STUDY

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Transport and tourism in outermost regions: assessing mobility poverty and the effects of new climate policies



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Transport and tourism in outermost regions: assessing mobility poverty and the effects of new climate policies

Abstract

Using an own, newly elaborated functional definition of mobility poverty, this study first estimates mobility poverty in the nine EU outermost regions and assesses its effects on their transport and tourism sectors. It then reviews the Fit for 55 transport-related legislation and analyses its implications for these remote territories. It also outlines the main EU, national and regional measures tackling the effects of both mobility poverty and the new climate legislation, and finally concludes with policy recommendations.

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

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LIST OF ABBREVIATIONS

2M	Twice the National Median indicator
AFID	Alternative Fuels Infrastructure Directive
ATCP	After-Transport-Cost Poverty indicator
AOM	Autorités Organisatrices de la Mobilité
CEF	Connecting Europe Facility
CF	Cohesion Fund
CO2e	Carbon dioxide equivalent
ERDF	European Regional Development Fund
ETD	Energy Taxation Directive
ETS	EU Emissions Trading System
ETS2	EU Emissions Trading System for building and road transport fuels
EU	European Union
EU-SILC	EU Statistics on Income and Living Conditions
GDP	Gross Domestic Product
GHG	Greenhouse gas
LIHC	Low Income High Costs indicator
MIS	Minimum income scale
PPS	Purchasing Power Standard
PSO	Public Service Obligation
RED	Renewable Energy Directive
SAF	Sustainable aviation fuels
SIM	Spatial Interaction Model
SUMP	Sustainable Urban Mobility Plan
S3	Smart Specialisation Strategies

TEN-T	Trans-European Transport Network
TFEU	Treaty on the Functioning of the European Union
VLCC	Very Large Crude Carrier

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EXECUTIVE SUMMARY

KEY FINDINGS

- Mobility poverty arises with low transport availability, low accessibility to transport, low transport affordability, too much time spent travelling, inadequate transport conditions, and/or high exposure to transport externalities.
- In the outermost regions, characterised by specific geographic constraints, mobility poverty affects all transport modes and both intraregional and interregional mobility.
- This reverberates negatively on the competitiveness of their tourism sectors, a crucial issue considering that tourism accounts for a very large share of their economic outputs.
- Tackling mobility poverty requires significant investments, while the new EU climate legislation is expected to generate additional costs in the transport sector of outermost regions. This, in turn, will exacerbate the pressure on their public finances.
- In that context, a strong place-based approach to policy-making is needed. Policy action includes mainstreaming 'outermost derogations' in climate legislation and establishing an outermost-specific transport support programme to accelerate the development of innovative transport technologies.

Mobility poverty in the outermost regions

'Mobility poverty' has recently emerged, alongside energy poverty, as a cornerstone of the analysis of social vulnerabilities. It is connected to six core aspects: **low transport availability, low accessibility to transport, low transport affordability, too much time spent travelling (i.e. time poverty), inadequate transport conditions, and high exposure to transport externalities**. In the context of the nine EU outermost regions (Canary Islands, Guadeloupe, Martinique, French Guiana, Réunion, Mayotte, Saint-martin, Madeira and the Azores) , mobility poverty takes on even more significance as it reflects the challenges and shortcomings of a sector that is crucial for their own territorial cohesion (especially those that are archipelagos) as well as for their connections with their Member State's mainland and the rest of the EU.

In this study, indicators depicting the various aspects of mobility poverty have been selected, with a view to quantify and benchmark mobility poverty across regions. Owing to the regions' specific geographic constraints, the results show that **mobility poverty affects all transport modes in the outermost regions**, with few options for transport substitutability. At the same time, **these regions struggle with different aspects of intraregional and interregional mobility poverty**, even though some issues are shared by all regions (e.g. congestion in and around the main cities). In some regions (e.g. French Guiana and Mayotte), transport availability proves to be a pressing issue, while in others (e.g. Madeira and the Azores), transport conditions seem to be very unsafe. In the Canary Islands, transport options are not equally distributed across the islands of the archipelago.

