

STUDY

Requested by the TRAN committee



Transport infrastructure in low-density and depopulating areas



Transport and Tourism



RESEARCH FOR TRAN COMMITTEE

Transport infrastructure in low- density and depopulating areas

Abstract

This study investigates the key challenges and trends concerning the provision of transport policies and infrastructure in low-density and depopulating areas. It also provides a comprehensive assessment of relevant transport policies and projects implemented in these areas. Finally, it provides policymakers with an array of policy recommendations aimed at overcoming the identified challenges and gaps.

This document was requested by the European Parliament's Committee on Transport and Tourism.

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EXECUTIVE SUMMARY

Key Findings

- Existing classification and definitions found in EU Legislation and Guidelines cannot fully capture the features of low-density and depopulating areas, which are defined by demographic, geographic and socio-economic factors.
- Given the interplay among the different features which characterise the low-density and depopulating regions, a multi-dimensional assessment should be considered. However, local uniqueness should prevail over the aim to group similar regions into pre-defined classifications.
- Regional and Cohesion Policies comprise the bulk of EU support to transport policies and projects in low-density and depopulating areas, especially those projects funded by the European Regional Development Fund (ERDF).
- With the exception of some references and exemptions granted to sparsely populated areas and outermost regions, EU Regional Policy does not have a specific strategic approach to low-density and depopulating areas.
- The level of economic development appears to be more important than demographic and geographical considerations when it comes to the definition of objectives and the selection of projects. While the relevant legislative framework defines regions according to their economic trends, demographic and geographical considerations appear to have limited importance.
- Road infrastructure receives the highest share of EU funding – both in terms of total and average budget. In the framework of Cohesion and Regional Policy, traditional modes of transport still have a significant weight in EU policies in low density and depopulating regions.
- Effective and equitable policies to overcome the challenges faced by these areas require an overall acknowledgement of the unique features of low-density and depopulating areas. In order to assess their specific needs, policymakers should focus on designing tailored strategies within the existing EU transport policy framework.

The provision of transport in low-density and depopulating areas is an important challenge for European and national policymakers. While economic logic implies that transport projects and policies should be focused on connecting the most advanced and inhabited areas, low-density and depopulating regions are at risk of being overlooked. Policymakers may find it challenging to reconcile equity and efficiency considerations when deciding on what transport projects to carry out or to support via EU funds.

Defining low-density and depopulating regions and assessing their features

Low density and depopulating areas display unique demographic and geographical features, and their uniqueness clashes with the need to provide reliable and comprehensive classifications. EU legislation and guidelines have helped define specific territories which are affected by demographic or geographical features. The concept of low-density and sparsely populated areas is outlined in the TFEU (Art.174). Several studies shed light on the notion of rural and remote areas. Finally, Cohesion

Policies Regulations and Guidelines provide definitions for geographical features such as islands, mountains, border areas, and outermost regions.

However, low-density and depopulating areas are characterised by several interconnected factors, and the interplay of these factors is not adequately captured by the existing definitions. Indeed, regions belonging to the same group may display significant differences in terms of demography, socio-economic context and transport needs. Strict classifications may fail to capture the uniqueness of many low-density and depopulating regions.

Given this diversity, it appears that the current definition may need to be expanded by combining demographic, geographical and socio-economic considerations. Yet, some are sceptical about an EU-wide definition of low-density and depopulating areas. Local uniqueness should prevail over the desire to group similar regions into predefined groups.

Providing transport infrastructures in low-density and depopulating areas: recent trends and challenges

Transport in low-density and depopulating regions faces issues resulting from the low and dispersed nature of the population, which makes providing conventional public transport challenging. Difficulties also relate to the distances from the centres of economic activity, which increases costs. This challenge is exacerbated by increasing car use, which is leading to a decline in public transport use. Ageing societies and population movements from rural to urban areas make providing public transport services even more complex.

Similar challenges have been identified in the context of rural and mountainous regions. On the one hand, peripheral and remote areas face increasing travel and transport costs resulting from their location and distance from population centres. On the other hand, the absence of 'agglomerative advantages'¹ means that such areas are unable to benefit from economies of scale, unlike the more populated areas.

Many regions that lag economically behind are rural and on the periphery of their respective Member State and of the EU. In addition, many of these regions are not on a direct path between major urban centres and the main markets. As a result, they suffer from the increased travelling distances that are needed, but also from a generally lower level of overall investment and skills, which limits their ability to innovate and grow.

Overview of the policies and strategies to provide transport in low-density and depopulating areas

Although no specific EU strategy for the provision of transport in low-density and depopulating areas has been drawn up, these types of region are mentioned in wider EU strategies. The European Commission's framework for the development of transport policy in the EU over the past decade was set out in the 2011 White Paper. The document makes few references to the needs of 'low-density or depopulating' regions, although the policies contained within the White Paper would have some impact on these regions. TEN-T Guidelines (2013), however, underline that one of the 'general priorities' is to ensure "enhanced accessibility and connectivity for all regions" the guidelines explicitly mention islands, sparsely populated, remote and outermost regions (Article 10).

Regional and Cohesion Policy are the focus of most EU support for transport policies and projects in low-density and depopulating areas, especially through the European Regional Development Fund

¹ Economies of agglomeration or agglomeration effects are cost savings arising from urban agglomeration, a major topic of urban economics. One aspect of agglomeration is that firms are often located near to each other. This concept relates to the idea of economies of scale and network effects.

(ERDF). However, except for some references and exemptions granted to sparsely populated areas and outermost regions, EU Regional Policy does not have a specific approach to low-density and sparsely populated areas. In fact, EU Regional Policy is defined at the NUTS2 level and specific local features may be overlooked in the wider regional context.

The level of economic development appears to be more important for the definition of objectives and the selection of projects than demographic and geographical considerations. Road infrastructure receives the highest share of EU funding – both in terms of total and average budget. In the framework of Cohesion and Regional Policy, traditional transport modes remain the focus of EU policies in low-density and depopulating regions.

Combining equity and efficiency in the delivery of transport policies and infrastructure in low-density and depopulating has been shown to be challenging. Indeed, the number of users remains a pivotal variable in the appraisal of projects, which clearly disadvantage these regions.

Policy recommendations

Considering the key findings of the study, several policy recommendations addressed to both EU and national policymakers are identified:

- Ensure that local needs are better addressed through Cohesion Policy and other EU funds through the design of specific applications of EU policy to low-density and depopulating areas. Two immediate actions can be taken: 1) to clearly mention specific needs and features of low density and depopulating areas in the Connecting Europe Facilities (CEF); and 2) to make the most of the proposed Digital Europe Programme's reference to smart rural areas.
- Prioritise the revitalisation of existing transport infrastructure and the provision of links to the TEN-T in order to close the gap between low-density and depopulating areas and other regions. This should be done through substantial improvement of local infrastructure and by focusing on local needs rather than favouring tourism and long-distance travel.
- Consider a NUTS 3 (sub-regional administrative units, such as provinces or departments) approach to designing transport policies for low-density and depopulating areas, thus ensuring policymaking is more relevant for their specific needs. An alternative approach would be to better exploit the opportunities of Interreg Programmes, which often directly cover low-density and depopulating regions.
- Allow the use of ERDF funding to cover operational costs due to specific demographic and geographical issues in order to partly offset transport inequalities. This would allow EU funds to finance extraordinary maintenance rather than focusing on flagship investments which are often more expensive and less effective.
- Introduce "equity" as a horizontal principle in transport policies, leading policymakers and evaluators to expand the criteria for project appraisal which are too focused on efficiency and disregard distributional effects.

1. INTRODUCTION

Objectives of the study

The aim of the study is to provide a **comprehensive overview of transport infrastructure in depopulating and low-density areas** in order to support the work of the European Parliament's Committee on Transport and Tourism and its Members.

In particular, it intends to **support policy decision-making** on transport policies and projects by showing how efficiency and equity considerations can be balanced. The study analysed **how improving transport infrastructure** can positively impact on economic and social conditions in the areas under examination.

In this context, the study comprises:

- A **summary of the current policy debate** at the EU and Member States level on transport in sparsely populated and low-density areas;
- A **classification of sparsely populated and low-density areas** including their characteristics to facilitate the understanding of the main needs of these areas regarding transport, with a particular focus on rural areas, islands, remote, peripheral and mountainous regions;
- A detailed overview on how **EU funding supports transport projects** in sparsely populated and low-density areas, including funding criteria and approach;
- An assessment of whether EU institutions and Member States are **conciliating efficiency and equity considerations**, with a special attention to the effects in the tourism sector produced by transport shortage in all the mentioned areas;
- An overview of **societal and technological trends and future challenges and opportunities** in the area of transport;
- A **reflection on the current EU strategy and national legislations** on this topic, and an assessment of whether EU action is advisable and if a change in direction is needed, considering also the context of the Green Deal;
- A set of **conclusions and recommendations for EU policymakers**, tailored for Members of the European Parliament, on what could be done, especially at EU level.

To achieve these objectives the study has been structured as follow:

- Chapter 2 presents the existing definitions and classifications concerning low-density and depopulating areas highlighting their geographical and demographical features. It also analyses the main challenges faced by these areas.
- Chapter 3 aims to provide a multidimensional assessment of low-density and depopulating areas by including socio-economic and transport features. By doing so, it is possible to highlight common trends and challenges as well as identify the inherent differences between these types of regions.
- Chapter 4 provides an overview of the strategic EU policy framework for transport, followed by a review of the transport issues faced by low-density and depopulating areas. The chapter concludes with a review of the literature on the solutions that might be put in place to improve transport infrastructure in low-density and depopulating areas.

- Chapter 5 contains an overview of the current EU and national policies dealing with depopulating and low-density areas and focusing on transport. The analysis pays special attention to equity and efficiency considerations in such policies and their funding.
- Chapter 6 summarises the key findings from the four cases studies on low-density and depopulating areas. Despite their uniqueness, low-density and depopulating areas share common trends and challenges as far as transport provision is concerned.
- Chapter 7 provides a set of policy recommendations developed on the basis of the evidence collected throughout the study. The ultimate aim of the recommendations is to support policymakers in the provision of transport policies for low-density and depopulating areas.

Scope of the study

The geographic scope of the study extends to all EU Member States, with a key focus on depopulating and low-density areas, including rural areas, islands, remote, peripheral and mountainous regions. Special attention is paid to the main societal groups affected by transport shortage in all abovementioned areas. In fact, the quality of services and well-being of these areas depend also on the condition of transport infrastructures.

2. LOW-DENSITY AND DEPOPULATING AREAS

Key Findings

- In the EU policy debate, sparsity is understood in terms of population density. However, academic research shows that the problem of sparsely populated areas is more than just a problem of low population density.
- Remoteness is what characterises low-density areas which are likely to be faced with locational disadvantages, leading to low socio-economic development.
- The demography of remote and low-density areas is characterised by specific phenomena such as emigration, low-birth rates, and population ageing.
- Low-density areas are also likely to present specific geographical features (proximity to a border, presence of mountains, insularity, geographic remoteness) which may imply particular development challenges, also in terms of accessibility.

Introduction and caveats

As highlighted by the literature review, as well as by the stakeholders and experts consulted, low-density and depopulating areas do not display a common set of similar features. Whatever sample of cases is chosen, these will not be evenly representative of the vast diversity of socio-economic and geographic specificities that characterises these areas. This clarification, however, is not meant to minimise or devalue the relevance of the study findings; on the contrary, this constraint should be understood as inherent to the nature of the research scope.

Delineation of low-density and depopulating areas

In the EU context, an important reference to the debate over regions facing demographic challenges can be found in the Treaty on the Functioning of the European Union (TFEU). Article 174 of TFEU states that the least favoured regions requiring special attention are “rural areas, areas affected by industrial transition, and regions which suffer from severe and permanent natural or demographic handicaps, such as the northernmost regions with very low population density and island, cross-border and mountain regions”. The Article aligns with the general ambition of the EU and its Member States of “reducing disparities between the levels of development of the various regions and the backwardness of the least favoured regions”².

However, the issue of low-density and sparsely populated areas (or SPAs) was already introduced in the European debate on cohesion policy in 1995, as part of the Accession Treaties of Austria, Finland, Norway and Sweden to the EU³. Sparsely populated areas were then understood as “regions with extremely low population density” and were covered by a specific Objective of Regional Policy (Objective 6). More specifically, Objective 6 categorised extremely low-density regions as NUTS2⁴ regions “with a population density of eight persons per km² or less”⁴. Extensive parts of North Finland, North Sweden, Mid Sweden and East Finland (also labelled as Northern Sparsely Populated areas – NSPAs) were recognised as belonging to less prosperous areas of the European Union due

² European Union (2002). Treaty establishing the European Community (Nice consolidated version) - Part Three: Community policies - Title XVII: Economic and social cohesion – Article 158.

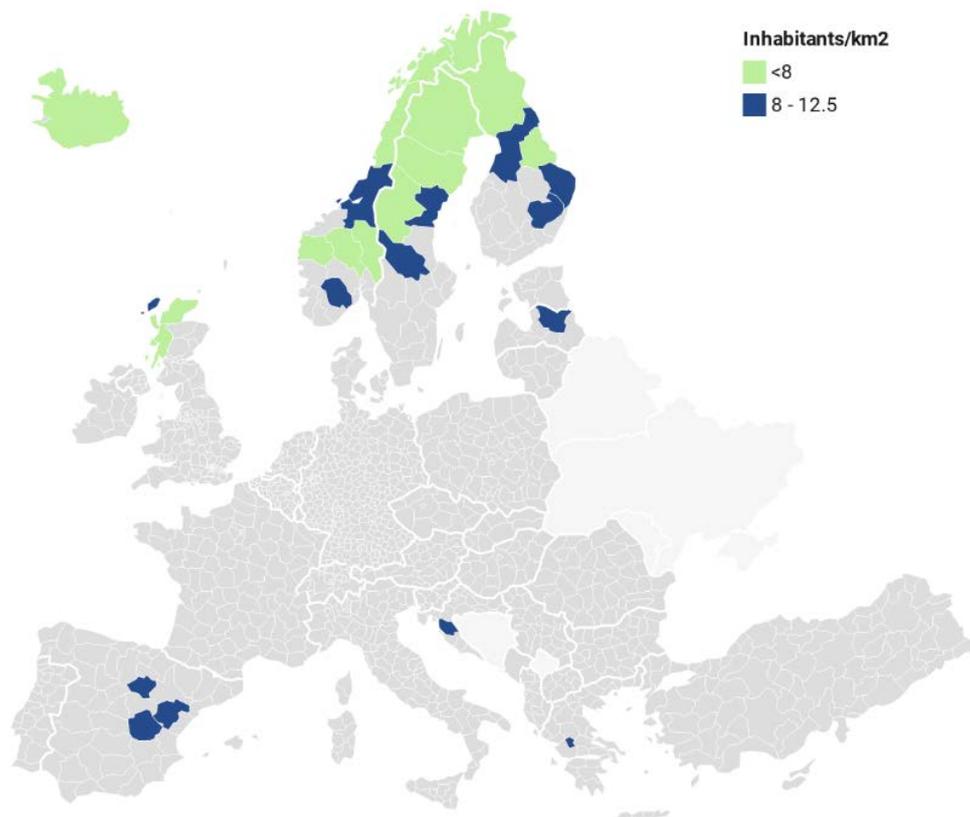
³ Available at: <https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:11994N/TXT:EN:HTML>

⁴ The Nomenclature of territorial units for statistics, abbreviated NUTS (from the French version *Nomenclature des Unités territoriales statistiques*) is a geographical nomenclature subdividing the economic territory of the European Union into regions at three different levels (NUTS 1, 2 and 3 respectively, moving from larger to smaller territorial units). Above NUTS 1, there is the 'national' level of the Member States. For more info visit the website: <https://ec.europa.eu/eurostat/web/nuts/background>

to the lack of a broad range of economic and social activities, as well as the lack of basic infrastructure.

The definition of extremely low-density regions formulated in the 1995 Accession Treaties was more recently complemented by the European Commission in the Guidelines on national and regional aid for 2007-2013 (2006/C 54/08)⁵. According to Article 30(b), low-population density regions are not only “such areas made up essentially of NUTS2 geographic regions with a population density of less than eight inhabitants per km²”, but also “NUTS3 geographic regions with a population density of less than 12.5 inhabitants per km²”. This categorisation helped the European Commission to establish an objective, fair, and transparent method to identify regions eligible for state aid.

Figure 1: Low-population density regions in Europe by NUTS3 (2018)



Source: Eurostat

Generally, sparsity is understood in the EU in terms of population density. Academic research, however, has argued that the case of sparsely populated areas is more complex than just a problem of low population density. Sparsity characterises regions where low-population densities, as well as dispersed settlement patterns, create specific challenges for economic activities and public service provision. The issue is not only linked to average regional population density, but to the total number of persons located within commuting distance of a given point. Therefore, while population density allows for broad comparisons of settlement intensity across geographic areas, it does not say much about the possible problems and challenges it may cause or exacerbate.

For instance, according to scholars such as Gløersen et al. (2006)⁶, one of the main issues generated by and within sparsely populated regions is the impossibility to provide certain economic and social

⁵ Official Journal of the European Union. (2006). “Guidelines on National Regional Aid For 2007-2013”. Available at: <https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:C:2006:054:0013:0044:EN:PDF>

⁶ Gløersen E., et al. (2006). “Northern Peripheral, Sparsely Populated Regions in the European Union and in Norway”, NordRegio Report 02/2006. Available at: <https://archive.nordregio.se/en/Publications/Publications-2006/Northern-Peripheral-Sparsely-Populated-Regions-in-the-European-Union-and-in-Norway/>

services to the population. The authors argue that sparsely populated regions suffer from the disadvantage that their population (and therefore the demand for both public and private service) is often too small to allow for economies of scale and cost-effective provision. They suggest that there is a general lack of employers and jobseekers at local level to allow the labour market to function effectively.

Broadly speaking, sparsely populated areas entail challenges linked to their economic development and connected to the lack of certain types of locational advantages: labour market pooling, access to a wider range of local suppliers, knowledge spill overs, and limited possibilities for commuting, among others. High transportation costs are identified as an inner socio-economic characteristic of sparsely populated areas, based on the assumption that “transactions and cooperation may be less costly in proximity due to the fact that trust is more easily developed between geographically proximate agents”⁷. High transportation costs – particularly severe in regions with specific geographical features such as mountains and islands – have in turn negative effects on individuals’, who are already confronted with long commuting times to access a basic range of goods and services.

More recently, incorporating this notion of locational disadvantages faced by sparsely populated areas, a study by the European Commission (2018) on broadband coverage in Europe⁸ found that low-density areas have also historically witnessed less technological investments. For instance, broadband coverage levels in rural regions remain notably lower than total national coverage, with fixed broadband networks accounting for 87.4% of rural EU households compared to 96.7% of total households. Investments of this kind in such areas are hard for operators to justify. As a result of the low population density, investments can be viewed as economically less profitable.

As a result of the increasing policy attention given to locational disadvantages faced by regions with specific territorial features, the European Observation Network for Territorial Development and Cohesion (ESPON) programme, funded a research project in 2012 titled ‘European Perspective on Specific Types of Territories’⁹. The project focused on the opportunities and challenges faced by regions with territorial specificities. Among those regions¹⁰, the category of “sparsely populated areas” was built on three main characteristics: 1) the low population density (as defined above in the European Commission Guidelines), 2) the isolation from urban centres and main transport networks, and 3) the low socio-economic development dynamics.

The concept of “isolation from urban centres” was also analysed in an article by Dijkstra and Poelman (2008)¹¹, where the authors provide a description of the characteristics of remote rural region. The regional typology discussed by the authors – extremely relevant in this context – combines two dimensions: a categorisation based on local population density and the presence of main cities; and a categorisation based on the remoteness of regions, compared to city centres. For the former, NUTS3 regions were categorised as urban, intermediate, or rural, according to their population density. For the latter, NUTS3 regions were labelled as remote or close to a city depending on the distribution of the regional population in relation to the selected city. Regions were labelled remote if at least half of its population lives at more than 45 minutes by road from any city of at least 50,000 inhabitants.

⁷ Dubois A., Roto J. (2012), “Making the best of Europe’s Sparsely Populated Areas – On making geographic specificity a driver for territorial development in Europe”. NordRegio Working Paper 15/2012.

Available at: <http://norden.diva-portal.org/smash/get/diva2:700300/FULLTEXT01.pdf>

⁸ Available at: <https://ec.europa.eu/digital-single-market/en/news/study-broadband-coverage-europe-2018#:~:text=Key%20findings,to%2083.1%25%20of%20EU%20households>.

⁹ ESPON (2012). “GEOSPECS – European Perspective on Specific Types of Territories”. Available at: www.espon.eu/sites/default/files/attachments/GEOSPECS_Final_Report_v8_revised_version.pdf

¹⁰ As well as sparsely populated regions, the study analysed the following territories: border regions, mountain regions, islands, coastal zones and outermost regions.

¹¹ Dijkstra L., Poelman H. (2008). “Remote rural regions: How proximity to a city influences the performance of rural regions”. Regional Focus 01/2008, European Commission DG Regio. Available at: https://ec.europa.eu/regional_policy/sources/docgener/focus/2008_01_rural.pdf

According to the authors, remote regions far from an urban centre are faced with a different set of problems than rural regions close to a city. This is clear from the lower levels of productivity and GDP per head, and the declining population of remote rural regions. Therefore, the typology proposes five classes of NUTS3 regions: 1) urban regions; 2) intermediate regions close to a city; 3) intermediate, remote regions; 4) rural regions close to a city; and 5) rural, remote regions. The regional typology by Dijkstra and Poelman is more deeply analysed in section 2.4.

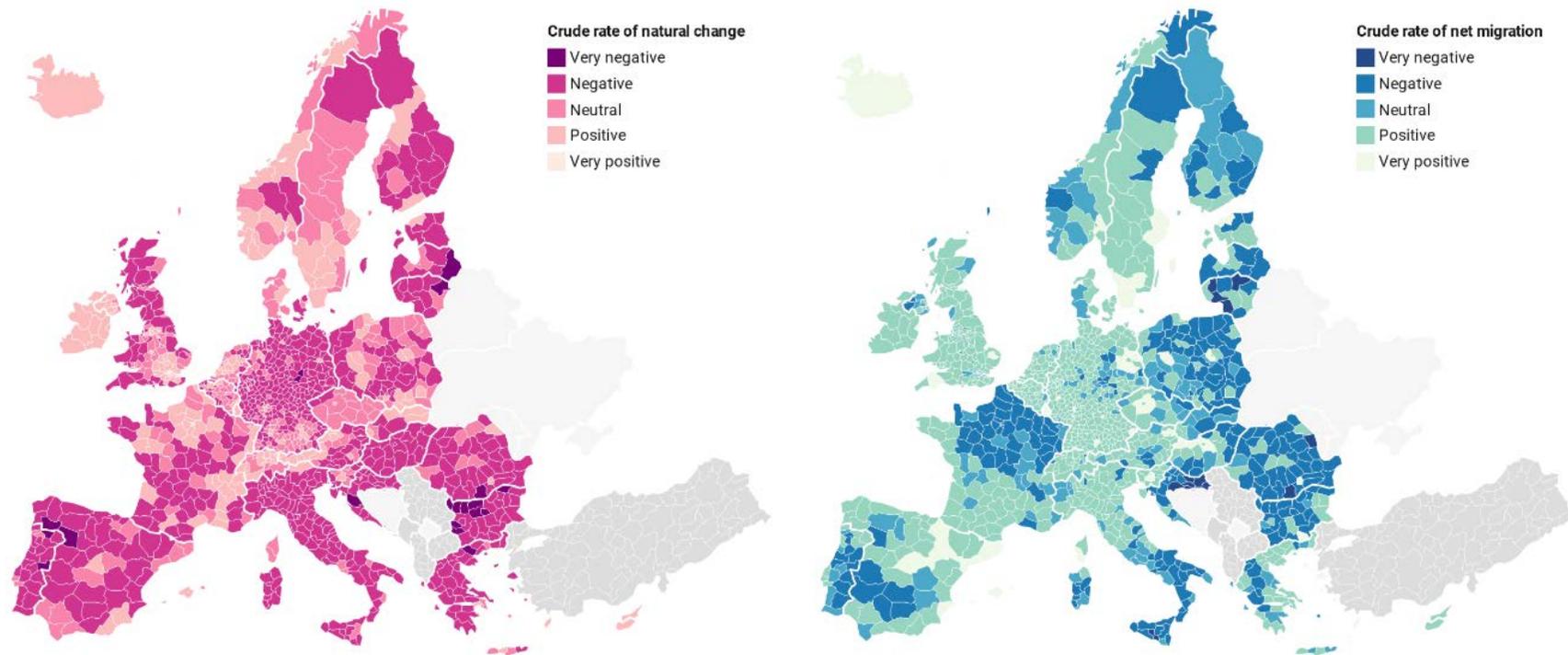
2.1.1. Demography of low-density and depopulating areas

According to the Centre for Studies on Depopulation and Development of Rural Areas (CEDDAR), depopulation is “a demographic and territorial phenomenon consisting of a decrease in number of inhabitants in a territory relative to a previous period”¹². The fall in absolute terms of the number of inhabitants can result from a negative natural growth (when deaths exceed births) and/or from negative net migration (emigration exceeds immigration).

Figure 2 shows the NUTS3 regions in Europe that are the most affected by negative natural growth and negative net migration.

¹² Pinilla V., Saez L. A. (2017) “Rural Depopulation in Spain: Genesis of a Problem and Innovative Policies”. Centre for Studies on Depopulation and Development of Rural Areas (CEDDAR). Available at: http://sspa-network.eu/wp-content/uploads/Informe-CEDDAR-def-1_EN-GB-1.pdf

Figure 2: Crude rate of natural change by NUTS3 regions in 2018 (left), and crude rate of net migration by NUTS3 regions in 2018 (right)¹³



Source: Eurostat

¹³ Crude rate of natural change: Very negative = <-10; Negative = >-10, <-1; Neutral = >-1, <1; Positive = >1, <10; Very positive = >10. Crude rate of net migration: Very negative = <-10; Negative = >-10, <-1; Neutral = >-1, <1; Positive = >1, <10; Very positive = >10.

The remoteness of a specific region, as well as the lack of connection to the surrounding territories, plays a significant role in fostering population decline.

Along with the disadvantages mentioned in the previous sub-chapter, which may imply significant development challenges, sparsely populated areas are therefore more sensitive than others to demographic phenomena such as **emigration** and **low birth rates**¹⁴. Negative rates of population change can in turn worsen the already precarious economic conditions under which services are provided in remote areas.

The issue of **emigration** from less developed areas reveals some significant contrasts between urban and rural areas in Europe (European Parliament study, 2019)¹⁵. Whereas considerable population growth has been recorded especially in metropolitan cities (and dynamic urban agglomerates in general), other territories are suffering from a loss of population (typically remote and sparsely populated areas).

The growing significance of rural-urban migratory flows has been analysed by different scholars. Sánchez-Moral et al. (2018)¹⁶ and González-Leonardo and López-Gay (2019)¹⁷, frame the phenomenon of depopulation within the general trend of “polarisation of cities”, induced by globalisation. In fact, according to the authors, depopulation is no longer a phenomenon exclusive to rural areas, but it has now expanded to small and medium-sized towns, and cities in outflow regions. Globalisation, in turn, increases the polarisation of cities, as economic activities of high added value concentrate in global cities thus marginalising smaller urban areas.

Box 1: Economic activities in regions facing demographic decline

Whereas economic and employment growth have become progressively **tertiarised**, favouring larger urban centres, low-density areas seem then to display a common employment structure skewed towards the **primary sector** (e.g. agriculture, fishery, forestry). This is partly underlined by a NordRegio Working Paper (2012) which refers to sparsely populated areas as consisting of “patchworks of local specialisation”. The paper, however, highlights that some low-density areas also have a significant amount of employment in **tourism and accommodation**. This reflects the fact that local economies often are built around activities that deal with landscapes, and the natural and historical heritage. From a demographic point of view, the development of tourism-related activities is attached to the attractiveness of a specific region. This in turn is likely to have a positive impact on population change, as tourism-related business may attract manpower from other regions, especially for seasonal jobs.

Source: ESPON (2017)¹⁸; Dubois, A., Roto, J. (2012)¹⁹

In addition to the decreasing number of inhabitants, **population ageing** – resulting from the emigration of young generations, increasing life expectancy, and falling birth rates – poses additional challenges to these areas. Most importantly, a lower and older population lacks human

¹⁴ Demographic trends are the sum of two main components: net natural population change (the difference between the number of births and deaths) and net migration change (the difference between the immigrants and the emigrants).

¹⁵ Vasileios M. (2019). “Demographic trends in EU regions”. European Parliament Think Tank. Available at: <https://ec.europa.eu/futurium/en/system/files/ged/eprs-briefing-633160-demographic-trends-eu-regions-final.pdf>

¹⁶ Sanchez-Moral S., et al. (2018). “Interregional mobility of talent in Spain: The role of job opportunities and qualities of places during the recent economic crisis”. Available at: https://journals.sagepub.com/doi/full/10.1177/0308518X18761151?casa_token=TvMRVSxD2tIAAAA%3AJMvBx4bc3srkkDvzbkZJn%20tZnKFAftt5u6T9IltYWSrncUuGRKaB1LA2Oa5BLAwL34RwF8Pp8Us

¹⁷ González Leonardo M., et al. (2019). “Brain drain and the Second Wave of Depopulation”, Centre d’Estudis Demogràfics, Perspectives Demogràfiques, 16/2019. Available at:

¹⁸ ESPON (2017). Shrinking rural regions in Europe. Policy Brief. Available at: www.espon.eu/sites/default/files/attachments/ESPON%20Policy%20Brief%20on%20Shrinking%20Rural%20Regions.pdf

¹⁹ Available at: <http://norden.diva-portal.org/smash/get/diva2:700300/FULLTEXT01.pdf>

capital for regional labour markets. In the current context of progress toward a knowledge-based economy, the lack of human capital reduces the possibilities for the development of rural areas²⁰, which in turn become even more marginalised²¹.

In conclusion, certain regions experiencing depopulation can witness what a study by the European Parliament (2019)²² defined a “**vicious circle of decline**”. In fact, migratory movements towards more favourable economic environments further diminish the socio-economic dynamism of rural and remote areas²³.

Geographical specificities with possible negative impacts on demographic trends

With the adoption of the Green Paper on Territorial Cohesion in 2008²⁴, the European Commission emphasised the importance of recognising European geographic specificities in order to turn them into strengths. To launch a debate, the Green Paper presented a series of themes that were considered relevant for feeding and structuring reflection on Territorial Cohesion. These ranged from concentration of activities and connecting distant territories to co-operation and territories with specific geographical features. In particular, the Green Paper considers “regions with very low population density and islands, cross-border and mountainous regions”.

In addition to sparsely populated areas –discussed in the previous sub-chapters – the paper distinguishes four types of specific regions, with easily identifiable geographical features, which may imply particular development challenges, notably regarding demographic and migratory changes, accessibility, or regional integration. The four types of regions are the following:

- Border regions
- Mountainous regions
- Island regions
- Outermost regions

The following paragraphs will provide a definition of each of the abovementioned types of regions, as well as a description of their unique socio-economic characteristics.

a. Border regions

Border regions are defined by Eurostat²⁵ as NUTS3 regions with part of their territory demarcated by an international border, or those regions where more than half of the population lives within 25 km of such a border. As the severity of border effects is likely to diminish as a function of the distance from a border, the Eurostat definition of border regions is complemented by those regions which, although not sharing an international border, are located within 25 km of a border. Internal border regions (those that share a border with another EU Member State), are the most important category in terms of population (with 150 million people, they account for 30% of the EU’s population)²⁶.

²⁰ Development in terms of “innovation processes”, which are, on the other side, concentrating in urban areas.

²¹ Li Y., et al. (2019). “Why some rural areas decline while some others not: an overview of rural evolution in the world”. Available at: <https://www.sciencedirect.com/science/article/abs/pii/S074301671830929X?via%3Dihub>

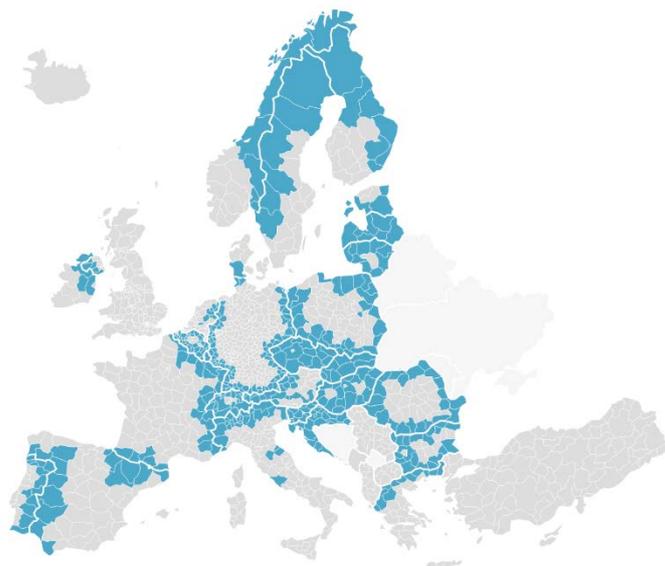
²² Vasileios M. (2019). “Demographic trends in EU regions”. European Parliament Think Tank. Available at: <https://ec.europa.eu/futurium/en/system/files/ged/eprs-briefing-633160-demographic-trends-eu-regions-final.pdf>

²³ It must be highlighted that the European Parliament study does not refer to all non-urban regions as witnessing population decline. In fact, the study – in line with what claimed by Dijkstra and Poelman (2008) – specifies that “rural areas that are close to dynamic urban centres as well as areas that are within commuting distance of such centres or enjoy good transport connections with them, can experience a positive population development”.

²⁴ European Commission (2008). “Green Paper on Territorial Cohesion Turning territorial diversity into strength”. Available at: https://ec.europa.eu/regional_policy/en/information/publications/communications/2008/green-paper-on-territorial-cohesion-turning-territorial-diversity-into-strength

²⁵ Available at: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Territorial_typologies_manual_-_border_regions

²⁶ European Commission (2017). “Boosting growth and cohesion in EU border regions”. Available at: https://ec.europa.eu/regional_policy/sources/docoffic/2014/boosting_growth/com_boosting_borders.pdf

Figure 3: Border regions in EU28 and EFTA by NUTS3

Source: Eurostat

According to a DG Regio Working Paper (2009)²⁷, in general border regions have **less access to basic services**. This is particularly the case for external border regions, where proximity to a hospital or a university is much lower than in the rest of Europe. It is however important to underline that sharing a border with another country does not imply per se a greater difficulty in accessing services. Border regions sometimes lay (totally or partially) upon e.g. a mountain range or along rivers and it thus becomes complicated to disentangle which factor causes the poor connectivity.

The major characteristic of border regions is that the level of development between neighbouring regions located on different sides of the border can vary substantially²⁷. For instance, the level of GDP per head is up to more than three times higher in the border regions of Lithuania than in the neighbouring regions of Belarus. Development gaps are particularly important for regions on the eastern external border of the EU, but in some cases significant gaps are also observed between internal border regions.

In terms of demography, different studies, such as the one carried out by Sohn and Stambolic (2015)²⁸, have highlighted that border regions, overall, do not show any clear positive or negative demographic trend. Border regions, in fact, are characterised by different degrees of urbanisation. Border regions with a metropolitan profile have witnessed an increase of their population, whereas rural border regions tend to experience demographic decline. Remoteness, in the sense of isolation from urban centres, is therefore a key concept to consider when analysing population change in border regions.

For what concerns transport, inhabitants of border regions are inevitably confronted with the presence of boundaries delimiting the sovereignty between different nations and introducing different kinds of barriers to cross-border flows. This is particularly true for those individuals who – for work-related, leisure or family reasons – must commute daily to a neighbouring region within a different country. The online public consultation on border obstacles (DG Regio, 2016)²⁹, revealed

²⁷ Monfort P. (2009). "Territories with specific geographical features". Working Paper 02/2009, European Commission DG Regio. Available at: https://ec.europa.eu/regional_policy/sources/docgener/work/2009_02_geographical.pdf

²⁸ Sohn C., Stambolic N. (2015). "The urban development of European border regions: a spatial typology". Available at: www.ssoar.info/ssoar/handle/document/45745

²⁹ European Commission (2016). "Overcoming Obstacles in Border regions, summary report on the online public consultation on border obstacles". Available at: https://ec.europa.eu/regional_policy/en/information/publications/reports/2016/overcoming-obstacles-in-border-regions-summary-report-on-the-online-public-consultation

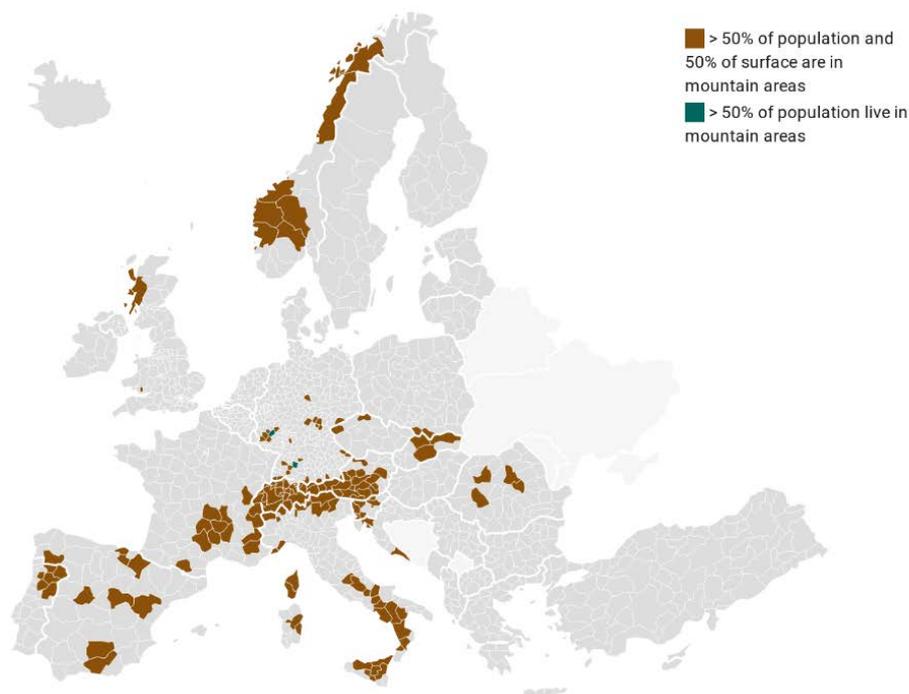
that EU citizens consider “legal and administrative” types of barriers as the main obstacles to their daily life when crossing the border. These barriers are followed by language, and those related to physical access, including transport. Regarding the latter, the same survey highlighted several concerns associated with the difficulty of accessibility: the lack of infrastructures; the lack of quality/safety of infrastructures; the lack of integrated public transport systems at the border; the lack of connections (in particular rail), and the low frequency of connections; different rules and standards in connection to transport; congestion and long commuting time; and the cost of crossing the border.

With regards to rail transport, Poelman and Ackermans (2017)³⁰ argue that border areas are not a homogeneous group when considering passenger services. Indeed, whereas some of the more densely populated border regions have efficient cross-border rail services, on average 28% of those living in border regions do not have access to adequate cross-border rail links. Furthermore, in 29% of all European border areas, the frequency of journeys to stations across the border is substantially lower: the average interval between two cross-border trains is at least 25% longer than between two domestic trains. In addition to that, the average speed of trips – given a fixed distance – is slower for those trains having to cross a border. More specifically, in 44% of border areas, the average speed of cross-border trips is less than three-quarters the speed of domestic services.

b. Mountain regions

Mountain regions are defined by Eurostat³¹ as NUTS3 regions where more than 50% of the surface is covered by topographic mountain areas or where more than 50% of the population lives in mountain areas.

Figure 4: Mountain regions in EU28 and EFTA by NUTS3



Source: Eurostat

³⁰ Poelman H., Ackermans L. (2017). “Passenger rail accessibility in Europe’s border areas”. Working Paper 11/2017, European Commission DG Regio.

Available at: https://ec.europa.eu/regional_policy/sources/docgener/work/201704_rail_passenger_accessibility.pdf

³¹ Eurostat. Territorial typologies manual - mountain regions.

Available at: https://ec.europa.eu/eurostat/statistics-explained/index.php/Territorial_typologies_manual_-_mountain_regions

Natural resources constitute a major asset for the economies of mountain regions. Therefore, the share of employment in the primary sector (especially in agriculture) remains quite high. At the same time, mountainous regions are more likely to be confronted with the **challenges posed by climate change, reliance on a limited number of activities** within each economic sector, **pressure linked to tourism** and **loss of biodiversity**. Mountainous regions are generally served by good transport links³², which is crucial for exploiting their potential as popular tourist destinations. However, the **nature of the terrain**, as well as the **degree of urbanisation** of mountainous areas, negatively affects the amount of transport infrastructure available and their maintenance costs.

It is important to note that **demographic trends in mountain regions are not uniform**. According to a study by the European Parliament REGI Committee³³, the only transnational massifs that saw significant demographic decline between 2001 and 2011 were the Carpathians, the Balkans/South East European Mountains, and the mountains of the British Isles. Populations are rising or stable in other European mountain areas, with populations in the Pyrenees and the Alps increasing rapidly. An important driver of population growth seems to be the overall **accessibility of the mountain areas**. According to the REGI Committee's study, western and central parts of Alps are growing due to their more accessible locations. This in turn is the result of the presence of more urban areas within that specific mountain massif, and the different level of economic and infrastructural development of those regions.

This overall positive trend was also one of the main findings of the last report on demographic changes in the Alps by the Alpine Convention³⁴. According to the authors, it is **not easy to highlight a single trend** regarding the Alpine population. For the decade 2001-2011, data show the highest population growth trends in the Austrian Bundesländer of Tyrol and Salzburg, in the French departments of Haute-Savoie, Savoie and Var, in the Swiss cantons of Valais, Ticino and in Central Switzerland (Nidwalden, Obwalden, Zug, Lucerne, Schwyz). In these prospering regions of the Alps, the higher degree of urbanisation of the valleys' towns, as well as the influence of the growing tourism sector are the main drivers of positive population change. Population gains, in turn, can also be noticed in the surrounding but less accessible municipalities.

On the other hand, population loss or stagnation can be observed in the Central-Eastern Austrian Alps (particularly in Eastern Styria, in the southern parts of Lower Austria and in the peripheral areas of Carinthia), in the Swiss Canton of Uri and in several areas of the Italian Alps (western side from Liguria to Val d'Ossola, inner Lombardy, provinces of Pordenone and Udine). All in all, agglomeration processes in the Alps can be detected in the proximity of urban areas and along the main transportation routes. The demographic development in the Alps, thus, mirrors the demographic trends that can be generally found in Europe³⁵.

The strongest population growth across mountain areas is observed in the Pyrenees, having experienced a population increase of about 15% between 2001 and 2011³⁶. Once again, the positive population developments were observed in areas relatively close to large urban centres, and especially in the regions of Catalonia (Spain), Navarra (Spain), and Aquitaine (France).

According to more recent and more granular data, the trend in the regions covered (or partially covered) by the Pyrenees Mountain range has not changed substantially. Overall, the NUTS3 regions within the Pyrenees area are increasing in population. This is, however, especially true for those

³² Monfort P. (2009). "Territories with specific geographical features". Working Paper 02/2009, European Commission DG Regio. Available at: https://ec.europa.eu/regional_policy/sources/docgener/work/2009_02_geographical.pdf

³³ European Parliament (2016), Research for REGI Committee. "Cohesion in mountainous regions of the EU". Available at: www.europarl.europa.eu/RegData/etudes/STUD/2016/573420/IPOL_STU%282016%29573420_EN.pdf

³⁴ Alpine Convention (2015). "Demographic changes in the Alps. Report on the state of the Alps". Available at: www.alpconv.org/fileadmin/user_upload/Publications/RSA/RSA5_EN.pdf

³⁵ ESPON (2019). The Alps 2050 Atlas. At: www.espon.eu/sites/default/files/attachments/ESPON_Alps_2050_FR_annex_ATLAS.pdf

³⁶ ESPON (2014). "Progress towards the Territorial Agenda of the European Union 2020". Territorial Monitoring Report 12/2014. Available at: www.espon.eu/sites/default/files/attachments/Territorial%20Monitoring%20Report.pdf

regions with a higher population density (thus more urbanised). Population decrease, instead, appears to be a strong characteristic of regions with a population density below 60 inhabitants/km² (except for Ariège in France). Therefore, the impact of population growth in non-densely inhabited regions within the Pyrenees seems to be limited.

Table 1: Population change in NUTS3 regions of Pyrenees area (2014-2019)

NUTS3 regions	Population density	Population change 2014-2019	
		Total	%
Barcelona (ES511)	718.7	129,588	2.4%
Gipuzkoa (ES212)	360.7	6,021	0.9%
Haute-Garonne (FRJ23)	218.5	70,779	5.4%
Girona (ES512)	127.8	14,373	1.9%
Pyrénées-Orientales (FRJ15)	116.7	11,195	2.4%
Pyrénées-Atlantiques (FRI15)	88.7	13,908	2.1%
Navarra (ES220)	62.5	13,496	2.1%
Zaragoza (ES243)	56.3	-504	-0.1%
Hautes-Pyrénées (FRJ26)	50.5	-1,533	-0.7%
Lleida (ES513)	35.5	-986	-0.2%
Ariège (FRJ21)	31.2	176	0.1%
Huesca (ES241)	14.1	-4,119	-1.8%

Source: Eurostat

Carpathians, on the other side, are confronted with more structural challenges, which include: the lack of social and technical infrastructure, remoteness and low population densities, unemployment, and migration³⁷. Due to a lower urbanisation of the area (when compared to the Alps), hence to less prosperous economic perspectives, over the last 20 years, population trends have generally been characterised by high rates of population loss (e.g. Romania), and slight decrease or stagnation (e.g. Hungary, Slovakia)³⁸.

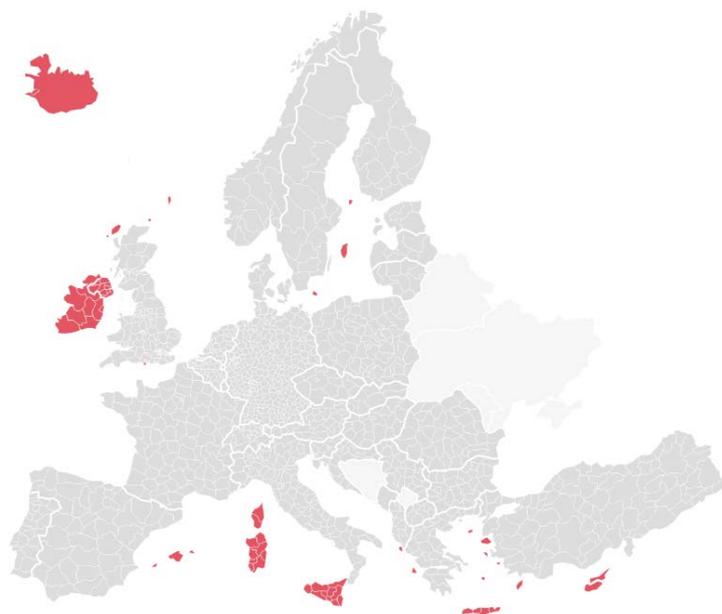
³⁷ Streifeneder T., et al. (2015). "Background analysis and documentation as basis for the development of the Carpathian Convention Sustainable Agriculture and Rural Development Protocol". European Academy Bolzano (EURAC Research), Institute. Available at: www.ra-un.org/uploads/4/7/5/4/47544571/12_unep_approaching_the_role_of_social_innovation_in_the_carpathian_region.pdf

³⁸ Pomazi I., Szabo E. (2010). "Main socio-economic and environmental trends in the Carpathian region". Available at: www.mtafi.hu/konyvtar/kiadv/HunGeoBull2010/HunGeoBull_2010_2_147-165.pdf

C. Island regions

Island regions are defined by Eurostat³⁹ as NUTS3 regions completely covered by islands. In this context, islands are territories having a minimum surface area of 1 km²; a minimum distance from the mainland of 1 km; a resident population of more than 50 inhabitants; and no fixed link (e.g. bridge) between the island and the mainland.

Figure 5: Island regions in EU28 by NUTS3



Source: Eurostat

Similar to mountain regions, islands are far from being a single homogenous category, having differing sizes, populations and levels of economic development. Nevertheless, several common issues affect most islands to a considerable degree.

According to a briefing from the European Parliament (2016)⁴⁰, the general **lack of connections** to and from other regions constitute a major problem for insular territories. More specifically, accessibility to most islands is problematic and can be characterised by infrequent (and often expensive) transport. Furthermore, the topography of islands can be a **unique natural feature**, serving as a positive factor for the development of tourism. However, due to these natural features, islands may have fragile ecosystems, being more vulnerable than other regions to drought, rising sea levels and land erosion.

Growth capacity in the island regions is usually limited due to the **small size of the local markets** and the problems of reaching other markets⁴¹. Indeed, smaller island regions have lower levels of economic activity than regions that are located within mainland Europe. Additionally, certain insular economies (often the smallest) focus on only a few sectors, such as tourism. Not being proximate to vibrant urban areas, smaller islands are not able to benefit from any kind of spill overs (knowledge, financial, etc.)⁴⁰.

Island regions are demographically diverse: some – especially the smaller and least developed ones – suffer from **population decline and ageing population**, as younger cohorts look for better job prospects inland or abroad. On the other hand, islands with a strong tourist economy, have managed to reverse this trend and to sustain a younger population⁴⁰.

³⁹ Eurostat. Glossary: Island region. Available at: https://ec.europa.eu/eurostat/statistics-explained/index.php/Glossary:Island_region

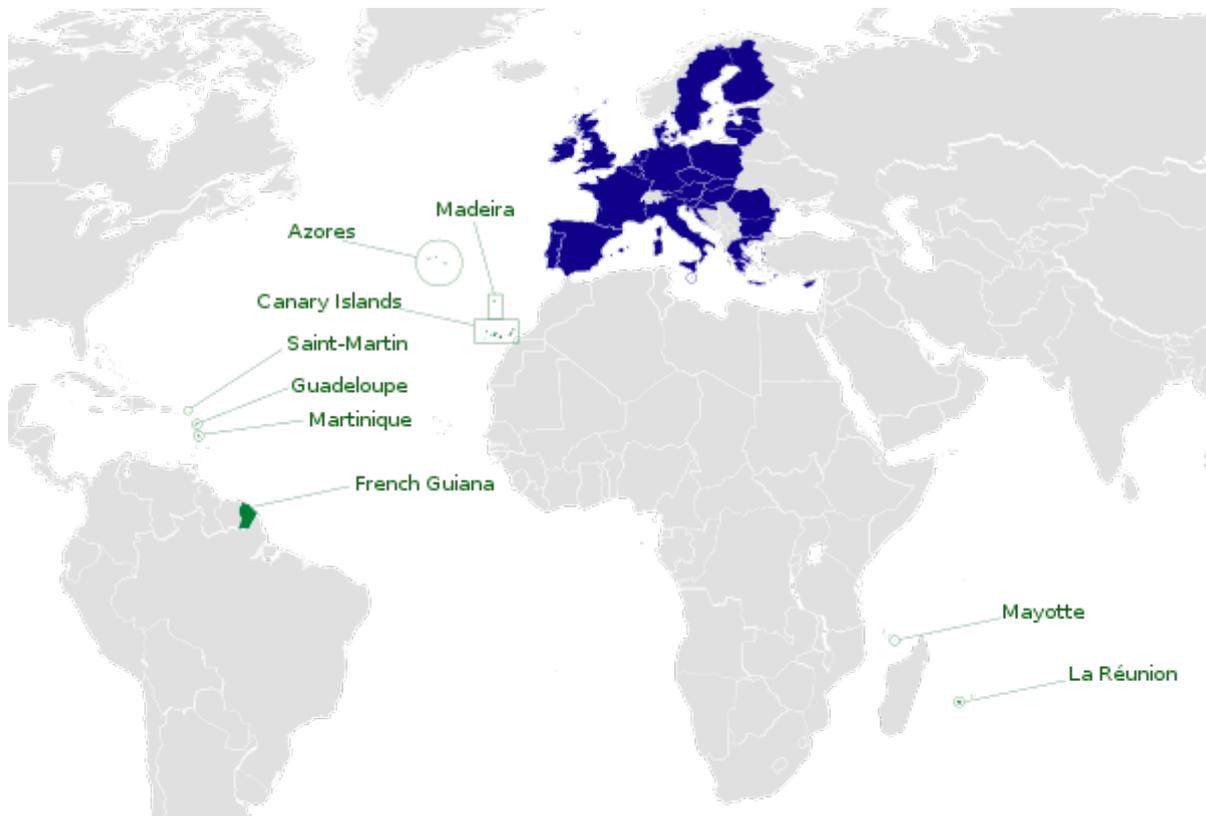
⁴⁰ Margaras V. (2016). "Islands of the EU: Taking account of their specific needs in EU policy". Briefing January 2016, European Parliament Think Tank. Available at: [www.europarl.europa.eu/thinktank/en/document.html?reference=EPRS_BRI\(2016\)573960](http://www.europarl.europa.eu/thinktank/en/document.html?reference=EPRS_BRI(2016)573960)

⁴¹ Monfort P. (2009). "Territories with specific geographical features". Working Paper 02/2009, European Commission DG Regio. Available at: https://ec.europa.eu/regional_policy/sources/docgener/work/2009_02_geographical.pdf

d. Outermost regions

Some EU Member States have part of their territory located in areas that are remote from Europe. These regions, known as outermost regions, are enlisted in Article 299(2) of the Treaty establishing the European Union.