The new EU climate legislation

In December 2019, the European Commission presented the European Green Deal with the goal for Europe to become a climate-neutral continent by 2050. One intermediate target is the reduction of net greenhouse gas (GHG) emissions by at least 55% by 2030, an objective for which the **'Fit for 55' legislative package** has been specifically designed. This package contains 19 regulations and directives, including 11 that are related to transport and tourism.

Considering that the outermost regions hinge largely on imported fossil fuels for their energy supply, air transport for their connection with their Member State's mainland and tourism, maritime transport for their supply of goods and cars for their everyday mobility, the new Fit for 55 transport-related legislation has major implications for these regions. That is why some **regulatory adaptations** (in the form of e.g. temporary derogation and/or exemption of certain routes from or to outermost regions) are provided. Notwithstanding these adaptations, concerns remain as regards **the effects that this legislation will have on their economies, the mobility of their citizens, the provision of supplies at reasonable prices and their convergence with the rest of the EU**.

Measures tackling the effects of mobility poverty and the new EU climate legislation in the outermost regions

While the direct and indirect effects of mobility poverty and the new EU climate legislation on the transport and tourism sectors of the outermost regions have yet to fully materialise, this research shows that:

- **Mobility poverty hampers the attractiveness and competitiveness** of these regions as tourism destinations for third country visitors, a crucial issue considering that tourism accounts for a very large share of their economic output and already faces stiff competition;
- **Tackling mobility poverty requires significant investments** to ensure basic transport services for both people and goods across the whole territory of the outermost regions, a major challenge considering that these regions have a difficult topography and are anticipating a reduction of public revenues in the green transition process;
- **The new EU climate legislation is expected to bring about additional costs** for transport services providers and, consequently, an increase in travel prices borne by consumers – potentially leading to reduced demand for transport and tourism; this, in turn, will exacerbate the pressure on the regions' public finances to cope with the requirements of the new climate legislation while delivering high-quality public services for their resident population and visitors alike.

These effects are all the more challenging that outermost regions generally lack the technological and financial capacity to comply with the new requirements stemming from the Fit for 55 legislation.

The **Connecting Europe Facility (CEF) and, above all, Cohesion Policy contribute to tackling mobility poverty** in the outermost regions and preparing their transport sector for the Fit for 55 imperatives. These instruments come in addition to a large array of national measures and region-specific schemes and strategies, such as subsidies on travel tickets, the development of right-of-way public transport networks and electric car infrastructures to alleviate mobility poverty and transition towards more environmentally friendly modes of transport. Still, **EU, national or regional-level measures specifically aimed at counteracting the potential adverse effects of the new EU climate legislation on the outermost regions remain very limited in scope and number**, especially as regards the air and maritime transport sectors.

Conclusions and policy recommendations

More crucially, **mobility poverty risks increasing in the outermost regions**, as their specific geographic conditions are aggravated by the effects of climate change. This will lead to increasing operational costs and bring about the need for cyclical investments in the various transport infrastructures, and, consequently, a more recurrent and extensive mobilisation of public resources. According to interviewed stakeholders, adding to the costs of complying with the new EU climate legislation, the outermost regions are expected to face **massive investments needs** – a major challenge given their lower wealth standings (relative to mainland peers) and the anticipated

decreasing revenues from fossil fuels taxation. This calls for cross-cutting and coordinated interventions at EU, national and regional levels, with a strong **place-based approach**. Possible avenues for EU policy action include:

- **Strengthening** the application of Article 349 of the Treaty on the Functioning of the European Union (TFEU) in EU climate policies by including more systematically (i.e. mainstreaming) 'outermost derogations' therein and adapting the timing and scope of the regulatory requirements until the necessary technologies are available and affordable;
- **Monitoring** the effects of mobility poverty and the new EU climate legislation on the transport and tourism sectors of each outermost region;
- **Establishing** an outermost-specific transport support programme (in a similar way as POSEI[1]) or, at least, significantly increasing the outermost specific allocation under Cohesion Policy to accelerate the development of innovative transport technologies and energy-efficient public transport options;
- **Reviewing** the competition and Public Service Obligations (PSOs) legislation, and adapting the rules of De Minimis Aid; and
- **Reinforcing** transnational cooperation with neighbouring countries to develop integrated transport solutions and promote coherent and consistent green agendas.

[1] The programme of options specifically relating to remoteness and insularity (POSEI) supports the agriculture sector of the EU outermost regions.

INTRODUCTION

Background of the study

The burden of climate change is not equally distributed across Europe – as in the rest of the world -, as some regions and countries are significantly more impacted than others (European Commission, 2020a). The **EU outermost regions** (Guadeloupe, French Guiana, Réunion, Martinique, Mayotte, Saint-Martin, the Azores, Madeira and the Canary Islands) are considered 'particularly vulnerable to climate change' (European Commission, 2021a). In fact, climate hazards' projections for Europe's island territories (including outermost regions) forecast a large array of adverse impacts, in particular on their tourism sector (e.g. fires, loss of beach area due to sea level rise), energy sector (e.g. decrease in energy productivity) and maritime transport sector (e.g. extreme sea water levels arising from the superposition of waves) (Lam-González et al., 2021).

Building on Article 191 of the Treaty on the Functioning of the European Union (TFEU), the EU strives to combat climate change. In December 2019, the European Commission presented the European Green Deal as an overarching policy framework for Europe to become the first climate-neutral continent by 2050. In March 2020, the European Commission presented its proposal to enshrine the EU's commitment to climate-neutrality in legislation and in June 2021, the European Climate Law (Regulation (EU) 2021/1119) was adopted. In doing so, the EU made its **climate goals legally binding**, in particular 'emissions reduction targets across a broad range of sectors, a target to boost natural carbon sinks, and an updated emissions trading system to cap emissions' (European Commission, 2023).

It is crucial that these ambitious climate targets are not achieved at the expense of the EU's most vulnerable populations and territories. Indeed, these groups are already confronted with one or more factors threatening their socio-economic development (e.g. sluggish growth, population decline, rising unemployment, limited financial capacity to foster innovation or invest in renewable energy, etc.). In some cases, these socio-economic and demographic challenges are even compounded by **geographic constraints**. This is typically the situation experienced by the outermost regions, whereby '[the permanence and combination of their] remoteness, insularity, small size, difficult topography and climate, [and] economic dependence on a few products […] severely restrain their development' (Article 349 TFEU). Enduring structural and geographical challenges and external shocks (e.g. the Great Recession of 2008-2009 or, more recently, the Covid-19 pandemic), the outermost regions have struggled to catch up with the rest of the EU.

Green transition and mobility poverty challenges in the outermost regions

For these regions, even more than for others, the green transition appears to be a mounting challenge: how to foster economic growth while reducing their carbon footprint, considering their **reliance on imported fossil fuels** for energy supply, **air transport** for tourism and **maritime transport** for trade in goods, with no infrastructure for rail transport. Not least, the relatively low carbon emissions levels of the outermost regions (in comparison to EU peers) could exacerbate the feeling that the EU's climate targets and corresponding legislation put them at a considerable, unjustified disadvantage while they endeavour to bridge the gap (in both economic and geographic terms) with the rest of the EU. Indeed, the Airlines International Representation in Europe (2022) noted that "the potential increase in flight ticket prices caused by the increase in the cost of aviation fuel may cause an uncontrolled decline in interest in flying [and], consequently, a reduction in the number of passengers served at European airports". In particular, sustainable aviation fuels (SAF) – which are expected to play a key role in the decarbonisation of the aviation sector – are still costly to produce (Cazzola et al., 2023). For the outermost regions that are generally more sensitive to price changes, the new EU climate legislation may harm their transport and tourism sectors.