Figure 6: European outermost regions



Source: European Commission

Currently, the following regions (both NUTS2 and NUTS3) belong to the outermost parts of Europe:

- Five French overseas departments – Martinique, Mayotte, Guadeloupe, French Guiana and La Réunion;
- One French overseas community – Saint-Martin;
- Two Portuguese autonomous regions – Madeira and the Azores;
- One Spanish autonomous community – the Canary Islands.

The European Commission's 2019 Regional Competitiveness Index,⁴² which ranks EU regions on the basis of 50 indicators in such areas as infrastructure, health and innovation, shows that the outermost regions score significantly lower than the other NUTS2 regions within their respective countries, with **particularly low scores in areas such as labour market efficiency and infrastructure**. These results suggest serious structural problems. Similarly, the 2019 European regional Social Progress Index⁴³ shows that the outermost regions score substantially **below EU average in terms of opportunities** available to their inhabitants⁴⁴.

⁴² European Commission (2019). The Regional European Competitiveness Index. Available at: https://ec.europa.eu/regional_policy/en/information/publications/working-papers/2019/the-european-regional-competitiveness-index-2019

⁴³ European Social Progress Index (2016). Available at: https://ec.europa.eu/regional_policy/en/information/maps/social_progress

⁴⁴ "Opportunity" is a macro-indicator whose sub-indicators are personal rights, personal freedom and choice, tolerance and inclusion, and access to advanced education.

However, the most significant factor characterising outermost regions is their **remoteness** to the main economic and administrative centres in Europe. The table below shows the distance from each region to the national capital.

Table 2: Distance of outermost regions from national capital

Outermost region	Distance (km)
Azores	1548
Canaries	1850 (average for all the islands)
Guadeloupe	7578
French Guiana	7841
Madeira	1041
Martinique	7641
La Réunion	9921
Saint-Martyn	6700
Mayotte	8444

Source: European Parliament, Fact Sheets on the European Union

Remoteness and isolation have surely an impact in many aspects of life in Europe's outermost regions. An opinion of the Committee of Regions from 2008⁴⁵ noted that these two factors create a **barrier to their growth and economic sustainability**, limiting opportunities for their residents and reducing the competitiveness of their industries. The constraints faced by outermost regions – due to their geographic position – have also been more recently underlined by a European Commission's Communication (COM/2017/0623) on "A stronger and renewed strategic partnership with the EU's outermost regions"⁴⁶.

In view of their remote location, outermost regions are **highly dependent on transport links**. As again noted by the Committee of Regions in 2014⁴⁷, airports can be vital to the survival of the outermost regions and for allowing them to connect, both with their respective countries and with the rest of the EU. However, problems such as increased costs and funding need (to ensure service provision), and fluctuating consumer demand for public transport services, can have a negative impact on public transport in the outermost regions⁴⁸.

The overall socio-economic outlook of outermost regions is complicated by their **difficult topography** (most of the outermost regions are mountainous areas or archipelagos of volcanic origin) and climate⁴⁹. The climate of these regions varies from maritime (e.g. the Azores) to tropical (e.g. Guadeloupe, Martinique and La Réunion), to equatorial (Guiana). As most of the economic activities are concentrated in the coastal areas, they are particularly exposed to extreme climate events. Remoteness, however, does not affect tourism, a sector for which the outermost regions' environmental and cultural diversity can be a competitive advantage⁴⁹.

⁴⁵ Available at: <https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:C:2008:172:0007:0011:EN:PDF>

⁴⁶ European Commission (2017). "Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee, the Committee of the Regions and the European Investment Bank – A stronger and renewed strategic partnership with the EU's outermost regions" (COM/2017/0623). Available at: <https://eur-lex.europa.eu/legal-content/en/TXT/?uri=CELEX%3A52017DC0623>

⁴⁷ Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52014R1691>

⁴⁸ Nonetheless, according to Regulation (EC) 1008/2008, In order to maintain appropriate scheduled air services on routes which are vital for the economic development of the region they serve, Member States may impose public service obligations on these routes. Regulation available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32008R1008>

⁴⁹ European Commission (2011). "Growth factors in the outermost regions". Available at: https://ec.europa.eu/regional_policy/en/information/publications/studies/2011/growth-factors-in-the-outermost-regions

Contrarily to border, mountain and island regions, outermost region's close proximity to less prosperous third countries means that they also face **substantial migratory pressures**. Together with a **population growth** rate that is often much higher than the EU average, this has led to significant economic and social tensions in the outermost regions. However, the influx of migrants is countered by a significant **brain drain** of young people searching for better opportunities⁵⁰.

2.1.1. Interplay between regions with geographical specificities

These types of regions described in the previous sub-chapter are not mutually exclusive. Regions can be included simultaneously in various categories (i.e. mountainous and outermost).

Table 3 shows the distribution of regions across the various categories.

Table 3: Distribution of EU28 NUTS3 regions in categories of territories

Regions	Number	Border	Mountainous	Island	Sparsely populated	Outermost
Border	565	100%	15%	7%	2%	1%
Mountainous	171	50%	100%	11%	1%	4%
Island	56	71%	34%	100%	2%	21%
Sparsely populated	19	67%	11%	6%	100%	6%
Outermost	13	54%	46%	92%	8%	100%

Source: Eurostat and DG Regio Working Paper "Territories with specific geographical features" (2009)

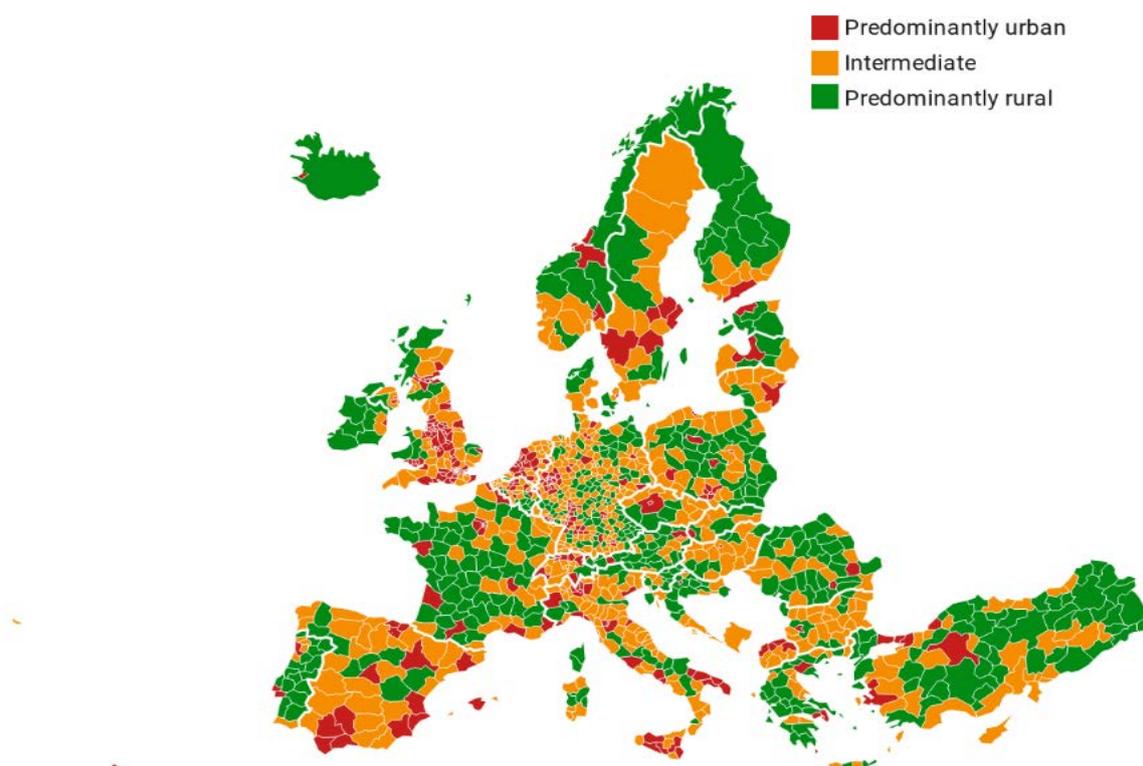
Remote and rural areas

At international level, a first attempt to define rural areas was developed by the OECD in the early 1990s. The OECD established a regional typology according to which regions were classified as predominantly urban, intermediate, and predominantly rural. This typology was based on a combination of three criteria: the identification of rural communities according to population density; the percentage of the population of a region living in rural communities; and the presence of large urban centres in the region.

The urban-rural typology subsequently developed by the European Commission⁵¹ takes the OECD approach and applies it to NUTS3 regions.

⁵⁰ "European Parliament resolution of 26 February 2014 on optimising the potential of outermost regions by creating synergies between the Structural Funds and other European Union programmes" (2013/2178(INI)). Available at: www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//NONSGML+TA+P7-TA-2014-0133+0+DOC+PDF+V0//EN (BROKEN LINK!)

⁵¹ Eurostat – Statistics Explained: Urban-rural typology. Available at: https://ec.europa.eu/eurostat/statistics-explained/index.php/Glossary:Urban-rural_typology

Figure 7: Urban-rural typology by NUTS3

Source: European Commission

In 2009, the OECD extended its classification to include the remoteness dimension. The previous classification, which was mostly based on the percentage of the regional population living in urban or rural communities, did not take into account the presence of economic agglomerations in neighbouring regions. For example, a region was classified as rural or intermediate regardless of its distance from a large urban centre where labour market, access to services, education opportunities and logistics for firms can be wider.

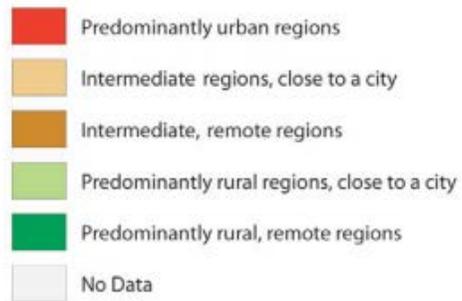
The OECD classification followed the approach developed by Dijkstra and Poelman⁵², who developed a five-tier classification of EU regions:

- 1) Predominantly urban regions;
- 2) Intermediate regions, close to a city;
- 3) Intermediate, remote regions;
- 4) Predominantly rural regions, close to a city; and
- 5) Predominantly rural, remote regions.

The authors found significant socio-economic differences between rural regions close to a city (i.e. within 45 minutes' drive from a city of at least 50,000 inhabitants) and remote rural regions. Access to a city, according to the authors, is an indicator of access to a wide range of services and opportunities (such as employment opportunities, higher education, and specialised healthcare).

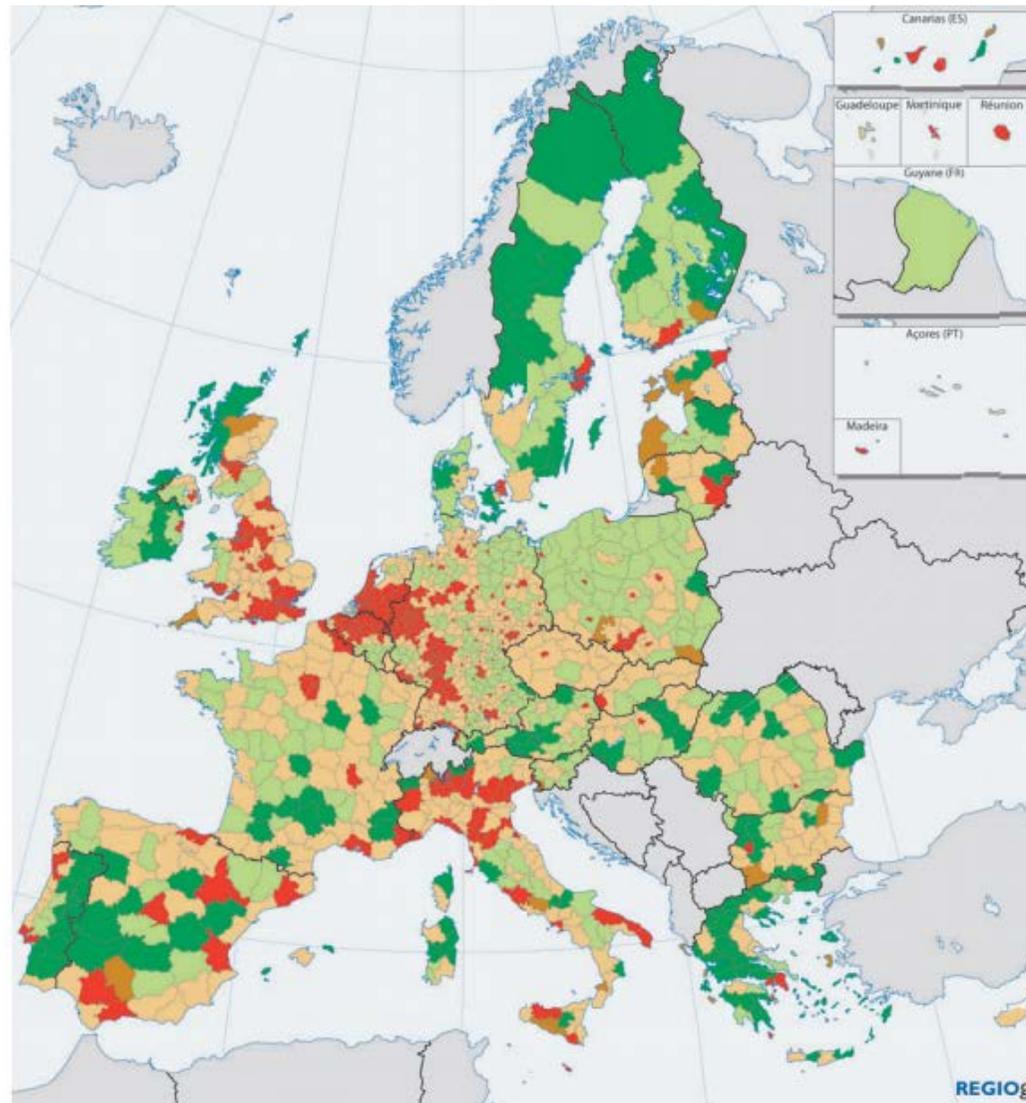
⁵² Dijkstra L., Poelman H. (2008). "Remote rural regions: How proximity to a city influences the performance of rural regions". Regional Focus 01/2008, European Commission DG Regio. Available at: https://ec.europa.eu/regional_policy/sources/docgener/focus/2008_01_rural.pdf

Figure 8: Urban-rural typology including remoteness by NUTS3



Close to a city: at least 50% of the population of the region lives at less than 45 minutes travel by road to a city of at least 50 000 inhabitants
 Sources: OECD (revised classification 2007), Eurostat, EuroGeographics, EEA, JRC, Statistics Finland, Statistics Sweden, REGIO-GIS

© EuroGeographics Association for the administrative boundaries



Source: Dijkstra and Poelman (2008)

Drawing a distinction between rural regions close to a city and remote rural regions highlights significant differences. Remote rural regions are the only group – among those listed by the authors – with **negative population growth**. Furthermore, the average **population density in remote rural regions is half** that of rural regions close to a city. Furthermore, rural and remote regions are more likely to have suffered from a reduction in the share of their country's population.

Predominantly rural and remote regions are to be mostly found in the Iberian Peninsula (especially close to the border between Spain and Portugal); southern France; the islands of Corsica and Sardinia; many parts of Ireland; the north of the UK (especially Scotland); Nordic and Baltic countries (especially Sweden, Finland, and Latvia); southern parts of Central Europe (Austria, Slovakia, Croatia); and across Romania, Bulgaria, and Greece.

When the remoteness factor is not incorporated in the analysis of the urban-rural divide, findings related to demographic trends in rural Europe can depart from those of Dijkstra and Poelman. For instance, according to Eurostat⁵³, from 2010 to 2019 a gradual increase in the number of people living in rural areas occurred in EU28 countries, with the share of the total number of inhabitants rising by 1.3%.

Depopulation is therefore a phenomenon shared only by those rural regions located far from an urban centre⁵⁴. Similar to regions with geographic specificities, a number of issues may force inhabitants of rural and remote regions to leave their areas. According to a briefing from the European Parliament⁵⁵, these include: fewer local education or job opportunities; difficulties in accessing public services or transport services; inadequate health coverage; and a lack of cultural/leisure activities.

The territorial dimension of the COVID-19 pandemic effects

In the EU and throughout the world, the outbreak of the COVID-19 pandemic in the first quarter of 2020 has led a large number of countries to introduce lockdown measures. Although they differed from country to country, lockdown measures have generally been drastic, and have led to what the OECD has called the “most serious economic crisis in a century”⁵⁶.

After a period of greater freedom over the summer months, lockdown measures have now been reinstalled in the majority of EU countries. The magnitude of the impact that this health crisis is having on European economies is historical. However, some countries have been hit harder than others. Indeed, GDP growth forecasts for 2020 tell us that e.g. Italy and Spain will lose respectively 9.9% and 12.4% of their national GDP, whereas e.g. Ireland and Lithuania “only” about 2%⁵⁷. Such differences, according to the European Committee of Regions⁵⁸, can be explained in two ways: 1) the intensity and the spread of the pandemic was much more significant in countries such as Italy, Spain, and France which in turn have had to deal with longer-lasting lockdowns; 2) as industrial and

⁵³ Eurostat. Distribution of population by degree of urbanisation, dwelling type and income group. Available at: https://ec.europa.eu/eurostat/databrowser/view/ILC_LVHO01_custom_98487/default/table?lang=en

⁵⁴ By looking at data on average annual change in population (1995-2004), the authors concluded that predominantly urban, intermediate (close to a city and remote), and predominantly rural (close to a city) areas showed positive rates of population change – respectively of 0.29, 0.31, and 0.10. On the contrary, predominantly rural and remote areas showed a negative change of -0.18.

⁵⁵ Vasileios M. (2019). “Demographic trends in EU regions”. European Parliament Think Tank. Available at: <https://ec.europa.eu/futurium/en/system/files/ged/eprs-briefing-633160-demographic-trends-eu-regions-final.pdf>

⁵⁶ OECD (2020). “The territorial impact of COVID-19: Managing the crisis across levels of government”. Available at: www.oecd.org/coronavirus/policy-responses/the-territorial-impact-of-covid-19-managing-the-crisis-across-levels-of-government-d3e314e1/

⁵⁷ European Commission (2020). “European Economic Forecast – Autumn 2020”. Institutional Paper 136, November 2020. Available at: https://ec.europa.eu/info/sites/info/files/economy-finance/ip136_en.pdf

⁵⁸ European Committee of Regions (2020). “EU Annual Regional and Local Barometer”. Available at: <https://cor.europa.eu/en/our-work/Pages/EURegionalBarometer-2020.aspx>

economic structures vary from country to country, the negative effects of the crisis were stronger in those countries that rely heavily on sectors such as tourism and transport.

Early research also suggests that **the impact of the COVID-19-containment-measures has also a territorial dimension**. Indeed, a national lockdown will not have the same effects across the regions it covers. Therefore, differences in lockdown measures need to be examined in the light of regional specificities to assess the economic impact of the COVID-19 in the EU regions. In its newly published “Potential impacts of COVID-19 on regions and cities of the EU” (2020)⁵⁹, the Committee of Regions assesses a territory’s sensitivity to lockdown measures based not only on the length and stringency of the lockdown imposed at national level, but also on its **pre-existing socio-economic structures**. The study argues that the regions that have suffered the most cases (and deaths) during the pandemic – which are usually more densely populated areas⁶⁰ – are not necessarily those economically hit the hardest. Indeed, regions highly dependent on those sectors most affected by lockdown measures are also those who paid the most severe economic consequences. For instance, **island (or coastal) and mountain regions are a particular high-risk category** due to their reliance on tourism, whereas regions in central and northern Europe are also exposed to negative impacts due to a large share of employment in risk sectors (i.e. manufacturing, wholesale and retail trade, accommodation and food services, real estate, administrative and support services, arts, entertainment and recreation). Therefore, the study argues that potential **impacts of COVID-19 do not correspond to the usual urban/rural or centre/periphery divides**.

Nonetheless, due to their demographic characteristics (a higher share of elderly population) and geographic features (larger distances to access basic services such as health care), it has been argued that **rural regions were faced with specific challenges** which hampered their ability to respond to the pandemic⁶¹. According to the OECD, what makes rural areas particularly vulnerable in light of a pandemic are the following factors:

- A high share of population who is at higher risk for severe illness;
- A less diversified economy, which makes it less resilient to economic shocks;
- A high share of workers in the primary sector and the limited capability to perform telework;
- Lack of specialised doctors and personnel in health care centres, best suited for dealing with COVID-19;
- Larger distances to access hospitals;
- Lower accessibility to internet and all the benefits/services connected.

Although less well documented, the effects related to COVID-19 are also expected to bring about some potential positive impacts for rural regions.

Both the OECD and the European Committee of Regions agree upon the fact that the current pandemic is accelerating the **use and diffusion of digital tools**. Indeed, to avoid close contact, lockdown measures are fomenting remote working/learning practices and boosting e-services. Although due to their occupations urban dwellers have a significantly higher potential to telework, the digitalisation of services seems particularly important for rural areas (especially the most remote ones) where commuting distances tend to be longer. An investment in digital technologies would

⁵⁹ European Committee of Regions (2020). “Potential impacts of COVID-19 on regions and cities of the EU”. Available at: <https://cor.europa.eu/en/engage/studies/Documents/IMPACTS-COVID-19.pdf>

⁶⁰ A study by Hamidi et al. (2020) finds that larger metropolitan areas have higher infection and higher mortality rates. However, this is sometimes mitigated by superior and more efficient health care systems. Available at: <https://www.tandfonline.com/doi/full/10.1080/01944363.2020.1777891>

⁶¹ OECD (2020). “Policy implications of coronavirus crisis for rural development”. Available at: https://read.oecd-ilibrary.org/view/?ref=134_134479-8kq0i6epcq&title=Policy-Implications-of-Coronavirus-Crisis-for-Rural-Development

in turn make rural areas more attractive to businesses as well as to individual workers which, in light of the digitalisation processes, might relocate to rural areas (and not only temporarily).

Another opportunity could be related to **changes in preferences towards services of proximity**, and greater **local consumption**. According to the OECD, there may be a shift in consumption habits to favour local goods and local tourism sites. For what concerns the former, as highlighted in an article by Nielsen⁶², the halting of manufacturing and the disrupting of supply chain due to lockdown measures mixed with consumer precautions are likely to influence purchase habits irreversibly. This will then fuel increased demand for local sourcing. For what concerns the latter, whereas overcrowded destinations have already witnessed a reduction in tourism flows⁶³, smaller rural destinations may become more popular⁶⁴.

Lastly, the increased **attractiveness of rural areas** might become an incentive for urbanised areas to become **greener** and more **sustainable**. Indeed, although Europe has not yet witnessed a large-scale urban population exodus towards less densely inhabited areas, teleworking is making suburban and rural living more attractive. For cities to regain their attractiveness to urban dwellers, they need to adapt. According to the Committee of Regions, office buildings, crowded places and public transport may be less in demand and cities may need to provide green areas, more space and safer (pandemic-proof) individualised transport instead.

⁶² Nielsen (March 11th, 2020). "COVID-10 concerns are a likely tipping point for local brand growth". Available at: www.nielsen.com/uk/en/insights/article/2020/covid-19-concerns-are-a-likely-tipping-point-for-local-brand-growth/

⁶³ Marques Santos A., et al. (2020). "Behavioural changes in tourism in times of COVID-19". JRC Science for Policy report. Available at: https://publications.jrc.ec.europa.eu/repository/bitstream/JRC121262/report_covid_tour_emp_final.pdf

⁶⁴ OECD (2020). "Tourism policy responses to the coronavirus (COVID-19)". Available at : https://read.oecd-ilibrary.org/view/?ref=124_124984-7uf8nm95se&title=Covid-19_Tourism_Policy_Responses

3. LOW-DENSITY AND DEPOPULATING AREAS: KEY FEATURES

Key Findings

- Low-density and depopulating areas are characterised by several interconnected factors. Specific geographic features are likely to affect local demographics which may determine the economic context and transport needs. The interplay of these factors is hardly captured by the existing definitions.
- Regions belonging to the same category (i.e. mountains, islands and sparsely populated areas) may display significant differences in terms of demography, socio-economic context and transport needs. Strict classifications may fail to capture the uniqueness of many low-density and depopulating regions.
- The multiple features of each region should be assessed at once. Thus, this study proposes a multidimensional assessment represented by radar charts. This visualisation allows a comparative analysis to be carried out and the identification of the key features defining each region.
- According to several local stakeholders, the uniqueness of these regions should not be overlooked. Rather than focusing on classifications, policymakers should analyse local needs which are deeply interconnected to their specific features.

By reviewing the work of European researchers and policymakers, the previous sub-chapters have identified the key demographic features of low-density and depopulating areas. Furthermore, the exercise facilitated the identification of geographic specificities of areas likely to suffer from demographic disadvantages as well as locational socio-economic difficulties of territories with negative demographic trends.

Table 4 presents the key features of low-density and depopulating areas. Given the vast diversity of socio-economic and geographic specificities that characterises these areas – which are by no means applicable to all low-density and depopulating regions – the table aims to provide a comprehensive list of the features that have emerged from the literature review.

Table 4: Key features of low density and depopulating areas

Demographic trends	<ul style="list-style-type: none"> • Low population density • Out-flow migration (brain drain) • Low-birth rates • Population ageing
<p>Low-density areas are by definition characterised by sparse human settlements – below or well below the EU average. Whereas very few areas have entire regions with population densities below 8 (at NUTS2 level) or 12.5 (at NUTS3 level) inhabitants per square kilometre, several European regions have population density levels that do not allow their economies to thrive.</p> <p>Emigration is often a natural consequence of the attractiveness of more urbanised areas, which offer more and better opportunities in terms of employment and services (education, healthcare, etc.).</p> <p>Younger individuals, especially the more educated ones, are usually more inclined to migrate. This in turn decreases the birth rate of their regions of origin and, assuming that the elderly have fewer reasons to move towards more vibrant economic centres, contribute to the ageing of population.</p>	
Geographic specificities	<ul style="list-style-type: none"> • Border regions • Mountain regions • Island regions • Outermost regions • Rural and remote regions
<p>Some low-density and depopulating territories with particular topographic specificities are likely to: 1) negatively affect the establishment of large human settlements, and 2) increase the willingness of individuals to relocate in areas which are geographically closer to urban agglomerates. Indeed, the literature review highlighted how identifiable geographic features deepen developmental challenges, notably regarding demographic change and migratory phenomena, accessibility, or regional integration. Although the above listed types of regions do not all show clear negative demographic trends (e.g. not all mountain regions are experiencing depopulation), in some cases their difficult accessibility, high degree of remoteness, and low economic development result in a substantial brain drain.</p>	

Socio-economic characteristics	<ul style="list-style-type: none"> • Limited economic growth • Weak supply to local labour markets • Employment structure skewed towards the primary sector • Development of tourism-related economic activities • Digital divide
<p>Many low-density and depopulating areas present a similar set of socio-economic characteristics (or locational disadvantages). Sparsity characterises regions with not only low population densities, but also dispersed settlement patterns, and creates specific challenges for economic activities and public service provision. The consequent limited economic growth is then the result of different factors that hamper the possibilities of a given community to flourish to the same extent as densely populated and non-remote areas. These factors are the following: the lower share of the population that offer services on the labour market (ageing and depopulating areas have a systemic lack of human capital for regional labour markets); an employment structure skewed towards the primary sector (traditional economic activities have remained a prerequisite of rural areas); and the low rate of technological investments (due to its unprofitability for market operators).</p> <p>On the other hand, some low-density and remote areas have a significant amount of employment in tourism and hospitality. This reflects the fact that local economies are often built around activities that deal with landscapes, and the natural and historical heritage.</p>	
Transport networks	<ul style="list-style-type: none"> • High dependence but poor access to transportation links • Low density of transport networks
<p>When sparsely populated and depopulating regions are also remote, lack of transport and of connections with more vibrant urban centres constitutes a major challenge. Accessibility to many of these regions is problematic and can be characterised by infrequent (or even absent) and often expensive transport services. High transportation costs – particularly severe in regions with specific geographical features such as mountains and islands – have negative effects on the ability to commute to work and to travel long distances to access a basic range of goods and services. Isolation from urban centres and main transport networks, therefore, contributes to the low socio-economic development dynamics of sparsely populated and remote regions.</p>	

Source: Author's elaboration (2021)

Towards a multidimensional assessment of low-density and depopulating areas: different features and related impacts

This section presents a proposal for a new assessment of low-density and depopulating areas, integrating the latest findings on the existing literature on the topic. It incorporates the socio-economic dimension to the demographical and geographical ones, providing a multidimensional approach that allows for a more comprehensive analysis of these areas, which in turn supports improved policymaking. In other terms, this section aims to combine the key features described in Table 4 and highlight possible interplays among them. The final output is the setting up of radar charts capable of displaying all these features at once.

3.1.1. The case for a multidimensional approach: defining the indicators and selecting the sample

As it has emerged from the review of the existing classifications and literature, the described features may combine in several ways and the same regions can be relevant for the assessment of multiple phenomena. On the other hand, regions belonging to the same group may experience significant demographic and socio-economic trends. Population density and depopulation trends are not necessarily correlated: low-density areas may experience positive demographic trends while sharply depopulating regions may have population density close to the EU28 average. For instance, northern Finland, which is considered as a Northern Sparsely Populated area (NSPA), has a fast-increasing population while Bulgarian rural areas, which have a population density five times higher, are sharply depopulating⁶⁵.

Regions having the same specific geographical features may display rather different socio-economic and demographic contexts. The Azores and the Canary Islands belong to the same categories of regions – they are both outermost and islands – but the former are experiencing a great decline in population (falling 4.2% – Crude rate of Natural Population Change, 2018), while the latter have one the fastest growing populations in the EU28 (+13.6%). Finally, socio-economic contexts are equally

⁶⁵ Eurostat 2018: <https://ec.europa.eu/eurostat/cache/RCI>

heterogeneous, ranging from less to more developed regions. This is also relevant for assessing transport infrastructures and policies, as these regions may have different assets and needs.

As far as socio-economic features are concerned, the diversity among low-density and depopulating regions is even more visible. Population density is not necessarily correlated with poor economic development. For instance, NSPAS (Northern Sparsely Populated Areas) have GDP per capita far higher than the EU average. On the other hand, rural areas – especially those located in Eastern Europe – may have a higher population density but a significantly lower level of economic development. In addition, areas belonging to the same type of regions (i.e. mountains, islands, outermost and rural) may display significant differences in their economic features. For instance, despite both being classified as “Mountains regions”, GDP per capita in PPS in Basilicata and Valle D’Aosta (IT) is significantly different⁶⁶.

The combination of different features, as well as the heterogeneity among regions belonging to the same category, are key underlying reasons for proposing a multidimensional classification. This makes a ‘one-size fits all’ approach unsuitable as different factors may combine and simultaneously affect the characteristics of a given region. The approach adopted by this study aims to assess relevant regions from different point of views (i.e. demographics, geographical features, socio-economic context, and transport infrastructures). This is not a straightforward task as it requires the development of an *ad hoc* methodology capable of combining different dimensions. The goal is to present all the above-described features at the same time and highlight their possible recurrent combinations. By doing so, it would be possible to identify clusters of regions sharing similar features and trends, but potentially belonging to different categories.

The detailed methodological framework underlying this multidimensional approach is presented in Annex I. A summarised overview – highlighting the key aspect – is provided in the following subsections.

a. Relevant data

Having identified the key features affecting low-density and depopulating areas, the next step in setting up the radar chart is the selection of relevant variables to be considered. The table below shows the selected indicators and the rationale behind their choice.

Table 5: Key variables

Topic	Data	Rationale
Demography	Population density (hab/km ²)	Population density is a key data to assess demographic features of relevant regions. As the whole study focuses on low-densely populated areas, including this indicator was an obvious choice.
	Population change – demographic balance and crude rates (%)	The crude rate of population changes effectively captures the depopulating trends faced by the relevant regions.
	Median age of population (year)	Low-density and depopulating areas are usually affected by an ageing population.
Geography	Remoteness	As described in the previous sections, low-density and depopulated areas are often remote and distant from major urban centre. This dimension is assessed following the definition provided by Dijkstra and Poelman (2008).
	Economic activity rate (%)	This indicator measures the labour force over the total population and provides a reliable proxy of the local socio-economic context. Due to high rates of out-flow migration (especially of younger

⁶⁶ According to Eurostat 2019, Valle D’Aosta has GDP per capita of 38,800 EUR while Basilicata stands at 23,800 EUR.

Topic	Data	Rationale
Socio-economic features		generations) the amount of available workforce tends to diminish in low-density and depopulating areas.
	Broadband coverage (%)	Low-density areas have also historically been disadvantaged by receiving less technological investments than other regions.
	Number of tourist arrivals per Km2	Besides having large shares of workers employed in the primary sector, some low-density areas also show a significant amount of employment in tourism and accommodation. This reflects the fact that local economies are often built around activities that deal with landscapes, and natural and historical heritage.
Transport infrastructures	Motorisation rate (cars per 1000 inhabitants)	Motorisation rate is usually higher in regions lacking or with poor public transport services. This is often the case for low-density and depopulating areas.
	Railway/road density (km per 1000 km2)	The total number of railway lines in less densely populated regions is likely to be lower, due to the geographic specificities of these territories and to the provision of transport services being less viable.

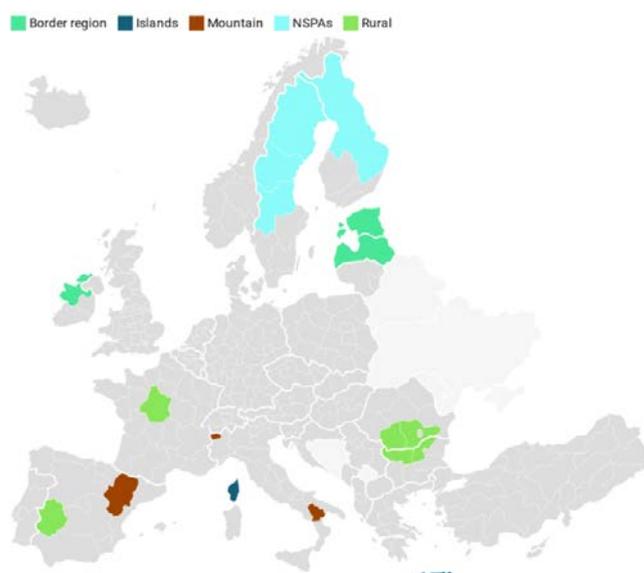
A more detailed description on how these data have been integrated in the radar charts is provided in annex. However, it is important to underline that, by using quantitative data, it is possible to compare the different features affecting low-density and depopulating areas.

b. Selecting the sample

As mentioned in the Introduction, it is hard to provide a fully representative sample given the uniqueness of each low-density and depopulating area. While detailed explanation of the selection criteria is provided in the methodological annex, it is sufficient to highlight that selected NUTS2 regions represent a fair overview of the diverse categories of regions relevant for the scope of the study, and they were selected considering demographic, geographical and economic features.

Figure 9 shows the location of the selected regions.

Figure 9: Selected Nuts 2 Regions



Source: Authors

The selection *per* category produced a representative sample of 19 NUTS2 regions. Indeed, no region exceeds the EU28 population average of 117 inhabitants per km², with the sample average being 39 inhabitants per km². It also represents rather heterogeneous types of demography. Ranging from 105 inhabitants per km² (the Azores) to 3.4 inhabitants per km² (Övre Norrland), the sample effectively represents different degrees of low-densely populated areas.

Similarly, the sample average of total population change in the sample is -1.9 per 1,000 persons, well below the EU average (+1.6). However, in this case, the sample is more scattered. The sample includes very rapidly depopulating areas (such as Romanian and Bulgarian regions) as well as regions with an increasing population (i.e. Northern and Western Ireland and Crete).

An overall balance between the different types of region is ensured. With six, rural regions are the most represented. This is consistent with the fact that most the regions belonging to the other categories can also be considered as a rural region. Northern Sparsely Populated Areas (NSPAs), Islands and Mountains area are almost equally represented. Outermost Regions (ORs) are represented by the Azores. As the table overleaf shows, the same region may fall within more than one classification. For instance, Corsica is an island whose territory is mostly mountainous, while Lower Danube areas are both rural and border.

The full list of selected regions is provided in Table 6.

Table 6: Overview of the sample

Region (NUTS2)	Code	Pop. Density (in/km2) (2019)	Total pop. Change (per 1,000 persons) (2019)	Types of Region			Economic development
Aragon	ES24	25.7	1.1	Mountain	Rural	Border region	In transition
Basilicata	ITF5	56.4	-7.5	Mountain	Rural		Less developed
Corse	FRM0	36.5	9.7	Islands	Mountain		In transition
Eesti	EE00	30.4	4.3	Border region	Rural		Less developed
Extremadura	ES43	26.1	-4.7	Rural	Border region		Less developed
Latvija	LV00	30.4	-7.5	Border region	Rural		In transition
Centre Val Loire	FRB0	41.5	-3.2	Rural			In transition
Mellersta Norrland	SE31	5.3	-0.1	NSPA	Border region	Rural	More developed
Norra Mellansverige	SE32	13.4	3.5	NSPA	Rural		More developed
Northern and Western	IE04	34.5	13.6	Border region	Rural		More developed
Övre Norrland	SE33	3.4	1.7	NSPA	Rural	Border region	More developed
Pohjois- ja Itä-Suomi	FI1D	11.8	7.1	NSPA	Border region	Rural	More developed
Região Autónoma dos Açores	PT20	105	-4.2	Outermost	Islands	Border region	Less developed
Severen tsentralen	BG31	53.9	-13.7	Rural	Border region		Less developed
Severozapaden	BG32	39.8	-18.2	Rural	Border region		Less developed
Crete	HE	76	9.2	Islands	Rural	Border region	Less developed
Sud-Est	RO41	71.5	-10.7	Rural	Border region		Less developed
Sud-Vest Oltenia	RO31	67.6	-11.9	Rural	Border region		Less developed
Valle d'Aosta/Vallée d'Aoste	ITC2	38.8	-4.3	Mountain	Rural	Border region	More developed
Sample average		39.0	-1.9				
EU28	EU	117	1.6				

3.1.2. Presenting the multidimensional assessment: analysis of the radar charts

This section presents the result of the multidimensional assessment described above. The overview of a specific region included in the sample is displayed by means of a radar chart. In general, radar charts are excellent tools for comparing different variables, especially when these are not homogenous. At the same time, they are easily readable and simple to understand. Each radar chart has been analysed and a short description of the key features of each low-density and depopulating region included in the sample has been provided (see Annex 1). Bearing in mind their inherent differences, it is nevertheless possible to gather some general findings and compare the key features found in the relevant regions.

Northern Sparsely Populated Areas (NSPAs) appear to be the most homogenous group. Despite their low population, they are not experiencing significant depopulation trends. On the contrary, they tend to have a positive or stable demographic trend. In addition, NSPAs tend to have economic activity rates higher than the average value among the selected regions, proving that low-density is not necessarily correlated with poor economic development. Another interesting common feature among NSPAs is their high level of broadband coverage, which is higher than the average value and very close to 100%. Their high digital connectivity has proven to be an effective alternative to transport connectivity. These areas have developed a strategy based on “bringing the service to the citizens” by boosting e-government and digital literacy to overcome the vast areas and the connectivity issues. In fact, railway networks in NSPAs tend to be modest, for which a high motorisation rate compensates. Tourism does not appear to have any particular relevance in these areas.

On the contrary, tourism appears to be a key feature of the island regions included in the sample (Corsica Crete, and the Azores). These regions also tend to have a higher population density as Crete (76 inhabitants per km²) and the Azores (105 inhabitants per km²) show the highest values among the sample. Moreover, they tend to have a relatively young population and stable rate of population change. As far as transport is concerned, it is interesting to note that railways networks are either very limited (in Corsica) or non-existent (in Crete and the Azores); the motorisation rate is in line with the rest of the sample. The economic activity rate appears to be below the average – which is probably related to tourism seasonality.

Albeit displaying significant differences, mountain regions tend to share similar demographic trends of a decreasing and ageing population. Indeed, these regions have the highest median ages among the selected sample. Interestingly, tourism is an important feature only in Valle D’Aosta, while it is not particularly developed in Aragon and Basilicata. Finally, it is worth noting that railway networks are usually poorly developed, and these regions remain highly dependent on cars. Indeed, Valle D’Aosta has the highest motorisation rate in the EU.

Despite being rather diverse, rural regions tend to have sharply decreasing populations. In some areas, notably in the Lower Danube area, the crude rate of population change is the lowest in the EU with more than one inhabitant over 1,000 leaving the area each year. These areas are also characterised by poor economic activity rate and a rather low broadband coverage. The lack of economic appeal eventually is likely to worsen the demographic outflow creating the vicious circle described in the previous section. Interestingly, the motorisation rate in these regions is below the sample’s average. However, rather than being explained by an effective public transport network, this low rate may be caused by transport and fuel poverty, as described by Mattioli et al (2015)⁶⁷.

⁶⁷ Mattioli, G., Lucas, K. Marsden, G. “Transport poverty and fuel poverty in the UK: From analogy to comparison”, *Transport Policy*, Volume 59, 2017, Pages 93-105.

Except for the Irish border areas, rural regions tend to have a poor touristic appeal, which may further exacerbate the depopulation trend.

Considering these findings, the current definitions and classifications may need to be expanded and revised. Geographical classifications tend to group regions which may have rather diverse demographic and socio-economic contexts. Even though only regions with either a low population density or a negative population change were considered, the differences among the selected sample are indeed remarkable. On the other hand, considering only demographic features is equally misleading. For instance, Corse and Valle D'Aosta have similar population density, but a totally different geographical context. Similarly, the Irish border and the Romania and Bulgaria areas show radically opposed demographic trends. While the former is experiencing an increasing population, the latter is the fastest depopulating area in Europe. Thus, a combination of both factors (demography and geography) is more effective. Indeed, the only existing classification which combines them – i.e. Northern Sparsely Populated Areas – represents the most homogenous group of regions.

On the other hand, one may conclude that even flexible and multidimensional classifications may fail to assess the inherent differences among the low-density and depopulating areas. As emerged from the interviews and the workshop⁶⁸ carried out during the study, both local stakeholders and experts highlighted that an excessive focus on classification and definition may be counterproductive. Setting a strict population density or depopulating rate would be misleading. Similar data may be recorded in different contexts and be caused by different factors.

Thus, there is some scepticism on an EU-wide definition of low-density and depopulating areas. Local uniqueness should prevail over the desire to group similar regions into predefined groups. Top-down approaches are likely to overlook specific features. Rather than being the end goal, classifications and definitions should be the starting point of a wider process aimed at identifying and assessing local needs through a bottom-up approach. By doing this, it would be possible to add a local application into the existing classification that considers various features. The concept of Northern Sparsely Populated Areas is a clear example: it is the application of an EU-wide definition (as per 2013/C 209/01) to a specific geographic and socio-economic context. Similarly, local stakeholders have also created the Southern Sparsely Populated Areas Network⁶⁹ (SSPA) which focuses on challenges and needs of low-density areas in Mediterranean countries. This approach may be applied to all the regions analysed in this study and several more specific classifications may be established (i.e. depopulating rural areas, ageing mountains areas, lagging-behind border regions, etc.).

⁶⁸ 20 interviews with relevant stakeholders were carried out between August and September 2020. The list of relevant organisations is found in annex. The two-day workshop was held on 14th and 15th October 2020. The agenda and the list of attendees (organisations) is provided in annex as well.

⁶⁹ SSPA: <https://sspa-network.eu/en/home>

4. PROVIDING TRANSPORT INFRASTRUCTURES IN LOW-DENSITY AND DEPOPULATING AREAS: RECENT TRENDS AND CHALLENGES

Key Findings

- The European Commission's framework for the development of transport policy in the EU over the last decade - the 2011 White Paper - makes few relevant references to the needs of 'low-density or depopulating' regions, although it contains policies that are of importance to such regions.
- The main challenges for transport for the next decade were set out in the 2019 European Green Deal, including the need to significantly reduce transport's greenhouse gas emissions and support for the digitalisation of transport. The Green Deal committed the Commission to developing the 'strategy for sustainable and smart mobility'.
- Transport in low-density or depopulating regions faces issues resulting from the low and dispersed nature of the population, which makes providing conventional public transport challenging. In addition, the distances between such regions and the centres of economic activity, increases the costs of providing public transport services to these regions.
- The importance of improving infrastructure and services within low-density or depopulating regions has been underlined by a number of authors.
- The digitalisation of services more generally, and of transport in particular, has the potential to improve the accessibility of low-density or depopulating regions. This includes improving access to services online, and so reducing the need to travel, and improving access to a range of transport services, including on-demand and shared transport services that will be able to complement conventional public transport services.

The current and future EU strategic framework for transport

Chapter 4 provides an overview of the strategic EU policy framework for transport, followed by a review of the transport issues faced by low-density and depopulating areas. The chapter concludes with a review of the literature on the solutions that might be put in place to improve transport infrastructure in low-density and depopulating areas. When reviewing the literature, we use the terminology used in the document, rather than referring to 'low-density and depopulating' areas. However, the findings from these studies are relevant to the current study and, thus, these are included in the literature review.

4.1.1. The current EU strategic policy framework

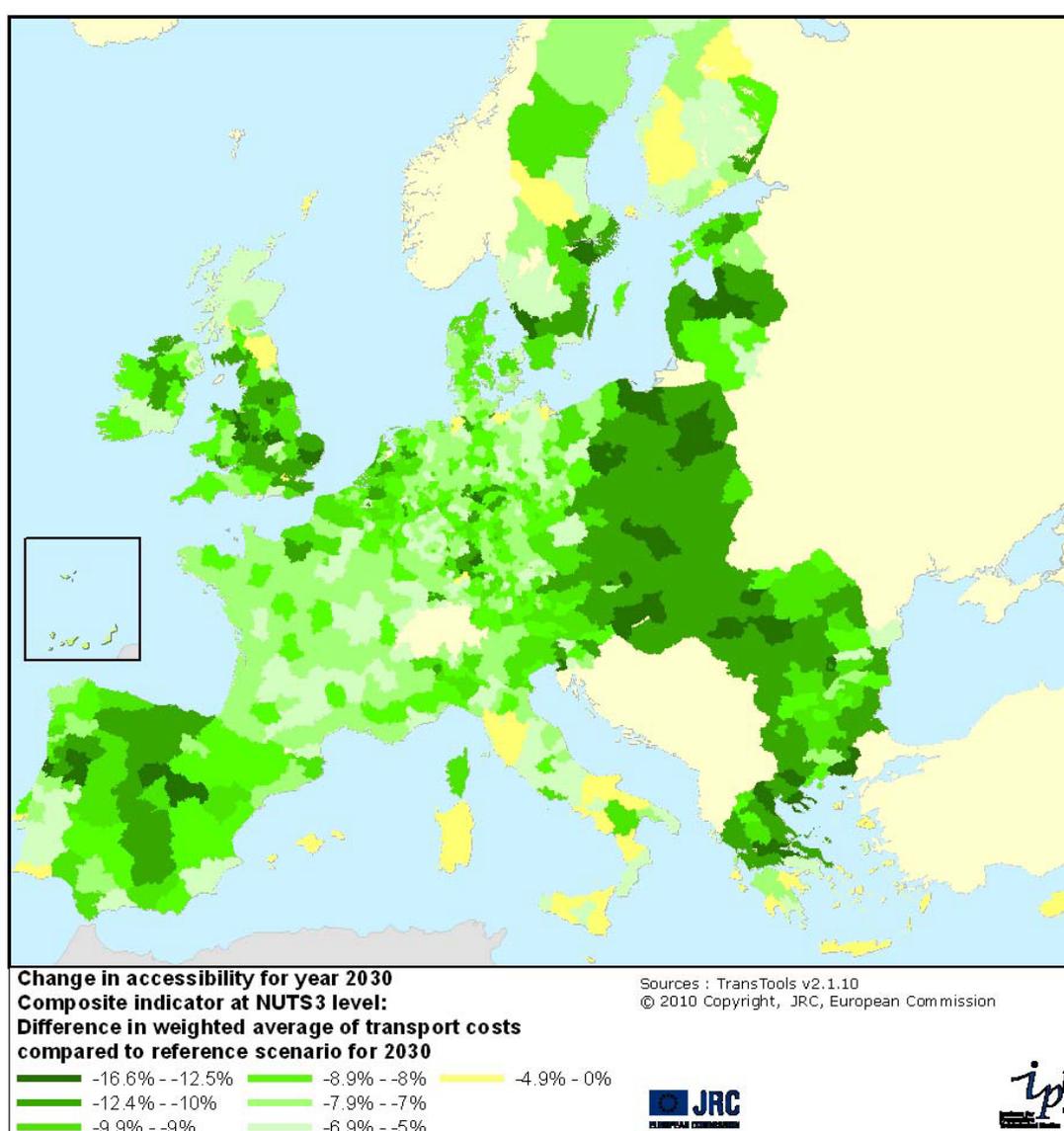
The European Commission's framework for the development of EU transport policy is currently set out in the 2011 Transport White Paper⁷⁰. Although 'low-density or depopulating' regions are mentioned only a few times in the White Paper itself, the document still contains elements that are of importance for such regions (as discussed below). The White Paper contains a reference to 'peripheral areas', which reflects a discussion in the supporting Impact Assessment (IA) about the 'accessibility gap' between central and peripheral areas; it also notes that this gap would widen without additional policy action.

⁷⁰ White Paper from the Commission, "Roadmap to a Single European Transport Area – Towards a competitive and resource efficient transport system", COM (2011 144). Available at: <https://eur-lex.europa.eu/legal-content/en/TXT/?uri=celex:52011DC0144>

The IA noted that peripheral regions were already adversely affected by poorer transport connectivity and higher costs of transport resulting from their geographical location and patterns of economic activity⁷⁰. Without additional policy action, the IA projected that the divergence between peripheral areas and 'central' areas would worsen in terms of their accessibility as a result of anticipated increases in fuel costs and congestion levels⁷¹.

Figure 10 presents the reduction in transport costs – which the Commission used as a proxy for improvements to accessibility – that would be delivered by the policies set out in the White Paper. The darker the shade of green, the more transport costs would be reduced through the implementation of the policies set out in the White Paper. It is clear that the projected benefits of the policies of the White Paper in terms of reducing transport costs (and so potentially improving accessibility) would be felt by some low-density and depopulating regions, as well as by many other regions.

Figure 10: Change in accessibility of the chosen policy option compared to no policy action in 2030



Source: Figure 5 of SEC (2011) 358

⁷¹ The IA was not explicit in terms of where this congestion occurred. However, increased congestion in central areas would increase travel times and costs, which would have implications for all areas, including peripheral areas where travel costs are already higher.

The 2011 White Paper set out a vision for a competitive and sustainable European transport system, underlining the need for policy action to complete the internal market for transport and to meet the needs of people to travel and of companies to transport goods. This vision had at its heart the need to support a growth in transport services and infrastructures while at the same time reducing its greenhouse (GHG) emissions by 60% by 2050 (compared to 1990 levels). In order to do this, more efficient and less polluting transport was deemed to be particularly important.

Many of the White Paper's action points and initiatives had the potential to affect low-density and depopulating areas, even though these areas were not explicitly mentioned. The White Paper underlined that investments were needed to develop the infrastructure that would support a multimodal system, including investments in intermodal interchanges. It also noted that intelligent transport systems (ITS) were important for improving the efficiency of all transport modes, as was multimodality for both passenger and freight transport. In order to deliver multimodality, it suggested that a greater integration of different modes was required, including of their respective online information, booking and payment systems. All of these initiatives could benefit low density and depopulating areas, if implemented in accordance with the needs of these areas. While some of the initiatives foreseen by the White Paper had the potential to directly benefit low-density and depopulating areas, other initiatives in the White Paper would need to be implemented more carefully in order to not adversely affect such areas. The most obvious example, in this respect, was the action point that focused on ensuring that each mode was priced appropriately, through the appropriate application of the 'user-pays' and the 'polluter-pays' principles. However, increasing the cost of transport has the potential to adversely affect low-density and depopulating areas, suggesting that the respective initiatives need to be implemented with care so as not to adversely affect such regions.

4.1.2. Developments since the White Paper

In its 2019 assessment of EU transport trends, the Commission identified three broad areas where policy challenges persisted, namely the continued sub-optimal functioning of the single market, the low level of investment in, and quality of, infrastructure and the need to deliver low emission transport and to reduce transport's external costs⁷². In relation to the single market, the report underlined the importance of the implementation of the 4th Railway Package, which *inter alia* aims to open up the rail market, as well as single market initiatives for maritime, inland waterway and air transport. Addressing these issues has the potential to benefit low-density and depopulating areas, if this improves the efficiency, and so lowers the costs, of transport.

The second area covered – the low level of investment in infrastructure and the inadequacies in coverage and quality – is clearly relevant for this study. In the context of the need to deliver low emission transport (the third area), the report highlighted other types of infrastructure that will be important for transport in the future. These include infrastructure for refuelling and recharging clean alternative fuels, infrastructure to support the new, disruptive business models (such as vehicle sharing and trip pooling, as well as e-services) and infrastructure to support cooperative, connected and automated mobility⁷².

In relation to the deployment of all of these types of infrastructure, the challenges for low-density and depopulating areas are likely to be greater than for other areas. The provision of the infrastructure will be expensive. The capacity of public authorities to invest in this infrastructure was already limited prior to the Covid-19 crisis, as a result of the constraints on expenditure resulting from the recovery from the financial crisis of the late 2000s. If public sector budgets are further constrained, there will be even less public investment in such infrastructure. While the private sector

⁷² COM (2019). "Transport in the European Union. Current Trends and Issues." Available at: <https://ec.europa.eu/transport/sites/transport/files/2019-transport-in-the-eu-current-trends-and-issues.pdf>

will be investing in the relevant infrastructure, their initial focus is not likely to be in low-density and depopulating areas, where economies of scale, and the potential for returns on investment, are less.

4.1.3. The future strategic policy framework for transport in the EU

The 2011 White Paper has been recently evaluated by DG MOVE, with results published in December 2020⁷³. In 2019, the European Green Deal committed the Commission to developing a ‘strategy for sustainable and smart mobility’ in 2020. This strategy will put users first to deliver affordable, accessible, healthier and cleaner alternatives, and will tackle all emissions, while drawing on the experience with the current White Paper⁷⁴. It also set out a number of areas in which it is important for transport to make progress. The main themes of the Green Deal for transport echo those of the 2011 White Paper and have implications for low-density and depopulating areas.

The first of the main themes for transport set out in the Green Deal is the need to reduce transport’s GHG emissions. However, an important change compared to the White Paper is that the Green Deal increases the ambition for transport in terms of the GHG emission reductions that are needed. In order to achieve climate neutrality, which the Green Deal states is required by 2050 in order to meet the aspirations of the 2015 Paris Agreement, a 90% reduction in transport’s GHG emissions is needed (compared to the 60% reduction that underlay the White Paper). The transition to low emission mobility was already going to have an impact on low-density and depopulating areas, as a result of the need for vehicles using different energy sources. The more stringent ambition further increases the challenges that already exist for these regions.

In order to support the transition to clean vehicles and fuels, the Green Deal notes that there is a need to significantly increase the production and deployment of sustainable, alternative transport fuels. It explicitly states that this will include support for the deployment of public refuelling and recharging points where gaps exist, and explicitly mentions “less densely populated areas” in this context. This suggests that the challenge faced by such areas transitioning to low emission mobility is at least recognised by the Commission.

The Green Deal also underlines the continuing importance of improving multimodality to increase the efficiency of the transport system, which will include increasing capacity on rail and inland waterways, along with an amended Combined Transport Directive to facilitate multimodal freight transport involving rail, inland waterways and short-sea shipping. Such developments have the potential to benefit low-density and depopulating areas, depending on how they are implemented.

The Green Deal puts an emphasis on cooperative, connected and automated mobility. This underlines the way in which technology that potentially enables automated and connected multimodal mobility has developed in the last decade. In this context, the Green Deal noted that there would be support for the development of smart systems for traffic management and for mobility as a service (MaaS) solution through the EU’s funding instruments, such as the Connecting Europe Facility. The increasing focus on MaaS, in which users are able to combine the planning, payment and ticketing of a multimodal journey using either an online platform or smartphone app, also highlights the way in which technology is enabling new transport services that can support low carbon mobility. While the focus of the deployment of such technologies is often in urban areas, these also have the potential to bring similar benefits in low-density and depopulating regions, which might be felt to a larger extent given the existing transport challenges of such regions (see Section 4.3.2, below).

⁷³ European Commission (2019), Evaluation of the 2011 White Paper on Transport. Available at: <https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/2080-Evaluation-of-the-2011-White-Paper-on-Transport> (accessed 9 September 2020) (UPDATE WITH LINK TO THE RESULTS)

⁷⁴ See Section 2.1.5 of COM (2019), “The European Green Deal”. Available at: https://ec.europa.eu/info/sites/info/files/european-green-deal-communication_en.pdf

The Green Deal also underlined that the cost of transport must reflect its impact on the environment and health, with the Green Deal explicitly noting that this should include ending fossil fuel subsidies and closing tax loopholes for aviation and maritime fuel. The potential adverse impact on low-density and depopulating areas of such measures will need to be considered, particularly with regards to potential increases to transport costs in remote and island regions, and to connectivity.

The discussion in this section has demonstrated that many of the strategic themes that continue to be present in EU transport policy have potential impacts on low-density and depopulating areas, even though the specific concerns of these are rarely explicitly mentioned.

Transport issues faced by low-density and depopulating areas

This section presents the results of the literature review that was undertaken to identify the transport issues that affect low-density and depopulating areas⁷⁵. In relation to transport in these areas, a distinction needs to be made between travel within these areas and travel that links these areas to 'central', more populated areas. Often the literature focuses on a specific type of area, with rural areas in general receiving more attention.

4.1.4. Transport issues in rural and mountainous areas

When discussing transport within rural areas, a report from the International Transport Forum (ITF) identified a set of challenges. The report noted that providing public transport in these areas was a challenge due to the low levels of population and the dispersed nature of these populations. This challenge is exacerbated by increasing car use, leading to a decline in public transport use. Ageing societies and population movements from rural to urban areas make providing public transport services even more challenging. These trends, coupled with increasing operational costs and the reduced ability of public authorities to subsidise public transport given the constraints on their budgets, have led to increasing fares and/or reductions in service levels⁷⁶.

To improve the supply of transport in rural areas, both the supply of transport infrastructure and the provision of public transport services need to be addressed. Improving accessibility to public transport, and relevant mobility policies more generally, has been identified as being important in addressing social exclusion^{77,78}. While car use has increased, those without access to a car, either all or part of the time, are adversely affected by the decline in public transport services. Without access to public transport, or other transport services, the potential for these people to participate in society, and to contribute to the economy, is limited⁷⁹.

4.1.5. Transport issues in peripheral and remote areas

One of the two main disadvantages faced by peripheral areas is increased travel and transport costs resulting from their location and distance from population centres. The other main disadvantage is the absence of 'agglomerative advantages', which means that such areas are unable to benefit from economies of scale, unlike more populated areas. This also has a transport element, as the situation is often made worse by poor infrastructure linking the area's sparse population with each other.

⁷⁵ As noted above, to ensure that we are not making misleading statements, we have kept the terms used in the respective study, e.g. 'remote area', rather than referring to low-density and depopulating regions.

⁷⁶ International Transport Forum (ITF, 2015) "International Experiences on Public Transport Provision in Rural Areas". Available at: www.itf-oecd.org/sites/default/files/docs/15cspa_ruralareas.pdf

⁷⁷ Interreg Central Europe (2018), "New Demand Patterns for Public Transport due to Demographic Change. Working paper." Available at : www.interreg-central.eu/Content.Node/working-paper--New-demand-patterns-for-public-transport-due-.pdf

⁷⁸ Camarero, L., Oliva, J., (2019), "Thinking in rural gap: mobility and social inequalities.", Palgrave Commun 5, 95. Available at: www.nature.com/articles/s41599-019-0306-x.pdf

⁷⁹ European Network for Rural Development (ENRD, 2019), "Smart Villages: Rural mobility". Available at : https://enrd.ec.europa.eu/sites/enrd/files/enrd_publications/smart-villages_brief_rural-mobility.pdf

These challenges may change over time, e.g. if the economy of a peripheral region changes from a manufacturing-based economy to a knowledge-based economy. In this example, there would be less need for infrastructure and services that support the transport of physical goods, whereas other forms of accessibility, e.g. to connect people, such as air travel and broadband connectivity, would become more important⁸⁰.

The importance of air transport for serving some remote areas, and of maritime transport for some of these areas in particular for goods transport, is emphasised by several studies. For some regions, air transport can be considered to be a 'lifeline service', although only where other modes of transport are not able to perform this role. In such cases, it is important to strike a balance between the pricing policies for air travel and the need for public support. While air transport can be important for many remote areas, attention should also be paid to other modes of transport⁸¹. Air transport is particularly important for Europe's Northern Sparsely Populated Areas, its islands and its outermost regions (effectively the overseas territories of the Member States), while maritime transport, particularly for goods, is also important for the latter two^{82/83}. Indeed, Dubois and Roto (2012) consider that point-to-point transport infrastructure that facilitates air and sea transport is a more appropriate model for peripheral areas than focusing on the provision of connectivity by roads and railways⁸⁴.

4.1.6. Other issues related to the provision of transport infrastructure

Many regions that lag economically behind are rural and on the periphery of their respective Member State and of the EU. In addition, many of these regions are not on a direct path between major urban centres and the main markets. As a result, they suffer from the increased travelling distances that are needed, but also from a generally lower level of general investment and skills, which limits their ability to innovate and grow⁸⁵.

Addressing the transport issues of low-density and depopulating areas

The previous sections have looked, respectively, at the EU strategic policy framework for transport and the transport issues that are found in low-density and depopulating areas. This section reviews the literature on potential transport solutions for these areas.

4.1.7. The role of transport infrastructure

A number of authors have highlighted the importance of transport infrastructure *within* sparsely populated areas. For example, Dubois and Roto (2012) have argued that in the northern Nordic regions the main accessibility challenges are within the region, or to neighbouring sparsely populated areas, rather than with core economic centres. Rather than the peripheral attribute being a challenge to be overcome, the focus should be on recognising and capitalising on the assets that

⁸⁰ Dubois, A., Roto, J. (2012), "Making the best of Europe's Sparsely Populated Areas on making geographic specificity a driver for territorial development in Europe". NordRegio Working Paper 2012:15.

Available at: <http://norden.diva-portal.org/smash/get/diva2:700300/FULLTEXT01.pdf>

⁸¹ Bräthen, Svein (2011), "Air transport services in remote regions". International Transport Forum Discussion Paper, No. 2011-13, Organisation for Economic Cooperation and Development (OECD), International Transport Forum, Paris.

Available at: www.econstor.eu/bitstream/10419/68819/1/660934116.pdf

⁸² Carbone G. (2018), "Expert Analysis on Geographical Specificities, Cohesion Policy 2014-2020." Available at: https://ec.europa.eu/regional_policy/sources/docgener/studies/pdf/expert_analysis_geographical_specificities_en.pdf.

⁸³ Mantero, C., Pickup, L., "Transport Accessibility for the EU Outermost Regions (ORs). Final Report" https://ec.europa.eu/regional_policy/sources/policy/themes/outermost-regions/pdf/transport_report_en.pdf

⁸⁴ Dubois, A., Roto, J. (2012), "Making the best of Europe's Sparsely Populated Areas on making geographic specificity a driver for territorial development in Europe". NordRegio Working Paper 2012:15.

Available at: <http://norden.diva-portal.org/smash/get/diva2:700300/FULLTEXT01.pdf>

⁸⁵ COM (2017), "Economic Challenges of Lagging Regions. Final Report." Available at: https://ec.europa.eu/regional_policy/sources/docgener/studies/pdf/challenges_lagging/econ_challenges_lagging_en.pdf

such regions have. Hence, there should be improved transport corridors within these regions that foster the development of local specialisations and their competitive advantage by allowing local firms to capitalise on shared social capital within the wider region. At the same time, virtual connectivity should be enhanced to support e-services and e-business⁸⁶.

Sippel et al (2018) concluded that, in relation to rail in cross-border regions, gaps in the passenger rail network are often not the result of missing or unusable infrastructure. Even on the main lines, it is often a lack of services that is the main problem. As a result, what is needed is more support for smaller cross-border rail projects, which are not part of either the core or comprehensive TEN-T networks, perhaps even via cross-border funding such as Interreg A, as well as seed funding to support the launch and early operation of new services and also financial support for the procurement of rolling stock⁸⁷.

4.1.8. The importance of the digitalisation of transport for low-density and depopulating areas

Randall et al (2018) have identified the importance of digitalisation as a tool to support the development of Nordic regions, including their transport services. While there has been much discussion of 'smart cities', in which the transport, energy and ICT systems are integrated to provide a more efficient and sustainable provision of the necessary services, they argued that there is a need to move beyond the city as a focus for such 'smart' innovation. Similar solutions, in relation to both mobility and access to digital public services, are as relevant and as important for rural, peripheral and sparsely populated regions⁸⁸.

An attempt to replicate the smart city concept in rural areas can be found in the 'smart village' concept, which aims to make the most of ICT to improve access and support the development of transport and other services⁸⁹. The importance of the smart village concept for addressing social exclusion in rural areas has been underlined, as it has the potential to improve access to transport, and therefore to wider society and employment opportunities for those without consistent access to a car⁹⁰. The smart village concept aims to address the challenges faced by rural areas, including ageing, people moving to the cities, low population density and the lack of a critical mass for services and infrastructure. Digitalisation is at the core of the concept, including the digitalisation of relevant services and the development of common online platforms that communities can use to access and share information. The provision of the necessary digital infrastructure is also important⁹¹.

A key element of the smart village concept is improving the range of mobility options available to those who live in these villages and in improving accessibility more generally. One element of this is to improve digital connectivity, which will foster access to services for those living in low-density and depopulating areas without the need to travel. However, improved digital connectivity also enables residents to access a wider range of mobility options when they want to travel.

⁸⁶ Dubois, A., Roto, J. (2012), "Making the best of Europe's Sparsely Populated Areas on making geographic specificity a driver for territorial development in Europe". NordRegio Working Paper 2012:15.

Available at: <http://norden.diva-portal.org/smash/get/diva2:700300/FULLTEXT01.pdf>

⁸⁷ Sippel et al (2018), "Comprehensive analysis of the existing cross-border rail transport connections and missing links on the internal EU borders." Available at: https://ec.europa.eu/regional_policy/sources/docgener/studies/pdf/cb_rail_connections_en.pdf

⁸⁸ Randall L, Berlina A, Teräs, J & Rinne T (2018), "Digitalisation as a tool for sustainable Nordic regional development: Preliminary literature and policy review". Discussion paper prepared for Nordic thematic group for innovative and resilient regions, January 2018, Stockholm. Available at: www.nordregio.org/wp-content/uploads/2017/04/Digitalisation_Discussion-Paper_Jan-31.pdf

⁸⁹ ESPON (2017). "Shrinking Rural Region in Europe." Available at: www.espon.eu/sites/default/files/attachments/ESPON%20Policy%20Brief%20on%20Shrinking%20Rural%20Regions.pdf

⁹⁰ European Network for Rural Development (ENRD, 2019), "Smart Villages: Rural mobility".

Available from: https://enrd.ec.europa.eu/sites/enrd/files/enrd_publications/smart-villages_brief_rural-mobility.pdf

⁹¹ European Network for Rural Development (ENRD, 2018), "Smart Villages: Revitalising rural services".

Available from: https://enrd.ec.europa.eu/sites/enrd/files/enrd_publications/publi-enrd-rr-26-2018-en.pdf

Various mobility options are relevant in this context. Demand-responsive transport (DRT), which consists of public transport services that do not follow a fixed route or timetable and instead respond to the demands of users, can be facilitated by the online platforms that are at the core of the smart village concept. Similarly, car and bike sharing schemes can also be facilitated by such platforms, as other forms of ride sharing. In a smart village, all of these local mobility options would be brought together in a common platform, thus enabling easy access to a wide range of additional mobility options for those with otherwise limited mobility. These options would complement other services, such as conventional public transport, which would operate mainly during peak periods and would be designed so that their routes and stops serve the needs of the local population⁹².

4.1.9. The role of different mobility options in low-density and depopulating areas

Studies that have examined the role of different mobility options for low-density and depopulating areas have identified a similar set of mobility options to those that are seen as relevant in the context of smart villages (see Section 4.3.2). For example, Brovarone and Cotella (2020) identified DRT, shared mobility services and multimodal planning and payment systems as being important to address the challenges of delivering mobility in rural areas⁹³. Avary (2019) noted that these services can be supported by MaaS operators that provide multimodal travel solutions⁹⁴. CIVITAS (2016) identified a similar set of measures as being important to address transport poverty in rural areas, which is one of the factors that leads to social exclusion, and also suggested that the integration of passenger and freight services on the same vehicle might be considered⁹⁵.

Increased attention is being paid to DRT, which has been stimulated by improvements in route planning software and new ways of information provision, enabling such services to become more responsive to users' needs. DRT is well suited to rural areas as a result of its flexibility in meeting users' demands. It can be door-to-door, or between pre-defined pick-up/drop-off points, and can also be used to complement regular bus routes or train services. Traditionally, DRT operates well where there is a low demand, off-peak or where the target audience is dispersed. While it is important that DRT services are developed in consultation with users and the involvement of the local community, central government support can be used to help set up services⁹⁶.

As taxi services are used as a complement to public transport by many people, taxis should be considered in the context of rural public transport. ITF (2015) argued that limiting numbers of taxi licences in many places has had an adverse effect on supply and innovation; where supply restrictions had been removed taxi numbers increased, while prices and waiting times dropped and new innovative services had been developed. As a result, the report suggested that taxi deregulation might be considered, whilst ensuring that quality is maintained⁹⁶.

ITF (2015) underlines that conventional public transport services will continue to be important, as DRT will not be able to meet all demand for public transport in rural areas. DRT, which is usually provided by smaller vehicles (minibuses, cars, etc.), should supplement conventional services, generally provided by larger buses and trains. Service levels for conventional public transport, and the quality of these, need to be improved, e.g. through more comfortable buses, and better information provision and marketing. For both DRT and conventional public transport services, ITF

⁹² European Network for Rural Development (ENRD, 2019).

⁹³ Brovarone, E., Cotella, G. (2020), "Improving Rural Accessibility: A Multilayer Approach." MDPI, Sustainability 2020, 12, 2876; doi:10.3390/su12072876.

⁹⁴ Avary, M. (2019), "As rural communities age, their public transport is shrinking. It's time to fix this", World Economic Forum. Available at: www.weforum.org/agenda/2019/07/rural-mobility-japan/

⁹⁵ CIVITAS (2016), "Thematic Policy Note: Transport Poverty." Available at: https://civitas.eu/sites/default/files/civitas_policy_note_transport_poverty.pdf.

⁹⁶ International Transport Forum (ITF, 2015) "International Experiences on Public Transport Provision in Rural Areas". Available at: www.itf-oecd.org/sites/default/files/docs/15cspa_ruralareas.pdf

noted that it is important that solutions are relevant for the local area. Hence, they underlined the importance of involving the community and local businesses in the planning of the routes and also of engaging with local businesses to potentially finance some local services⁹⁷. Interreg (2018) considered that the integration of public transport systems is important for improving public transport services in rural areas, as is the integration of public transport with walking and cycling⁹⁸.

In the outermost regions, bus rapid transit (BRT) systems are needed to connect rural areas to the urban centres⁹⁹. They also underline the importance of DRT lines being integrated with ferry services, as well as a further development of water transport and possibly even cable systems and monorails to address land-shortage issues and cases where the terrain is too steep for conventional public transport⁹⁹. BRT schemes, in which dedicated, separate lanes are provided for buses to enable them to avoid congestion caused by other motorised modes¹⁰⁰, are becoming increasingly important in cities, although their role in helping those living in rural areas to access jobs in the city has also been noted¹⁰¹.

4.1.10. The importance of a strategic approach to the provision of transport in low-density and depopulating areas

As in cities, it is important that the provision of transport in low-density and depopulating areas is undertaken strategically. Oszter and Kövesdi (2014) underlined that transport provision in rural areas needs to be part of a broader regional transport strategy. The integration of the regional transport network is important, with buses as the backbone of the regional network that link rural areas to the main intermodal transport stations of a region¹⁰². There is also significant potential for economies of scale, e.g. through pooling passengers, opening up special transport services to the public and common planning and purchasing. Better coordination is important, both between authorities in planning and providing services, as well as between different types of public transport service (including special services). In addition, combining the movement of passengers and freight in the same vehicle could be explored, e.g. post buses. Sustainability of funding will also be important, as will flexibility in school and working hours, so that transport services can be best aligned with users' needs⁹⁶.

The importance of coordination and integration has been highlighted in order to develop new public transport services in sparsely populated, peripheral regions. This applies both at the administrative level, where appropriate regional administrative arrangements are necessary to ensure that transport is planned for the region as a whole, as well as at the operation level for the management of routes to ensure that there is a high quality, easily accessible and integrated public transport network. Flexible public transport services, which could be flexible in terms of routes, times and modes, are a potential complement to the integrated network of conventional public transport¹⁰³.

More generally, Lorenzini (2019) suggested that an important issue in many EU Member States is a near absence of policy for mobility in rural areas. There are few obligations to provide mobility in

⁹⁷ International Transport Forum (ITF, 2015).

⁹⁸ Interreg Central Europe (2018). "New Demand Patterns for Public Transport due to Demographic Change", Working paper. www.interreg-central.eu/Content.Node/working-paper--New-demand-patterns-for-public-transport-due-.pdf

⁹⁹ Mantero, C., Pickup, L. (2017), "Transport Accessibility for the EU Outermost Regions (ORs). Final Report" https://ec.europa.eu/regional_policy/sources/policy/themes/outermost-regions/pdf/transport_report_en.pdf

¹⁰⁰ It is worth noting that congestion is an issue in some low-density areas (see, for example, the Lower Danube case study, and in winter sports destinations).

¹⁰¹ UITP (2019) "Transforming cities with bus rapid transit systems: How to integrate BRT".

Accessible at: https://cms.uitp.org/wp/wp-content/uploads/2020/07/BRT_ENG_Web.pdf

¹⁰² Oszter, V., Kövesdi, I. (2014), "Railway Hub Cities and TEN-T network (RAILHUC Project) - How to improve connectivity around several Central European railway hub cities?". Available at: www.sciencedirect.com/science/article/pii/S2352146514003226

¹⁰³ Sitanyiova, D., Misso, F.E., (2019), "RUMOBIL – Feasibility of New Public Transport Services in European Rural Areas", IOP Conf. Ser.: Mater. Sci. Eng. 661 012148 Available at: <https://iopscience.iop.org/article/10.1088/1757-899X/661/1/012148/pdf>

rural areas. In addition, some of the transport services, such as DRT, are usually seen as a 'safety net' rather than as an integral part of a wider public transport network. In addition, there tends to be weak institutional structures and an insufficient policy framework for the development of shared mobility¹⁰⁴.

¹⁰⁴ Lorenzini / European Commission, (2019), "Time to Rethink Rural Mobility", SMARTA Project. Available at: www.eltis.org/sites/default/files/sump2019_d4_lorenzini_andrea_memex.pdf

5. ASSESSMENT OF CURRENT EU AND NATIONAL FUNDING AND POLICIES FOR TRANSPORT IN SPARSELY POPULATED AREAS

Key Findings

- Regional and Cohesion Policy are the bulk of EU support to transport policies and projects in low-density and depopulating areas, especially through the European Regional Development Fund (ERDF).
- Except some references and exemptions granted to sparsely populated areas and outermost regions, EU Regional Policy does not have a specific approach to low density and depopulating areas. In fact, most of them are included in larger Operational Programmes addressing the whole NUTS 2 region.
- The level of economic development appears to be more important to the definition of objectives and the selection of projects than demographic and geographical considerations. Indeed, while the relevant legislative framework defines regions according to their economic context, demographic and geographical considerations appear to have limited importance.
- Road infrastructure receives the highest share of EU funding – both in terms of total and average budget. In the frame of Cohesion and Regional Policy, traditional transports still have a significant weight in EU policies in low density and depopulating regions.
- Low-density and depopulating areas are increasingly drawing the attention of public institutions in Member States, which work to develop targeted policies capable of addressing the complex dynamics of these territories more effectively.
- Policies focusing on efficiency rather than equity aspects impact greatly on social groups that are already disadvantaged, such as students, the unemployed and the elderly.
- The consideration of equity in EU and national policymaking tends to have a limited scope: in transport policy, investments are often made based on the number of potential consumers in a certain area.
- Whereas green mobility might solve many urban-related issues, inhabitants of less densely populated areas tend to be more in need of a flexible and demand-responsive transport system, rather than a greener one.

Assessment of relevant EU policies

While Section 4.1 set out the current and future strategic policy framework in which EU transport policy develops, this section focuses on the actual policies that support the development of transport infrastructure, and the relevant funding mechanisms.

5.1.1. EU support for the development of transport

The EU's main infrastructure development policy for transport is the TEN-T, which is governed by the TEN-T Guidelines¹⁰⁵ and supported financially by the Connecting Europe Facility (CEF)¹⁰⁶.

The aim of the TEN-T is to ensure that there is a truly pan-EU transport network that supports:

- cohesion, including the accessibility and connectivity of remote, outermost, peripheral, mountainous and sparsely populated areas, linking regional and local infrastructure to

¹⁰⁵ "Regulation (EU) No 1315/2013 of the European Parliament and of the Council of 11 December 2013 on Union guidelines for the development of the trans-European transport network and repealing Decision No 661/2010/EU". Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32013R1315>

¹⁰⁶ "Regulation (EU) No 1316/2013 of the European Parliament and of the Council of 11 December 2013 establishing the Connecting Europe Facility, amending Regulation (EU) No 913/2010 and repealing Regulations (EC) No 680/2007 and (EC) No 67/2010". Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32013R1316>

international routes and levelling up the quality of infrastructure between Member States (Article 4(a));

- efficiency, including bridging missing links in cross-border areas (Article 4(b));
- sustainability, so supporting low carbon transport (Article 4(c); and;
- increasing the benefits for users (Article 4(d)).

The TEN-T Guidelines specify the objectives of the network, as well as the detail of the infrastructure that makes up its core and comprehensive networks. The core network is the backbone of the network and a date of 2030 has been set for its completion, while the comprehensive network is broader. The TEN-T also includes provisions to support the development of refuelling and recharging technologies for alternative fuels and the implementation of ITS for various modes. The CEF supports the development of the TEN-T by providing co-funding to projects, with a focus on the modes that have more potential to support a sustainable transport system, e.g. railways and inland waterways, although traffic management, including Intelligent Transport Systems (ITS), is supported for all modes.

Article 37 of the TEN-T Guidelines underlines that transport infrastructure shall allow seamless mobility and accessibility for all users, although the examples given relate to those with reduced mobility rather than those from a particular region. Given that one of the aims of the TEN-T was to promote cohesion through improving accessibility and connectivity of various regions, it is arguably a missed opportunity that Article 37 does not include a reference to improving the accessibility of people living in specific regions, including low-density and depopulating regions. Had such reference been included, such areas could potentially have had a higher profile in subsequent CEF calls.

The TEN-T guidelines also underline that one of their 'general priorities' is "ensuring enhanced accessibility and connectivity for all regions", and then explicitly mentions islands, sparsely populated, remote and outermost regions (Article 10). Specific regions are mentioned in other articles, e.g. the importance of high-quality roads to link mountainous, remote and peripheral regions to central regions is mentioned in Article 17. A special case is made for ports in the outermost and peripheral regions (Article 20) and the article on sustainable freight services notes that particular attention should be paid to improving links to outermost, island, remote and mountain regions (Article 32).

The TEN-T Guidelines are currently being evaluated and a new proposal from the Commission is expected in the second quarter of 2021¹⁰⁷. As part of the proposals for the next budget, in 2018 the Commission published a proposal for a revised CEF Regulation, which also makes many references to the articles of the current TEN-T Guidelines to identify the transport projects that it will support¹⁰⁸. This underlines the importance of the TEN-T Guidelines in determining how EU support for transport infrastructure will be spent.

In the Commission's proposal for the next CEF, the EU's outermost regions (although not its sparsely populated regions) receive specific attention, e.g. in relation to eligible actions in the transport sector, which includes actions implementing sections of the comprehensive network located in the outermost regions, whereas in other cases – apart from cross-border links – eligible actions are on the core network (Article 9). Unlike the current CEF Regulation, the Commission's proposal for the next CEF makes an explicit reference that actions to be supported include those that address Article

¹⁰⁷ European Commission website, Mobility and Transport, *TEN-T Review*. Available at: https://ec.europa.eu/transport/themes/infrastructure/ten-t/review_en (accessed 23 July 2020).

¹⁰⁸ "Proposal for a Regulation of the European Parliament and of the Council establishing the Connecting Europe Facility and repealing Regulations (EU) No 1316/2013 and (EU) No 283/2014, COM(2018)438". Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2018%3A438%3AFIN>

37 of the TEN-T Guidelines, i.e. that on accessibility for all users (see above). In addition to the CEF proposal, the Commission has also published a proposal for a Digital Europe Programme, which included, in Annex 1, a list of activities that will be supported, including ‘smart rural areas’ in support of transport, energy and environmental policies¹⁰⁹.

5.1.2. EU cohesion funds and the development of transport

The development of transport infrastructure, as well as other transport projects, is also supported via the European Regional Development Fund (ERDF)¹¹⁰ and the Cohesion Fund (CF)¹¹¹, although the selection of projects to be supported is the responsibility of the managing authorities within the Member States. Amongst the investment priorities mentioned in the current regulations, there is an explicit mention of sustainable urban mobility, which is one of the four priorities that should receive the majority of funds in all regions under the ERDF. Less attention is given to the mobility needs of low-density and depopulating regions, as infrastructure to promote “sustainable and regional mobility” is only one element of a broader priority on “promoting sustainable transport”, which is not one of the main priorities for the ERDF. Within the ERDF, under this priority, support can also be given to infrastructure to link secondary and tertiary nodes to the TEN-T.

The current ERDF Regulation also notes that the rules that set out the spending priorities for ‘more developed’, ‘transition’ and ‘less developed’ regions (as set out in Article 4) do not apply to either the northernmost regions with a very low population density or to outermost regions (Articles 11 and 12, respectively), although the reasons for these exemptions are not explicit. This means that more resources could, potentially, be spent on ‘promoting sustainable transport’ in these areas. This is because Article 4 effectively puts an upper limit on the proportion of funds that could be spent on the ‘promoting sustainable transport’ thematic objective. In addition, Article 11 explicitly includes the fund’s ‘sustainable transport’ objective in the list of objectives to be given priority for the northernmost regions with a very low population density.

The proposals for the ERDF and CF for the next budgetary period take a different approach. First the Commission has proposed to merge the provisions for the two funds into one Regulation¹¹², which contains specific objectives for both funds (Article 2). The third of these specific objectives is for the funds to support “a more connected Europe by enhancing mobility and regional ICT connectivity”, which includes “developing sustainable, climate-resilient, intelligent, secure and intermodal national, regional and local mobility, including improved access to TEN-T and cross-border mobility” and “promoting sustainable multimodal urban mobility”.

In addition, under the proposed ERDF, a sum of nearly €1.5 billion is proposed to be set aside for “outermost regions and sparsely populated areas”. This sum is included in the ‘Budgetary Implications’ section (Section 4) of the proposal’s Explanatory Memorandum (so not in the text of the legislative proposal) and is explicitly mentioned as being for these two types of areas. However, the proposal of Regulation (i.e. the proposed legislative text) only contains provisions relating to outermost regions (e.g. in Article 11); there is no explicit mention of ‘sparsely populated areas’ in any of the articles of the proposed Regulation, which contradicts the ‘Budgetary Implications’ of the proposal’s Explanatory Memorandum. Hence, as originally proposed, the legislative text did not

¹⁰⁹ “Proposal for a Regulation of the European Parliament and of the Council establishing the Digital Europe programme for the period 2021-2027, COM (2018)434”. Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2018%3A434%3AFIN>

¹¹⁰ “Regulation (EU) No 1301/2013 of the European Parliament and of the Council of 17 December 2013 on the European Regional Development Fund and on specific provisions concerning the Investment for growth and jobs goal and repealing Regulation (EC) No 1080/2006”. Available at: <https://eur-lex.europa.eu/legal-content/en/TXT/?uri=CELEX%3A32013R1301>

¹¹¹ “Regulation (EU) No 1300/2013 of the European Parliament and of the Council of 17 December 2013 on the Cohesion Fund and repealing Council Regulation (EC) No 1084/2006”. Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32013R1300>

¹¹² “Proposal for a Regulation of the European Parliament and of the Council on the European Regional Development Fund and on the Cohesion Fund, COM(2018)372”. Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2018%3A372%3AFIN>

cover sparsely populated areas, despite the apparent budget allocation. However, in the course of the development of the legislative text, a recital has been added to the compromise text that underlines that the ERDF should pay particular attention to NUTS level 3 areas that are sparsely populated.¹¹³

In addition, Article 11 of the proposed Regulation explicitly notes that the allocation for outermost regions would cover all the activities for which other regions can use ERDF support, so *inter alia* investments in infrastructure and access to services. In addition, ERDF support in the outermost regions would be able to be used to cover operating costs to offset the additional costs caused by the constraints faced by these regions. ERDF support would also be able to be used to support expenditure covering compensation granted for the provision of public service obligation and contracts in these regions.

5.1.3. Other EU legislation covering relevant transport infrastructure

In addition to the TEN-T guidelines and the different funds, other EU legislation is important for the deployment of transport infrastructure in the EU, particularly those relating to recharging and refuelling infrastructure for alternative fuels and intelligent transport systems.

A common framework for the deployment of recharging and refuelling infrastructure for alternative fuels is set out in the Alternative Fuels Infrastructure Directive¹¹⁴. This sets a framework for the deployment of recharging and refuelling infrastructure for six alternative fuels, including electricity, although the scale and location of deployment is left to the individual Member States, which have to develop national policy frameworks. The Directive is currently under review, to which the Commission committed in the Green Deal (see Section 4.1.3). If the revised Directive were to become more prescriptive, e.g. setting targets for Member State deployment of recharging infrastructure as some stakeholders are calling for¹¹⁵, it will be important that the needs of low-density and depopulating areas are not overlooked.

At the end of 2018, the Commission published an updated Working Programme for actions under the ITS Directive, which will cover the period until 2022¹¹⁶. This includes potentially extending the geographical scope of the requirements relating to real-time traffic information (this is currently limited to the comprehensive TEN-T network and other motorways), looking at the accessibility of static and dynamic information (including on pricing) relating to publicly accessible recharging and refuelling points for the whole road network and looking at the challenges associated with multimodal booking and ticketing in order to support MaaS. In support of the latter, a 2019 report set out an overview of the challenges, as well as different proposals for policy action¹¹⁷.

Assessment of EU Regional Policy Programmes

While the previous chapter aimed to assess the high-level EU policies – highlighting the key strategic approaches and priorities – this section assesses the practical implications of Regional and Cohesion policies in the 2014-2020 programming period. The overarching objective is to present a detailed overview on how EU funding is supporting transport projects in sparsely populated and low-density areas. To do so, the study presents an overview of Regional and Interregional Programmes co-

¹¹³ Council of the European Union (2020), "European Regional Development Fund and Cohesion Fund (ERDF/CF) Regulation - Progress report", Brussels, 11 December 2020;

see https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CONSIL:ST_13716_2020_INIT&from=EN

¹¹⁴ "Directive 2014/94/EU of the European Parliament and of the Council of 22 October 2014 on the deployment of alternative fuels infrastructure". Available at: <https://eur-lex.europa.eu/legal-content/en/TXT/?uri=CELEX%3A32014L0094>

¹¹⁵ ACEA, Eurelectric and Transport & Environment (2019) "Joint call to action for the accelerated deployment of smart charging infrastructure for electric vehicles". vehicles'vehicles'.

Available at: https://www.acea.be/uploads/press_releases_files/Joint_call_to_action-ACEA_Eurelectric_TE.pdf

¹¹⁶ COM (2018), "Commission Decision of 11.12.2018 updating the Working Programme in relation to the actions under Article 6(3) of Directive 2010/40/EU". Available at: https://ec.europa.eu/transport/sites/transport/files/legislation/c20188264_en.pdf

¹¹⁷ VVA, Grimaldi Studio Legale, Wavestone (2019) "Remaining challenges for EU-wide integrated ticketing and payment systems".

financed by the European Regional Development Fund which is often considered as the most relevant EU financial support for low-density and depopulating areas. This was undertaken using a mapping tool that classifies Regional and Interregional/Cross-Border Programmes which are potentially significant in funding transport activities in the EU. The aim of the mapping tool is to identify and highlight relevant transport policies promoted by EU Cohesion Policy and implemented in low-density and depopulating areas.

5.1.4. Selecting the sample

a. Shortlisting relevant programmes

The first step of the selection process was to create a shortlist of all potentially relevant Programmes that could be included in the mapping exercise. To ensure consistency with the rest of the study, the shortlist was made up of Regional and Interregional Programmes covering the 19 NUTS2 sample assessed in Section 3.2. Indeed, this sample is not only balanced from a demographic and geographical point of view, but it is also representative of the different socio-economic contexts faced by the regions. However, it is worth noting that – as often mentioned throughout the study – each low-density and depopulating areas displays unique features which are not necessarily found in similar regions. Thanks to the European Commission Database on Regional Policy, it is possible to identify a full list of EU-financed programmes for each region. Only Regional and Interregional/Cross-Border Programmes were considered. Indeed, National Programmes – even when they focused only on one policy field (i.e. Transport, Education, R&I) cover the full country and have little relevance for low-density and depopulating areas specifically.

b. Selection criteria

Once programmes had been shortlisted, a further selection was needed to ensure relevance. For the purpose of this study, only programmes including transport policies or financing transport projects are considered relevant.

The following hierarchical selection criteria ensured that only relevant programmes were considered:

- Step 1: Programmes including Thematic Objectives¹¹⁸ 7: “Promoting sustainable transport and removing bottlenecks in key network infrastructures” are considered relevant as this is the main source of financing of transport interventions within EU Cohesion Policy.
- Step 2: Besides Thematic Objectives, Investment Priorities – outlined at the programme level – may also be used as a proxy to identify relevant programmes. Indeed, transport projects may be financed under different TOs¹¹⁹. If an Investment Priority explicitly mentions transport policies, then the Programme was considered relevant.
- Step 3: Finally, in case the previous two criteria are not met, a more detailed screening was needed. An overview of the financed projects may be useful to identify relevant policies. For instance, transport related projects may be combined with wider research and innovation strategies

¹¹⁸ Thematic Objectives: https://ec.europa.eu/regional_policy/en/policy/what/glossary/t/thematic-objectives

¹¹⁹ TO 4: Supporting the shift towards a low-carbon economy, TO 1: Strengthening research, technological development and innovation, TO 6: Preserving and protecting the environment and promoting resource efficiency. Screening the Investment.

Besides criteria specifically related to transport policies, the selection of relevant Programmes also takes into consideration different aspects, such as:

- Programmes that had a specific focus on low-density and sparsely populated areas were given preference, as these were more relevant to the study. For instance, Interreg Programmes usually focus on specific areas – often characterised by relevant geographic features (i.e. Alpine Interreg is entirely focused on mountains regions while INTERREG VB Northern Periphery and Arctic only covers remote areas) or depopulating areas (such as RO-BG Interreg).
- Representativeness of the different geographical features of the areas and socio-economic context was ensured by discarding potentially relevant programmes to avoid overrepresentation of a given type of region.

The following table shows the final list of programmes, according to their relevance to the above-mentioned criteria.

Table 7: Shortlisted Sample

Programme	Country	Geographical Feature	Socio-economic context	Does the programme have a Thematic Objective ¹²⁰ focused on transport?	Does the programme have any Investment Priority ¹²¹ focused on transport?	Is the programme focused on low-density and sparsely populated areas?	Selected (Y/N)	Remarks and reasons for selection/exclusion (optional)
ROP Basilicata ERDF 2014-2020	IT	Rural - mountain	Less developed	Yes	Yes	Partly	Yes	With a significant focus on transport infrastructures and its coverage of a mountainous area, this programme is considered relevant to the purpose of the study.
Castilla y León ERDF 2014-20 OP	ES	Rural	In transition	No	No	Partly	No	This Programme does not have any relevant intervention related to transport
Aragón ERDF 2014-2020 OP	ES	Mountain	In transition	No	No	No	No	This Programme does not have any relevant intervention related to transport
Interreg V-A - Spain-France-Andorra (POCTEFA)	ES/FR	Mountain	In transition	Yes	Yes	Fully	Yes	Besides having an important share of the budget allocated to transport policy, this Operational Programme covers a cross-border and mountainous area.
Regional programme Centre 2014-2020v	FR	Rural	In transition	Yes	Yes	No	Yes	
Interregional programme Loire 2014-2020	FR	Rural	N.A.	No	No	No	No	This Programme does not have any relevant intervention related to transport
Regional programme Corse 2014-2020	FR	Island	In transition	No	Yes	Partly	Yes	This Programme effectively represent EU regional policy on transport on islands.
Interreg V-A - Estonia-Latvia	EE/LT	Border region	Less developed	Yes	Yes	Partly	Yes	The cross-border dimension of this programme can be considered an added value.
Extremadura ERDF 2014-20 OP	ES	Rural	Less developed	Yes	Yes	Partly	Yes	The Extremadura region is one of the proposed case studies.

¹²⁰ Thematic Objectives are defined in art. 9 of Regulation (EU) No 1303/2013. For the 2014-2020 Programming Period, 11 Thematic Objectives (TO) were identified. Programmes co-financed by ESI Funds need to support these objectives in order to contribute to the Union strategy for smart, sustainable and inclusive growth. For further information: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32013R1303&from=en> (page 24)

¹²¹ Investment priorities are the concrete actions to be taken to achieve the Thematic Objectives. These are described in Art. 27 of Regulation (EU) No 1303/2013. Each Thematic Objective may include one or more Investment Priorities.

Programme	Country	Geographical Feature	Socio-economic context	Does the programme have a Thematic Objective ¹²⁰ focused on transport?	Does the programme have any Investment Priority ¹²¹ focused on transport?	Is the programme focused on low-density and sparsely populated areas?	Selected (Y/N)	Remarks and reasons for selection/exclusion (optional)
North-Central Sweden ERDF	SE	NSPA	More developed	Yes	Yes	No	Yes	Albeit relevant, this Programme has been excluded to avoid an over-representation of Northern regions within the selected sample (see below)
Upper Norrland ROP	SE	NSPA	More developed	Yes	Yes	Partly	Yes	Being more focused on sparsely populated areas, this Programme is considered more relevant than the North-Central Sweden ERDF to the purpose of this study
Interreg V-A Sweden-Norway Programme	SE/NO	NSPA	More developed	Yes	Yes	Fully	Yes	Its focus on sparsely populated areas make this Programme particularly relevant for the scope of this study.
Interreg V-A - Sweden-Finland-Norway (Nord)	SE/NO/FI	NSPA	More developed	Yes	No, but several transport projects are financed under Research and Innovation priorities	Fully	Yes	Its focus on sparsely populated areas and border regions make this Programme particularly relevant for the scope of this study.
INTERREG VB Northern Periphery and Arctic	SE/NO/FI	NSPA	More developed	Yes	No, but several transport projects are financed under Research and Innovation priorities	Fully	Yes	
Interreg V-A - Sweden-Denmark-Norway (Öresund-Kattegat-Skagerrak)	SE/DK/NO	Remote	More developed	No	Yes	Partly	Yes	
Border, Midland and Western Regional OP	IR	Rural	More developed	Yes	Yes	No	Yes	
Regional OP Azores (Autonomous Region)	PT	Outermost	Less developed	Yes	Yes	Partly	Yes	This Programme provides an example of EU Cohesion Policy in outermost regions.
Interreg V-A - Spain-Portugal (Madeira-Açores-Canarias (MAC))	PT/ES	Outermost	Less developed/in transition	No	No	Fully	No	Albeit relevant as far as geographical features are concerned, this Programme does not have relevant interventions in the field of transport.

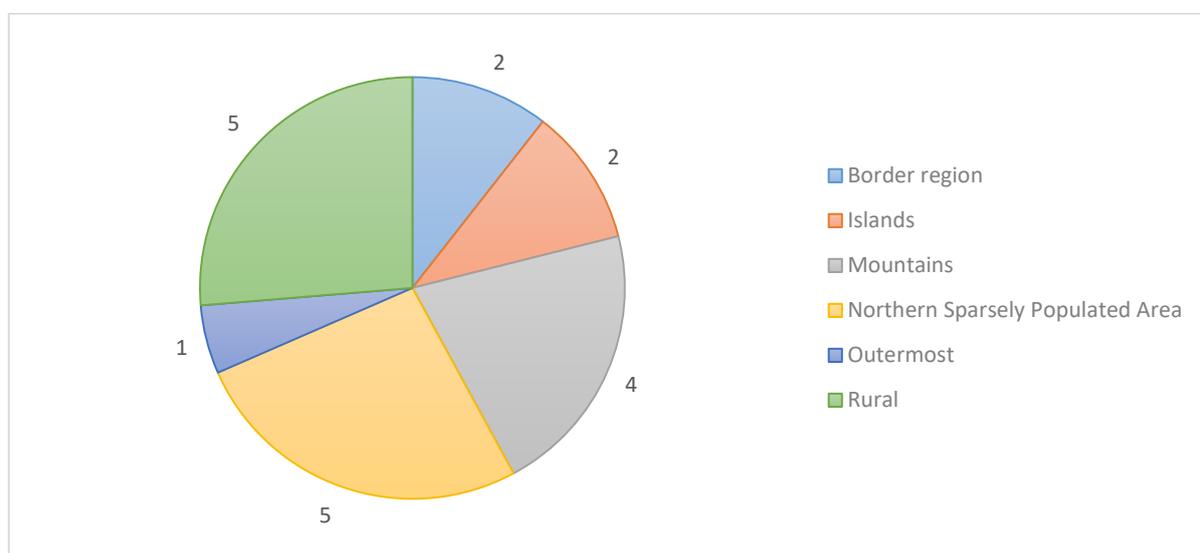
Programme	Country	Geographical Feature	Socio-economic context	Does the programme have a Thematic Objective ¹²⁰ focused on transport?	Does the programme have any Investment Priority ¹²¹ focused on transport?	Is the programme focused on low-density and sparsely populated areas?	Selected (Y/N)	Remarks and reasons for selection/exclusion (optional)
Crete Operational Programme (2014-2020)	HE	Island	Less Developed	Yes	Yes	Partly	Yes	
INTERREG VB Danube 2014-2020	RO/BG/HU/AT	Rural	Mixed	Yes	Yes	Partly	Yes	This Interreg Programme covers region located on the Danube River, some of which are considered low-density and depopulating regions. As this Programme covers also high-density region, projects located in those areas would be excluded.
Interreg V-A - Romania-Bulgaria 2014-2020	RO/BG	Rural	Less developed	Yes	Yes	Fully	Yes	The lower-Danube area has been selected for a case study. This Programme entirely covers the relevant area.
ROP Valle d'Aosta ERDF	IT	Mountain	More developed	Yes	Yes	Partly	Yes	With a significant focus on transport infrastructures and its coverage of a mountainous area, this programme is considered relevant to the purpose of the study.
Alpine Space Interreg (2014-2020)	IT/FR/CH/AT	Mountain	More developed	Yes	Yes	Fully	Yes	With a significant focus on transport infrastructures and its coverage of a mountainous area, this programme is considered relevant to the purpose of the study.

c. Overview of the sample

As a result of the selection process, 19 Programmes were included in the sample. Four Programmes (Castilla y León ERDF 2014-20 OP, Aragón ERDF 2014-2020 OP, Interregional programme Loire 2014-2020, Interreg V-A - Spain-Portugal) were excluded because they do not include any relevant transport policies. North-Central Sweden ERDF was excluded to avoid an excessive over representation of remote and Nordic areas.

The sample is well balanced between Regional and Interregional Programmes (10 Regional and 9 Interregional Programmes) and it represents all the different types of regions and socio-economic contexts. As the figure below shows, each geographical feature is included, even though remote and rural regions are slightly over-represented. The over-representation of remote areas – exclusively located in the Nordic and Arctic regions – is caused by the high number of Interregional Programmes implemented in those areas. Island regions are represented by Corse OP and Crete OP while the Operational Programmes Azores 2014-2020 is the only one located in Outermost Regions (ORs).

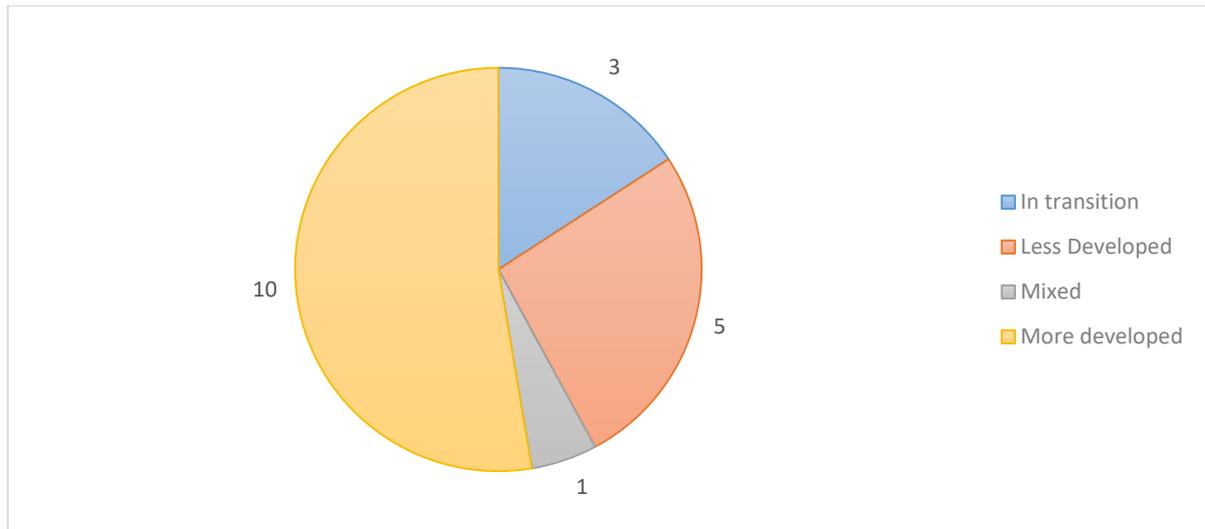
Figure 11: Number of Programmes per type of region (Geographical Feature)



Source: authors' elaboration on mapping data (2021)

As far as the socio-economic context is concerned, more developed regions are slightly over-represented. This is due to the relative prominence of Northern Sparsely Populated Areas – which are classified as more developed. Less developed regions are represented by Basilicata, the Baltic countries, Extremadura, the Azores, and the lower Danube areas. As the Interreg Danube covers different socio-economic contexts¹²², it is classified as mixed.

¹²² The Danube Transnational Programme (DTP) gathers one of the highest numbers of participating countries among all the Interreg programmes: 9 EU countries (Austria, Bulgaria, Croatia, Czech Republic, Germany - Baden-Württemberg and Bavaria-, Hungary, Romania, Slovakia, Slovenia) and 5 non-EU countries (Bosnia and Herzegovina, the Republic of Moldova, Montenegro, Serbia, Ukraine - four provinces: Chernivetska Oblast, Ivano-Frankiviska Oblast, Zakarpatska Oblast and Odessa Oblast). These regions have very different level of economic development; thus, the Programme is classified as mixed. For further information: <http://www.interreg-danube.eu/about-dtp/participating-countries>

Figure 12: Number of Programmes per type of region (Socio-economic context)


Source: authors' elaboration on mapping data (2020)

5.1.5. Mapping tool

a. Designing the mapping tool

The mapping tool is designed to identify and highlight relevant transport policies promoted by EU Cohesion Policy and implemented in low-density and depopulating areas in order to provide an overview of the wider features of EU Cohesion policy in this field.

Several elements included in each programme needed to be mapped and assessed to provide an overview of the strategies and implementation of relevant transport policies. Table 8 describes them and shows the classification options.

Table 8: Key features to be assessed in the mapping tool

Programme element	Definition and relevance
Thematic Objectives	According to Regulation (EU) No 1303/2013, Structural Funds should focus their support on a limited number of common thematic objectives. Those are described at Art. 9 and each Programme should define its strategy in line with them. Assessing TOs is important for two reasons. Firstly, – as described above - they allow to identify which Programmes have transport related interventions. Secondly, it is interesting to assess which of the 11 TOs is the most used to support transport-related objectives.
Overall budget/ budget for transport relevant TO	Dividing by the budget dedicated to the TOs financing transport-related interventions over the overall financial allocation of the programmes provides a reliable proxy of the importance of transport policy.
Investment Priorities	Investment priorities are included in each Thematic Objective. They are the concrete result which the TO is aiming to achieve. They are defined and listed in Art. 27 of Regulation (EU) No 1303/2013. To the purpose of this study, only IPs focused on transport are considered relevant.
Type of measures	In order to have a clearer overview, transport projects are broken down into three different categories: Hard projects entailing physical interventions, such as the construction of new infrastructures, extraordinary maintenance, upgrading existing infrastructures... Soft projects focused on studies and research, such as planning new policies, strategies and tools. Mixed projects combine soft and hard elements.

Programme element	Definition and relevance
Type of transport	Transport projects are divided in the following categories: Road infrastructures and networks Railway Pedestrian/bike lanes Inland navigation Sea navigation Sustainable/multi-modal shifting Aviation/airlines
Project's budget	Each project budget is recorded in order to have aggregate information on the financial size of different types of projects. By doing so, it was possible to define which transport mode receives the highest financial contribution by the EU.

b. Structure of the mapping tool

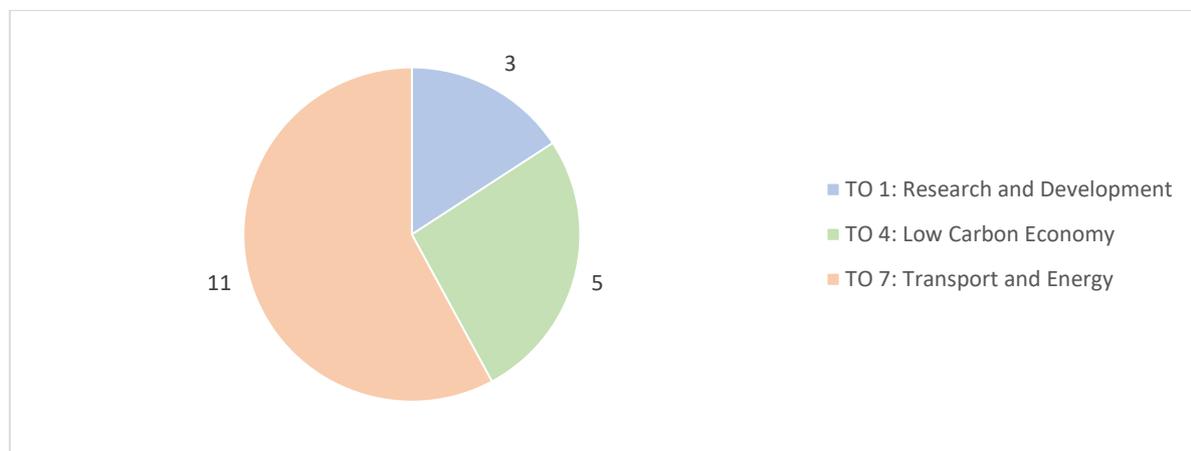
The 19 relevant Programmes are mapped and processed via a centralised database. The full mapping tool – including the assessment of all the Programmes included in the sample – is provided in the Annex 2.