EU policy-makers acknowledged the importance of making the transition to climate-neutrality **just and inclusive**. In its Communication on sustainable and smart mobility, the European Commission (2020b) stressed that "The shift towards sustainable, smart and resilient mobility must be just or else risks not taking place". In its Communication on the Fit for 55 package, the European Commission (2021b) further emphasised that "The transition towards climate neutrality can be a unique opportunity to reduce systemic inequality. Carbon pricing instruments, for example, raise revenues that can be reinvested to address energy poverty and mobility challenges for the vulnerable, spur innovation and economic growth, and create employment". The European Commission further specifies that the "new Social Climate Fund will provide dedicated funding to Member States to support European citizens most affected or at risk of energy or mobility poverty, to accompany the introduction of the Emissions Trading to road transport and buildings".

The structural and geographical challenges that are characteristics of the outermost regions call for a detailed **assessment of their vulnerabilities and constraints**, as well as the **potential impacts of climate-related policies**. Indeed, the insularity of most outermost regions and their remoteness from the European continent result in barriers to socio-economic development, as distance and non-contiguity increase transport costs and thereby hinder their integration into the 'core' of the EU Single Market (Maucorps et al., 2024). That is why technological advancement, the expansion of transport networks and transport liberalisation policies allowed for the crucial development of trade and tourism in those distant and relatively isolated regions, among others. Nevertheless, persisting poorer accessibility, higher dependence on air and maritime transport, lower substitutability of transport modes, less developed interconnections and intermodality, higher price sensitivity, etc. have major implications for tourism, trade, commuting, and more generally, economic development.

In fact, '**mobility poverty**' (and, more generally, 'transport poverty') has recently emerged as a determinant of social vulnerabilities (alongside energy poverty), raising particular interest in the discussions on the 'Fit for 55' package and the sustainable and smart mobility strategy (Kiss, 2022). While this concept has not yet been linked to any functional definition, endeavours to understand the reality of mobility poverty, both qualitatively and quantitatively, have been pursued by policy-makers and researchers alike. More importantly, understanding what mobility poverty entails in the context of the outermost regions is fundamental for their development, not only for its direct effects on the conditions of mobility and flows of goods and people, but also for its cumulative and combined effects with the new EU climate legislation. All in all, the outermost regions need to take up the triple challenge of mitigating transport bottlenecks and mobility poverty, fostering sustainable tourism (a key driver of economic growth) and, concurrently, complying with climate legislation.

The final report of the Expert Group on 'Transport accessibility for the EU outermost regions' (Pickup and Mantero, 2017) provided an overview of the accessibility gap in the outermost regions (in relation to three core issues: sustainable mobility, links to Member States, and links to the neighbourhood) and put forward recommendations that address legislation, financing, know-how and opportunity. While the report hinted at possible avenues of policy support, it essentially stressed the "lack of quantitative evidence on the size and nature of the accessibility gap". More recently, the Presidents of the Outermost Regions (2022) called to adapt the climate legislation proposals which has an impact on transport (e.g. the EU Emissions Trading System (EU-ETS) Directive, the Alternative Fuels Infrastructure Directive (AFID) – now Regulation -, the ReFuelEU Aviation Regulation, the FuelEU Maritime Regulation and the revised Energy Taxation Directive (ETD)) and further demanded "an overall impact assessment on the implementation of [the Fit for 55] package and an analysis of the cumulative and combined effects of the different measures on the [outermost regions]" (2023).

Aims and methodology of the study

The objective of this study is, therefore, to address these issues by: first, elaborating a functional definition of mobility poverty; second, assessing mobility poverty and its effects on the transport and tourism sectors in the outermost regions; third, assessing the effects of the new EU climate legislation (with a focus on the recently adopted transport-related Fit for 55 legislation) on these same two sectors, including the connections between the outermost regions, their Member State's mainland, the EU territory more generally and their neighbouring third countries; and finally, identifying existing and proposing new policy solutions to tackle both issues, namely mobility poverty and the potential adverse effects of the new climate legislation in the outermost regions. To do so, several methods for collecting and analysing data have been used: extensive **literature review**, collation of **indicators** from primary and secondary sources, **interviews** with key stakeholders (see **Annex I** for details of the consultation process) from the transport and tourism sectors in all nine outermost regions to gather primary information, and analysis of relevant **policy documentation**.