5.1.6. Key findings from the mapping tool

a. Overview of Strategies and Priorities

The first step was to assess the most common Thematic Objectives (TOs) in the selected programmes. The definition of the TOs is a pivotal step in the design of EU-financed programmes and thus, illustrate relevant trends, Figure 13.

Figure 13: Frequency of Thematic Objectives (number)



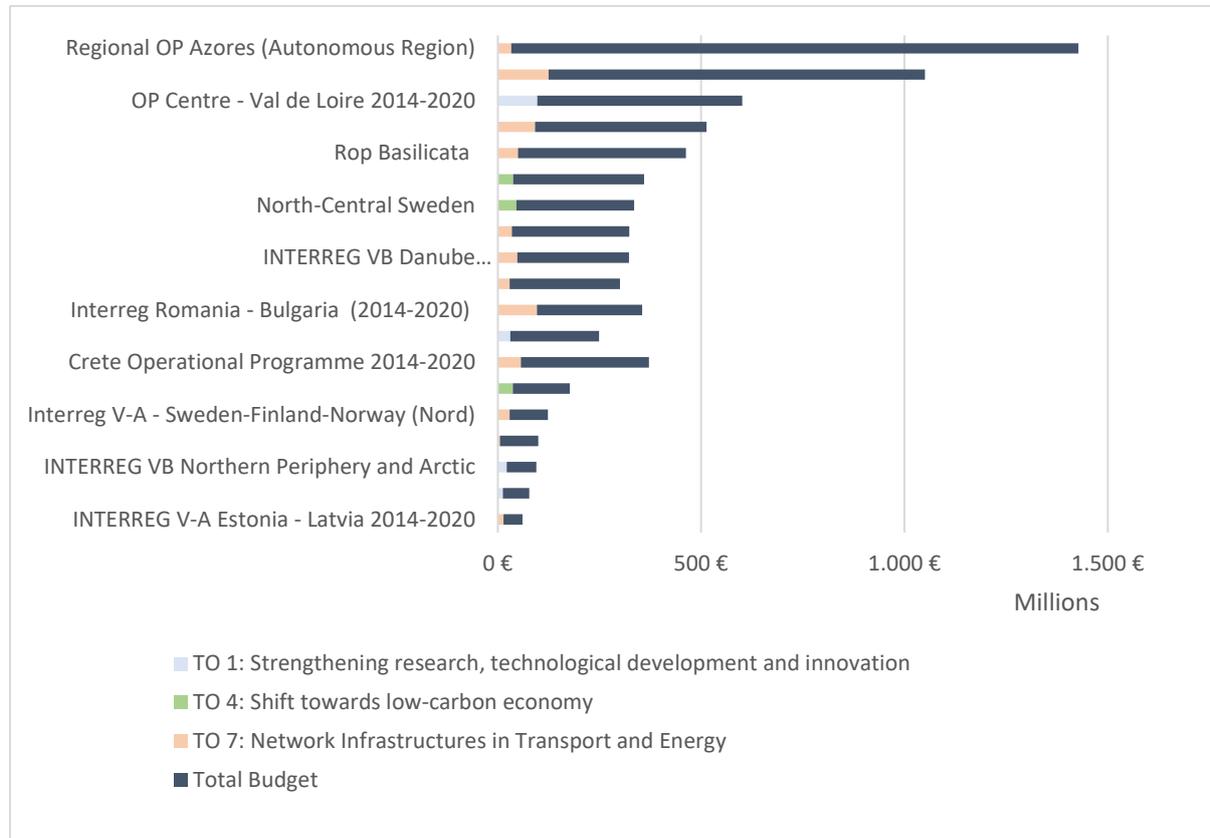
Source: authors' elaboration on mapping data (2020)

As expected, TO 7: Network Infrastructures in Transport and Energy is the most common, followed by TO 4: Low-carbon economy, while TO 1: Research & Innovation is only covered in 3 Programmes out of 19. It is interesting to note that – amongst the selected sample – no other Thematic Objective¹²³ is relevant for addressing transport issues or financing projects.

¹²³ TO 2: enhancing access to, and use and quality of, ICT; TO3: enhancing the competitiveness of SMEs, of the agricultural sector (for the EAFRD) and of the fishery and aquaculture sector (for the EMFF); TO5: promoting climate change adaptation, risk prevention and management; TO 6: preserving and protecting the environment and promoting resource efficiency; TO 8: promoting sustainable and quality employment and supporting labour mobility; TO 9: promoting social inclusion, combating poverty and any discrimination; TO 10 investing in education, training and vocational training for skills and lifelong learning; TO: 11 enhancing institutional capacity of public authorities and stakeholders and efficient public administration.

In addition, as Figure 14 shows, none of these Thematic Objectives seem to have a particularly high share of the total budget of any of the selected programmes, which suggests that transport-related objectives are not prioritised.

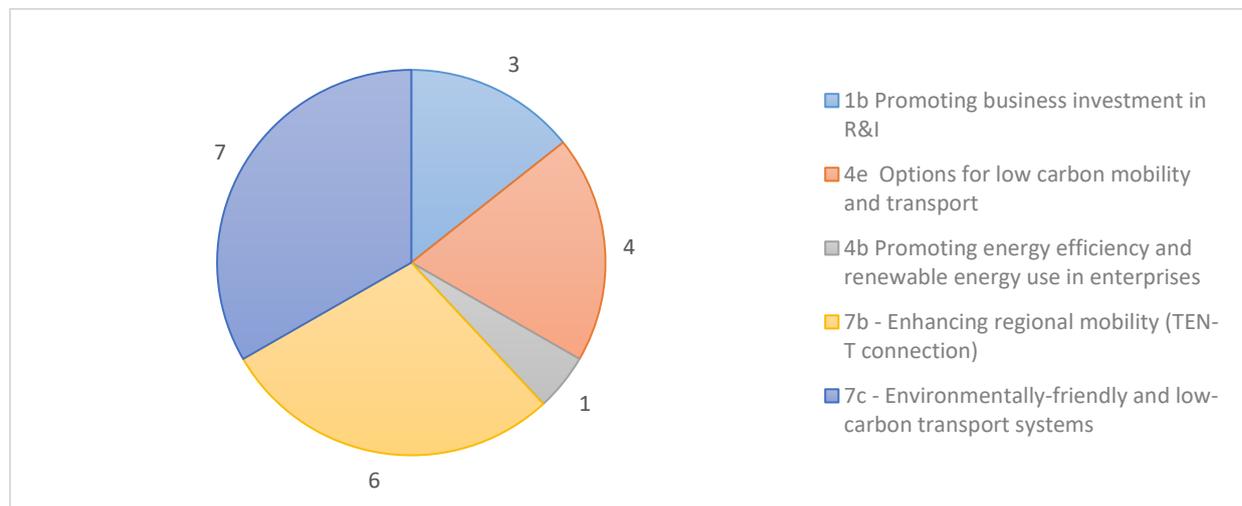
Figure 14: Sampled programmes – total budget and TOs Budget



Source: authors' elaboration on mapping data (2020)

To have a more detailed overview, the Investment Priorities of each of the selected Programmes were also analysed. Each Thematic Objective may include a set of Investment Priorities. These are defined according to the regional and national contexts and thus may better reflect local features. The figure below shows the frequency of relevant Investment Priorities amongst the 19 sampled Programmes.

Figure 15: Frequency of Investment Priorities (IPs) (number)



Source: authors' elaboration on mapping data (2020)

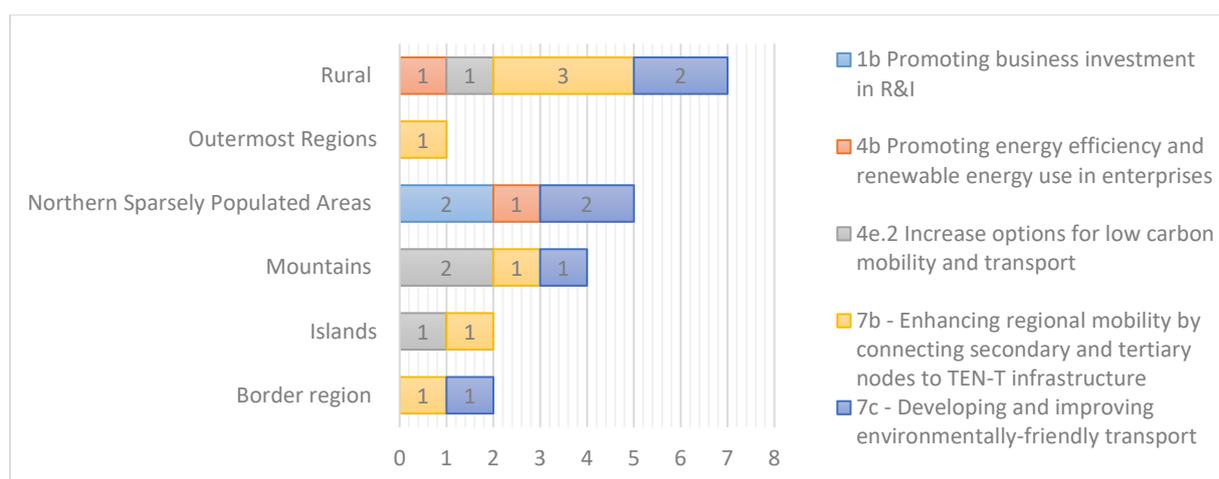
Whilst it is predictable that Investment Priorities under TO7: “Transport and Energy” are the most frequent, a focus on eco-friendly and low-carbon transport can be observed. Indeed, either IP 7c: “Environmentally friendly and low-carbon transport systems” or IP 4e: “Options for low-carbon mobility and transport” are found in 60% of the selected Operational Programmes. IP 7b “Enhancing regional mobility by connecting secondary and tertiary nodes to TEN-T infrastructure, including multimodal nodes” is rather relevant. This suggests that the connection of secondary and tertiary nodes to TEN-T network are relevant to the regions on which the study is focusing.

Indeed, with the relevant exemption of NSPAs – the TEN-T Network¹²⁴ covers all the remaining relevant regions – regardless to their specific geography or demography. Hence, policy priorities aimed at supporting connection to the TEN-T are particularly relevant. Even though their frequency is limited, IPs that focus on enterprises are also potentially important. IP 1b: “Promoting business investments in R&I” and IP 4b: “Promoting energy efficiency and renewable energy use in enterprises” mostly target the private sector leveraging its ability to deliver more efficient and more innovative transport solutions.

The figure below shows the distribution of Investment Priorities per type of region. It is possible to highlight several interesting trends within the selected programmes:

- Programmes implemented in the **Northern Sparsely Populated Areas (NSPAs) have a clear focus on innovative and sustainable transport** while TEN-T priorities are not relevant (as IP 7b is not covered). This is consistent with the overall framework of Regional Policy. Indeed, Art. 11 of the current ERDF regulation¹²⁵ exempts “northernmost regions with very low population density” from the Thematic Concentration laid down by Art. 4¹²⁶. This potentially allows to spend more resources on promoting sustainable transport which is in line with what emerged from the mapping analysis (see Figure 16).
- **Rural areas** tend to have a **focus on the improvement of TEN-T network** as IP 7b is the most common IPs in the relevant programmes.
- A certain focus on **low-carbon transport is found in mountains areas**.
- There is **no obvious trend in the outermost regions, islands and border regions**.

Figure 16: Distribution of IPs amongst types of regions (number of programmes)



Source: authors' elaboration on mapping data (2021)

¹²⁴ “Regulation (EU) No 1315/2013 of the European Parliament and of the Council Union of 11 December 2013 on Guidelines for the development of the trans-European transport network and repealing Decision No 661/2010/EU”. Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32013R1315&rid=1>

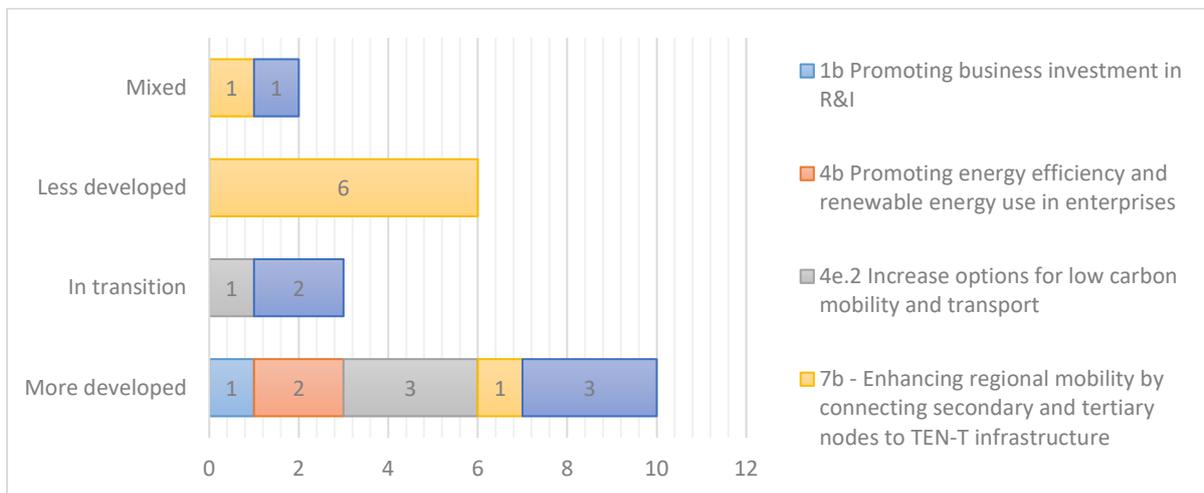
¹²⁵ “Regulation (EU) No 1301/2013 of the European Parliament and of the Council of 17 December 2013 on the European Regional Development Fund and on specific provisions concerning the Investment for growth and jobs goal and repealing Regulation (EC) No 1080/2006”. Available at: <https://eur-lex.europa.eu/legal-content/en/TXT/?uri=CELEX%3A32013R1301>

¹²⁶ EU Regional Policy lays down a specific allocation of Thematic Objectives according to the level of economic development (less developed, in transition, and more developed).

To further identify relevant factors influencing the choice of Investment Priorities, the level of economic development of the respective region has also been considered. As the figure below shows, **TEN-T connections appear to be relevant exclusively to less developed low-density and depopulating regions.** Indeed, these regions can suffer from long-lasting challenges in developing sufficient transport networks and poor connectivity to the TEN-T network (see Case Study: Lower Danube). Thus, the focus on improving TEN-T secondary and tertiary nodes may result from their level of economic development rather than their demography or geography. On the other hand, **more developed regions show a more balanced selection of relevant IPs.** The most common are either IP4e “Increasing options for low-carbon mobility and transport” or IP7c “Developing and improving environmentally friendly transport”. These IPs are not found in any of the less developed regions included in the sample. This may lead to the conclusion that the focus **on sustainable transport is more likely to happen in regional contexts where basic transport needs are already solved.**

In addition, it should be noted that Article 9 of Regulation (EU) No 1303/2013 laid down strict resource allocation rules. More developed regions must allocate at least 80% of the total ERDF resources to Thematic Objectives 1, 2, 3 and 4. Paragraph (ii) of the same article also specifies that at least 20% of ERDF resources should be allocated to TO 4. On the other hand, less developed regions have more room for manoeuvre as only 50% of total resources had to be allocated to the above-mentioned Thematic Objectives. Only low-density and outermost regions are granted an exemption from these budget rules. This may lead to the conclusion that – as far as the 2014-2020 Programming Period is concerned – **economic development remains the key criteria to identify priorities and design strategies.** This has a clear impact on the design of transport policies – which seem to be much **more influenced by the economic development level rather than geography and demography.**

Figure 17: Distribution of IPs per level of economic development (Number of Programmes)



Source: authors' elaboration on mapping data (2021)

b. Implementing EU Policies: relevant projects and measures

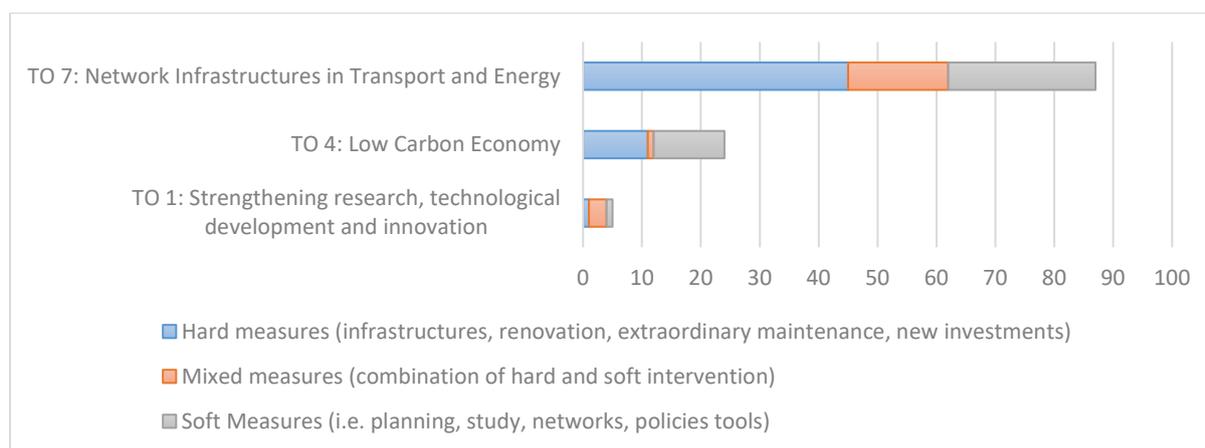
Amongst the 19 Operational Programmes, 116 transport projects were identified – a sufficiently large sample to identify possible conclusions and highlight key findings. In the scope of this study, a flexible definition of “transport project” has been adopted. Indeed, projects combining transport provisions with other interventions (i.e. the implementation of bike lane exclusively for touristic and leisure purposes) and grants aimed at developing transport solutions were considered relevant. A full list of projects is provided in Annex 4.

The figure below shows the distribution of types of measure (hard/soft/mixed) per Thematic Objective. Most of the projects (87) included in the sample are financed under TO 7: “Transport and Energy” includes most of the projects. Among these, there is a clear predominance of hard projects

focused on infrastructural interventions. Indeed, the number of hard measures (45) exceed soft (25) and mixed (17) measures combined.

These results are heavily influenced by the very priorities of TO 7 whose focus on infrastructure is clear. On the other hand, TO 4: “Low-Carbon Economy” shows a more balanced distribution, as relevant projects are almost equally split between hard (11) and soft (12) projects. Finally, even though the sample is rather small (5), projects financed under TO 1: “Research & Innovation” are mixed or soft.

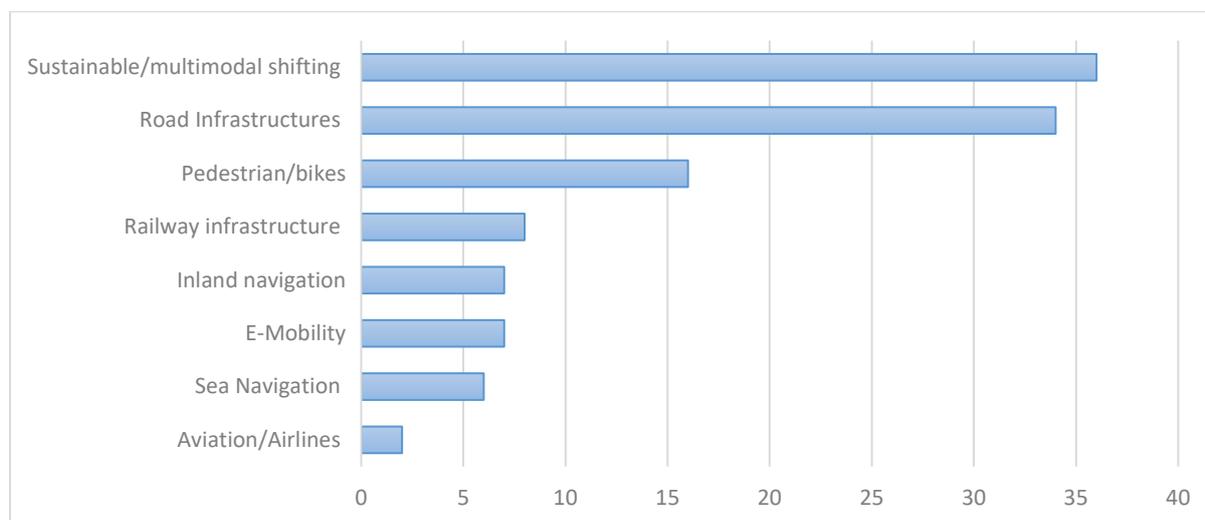
Figure 18: Types of measure per Thematic Objectives



Source: authors’ elaboration on mapping data (2021)

In the scope of this study, it is also interesting to assess the most common types of transport projects financed by ERDF programmes. The figure below provides an overview, based on the 116 projects included in the sample. Road infrastructures (34) and projects aimed at boosting sustainable transport and modal shift (36) appear to be – by far – the most common. This suggests that the focus is on both “traditional” mode of transports (such as road infrastructure) and alternative approaches to providing transport. It is also interesting to notice a relatively modest importance of railway projects (8) while pedestrian/bike lanes are the third most common type of transport projects financed by the sampled Programmes. E-mobility is less frequently addressed, while sea (6) and inland navigation (7) projects are inherently influenced by local geographical features. Finally, only 2 out of 116 relevant projects concerned aviation or airlines.

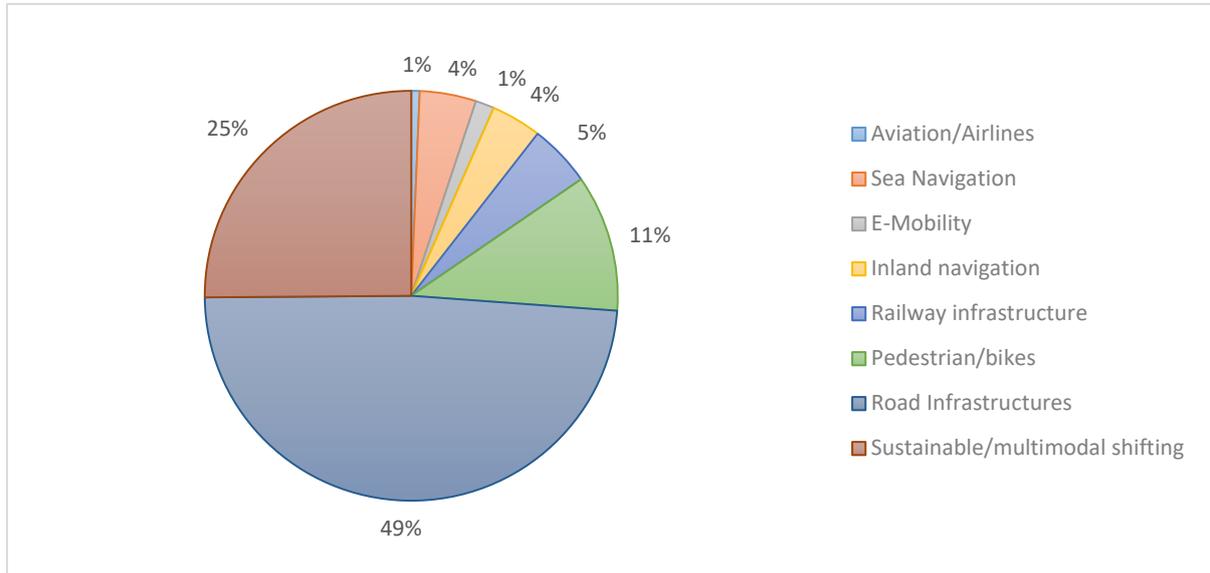
Figure 19: Type of transport project (number)



Source: authors’ elaboration on mapping data (2021)

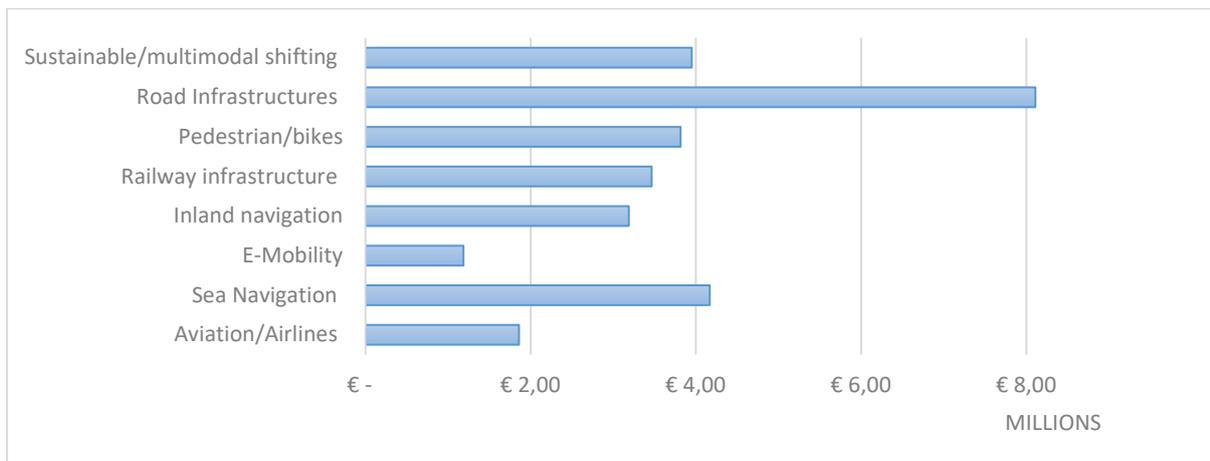
To further understand the relevance of the different transport modes in the selected Programme, it is equally important to assess their overall funding. Figure 20 and Figure 21 show both the total and the average budget per type of transport project.

Figure 20: Total budget per type of transport project



Source: authors' elaboration on mapping data (2021)

Figure 21: Average budget per type of transport project



Source: authors' elaboration on mapping data (2021)

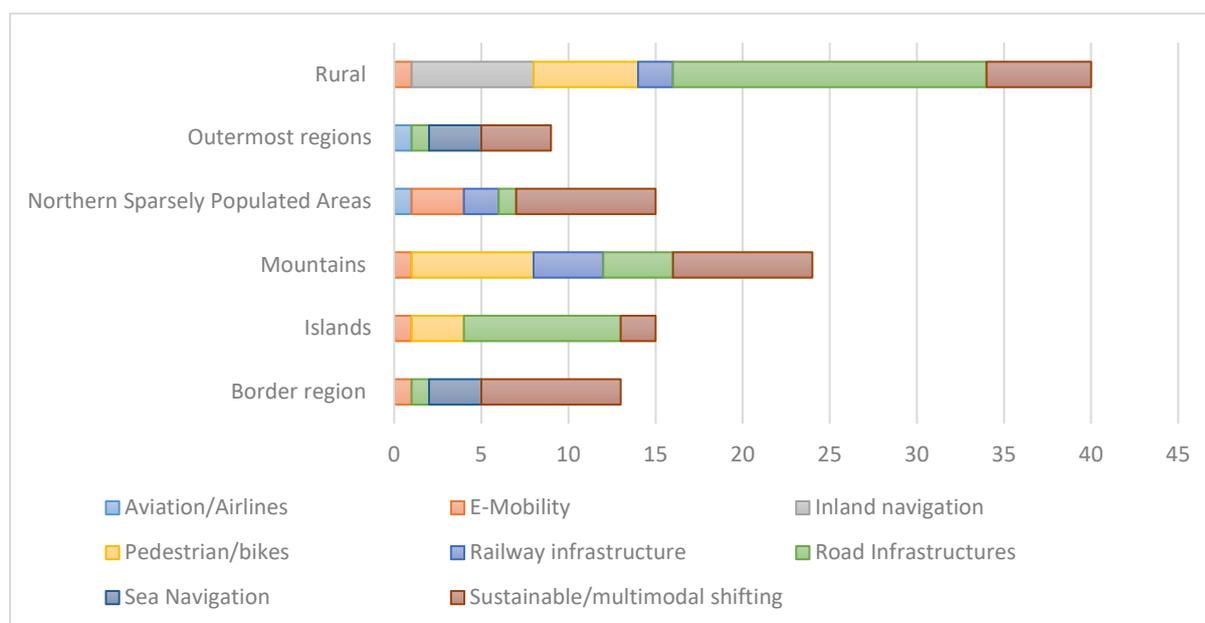
Road infrastructure receives the highest share (almost half) of EU funds in the sampled Programmes that have been implemented in low-density and depopulating areas. Moreover, their average budget (8.1 EUR million) is by far the highest amongst the relevant type of transport projects. This evidence may lead to the conclusion that – despite the increasing significance of innovative and sustainable solutions – road infrastructure remains the cornerstone of EU policies in low-density and depopulating areas. Even though projects aimed at “sustainable/multimodal shifting” are the most numerous, their average budget is half (3.9 EUR million) the average budget for road transport. In fact, they are often soft projects focused on developing new strategies or defining new plans. There are few hard infrastructure projects (4) in this context.

It is also interesting to highlight the importance of Pedestrian/bikes projects. With a combined budget over 60 EUR million, they receive more funding than railway projects whose relevance in low-density and depopulating areas appears to be rather modest. Considering that two Programmes in the sample are covering the Danube area, one may highlight a relative under-

financing of inland navigation projects whose total budget is about EUR 22 million (4% of the total combined budget). E-mobility and aviation/airlines projects receive only a small share of the overall budget. However, these overall considerations may overlook the specific features of the assessed regions. Indeed, as often mentioned throughout this study, each low-density and depopulating area is somehow unique and aggregated findings may not be relevant at the local level.

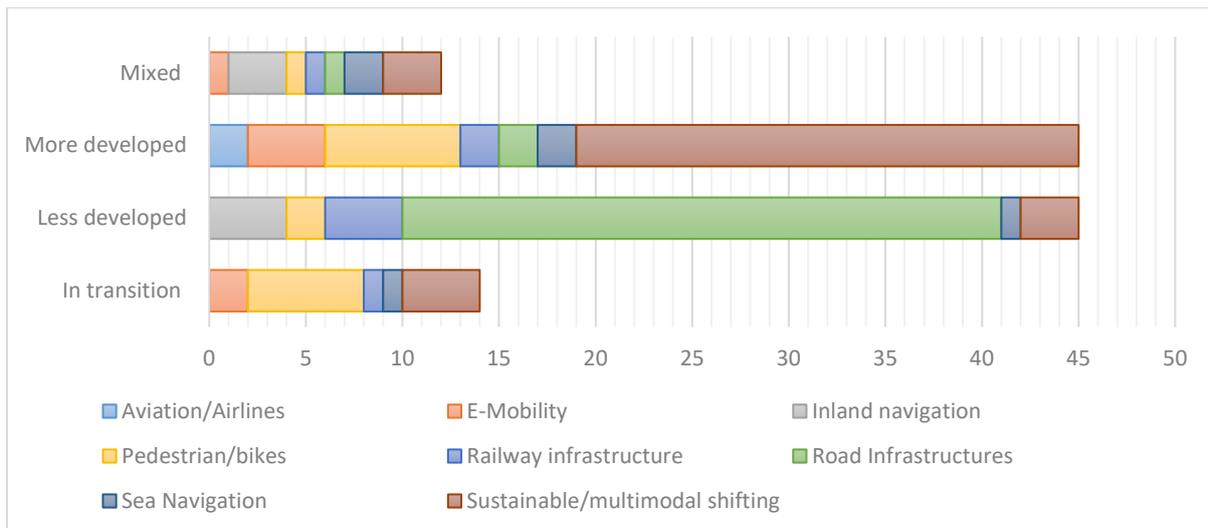
Figure 22 shows that most of the road projects are implemented in rural areas. Out of 41 transport projects implemented in rural areas, 18 concern road infrastructures. Projects aimed at sustainable/multimodal shifting and pedestrian/bike lanes have some importance – even though it is rather modest compared to the clear predominance of road infrastructure. Innovative transport modes such as e-mobility appear to be marginal in rural areas. On the other hand, sustainable and innovative transport appear to be more relevant in NSPAs and mountain areas. The former have the highest share of both ‘E-Mobility’ and ‘Multimodal transport’ projects while the latter focus on pedestrian/bikes lanes especially for touristic purposes (e.g. Operational Programme Valle d’Aosta) or on innovative and digital transport projects (e.g. Alpine Interreg). It is also interesting to notice that no sea navigation project is implemented in islands which – in turn – have a clear predominance of road projects. This is partly due to the large-scale road renovation intervention carried out by Crete’s Operational Programme.

Figure 22: Types of transport projects per category of region (geography)



Source: authors’ elaboration on mapping data (2021)

Figure 23 shows the distribution of type of projects per level of economic development. There is a stark contrast between less and more developed regions. While the former have a clear predominance of road projects, sustainable and innovative transport modes are the most common in the latter. More than two-thirds (31) of the projects implemented in less developed regions concern road infrastructure. The remaining transport modes have little or no importance. In contrast, only 2 projects out of 45 implemented in more developed regions cover road transport and projects aimed at sustainable and multimodal shifting represent more than half (26) of the total. Likewise, ‘pedestrian/bikes’ and ‘e-mobility’ have an important share. Thus, it can be concluded that ERDF funded programmes in more developed low-density and depopulating regions are more likely to finance innovative and sustainable transport. Indeed, “traditional” transport modes – such as railways and roads – have a rather marginal importance. In line with what emerged from the assessment strategies and priorities, it appears that the selection of the type of transport projects financed by ERDF Programmes is determined by the level of economic development rather than demographic and geographical considerations.

Figure 23: Types of projects per level of economic development


Source: authors' elaboration on mapping data (2021)

5.1.7. Conclusions

Before highlighting the main conclusions emerging from the mapping analysis, it is important to outline two main caveats:

- The selected programmes refer to a limited sample of NUTS2 regions. As described in Section 3, each low-density and depopulating region displays a unique set of features which inherently affect transport policies and objectives. Thus, **the results of the mapping exercise should mainly serve as an illustration.**
- **The interplay amongst the different types of factors** (geography, demography, and economic development) **is not captured by the mapping tool.** For instance, one region may be less developed because of its demography or geography.

Given these caveats, it is possible to highlight some key findings:

- It is **hard to identify a common approach** in terms of priorities and strategies for all types of low-density and depopulating regions. In fact, based on the result of the mapping tool, it appears that the selection of Thematic Objectives and Investment Priorities highly depends on the specific features of each relevant region.
- **ERDF funded programmes finance all types of transport modes even though their relevance changes according to regional features.** Road transport and sustainable/multimodal projects are the most common overall, but their importance is not evenly distributed amongst the selected sample.
- **The level of economic development appears to be more important to the definition of objectives and the selection of projects than demographic and geographical considerations.** Indeed, while the relevant legislative framework defines regions according to their economic context, demographic and geographical considerations appear to have limited importance. Except for sparsely populated and outermost regions, the remaining low-density and depopulating areas are hardly considered by the ERDF strategies. Thus, the focus on economic development somehow overshadows specific demographic and geographical features.
- **Road infrastructure receives the highest share of EU funding** – both in terms of total and average budget. In the framework of Cohesion and Regional Policy, **traditional transport – especially roads – still have a significant weight in EU policies in low density and depopulating regions.**

Overview of Relevant National Policies

This section zooms into selected national policies targeting depopulating and low-density areas in France¹²⁷, Italy and Spain. A brief analysis of these shows the commonalities between the target areas, and how the different configurations of the countries and the specific characteristics of the territories impact the strategic measures devised. The analysis also reveals that the EU cohesion policy brought the low density and depopulating areas at the centre of the public debate, thereby favouring the development of actions to address what had become, in many cases, chronic deficiencies in the provision of services, particularly transport. Finally, an important shift in the approach to these areas can be observed in the formulation of tailored strategies that go beyond the sole investment in infrastructures.

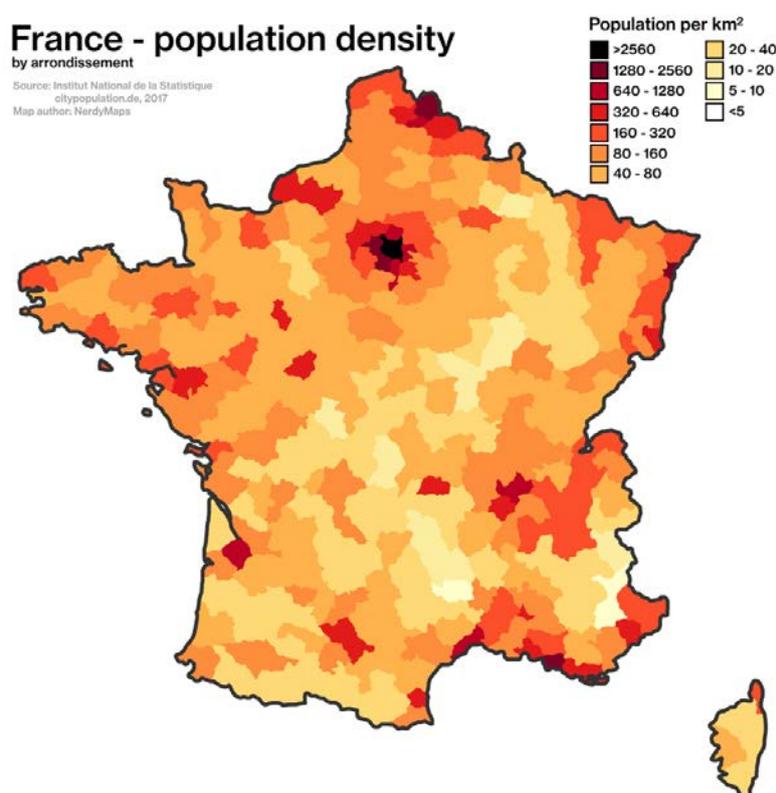
5.1.8. France: “The territories and the rural”

The French territory is characterised by opposite dynamics, namely: Paris versus regions, cities versus periphery, and urban versus rural France. In this context, jobs are increasingly concentrated in metropolitan areas, while housing is clustered in the suburbs¹²⁸.

The “Diagonal Void or Emptiness” (*Diagonale du vide*) describes a diagonal band which crosses France from south-west to north-east, and is characterised by being mainly rural, aging and lowly populated, mostly due to migration to urban centres. Its particularities started to come to the public’s attention in the 1970s, when the severe loss of population led to the closure of many public services and thus, a deterioration in the living conditions of the remaining inhabitants.

The Diagonal comprises one-third of the national territory, but only 10% of the population, Figure 24.

Figure 24: Diagonal void



Source: INSEE

¹²⁷ It is important to note that France does not have specific policies targeting the Diagonal, but there are several initiatives and programmes that address specific areas within it, and which can also be applicable to other parts of the country outside the Diagonal.

¹²⁸ Institut Montaigne (2019), “Faces of France. The Barometer of Territories 2019”, Document de Travail. Available at: www.institutmontaigne.org/en/publications/faces-france-barometer-territories-2019

In the past few years, the population decline within the Diagonal has reversed, mainly due to newcomers venturing to increasingly remote areas. The growth of low-density areas concerns 80% of the departments in the country and is particularly significant in low-density municipalities located in the outskirts of the main cities¹²⁹. However, this has not yet been matched by an equal recovery of public services, which also need to address the continuing urban sprawl caused by the redistribution of the population. Seven out of 10 employees still use cars to go to work¹³⁰.

Approved by the French National Assembly on 24 December 2019, the Mobility Orientation Law (*Loi d'Orientation des Mobilités*, LOM Act)¹³¹ promotes the transition to a more sustainable mobility system that aims to improve the everyday mobility of all citizens, in all regions, through more efficient, cleaner, and accessible transport solutions¹³².

The measures embodied in the LOM are expected to have a positive impact in low-density and depopulating areas. The role of the organising mobility authorities (*Autorités Organisatrices de la Mobilité*, AOMs), which are responsible for the management of the urban public transport within their perimeter through a Sustainable Urban Mobility Plan (SUMP), is significantly reinforced. The AOMs are intended to cover all the territory and not only metropolitan areas and are given more responsibilities, enabling them to organise and propose alternative mobility solutions such as car-sharing, carpooling, on-demand transport, socially responsible transport, intermodal services and so on. Placing decision-making centres closer to the territories enables the development of more concrete, fast and adapted strategies. Likewise, the LOM intends to end discrimination in accessibility to public transport by improving the availability of services in poorly connected regions.

Nonetheless, the LOM has also faced strong criticism. Some measures such as the promotion of public transport or the increase of fuel taxes are considered to have a negative impact in already disadvantaged regions, where private cars continue to be the main (and only) travel option. In fact, considering the complex combination of underlying factors, the yellow vests could be considered a direct consequence of this inequality among territories, as suggested by the significant support for the protests within the Diagonal¹³³.

The National Cohesion Agency (*Agence nationale de la cohésion des territoires*, ANCT)¹³⁴ operates a wide range of public policies focused on reducing the inequalities between territories by considering the diversity of geographical situations, in conjunction with local authorities, to design adapted and concrete solutions for each type of territory that enhance the effectiveness of the actions. Many of these policies target different challenges of the Diagonal regions.

The major national programmes are listed below¹³⁵:

- **Heart of the City Action**¹³⁶ aims to improve the living conditions of medium-sized towns' inhabitants and to reinforce their driving role in the development of the territory.
- **Industrial Territories**¹³⁷ provides specific support to revitalise local industry and create employment.
- **Small Cities of Tomorrow**¹³⁸ supports the revitalisation of small towns, strengthening their central role and reinforcing the territorial network.

¹²⁹ INSEE (2019), Marked population growth in low-density areas. Available at: www.insee.fr/en/statistiques/4293466

¹³⁰ INSEE (2019), Seven out of ten employees go to work by car. Available at: www.insee.fr/en/statistiques/4137155

¹³¹ LOM, www.legifrance.gouv.fr/eli/loi/2019/12/24/TRET1821032L/jo/texte

¹³² www.ecologique-solidaire.gouv.fr/elisabeth-borne-et-jean-baptiste-djebbari-saluent-promulgation-loi-dorientation-des-mobilites.

¹³³ Institut Montaigne (2019), "The Yellow Vest protesters: the tip of the French social crisis?" Available at: www.institutmontaigne.org/en/blog/yellow-vest-protesters-tip-french-social-crisis

¹³⁴ The ANCT is operative since 2020.

¹³⁵ <http://agence-cohesion-territoires.gouv.fr/territoires-et-ruralites-99>

¹³⁶ <https://agence-cohesion-territoires.gouv.fr/action-coeur-de-ville-42>

¹³⁷ <https://agence-cohesion-territoires.gouv.fr/territoires-dindustrie-44>

¹³⁸ <https://agence-cohesion-territoires.gouv.fr/petites-villes-de-demain-45>

- **France Services**¹³⁹ aims to facilitate access to the same quality of public services and professional assistance to all citizens, independently of where they live, through a one-stop-shop, which is also conceived as a space for innovation¹⁴⁰. The deployment of these services across the territory is expected to mitigate the negative consequences of the strong centralisation promoted in previous years¹⁴¹.

Furthermore, the ANCT features the Mountain Programme (*Programme Montagne*¹⁴²) to support mountainous regions in the reorientation of their tourism strategies and the creation of new development models, aiming to mitigate some of the climate change related challenges¹⁴³. Some of the actions devised include the use of new technologies to improve mobility, contribute to the implementation of a sustainable transport policy and mobility services (to gradually replace the use of private car by public or shared transportation), or the digitalisation and adjustments of the logistics to the territory characteristics¹⁴⁴.

Similarly, the Territorial Pacts¹⁴⁵ (*Les pactes territoriaux*) target territories facing demographic and economic difficulties, providing support in the development and implementation of intervention projects to address such problems. The mining areas are some of the targeted territories, some of which are located within the Diagonal¹⁴⁶. The Rurality Programme (*Programme Ruralités*) works with rural territories through the coordination of the rural agenda, the government's roadmap to favour the development of the rural areas and improve the daily life of their population. Some of the measures implemented were aimed to support small railway lines or the youth mobility through an online platform¹⁴⁷.

In addition, it is also worth mentioning the **French Mobility Programme**¹⁴⁸, which set up regional support units to foster innovation in sparsely populated areas.

5.1.9. Italy: Inner Areas Strategy

The Italian territory is characterised by a polycentric system¹⁴⁹ – i.e. a network of municipalities or hubs offering basic services, around which areas gravitate with different degrees of spatial *peripherality*. The Inner Areas, defined as territories substantially far from centres offering essential services (health, education, mobility) account for over 60% of the Italian territory and 23% of the population¹⁵⁰.

¹³⁹ <https://agence-cohesion-territoires.gouv.fr/france-services-36>

¹⁴⁰ ANCT, France Services : <http://agence-cohesion-territoires.gouv.fr/france-services-36>

¹⁴¹ https://agence-cohesion-territoires.gouv.fr/sites/default/files/2020-05/dp_2020-france-services-web.pdf

¹⁴² <https://agence-cohesion-territoires.gouv.fr/programme-montagne-112>

¹⁴³ ANCT, Programme Montagne: <https://agence-cohesion-territoires.gouv.fr/programme-montagne-112>

¹⁴⁴ Convention interrégionale du massif des Alpes (CIMA), Fiche de mesures 2015.

Available at: https://agence-cohesion-territoires.gouv.fr/sites/default/files/2020-06/fiches_mesures_cima.pdf

¹⁴⁵ <https://agence-cohesion-territoires.gouv.fr/les-pactes-territoriaux-75>

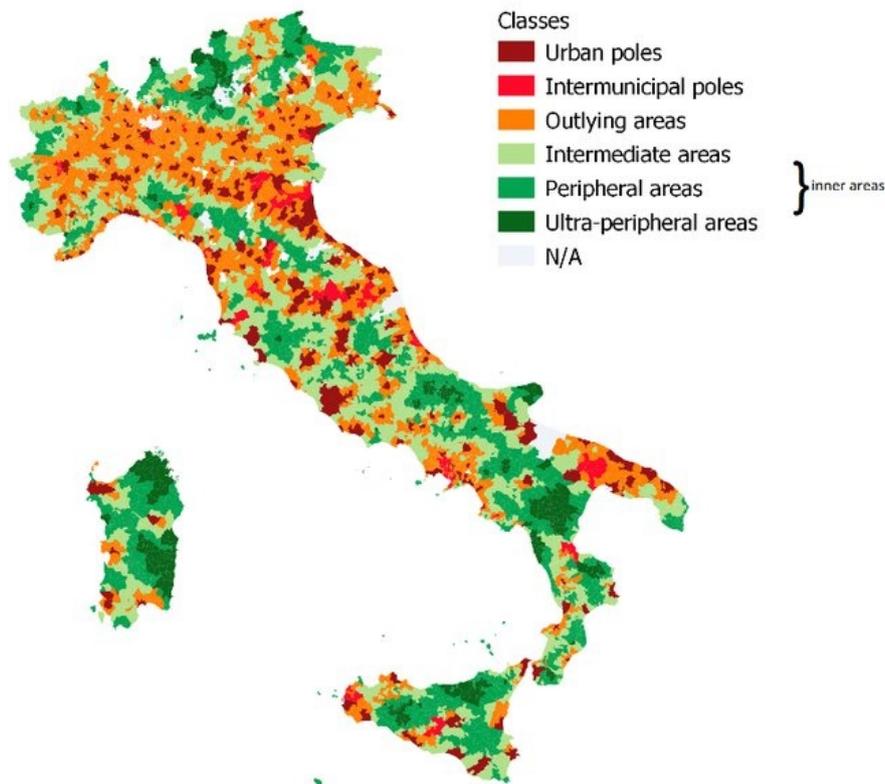
¹⁴⁶ ANCT, Les Pactes territoriaux: <http://agence-cohesion-territoires.gouv.fr/les-pactes-territoriaux-75>

¹⁴⁷ ANCT, Programme Ruralités: <http://agence-cohesion-territoires.gouv.fr/programme-ruralites-46>

¹⁴⁸ France Mobility: www.francemobilites.fr/ingenierie

¹⁴⁹ Materiali Uval, "A strategy for inner areas in Italy: definition, objectives, tools and governance", Issue 31, 2014. Available at: http://old2018.agenziacoazione.gov.it/opencms/export/sites/dps/it/documentazione/servizi/materiali_uval/Documenti/MUVAL_3_1_Aree_interne_ENG.pdf

¹⁵⁰ European Network for Rural Development (ENRD, 2018), "Strategy for Inner Areas Italy", Working Document. Available at: https://enrd.ec.europa.eu/sites/enrd/files/tg_smart-villages_case-study_it.pdf

Figure 25: Italian Inner Areas according to SNAI (National Strategy for Inner Areas) classification¹⁵¹


Source: Urso et al

In 2014, there were 4,185 municipalities classified as Inner Areas, which represented almost 52% of total Italian municipalities and comprised more than 13 million inhabitants¹⁵².

Highly diverse due to the dynamics of the natural systems and specific anthropisation (referred to the human action in the environment) processes and historically deprived of many services, the Inner Areas have experienced a lengthy and steady period of abandonment in favour of urban hubs. The severe ageing and depopulation have been matched by a further decline in services. The public and private interventions have also failed to generate value for these communities, and innovation was sometimes deterred by local opposition to outside intervention. Nevertheless, Inner Areas are endowed with significant strategic environmental and cultural resources which a solid and inclusive national strategy could unlock.

The National Strategy for Inner Areas (SNAI by its Italian acronym) was launched in 2012. It aims to support the sustainable territorial competitiveness of such areas to foster development and social inclusion and, ultimately, improve the wellbeing of the inhabitants¹⁵³. For this purpose, it devises a set of actions to promote a diversified economy through local projects that unlock their resources' potential and to guarantee the access to basic services such as local public transport, education, and healthcare. These measures are expected to safeguard, rehabilitate and revitalise these areas, thus reverting the trends of depopulation, impoverishment and isolation¹⁵⁴.

¹⁵¹ Urso, G., Modica, M., Faggian, A. (2019), "Resilience and Sectoral Composition Change of Italian Inner Areas in Response to the Great Recession". *Sustainability*. 11. 2679. 10.3390/su11092679.

¹⁵² Romagnoli, L., Mastronardi, L. (2020), "Can Local Policies Reduce the Gap between 'Centers' and 'Inner Areas'? The Case of Italian Municipalities' Expenditure", *Economies*. Published: 20 April 2020.

¹⁵³ Agenzia per la Coesione Territoriale: www.agenziacoesione.gov.it/agenzia/obiettivi-e-finalita/strategia/

¹⁵⁴ Public Investment Evaluation Unit (UVAL) (2014), "A Strategy for Inner Areas in Italy: Definition, Objectives, Tools and Governance", Available at: www.agenziacoesione.gov.it/lacoesione/le-politiche-di-coesione-in-italia-2014-2020/strategie-delle-politiche-di-coesione/strategia-nazionale-per-le-aree-interne/

The Strategy lays down five mid-term objectives: 1. Improving the wellbeing of local populations; 2. Growing local labour demand (and employment); 3. Promoting the use of territorial capital; 4. Lowering the social costs of de-anthropisation; and, 5. Boosting local development factors. These interdependent objectives help to define the two types of local development – intensive and extensive¹⁵⁵ – and contribute to demographic recovery in Inner Areas. To accomplish these, the Strategy foresees two types of actions, namely: upgrading the quality and quantity of the basic services and promoting local development projects, both tools with a national and local dimension. The Strategy identifies five categories of local development projects: A. Active territorial/environmental sustainability protection; B. valorisation of natural/cultural capital and tourism; C. valorisation of agriculture and food systems; D. Activation of renewable energy supply chains; and, E. Know-how and crafts. The Strategy was part of the National Reform Plan (NRP) and in line with the Development Pacts and the National Smart Specialisation Strategy¹⁵⁶.

Preliminary results show that the SNAI has produced a significant change in Inner Areas by outlining the importance of place-based solutions to place-specific issues, involving in the process local stakeholders, communities and policymakers. It has also helped to overcome the traditional way of viewing Italian territory in a north-south and city-rural way, putting the focus on the access to services and opportunities to build on the specificities of the territories¹⁵⁷. It also brought back these areas onto the political agenda.

Some of the projects supported include community carpooling, remote classrooms, remote diagnostics by hospital personnel through smart technologies in pharmacies, and smart devices to allow the monitoring of landslides¹⁵⁸.

5.1.10. Spain: Plan to reactivate the depopulated areas (*Plan de Reactivación de las zonas despobladas*)

Almost half of the Spanish population lives in 4% of the territory (the 100 most populated municipalities are home to 22 million inhabitants), with this trend consolidating¹⁵⁹. The interior migration from rural regions to large cities such as Madrid and Barcelona¹⁶⁰, and especially the generalisation of the central-peripheral spatial distribution within the regions (migration to the provinces' capital cities or their mid-sized cities, as well as to the capital of the autonomous Communities), are outlined as the main causes of the so-called *España vacía* (Empty Spain)¹⁶¹. The centre of Spain, except for the capital Madrid, is the most affected area.

¹⁵⁵ Intensive development refers to all those changes that improve the per capita wellbeing of residents in Inner Areas; extensive development refers to all those changes that lead to increased job opportunities and territorial capital uptake.

¹⁵⁶ Agenzia per la Coesione Territoriale: www.agenziacoesione.gov.it/lagenzia/obiettivi-e-finalita/strategia/

¹⁵⁷ "Uscire dal vecchio mondo: dialogo con Fabrizio Barca", 2017.

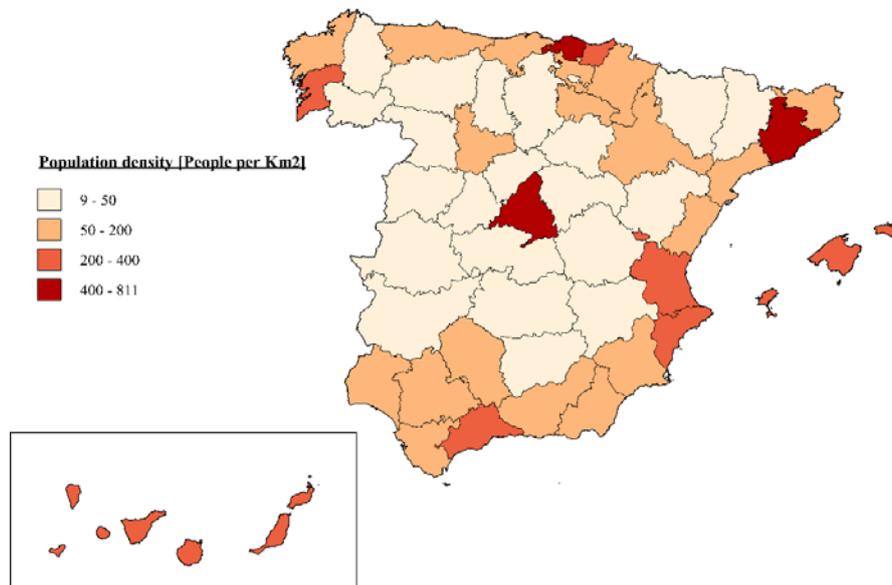
Available at : www.che-fare.com/uscire-dal-vecchio-mondo-dialogo-con-fabrizio-barca/

¹⁵⁸ European Network for Rural Development (ENRD, 2018), "Strategy for Inner Areas Italy", Working Document. Available at: https://enrd.ec.europa.eu/sites/enrd/files/tg_smart-villages_case-study_it.pdf

¹⁵⁹ "La España vacía", gestionado por el líder global en sistemas de información geográfica ESRI".

¹⁶⁰ Instituto Nacional de Estadística (INE).

¹⁶¹ Stratego (2019). "Envejecimiento en los municipios españoles: situación y perspectivas (2018)". Informe Stratego, Agosto 2019. Available at : <https://strategocyc.com/wp-content/uploads/2019/08/INFORME-STRATEGO-ENVEJECIMIENTO-MUNICIPIOS-DE-ESPA%C3%91A.pdf> (BROKEN LINK! PLEASE FIX REFERENCE)

Figure 26: España vacía (Empty Spain) 2019

Source: INE

The severity of this demographic phenomenon has drawn the attention of national and regional authorities, as well as Spanish society in general. The loss of population translates into loss of investment, infrastructure and basic services, thus further deepening the negative demographic trend in rural areas. Despite awareness of the problem, few measures have been introduced to address them and their outcomes have been uneven.

In 2020, the Spanish government established the vice-presidency for the Ecological Transition and the Demographic Challenge. The aim was to formulate a “Plan to Reactivate the depopulated areas” and steer the state pact on the matter: “State Pact: towards a structured Spain, for territorial balance, sustainability and the demographic challenge, in an emptied Spain” (*Pacto de estado: hacia una España vertebrada, por el equilibrio territorial, la sostenibilidad y el reto demográfico, en la España vaciada*)¹⁶².

Aligned with the objectives of the Recovery Plan for Europe Europa (2021-2027) and the Next Generation EU (2021-2024) instrument, the plan aims to establish a programme for the modernisation of transport and telecommunications infrastructures capable of reaching all rural population. This is intended to achieve an improvement in territorial accessibility, promoting sustainable and competitive transport models within the framework of a future Rural Mobility Committee, as well as the digitalisation of all territories, improving connectivity through high-speed broadband.

Another important aspect of the reactivation plan is the promotion of housing by Territorial Development Agencies and the drawing up of a set of measures to boost economic activity in areas affected by depopulation.

Finally, the reactivation plan promotes economic diversification. It focuses on activities related to ecological modernisation and locally-based industrialisation, linked to the green and blue ecological transition, by generating added value and research, development and innovation (RDI) investment, with a view to digital transformation. Ultimately, the plan intends to “revitalise the social and economic structure of the rural”.

Some data indicates that intensive depopulation of rural areas (from the post-war period to 1970) has slowed down in recent years and, in some cases, the trend has reversed. Many foreign

¹⁶² The initial objective was to have a Plan by the end of 2020, but the initiative seems to be on hold since the start of the pandemic.

immigrants are settling in depopulated areas in search of a slower lifestyle, while others move to seize economic opportunities and benefit from a lower cost of living. In 2018, some municipalities registered more foreigners than Spanish nationals.

Efficiency and Equity Considerations

This section aims to shed light on why, beyond economic efficiency, equity considerations should be taken into account in order to deliver effective transport policies in low-density and depopulating areas. Furthermore, the section will investigate whether European and national-level policy objectives are able to address the transport needs of low-density and depopulating areas or whether there is an inherent clash between the two levels of government. Whereas the concepts of equity and efficiency are introduced by means of a literature review, the equity criteria in European and national-level transport policies (and the addressing of low-density areas specific issues) is investigated through the analysis of expert consultations¹⁶³.

5.1.11. Equity vs efficiency

Lack of accessibility may lead to various issues such as rural depopulation and social exclusion and can impede regional development and economic growth. While providing a basic level of accessibility to all socio-economic groups is important, investments in transport should be economically efficient. This requires thorough and deep understanding of the complex relationship between equity and efficiency¹⁶⁴.

The tension between efficiency and equity has been the focus of major debate since equity aspects started to be considered as part of evaluation procedures¹⁶⁵. Broadly speaking, equity refers to the distribution of impacts (benefits and costs) and whether that distribution is considered fair and appropriate¹⁶⁶. Equity in transport policy is frequently broken down into horizontal equity (the equal distribution of costs and benefits between people with equal abilities and needs), and vertical equity (which seeks to compensate for the inequalities between groups by imposing greater costs on those of greater abilities and providing greater benefits to those with greater needs). Planning for equity requires a recognition that procedures that are individually fair can be socially unjust, depending on what groups of people they affect. For example, a focus on horizontal equity might lead to equal spending per capita. However, a horizontally equal approach would not be able to compensate for the lack of investment in less-developed areas.

Efficiency, however, is widely accepted as the primary objective of transport sectors operations and is used as a criterion to guide projects design and implementation¹⁶⁷. The main tool for policy analysis in the field of transport is cost-benefit analysis, which focuses on efficiency rather than on equity aspects.¹⁶⁸

¹⁶³ A list of experts (hereinafter referred to also as stakeholders or interviewees) consulted during the course of the study is provided in Annex 3.

¹⁶⁴ Karst T. G., et al. (2016). "Accessibility, equity, and efficiency: challenges for transport and public service". Cheltenham, UK and Northampton, Massachusetts: Edward Elgar.

¹⁶⁵ At European level, the debate was initiated by the European Commission's green paper "Towards Fair and Efficient Pricing in Transport" of 1995.

¹⁶⁶ Litman T. (2020). "Evaluating Transportation Equity". Available at: <https://vtpi.org/equity.pdf>

¹⁶⁷ Isoraite M. (2005), "Evaluating efficiency and effectiveness in transport organisations". Available at: www.tandfonline.com/doi/pdf/10.1080/16484142.2005.9638027

¹⁶⁸ Rietveld P. (2003). "Winners and Losers in Transport Policy: On Efficiency, Equity, and Compensation".

Available at: <https://research.vu.nl/en/publications/winners-and-losers-in-transport-policy-on-efficiency-equity-and-c>

Box 2: Cost-Benefit Analysis

Among the various methods used to evaluate the impacts of transport infrastructure projects, **Cost-Benefit Analysis (CBA)** is one of the most common. CBA is a method where the **benefits** of a given project **are weighed against the costs** of the project (benefit to cost ratio). If the benefit to cost ratio is greater than 1, then the project is considered as a **worthy investment** and is compared against other alternative projects (or options of the same project). Due to its sound theoretical foundation CBA has been an attractive choice for many decision makers. Furthermore, **Social Cost Benefit Analysis (SCBA)** has been developed in the past few decades to address **social and other indirect project impacts**. Yet, although SCBA includes impacts not normally included in conventional CBA, it still faces some common CBA limitations, given that the measured impacts still need to be converted into monetary terms. Therefore, assessing **equity considerations using CBA has certain limitations**. For instance, CBA often does not differentiate among different beneficiaries of a project or policy. As a result, it does not account for the welfare loss of certain groups or regions, **focusing only on the aggregate welfare**.

Source: Thomopoulos N. et al. (2009)¹⁶⁹; Shang J. et al. (2004)¹⁷⁰

Such a focus on efficiency has resulted in policymakers prioritising the implementation of projects with the highest economic value added (such as cross-border lines, urban infrastructure, lines between large cities). Conversely, the development of infrastructure in sparsely populated and low-density areas is less prioritised, which can lead to a vicious circle of decreased accessibility and depopulation.

5.1.12. Societal groups in low-density areas affected by unjust transport policies

The low population density rates in certain regions imply that longer journeys are required to access (even basic) services and maintain social links. Different sections of the population are effectively disadvantaged in mobility terms by the lack of infrastructure or inadequate public transport provision. Some scholars (e.g. Titheridge et al. (2014)¹⁷¹), along with the stakeholders and experts interviewed in the course of the study, argue that while some transport policies might benefit society as a whole, they also create both winners and losers from the standpoint of mobility and accessibility. More specifically, losers from policies that are more focussed on efficiency than equity are those already disadvantaged social groups, namely:

1. **Students:** especially those from low-income households, students can find it hard to afford the bus or train journeys required for their academic activities; furthermore, students are often below the minimum age to drive;
2. **Unemployed people:** jobseekers residing in remote areas, and from deprived backgrounds, find it difficult to attend job interviews if they do not have access to a car or are reliant on expensive or inadequate public transport;
3. **Elderly people:** the aged face mobility limitations due to their physical conditions, which could worsen when they no longer have access to a private car or when public transport is expensive or lacking.

¹⁶⁹ Thomopoulos S., et al. (2009), "Incorporating equity considerations in transport infrastructure evaluation: Current practice and a proposed methodology". Available at: www.sciencedirect.com/science/article/abs/pii/S0149718909000573

¹⁷⁰ Shank J. et al. (2004), "A unified framework for multicriteria evaluation of transportation projects". Available at: <https://ieeexplore.ieee.org/document/1317176>

¹⁷¹ Titheridge H., et al. (2014), "Transport and poverty: a review of evidence". Available at: <https://www.ucl.ac.uk/transport/sites/transport/files/transport-poverty.pdf>

5.1.13. The inclusion of the equity criteria in European and national policies on transport

According to the majority of stakeholders contacted for the purpose of the study, the consideration of equity in EU and national policymaking tends to have a limited scope¹⁷². These considerations often disregard the complexity of factors that contribute to the vulnerability of individuals when it comes to mobility. For instance, they are likely to disregard the compounding effects of living in a less densely populated area, or a topographically challenged one.

In transport policy, investments continue to be made based on the number of potential users in a certain area, thus disregarding the principle of equity and the provision of greater benefits to those with greater needs (i.e. vertical equity). In turn, significant differences are observed by stakeholders in the provision of services, equipment and infrastructures in remote and depopulating areas. For instance, as mentioned during one of the interviews, investment in electric modes of transportation (private, public and shared) has, to date, mostly focused on urban centres, disregarding the mobility needs of people living in less densely populated areas. Companies are less likely to invest in electric vehicle charging stations in rural areas where they will be less profitable.

Transport policies must therefore be based on criteria of equity that are much more complex and multidimensional, assuming social and economic parameters capable of responding to sparsely populated territories.

On a more practical level, data on car owners in rural areas, for instance, should help policy makers make significant decisions and address issues concerning the frequency of existing services. According to most stakeholders, this should also facilitate the identification of areas most in need of alternative transport modes (based on the number of households that do not have access to a car).

5.1.14. European and national policy objectives and the needs of low-density and depopulating areas

When asked to assess the level of support provided by EU and national legislators to sparsely populated areas in the field of transport, the majority of stakeholders (see Annex 3) agreed that there is a general absence of targeted policies able to address their specific needs. For instance, since the 1990s European legislators have focused their attention on the construction of a modern integrated transport system, i.e. the Trans-European Transport Network (TEN-T). However, the main goal of the TEN-T was (and is) to strengthen the EU's global competitiveness. Such a goal, according to stakeholders, does not advance the development of secondary transport networks which, in turn, would help address the isolation of peripheral, rural regions. Similarly, a primary focus on more densely populated areas and economically active regions was also said to be a main characteristic of the 2013 strategy on "Alternative fuels for sustainable mobility in Europe"¹⁷³.

By contrast, EU regional policy (Cohesion Policy) is widely recognised as a policy whose objectives can support a transition to a more just and fair transport policy. According to some stakeholders, this is particularly true for railway transport policy, as it is one of the very few European instruments that provide funds for the modernisation and the construction of railway links in low-density areas. Nonetheless, it was also highlighted that, in light of the constant loss of population and loss of economic potential of rural and more remote areas, Cohesion Policy should be evaluated as an ineffective strategy in terms of territorial development and integration.

¹⁷² According to some stakeholders, there has been improvement on accessibility for disabled people, but mostly in urban areas.

¹⁷³ Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52013PC0017>

Initiatives on digital transport at European¹⁷⁴ and national level are growing in number and significance, and some stakeholders view them to be overall in line with the enhancement of accessibility and mobility within low-density and depopulating areas. Indeed, digital technologies in the field of transport aim to integrate different modes of transport to provide more flexible, on-demand, and cost-effective transport options¹⁷⁵. However, given the lower level of digital literacy in rural areas, the effectiveness of digital transport policies might be limited. In this respect, the introduction of digital transport services needs to be accompanied by upskilling of the targeted population.

However, it is important to note that, as emphasised by a smaller group of interviewees, the provision of transport within regions is under the responsibility of local administrations and that the EU is not in the position to develop specific pieces of legislation to enhance transport provision in rural and remote areas. Therefore, while EU transport policies are designed to achieve a wide objective on a European level, the development of transport infrastructures in low-density areas usually falls under national or regional strategies.

An inherent clash between European-level policy objectives and local needs was also highlighted by most stakeholders when asked to evaluate the shift to more sustainable mobility promoted by European legislators. Firstly, some stakeholders argued that some green transport measures (e.g. as the promotion of electric private vehicles) might have little impact in low-density areas, if enabling infrastructures and services (e.g. charging stations) are not provided. In addition, the questionable effectiveness of greener measures also raised the issue of efficiency. Indeed, given their disadvantaged background, rural and remote areas would need a much higher monetary investment in order to implement such measures (compared to urban areas). The stakeholders, in turn, were sceptical about whether these investments will be deemed efficient by the legislators.

Secondly, it was highlighted that rarely a one-size-fits-all transport solution can be found. While green mobility might solve many urban-related issues, inhabitants of less densely populated areas tend to be more in need of a flexible and demand-responsive transport system, rather than a greener one (i.e. the two can be complementary, but the former should be prioritised).

Furthermore, green mobility was also considered to likely weaken the accessibility of urban areas for rural dwellers. Indeed, as often green mobility means banning polluting vehicles from cities, rural dwellers might see their possibilities to reach their workplace reduced. To help them reach their destinations, many interviewees (for a complete list of stakeholders involved in the study see Annex 3) suggested multi-modal transport as a feasible option that could partially supplement the use of private cars.

¹⁷⁴ At European level, the “European Strategy for Low-Emission Mobility” and the “Digital Single Market Strategy for Europe” were mentioned.

¹⁷⁵ A flexible and demand-responsive transport system has been identified by a few stakeholders as one of the promising solutions for widespread public transport in rural areas. Flexible transport services include: shared taxicabs, shuttle vans, dial-a-ride services, paratransit services, ring-and-ride services, dial-up buses, lift shares and car-clubs.

6. CASE STUDIES

Key Findings

- Transport infrastructure is less developed in low-density and depopulating areas. Road is the main transport. The shortage of services and lack of alternatives make these areas highly car dependent.
- Low density is a long-lasting characteristic of the areas examined, which together with the dispersion of the population across territories, constitutes one of the main challenges in the provision of transport.
- New mobility solutions represent a unique opportunity for the target areas, but their implementation is very limited. The main obstacles are the overall backwardness of the infrastructures, not only in terms of transport but also broadband, the distances and the scale of the economy.

Overview of the selected regions

The case studies examined are Extremadura (Spain), the Lower Danube (Romania, Bulgaria), Övre Norrland (Sweden), and Valle D'Aosta (Italy). The sample was selected based on the following criteria:

- Relevance of the regions for the study: all case studies are low-density and/or depopulating areas.
- Geographical balance: the regions are spread across north, south, east and west Europe.
- Type of region: the defining element of the regions includes physical features such as mountainous, remoteness, inland, and access to the sea or important rivers, and administrative features such as being a border area.
- Socioeconomic characteristics including the degree of urbanisation, innovation, or the main demographic trends, among others.

Extremadura is one of the most extensive regions in Spain and has one of the lowest population densities. Following a centre-periphery model, most inhabitants live in the three main regional urban centres, while the others live in small villages scattered throughout the territory. Ageing is an important phenomenon, especially in the rural areas. Although it possesses vast natural resources, Extremadura is one of the poorest regions and has one of the highest unemployment rates in the country, especially affecting women and youth. It is also one of the less innovative regions not only in Spain, but in Western Europe.

The Lower Danube region is situated in Eastern Europe, comprising the border area between Romania and Bulgaria. The Danube River, which constitutes a natural frontier between both countries, is the main landmark of the territory and exerts an important influence in the regional economy. The demography is characterised by a low population density, which is distributed in urban centres and large rural areas, and an acute outward migration, especially among youth. Even though some differences can be observed between the Bulgarian and Romanian parts, the Lower Danube is amongst the poorest regions in the EU. The cross border cooperation is rather weak.

Övre Norrland is one of the northernmost, largest and remotest areas in Europe. The region has one of the lowest population densities in the EU, and its population is mostly concentrated in the coast. The inland part of the region is largely uninhabited and mainly consists of small villages. A slight increase in the population can be observed in the last years, mainly due to internal migration. The regional economic activities revolve around the exploitation of the natural resources, with the tourism sector growing rapidly. Övre Norrland is a relevant university and research centre. It has close ties with the territories in Finland, Norway and Russia, forming the Barents region. The remoteness of the areas makes cross-border cooperation of key importance.

Valle D'Aosta is the smallest region in Italy. Located in north western Italy, it borders with France and Switzerland. The valley constitutes part of the Alpine landscape and as such, it is near some of the highest peaks in Europe. It is the least densely populated region in Italy, with the urbanised areas, key infrastructure, and economic activities mainly located in the valleys. The decline of the natural population is being countered by the immigration of young people, which is also helping to slow down the ageing phenomenon. With a low unemployment rate, tourism is the main economic activity in the area.

Key transport infrastructures

All low-density and depopulating regions analysed are highly car dependent. This can be largely explained by the deficient development of other transport infrastructures and services. The motorisation rate varies quite significantly across the regions. Although the economic situation might have some influence, the degree of autonomy of the communities, understood as the capability to provide basic services such as education, health and jobs, might be an important factor to determine car ownership.

Despite its importance, and independently of the regional economy, the road network in low-density and depopulating areas is underdeveloped if compared with other parts of the country, the exception being Valle D'Aosta. The length of the motorways tends to be below the national average, while there are no motorways in the Lower Danube. As a result, the accessibility to and within the regions is very much hindered, affecting its socioeconomic development. The poor maintenance and safety also appear to be common issues, especially in secondary roads. These are used by passengers but also freight road transport, and in Övre Norrland and Valle D'Aosta are also exposed to severe weather conditions, which contribute to a rapid deterioration and increase the demand for stronger safety measures. The environmental impact of the road transport is another major concern.

The railway network is affected by significant shortcomings in all regions. The infrastructure does not provide an adequate coverage and it is often in poor condition due to the abandonment of many sections in favour of roads. Most regions have an obsolete infrastructure that dates from the XIX, beginning of XX century. Single tracks and low electrification are some of the most common problems, coupled with restricted speeds, low internal and external accessibility. None of the regions have high-speed trains and, in some cases such as Övre Norrland, have been excluded from core projects such as the TEN-T. Safety constitutes another crucial issue that has not been properly addressed, with railway operators relying on outdated measures.

In addition to the infrastructural deficiencies, the rail services are often inadequate. The closure of railway stations has left many communities without service and, thus, a car is needed to travel to the nearest station. The timetable, cost and time hardly match the needs of the potential users. Moreover, delays and malfunctions are very frequent, making the railway very unreliable in these areas. Only Valle D'Aosta has experienced a sharp increase in the demand of railway services, which constitutes, together with coaches, the most used public transport.

Concerning air transport, the situation is rather akin across the regions examined. Extremadura and Valle D'Aosta have one airport. While the one in Extremadura functions under the Public Service Obligations (PSO)¹⁷⁶ and only covers two national routes, the airport in Valle D'Aosta does not currently operate commercial flights. In both cases, the population often opts (or must opt) for travel from the closest international airports, Madrid and Milan. The Lower Danube is served by two airports, both located in Romania. Due to its remoteness, air transport of goods and passengers is very important for Övre Norrland. The region has at least an aerodrome in every medium-size town, some of which function under the PSO arrangements.

The Danube constitutes one of the main inland waterways in Europe. The river is therefore vital for transportation in the Lower Danube region. However, the constraints in the development of logistic

¹⁷⁶ Public Service Obligations: https://ec.europa.eu/transport/modes/air/internal-market/psa_en

hubs, which could increase the capabilities of the ports along the river and enhance their accessibility and the regional connectivity, are hindering the full unlocking of its potential. The mobility of passengers is especially affected by these flaws, despite the number of ferries linking Bulgaria and Romania across the river. Similarly, maritime transport of consumer goods and passengers is core for Övre Norrland. The concentration of population on the coast, the proximity with Finland and the access to the rest of Europe place the Gulf of Bothnia as one of the principal regional corridors. The inland links to the sea are however poor.

Challenges and issues

The low-density of the population and its dispersion across the territory constitute an important challenge for the provision of quality transport services in the target regions. It is important to note that low population density is not always a novel phenomenon, but a historical feature of certain regions. Similarly, the uneven distribution of the population often responds to factors such as the weather, the access to the sea or a river, the arable land, the existence of a natural corridor, and so on. However, depopulation is a more dynamic phenomenon. This differentiation is crucial when planning transport policies in low-density and depopulating areas.

The main issue haltering the mobility in these regions is the deterioration of transport infrastructures and the shortage of services. This negligence is often a direct consequence of the backwardness that these territories have accumulated over decades, caused by the geography, the inaction of policymakers and therefore, the scarce investments, among other reasons. The low maintenance or simply abandonment seem more prevalent than the absence of key infrastructures.

Cars are the main mode of transport in low-density and depopulating areas, yet roads are still rather undeveloped, and motorways are rare. Secondary roads have not been equipped with the necessary safety measures nor offer an adequate internal and external accessibility, since links with main communications nodes such as the TEN-T core corridors are often missing. As roads constitute the unique access to certain places, they are often used for multiple purposes such as commuting and freight transport, which leads to problems such as traffic congestion and pollution. The increase of tourism in many of these regions is therefore aggravating the situation.

Public transport in low-density and depopulating areas is almost inexistent. The offer is mainly limited to coaches, which frequently operate according to fixed schedules that not always meet the needs of the population. This shortage is paired with expensive and unreliable services, and long travel times, forcing people into car ownership. This has proved to be a significant burden for many households, which need to cut other essential utilities to afford a vehicle. In this regard, it is worth mentioning that many of the target regions also correlate with low income. Furthermore, it is a major handicap for vulnerable groups, such as elderly or young children who cannot drive, and therefore hinder their autonomy, increasing the risk of isolation, and preventing them from accessing basic services.

Other modes of transport, such as railway, air or water, do not represent a realistic alternative in most of the regions analysed. The railway network needs to undergo a substantial modernisation, as the current infrastructure does not guarantee the provision of adequate services. None of the regions have high-speed trains. Likewise, the share of air and water transport is very low as none seems to respond to the needs of the population. Furthermore, private vehicles are critical for the so-called "last mile". As a result, it is usually easier to complete the whole journey by car when the distance allows. The TEN-T is expected to improve the connections with the main corridors, favouring the development of intermodal infrastructure and transport.

In this respect, the small scale of the economy impedes the provision of cost-effective transport services. While the state must guarantee the essential services, safeguarding the equity principle, the balance of political benefits and the distance from the decision-making centres, often with an urban bias, might halter the development and upgrading of transport infrastructure. This can be observed even in countries where the legislation devises a minimum provision. Another prevalent issue is the fragmented administration in many of these regions, which makes it very difficult to

formulate specific policies. This is especially relevant given the importance and the potential of the cross-border activities. The small scale of the population is also detrimental when competing for funds. The methods for analysing the allocation of budget are also prejudicial for these regions, as common criteria are the size of the population and the volumes of traffic. For instance, this is the case of the TEN-T.

Although tourism can constitute an opportunity, since the rising demand for transport can lead to the development of new infrastructures and services, it also exacerbates some of the current problems by saturating the existing services. In some cases, locals are directly affected by the flood of seasonal tourists and the new services are only developed to serve these. A sustainable approach to transport and tourism is key in this regard.

The deployment of new mobility solutions seems to be rather slow in these regions. Intelligent transport systems are digitally-based, which poses an obstacle in some of the low-density and depopulating areas with poor broadband connection. The lack of digital competences of the population, especially vulnerable groups, are also an important hurdle. The infrastructure and maintenance of electric vehicles is also very challenging. Alternative mobility solutions such as car sharing, carpooling, cycling and similar are difficult to extrapolate, either because private actors do not find profitable to operate their business in these areas, or because of the large distances and the weather conditions.

Lessons learnt

The transport network serves as a backbone to enhance territorial cohesion. The insufficient infrastructures and transport services in low-density and depopulating areas are often a contributing factor to their isolation from the rest of the country. In many cases, these regions have experienced a significant political withdrawal, which translated in very low investments. As a result, the existing transport infrastructure is outdated and there is an important shortage of adequate services to the population, which makes it very car-dependent.

Attending to the shortcomings identified, investments should be mainly allocated to the modernisation and maintenance of the existing infrastructure. New infrastructure should be limited to bridge the gaps caused by missing links with important European and national corridors. The development of multimodal transport should be another essential objective.

The backwards infrastructure and the demography often prevent these areas from being included in key projects that could improve their accessibility. Thus, considering additional to the cost effectiveness of a project would help to avoid the discrimination of these areas. It is important to note that significant investment is still required to align the situation of transport with the rest of the country.

Low-density and depopulating areas are receiving increased attention from public institutions. However, it is difficult to formulate specific policies due to the complexity of factors interacting within the territory, including the different levels of governance. The involvement of local stakeholders, from civil society to public authorities, which are well versed on the problems of the territory, seems to result in more successful initiatives, including the provision of transport.

Cross-border mobility is of high importance for the regions examined. In many cases, the nearest population hub offering basic services and economic opportunities is located across the border. Despite such proximity, mobility often faces significant challenges, such as the lack of transport or interoperability. While a range of initiatives aim to strengthen the cross-border cooperation in transport in all the regions, the EU projects tend to be the most important in this regard.

New mobility solutions seem to constitute unique opportunities to improve the deployment of services in low-density and depopulating areas. However, the shortcomings previously mentioned do not make these economically attractive for businesses, such as car sharing, or projects tend to require a higher investment compared to other areas, such as for electric vehicles. Furthermore,

there are many alternatives such as bicycles that are not feasible to implement given the particularities of the areas.

Lastly, sustainability is also of foremost importance. The predominance of road transport, the congestion registered in some areas due to the number of tourists and other factors contribute to significant levels of pollution.

7. POLICY RECOMMENDATIONS

Key Findings

- EU Transport Policy should acknowledge and address the specific needs of low-density and depopulating regions which are partly overlooked at the moment. Including explicit references to low-density and depopulating areas in the Cohesion and Digital Policy would be a promising starting point.
- Connecting low-density and depopulating areas to the TEN-T Network can be fully effective only if local transport infrastructures are functional.
- Shifting policy-making at the NUTS3 level may highlight specific needs in low-density and depopulating areas.
- Covering operational costs through ERDF funds could somehow offset the demographic and geographic limitations.

Recommendations addressed at EU level

Recommendation 1: Ensuring local needs are better addressed through Cohesion Policy and other EU funds

Low density and depopulating areas include several categories of regions currently defined at the EU level. Some of these are defined by treaties, others identified by studies and policy papers. Yet, a comprehensive strategy for low-density and depopulating areas is still missing in EU Transport Policy. Indeed, these regions are often mentioned and treated as an “exception” instead of being targeted by specific policies. In the long run, this may lead to a persistent disregard of their needs. Thus, there is scope for the definition of an EU strategy which – while acknowledging the differences between these regions – aims at identifying key principles to address their specific needs, especially as far as Cohesion Policy is concerned.

The Commission’s proposals for the next budgetary period provide some potential opportunities for low-density and depopulating areas. The first of these would be to explicitly mention these regions’ features and needs in the CEF actions that promote the accessibility of all users. As noted in Section 4, improving accessibility is particularly important for low-density and depopulating areas, so this could be a potential opportunity for such areas to have a greater priority within CEF calls. This would be enhanced further if Article 37 (i.e. on accessibility), or more specifically the equivalent article in the Commission’s proposal for the revised TEN-T Guidelines, made an explicit reference¹⁷⁷ to addressing the accessibility needs of those living in low-density and depopulating areas.

The second opportunity for those in low-density and depopulating areas is to make the most of the proposed Digital Europe Programme’s reference to smart rural areas. As noted in Section 4.3.2, making rural areas smart has the potential to improve their accessibility and connectivity by using developments in ICT to support local mobility and connectivity more generally, e.g. e-services. The reference to ‘smart rural areas’ is included under the proposed Digital Europe Programme’s Specific Objective 5¹⁷⁸, which focuses on the deployment and best use of digital capacities and interoperability. Point 4, under part I of this specific objective also includes a reference to ‘smart cities’, so it will be important that the needs of rural areas are not overlooked in favour of those of cities.

¹⁷⁷ See page 57 (section 5.1.).

¹⁷⁸ For further information, please see: <https://ec.europa.eu/digital-single-market/en/news/digital-europe-programme-summary-report-targeted-consultation-future-investment-europes-digital>

Recommendations addressed at the level of the EU and the Member States

Recommendation 2: Prioritising the revitalisation of existing transport infrastructures and the provision of links to the TEN-T

Many of the issues concerning the provision of transport in low density and depopulating areas are due to the lack of maintenance and the overall poor state of existing transport infrastructures. The simple fact of being connected to TEN-T networks is not per se sufficient to guarantee an adequate supply of transport. Indeed, TEN-T network aims at providing reliable transport between Europe's major urban centres, so their relevance for low-density and depopulating areas may be limited. An interesting example is provided by the Case Study on the Lower Danube, insofar as the region suffers from a chronic transport deficit irrespective of the two TEN-T corridors crossing the area. Similar issues also concern Extremadura whose internal road infrastructure suffers from a lack of connectivity to other parts of Spain, as well as an incomplete network and a need for modernisation, including with respect to safety, the quality of services and better environmental integration. Shortcomings in the local transport infrastructure make the connection to the TEN-T network hardly effective or relevant.

The construction of new infrastructure may be less efficient and effective than the improvement of existing ones. However, local authorities often are more inclined to finance flagship projects rather than carrying out maintenance on the existing ones. In addition, new infrastructures usually focus on tourism and they may not be relevant to address local needs. Indeed, the focus on tourism may distort the allocation of resources from the ordinary maintenance of roads outside the most important touristic areas. Tourism routes and TEN-T networks do not necessarily coincide, and this misalignment may further worsen connectivity.

A substantial improvement (especially through improved maintenance) of local infrastructure is in line with the needs of low-density and depopulating areas. On the other hand, some concerns arise regarding its financial feasibility. Revitalising the existing transport networks (especially those connected with TEN-T) implies large financial resources which – given the current budgetary constraints – may not be available. Moreover, projects aimed at improving TEN-T secondary and tertiary networks are mostly financed via Cohesion Fund and ERDF. More developed low-density and depopulating areas regions may face legal constraints and allocation criteria which hamper the financing of TEN-T secondary and tertiary networks. For instance, more developed regions are not eligible for Cohesion Funds and may allocate only a limited share of the ERDF funds to TO 7: Transport and Infrastructures. Thus, implementing this would also require a substantial change in the current regulations concerning funds eligibility and allocation.

Improving the existing infrastructures is likely to improve equity in the provision of transport. Indeed, poor local infrastructures (especially local roads) significantly hinder mobility within low-density and depopulating areas and their connection to the rest of the country. Indeed, the maintenance of existing infrastructures is often financed by local authorities (either at the regional or provincial level) which may have very few resources to invest – especially if they suffer from poor economic development. Thus, expanding EU support to these types of projects may help to close the financing gap and – ultimately – improve equity in the provision of transport.

However, there are concerns with regards to the efficiency and effectiveness of this policy recommendation given the high costs to which it is associated. Indeed, transport infrastructures – especially when they are designed to overcome significant geographical barriers (e.g. viaducts, tunnels, bridges, etc.) – require costly investments. Covering these costs may be financially burdensome and would imply a significant budget increase, or reallocation.

Recommendation 3: Ensuring that the needs of NUTS 3 areas are not ignored in the context of wider strategies

The research tools adopted in this study highlighted that there are governance issues affecting policymaking in low-density and depopulating areas. Indeed, these regions tend to be administered by a number of different authorities. In other cases, low-density and depopulating areas may be a tiny area within a larger territory and the wider strategic priorities may not suit the needs of the smaller area. EU Regional Policy is designed at NUTS 2 level which – according to several stakeholders – may overlook specific local needs. These issues may be solved by placing decision-making centres closer to the territories and involving stakeholders in the process. Thus, there is a case to shift the policymaking process at the NUTS 3 level to improve the efficiency and the relevance of transport policies for low-density and depopulating areas.

Indeed, a NUTS 3 approach would highlight local needs and it would consequently better design transport policies to address them. On the other hand, this may be difficult to implement. Firstly, the current policy framework would need to be entirely revised – gradually shifting from NUTS 2 to NUTS 3. This would require a radical re-thinking of EU Regional Policy which appears rather unrealistic in the medium term.

An alternative approach would be to better exploit the opportunities of Interreg Programmes, which often directly cover low-density and depopulating regions (i.e. mountainous border regions). Within this existing policy tool, it would be possible to focus on local specific needs as the concerned areas are more homogenous than in the average Regional Programme. For instance, Alpine Interreg 2014 – 2020 can serve as best practice, as its entire strategy is focused on addressing issues faced by mountainous areas.

Another limitation concerns its efficiency and effectiveness. As pointed out by some stakeholders, shifting the governance to NUTS 3 may result in inconsistent policies as each area would focus on its own priorities. This may hinder the implementation of coherent policy at the EU, national and even regional levels, creating an extremely fragmented policy framework. Moreover, NUTS 3 regions have scarce financial resources which would limit the impact of the interventions. Hence, this approach would need to take account of the wider strategic needs of the region.

Recommendation 4: Allowing to use ERDF funding to cover operational costs due to specific demographic and geographical issues

Providing transport in low-density and depopulating areas often implies higher operational costs. Population scarcity reduces the number of users in a given region/area and consequently the possible revenues. The specific geographic features – which make these areas remote and difficult to access – require the construction of complex infrastructures (such as bridges, viaducts, tunnels), which usually have higher maintenance costs. While EU funds cover investment costs, operational expenditures need to be met by local authorities – which often have few financial resources. Moreover, as mentioned above, the lack of ordinary maintenance appears to be a critical issue in some low-density and depopulating areas.

The option of covering operational costs is also included in the Art. 11 of the “Proposal for a Regulation on the European Regional Development Fund and on the Cohesion Fund”¹⁷⁹ which defines the cornerstone of the upcoming Programming Period 2021-2027. The proposal only refers to outermost regions – even though sparsely populated areas are also mentioned in the Explanatory Memorandum accompanying the proposal – although this approach may be relevant for all type of low-density and depopulating areas as they are affected by similar issues.

This would allow EU funds to finance extraordinary maintenance, such as reconstructions and improvements of existing transport networks, rather than focusing on flagship investments which are often more expensive and less effective. On the other hand, excessive EU support for covering

¹⁷⁹ <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2018%3A372%3AFIN>

operational costs may lead to over-investment. However, this risk is perceived as modest by most of the stakeholders.

This measure would improve equity in the provision of transport as it would – to a certain extent – offsets the higher costs due to the demographic and geographical challenges faced by low-density and depopulating areas.

Recommendation 5: Introducing “equity” as a horizontal principle in transport policies

As described in section 5.4., transport inequality is particularly severe in low-density and depopulating areas. The scarce number of users and the high investment costs are strong disincentives to private investment and public service is not always able to fill this gap. Policy interventions – both at the EU and the national level – may exacerbate this inequality. Indeed, by focusing on large infrastructures and macro objectives, transport policies may overlook specific local needs and consequently lead to the widening of the gap between the flourishing and lagging regions. Finally, project appraisal tools such as cost-benefit analysis tend to disregard distributional effects and to favour the selection of projects with the highest economic value, which are usually located in high densely populated areas. Thus, introducing “equity” as a horizontal principle (following the example of “sustainable development” “gender equality” and “non-discrimination”) to assess transport policies may overcome these issues.

While there is little doubt that this policy option would improve equity, some concerns arose about its effectiveness and feasibility. Indeed, equity is a vague concept, and its definition is challenging. Without a clear definition and enforceability, the application of this horizontal principle would not be effective. On the other hand, adopting “equity” as a strict selection criterion may have distorting effects and economical beneficial projects may be discarded on the ground of their eventual unequal distribution. Striking a balance is challenging. A possible solution may be to introduce equity as an additional criterion which would provide extra points.

Recommendations to public authorities and service operators

Recommendation 6: Focus on on-demand and shared transport services to complement conventional public transport services

The traditional provision of public transport, with main lines and fixed schedules, is becoming increasingly obsolete and costly. The specific travel and living patterns of low-density and depopulating areas coupled with emerging trends in e.g. home working, and the increased use of digital services, demand a more flexible approach in the provision of transport. On-demand services and shared mobility seem to be best placed to meet the current needs of the citizens living in these areas. As well as relevant and feasible options, which can be designed taking into account recent innovations as well as the Green agenda, they are also considered to be comparatively cost-effective.

Public authorities are central actors in the planning and design of public transport although the role of national public authorities differs across the EU-27 since they each reflect a unique governmental set-up. Nevertheless, public authorities, in particular local ones, do constitute key actors in terms of funding opportunities, pooling resources, innovation promotion and they have an important coordination role in liaising with regional authorities on transport and wider economic issues.

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EU Transport statistics	https://ec.europa.eu/transport/facts-fundings/statistics/pocketbook-2018_en
Eurostat	https://ec.europa.eu/eurostat/web/transport/data/database
OECD	www.oecd-ilibrary.org/transport/data/itf-transport-statistics_trsprt-data-en
	https://data.oecd.org/transport/infrastructure-investment.htm
Regional Innovation Monitor	https://ec.europa.eu/growth/tools-databases/regional-innovation-monitor/
World Bank	https://data.worldbank.org/topic/infrastructure

ANNEX 2: OVERVIEW OF THE EU REGIONAL PROGRAMMES ANALYSED

Table 9: Overview of regional programmes

Programme	Type of region (Geography)	Level of Development	Overall budget	Funds	Thematic Objectives Relevant to transport	Budget per Thematic Objective	Specific objectives to transport	Type of measures (relevant transport)	Transport Projects (examples)	Type of Transport	Project Budget
Alpine Space Interreg (2014-2020)	Mountains	More developed	€ 116,635,466	ERDF	TO 4: Low Carbon Economy	€ 31,491,576.00	4e.2 Increase options for low carbon mobility and transport	Soft measures	Alpine Social Innovation Strategy	sustainable/multimodal shifting	€ 1,798,030.00
								Soft measures	Alpine Smart Transport and Urbanism Strategies	sustainable/multimodal shifting	€ 2,395,951.00
								Soft measures	Alpine Innovation for Combined Transport	sustainable/multimodal shifting	€ 3,088,271.00
								Soft measures	Mobility Ecosystem for Low-carbon and INnovative moDal shift in the Alps	sustainable/multimodal shifting	
								Soft measures	e-mobility SMART grid for passengers and last mile freight transports in the Alpine Space	sustainable/multimodal shifting	€ 2,528,349.00
Interreg Romania - Bulgaria (2014-2020)	Rural	Less developed	€ 258,504,126	ERDF	TO 7: Network Infrastructures in Transport and Energy	€ 81,983,295.00	7b - Enhancing regional mobility by connecting secondary and tertiary nodes to TEN-T infrastructure, including multimodal nodes	Soft measures	IntermodalCBC	sustainable/multimodal shifting	€ 6,660,192.00
								Soft measures	E-bike Net	Pedestrian/bikes	€ 6,798,255.00
								Hard measures	SEVEN-T	Road Infrastructures	€ 6,790,448.00
								Hard measures	DJ-MN: BET-CON	Road Infrastructures	€ 6,788,704.00
								Hard measures	ROAD SAFETY AND TEN-T CONNECTIVITY RUSE-GIURGIU	Road Infrastructures	€ 6,752,146.00
								Mixed measures	I-Ten	Road Infrastructures	€ 6,746,812.00
								Hard measures	W - TEN	Road Infrastructures	€ 6,712,218.00
								Hard measures	BC-TENT	Road Infrastructures	€ 6,577,116.00
								Hard measures	L-TeN	Road Infrastructures	€ 6,535,878.00

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								Hard measures	Route to TEN-T	Road Infrastructures	€ 6,518,678.00
								Mixed measures	MN-DJ: CLOSER	sustainable/multimodal shifting	€ 6,063,495.00
								Hard measures	TEN-T	Road Infrastructures	€ 5,991,731.00
								Hard measures	B-TeN	Pedestrian/bikes	€ 5,377,480.00
								Hard measures	EF – Road	Road Infrastructures	€ 4,203,707.00
								Hard measures	A-CB connect to TEnT	Road Infrastructures	€ 4,054,234.00
								Hard measures	MEDDOB	Road Infrastructures	€ 3,852,690.00
								Hard measures	STD	Road Infrastructures	€ 1,173,209.00
								Hard measures	MABAL-T	Inland navigation	€ 647,772.00
								Hard measures	NAVY T-WAY	Inland navigation	€ 5,054,135.00
								Hard measures	BETTER CONNECTED EUROREGION RUSE-GIURGIU	Inland navigation	€ 6,247,468.00
								Mixed measures	Danube Safety Net	Inland navigation	€ 4,844,670.00
Interreg V-A Sweden-Norway Programme (2014-2020)	Outermost	More developed	€ 94,399,930	ERDF	TO 7: Network Infrastructures in Transport and Energy	€ 4,839,992.00	7b - Enhancing regional mobility by connecting secondary and tertiary nodes to TEN-T infrastructure, including multimodal nodes	n/a	n/a	n/a	
								Soft measures	Green Drive Region	sustainable/multimodal shifting	€ 2,900,000.00

							7c - Developing and improving environmentally-friendly (including low-noise) and low-carbon transport systems	Hard measures	Green Flyway Testarena	Aviation/Airlines	€ 1,321,553.00
								Soft measures	Fjelltransfer Trysil–Dalafjellene	sustainable/multimodal shifting	€ 176,449.00
								Mixed measures	Fossilfri gränsregion 2030	sustainable/multimodal shifting	€ 1,122,421.00
								Soft measures	Fossilberoende gränsregion 2030	sustainable/multimodal shifting	€ 1,072,000.00
INTERREG V-A Estonia - Latvia 2014-2020	Border region	In transition	€ 46,728,593.	ERDF	TO 7: Network Infrastructures in Transport and Energy	€ 14,115,537.00	7c - Developing and improving environmentally-friendly (including low-noise) and low-carbon transport systems	Mixed measures	ESTLAT harbours	Sea Navigation	€ 10,811,188.53
INTERREG VB Danube 2014-2020	n.a	Mixed	€ 274,578,077	ERDF	TO 7: Network Infrastructures in Transport and Energy	€ 47,546,784.00	7c - Developing and improving environmentally-friendly (including low-noise) and low-carbon transport systems	Mixed measures	Linking transnational, multimodal traveller information and journey planners for environmentally-friendly mobility in the Danube Region - LD	sustainable/multimodal shifting	€ 2,917,930.50
								Mixed measures	Transdanube.Pearls - Network for Sustainable Mobility along the Danube	sustainable/multimodal shifting	€ 2,937,908.99
								Mixed measures	Comprehensive Elaboration of Strategic plans for sustainable Urban Transport - Chesnut	sustainable/multimodal shifting	€ 2,004,272.18
								Mixed measures	Integrated transnational policies and practical solutions for an environmentally-friendly Inland Water Transport system in the Danube region	Inland navigation	€ 1,586,244.00
								Mixed measures	Towards energy responsible places: establishing walkable cities in the Danube Region - CityWalk	Pedestrian/bikes	€ 2,229,590.50
								Soft Measures	Regional and Transport Development in the Danube-Black Sea Region towards a Transnational	Sea Navigation	€ 2,178,449.30

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									Multiport Gateway Region - DBS Gateway Region		
								Mixed measures	Integrated Transport and Green Infrastructure Planning in the Danube-Carpathian Region for the Benefit of People and Nature - TRANSGREEN	Railway infrastructure	€ 2,439,086.87
								Soft measures	Danube Ports Network - DaPhNE	Sea Navigation	€ 2,985,406.15
								Hard measures	Smart, Integrated and Harmonized Waterway Management - Danube STREAM	Inland navigation	€ 2,108,661.42
								Soft measures	Electric, Electronic and Green Urban Transport Systems - eGUTS	E-Mobility	€ 1,789,167.58
								Soft measures	Risk Assessment on Danube Area Roads - RADAR	Road Infrastructures	€ 2,152,510.00
								Soft measures	Green and efficient Danube Fleet - GRENDDEL	Inland navigation	€ 1,824,999.20
Interreg V-A - Sweden-Denmark-Norway (Öresund-Kattegat-Skagerrak)	Border region	More developed	€ 271,376,522	ERDF	TO 7: Network Infrastructures in Transport and Energy	€ 28,716,908.00		7b - Enhancing regional mobility by connecting secondary and tertiary nodes to TEN-T infrastructure, including multimodal nodes			
								Soft measures	Öresundsmetro fas 3	sustainable/multimodal shifting	€ 220,000.00
								Soft measures	Et sammenhængende transportsystem i Greater Copenhagen	sustainable/multimodal shifting	€ 3,072,997.00
								Mixed measures	Fremtidens Intelligente Mobilitet i Greater Copenhagen	sustainable/multimodal shifting	€ 2,124,896.00
								Soft Measures	Intelligent mobility in Greater Copenhagen	sustainable/multimodal shifting	€ 75,063.00
Mixed measures	Närsjöfart i Öresund-Kattegat-Skagerrak - NOKS II	sustainable/multimodal shifting	€ 2,908,535.00								
								7c - Developing and improving environmentally-friendly (including low-noise) and low-carbon transport systems			

								Soft Measures	RSMP (Roadside Message Protocol) Nordic	Road Infrastructures	€ 326,988.00
								Mixed measures	Skandinavisk Elektrisk Transport System II	Sea Navigation	€ 4,526,701.00
								Soft measures	Sustainable Mobility Rural and Urban Transport - SMART	sustainable/multimodal shifting	€ 3,225,582.00
								Soft measures	Fællesnordisk sekretariat for E-mobilitet i ÖKS-regionen	E-Mobility	€ 1,840,078.00
								Soft measures	Strategisk analys/forberedende studie af en fast forbindelse mellem Helsingør og Helsingborg	sustainable/multimodal shifting	€ 1,971,499.00
								Soft measures	Value2Sea	Sea Navigation	€ 2,966,302.00
								Soft measures	Öresundsmetro - en del av Greater Copenhagen Trafikcharter	sustainable/multimodal shifting	€ 600,000.01
Interreg V-A - Sweden-Finland-Norway (Nord)	Outermost	More developed	€ 94,617,296.00	ERDF	TO 1: Strengthening research, technological development and innovation	€ 28,807,375.00	1b - promoting business investment in R&I, developing links and synergies between enterprises	Hard measures	Nordic Platform for Development of Autonomous Utility Vehicles	E-Mobility	€ 1,304,787.00
								Soft measures	Preliminary research of nordic platform for utility vehicles	E-Mobility	€ 30,744.00
								Soft measures	SmartCharge	E-Mobility	€ 278,754.00
								Soft measures	Industrial Internet Applications in Winter Road Maintenance	sustainable/multimodal shifting	€ 1,171,733.00
Interreg V-A - Spain-France-Andorra (POCTEFA)	Mountains	In transition	€ 288,964,102.00	ERDF	TO 7: Network Infrastructures in Transport and Energy	€ 34,283,834.00	7c - Developing and improving environmentally-friendly (including low-noise) and low-carbon transport systems	Soft measures	Transnational intermodal links towards sustainability - trails	sustainable/multimodal shifting	€ 1,351,873.62
								Hard measures	Promotion of bicycle tourism mobilities along the Garonne - TRANS-GARONA	Pedestrian/bikes	EUR 3 681 853.00
								Hard measures	BiciTransCat - Development of new cycling routes and cross-border multimodal connections for the promotion of sustainable mobility.	Pedestrian/bikes	EUR 4 689 269.25

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								Mixed measures	Reopening of the international railway line between Pau- Canfranc- Zaragoza - Canfrancus II	Railway infrastructure	EUR 1 683 106.00
								Hard measures (infrastructures)	Promoting the mobility of inhabitants of the Transfrontier Catalan Space	sustainable/multimodal shifting	EUR 1 683 106.00
								Mixed measures	Easy, integrated and sustainable urban public transport in the Basque Eurocity -EMOBASK	E-Mobility	EUR 1 819 012.60
								Mixed measures	Development of sustainable and cycle mobility, on cross-border lands - ederbidea	Pedestrian/bikes	€ 9,401,475.38
INTERREG VB Northern Periphery and Arctic	Outermost	More developed	€ 72,611,238.00	ERDF	TO 1: Strengthening research, technological development and innovation	€ 21,783,372.00	1b - promoting business investment in R&I, developing links and synergies between enterprises	Mixed measures	Smart Peripheral and Remote Airports 2020	Aviation/Airlines	€ 2,394,999.90
ROP Valle d'Aosta	Mountains	More developed	€ 64,350,950.00	ERDF	TO 4: Low Carbon Economy	€ 12,500,000.00	4e.2 Increase options for low carbon mobility and transport	Hard measures	The Region intends to pursue the objective of increasing the share of journeys made in the urban area through low carbon transport systems, in particular by developing an integrated track system cycle paths in the area and the more intense adoption of intelligent transport systems in order to improve the overall system mobility.	sustainable/multimodal shifting	
ROP Basilicata 2014-2020	Rural	Less developed	€ 550,687,552.00	ERDF	TO 7: Network Infrastructures in Transport and Energy	€ 55,755,200.00	7b - Enhancing regional mobility by connecting secondary and tertiary nodes to TEN-T infrastructure, including multimodal nodes	Hard measures	Strengthening the connections of the secondary and tertiary nodes of the "internal areas" and of those where significant agricultural and agro-industrial production districts are located with the main roads and railway axes of the ten-t network.	Railway infrastructure	
								Hard measures	Strengthen the regional and interregional public transport	Railway infrastructure	€ 6,050,000.00

									services on sections equipped with significant potential application through infrastructural and technological interventions, renewal of rolling material, promotion of electronic integration ticketing.		
									Strengthen the regional and interregional public transport services on sections equipped with significant potential application, through infrastructural and technological interventions, renewal of rolling material, promotion of electronic integration ticketing.	Railway infrastructure	€ 12,480,000.00
									Strengthen the regional and interregional public transport services on sections equipped with significant potential application, through infrastructural and technological interventions, renewal of rolling material, promotion of electronic integration ticketing.	sustainable/multimodal shifting	€ 1,320,000.00
									Strengthen the regional and interregional public transport services on sections equipped with significant potential application, through infrastructural and technological interventions, renewal of rolling material, promotion of electronic integration ticketing.	sustainable/multimodal shifting	€ 1,690,000.00
Upper Norrland	Outermost	More developed	€ 421,646,628.00	ERDF	TO 7: Network Infrastructures in Transport and Energy	€ 91,585,402.00	7c - Developing and improving environmentally-friendly (including low-noise) and low-carbon transport systems	Hard measures	Bärighetshöjning Brånan-Brunflo 2016	Road Infrastructures	€ 4,885,640.00
								Hard measures	Hillskär - infrastruktur för effektiv samordning av transportslag vid Kvarken ports	Railway infrastructure	€ 3,952,120.00
								Soft measures	Omställning till förnyelsebara drivmedel	Railway infrastructure	€ 134,566.00
								Hard measures	Mittstråket	sustainable/multimodal shifting	€ 34,487,600.00

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OP Extremadura 2014-2020	Rural	Less developed	€ 925,740,674.00	ERDF	TO 7: Network Infrastructures in Transport and Energy	€ 124,373,887.00	7b - Enhancing regional mobility by connecting secondary and tertiary nodes to TEN-T infrastructure, including multimodal nodes	Soft measures	"Redacción de Proyecto de Obra y Obras de Contratación de Terminales Ferroviarias"	Railway infrastructure	n/a
								Hard measures	"Ronda Sur de Badajoz. Tramo III. Ex107- Recinto Ferial"	Road Infrastructures	€ 15,270,786.31
								Hard measures	"Ronda Sureste de Cáceres, Tramo I: Ex – 206-N-521"	Road Infrastructures	€ 10,707,290.00
								Hard measures	Glorieta en la intersección de la EX-390 y la n-521 en Cáceres	Road Infrastructures	€ 439,880.00
OP Centre - Val de Loire 2014-2020	Rural	More developed	€ 503,458,623.00	ERDF	TO 4: Low Carbon Economy	€ 97,264,000.00	4e.2 Increase options for low carbon mobility and transport	Hard measures	Renovation of the Orléans-Châteauneuf urban and peri-urban transport link	Road Infrastructures	€ 55,000,000.00
Border, Midland and Western Regional OP 2014-2020 (Ireland)	Rural	More developed	€ 321,417,842.00	ERDF	TO 4: Low Carbon Economy	€ 37,878,406.00	4e.2 Increase options for low carbon mobility and transport	Hard measures	Letterkenny: Upgrading Joe Bonner Link Road; Upgrading of town linkages (sustainable transport grants)	Pedestrian/bikes	€ 4,000,000.00
								Hard measures	Athlone: Church Street Enhancement	Pedestrian/bikes	€ 3,000,000.00
								Hard measures	Sligo: Enhancement O'Connell Street	Pedestrian/bikes	€ 4,000,000.00
								Hard measures	Logistics infrastructure enhancement equipment to improve road safety for road users	Road Infrastructures	€ 2,011,500.00
								Hard measures	Upgrading of regional road transport network and connections with TEN-T	Road Infrastructures	€ 15,000,000.00

ANNEX 3: STAKEHOLDER CONSULTATION

Organisation	Type	Interview	Workshop
AVERE	Associations	yes	yes
Centre for Transport Research (University of Aberdeen)	Experts and academics	yes	yes
Committee of the Regions	Policymakers		yes
Community of European Railways and Infrastructure Managers (CER)	Associations	yes	yes
Danube Commission	Associations	yes	yes
European Association for Mountain Areas (EUROMONTANA)	Associations	yes	
EUSALP Regions	Associations	yes	Yes
International Association of Public Transport (UITP)	Associations	yes	
Northern Sparsely Populated Areas (NSPA) Network	Associations	yes	yes
POLIS Network, cities and regions for transport innovation	Associations	yes	yes
Senior Expert for DG REGIO	Experts and academics	yes	
Southern Sparsely Populated Areas (SSPA) Network	Associations	yes	yes
University of Žilina	Experts and academics	yes	
ERTICO-ITS EUROPE	Associations	yes	
Technical University Dortmund	Experts and academics	yes	yes

ANNEX 4: WORKSHOP AGENDA

Workshop “Transport infrastructures in depopulating and low-density areas”

Day 1 – Tuesday, 13 th of October 2020	
09:00 – 09:30	<p>Welcome and opening remarks <i>European Parliament & Research Team</i></p> <ul style="list-style-type: none"> • Welcome • Presentation of the study and objectives • Tour de table
09:30 – 10:45	<p>Session I: Defining low-density and depopulating areas <i>Moderator: Francesco Romano (VVA)</i></p> <ul style="list-style-type: none"> • Presentation of the multidimensional classification • Challenges and limitations
10:45 – 11:00	Coffee break
11:00 – 12:30	<p>Session II: Providing transport in low density and depopulating areas: key challenges and trends <i>Moderator: Luca Bisaschi (VVA) and Jessica Carneiro (VVA)</i></p> <ul style="list-style-type: none"> • Transport issues for each type of relevant areas • Addressing the challenges: connectivity, infrastructures, and new options for mobility
Day 2 – Wednesday, 14 th of October 2020	
09:00 – 09:30	<p>Introductory session <i>European Parliament & Research Team</i></p> <ul style="list-style-type: none"> • Welcome • Recap of Day 1
09:30 – 10:30	<p>Session III: Transport infrastructures in low-density and depopulating areas: overview of relevant policies (EU and National level) <i>Moderator: Ian Skinner (Senior Expert) and Luca Bisaschi (VVA)</i></p> <ul style="list-style-type: none"> • The current EU Framework and High-level EU Policies • Assessing EU policies on the field: the role of Cohesion Policy • Combining equity and efficiency: how to square the circle
10:30 – 10:45	Coffee break
10.45 - 12.30	<p>Session IV: Policy recommendations for MEPs <i>Moderator: Malin Carlberg (VVA) and Luca Bisaschi (VVA)</i></p> <ul style="list-style-type: none"> • Lessons learnt and main conclusions • Recommendations

ANNEX 5: MULTIDIMENSIONAL APPROACH

a. Methodological framework

To properly design and apply a multidimensional approach, several methodological steps need to be duly defined.