Structure of the study

The qualitative and quantitative findings of the analysis have been compiled and articulated to produce substantiated results on the core issues at hand. The study is structured as follows:

- **Chapter 1** proposes a novel functional definition of mobility poverty and applies it to the outermost regions;
- **Chapter 2** analyses the effects of mobility poverty on the outermost regions' transport and tourism sectors;
- **Chapter** 3 reviews the new EU climate legislation and its implications for the outermost regions;
- **Chapter 4** outlines current policies and measures aimed at tackling mobility poverty and countering the potentially adverse effects of the new climate legislation in these regions; and
- **Chapter 5** concludes the study with policy recommendations adapted to the context of the outermost regions.

1. MOBILITY POVERTY: A FUNCTIONAL DEFINITION

KEY FINDINGS

- The concept of 'transport poverty' has recently come to the fore in the policy discussions around achieving a just and inclusive transition to climate neutrality.
- Six core aspects are commonly associated with this concept: low transport availability, low accessibility to transport, low transport affordability, too much time spent travelling (time poverty), inadequate transport conditions, and high exposure to transport externalities.
- The geographic conditions and specificities that characterise the EU outermost regions (Canary Islands, Guadeloupe, Martinique, French Guiana, Réunion, Mayotte, Saint-Martin, Madeira and Azores), must be taken into account when assessing mobility poverty within, to and from these regions.
- The selection of indicators to quantify transport poverty has been carried out on the basis of extensive literature review.
- The results show a wide array of values both across indicators and across regions for intraregional and interregional transport poverty, even though some issues are shared by all outermost regions (in particular congestion).
- Qualitative information collected from interviews with key stakeholders in the transport and tourism sectors of the nine outermost regions provide detailed insights into the specific challenges of mobility poverty, such as the lack of public transport options or the lack of transport safety.

1.1. Review of the mobility poverty concept

The European Environment Agency underlines the central role of transport for socio-economic development, both in terms of **economic growth** and **quality of life**: "Transport connects people, cultures, cities, countries and continents. It is one of the main pillars of modern societies and economies, allowing producers to sell their products across the world and travellers to discover new places. Transport networks also ensure access to key public services, such as education and health, contributing to a better quality of life. Connecting to transport helps boost the economy in remote areas, creating jobs and spreading wealth." Hence, transport assumes particular importance in the outermost regions, which are, by definition, very distant and relatively isolated (**Figure 1** and **Table 1**). As a matter of fact, transport improvement (in terms of decreasing transport costs and times and/or increasing the number of transport options) is not just a driver of, but first and foremost, a prerequisite for growth in these regions. For illustration, the journey from Bordeaux (located in mainland France) to Guadeloupe took around ten days in the 1920s, against eight hours nowadays (Gay, 2021).

Figure 1: Location of the EU's outermost regions across the globe



Source: European Commission

Table 1: Key geographic features of the EU outermost regions

EU outermost region	Geography	Distance to country's capital[2]	Distance to nearest EU region	Distance to nearest foreign country	Population
Canary Islands	Archipelago in Macaronesia	1,700 km	500 km	100 km	2,252,237
Guadeloupe	Archipelago in the Caribbean Sea	6,800 km	200 km	100 km	383,600
Martinique	Island in the Caribbean Sea	6,900 km	200 km	65 km	352,205
French Guiana	Land territory in South America	7,000 km	1450 km	0 km	296,058
Réunion	Island in the Indian Ocean	9,400 km	1400 km	240 km	869,993
Mayotte	Archipelago in the Indian Ocean	8,000 km	1400 km	120 km	299,022
Saint-Martin	Island (part of) in the Caribbean Sea	6,700 km	260 km	0 km	36,000*
Azores	Archipelago in Macaronesia	1,500 km	900 km	2,000 km	236,488
Madeira	Archipelago in Macaronesia	970 km	500 km	700 km	251,182