- **To ensure consistency with the policy analysis, the multidimensional definition is applied at NUTS 2.** In this respect, it is important to highlight that EU transport policies in the relevant areas are mostly addressed through Regional Programmes co-funded by the European Regional Development Fund. These policies are designed and implemented at NUTS2 level. A previous study by DG REGIO (2011)¹⁸⁰ on EU Regional Policy support to regions with specific geographical features found that “there is something of a disjuncture between policy governance and implementation at the programme level (usually NUTS2) and the more appropriate geographical level for the island, mountainous area or sparsely populated area (usually NUTS3)”¹⁸¹. The same study highlights in its findings that the main strategic focus of ERDF is at the NUTS2 level, especially as far as hard infrastructures are concerned.
- **Some of the classifications previously described need to be shifted at the NUTS 2 level.** This can be challenging as some classifications – especially those concerning geographical features – are mostly conceived at NUTS3 level.
- **Identifying the regions suitable for testing the new classification is also challenging.** As discussed above, relevant regions are somewhat heterogeneous, and their different features make it irrelevant to find a common selection criterion. Thus, a more flexible approach to selecting a balanced sample of regions should be considered.
- **Selecting the relevant indicators is also essential to effectively represent features and characteristics.** Indeed, while geographical features are defined either in dichotomic variables (i.e. islands yes/no) or on a limited scale (i.e. rural/urban classification), socio-economic and transport data are numerical values having their specific unit of measurement.
- Finally, **the multidimensional approach should be able to produce an effective overview of the key features characterising the relevant region.** This needs to be translated into a proper **visualisation of different indicators** through reader-friendly and self-explanatory figures.

i. Defining the level of analysis: shifting

The definition of the geographical level of analysis is based on three concurrent factors: relevance, data availability, and comparability. It can be concluded that a NUTS3 analysis is appropriate as most geographical features are defined at this level (even though in some cases NUTS2 level also applies).

¹⁸⁰ NordRegio (2011). “ERDF in regions with geographical specifics”. Available at: <https://archive.nordregio.se/en/Nordregio-Research/ERDF--in-regions-with-geographical-specificities/index.html>

¹⁸¹ Ibid.

Table 10: Geographical and demographical level relevance of existing classification

Definition	Geographical and demography level of definition
Low -density and sparsely populated areas	Available both at NUTS2 and NUTS 3 as per guidelines on national and regional aid for 2007-2013 (2006/C 54/08) ¹⁸² .
Mountainous regions	Eurostat definition is applied at NUTS3 level ¹⁸³ . The a Study by European Parliament ¹⁸⁴ also favours a NUTS3 approach. Definitions focused on topography (i.e. NORDREGIO ¹⁸⁵) are not necessarily set at NUTS3.
Islands	Eurostat definition is applied at NUTS3 level. However, ESPON (2020) ¹⁸⁶ also points out that many islands are classified at NUTS2 level.
Outermost regions	Outermost regions are defined by Article 299(2) of the TFEU. Those are NUTS2 regions exclusively.
Rural areas ¹⁸⁷	Eurostat¹⁸⁸ assesses the urban-rural divide mostly at the NUTS3 level. For the scope of this study, However, as discussed above (see chapter 3) ¹⁸⁹ , these data can be used to determine urban-rural divide at a higher geographical level.
Border regions	Eurostat defines border regions at the NUTS3 level. However, it is possible to identify NUTS2 regions created entirely from NUTS3 border regions.

ii. Adjusting existing definitions at NUTS2 level

Implementing the analysis at NUTS2 level requires an adjustment to the existing classification in order to preserve its relevance. This exercise inherently requires a degree of approximation and limitations. However, it should be noted that a study by DG Regio (2011)¹⁹⁰ adopted a similar approach in shifting to NUTS2 level.

Low-density and sparsely populated areas and outermost regions do not need any adjustment as they are already classified at **NUTS2 level**.

Islands regions are generally classified at NUTS3, but - as noted by ESPON (2020) – there are several islands classified as NUTS2 (i.e. the Canary Islands, Corsica and Sardinia). In addition, a previous definition by ESPON (2010) focused on the total population, rather than administrative governance. Also, Dijkstra and Poelman (2008) focused more on the geographical features rather than the administrative boundaries, saying that “NUTS3 island regions can correspond to a single island, or can be composed of several islands, or can be part of a bigger island containing several NUTS3

¹⁸² Official Journal of the European Union (2006), “Guidelines on National Regional Aid For 2007-2013”. Available at: <https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:C:2006:054:0013:0044:EN:PDF>

¹⁸³ Monfort P. (2009). “Territories with specific geographical features”. Working Paper 02/2009, European Commission DG Regio. Available at: https://ec.europa.eu/regional_policy/sources/docgener/work/2009_02_geographical.pdf

¹⁸⁴ Gløersen E., et al. (2016). “Cohesion in Mountainous Regions of the EU”. Study for REGI/Regi/Regi Committee, European Parliament. Available at: https://www.europarl.europa.eu/RegData/etudes/STUD/2016/573420/IPOL_STU%282016%29573420_EN.pdf

¹⁸⁵ NordRegio (2004). “Mountain Areas in Europe: Analysis of mountain areas in EU member states, acceding and other European countries”. Available at: https://ec.europa.eu/regional_policy/sources/docgener/studies/pdf/montagne/mount1.pdf

¹⁸⁶ ESPON (2019). “BRIDGES – Balanced Regional Development in Areas with Geographic Specificities”. Available at: <https://www.espon.eu/sites/default/files/attachments/BRIDGES%20-%20Final%20Report.pdf>

¹⁸⁷ Vasileios M. (2019). “Demographic trends in EU regions”. European Parliament Think Tank. Available at: <https://ec.europa.eu/futurium/en/system/files/ged/eprs-briefing-633160-demographic-trends-eu-regions-final.pdf>

¹⁸⁸ Available at: https://ec.europa.eu/eurostat/statistics-explained/index.php/Archive:Urban-rural_typology

¹⁸⁹ Stefan K. et al. (2020). “EU Cohesion Policy in non-urban areas”. Study for Regi Committee, European parliament.

Available at: [https://www.europarl.europa.eu/RegData/etudes/STUD/2020/652210/IPOL_STU\(2020\)652210_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/STUD/2020/652210/IPOL_STU(2020)652210_EN.pdf)

¹⁹⁰ Ibid.

regions”¹⁹¹. For the scope of the study, **NUTS2 regions entirely composed of “NUTS3 island regions” are considered relevant.**

There are two main ways to adjust mountains at NUTS2 level. The first and the most straightforward way is to consider relevant **NUTS2 regions entirely composed of NUTS3 areas considered as mountains.**

A similar approach can be used to identify rural regions. In the scope of this study, predominantly rural regions – as defined by Dijkstra and Poelman (2008)¹⁹² – are considered relevant. Thus, **NUTS2 regions entirely composed of NUTS3, classified as predominantly rural, are defined as “rural areas”.**

Given the vast numbers of NUTS3 borders region, selecting **only NUTS2 regions located at the internal or external border** should suffice to provide a representative sample.

b. Selecting the NUTS2 Regions sample

Identifying a sample able to represent such as a heterogeneous group of regions is a challenging task. Indeed, defining key variables (i.e. demography) may not be appropriate, as some category of regions may be excluded *a priori*. On the other hand, disregarding completely any reference to population density and population change may result in including in the sample regions with a very densely populated and populating regions – which contradicts the purpose of the study. Thus, the following approach is proposed:

- 1) It is important that each of the above-described types of region is included in the sample. Thus, a shortlist including all NUTS3 per category of region (as shown in the figure below) is compiled. When doing so, it is important to bear mind a key limitation highlighted by DG REGIO (2010): it is not feasible to select a ‘definitive’ sample of 15 regions that are somehow ‘representative’ of the identified categories. In other words, given their diversity, there is no ‘typical’ type of island, mountain or sparsely populated region¹⁹³.
- 2) As an equally important criterion, data on population density and population change are considered. Operationally, this means that between two regions belonging to the same category, the one with lowest population density and/or the sharpest depopulating trend is selected. In addition, demographic considerations may be used to screen out the sample regions with a high population density (i.e. above the EU28 average) or a fast-growing population. This may be particularly useful for rural and border regions as more than 500 NUTS3 regions are thus classified. These are not clear-cut thresholds and the demographic dimension is assessed on a case-by-case basis.
- 3) Region combining different types of features should be preferred. As shown in Table 2, interplay is important and one of the key goals of the multidimensional approach is to capture all these features at once.
- 4) If possible, a balance between different level of economic development should presented. To do so, Structural Funds Eligibility Criteria 2014-2020 are adopted as a reliable proxy.

¹⁹¹ Dijkstra L., Poelman H. (2008). “Remote rural regions: How proximity to a city influences the performance of rural regions”. Regional Focus 01/2008, European Commission DG Regio. Available at: https://ec.europa.eu/regional_policy/sources/docgener/focus/2008_01_rural.pdf

¹⁹² Ibid.

¹⁹³ Ibid.

i. *Low density and sparsely populated areas*

As described in the previous sections, only a handful of regions are classified as “Low-density and sparsely populated areas”, as the population density threshold is extremely low. Specifically, the selection of the category “Northern Sparsely Populated Areas” – which is also remote and peripheral – is rather straightforward as only four NUTS2 regions, located in Northern Sweden and Finland, are thus classified. Evrytania (EL643) and Ličko-senjska županija (HR032) are extremely small NUTS3 regions located in rather populous NUTS2. The three sparsely populated regions in inner Spain – Cuenca (ES423), Teruel (ES242) and Soria (ES417) – can be considered representative also for other categories of regions and are thus assessed at a later stage. Therefore, the final list of regions selected to represent SPAs is provided in the following table – which also shows its demographic features and socio-economic context.

ii. *Mountainous regions*

As shown in Figure 4, NUTS3 these regions are concentrated in the territories of the largest European mountains ranges, such as the Alps, the Pyrenees, the Carpathians, and the Apennines. They are often located at country borders, as 50% of mountains regions are also classified as border regions. Moreover, they are usually spread across different regions making the selection of a representative NUTS2 sample particularly complex. In these cases, a preliminary screening may be done by assessing the population density data – both at NUTS2 and NUTS3 level. These show that most Italian and Austrian mountainous regions are not relevant, as their population is close to the EU average¹⁹⁴. The NUTS3 regions with the lowest population density include the Aosta Valley (ITC20) in northwest Italy at the border with France. This region is particularly suitable for selection, and given that NUTS2 and NUTS3 level overlap it can be considered as a NUTS2 level fully mountainous. As well as demographic criteria, geographical balance should also be considered as the mountain range has heterogeneous features. Thus, Aragon (ES24) – which also includes an SPA (Soria, ES417) – is selected to represent the Pyrenees. Basilicata (ITF5) – which is entirely made up of mountainous NUTS 3 – is also experiencing a sharp decline in population and thus representative of depopulating areas.

iii. *Outermost regions*

As for SPAs, Outermost Regions (ORs) also have a very limited sample. Most of them are extremely densely populated, hence not relevant for this study¹⁹⁵. In fact, only the Azores (PT20) and French Guiana (FRY30) have populations below the EU28 average. The latter can also be considered an SPA as its population density is 3.4 inhabitants per Km². However, French Guyana is a unique case. Located in South America, it is hardly relevant in a study that is focused on the continental European Union, while the Azores, which are located in the middle of the Atlantic Ocean, better represent the concept of insularity and peripherality of ORs. In addition, they can also be considered as an Island Region.

iv. *Island regions*

According to Eurostat, there are 56 NUTS3 and 11 NUTS2 regions which can be considered as Islands. A preliminary assessment shows that European islands tend to be densely populated¹⁹⁶. NUTS2 regions entirely covering island areas with a low density of population are rather few: Corsica (FRM0) (36 inhabitants/km²), South Aegean (EL42) (46.6 inhabitants/km²) and North Aegean (EL41) (56

¹⁹⁴ For instance, Verbano-Cusio-Ossola (ITC14): 73.3 inhabitants per Km²; Trento (ITH20): 87.8; Bolzano-Bozen (ITH10): 71.8; Innsbruck (AT332): 149.5; Tiroler Unterland (AT335): 65.4.

¹⁹⁵ Canary Islands: 282,25 inhabitants/km², Guadalupe: 245 inhabitants/km², Madeira: 319.9 inhabitants/km², Martinique: 344 inhabitants/km², Mayotte: 663 inhabitants/km², Saint Martin: 672 inhabitants/km².

¹⁹⁶ Besides the above mentioned Canary Islands and Madeira, here's an overview of some of densely populated Islands (NUTS2 and NUTS3): Mallorca (ES532): 252 inhabitants/km²; Eivissa y Formentera: 257 inhabitants/km²; Crete: 76 inhabitants/km²; Sicily: 195 inhabitants/km², Cyprus: 96 inhabitants/km².

inhabitants/km²). Corsica is selected to represent a larger island while South Aegean is selected to represent archipelagos. In addition, Corsica also represents a particular type of mountainous islands region.

v. *Rural regions*

According to Eurostat (2016)¹⁹⁷, there are 438 NUTS3 regions classified as “predominantly rural”. According to the definition by Dijkstra and Poelman, more than 90% of the EU territory is covered by rural areas. In line with previous studies on the subject, a recent paper by the European Parliament acknowledged that rural regions are extremely diverse in terms of demography, socio-economic context, and transport. To ensure consistency with the objective of the study, demographic considerations should guide the selection of the NUTS2 regions. Rural areas appear to be particularly affected by depopulating trends. Thus, data on crude population change – which effectively capture the out-flow migration – are used to identify rural and depopulating regions to be included in the sample. Being considered as predominantly rural and having the highest depopulating rate in the EU28, the NUTS2 regions located on the Romanian-Bulgarian border appear as a natural choice. They are also amongst the poorest NUTS2 in the EU28 which make them relevant also from the socio-economic context. To ensure geographical balance and offset an overrepresentation of Eastern rural areas, the inner French region of Centre Val de Loire (FR6) and the two Spanish regions of Extremadura (ES43) are included in the sample. Both regions are landlocked rural region experiencing a decline in population.

Finally, it should be highlighted that most regions included in the scope of this study are considered rural and/or remote. As described in the following sections, rurality and remoteness indicator are included in the data to be assessed in the multidimensional classification.

vi. *Border regions*

Most of the regions previously selected are also border regions. Thus, a further selection is not necessary. However, to complete the sample, it may be interesting to select a couple of regions in which the border effect is particularly relevant. Bordering with a big non-EU State such as Russia, the Baltic Countries are particularly relevant for assessing the border effect. Amongst them, Estonia and Latvia have very similar population density data. On the other hand, while the former has a positive population trend, the latter is rapidly depopulating. It is also interesting to assess border regions located on the same geographical island (i.e. an island belonging to two different States). For this reason, the border between the Republic of Ireland and Northern Ireland may be relevant. Thus, the Northern and Western (IE04) is included in the scope of the sample.

c. **Normalisation of the indicators**

The overall score of a specific region is displayed by means of a radar chart. In general, radar charts are excellent tools to compare different entities (in our case, NUTS2 regions) on the basis of several parameters or indicators. At the same time, they are easily readable and simple to understand¹⁹⁸.

Being the geographic indicators “Island”, “Mountain region”, “Border region”, “Outermost region” dichotomous (i.e. they take on only one of two values when observed), they will not be displayed within the radar charts. Therefore, whether a region has one or more of these features, this will be stated on top of each radar chart as “Geographic feature”.

In order to be easily interpretable and consistent, the perimeter of each radar charts shows peaks towards the outer rim for higher values along “advantageous” indicators (i.e. population density, total population change, motorisation rate, railway networks, economic activity rate, broadband coverage, tourist arrivals/km²), and peaks towards the middle for higher values along

¹⁹⁷ <https://ec.europa.eu/eurostat/web/rural-development/methodology>

¹⁹⁸ It is worth noticing that the real values along the indicators selected will be displayed as well for each region in the sample.

“disadvantageous” indicators (i.e. median age, rural and remote areas). This is feasible by simply inverting the scale for “disadvantageous” indicators.

Lastly, each radar chart will also show the sample mean, i.e. the average of each indicator across the NUTS2 regions we selected.

The normalisation of the variables has been carried out according to the ranges provided in the table below. Indicators in red have had their scale reverted, whereas grey ones indicate dichotomous indicators.

Table 11: Normalisation of indicators

Indicators	Min value	Reasoning	Max value	Reasoning
Population density (people/Km²)	3.4	Lowest value within the selected sample	105	Highest value within the selected sample
Median age of population	48.4	Highest value within the selected sample	38.6	Lowest value within the selected sample
Crude rate of total population change	-18.2	Lowest value within the selected sample	13.6	Highest value within the selected sample
Rural region (including remoteness)	5	According to Dijkstra and Poelman (2008), there are 5 different degrees of rurality and remoteness across NUTS3 regions. Rurality and remoteness of NUTS2 regions is assessed according to the mean across the different NUTS3 regions within them.	1	According to Dijkstra and Poelman (2008), there are 5 different degrees of rurality and remoteness across NUTS3 regions. Rurality and remoteness of NUTS2 regions is assessed according to the mean across the different NUTS3 regions within them.
Border regions	N/A	Dichotomic variable (Yes/No)	N/A	Dichotomic variable (Yes/No)
Mountain regions	N/A	Dichotomic variable (Yes/No)	N/A	Dichotomic variable (Yes/No)
Islands	N/A	Dichotomic variable (Yes/No)	N/A	Dichotomic variable (Yes/No)
Outermost regions	N/A	Dichotomic variable (Yes/No)	N/A	Dichotomic variable (Yes/No)
Motorisation rate (Passengers cars/1000 inhabitants)	179	Lowest value within the selected sample	1325	Highest values within the selected sample
Networks, Total railway lines (Km/1000 Km²)	13	Lowest value within the selected sample	51	Highest values within the selected sample
Economic activity rate (%)	56.6	Lowest value within the selected sample	82.1	Highest values within the selected sample
Broadband coverage (% of households)	71	Lowest value within the selected sample	97	Highest values within the selected sample
Number of tourist arrivals/km²	1.6	Lowest value within the selected sample	239.4	Highest values within the selected sample

d. Radar Charts

Figure 12: Valle d'Aosta/Vallée d'Aoste (ITC2)

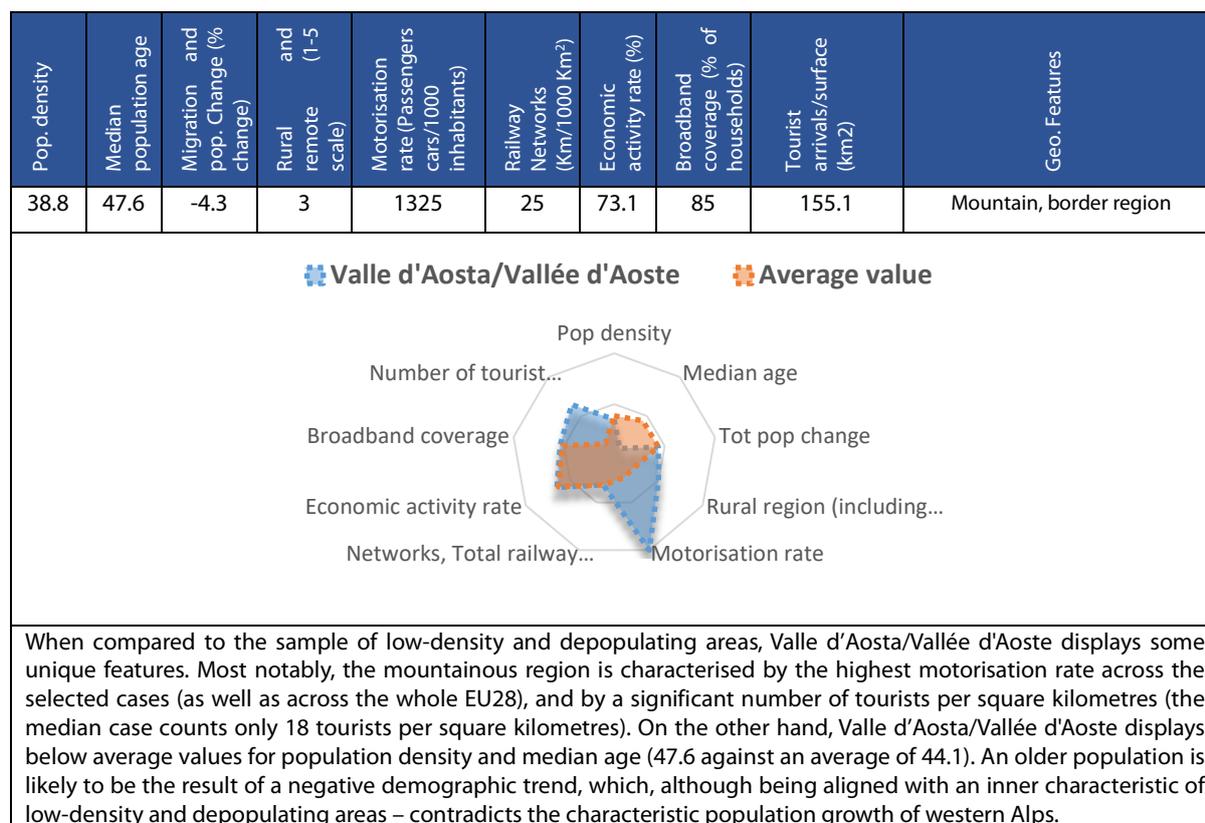


Figure 13: Corsica (FRM0)

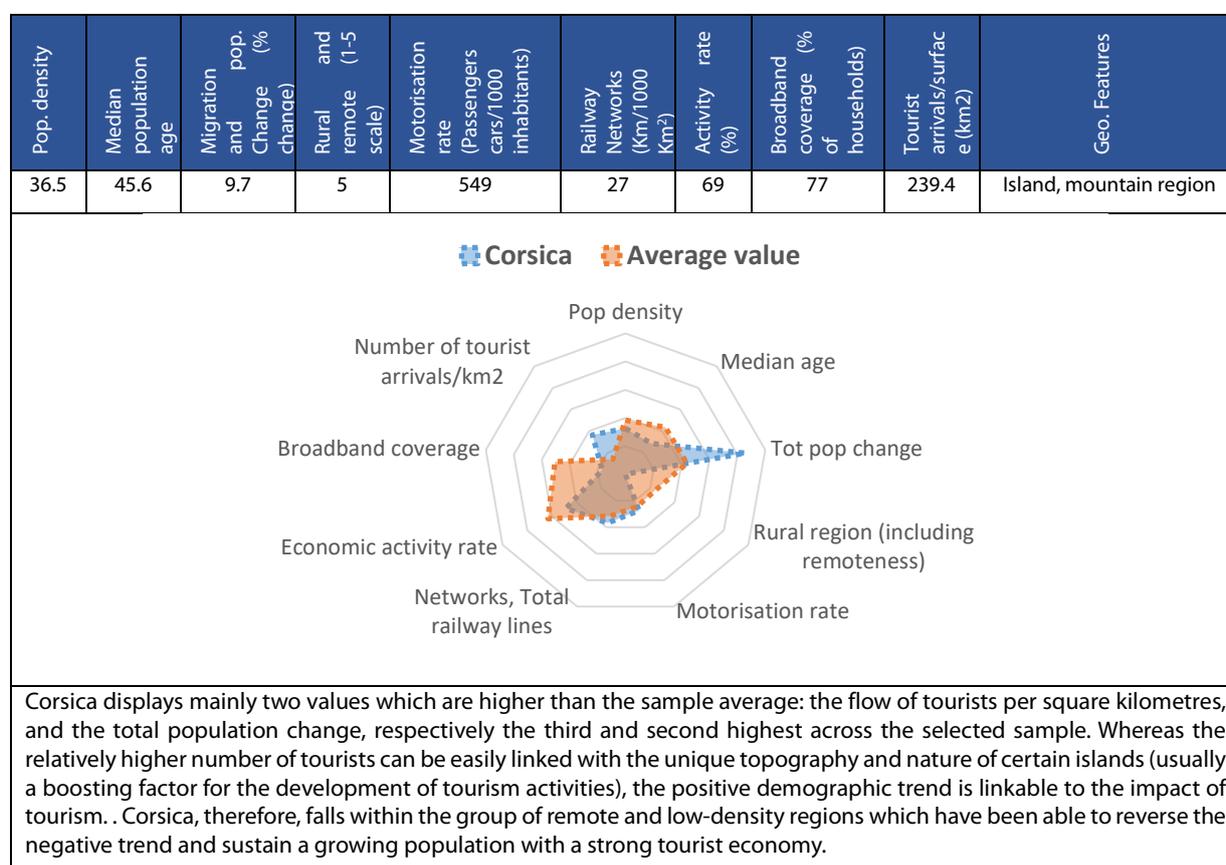


Figure 14: Norra Mellansverige (SE31)

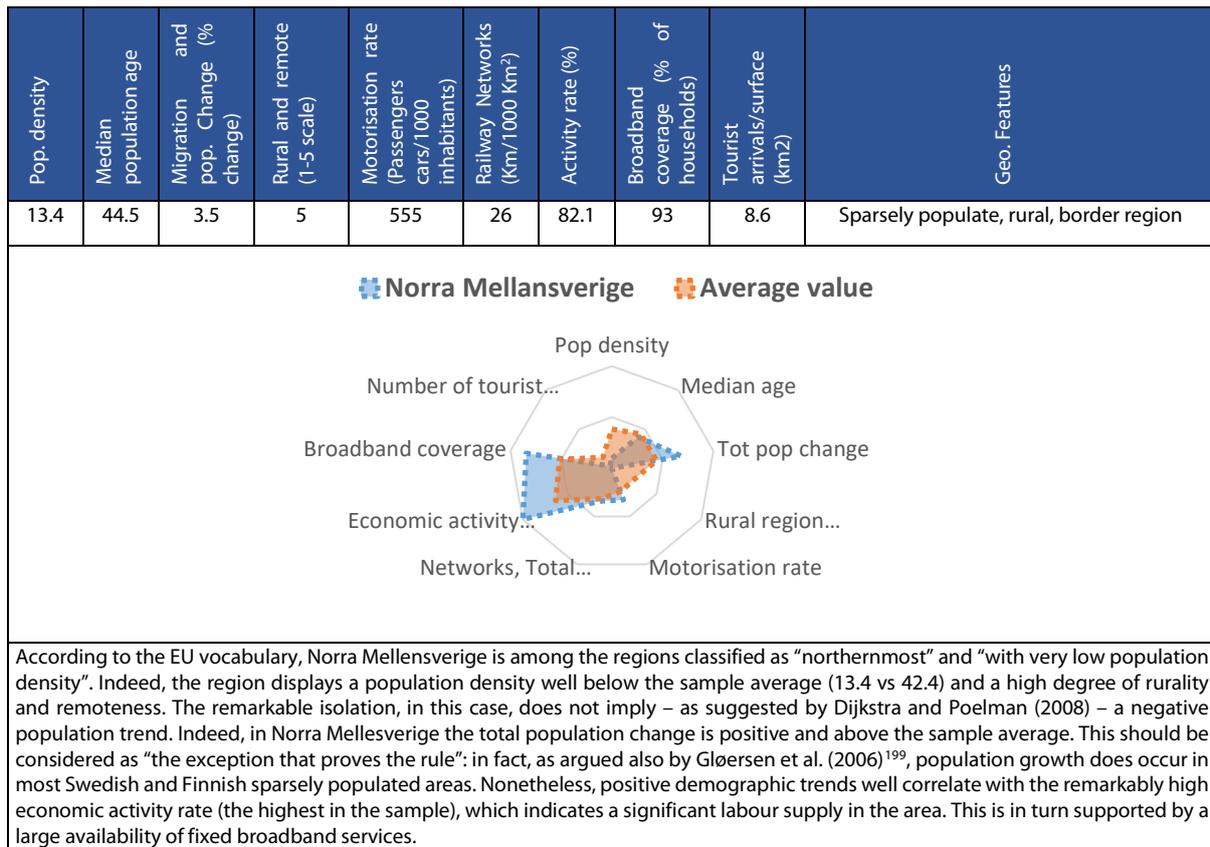
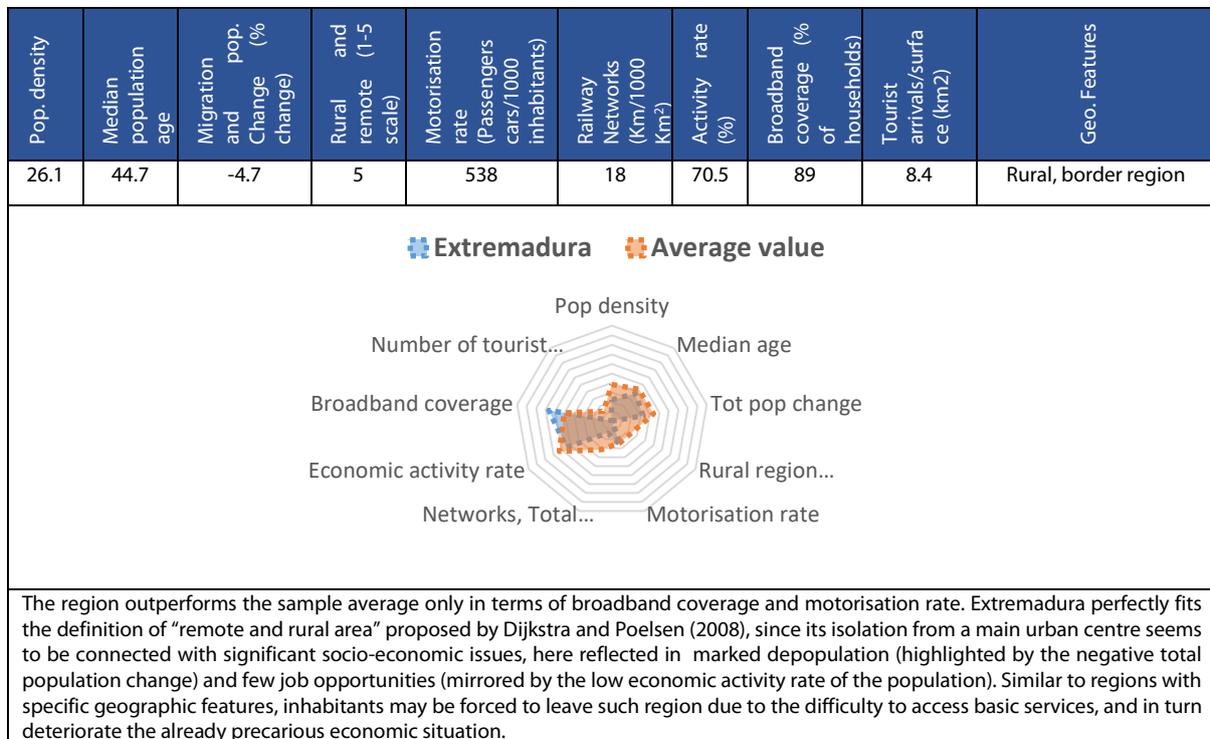


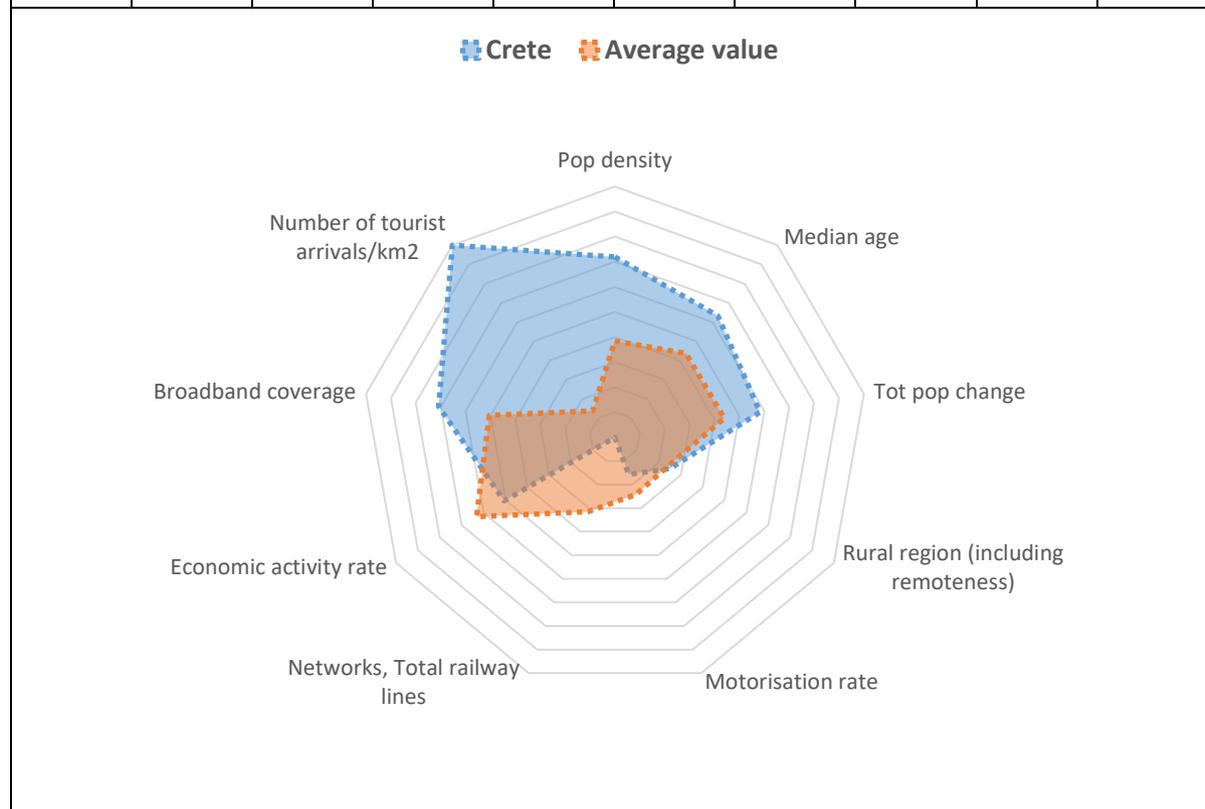
Table 15: Extremadura (ES43)



¹⁹⁹ Gløersen E., et al. (2006). “Northern Peripheral, Sparsely Populated Regions in the European Union and in Norway”, NordRegio Report 02/2006. Available at: <https://archive.nordregio.se/en/Publications/Publications-2006/Northern-Peripheral-Sparsely-Populated-Regions-in-the-European-Union-and-in-Norway/>

Table 16: Crete (EL43)

Pop. density	Median population age	Migration and pop. Change (%)	Rural and remote (1-5 scale)	Motorisation rate (Passengers cars/1000)	Railway Networks (Km/1000 Km ²)	Activity rate (%)	Broadband coverage (% of households)	Tourist arrivals/surface (km ²)	Geo. Features
76.4	42.2	2.2	4	424	0	69.5	90	653.9	Island region



Crete is the largest and most populous of the Greek islands. The population density of this region is nonetheless among the lowest in Europe: 76.4 inhabitants per square kilometres. In spite of this, Crete represents the third most densely inhabited area of our sample. Furthermore, the region outperforms the sample average across the majority of the indicators here under analysis. The Cretan population is overall younger of the sample average (42.2 vs 44.1); it shows a growing tendency (with a total population change of 2.2); it is well-equipped in terms of fixed broadband services. Finally yet importantly, Crete outperforms the remaining regions in our sample in terms of number of tourists' arrivals per square kilometres (653.9). The island has an economy predominantly based on services and tourism. This helps also understanding why the region does not show any negative demographic trends: tourism has been able to sustain a younger population.

Table 17: Aragon (ES24)

Pop. density	Median population age	Migration and pop. Change (% change)	Rural and remote (1-5 scale)	Motorisation rate (Passengers cars/1000 inhabitants)	Railway Networks (Km/1000 Km ²)	Activity rate (%)	Broadband coverage (% of households)	Tourist arrivals/surface (km ²)	Geo. Features
25,7	45,2	1,1	3	455	27	76	92	18	Mountain region Rural

This mountainous region located on the Pyrenees shows an ageing population (like the other Mountains region included in the study), but it is not experiencing depopulating trends. It also shows a motorisation rate slightly below the average and the railway network is more extended. On the other hand, tourism appears to have little importance. Interestingly, broadband coverage is well above the sample average.

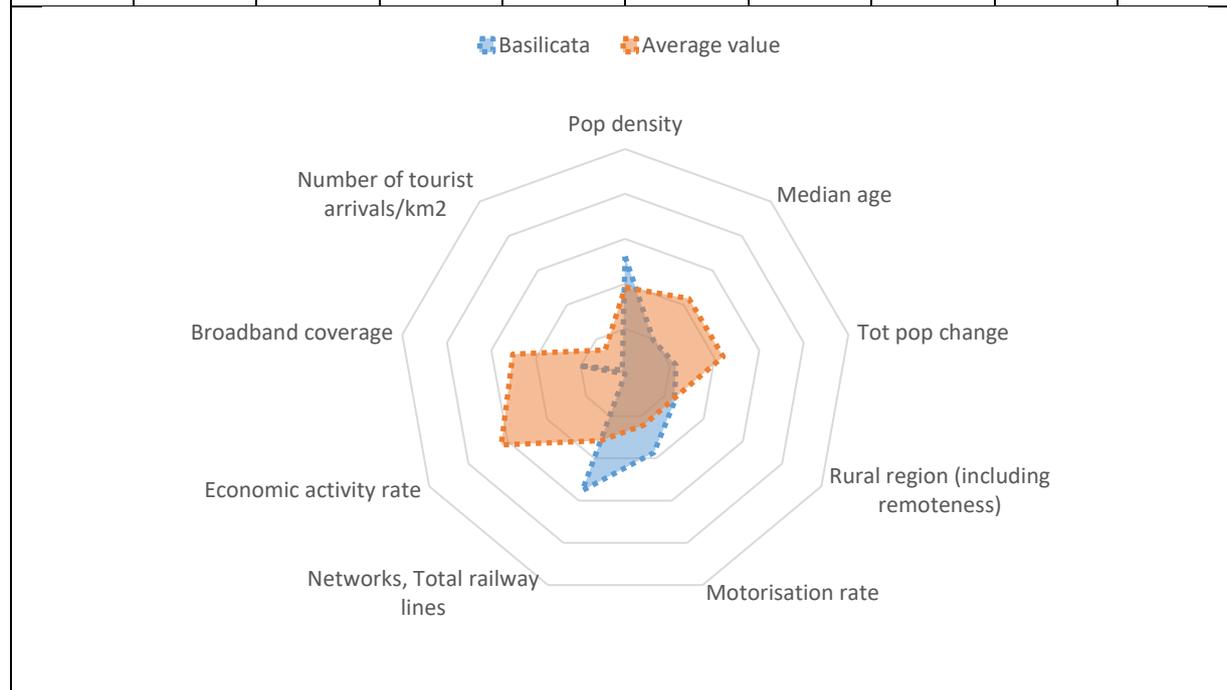
Table 18: Centre – Val de Loire (FRB0)

Pop. Density	Median population age	Migration and pop. Change (% change)	Rural and remote (1-5 scale)	Motorisation rate (Passengers cars/1000 inhabitants)	Railway Networks (Km/1000 Km ²)	Activity rate (%)	Broadband coverage (% of households)	Tourist arrivals/surface (km ²)	Geo. Features
56,5	44,2	-2,2	4	495	51	72,2	80	109,5	Rural Region

Centre Val De Loire is a rural region located in Central France. Despite its remoteness (4/5), the region enjoys a fairly extended railway network line (the highest within the sample) which is not matched by a low motorisation rate. Population density is amongst the lowest in France but higher than the sample average. The region is experiencing some depopulating trend, but the key deficiency appears to be the poor broadband coverage (80%). Tourism activity is in line with the average value.

Table 19 Basilicata (ITF5)

Pop. density	Median population age	Migration and pop. Change (% change)	Rural and remote (1-5 scale)	Motorisation rate (Passengers cars/1000 inhabitants)	Railway Networks (Km/1000 Km ²)	Activity rate (%)	Broadband coverage (% of households)	Tourist arrivals/surface (km ²)	Geo. Features
56,4	46,5	-7,5	4	654	34	56,6	78	15,7	Mountain region Rural Region



Basilicata is a mountainous region located in Southern Italy. It is rapidly depopulating and ageing, also compared to the average sample. This is linked with the low activity rate and the lack of connectivity (broadband covers only 78% of households). Tourism remains underdeveloped and it does not represent an alternative to the low-economic development. Motorisation rate is rather high despite the fairly extended railway network. This may be due to the lack of effective train services (few wagons, frequent delays, etc.).

Table 20: Estonia (EE)

Pop. density	Median population age	Migration and pop. Change (% change)	Rural and remote (1-5 scale)	Motorisation rate (Passengers cars/1000 inhabitants)	Railway Networks (Km/1000 Km ²)	Activity rate (%)	Broadband coverage (% of households)	Tourist arrivals/surface (km ²)	Geo. Features
30,4	42	4,3	4	550	27	79,1	90	49,8	Border region Rural Region

■ Eesti ■ Average value

Estonia can be entirely considered as a border region as its entire territory is close to international frontiers. Eastwards, it borders with Russia, a non-Schengen area. Its features are largely in line with the average value. From the demographic point of view, it is interesting to highlight an increasing and young population.

Table 21: Latvia (LV)

Pop. density	Median population age	Migration and pop. Change (% change)	Rural and remote (1-5 scale)	Motorisation rate (Passengers cars/1000 inhabitants)	Railway Networks (Km/1000 Km ²)	Activity rate (%)	Broadband coverage (% of households)	Tourist arrivals/surface (km ²)	Geo. Features
30,4	43,3	-7,5	3	356	29	77,7	83	30,4	Rural Region Border region

■ Latvija ■ Average value

Despite sharing many features with Estonia (i.e. border regions, relatively high economic activity rate, low tourism attractiveness, and poor railway network), Latvia is experiencing a sharp depopulating trend which is difficult to associate to any specific feature.

Table 22: Mellersta Norrland (SE31)

Pop. density	Median population age	Migration and pop. Change	Rural and remote (1-5)	Motorisation rate (Passen)	Railway Networks (Km/100)	Activity rate (%)	Broadband coverage (% of	Tourist arrivals/surface (km2)	Geo. Features
5,3	44,3	-0,1	5	553	22	81,6	97	3,8	NSPAs

■ Mellersta Norrland
 ■ Average value

Mellersta Noorland shares the key features of NSPAs (extremely low population density in a very remote area couple with a high economic activity rate and broadband coverage). It also shows a stable population. As for the other NSPAs, Melllersta Noorland shows that sparsely populated areas are not bound to depopulation and they may have a rather high economic development. Car is the only transport solution in the area.

Table 23: Northern and Western (IE04)

Pop. density	Median population age	Migration and pop. Change (%)	Rural and remote (1-5 scale)	Motorisation rate (Passengers cars/1000 inhabitants)	Railway Networks (Km/1000 Km ²)	Activity rate (%)	Broadband coverage (% of households)	Tourist arrivals/surface (km2)	Geo. Features
34,5	38,6	13,6	5	441	15	71,5	84	265,3	Border region Rural region

■ Northern and Western
 ■ Average value

Northern and Western Ireland shows the example of a thriving border region. The region is experiencing a sharp population increase and the median age is amongst the lowest found in the sample. Tourism provides a reliable opportunity for economic development (the area host widely known touristic attraction, such as Galway, Connemara, and the Cliffs of Moher). As for the rest of Ireland, railway network is limited.

Table 24: Pohjois- ja Itä-Suomi (FI1D)

Pop. density	Median population age	Migration and pop. Change (% change)	Rural and remote (1-5 scale)	Motorisation rate (Passengers cars/1000 inhabitants)	Railway Networks (Km/1000 Km ²)	Activity rate (%)	Broadband coverage (% of households)	Tourist arrivals/surface (km ²)	Geo. Features
11,8	44,6	7,1	5	658	13	75,3	91	4	NSPAs Border region Rural region

■ Pohjois- ja Itä-Suomi ■ Average value

Despite its remoteness, the lack of railway network and a very low population density, this Finnish region is experiencing a population increase. As the other NSPAs in the sample, it is possible to notice a high broadband coverage and economic activity rate. The area is not particularly touristic and cars remain the only mean of transport.

Table 25: Autonomous regions of The Azores (PT20)

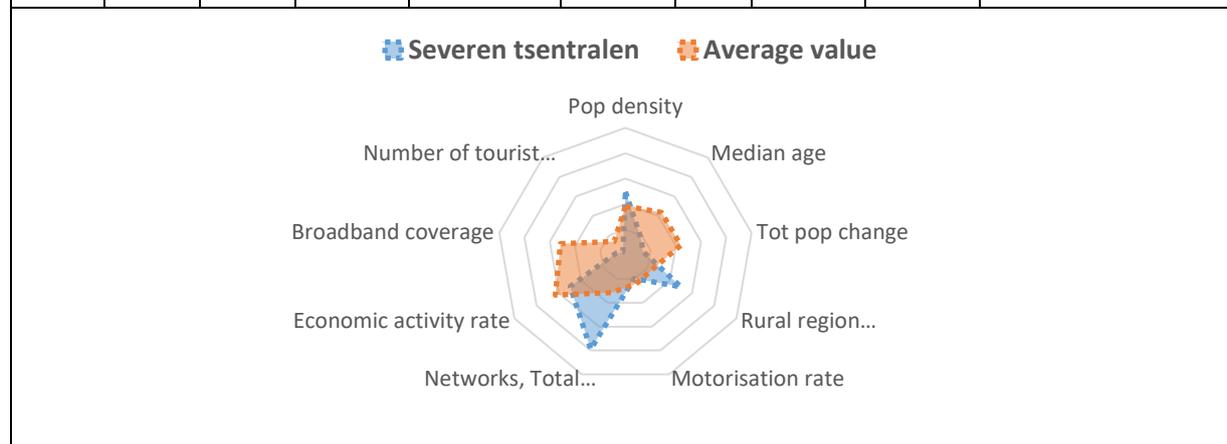
Pop. density	Median population age	Migration and pop. Change (% change)	Rural and remote (1-5 scale)	Motorisation rate (Passengers cars/1000 inhabitants)	Railway Networks (Km/1000 Km ²)	Activity rate (%)	Broadband coverage (% of households)	Tourist arrivals/surface (km ²)	Geo. Features
105	38,2	-4,2	5	370	0	70,3	83	155,9	Outermost regions Island

■ Região Autónoma dos Açores ■ Average value

The Azores are the only outermost region in the sample. They have a rather young population (close to the EU average) and they highly rely on tourism (as the other island regions included in the sample). They do not have any railway network, but motorisation rate is below the sample average.

Table 26: Severen Tsentralen (BG31)

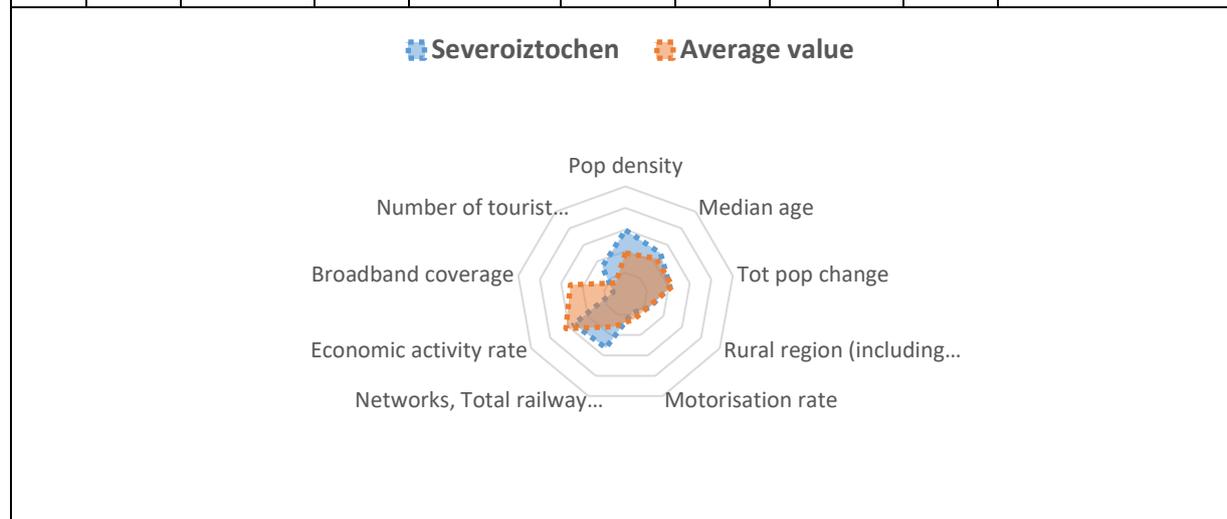
Pop. density	Median population age	Migration and pop. Change (% change)	Rural and remote (1-5 scale)	Motorisation rate (Passengers cars/1000 inhabitants)	Railway Networks (Km/1000 Km ²)	Activity rate (%)	Broadband coverage (% of households)	Tourist arrivals/surface (km ²)	Geo. Features
53,9	46,6	-13,7	3	404	43	69,3	73	8,9	Rural regions Border region



Located along the Danube, this rural Bulgarian region is amongst the fastest depopulating areas in the EU. This is matched by an ageing population. This demographic trend is likely caused by the low level of economic development and the poor economic activity rate pushing many inhabitants – especially the young – to emigrate. The area has virtually no tourism attractiveness. The low motorisation rate (less than one car every two inhabitants) is mostly due to widespread deprivation rather than to the existence of alternative transport means.