Source: authors' own elaboration based on data from the European Commission (Eurostat) and the French National Institute of Statistics and Economic Studies (Insee)

Note: while Eurostat groups Guadeloupe and Saint-Martin in a single NUTS 2 region, this table relies on national data to differentiate between the two regions. For population data, values refer to 2020 (*) and 2022 depending on data availability.

[2] The distances indicated in the third, fourth and fifth columns of the table refer to an estimate of the shortest distance to the county's capital, the closest EU region and the closest non-EU territory, respectively, as an indication of the regions' remoteness. It does not necessarily correspond to the distance of direct flight or cruise connections. For instance, the distance between Saint-Martin and Paris is around 6700 km, between Saint-Martin and Guadeloupe (the nearest EU region, as Saint-Barthélemy is not an EU outermost region but an Overseas Country or Territory) is around 260 km, and between Saint-Martin and Sint-Maarten (a country of the Kingdom of the Netherlands) is 0 km, as both are located on the same island.

Hence, it is no surprise that the growing importance of transport for socio-economic development has shed light on the issues of 'transport poverty' and 'mobility poverty'.[3] More specifically, **mobility poverty** has recently emerged as a fundamental concept when examining **social vulnerabilities** (alongside energy poverty), in particular in the discussions on the 'Fit for 55' package and the sustainable and smart mobility strategy (Kiss, 2022). It has been investigated by researchers and recognised by policy-makers, but does not have any settled operational definition yet. Recital (15) of Regulation (EU) 2023/955 establishing a Social Climate Fund provides a working definition of 'transport poverty': "Transport poverty is usually caused by one or a combination of factors such as low income, high fuel expenditures, or a lack of affordable or accessible private or public transport" and that "Transport poverty can particularly affect individuals and households in rural, insular, peripheral, mountainous, remote and less accessible areas or less developed regions or territories, including less developed peri-urban areas and the outermost regions". Article 2(2) of the Regulation further defines transport poverty as "individuals' and households' inability or difficulty to meet the costs of private or public transport, or their lack of or limited access to transport needed for their access to essential socioeconomic services and activities, taking into account the national and spatial context".

The regulation thus highlights the importance of **affordability, availability and accessibility of transport options**, as well as the spatial context, which, in the case of the outermost regions, deserves particular consideration. A literature review carried out for the European Commission's Joint Research Centre (Mejía Dorantes and Murauskaite-Bull, 2022) finds that "Transport poverty occurs when an individual or household cannot access essential transport services due to a lack of alternatives to cover the distance between the place of departure and the destination; there are no suitable and affordable transport alternatives at a reachable distance to their departure and destination points, in service hours and frequencies which meet their needs; the individual's transport expenditure brings their residual income below or close to the official poverty line; the total duration of travel leads to time poverty; or the available transport options fail to ensure the individual's safety and security". In other words, **time poverty** (i.e. excessive travelling time) and **inadequacy of transport conditions** are additional building blocks of mobility poverty besides the lack of availability (in terms of transport options and frequency), lack of accessibility, and unaffordability.

In a similar vein, Lucas (2012) argues that the concept of mobility poverty involves the lack of mobility services necessary for participation in society, resulting from the inaccessibility, unaffordability or unavailability of transport. Lucas et al. (2016) then define an individual as transport poor when that individual meets any of the following conditions: i) lack of mobility alternatives adapted to their financial resources or physical conditions, ii) lack of an adequate transport system that guarantees them to have a good access to places where they can participate in regular activities that are necessary to have a reasonable quality of life, iii) being financially constrained with a residual income below the official poverty line because of a high expenditure incurred in transport, iv) investing excessive time in daily trips, leaving scarce time to other activities which produces a time poverty situation or social isolation, or v) travelling regularly in dangerous, unsafe or unhealthy conditions. This latter point introduces a new dimension in the mobility poverty concept, namely that of environmental and health

[3] Transport and mobility have two distinct, though interrelated meanings: "transport is the movement of goods, services, and people between two or more places, while mobility is the ability to access activity areas safely, quickly, and affordably, using environmentally friendly transport options" (UN Habitat, 2021). Accordingly, 'transport poverty' and 'mobility poverty' imply different issues, and the literature often refers to one or the other concept when broadly addressing transport-related vulnerabilities. For instance, Kuttler et al. (2018) refer to 'mobility poverty' as one of the three perspectives from which 'transport poverty' can be conceptualised, the other two being 'transport affordability' and 'accessibility poverty'. In fact, this study focuses on the challenges for the mobility of people in, to and from the outermost regions via different transport modes and covers the transport of freight to a more limited extent. Hence, it appears that 'mobility poverty' is more suited to the scope and purpose of this research. This study therefore predominantly uses the term 'mobility poverty', in line with the Terms of Reference, unless it quotes or refers to a piece of literature that specifically tackles 'transport poverty'.

concerns. In fact, transport is also the cause of many **negative externalities** such as congestion, greenhouse gas (GHG) emissions, noise, and biodiversity degradation.

All in all, a well-rounded definition of mobility poverty must thus reflect the following aspects (building on the work by Kiss (2022) and Alonso-Epelde et al. (2023)):

- **Low transport availability** (i.e. lack of or low frequency of transport options);
- **Low accessibility to transport** (e.g. for disabled people);
- **Low transport affordability** (i.e. inability to meet the cost of transport);
- **Too much time spent travelling** (also referred to as time poverty);
- **Inadequate transport conditions** (e.g. available transport options are dangerous, unsafe or unreliable);
- **High exposure to negative transport externalities** (e.g. in the form of noise and pollutant emissions for both users and non-users).

Importantly, mobility poverty analysis must take account of **all different modes of transport** when applied to insular territories and rugged terrains, i.e. road and inland waterways transport (crucial for local mobility) as well as air and maritime transport (because air and maritime connectivity play a far more prominent role in the outermost regions than in EU mainland regions). For instance, mobility poverty may occur in the outermost regions due to their specific geography , e.g. because cities in the different islands of a given archipelago cannot be connected by road transport and railways. For this reason, the lack of surface transport reduces the number of potential trips and, at the same time, increases the time and money spent on each trip, reducing the accessibility of the outermost territories. The literature also reveals that lack of transport alternatives occurs with monopolistic state transport concessions: if there are state transport monopolies without necessity, then mobility poverty is likely to increase.

Sea transport for inter-island communication and connection thus plays a prominent role for the outermost regions that are archipelagos (i.e. Guadeloupe, Mayotte, the Azores, Madeira and the Canary Islands) as well as for the outermost regions that are located sufficiently close to each other to be connected by ferry links (e.g. Guadeloupe and Martinique). Where the distance between islands is greater, air transport becomes indispensable (e.g. between several islands of the Azorean archipelago). This, of course, also applies to the distance between different outermost regions and between the outermost regions and their Member States' mainland (see again **Table 1**). This brings the need for public policies for ferry and air services to the fore: indeed, "the majority of islanders and visitors, but also businesses cannot rely on private means of transportation and have to rely on public ferries and airplanes to move to and from islands" (Kizos et al., 2023).