Table 27: Severoiztochen (BG32)

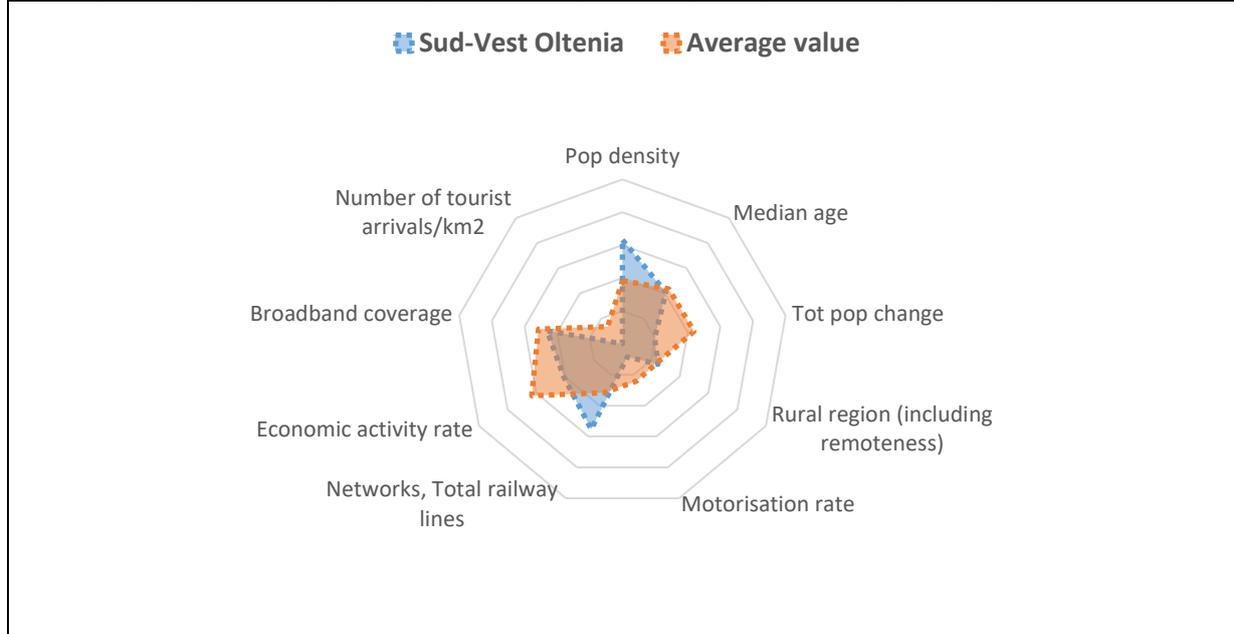
Pop. density	Median population age	Migration and pop. Change (% change)	Rural and remote (1-5 scale)	Motorisation rate (Passengers cars/1000 inhabitants)	Railway Networks (Km/1000 Km ²)	Activity rate (%)	Broadband coverage (% of households)	Tourist arrivals/surface (km ²)	Geo. Features
64	43,5	-5	4	384	33	70,6	74	81,2	Rural regions Border region



Located in the same area of the above-described Severen Tsentralen, Severoiztochen share the same features. Depopulation is closely correlated to the lack of economic opportunities. Broadband coverage is amongst the lowest in the EU and the median age is high.

Table 28: Sud-Vest Oltenia (RO31)

Pop. density	Median population age	Migration and pop. Change (% change)	Rural and remote (1-5 scale)	Motorisation rate (Passengers cars/1000 inhabitants)	Railway Networks (Km/1000 Km ²)	Activity rate (%)	Broadband coverage (% of households)	Tourist arrivals/surface (km ²)	Geo. Features
67,6	44,4	-11,9	4	277	34	67	83	1,5	Rural regions Border region



Located on the other side of the Danube, this Romanian rural region shares many similarities with its Bulgarian counterpart. Population is sharply decreasing due to the low economic activity rate. Tourism opportunity are close to none and very low motorisation (about one car every four inhabitants) is linked to deprivation. Transport poverty is a key issue in these areas.

ANNEX 6: CASES STUDIES

a. Extremadura

i. Overview of the region

Extremadura is part of the so-called “España vacía” (Empty Spain). The region combines mountainous areas with extensive plateaus, hosting a rich biodiversity. Its location in a natural north-south corridor has attracted many civilisations that have left their marks, notably the Romans, and now constitute part of the rich cultural heritage of the region.

The low density of population and the dispersion across the territory appears to be a historical feature of Extremadura. However, an increase in the concentration of the population in a centre-peripheral model (both at regional and national level) has further contributed to the abandonment of some parts of the region. Likewise, the limited coverage and accessibility of a quality transport network has lowered mobility within and to other territories, contributing to Extremadura’s isolation and hindering its development.

Key demographic features and trends

In January 2020, Extremadura had 1,061,768 inhabitants, accounting for slightly over 2% of the total Spanish population. The region has one of the lowest population densities in the country, with an average of 26 inhabitants per km². These figures have remained quite stable over the years, but the concentration of the population around the main regional urban hubs, Cáceres, Badajoz and Mérida, has become increasingly significant²⁰⁰. Nearly 30% of the population lives in these cities²⁰¹, where the density reaches 150 inhabitants per km².

The uneven distribution of the population across the territory can be already observed at provincial level. Badajoz accounts for 63% (670,782 inhabitants) of the regional population, while Cáceres accounts for the remaining 37% (390,986). Municipalities with over 10,000 inhabitants comprise 49% of the population, but only 17% of the territorial surface, while almost 75% of municipalities have less than 2,000 inhabitants.

The demographic trends show an increasingly aging population; the average age is 44 years and life expectancy is 82.75 years. The net migration of Extremadura reversed its negative trend in 2016 and continued to slowly grow over the following years. Local youth started to emigrate again in 2019, while foreign immigration continued to increase²⁰². The immigration flows from other countries come particularly from Portugal, Romania, Morocco and countries in Latin America, while locals tend to migrate to other Spanish regions, mainly Madrid²⁰³.

Geographical features

Extremadura is one of the largest regions in Europe covering an area of around 41,600 km², or 8% of the Spanish territory. Located at the periphery of Spain and Europe, and bordering with Portugal, it is close to Lisbon and Madrid.

The Autonomous Community, which is part of the Central Plateau, is crossed by three significant mountain chains: the Sistema Central in the North, which is home to the highest peak in the region reaching a height of more than 2,000 m; the Montes de Toledo in the centre; and Sierra Morena in the South. It is also home to two of the main Spanish rivers, the Tago and Guadiana, which create fertile land for agricultural activities.

²⁰¹ Junta de Extremadura, Instituto Estadístico de Extremadura, IEEX, (2019), “Situación Demográfica de Extremadura 1999-2019.” Available at: https://ciudadano.gobex.es/documents/9292336/9782374/Situacion_demografica_1999_2019_completo.pdf/91856705-0ddc-4e0e-b228-40568ffa31f2

²⁰² INE: www.ine.es/jaxiT3/Datos.htm?t=31304#tabs-tabla

²⁰³ Instituto Estadístico de Extremadura : <https://ciudadano.gobex.es/web/ieex/publicaciones-tipo>

The contrasting landscape has both pros and cons with regards to the transport network. On the one hand, it is a factor in creating uneven settlement patterns of the population across the territory. On the other hand, Extremadura is located near Lisbon and Madrid, which offers a key advantage.

Local economy and development

The economy of Extremadura is heavily dependent on its natural resources. The regional GDP has been increasing in recent years, reaching EUR 20,654 million in 2019. Extremadura is nevertheless categorised as 'less developed'. The region has one of the lowest GDP per capita in Spain. It has one of the highest unemployment rates (23.5%), with women and young people most affected by unemployment²⁰⁴.

Agriculture plays a significant role in the economy. The production of food and beverages accounts for 35% of the region's industrial activity. Renewable energies are gaining track, especially photovoltaic energy due to the favourable climate conditions.

Likewise, the biodiversity and cultural heritage of the region has boosted tourism.

The Regional Innovation Scoreboard 2019 (RIS 2019) ranks Extremadura as a "Moderate + Innovator"²⁰⁵ and innovation performance has decreased slightly over time due to the decline in R&D investment²⁰⁶. Only 20.6% of the population has higher education, one of the lowest rates in Spain.

Administrative framework

Extremadura is one of the 17 Autonomous Communities that form Spain. It is divided into two provinces, Caceres in the north and Badajoz in the south, which is home to Merida, the region's capital. Since 2008, the territory is further divided into 33 smaller administrative units denominated "*mancomunidades*" (associations of municipalities).

ii. Key transport infrastructures

Road network

Extremadura's road network dates back to the Romans, who built roads connecting the territory with the main Iberian cities. Since this time, roads have continued to be the main form of transport in the region. The dispersion of inhabitants in small, rural hubs, coupled with a vast territory, largely explain the prevalence of this mode of transport and thus, the critical importance of developing, modernising and maintaining the infrastructure and public transport services.

Despite its importance, road transport in Extremadura remains characterised by insufficient external accessibility, incomplete internal articulation and deficits in modernisation, safety and quality of services, along with reduced environmental integration. This is manifested by an incomplete high capacity and basic network, which limits the connection of the vertical high capacity axes to the plateau, as well as the transversal axes to the main urban centres and the Spanish east coast area. Also, the interregional and secondary network lacks transversal corridors that ensure internal integration²⁰⁷.

The main road arteries crossing the region are the A-5 Madrid-Lisbon motorway, the A-66 motorway, known as *Ruta de la Plata* (Silver Route), which connects Seville with Gijon, and the A-58 that connects Caceres with the A-5. The region has additional highways that connect towns with a certain level of economic activity and population, with the national highways²⁰⁸.

²⁰⁴ Instituto Estadístico de Extremadura : <https://ciudadano.gobex.es/web/ieex/publicaciones-tipo>

²⁰⁵ RIM+: <https://ec.europa.eu/growth/tools-databases/regional-innovation-monitor/>

²⁰⁶ Ibid.

²⁰⁷ Junta de Extremadura: www.juntaex.es/orsv/view/portal/index/index.php?id=inicio

²⁰⁸ Dirección General de Tráfico: www.dgt.es/es/seguridad-vial/estadisticas-e-indicadores/parque-vehiculos/tablas-estadisticas/

Interestingly, no highway connects Badajoz and Caceres. The motorisation rate of Extremadura is 522 cars per 1000 inhabitants, second only to Madrid in Spain, and higher than the EU28 average of 506²⁰⁹. This shows a significant car-dependency among local citizens.

The development of the regional road infrastructure is focused on: maintaining the existing infrastructure; reinforcing safety; promoting the use of new technologies to manage traffic; optimising the services; promoting the continuity of regular interregional lines; and, seeking greater competition and competitiveness in the market, which will benefit citizens by providing the best quality service at the best price. Ultimately, the aim is to improve the mobility of the population, as well as the overall accessibility within and to the territory.

Railway network

Extremadura's railway network has 725 km of operational track. All routes are single-track conventional and non-electrified, hindering the circulation of trains and lowering speed (15% of the routes do not admit speeds of over 50-60 km/h and only the route Madrid-Caceres-Valencia de Alcantara surpasses 160 km/h). Moreover, 70% of these routes are still managed with old telephone blockades. This means that operators advise by telephone when and which control point a train is going to occupy, posing a significant threat to the safety of passengers²¹⁰.

Extremadura's railway is characterised by insufficient external accessibility, with few corridors, since the only existing connections are with Madrid, Seville, Huelva and Ciudad Real. In 2012, the service to Lisbon was discontinued. With an average of 18 km per 1,000 km², it has the lowest network rate in mainland Spain²¹¹. Extremadura is the only inland region that does not have any long-distance trains, Figure 27.

Figure 27: High-speed and long-distance lines in Spain



Source: Junta de Extremadura

²⁰⁹ Eurostat. See: <https://ec.europa.eu/eurostat/statistical-atlas/gis/viewer/?config=RyB-2018.json&ch=C14,C05,C10,AGR,TRZ,TRT&mids=BKGCNT,C11M02,CNTOVL&o=1,1,0.7¢er=50.03696,19.9883,3&lcis=C11M02&nutsId=ES43&>

²¹⁰ Junta de Extremadura, Consejería de Medio Ambiente y Rural, Políticas Agrarias y Territorio

²¹¹ <https://ec.europa.eu/eurostat/cache/RCI/#?vis=nuts2.transport&lang=en>

Construction of the new Madrid-Lisbon corridor through Badajoz and part of the TEN-T began in 2010, but delays to the construction mean that it is still not yet fully operational. Once completed, it would provide Extremadura with a more modern and efficient rail service, with high-speed trains reducing journey times between Madrid and Lisbon through Badajoz²¹². There are also plans for a freight railway line to link the port of Sines in Portugal with Puertollano (Ciudad Real), via Badajoz and Mérida.

The lack of appropriate services, even for the main cities in the region, has caused the number of passengers to drop significantly. This loss can be largely explained by inadequate journey times, incomplete internal and external articulation, a lack in suburban trains and serious deficits in modernisation, safety and quality of services, with unelectrified tracks, low maintenance and trains over 25 years old. The overall inefficiency (e.g. Badajoz-Sevilla takes four and a half hours by train vs two hours and 20 minutes by car) is compounded by frequent delays and breakdowns.

Rail freight transport is minimal, having decreased from almost 50,000 tonnes in 2006 to less than 20,000 in 2018. The important shortcomings in the railway infrastructure mentioned, the lack of optimal modal shift facilities, and the poor external connection of Extremadura's logistics system are the main causes of this decline²¹³.

The efforts of the region to improve the railway services were summarised in the "Social and Economic Pact for Railway in Extremadura" (2016)²¹⁴, and later materialised in the "Plan for the Optimisation and Improvement of Rail Transport in Extremadura"²¹⁵. The progression towards these objectives and their impact are yet to be confirmed.

Airline connections and infrastructures

Badajoz is the only airport in Extremadura²¹⁶. Operating under the Public Service Obligation (PSO) since 2018, it offers 11 outbound flights to Madrid and four to Barcelona, weekly, with prices that cannot exceed EUR 90 and EUR 110, respectively. Moreover, it offers seasonal flights to various national destinations.

In 2019, the Badajoz Airport registered 75,418 passengers, an increase of 44.8% on the previous year, Figure 28²¹⁷.

²¹² Administrador de Infraestructuras Ferroviarias (ADIF, 2018), *Líneas de Alta Velocidad. Línea Madrid - Extremadura - Frontera Portuguesa*. See: www.adifaltavelocidad.es/es_ES/infraestructuras/lineas_de_alta_velocidad/madrid_extremadura_fronteraportuguesa/madrid_extremadura_fronteraportuguesa.shtml

²¹³ Junta de Extremadura: <https://ciudadano.gobex.es/documents/9224560/9380194/Informe+a+la+comisi%C3%B3n.pdf/163ea92c-f2b4-42e2-a66e-8daf9c85dade>

²¹⁴ Junta de Extremadura (2016), "Pacto social y político por el ferrocarril en Extremadura". Available at: www.juntaex.es/filescms/pactoffcc/uploaded_files/documentos/02_DOCUMENTO TECNICO SOBRE PACTO POR EL FERROCAR RIL Extremadura MARZO 2016.pdf

²¹⁵ Junta de Extremadura website, *Plan de optimización y mejora del transporte ferroviario en Extremadura*. See: <https://ciudadano.gobex.es/web/transportes/plan-ferroviario>

²¹⁶ Cáceres has an aerodrome. Even though there have been numerous initiatives to promote its transformation into an airport, both for passengers or only for freight transport, none has succeeded.

²¹⁷ Aeropuertos Españoles y Navegación Aérea (AENA) website, *El Aeropuerto de Badajoz cierra el año 2019 con 75.418 pasajeros* See: www.aena.es/es/corporativa/aeropuerto-badajoz-cierra-ano-2019-75.418-pasajeros.html?p=1237548067436

Figure 28: Annual traffic evaluation of the Badajoz Airport

Source: AENA

Boat and other waterways transport

Extremadura does not have access to the sea. The two main rivers crossing the region, the Tajo and Guadiana, are navigable in some parts, but no transport means are available²¹⁸.

Local public transport

Local public transport is mainly limited to bus and coach. In 2019, the region registered 1,366,980 users of regular passenger road transport, a small increase on the previous year²¹⁹. According to Eurostat, Extremadura's equipment rate for public transport vehicles (number of motor coaches, buses and trolleybuses per 1 000 inhabitants) is 1.2, below than the EU average of 1.8²²⁰.

The region offers a transport card, which subsidises travellers over 60 years old and other *vulnerable* groups (young people, the unemployed, people with disabilities, victims of gender violence) at 50% of the cost of the intercity journeys originating in Extremadura and carried out using regular road services. Residents of municipalities with less than 500 inhabitants are also eligible for this discount. Likewise, on flights operated at the airport of Badajoz with origin or destination in Madrid or Barcelona, excluding airport taxes, the discount is 10% for all users²²¹.

iii. Transport policies and key challenges

Overview of national and EU policies

The strategy **Extremadura 2030** aims to promote the transition to a green and circular economy. The document is fully aligned with the UN Sustainable Development Goals and similar global policies, as well as with EUROPE 2020 and other EU initiatives. It can be considered as a compilation and upgrade of existing regional policies such as the Programme for Rural Development (PDR Extremadura), the Regional Smart Specialisation Strategy (S3) and a range of employment policies, among others.

²¹⁸ Agencia Extremeña de Energía (AGENEX, 2014), "Oferta y demanda de transporte en Extremadura". Available at: www.agenex.net/guias-altercexa/8_OFERTA_Y_DEMANDA_DE_TRANSPORTE_EN_EXTREMADURA.pdf

²¹⁹ Junta de Extremadura (2019), "Informe estadístico correspondiente al ejercicio 2019 en relación con el Transporte en Líneas Regulares de Viajeros por Carretera de competencia de la Comunidad Autónoma de Extremadura." Available at: <https://ciudadano.gobex.es/documents/9275018/9280638/Informe+estadistico+-+Ejercicio+2019/bdc740ef-b7ac-4eb1-be63-7631d7e8797a>

²²⁰ Eurostat: <https://ec.europa.eu/eurostat/statistical-atlas/gis/viewer/?config=RYP-2018.json&ch=C14,C05,C10,AGR,TRZ,TRT&mids=BKGCNT,C11M02,CNTOVL&o=1,1,0,7¢er=50.03696,19.9883,3&lcis=C11M02&nutsId=ES43&>

²²¹ Junta de Extremadura website: <https://ciudadano.gobex.es/web/transportes/tarjeta-transporte-subsencionado>

In terms of transport, it largely builds on the **Climate Change Strategy Extremadura 2014-2020**²²². Its objectives include the promotion of energy efficiency in mobility, improvement of urban and interurban transport habits, improvement of ecological transport infrastructure, zero- or low-emission vehicles, and the dissemination of information on sustainable mobility. Extremadura 2030 further emphasises the focus on sustainable transport, seeking to improve the transport network and services, especially linked to the railway, and to achieve an efficient, safe and sustainable management of mobility.

The **Strategic Pluriannual Plan of Infrastructures 2016-2030**²²³ included the following objectives concerning road infrastructures, namely:

- Upgrade the road network to match and promote socio-economic development;
- Improve regional connectivity by upgrading and maintaining the existing communication networks;
- Improve access of all Extremadura's municipalities to the large logistic centres and to the main regional, national and international communication routes;
- Guarantee the quality of the road infrastructure, both existing and new;
- Increase road safety and reduce the risk of accidents for road users; and
- Help people make better use of their leisure time.

Since road infrastructure is a decisive factor in the progress and development of the region, the regional government of Extremadura is committed to building a high capacity road network that serves as a backbone to connect the territory, facilitating full accessibility, optimising safety and guaranteeing that this public service reaches all the population equally.

The government of Extremadura together with the Spanish Ministry of Infrastructures has also introduced the **"Plan for the Optimisation and Improvement of Rail Transport in Extremadura"**²²⁴. The plan intends to respond to the demands and addresses the inaction of the past few decades (i.e. in 2017, 80% of the budget allocated was not spent and no new trains were bought) by setting the guidelines to improve the quality and performance of the railway service in the short and medium term. The plan, which has a budget of EUR 388 million²²⁵, aims to: improve the performance of medium- and long-distance services; ensure their maintenance by reducing operating costs; improve service quality by adjusting schedules and reducing travel times; improve rolling stock; and implement commercial policies that make trains more accessible to citizens.

Key issues and challenges

Transport policies in Extremadura must address the challenges presented by dispersed population, the ageing demographic, the low income and uneven development of the territory, and increasing urbanisation, with the consequent abandonment of the rural areas. The dispersion of the population across such a vast territory requires the deployment of logistic and transport infrastructures that serve as a backbone to improve connectivity and, ultimately, to contribute to territorial cohesion.

The modernisation of the roads has not been able to guarantee remote municipalities an adequate accessibility to the main communication nodes so far, while rail and air transport continue to be rather poor. For instance, Extremadura has one of the lowest rates of intermodal transport in the EU.

²²³ Junta de Extremadura, Plan Estratégico Plurianual de Infraestructuras 2016-2030. Available at : <https://ciudadano.gobex.es/documents/9224560/9380194/VERSION+FINAL+PLAN+ESTRAT.pdf/bdf5ba16-e2e6-4bd2-a15a-a94b400c0d28>

²²⁴ Junta de Extremadura website, Plan de optimización y mejora del transporte ferroviario en Extremadura. See: <https://ciudadano.gobex.es/web/transportes/plan-ferroviario>

²²⁵ <https://ciudadano.gobex.es/web/transportes/plan-ferroviario>

Even though estimates show that Extremadura could become the main route for freight transport from Portugal to Europe, the lack of accessibility, especially external, affects both passengers and goods, as freight transport occurs mainly by road.

The failure of policymakers to effectively plan and implement measures for the provision of basic services has been a continuous factor hindering the progress of Extremadura. The increasing (political) importance of the main cities in the region might put the rural and smaller towns in a general disadvantaged position with regards to investments. Moreover, the new forms of mobility appear to be difficult to implement beyond urban areas, as the aging and dispersed population might not have the competences and means to use them (18% of the population had never used the internet in 2017²²⁶). Secondly, the operators of new modes of mobility do not consider it profitable to expand their services in such areas.

The 2008 economic and financial crisis hampered the investment and development of the transport networks in Extremadura. Not only are transport infrastructures increasingly obsolete (and necessary investments in railway for instance have been postponed), but their correct maintenance is also jeopardised. The uncertain political situation of the country in recent years, with numerous changes of governments and the consequent difficulty of agreeing a national budget, have also impacted the development of key projects across all modes of transport. Some have been indefinitely abandoned, delayed or only partially completed.

Emerging trends

The strategy **Extremadura 2030** encompasses many of the emerging trends in the region and devises a comprehensive strategy to unlock their potential by leveraging the available resources and strengths, with a focus on sustainability.

Extremadura is fostering the development and deployment of **new technologies**, which could reduce the centre-periphery imbalance, the isolation of some small rural communities, as well as improve the efficiency of the different means of transport and their provision. For instance, there is a strong interest in electric vehicles, both for individual and public use, as reflected in the “Regional Strategy to Promote Electric Vehicles 2018-2020”²²⁷. Moreover, Extremadura is promoting green mobility and concepts such as preserving before building new infrastructures. It is also emphasising the importance of adequate mobility management to complement investment in infrastructure.

The **synergies between Extremadura and Portugal** have not yet been exploited. In addition to the market of the neighbour country and the closeness to its capital, Portugal also constitutes easy access to the sea, with all the opportunities it brings. Initiatives such as the Euroregion Alentejo Centre-Extremadura (EUROACE)²²⁸ have been implemented to promote bilateral cooperation with Portugal, but the inefficient coordination of transport and industrial policy has limited cross-border activities to a great extent²²⁹.

Neo-ruralism is a promising trend despite its slow development. The search for a calmer and more sustainable lifestyle is an important motivation for an increasingly number of people. If this trend continues to grow, it could have a positive impact on demography and therefore the provision of transport services. The current pandemic and the possibility to work remotely are likely to favour the movement of citizens to rural areas.

Similar to many low-density areas, Extremadura is trying to foster its **tourism sector**. The region is focusing on specific niches, such as starlight (observation of stars) and slow (based on the concept

²²⁶ Eurostat: <https://ec.europa.eu/eurostat/cache/RCI/#?vis=nuts2.infosoc&lang=en>

²²⁷ Junta de Extremadura, Estrategia Regional para el Impulso del Vehículo Eléctrico 2018-2020”. Available at: www.juntaex.es/filescms/con02/uploaded_files/planes/EstrategiaVE.pdf

²²⁸ EUROACE: www.euro-ace.eu

²²⁹ Junta de Extremadura Actualización de la Estrategia Industrial de Extremadura. Available at: www.juntaex.es/filescms/con02/uploaded_files/planes/Actualizacion_Estrategia_Industrial.pdf

of speed, it refers to a decrease on the rate of tourism adopting a pace that allows rediscovery of oneself²³⁰) tourism. The current infrastructure deficiencies are likely to continue to hamper the development of the tourism sector, but the advantages linked to the niches could outweigh the negative aspects.

iv. Conclusions and lessons learnt

Extremadura is one of the most lagging behind regions in Spain, having suffered from a severe lack of public investment and strategic focus. The traditional territorial imbalances are matched by an inefficient transport network, which prevents the exploitation of the vast resources existing in the region to a significant degree. The progression of the centre-periphery model and the migration of young people are resulting in a greater dispersion of the population in the rural areas, further aggravating the situation of vulnerable groups, whose access to basic services is jeopardised.

The mobility of the population is highly dependent on private cars as public transport is limited and not very reliable. New mobility solutions, such as car sharing, are quite widespread in the cities, but do not appear to have an important footprint in sparsely populated areas. The value of certain means of transport, such as bikes, is quite low as the distances are too vast to be covered easily. The poor connectivity in some areas, and the low digital competences of the most vulnerable groups of society, are also important factors hindering the implementation of new solutions, such as electric vehicles or mobile apps.

In addition to the road network, Extremadura has air and rail transport. The latter has been at the centre of the public debate in recent decades, including many civil platforms, due to its reliance on obsolete infrastructure, the failure to implement the allocated budget and the overall poor quality of services. The railway network of Extremadura is among the worst in Spain, and despite the efforts made little improvement has been achieved. In common with most low-density and depopulated areas, train services are mainly unavailable. Badajoz airport has also received much criticism for its location and the few flight connections it offers.

Initiatives for the improvement of the regional transport network are materialising in different plans and strategies. However, investments and political action have not followed, and many of these initiatives have thus never been implemented. For instance, logistics connections to principal ports, especially those that are intermodal, have not been completed. The impact is not just seen in the area of mobility, but also on the economic and social progress of the region.

On a positive note, the dispersed and aging population has driven the development of new solutions for the provision of efficient public services. Building on an intensive use of technology for their deployment, some of the social services in Extremadura are used as a model of good practice for regions displaying similar characteristics²³¹. Moreover, an informal collaborative mobility model that can be observed in close-knit communities is carpooling among neighbours, which could be reinforced and structured by public support.

The region is focused on harnessing its strengths in order to overcome its shortcomings and even turning these into new opportunities. Much progress must still be made in achieving an adequate transport service, but the foundations are being laid. The governance framework, which considers the association of municipalities as administrative units, could be very beneficial in rural areas, as the service could be jointly restructured to meet the specific needs of the population in a more cost-effective manner. The reform of the public procurement procedures could also help to promote competition in the development of new solutions, which satisfy the specific demands of the sparsely populated areas.

²³⁰ Callot P. (2013). "Slow Tourism". In: Idowu S.O., Capaldi N., Zu L., Gupta A.D. (eds), Encyclopedia of Corporate Social Responsibility. Springer, Berlin, Heidelberg. https://doi.org/10.1007/978-3-642-28036-8_149

²³¹ RIM+ : <https://ec.europa.eu/growth/tools-databases/regional-innovation-monitor/>

Lastly, a renewed focus on relations with Portugal could provide a great impetus to Extremadura. The Atlantic TEN-T rail and road corridors and the Atlantic route of Eurovelo²³² are foremost projects in this regard.

b. Lower Danube

i. Overview of the region

Key demographic features and trends

The population in the Lower Danube Area is 3.76 million inhabitants: 2.58 million on the Romanian side (69%) and 1.18 million on the Bulgarian side (31%). The distribution of the population, which is in general characterised by low population density, is highly related to the co-existence of urban centres and large rural areas. Both Romanian and Bulgarian sides of the Lower Danube Area are highly affected by three main demographic factors: strong outward migration and population ageing along with a low birth rate. The trend is more marked on the Bulgarian side than on the Romanian side and is also more acute in the Western part of the cross-border region.

Long-term unemployment levels are high in the entire cross-border region, although this phenomenon is more acute in Bulgaria. These negative trends are also reflected in labour market productivity, which is substantially below the EU average and also far below the respective national averages on both side of the Danube.

All EU social indicators and Eurostat data²³³ highlight that the region is facing many significant challenges²³⁴. Levels of early leavers from education and training (18 to 24 years old) in both regions are among the highest in the EU, and the share of the population aged between 25 and 64 years, with less than primary or lower education, is significantly above the EU average. Also, the region has a much higher than average level of young people neither in employment nor in education or training (NEETs).

There is also a very limited labour mobility, mainly due to the difficulty in crossing the Danube. However, even in areas where river crossing are easier, there are virtually no commuters.

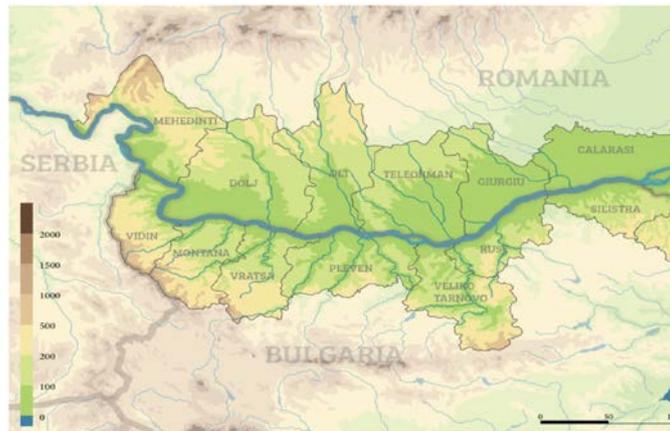
Geographical features

The Lower Danube Area covers 16.5% of the surface area of the two countries (57,498 km²), 56% of the area belongs to Romania and 44% to Bulgaria. The main geographical element, shaping the entire area from west to east is the Danube which runs along 470 km of the border between Romania and Bulgaria (exceeding the borders of the Lower Danube Area). The 32,249 km² on the Romanian side is mostly agricultural land (78.21%), while 10.77% is forest and 4.02% water and lakes. The main specificity of the Bulgarian area is the unique river network (20 major tributary streams of the Danube) that represents 52% of all arable land in Bulgaria and more than 20% of its vineyards.

²³² Eurovelo: <https://pro.eurovelo.com/>

²³³ In particular data regarding education, skills and lifelong learning, living conditions and poverty and youth.

²³⁴ <https://ec.europa.eu/eurostat/web/european-pillar-of-social-rights/indicators/data-by-region>

Figure 29: Lower Danube Area


Source: Territorial Analysis of the Romania – Bulgaria Cross-Border Area

Administrative framework

Bulgaria and Romania are centralised unitary states, with only one intermediary level between the central government and local authorities, NUTS3: seven districts in Bulgaria and six counties in Romania. In Romania, NUTS3 counties are responsible for culture, public health, specific social services and managing municipal property. In Bulgaria, municipalities are delegated with responsibilities concerning education, adult training, social security and certain aspects of the health sector.

ii. Key transport infrastructures

Border crossing infrastructures

The table below shows the different border crossing modalities along the Romanian-Bulgarian border. Currently, there are two existing bridges for road and rail transport across the Danube between Romania and Bulgaria (Calafat-Vidin, Giurgiu- Ruse). In addition to the two bridges (both road and rail), there are six ferries. The main difficulties affecting ferries are the quality and capacity of road connections, as well as the high crossing fee compared to bridge fees and the sometimes irregular schedule.

Table 29: Border Crossing Infrastructures (RO-BG)

Romania Border Point	Bulgaria Border Point	Border Crossing way
Calafat	Vidin	Water transport Road transport (bridge) Rail transport
Bechet	Oryahovo	Water transport Road transport (ferry)
Corabia	Magura	Water transport
Somovit	Nicopol	Water transport
Zimnicea	Svishtov	Water transport (ferry)
Giurgiu	Ruse	Road and rail transport (bridge) Port and ferry
Oltenița	Tutrakan	Water transport (ferry)
Calarasi	Silistra	Water transport (ferry)
Ostrov	Silistra	Road transport (road)
Negru Voda	Kardam	Road transport (road) and rail transport
Turnu Magurele	Nikopol	Water transport (ferry)

Source: Territorial Analysis of the Romania – Bulgaria Cross-Border Area

Road network

In 2018, the cross-border roads²³⁵ in the Lower Danube Area amounted to 15,416 km. More specifically, on the Romanian side of the cross-border area, the total amount of the public roads in the Lower Danube Area was 10,152 km (corresponding to 14.8% of the national road network), according to Romanian National Institute of Statistics, data for 2018. On the Bulgarian side, instead, the total amount of public roads was 4,628 km (corresponding to 23.2% of the national road network). Interestingly, even though the total length of the public roads network in Romania more than doubles the total length of the Bulgarian counterpart, the roads network's share of the respective national road network is higher in Bulgaria (23.2%) than in Romania (14.8%).

Cross-border secondary and tertiary road networks are underdeveloped and poorly maintained throughout the area and have a high risk of accidents. Moreover, some roads are exposed to flooding, especially on the Romanian side of the Danube, while many have insufficient capacity, leading to traffic jams and, as a consequence, to increased travelling times, vehicle operating costs, accidents and damage to the environment.

The Lower Danube Area has among the lowest motorisation rates in the EU, according to NUTS2 Eurostat data for 2017. The South-Muntenia region in Romania has just 256 cars per 1000 inhabitants, while the best-performing region is Bucuresti (although outside the scoping area) with 518 cars per 1000 inhabitants²³⁶. Also, Romanian and Bulgarian cross-border regions steadily underperforms the EU benchmark for what concerns accessibility and transport performance by car²³⁷.

The area contains no motorways, with the closest being the Bucharest and Constanta connection (220 km). In 2020, a high-speed road between Craiova and Pitesti began construction; it is expected to be completed by 2021²³⁸. However, no additional high-speed road infrastructure is being planned in the cross-border area, especially roads connecting the two countries.

This area is also crossed by two Eurovelo routes: Eurovelo 6 and 13. The Eurovelo routes are cycling corridors that have tourism purposes, linking key cultural and heritage sites in Europe. However, both routes are poorly developed on the Romanian and Bulgarian side. Figure 3 shows that the extension of Eurovelo 6 Route, marked in red, in the cross-border area between Romania and Bulgaria is currently incomplete.

Figure 30: Eurovelo 6 Route



Source: <https://www.bicyclette-verte.fr/eurovelo-loire-velo-danube-velo-pxl-74.html>

²³⁵ For the scope of this study, we consider as “cross-border roads” the network of public roads of all administrative entities eligible for the Lower Danube area in Romania and Bulgaria.

²³⁶ <https://ec.europa.eu/eurostat/cache/RCI/#?vis=nuts2.transport&lang=en>

²³⁷ Road transport performance in Europe: https://ec.europa.eu/regional_policy/sources/docgener/work/2019_02_road_transport.pdf

²³⁸ <http://www.130km.ro/dx12.html>

Railway network

The current length of operating railways shows that the total length of running tracks is higher in Romania (1050 km) than Bulgaria (931 km), but the Bulgarian side of the Lower Danube has 56.7% more electrified railway kilometres (594 km) than Romania (379 km). At NUTS3 level, the best performing district is Veliko Tarnovo (236 km, of which 159 km electrified), while the worse performing is Giurgiu (47 km, of which 32 km is electrified)

Table 30: Railway network in the Lower Danube Area (km)

NUTS 3 Entities	2019			NUTS 3 Entities	2019		
	Total length of running tracks	of which			Total length of running tracks	of which	
		Double railway lines	Electrified railway lines			Double railway lines	Electrified railway lines
Mehedinti	124	23	23	Vidin	108	-	93
Dolj	227	81	81	Vratsa	112	67	112
Olt	237	58	58	Montana	114	-	114
Teleorman	227	67	67	Pleven	206	116	116
Giurgiu	47	43	32	Veliko Tarnovo	236	82	159
Calarasi	188	132	118	Ruse	155	-	-
				Silistra	70	-	-
Total Romania	1050	404	379	Total Bulgaria	931	265	594

Source: Romanian and Bulgarian national institutes of statistics

The density of operating railways is around 46.1 km per 1000 km² in Romania and 38.9 km per 1000 km² in Bulgaria. Both figures are under the EU average of 65 km per 1000 km². Moreover, the rail networks of Romania and Bulgaria are considered among the worst in the EU, in terms of train services²³⁹. Indeed, in 2018, a World Economic Forum survey found that both countries rank among the last Member States in Europe²⁴⁰. In fact, the poor state of the Romanian and Bulgarian railways has become a much-debated topic in the European press.

The intermodal railway transport operator, Hupac, announced in 2018 new routes and solutions for the intermodal network. The company is responding to the growing demand for intermodal connections to and from southeast Europe, adding its networks to Stara Zagora in Bulgaria, passing through Romania, with one round trip train from Duisburg to Stara Zagora each week²⁴¹ (see Figure 31).

²³⁹ Only Greece and Croatia have worse service.

²⁴⁰ https://ec.europa.eu/transport/facts-fundings/scoreboard/compare/investments-infrastructure/quality-rail-infrastructure_en#2018

²⁴¹ <https://mobilitate.eu/hupac-tren-romania-bulgaria/>

Figure 31: Key railway connections between Lower Danube and Central or Western Europe



Source: <https://www.railfreight.com/intermodal/2018/12/03/11082/?gdpr=accept>

Airline connections and infrastructures

The region is serviced by two international airports in Romania, Craiova and Bucharest-Otopeni, which is located close to the cross-border area. It is, however, interesting to examine the busiest route from the Craiova International Airport.²⁴² As we can see from Table 4, the most common destinations from Craiova International Airport correspond to the countries that host the largest communities in the Romanian diaspora. This indicates that the airport is more of a connecting point between those arriving and departing to and from Romania, rather than serving as a hub for regional mobility.

Table 31: Busiest routes from Craiova International Airport (2019)

Airport	Passengers
London - Luton	142.678
Bergamo	84.970
Rome Ciampino Airport	43.856
Madrid	40.183
Bologna	35.368

Source: flightera.net

The nearest airports in Bulgaria are in Sofia and Varna (outside the Lower Danube region). However, a part of the population of the Bulgarian side of the cross-border region regularly uses the airport Bucharest-Otopeni. Moreover, TAROM, the first and largest airline operating in Romania, based on international destinations, operates regular flights between Bucharest and Sofia.

²⁴² <https://www.flightera.net/it/airport/Craiova/LRCV/>

Boat and other waterways transport

There are 12 ports along the Lower Danube area equally divided between Romania and Bulgaria²⁴³. The infrastructures of these ports could be developed to adapt to people's mobility needs as well as the leisure industry and tourism. Moreover, they could benefit from improved connection to national or European road or rail networks and have the potential to become logistics hubs. The EU strategy for the Danube region aims to fully exploit the potential of the Danube as a waterway, increasing the volume of transport on the Danube by 20%²⁴⁴ by eliminating obstacles to navigation.

According to 2019 data, Romania shipped 2226 tonnes to EU ports, of which 806 t (36%) were directed towards Bulgarian ports, being second only to Hungary (869 tonnes).

Table 32: Goods transported from Romanian ports (2019)

EU Member States	Thousands of Tonnes
Austria	216
Bulgaria	806
Germany	152
Croatia	139
Slovakia	44
Hungary	869
Total EU	2226

Source: Romanian National Institute of Statistics

On the other side, Bulgaria exported to Romania through inland waterways 1,404 tonnes of freight, representing 35% of the total Bulgarian waterways transportation flow (import and export) of 4,038 tonnes. However, the waterways transportation capabilities are highly dependent on the Danube water levels. Shipping during dry months often must be stopped at several points of the cross-border area along the Danube.

Local public transport

Public transportation in the Lower Danube Area between Romania and Bulgaria is practically non-existent, excluding the already poor railway infrastructure, meaning that private means of transport are required to cross to the other side of the Danube. Private busses and shuttles represent another way to reach the other side of the border, but they mainly connect the capitals Bucharest and Sofia and other big cities in the cross-border area while neglecting smaller cities. Moreover, journeys might be very slow; a Bucharest-Sofia trip can take up to seven hours²⁴⁵.

iii. *Transport policies and key challenges*

Overview of national and EU policies

Bulgaria

In Bulgaria, the national operational programme, "Transport and transport infrastructure" introduced in 2014, aims to develop the TEN-T Network, as well as make transport infrastructure safer and more sustainable. The construction of new infrastructure aims to stimulate the Bulgarian economy as well as lower the costs for freight transportation. Moreover, the operational programme focuses on several priority areas that are closely linked to the Bulgarian side of the Lower Danube area. TEN-T connection and regional mobility challenges in Bulgaria are also addressed by the

²⁴³ There are 6 on the Romanian side and 6 on the Bulgarian one: Drobeta Turnu Severin, Calafat, Turnu Magurele, Giurgiu, Oltenița, Călărași in Romania and Vidin, Lom, Oryahovo, Svishtov, Ruse, and Silistra in Bulgaria.

²⁴⁴ Territorial Analysis of the Romania – Bulgaria Cross-Border Area.

²⁴⁵ <https://www.rome2rio.com/s/Romania/Bulgaria#:~:text=The%20best%20way%20to%20get%20from%20Romania%20to%20Bulgaria%20is,%2445%20and%20takes%2010h%2024m>

operational programme, Regions in Growth, 2014-2020. The programme aims to address territorial imbalances, as well as support the achievement of regional and urban development policy goals in the 39 Bulgarian urban centres that the main target group of the programme.

Romania

In Romania, the Large Infrastructure Operational Programme (LIOP)²⁴⁶ addresses the development challenges identified at national level in terms of transport infrastructure, sustainable urban transport, environment, energy and risk prevention. The programme will mainly invest in removing the main transport bottlenecks and developing sustainable, efficient and green transport modes in Romania. Similar to the Bulgarian programme, the LIOP focuses on several priorities that are closely intertwined with the main transport issues and key challenges on the Romanian side of the Lower Danube area. Of the eight priorities of the programme, two have key transport challenges at their core: one focuses on the development of the TEN-T network, while the other on the development of a multimodal, high-quality, sustainable and efficient transport system.

The Improvement of regional mobility is also targeted by the Regional Operational Programme (ROP), which aims to promote smart sustainable and inclusive growth in all regions. Transportation issues are a central aspect of the programme: the repair and modernisation of more than 2,000 km of roads to improve regional connectivity to the TEN-T network is expected.

EU Policies

Interreg V-A Romania - Bulgaria

Interreg Romania-Bulgaria has played a prominent role in implementing EU-led policies in the field of transport in the Lower Danube. The financial allocation to PA1, "A well-connected Region", is by far the best funded part of the programme; it emphasises the cross-border needs for an enhanced, and preferably more sustainable, transport network. Indeed, as stated in the work programme, one of the main objectives of Interreg Romania-Bulgaria is to foster long-term objectives for exploiting the regional intermodal potential of combining river and sea transport (Danube and Black Sea). It also aims to expand the region's horizon, optimising it as a region in which to live, study, work, visit and invest.

According to the latest data on the programme²⁴⁷, more than 219 km of roads are covered by modernisation projects. So far, over 600,000 people benefit from an improved and safer road network leading to TEN-T, according to the forecast of indicators, and more are expected over the coming years, proving that modernisation and improvement of road safety is a key feature of the programme. The navigability and safety of the Danube will be improved by two large projects that will cover the entire length of the Danube stretch in the cross-border area²⁴⁸.

Key issues and challenges

The relatively low physical connectivity between the northern and southern regions in the Lower Danube is a major issue that hinders the competitiveness and the cohesion of the border area between Romania and Bulgaria. Indeed, the low density of border crossings has affected the mobility between the two sides of the Danube, with negative consequences on commuting and commercial flows.

The Danube River remains a real factor of discontinuity across the territory. Various national transport corridors are rerouted to the few border crossings available at present, as there are just two bridges crossing the Danube corridor of 470 km (one at the Giurgiu – Ruse border point and one at the Calafat – Vidin border point). The lack of stable and functional river crossing infrastructure is widely recognised as one of the main problems of the region affecting not only freight and

²⁴⁶ <https://www.fonduri-ue.ro/poim-2014>

²⁴⁷ 2019 Implementation report Interreg V-A Romania Bulgaria: <https://www.interregrobg.eu/en/archive/619-the-annual-implementation-report-2019-for-the-interreg-v-a-romania-bulgaria-programme.html>

²⁴⁸ NAVY-T WAY (ROBG-478) and Danube Safety Net (ROBG-522).

passenger transport on the major EU TEN-T corridors, but also labour mobility and other socio-economic flows, such as intra-regional commercial exchanges, tourism and new investments and business opportunities. A new bridge between Călărași and Silistra could reroute some of the north-south traffic and lighten the traffic flows on the currently two existing bridges. Moreover, the transport of goods and passengers on the Danube is significantly lower than the best performing European waterways.²⁴⁹

In 2017, Romania and Bulgaria signed a memorandum of cooperation aimed at making significant investments in local infrastructure, especially in the construction and rehabilitation of bridges. This convergence of priorities and objectives should, in principle, extend the current regional mobility²⁵⁰. However, the current infrastructure does not guarantee sufficient density to ensure access to the TEN-T and major national corridors or to safeguard a good connectivity across the border and alongside the border area. Moreover, the intermodal connections are poorly developed. The current situation is at least in part brought about by the regional transport design, which historically considered the Danube as a rigid border and focused on ensuring connectivity with the two capitals and main urban poles. This resulted in poor cross-border connectivity as well as significant gaps within the territory, particularly between the rural and urban areas.

Even though the quality of roads has increased over the past few years, especially on the Bulgarian side, the deterioration of roads and related roads accidents are a key issue in the Lower Danube area. The subsequent fatality rate related to road safety doubles the EU Average, with the two countries consistently ranking at the bottom of EU rankings.

As we can see in the tables below, almost all NUTS3 region in the Lower Danube Area recorded an increase in the number of accidents, fatalities and injuries between 2017 and 2018. Veliko Tarnovo in Bulgaria is among the worst performing counties, registering 1,464 car accidents, 21 casualties and 293 injuries. In Romania, the worst performing NUTS3 region is Dolj, which recorded 901 accidents, 1,190 injuries. The number of fatalities in the entire Lower Danube Area was 62. It should be noted that the figures for the period 2014-2016 are worse than those for 2017-2018 in almost every NUTS3 region.

²⁴⁹ <https://inland-navigation-market.org/chapitre/2-freight-traffic-on-inland-waterways/?lang=en>

²⁵⁰ <https://sofiaglobe.com/2017/10/03/bulgarian-romanian-prime-ministers-open-new-border-checkpoint-sign-co-operation-memoranda/>

Table 33: Car accidents on the Romanian side of the Lower Danube

NUTS 3 Entity	2017			2018		
	Accidents	Fatalities	Injured	Accidents	Fatalities	Injured
Mehedinti	494	49	721	524	34	724
Dolj	944	79	1246	901	62	1190
Olt	571	46	733	594	39	793
Teleorman	471	29	599	451	39	588
Giurgiu	459	29	575	442	23	556
Calarasi	470	43	637	481	24	646
Average	568.1	45.8	751.8	565.5	36.8	749.5
Total	3409	275	4511	3393	221	4497

Source: Romanian National Institute of Statistics

Table 34: Car accidents on the Bulgarian side of the Lower Danube

NUTS 3 Entity	2017			2018		
	Accidents	Fatalities	Injured	Accidents	Fatalities	Injured
Vidin	460	6	75	461	12	81
Vratsa	827	18	183	772	27	217
Montana	653	23	132	675	9	179
Pleven	1448	23	294	1207	17	255
Veliko Tarnovo	1388	23	246	1464	21	293
Ruse	1445	17	438	1109	15	419
Silistra	330	21	120	304	13	124
Average	935.8	18.7	212.5	865	16.2	224
Total	6551	131	1488	5992	114	1568

Source: Bulgarian National Institute of Statistics

Another critical issue regards the road density in the cross-border area, which continues to be lower than the EU average. The low road density has an impact on ports or water border crossings. Harbours on both sides lack an effective transport infrastructure to serve a larger hinterland, which makes it difficult for freight to reach or leave them, while motorways are basically non-existent in the region.

Rail transport in the Lower Danube Area is mainly underdeveloped and underutilised, as the rail infrastructure is rather local, on both Romanian and Bulgarian side, and not connected to the rest of Europe. The Lower Danube Area lacks high-speed rails, as the closest one is between Costanta and Bucharest, which is outside the area of this study. On the Bulgarian side, there are no high-speed rails, though almost all railways are electrified; this is not the case in Romania, where most of the railways serving the Danube area are not electrified.

The most significant problems for navigating Lower Danube River relate to the low water levels and common safety measures. However, Romania and Bulgaria are collaborating in order to find technical solutions to ensure the navigation conditions on the Romanian-Bulgaria section of the Danube. However, the lack of funds represents an obstacle to the improvement of coordination between the two countries.

Moreover, since intermodal ways of transport and water-based infrastructures are poorly connected to the inland roads, the Lower Danube area inhabitants are poorly served by services of general

interest. The lack of connectivity is also reflected in the less dense population settlements, in favour of larger cities located outside the study area, on both Romanian and Bulgarian side.

Emerging trends

Emerging trends in the field of transport in the Lower Danube Area focus on three main issues: **intermodality, transport safety** and **improvement of the TEN-T network**.

Intermodality is one of the main themes that emerges from the analysis of the overview of policies and investment plans at national and European level. Indeed, strengthening intermodal links would definitely strengthen sustainability and accessibility of the Lower Danube transport potential. One of the main impediments associated with the achievement of a functional intermodal infrastructure is the fact that the rail and the road networks associated to the harbours along the Danube are poorly developed, hindering the transport of freight and passengers across the river. Also, the lack of eco-friendly river and seaport infrastructure represent a large barrier to the development of a cross-border sustainable tourism.

Transport safety is another emerging trend in the development of the Lower Danube transport potential. Both Romanian and Bulgarian infrastructures operational programmes focus on the improvement of transport safety, especially by road and water. As we observed in the previous section both Member States are experiencing a high number of fatalities due to the deterioration of roads and traffic safety issues. At European level, the Interreg programme between Romania and Bulgaria has widely focused, through both hard and soft measures, on road and navigation safety.

Improvement of the TEN-T network is also another key emerging trend in the area. Both countries consider the upgrade of the TEN-T network fundamental, as its completion would not only strengthen the intra-mobility region, but would also boost connection between the region and the rest of Europe, with positive consequences on economic flows, goods transportation, tourism, labour mobility etc. At the European level the investments are centred around the strengthening of the Orient/East-Med TEN-T and Rhine-Danube Corridor. Moreover, despite the tight budget, the Interreg programme V-A Romania Bulgaria is financing interventions to strengthen the planning, development and coordination of cross-border transport systems for better connections to TEN-T transport networks.

iv. Conclusions and lessons learnt

Such socio-economic imbalances are accompanied by an inefficient, and sometimes non-existent intraregional transport network and towards the rest of Europe (TEN-T).

Mobility in the Lower Danube area is highly dependent on one of the main geographical features, the Danube River, which covers the entire common length between Romania and Bulgaria. The Danube River has always been considered a factor of discontinuity in the area, as the cross-border region suffers from lack of mobility, mainly due to the lack of effective crossing points, as there are only two bridges along the common length. Indeed even for a region with a low-density area, which is also facing many challenges connected to depopulation, only two fixed links are not enough, but on the other hand the low density and the rural main feature of the area do not encourage massive investments in bridges across the Danube.

The road network in the Lower Danube Area, even though the situation has improved over the last years, remains in poor condition, raising many challenges in terms of road safety. Indeed, the fatality rate on Romanian and Bulgarian roads doubles the EU average. At both National and EU level, transport safety plays a primary role in policy design and investment plans.

Another critical issue that characterizes the Lower Danube road network is the road density, which underperforms the EU average. The low density and the bad conditions of the road network do not allow to fully exploit one highest potential of the region, intermodal mobility. Indeed, harbours on both side of the Danube are not efficiently connected to other infrastructures, hindering the

movement of freight and people. Furthermore, the lack of intermodal infrastructures represents a big barrier to the development of the region as such, as it hinders the regional economy, tourism's expansion, not to mention that due to lack of water-based and road-based infrastructures the inhabitants are poorly served by services of general interest.

When it comes to navigation, waterway transportation capabilities are highly dependent on the water levels of the Danube, as shipping needs to be stopped during dry months. Safety of navigation is another critical issue, though Romania and Bulgaria are developing joint response measures in case of risks and disasters on the Danube River.

c. Northern Sweden

i. Overview of the region

Northern Sweden (Norrland) is the northernmost, largest and least populated region of Sweden²⁵¹. It is also one of the remotest and least populated regions in the EU. While it represents 70% of the country's territory, Northern Sweden is home to only 17% of the population, mainly concentrated in the coastal areas.

Its remoteness, extreme weather conditions and economic opportunities have had a decisive influence in the regional settlement patterns, mostly concentrated in the coastal areas. The exploitation of resources constitutes the main economic activity of the region, which was accompanied by the development of transport infrastructures to serve the needs of the key industries. Currently, the investments in the diversification of the economy, focused on a knowledge-based and sustainable activity also resonate in the regional approach to transport.

Although Northern Sweden represents a historical, cultural and geographical region, it does not constitute an administrative unit. The various counties comprised within this denomination are further grouped in three subregions: North-Middle Sweden (*Norra Mellansverige*), Middle Northland (*Mellersta Norrland*), and Upper Northland (*Övre Norrland*). The present case study will focus on Övre Norrland.

Key demographic features and trends

In 2019, Övre Norrland had 520,651 inhabitants and a population density of 5.3 persons per square kilometre on average, one of the lowest in the EU²⁵². The population has remained stable over the last decade, but a slight growth across all the region can be observed.

The urbanisation was 73.2 in 2017, above Swedish average. The city of Umeå, with 126,103 inhabitants, is the most populous. Luleå, Skellefteå, Piteå and Boden are the other main urban centres. Out of these, only Boden is located inland. The rest of the population lives scattered in small villages in rural areas.

The average age is 42.7, two years above the national average, and it has slowly decreased over the last years. Life expectancy reaches 81.7 years old.

Geographical features

With a surface of 164,077 km², Övre Norrland covers 37.4% of Sweden²⁵³. It forms part of Sápmi (Lapland) and borders with Norway and Finland. The landscape is characterised by the Scandinavian mountains, with the highest peak in the country, Kebnekaise, standing at 2,111 metres, and the many rivers crossing the terrain.

The region has vast natural resources. The territory is one of the most heavily forested in Europe and there are significant reserves of gold, iron ore and other metals. Mining and metallurgy have been

²⁵¹ www.britannica.com/place/Norrland

²⁵² Eurostat, population: https://ec.europa.eu/eurostat/databrowser/view/demo_r_gind3/default/table?lang=en

²⁵³ EU-SPI: <https://eu-spi.eu/pilot-regions/upper-norrland>

largely decisive in boosting the economic activity in the area. The access to sea, with a long coastline very close to Finland, has also been a strong advantage.

The mountainous landscape and the extreme weather conditions have influenced the population settlements across the territory, which together with the industrial activities, have in turn determined the planning and development of the existing transport network.

Local economy and development

The economy of Övre Norrland revolves around its natural resources. In particular, the major regional industries are mining, metallurgy, mechanical, forestry (wood, paper and pulp), hydroelectricity, and specialised services. The production of biomass based on residual and side currents within the forestry industry is very important, allowing for large-scale commercial production of advanced biofuels and bio-based materials.

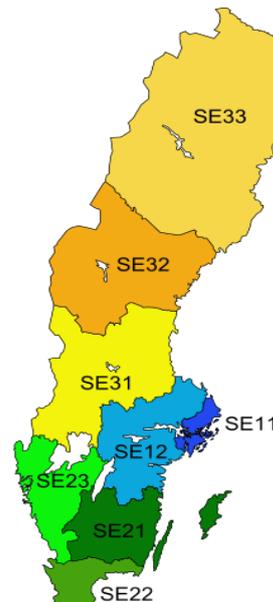
Its historical dependency on mining and other natural resources, has prompted Övre Norrland to invest important resources in the diversification of its economic activity putting a special focus on the development of a knowledge-based economy, The data centre of Facebook in Luleå will be one of the largest in the world. The availability of universities and research centres in the region is a critical factor in this respect. The tourism sector has also experienced an important growth becoming one of the strongest contributors to the regional economy.

In 2018, Övre Norrland's GDP totalled EUR 23,105.58 million, accounting for almost 5% of the national GDP. The unemployment rate is very low, at 6.1%. Although its performance has significantly declined over time, the Regional Innovation Scoreboard 2019 (RIS 2019) ranks Övre Norrland as a "Strong + Innovator"²⁵⁴. The share of population with tertiary education was 39.7% in 2019, above the national average of 37.8%²⁵⁵. The importance of lifelong learning is worth to be highlighted.

Administrative framework

Övre Norrland (NUTS 2, SE33) comprises the counties (*landscaper*) of Västerbotten and Norrbotten, which constitute independent NUTS 3.

Figure 32: Swedish division at NUTS2



Source: Eurostat

²⁵⁴ RIM+: https://ec.europa.eu/growth/industry/policy/innovation/regional_en

²⁵⁵ Eurostat, educational attainment level: https://ec.europa.eu/eurostat/databrowser/view/edat_lfse_04/default/table?lang=en

As of January 2019, all counties have been transformed into regions that correspond to NUTS 3. There are no authorities at NUTS 2 or NUTS 1 level in Sweden. This restructuring has led to complexity in terms of establishing governance in line with the new regions.

The Swedish Transport Administration (Trafikverket) is responsible for construction, operation and maintenance of the state road network and the national railway network. The administration is also responsible for the long-term planning of the transport system for all four transport modes. According to the principle of self-government, the regions and municipalities hold complementary competences in transport.

ii. *Key transport infrastructures*

Road network

Northern Sweden is very car dependent, mainly due to the lack of transport alternatives for many communities. Roads are the most important internal communication channel between widely dispersed towns in the region, especially for transportation of people and goods, as well as for cross border mobility. Moreover, vehicles are essential due to their role as ‘last mile’ transport.

Despite their relevance, roads are scarce and therefore, they can constitute a freight transport route, a work commuting stretch and a small town’s only street at the same time. There are only six kilometres of motorways in Övre Norrland, one of the lowest in the EU. In contrast, Sweden’s total motorway’s length was 2,132 km in 2018, one of the largest in the EU. The motorisation rate in Övre Norrland is 524 passenger cars per 1,000 inhabitants, compared to Sweden’s 476 cars per 1,000 inhabitants²⁵⁶.

The E4, connecting the north and south of the country following the coast, the E8, linking southern Finland to northern Norway through Sweden, the E10 linking with Helsinki, and the E75, connecting Luleå (Sweden) to Narvik (Norway) are some of the main cross border routes. The latter functions as an important artery for passengers and freight to industries, workplaces, municipal and regional centres.

Road maintenance and safety needs to be improved. The climate and the mountainous landscape demand a strict preservation of the infrastructure, while small towns where the state road is a local street, residents request a better planning that ensure vulnerable groups’ safety. The increased traffic in major touristic destinations is aggravating these challenges.

Railway network

Sweden has one of the largest rail networks in the world, but the infrastructure and services in Övre Norrland have many shortcomings. There are three main lines crossing the region: the Iron Ore Line, the Swedish Main Line and the Bothnia Line. The main railway terminals are Umeå, Luleå and Kiruna, in terms of passenger and freight transport, and Boden, only for passenger transports.

The Iron Ore Line expands through 626 km until Narvik (Norway) and was initially built to serve the needs of the mining industry based in the area. In addition to be the main line for freight traffic, it also provides services to various populations along the route. The line has several branches to settlements on the coast, particularly to the cities of Umeå and Luleå. However, it requires an important modernisation. Main actions envisaged to improve the Iron Ore Line (Malmbanan) include railroad extensions and the introduction of the ERTMS signalling system, as well as reinvestments on the contact line and tracks, and a bridge over the Kalix River²⁵⁷.

²⁵⁶ Eurostat: <https://ec.europa.eu/eurostat/cache/RCI/#?vis=nuts2.transport&lang=en>

²⁵⁷ North Sweden European Office (2018) “National Transport Plan for 2018-2029”. Available at: [www.northsweden.eu/english/news/2018/national-transport-plan-for-2018-2029/#:~:text=On%20June%204%2C%20the%20Swedish,for%20the%20period%202018%2D2029.&text=The%20government%20gives%20in%20the,North%20Bothnia%20Line%20\(NBB\)](http://www.northsweden.eu/english/news/2018/national-transport-plan-for-2018-2029/#:~:text=On%20June%204%2C%20the%20Swedish,for%20the%20period%202018%2D2029.&text=The%20government%20gives%20in%20the,North%20Bothnia%20Line%20(NBB))

The Bothnia Line is a 190 km higher-speed railway running along the coast. Since its inauguration in 2010, it has become the main passenger traffic line. An expansion of 270 km is planned to establish a direct coastal rail link to Luleå. This project, known as the North Bothnia Line (*Norrbottenbanan*)²⁵⁸.

A new line is intended to cover the Umeå – Skellefteå section. The capacity of the railway system will be increased on the Iron Ore Line and the Main Line through Övre Norrland, and an important rehabilitation of their infrastructure will also be performed.

Airline connections and infrastructures

The long distances between towns, markets and services make air transport critical in Övre Norrland. All the main urban centres in the region have an airport, including some smaller cities inland.

The air transport of passengers totalled 2.2 million in 2018²⁵⁹, maintaining the growing trend registered during the past years. On the other hand, the air freight transport has declined for the first time in years, from 6,000 tonnes in 2012 to 4,000 tonnes in 2018. These figures underline the importance of reliable access to domestic and international flight connections with high frequency are indispensable for regions heavily dependent on export, with test-beds and SMEs interlinked in global value chains, as well as a growing global tourism industry.

Previous initiatives to establish interregional flights within the Barents Region have failed. The latest “The Arctic Airlink” connecting Tromsø– Luleå–Oulu opened in January 2015 and closed in May 2018. Only 9,700 passengers used the service during this time.

Long-distance flight connections are also essential given the distance from the markets. In the case of domestic routes with the EU, funding of unprofitable routes is done via the PSO (Public Service Obligation) arrangement. However, the region cannot use ERDF funds to improve the regional airports, as these do not allow for investing in airports located in sparsely populated areas.

Boat and other waterways transport

The maritime transport of passengers reached 212,000 in 2018, continuing the growing trend observed in the last years. Similarly, the maritime freight transport has remained rather stable. With 13,244 thousand tonnes loaded and unloaded in 2018, Övre Norrland accounts for the bulk of the maritime freight transport in Northern Sweden, and approximately 7.4% of the national maritime freight transport²⁶⁰.

The sea corridor in the Gulf of Bothnia is essential for transport and the Baltic Sea constitutes a direct connection to the rest of Europe. The Motorways of the Sea (MoS)²⁶¹ are expected to serve trade, but also connect ports to European hinterland²⁶². Yet, Luleå is the only TEN-T Core Network port in Övre Norrland, constituting the Kvarken Multimodal Link with the city of Vaasa. The capacity of the harbour will be enhanced, strengthening the logistics of the region, reducing emissions and increasing the redundancy mainly for the iron ore shipments. Umeå has the status of comprehensive port.

²⁵⁸ Government Offices of Sweden (2018), “The Government’s plan for infrastructure – how we build Sweden strong and sustainable”. Available at: www.government.se/press-releases/2018/06/the-governments-plan-for-infrastructure--how-we-build-sweden-strong-and-sustainable/

²⁵⁹ Eurostat, air transport : https://ec.europa.eu/eurostat/databrowser/view/tran_r_avpa_nm/default/table?lang=en

²⁶⁰ Eurostat, maritime transport: <https://ec.europa.eu/eurostat/databrowser/view/tgs00075/default/table?lang=en>

²⁶¹ The Motorways of the Sea concept refers to the introduction of new intermodal maritime-based logistics chains in Europe. Available at: https://ec.europa.eu/transport/modes/maritime/motorways_sea_en

²⁶² Anselmo, J., “Motorways of the Sea (MoS) – State of the Art and Way Ahead”, European Commission, MoS – Baltic Sea Ports Conference (BPO), Riga, September 2015. Available at: www.onthemosway.eu/wp-content/uploads/2015/11/2.-Jos%C3%A8-Anselmo-MoS-OCT-2015-Final.compressed.1.pdf

Local public transport

The local public transport is very limited, especially in the western part of Övre Norrland. The sparse population makes cross border mobility the more important, as some towns are closer to services and markets in neighbouring countries.

iii. Transport policies and key challenges

Overview of national and EU policies

The **2018-2029 National Transport Infrastructure Plan**²⁶³ by the Swedish Transport Authority (Trafikverket) set the agenda for the development of the country's transport network in the next decade. The Plan aims to create a robust and reliable transport system, with a focus on digitalisation, automation, and sustainability. Furthermore, it pursues an ambitious policy concerning the transition to a fossil-free welfare state an increase in housing construction and improved conditions for business²⁶⁴.

The Plan endowed some SEK 622.5 bn (EUR 60 bn²⁶⁵) for Sweden's road, rail, aviation and maritime infrastructure. In addition, it expects to obtain a further sum SEK 90bn (EUR 8.7 bn²⁶⁶) through road congestion charging, track access charges, and co-financing.

The Plan envisages the largest railway investment, aimed to build new infrastructure and to maintain and upgrade the existing one. In fact, it contains several measures targeting the less used railway network. It also allocates significant funds to the road and maritime transport.

Table 35: 2018-2029 National Transport Infrastructure Plan Funds

Distribution of investment	SEK	EUR267	%
Operation and maintenance of state-owned railways	SEK 125 billion	12 bn	20%
Operation and maintenance of state-owned roads	SEK 164 billion	15.8 bn	26%
The development of the transport system (inc. environmental measures)	SEK 333.5 billion	32.2 bn	54%

Source: Trafikverket

Some of the key investments concerning Övre Norrland's railway network include the construction of various new lines, and the upgrading and modernisation of existing railways, multimodal operations and shipping²⁶⁸. A non-exhaustive list can be found below:

- Enhanced capacity of the railway systems, double track expansion, and a package of measures for 750m-long long freight trains.
- Rollout of ERTMS and upgrade of the telecommunications system by introducing supersede GSM-R and renewing the optical fibre network, which in turn will support the continued introduction of remote asset monitoring systems.

²⁶³ 2018-2029 Draft National Transport Infrastructure Plan. Available at: www.government.se/press-releases/2018/06/the-governments-plan-for-infrastructure--how-we-build-sweden-strong-and-sustainable/

²⁶⁴ Government Offices of Sweden (2018), "The Government's plan for infrastructure – how we build Sweden strong and sustainable". Available at: www.government.se/press-releases/2018/06/the-governments-plan-for-infrastructure--how-we-build-sweden-strong-and-sustainable/

²⁶⁵ ECB, 15.10. 2020

²⁶⁶ Ibid.

²⁶⁷ Ibid.

²⁶⁸ North Sweden European Office (2018) "National Transport Plan for 2018-2029". Available at: [www.northsweden.eu/english/news/2018/national-transport-plan-for-2018-2029/#:~:text=On%20June%204%2C%20the%20Swedish,for%20the%20period%202018%2D2029.&text=The%20government%20gives%20in%20the,North%20Bothnia%20Line%20\(NBB\)](http://www.northsweden.eu/english/news/2018/national-transport-plan-for-2018-2029/#:~:text=On%20June%204%2C%20the%20Swedish,for%20the%20period%202018%2D2029.&text=The%20government%20gives%20in%20the,North%20Bothnia%20Line%20(NBB))

- Deployment of new systems including the Market-Adapted Capacity Planning System (MPK) and the National Train Management System (NTL) to enhance capacity and operational performance.
- Axle loads increases on the Malmbanan, between Vitåfors and the port of Luleå, which is used by heavy iron-ore trains.

The Plan also foresees to improve fairways to Luleå port. In terms of road safety, measures include separated oncoming traffic lanes on the E4 and the E10 in Norrbotten; continuation of the load-bearing class 4 (BK4) road network; and frost protection. The Swedish Transport Administration will also co-finance county plans concerning traffic safety measures on the regional road network, as well as municipal and regional investments in infrastructure for public transport and cycling²⁶⁹.

At EU level, the European Commission suggested an extension of the ScanMed and North-Sea Baltic Corridors to Northern Scandinavia, connecting the cities of Umeå and Luleå in Övre Norrland to the main European routes. Such extension was suggested in 2018, when the Commission presented the proposal for a new regulation for the Connecting Europe Facility (CEF) post 2020. The extension of the corridors would constitute a crucial gateway for the EU into the Arctic region²⁷⁰.

Övre Norrland is part of the Barents Euro-Arctic Region, together with northern Norway, Finland and the bordering territory of Russia. The Barents Euro-Arctic Transport Area (BEATA) was created with the objective of “developing an efficient transport system in the region with good internal connectivity between the Barents countries and with good external links to world markets, as well as to facilitate Barents regional development while safeguarding the environment and improving safety and accessibility for all”²⁷¹. The “**Declaration of the Transport Ministerial Meeting of the Barents Euro-Arctic Council (BEAC)**” (2019) reinforced this commitment with sustainable transport²⁷².

Figure 33: Barents Region



Source: The Barents Euro-Arctic Region

²⁶⁹ Trafikverket (2019) “The Swedish Transport Administration’s implementation plan for the years 2019–2024”. Available at: https://trafikverket.ineko.se/Files/sv-SE/61956/Ineko.Product.RelatedFiles/2019_106_the_swedish_transport_administrations_%20implementation_plan_for_the_years_2019_2024%20_english_short_version.pdf

²⁷⁰ Railfreight.com (2019), “Why the TEN-T should be extended to Northern Sweden”. Available at: www.railfreight.com/corridors/2019/10/07/why-the-ten-t-should-be-extended-into-northern-sweden/?gclid=accpt

²⁷¹ The Barents Euro-Arctic Region (2019), “Joint Barents Transport Plan. Revised draft, Main Report 2019. Available at: www.barentsinfo.fi/beac/docs/JBTP2019_MAIN_REPORT_190910.pdf

²⁷² Available at: www.barentsinfo.fi/beac/docs/Transport_Ministers_meeting_Umea_12_September_2019_Declaration_Final.pdf

The revised **Joint Barents Transport Plan (JBTP) 2019** integrates tourism industry and the concept of connected mobility, as well as considerations concerning climate change and other external conditions. There are several on-going cross-border cooperation projects between both transport authorities and the municipalities, but also between the tourism industry and the regions in the neighbouring countries²⁷³.

Key issues and challenges

The large distances, a sparse and ageing population, harsh weather conditions and an economy based on natural resources are some of the main issues faced by Övre Norrland, and Northern Sweden in general. All these have an important effect on the provision of transport. The deterioration of the infrastructure poses a threat to safety, especially concerning roads and railway, as they are more exposed to the weather and in some cases, abandoned due to the low traffic²⁷⁴. Roads may also be frequently closed during snowstorms and snowfalls in the mountains, preventing people and road freight transport to circulate.

The public transport offer and coverage is very limited and there are not enough travellers to provide cost-effective services. The small scale of the economy is also detrimental when competing for EU funds for infrastructures. The cost-benefit analysis method used by the European Commission does not consider the specificities of the territory when it comes to infrastructure projects, putting Övre Norrland in a disadvantaged position²⁷⁵.

Övre Norrland has been excluded from some important infrastructures, remarkably the TEN-T. For instance, the Scandinavian-Mediterranean (ScanMed) corridor only reaches southern Sweden, exacerbating the existing structural divisions between regions. Likewise, it is not included in the Motorways of the Sea (MoS). As previously mentioned, an extension of the various corridors to Övre Norrland is being discussed.

The low reliability of the transport system is another important concern. Likewise, there is an important lack of multimodal transport, and the implementation of connected mobility solutions and satellite navigation systems is slow. Moreover, there are no reasonable alternatives to aviation in the European Arctic since rail and road networks are not as well developed and maintained. These constitute clear obstacles to the development of the tourism sector, which has grown rapidly in the region and is expected to continue to rise. In this respect, the public transport is poorly adapted to the needs of the tourists²⁷⁶.

Emerging trends

Övre Norrland is devoting great efforts in the transition to a sustainable transport. The focus on clean transport and the stimulus to alternative fuels are notable. The Green Highway project that is being jointly developed with Norway is one example. The project seeks to develop a transport corridor free from fossil fuels, which runs from Sundsvall to Östersund in Sweden to Trondheim in Norway (SÖT). The SÖT partnership seeks to develop and implement renewable energy solutions for transport systems, based on electricity, water, wind and bio-fuels. By renovating traditional petrol stations, it has established filling-stations for environmentally friendly fuels and charging points for

²⁷³ The Barents Euro-Arctic Region (2019), "Joint Barents Transport Plan. Revised draft, Main Report 2019. Available at: www.barentsinfo.fi/beac/docs/JBTP2019_MAIN_REPORT_190910.pdf

²⁷⁴ The Regional Competitiveness Index 2019 shows that infrastructures are one of the main shortcomings of Övre Norrland. Available at: https://ec.europa.eu/regional_policy/en/information/maps/regional_competitiveness/#4

²⁷⁵ Andersson, H., L. Hultkrantz, J.-. Nilsson, and G. Lindberg, 2018 "Economic Analysis for Investment Priorities in Sweden's Transport Sector." *Journal of Benefit-Cost Analysis* 9(1), pp. 120-146.

²⁷⁶ The Barents Euro-Arctic Region (2019), "Joint Barents Transport Plan. Revised draft, Main Report 2019. Available at: www.barentsinfo.fi/beac/docs/JBTP2019_MAIN_REPORT_190910.pdf

electric vehicles. It has also simultaneously developed business opportunities linked to environmentally friendly transport and infrastructure²⁷⁷.

Digitalisation is another important trend in the region. The deployment of Intelligent Transport Systems (ITS) is intended to help to optimise traffic, improving its reliability and safety under any conditions. The demand to maintain the functionality of the system and the need for information security and protective security are rising along the digitalisation in the transport system. Sweden has one of the highest shares of uptake of Electric Vehicles in the EU and is developing electric-powered flights for short-distances. These might represent a breakthrough for communications, although the shift will require significant investments and upgrades of regional airport infrastructures. Moreover, it is promoting the automation of the transport system²⁷⁸.

There are important developments in intermodal and combined transports. The cross border cooperation in transport in the Barents Region is also being supported through initiatives such as joint platforms to publish transport information, integrated ticketing systems, or developing a joint emergency plan in cooperation with bus operators.

Finally, the inclusion of the transport system into the social development is gaining momentum, as the link between the transport and many societal challenges becomes evident. Transport infrastructures have been mainly developed to meet the needs of the key regional industries, since the sparse population was insufficient to provide profitable services. Thus, the equity in the provision of transport, and the new user-centric and sustainable approach is especially relevant due to the remoteness of the territory, the severe weather and the dispersion of the population, and ultimately will determine its economic and social prosperity

iv. Conclusions and lessons learnt

Övre Norrland is one of the remotest and most sparsely populated regions in the EU. The uneven distribution of the population mostly concentrated in the coastal areas, and the large distances have hindered the development of an efficient transport infrastructure, which has been mainly built in accordance with the needs of the key regional industries.

Since the public transport is limited, the mobility of the population outside of the main urban centres is highly dependent on cars. Rail and airports are also essential for the region, but the current services and infrastructures do not meet the demands of the population and the businesses adequately. Concerning maritime transport, the volume of passengers and goods, as well as the connection with the rest of the EU make it of key importance.

The successful deployment of broadband and the strength of the regional innovation ecosystem are driving the development of digitally-based mobility solutions. The aim is to optimise travel times, reliability and overall, improve the services. The sustainability of the transport is also a major objective in the improvement of the system. These initiatives are being accompanied by large investments both, at national and EU level. The investment in the railway system is especially significant. Similarly, the cross border transport within the Barents region is being reinforced. Efforts to promote multimodal transport are also noteworthy.

The diversification of the economic activity in the area, with tourism growing rapidly, is also steering the improvement of the transport network. Unlike other regions, the population in Övre Norrland is experiencing a slight increase, with positive migration due to the economic opportunities available. This constitutes another factor to consider in the planning of future infrastructures.

²⁷⁷ Research for TRAN Committee (2017), "Transport and tourism in Sweden", European Parliament. Available at: [www.europarl.europa.eu/RegData/etudes/BRIE/2017/601987/IPOL_BRI\(2017\)601987_EN.pdf](http://www.europarl.europa.eu/RegData/etudes/BRIE/2017/601987/IPOL_BRI(2017)601987_EN.pdf)

²⁷⁸ Trafikverket (2019) "The Swedish Transport Administration's implementation plan for the years 2019–2024". Available at: https://trafikverket.ineko.se/Files/sv-SE/61956/Ineko.Product.RelatedFiles/2019_106_the_swedish_transport_administrations_%20implementation_plan_for_the_years_2019_2024%20_english_short_version.pdf

The exclusion of Övre Norrland from the TEN-T faced an important criticism that led to the revision of the proposal in 2019. Overall, the major investments are still dedicated to improving the transport system in the southern part of Sweden. In this respect, the restructuring of the administration in 2019, recognising the powers of the regions to decide over transport issues might help Övre Norrland to gain visibility and formulate policies which consider its specificities.

d. Valle D'Aosta

i. Overview of the region

Key demographic features and trends

Valle D'Aosta region is the least populous (125,501 residents) and the least densely populated (38.5 inhabitants per km²) in Italy.²⁷⁹ The population fluctuated around 80,000 residents until the 1920s, later growing to 100,000 in 1960 and 110,000 in 1980. After peaking around 128,000 residents between 2010 and 2014, the regional population started to decrease slightly but constantly over the last few years.²⁸⁰

As of 2019, the foreign-born population is among the lowest shares in Italy (14th out of 20 region, with 6.59% or 8,275 residents), with Romanian (2,405) and Moroccan (1,602) citizens being the two largest groups. According to a 2008 study,²⁸¹ more than 70% of the population speaks Italian as a first language, while around 15% speak French in the Franco-Provençal variation. Nevertheless, the vast majority of the population speaks both languages, and additional groups also speak local dialects such as Walser and Piedmontese.²⁸²

About 75% of the regional population is concentrated in the 28 municipalities of the central valley and more than 25% of the entire population is based in the regional capital, Aosta. None of the remaining 73 municipalities hosts more than 5,000 residents and 42 of these have less than 1,000 inhabitants.

Geographical features

Valle D'Aosta is the smallest region in Italy, with an extension of 3,260 km². It is located in north-western Italy and it borders the Italian region of Piedmont to the south and east, Switzerland to the north, and France to the west. The entire regional area is mountainous, with only 20% of the land being below 1,500 m, and surrounded by some of the highest peaks in Europe, including Mont Blanc (4,810 m), Monte Rosa (4,634 m), Cervino (4,478 m) and Gran Paradiso (4,061 m).

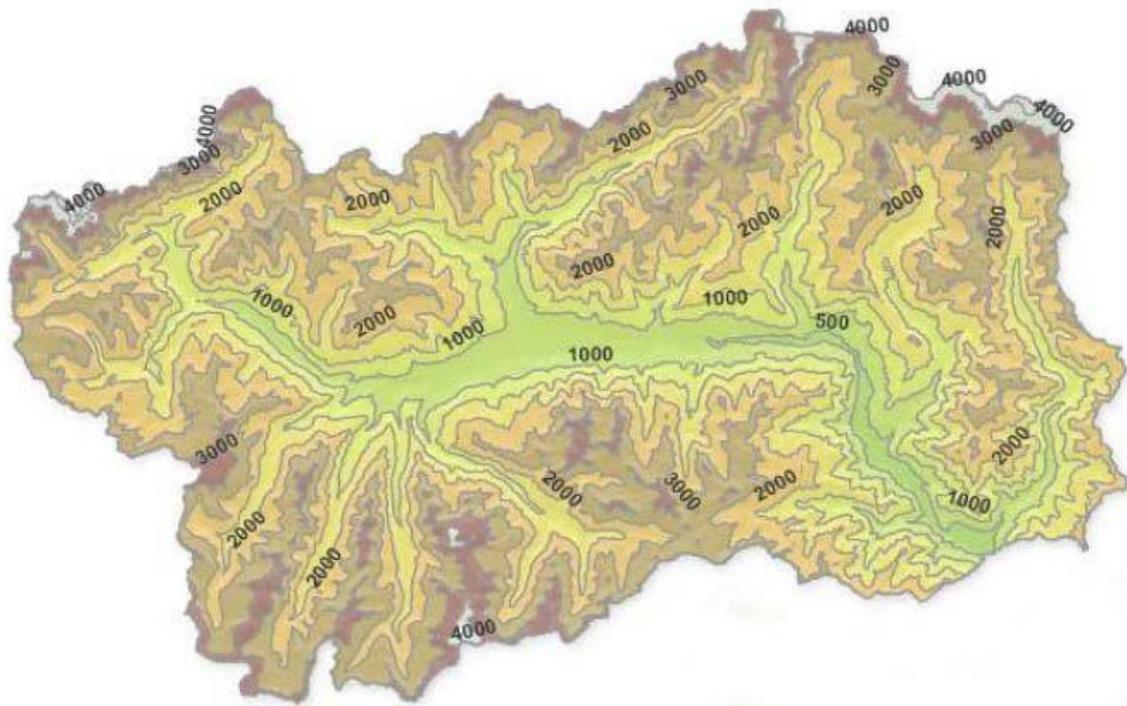
The climate is Alpine on higher altitudes and continental in the valleys. As a consequence, the landscape is characterised by the presence of woods, waterfalls, and glaciers such as Brenva, Lys, and Château Blanc. The main valley crosses the region from north-west to south-east, hosting the Dora Baltea River. A series of smaller rivers flow into the Dora Baltea from north and south, following minor valleys. These flatter parts of the region are where most of the urbanised areas, key infrastructure, and economic activities are located.

²⁷⁹ <http://demo.istat.it/bil2019/index.html>

²⁸⁰ http://seriestoriche.istat.it/index.php?id=1&no_cache=1&tx_usercento_centofe%5Bcategoria%5D=2&tx_usercento_centofe%5Baction%5D=show&tx_usercento_centofe%5Bcontroller%5D=Categoria&cHash=5dc94093f50e10c9e55a034d4c6ba123

²⁸¹ Toso F. (2008), "Le minoranze linguistiche in Italia", Editrice Il Mulino.

²⁸² <https://rm.coe.int/profil-de-la-politique-linguistique-educative-vallee-d-aoste-rapport-r/16807b3c41>

Figure 34: Valle d'Aosta - Physical Map (altitude in metres)

Source: Valle D'Aosta Region²⁸³

Administrative framework

Valle D'Aosta is one of the five Italian regions having a special status and the only one who also performs the usual functions of a province. All of the main institutions are based in the regional capital, Aosta. The regional assembly is composed of 35 members elected for 5 years.²⁸⁴ The President of the region is elected by the regional assembly and is the head of the executive branch. The office is normally held by a regional party.

While Italian regions all have extensive legislative powers in healthcare, tourism, and employment policies, the special status further expands to a series of policy domains, including transport. Financial autonomy allows the region to keep more than 90% of all tax revenue, meaning that the available budget (EUR 1.1 billion in 2018) is by far above the Italian average in per capita terms and that local public services perform above the national average.²⁸⁵ This also reflects the economic context of the region, which is overall positive despite the long-lasting economic stagnation and the high reliance on tourism. In fact, in 2017 the GDP of the region amounted to EUR 4.4 billion in real terms (0.3% of the Italian total), while GDP per capita (EUR 35,700 in PPP) was 23% higher than the Italian average and 19% higher than the EU one.²⁸⁶

²⁸³ https://www.regione.vda.it/territorio/ambiente/aria/piano_aria_i/default_i.asp

²⁸⁴ <http://www.consiglio.regione.vda.it/app/organismiistituzionali>

²⁸⁵ https://www.regione.vda.it/finanze/bilancio/pdf/2020_DEFR-testo-definitivo.pdf

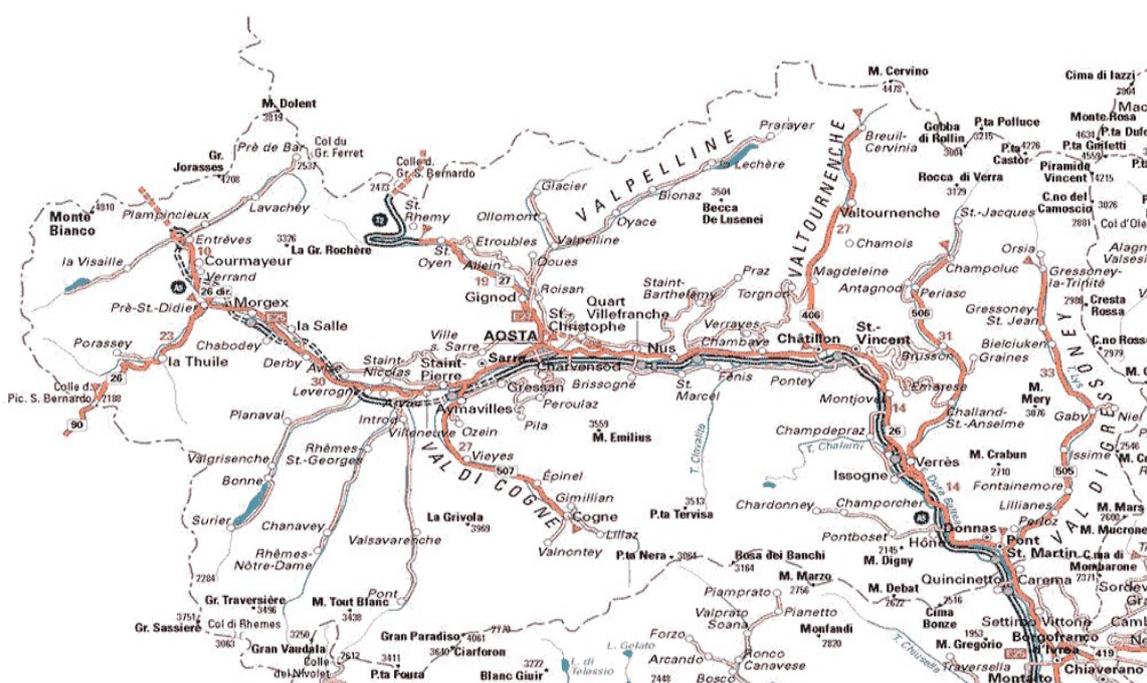
²⁸⁶ <https://ec.europa.eu/eurostat/documents/2995521/9618249/1-26022019-AP-EN.pdf/f765d183-c3d2-4e2f-9256-cc6665909c80>

ii. Key transport infrastructures

Road network

Given the geography of the region, road infrastructures are concentrated along the main valley floors. Thus, the road network largely overlaps with urbanised areas. The extensive road network, compared to the size of the region and the dispersion of the population, couples with high maintenance and technical standards. Thus, the road network accounts for the vast majority of transport flows.²⁸⁷

Figure 35: Map of road network (Valle d’Aosta)



Source: ANAS

As it can be observed in the figure above, the highway A5/E25 (in black) crosses the entire region, connecting Aosta to Turin, the Piedmont region capital city, in the south-east and to the Mont Blanc Tunnel, which links Italy to France since 1965, in the north-west. The main national road (in orange) follows the same path with additional deviations, including northbound towards Switzerland through the Great St Bernard Tunnel, which was inaugurated in 1964. Finally, regional and local roads spread further into the region towards smaller urban centres.

Table 36: Extension of road network

Type of road	Length
Regional roads	391 km
National roads	151 km
Highways	103 km
TOTAL (excluding local roads)	645 km

Source: Valle D’Aosta Region²⁸⁸

²⁸⁷ <https://new.regione.vda.it/europa/fondi-e-programmi/politica-regionale-di-sviluppo/la-politica-regionale-di-sviluppo-della-valle-d-aosta>.

²⁸⁸ https://www.regione.vda.it/territorio/ambiente/aria/piano_aria_i/default_i.asp

Railway network

The railway network is concentrated along the main valley floor, mirroring the road network and the majority of the urbanised areas. Nevertheless, the use of railways is severely affected by the limited extension of the network and the poor conditions of the infrastructure, which are both only partially due to the geographic characteristics of the region.

Overall, the network only covers 0.025 km per squared km, the lowest railway density among Italian regions.²⁸⁹ The whole regional railway is classified as “complementary network” by Ferrovie dello Stato, the state-owned holding company managing the infrastructure. In fact, the entire network presents serious structural limitations, including: an overall obsolete infrastructure going back to the late XIX and early XX centuries; a single track line allowing for a limited number of trains; a winding path, with numerous level crossing, limiting the average speed; and the predominance of diesel traction over the electrified system.

The infrastructure is essentially composed of two branches which connect in Aosta. The first branch connects Aosta to Chivasso, towards south-east, and from there to Turin and national and international destinations. It was first opened in 1886 and is 100km long, of which 59km are within the regional borders. The second branch connects Aosta to Pré-Saint-Didier, next to Courmayeur and the French border in north-west. It was inaugurated in 1929 and is 31km long, entirely within regional borders. Moreover, two partially dismissed railways, with no active service, connect Cogne to Acque Fredde (12 km) and La Thuile to Arpy (4 km), as part of a mining infrastructure active from the 1920s until 1979.

Airline connections and infrastructures

The “Corrado Gex” airport, located east of Aosta, is the only airport in the region. It was inaugurated in 1959 and has historically been reserved to private flight services, mainly for tourism purposes, as well as mountain rescue activities. In 1987, the regional council sponsored the creation of Air Vallée, with the goal of establishing regular commercial flights starting from 1995. Despite the partial failure, the regional council expanded the airport and attempted to re-open it to commercial flight multiple times between 2008 and 2013.²⁹⁰

Therefore, the region relies mainly on airports located outside of its territory. The closest one is Turin Caselle, which is about 115 km away from Aosta, followed by Geneva in Switzerland and the three Milan airports (Malpensa, Linate, and Orio al Serio).

Local public transport

The supply of local public transport in Valle d’Aosta relies mainly on buses, with the highest ratio in Italy of available buses per 1,000 residents (1.7). Out of total of 172 buses, 51 are dedicated to urban transport, while 121 run on suburban services. According to the national monitoring system of local public transport,²⁹¹ Valle d’Aosta and Friuli-Venezia Giulia are the only regions in Italy running a public transport service free of high-polluting buses (categories Euro 0 and Euro 1).

Local public transport includes trains as well, which are managed by Trenitalia until 2024 following a public procurement process. While the number of available trains is limited to 16, their average age (11.2) is among the lowest in Italy, with about a third of the trains being older than 15 years.²⁹² On the Aosta-Turin line, where the average speed is of 58 km/h, the Aosta-Turin service is based on 12/13 trains per day, with an average journey of about 2 hours, while 8/9 trains per day cover the Aosta-Ivrea service, with an average journey of around 1 hour. Following the inauguration of the new underground train station in Turin, diesel traction trains are banned from entering the city, which forces passengers from Aosta to a change of train along the way. The service from Aosta to Pré-Saint-Didier has been discontinued in December 2015 because of the condition of the

²⁸⁹ https://www.rfi.it/content/dam/rfi/rete/Piano_Commerciale_Edizione_Febbraio_2020_web_LW.pdf

²⁹⁰ https://www.regione.vda.it/trasporti/aeroporto_i.asp

²⁹¹ <http://www.affariregionali.gov.it/comunicazione/dossier-e-normativa/dossier-monitoraggio-servizi-pubblici-locali/>

²⁹² https://www.legambiente.it/wp-content/uploads/pendolaria2018_dossier.pdf

infrastructure, which was in urgent need of extraordinary maintenance activities. Until then, the service was performed by 12 couples of daily trains, with an average journey of about 50 minutes at a 38km/h speed.

In terms of demand, the region is considerably different from the rest of Italy. The share of users using local public transport for work or study reasons was limited to 12.7% in 2017, as compared to an Italian average of 20.4%. In parallel, private cars are the main mean of transport, with a motorization rate (combining cars and motorbikes) of 1,455 per 1,000 residents, as compared to a national average of 747.²⁹³ Nevertheless, the demand for rail transport has increased dramatically over the last decade, rising by 163% between 2011 and 2017, that is 3,500 and 9,212 passengers per day respectively.²⁹⁴

iii. Transport policies and key challenges

Overview of national and EU policies

EU regional development policies which are relevant for Valle D'Aosta touch only marginally on transport infrastructures in low-density areas.²⁹⁵ In fact, out of the EUR 135 million under the 2014-2020 budget, only around EUR 10 million are spent on local roads, while around EUR 10 million are invested on sustainable mobility with a focus on cycling.²⁹⁶ Under the European Digital Agenda and the Smart Specialisation Strategy, the EU also co-finances investments in various kinds of infrastructure, such as the modernisation of the region's highway.²⁹⁷

The region takes part in territorial cooperation programs, including the Macroregional Strategy for the Alpine area, which investigates cross-border mobility in a low-density context,²⁹⁸ the Interreg Mediterranean (EUR 275 million), which includes initiatives on urban low-emission transport, and the Interreg Central Europe, which includes EUR 28 million for transports projects and EUR 43 million for low-carbon development.²⁹⁹

Figure 36: Map of EU Strategy for the Alpine Region



Source: European Commission³⁰⁰

²⁹³ <https://reopenspl.invitalia.it/banche-dati/monitor-spl/monitor-trasporti/monitor-trasporti---valle-d-aosta>

²⁹⁴ https://www.legambiente.it/wp-content/uploads/pendolaria2018_dossier.pdf

²⁹⁵ <https://new.regione.vda.it/europa/fondi-e-programmi/politica-regionale-di-sviluppo/la-politica-regionale-di-sviluppo-della-valle-d-aosta>

²⁹⁶ <https://opencoesione.gov.it/en/territori/valle-daosta-provincia/>

²⁹⁷ https://www.regione.vda.it/Portale_imprese/Strumenti_di_programmazione/Smart_Specialisation_Strategy/s3vda_i.aspx

²⁹⁸ <https://www.alpine-region.eu/projects/arpaf-crossborder>

²⁹⁹ <https://www.interreg-central.eu/Content.Node/home.html>

³⁰⁰ https://ec.europa.eu/regional_policy/en/information/publications/maps/2015/eu-strategy-for-the-alpine-region-map-with-capitals

At the national level, the latest strategic plan for infrastructure development is “Italia Veloce”, which is attached to the National Reform Plan, in the framework of the EU Recovery Plan, put forward in 2020.³⁰¹ The plan identifies 130 key infrastructures to be completed across the whole country in the next 15 years, although none of these is located in Valle D’Aosta nor targets low-density areas. While the total budget amounts to EUR 200 billion, EUR 130 billion are already foreseen in the 2021-2023 proposed budget law.³⁰²

Next to this, the Strategic National Plan for Sustainable Mobility was published in 2019,³⁰³ worth EUR 3.7 billion over three years, with the completion of the projects foreseen within 15 years. The overall goal is to promote and improve air quality in the urban context by relying on new technologies. In order to do so, the plan aims mainly to renew the fleets dedicated to local public transports by shifting to low-pollution buses based on electric, methane, and hydrogen technologies. Half of the grants will be directed at complementary infrastructures. The resources are transferred directly to local powers, including EUR 2.2 billion to regions and about EUR 400 million to 38 cities with high pollution levels. It is then left to regional and local authorities to come out with specific projects to capture part of these resources, which is why the policy developments in Valle D’Aosta will have to follow accordingly. The regional capital, Aosta, can build on the past experience as a member of the ENDURANCE network for sustainable urban mobility planning.³⁰⁴

Looking at transport policy at the regional level, the regional law 29/1997 assigns to the Region the power to organise public transports through the regional transport plan and the basin traffic plan.³⁰⁵ Moreover, the region chooses the local transport provider and promotes intermodal transport in the planning process.³⁰⁶

The local assembly passed a law in October 2019 establishing the latest regional plan for sustainable mobility,³⁰⁷ which integrates the 2016 plan and the provisional 2020-2022 regional budget. On the one hand, the overall plan establishes a series of final incentives and initiatives for residents and public and private entities, aimed at low-emission vehicles, multimodality, and carsharing. Moreover, an information and dissemination campaign is foreseen, targeting sustainable mobility stakeholders and schools. On the other hand, it foresees a series of investments in the railway infrastructure amounting to EUR 150 million, which are only partially funded in the regional budget law and supported by a EUR 36 million allocation by the national government.³⁰⁸ The investment aims to open the way to a new set of agreements with the service provider, the first of which will end in 2021,³⁰⁹ aimed at increasing both the average speed and the supply of train services, thus shifting transport quotas from road to railway transport.

Key issues and challenges

The main horizontal issue with transport policy in Valle D’Aosta has to do with its geographic and demographic characteristics. The remote location of the region, combined with a completely mountainous territory, determines the exclusion from the main national and cross-border transport flows, and therefore major investments such as the Trans-European Transport Network (TEN-T)

³⁰¹ http://www.dt.mef.gov.it/export/sites/sitodt/modules/documenti_it/analisi_programmazione/documenti_programmatici/def_2020/DEF_2020_Programma_Nazionale_di_Riforma.pdf

³⁰² http://www.dt.mef.gov.it/modules/documenti_it/analisi_programmazione/documenti_programmatici/def_2020/DEF_2020_Allegato_MIT.pdf

³⁰³ <https://www.sipotra.it/wp-content/uploads/2019/03/Piano-Strategico-Nazionale-della-Mobilit%C3%A0-Sostenibile-per-il-rinnovo-del-parco-mezzi-su-gomma-per-i-servizi-di-transporto-pubblico-locale-e-il-miglioramento-della-q.pdf>

³⁰⁴ <http://www.epomm.eu/endurance/index.php?id=2809&country=it>

³⁰⁵ [https://appweb.regione.vda.it/dbweb/bandigara/bandigar.nsf/\(vediTutti\)/1410A64DE6ABC346C12577B20032C61F/\\$FILE/All_9_al_Disciplinare_Piano_di_bacino_di_traffico_pubblicazione.pdf?openelement](https://appweb.regione.vda.it/dbweb/bandigara/bandigar.nsf/(vediTutti)/1410A64DE6ABC346C12577B20032C61F/$FILE/All_9_al_Disciplinare_Piano_di_bacino_di_traffico_pubblicazione.pdf?openelement)

³⁰⁶ http://www.consiglio.regione.vda.it/app/leggieregolamenti/dettaglio?tipo=L&numero_legge=29%2F97&versione=V%20

³⁰⁷ http://www.consiglio.regione.vda.it/app/leggieregolamenti/dettaglio?pk_lr=9241&versione=V

³⁰⁸ http://www.consiglio.regione.vda.it/app/leggieregolamenti/dettaglio?pk_lr=8422#:~:text=22,-Disposizioni%20per%20una&text=La%20Regione%20definisce%20come%20asse,sia%20economica%20al%20territorio%20valdos tano

³⁰⁹ https://www.regione.vda.it/trasporti/ferrovia/futuraprogr_i.aspx

policy. This couples with a complex distribution of the population: while 75% of the population is concentrated in a small central area, the remaining 25% is spread out with an extremely low density across a vast mountain area, which makes most of the region a weak-demand area by definition.³¹⁰ The combined result is the presence of considerable diseconomies of scale which undermine the financial sustainability of major transport infrastructures. Therefore, the main challenge of any intervention is to solve a delicate trade-off between effectiveness and financial sustainability.

A second issue is the underdevelopment of the railway infrastructure. As previously described, the only functioning line is outdated and structurally unable to provide an effective service. In addition, the second line is currently inactive to the bad conditions of the infrastructure. While this is the result of decades of policy preference for road transport, the availability of national and European funds for the renewal of the railway network, its possible extension towards France, and the purchase of new vehicles, make the necessary investments possible. The challenge consists in setting a balance between the development of the infrastructure and long-term financial sustainability, which will be partially determined by the extent to which demand for the service increases.

The third issue is the prevalence of individual private transport over public transport for the 60,000 daily commuters.³¹¹ This is partly a consequence of the first two issues, namely the dispersion of the population and the weakness of the railway network, but it also due to additional factors. In particular, the existing local public transport, mainly based on buses, is neither well integrated nor effective, as shown by the last user satisfaction survey.³¹² While the capacity of the bus system could hardly be expanded further without affecting financial sustainability, the key lies in the lack of integration with other means of transport. In fact, multimodal transport is not yet incentivised, for instance through the integration of timetables of trains and buses, which leads to the use of private cars for parts of the trip that are potentially covered by public services.

Emerging trends

The review of the policy frameworks at the EU, national, and regional level leads, in light of the issues described, to underline a series of key trends. First, over the last few years, policymakers in the region have shifted their strategy: investment in railway infrastructure, in line with the EU and national push, is now a priority. The strategy described above consists in the electrification of both branches of the regional railway and the extension the infrastructure from Pré-Saint-Didier to Courmayeur towards the border with France.³¹³ A series of complementary measures complete the picture, including the doubling of the railway in several key points, the reduction of level crossings, the emission of a universal ticket for all forms of public transport, the integration of timetables, and the building of exchange parking lots in order to encourage intermodal transport.

Second, there seems to be a new push for the greening and renewal of existing road transport. As described above, national³¹⁴ and regional initiatives are funding the renewal of the local transport public fleet, which aims to replace older and high-emission buses. Moreover, additional policies are aimed at private cars. In particular, the 2019 regional plan for sustainable mobility³¹⁵ has established a series of incentives for local residents, including:

- A grant of up to EUR 10,000 for the purchase of low-emission vehicles;

³¹⁰ <https://reopenspl.invalitalia.it/banche-dati/monitor-spl/monitor-trasporti/monitor-trasporti---valle-d-aosta>

³¹¹ [https://appweb.regione.vda.it/dbweb/bandigara/bandigar.nsf/\(vediTutti\)/1410A64DE6ABC346C12577B20032C61F/\\$FILE/All_9_al_Disciplinare_Piano_di_bacino_di_traffico_pubblicazione.pdf?openelement](https://appweb.regione.vda.it/dbweb/bandigara/bandigar.nsf/(vediTutti)/1410A64DE6ABC346C12577B20032C61F/$FILE/All_9_al_Disciplinare_Piano_di_bacino_di_traffico_pubblicazione.pdf?openelement)

³¹² [https://appweb.regione.vda.it/dbweb/bandigara/bandigar.nsf/\(vediTutti\)/1410A64DE6ABC346C12577B20032C61F/\\$FILE/All_9_al_Disciplinare_Piano_di_bacino_di_traffico_pubblicazione.pdf?openelement](https://appweb.regione.vda.it/dbweb/bandigara/bandigar.nsf/(vediTutti)/1410A64DE6ABC346C12577B20032C61F/$FILE/All_9_al_Disciplinare_Piano_di_bacino_di_traffico_pubblicazione.pdf?openelement)

³¹³ https://www.rfi.it/content/dam/rfi/rete/Piano_Commerciale_Edizione_Febbraio_2020_web_LW.pdf

³¹⁴ <https://www.sipotra.it/wp-content/uploads/2019/03/Piano-Strategico-Nazionale-della-Mobilit%C3%A0-Sostenibile-per-il-rinnovo-del-parco-mezzi-su-gomma-per-i-servizi-di-transporto-pubblico-locale-e-il-miglioramento-della-q.pdf>

³¹⁵ http://www.consiglio.regione.vda.it/app/leggieregolamenti/dettaglio?pk_lr=9241&versione=V

- A grant of up to EUR 1,000 for the installation of home charging stations;
- And the exemption for three years, on top of national measures, from the payment of the vehicle tax for electric vehicles

A third trend is the diversification of transport modes, with the Region applying the EU framework on sustainable mobility linked to the new European Green Deal³¹⁶. On cycling, the new regional plan includes a series of measures, including: an expansion of existing cycle paths; the development of an application software to facilitate the localisation and use of cycle paths; the building of charging stations for electric bicycles; incentives for the purchase of electric and zero-emission vehicles; and the equipment of local public transports with facilities to host bikes. The Region also promotes the use of car sharing, carpooling, and other forms of sharing mobility. To this purpose, a regional registry of providers was made available, which provides a series of advantages such as dedicated parking spots.³¹⁷ Moreover, the region is set to pass to publish a new cycling plan.³¹⁸

iv. Conclusions and lessons learnt

Valle D'Aosta is a small mountainous region in the extreme north-west of the Italian peninsula. The low population density couples with an uneven distribution over the regional territory. The special constitutional status and the good economic context assign to the local administration the duty to face the complex transport challenges.

While most of the EU initiatives directed towards the region are outside the transport domain, the new policy context, and particularly the Recovery Fund and the European Green Deal, provide a solid framework for initiative. The recent Italian government initiatives in transport policy, which largely build on the EU framework, provides a powerful financial backing for regional planning. In this context, the recent regional plans for sustainable mobility could give start to a rethinking of the regional transport system.

The region faces difficult challenges related to a number of key issues. These include the difficulty to achieve economies of scale because of the geographic and demographic context; the underdevelopment of the railroad network; and the prevalence of private transports generated by the lack of integration of public supply and the low degree of multimodal transport.

Nevertheless, the emerging trends seem to suggest that key challenges are being addressed. Investment in railway infrastructure has become the key transport policy of the regional administration, which aims to renew and expand it over the next years. In addition, existing road transport, both public and private, is being renewed for greater environmental sustainability. Finally, a series of initiatives on alternative forms of transport are encouraging the diversification and integration of transport modes.

³¹⁶ https://eur-lex.europa.eu/resource.html?uri=cellar:b828d165-1c22-11ea-8c1f-01aa75ed71a1.0002.02/DOC_1&format=PDF

³¹⁷ http://www.consiglio.regione.vda.it/app/leggieregolamenti/dettaglio?pk_lr=9241&versione=V

³¹⁸ https://appweb.regione.vda.it/dbweb/Comunicati.nsf/ElencoNotizie_ita/C2147DC838D0A421C1258570003BE027?OpenDocument&l=ita&

This study investigates the key challenges and trends concerning the provision of transport policies and infrastructure in low-density and depopulating areas. It also provides a comprehensive assessment of relevant transport policies and projects implemented in these areas. Finally, it provides policymakers with an array of policy recommendations aimed at overcoming the identified challenges and gaps.

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