Likewise, the outermost regions' geography is likely to heighten the severity of transport safety issues and externalities: on the one hand, the regions' **exiguity** (due to scarcity of land) leads to the concentration of road transport around a few large cities and along a few main roads (e.g. around the city Fort-de-France in Martinique, thereby causing traffic jams (along with noise and pollution) and increasing travel times); on the other hand, the **low volume of intraregional, non-road journeys** (where the topography does not allow for roads to be easily built) render air and rail transport options less or not at all economically viable. In fact, the transport stakeholders interviewed as part of this study explained that even bus services running on the land territory of the outermost regions that serve the more remote parts of the regions are unprofitable, so that proactive public policies are needed to ensure that no parts of those territories are left behind.

1.2. Indicators of mobility poverty

1.2.1. Methodological approach of the literature review

In order to elaborate a definition of mobility poverty that is properly functional, the six aforementioned core aspects of mobility poverty are to be represented by **quantifiable indicators** (or composite indices). The selection (and, where relevant, the establishment) of indicators draws from extensive literature review, using the PRISMA method to pin down a short list of key indicators (see **Annex II** for more information). The literature review showed that there exist several indicators for measuring mobility poverty and that each approach to define those indicators has both advantages and limitations.

In fact, four main data sets have been found to be commonly used in the literature on mobility poverty indicators: the household budget surveys (e.g. Awaworyi Churchill and Smyth, 2019; Berry et al., 2016; Alonso-Epelde et al., 2023; Lowans et al., 2023; and Bousquet and Sanin, 2024), the mobility and transport annual surveys (see example in **Box 1**), the specific transport surveys carried out for vulnerable households (e.g. Bouscasse et al., 2023), and the accessibility gravity and cumulative opportunity indicators calculated at the level of specific territorial demarcation units (e.g. Pons et al., 2024; Benevenuto and Caulfield, 2020; and Martens and Bastiaanssen, 2019).

The literature review also put forth different indicators based on single measures rooted in transport cost-share expenditures, in multiple indicators that relate these with income distribution, or in scales measuring mobility poverty. Interestingly, setting standards or norms regarding the number of trips or the minimum travel time needed for a given period to participate in basic activities is an approach that has not been proposed as much as in the case of energy poverty. This budget-based approach to finding a sort of minimum income scale (MIS) is likely more problematic in the transport field because of the complexity of finding norms for activity participation that highly depend on urban planning and the car dependence of hyper-mobile societies. In that context, one important approach proposed in the literature is based on associated transport expenditures and disposable income (see **Annex II** for more information).

Box 1: Results of a quantitative field survey on car use conducted in Guadeloupe in 2022

In 2022, a quantitative field survey was conducted in Guadeloupe to explore the psychological and socio-anthropological drivers as well as structural factors behind the relationship of the outermost region's residents with their car. The results of this survey (alongside those from other data collection and analysis tools) have been reported in a study by Ball et al. (2023). Some of the results (presented below) show that congestion-bound time poverty and inadequate road transport conditions are found to be prevalent issues among the local population.

"Car use amounts to time wasted in traffic jams"	Share of responses
1 Do not agree at all	14.8%
2	11.2%
3	21.7%
4	20.3%
5 Totally agree	32.0%

"On a scale from 1 to 5, is the road network practical (in terms of itineraries, zones served, signalling, etc.)?"	Share of responses
1 Barely practical	20.2%
2	19.8%
3	40.2%
4	14.2%
5 Very practical	4.2%
I don't know	1.4%

Source: Quantitative field survey from ETOM LDdom conducted in 2022. Number of respondents: 600 (left-hand question) and 500 (right-hand question).

Source: authors' own elaboration and translation based on Ball et al. (2023)

Another interesting and more recent approach is based on studying transport poverty through administering specific questionnaires that include scales to measure the concept of mobility poverty (e.g. Verhorst et al., 2023). A final approach is based on spatial accessibility indicators that measure the number of opportunities (or population) that can be achieved through gravity potential models or cumulative models.[4] For instance, the European Commission's Directorate-General for Regional Policy (DG REGIO) developed an air accessibility index measuring, at the regional level, the population-weighted average number of flights per day accessible within 90 minutes by road[5], as well as a road-rail transport performance index representing the share of population within 120 km that can be reached within 90 minutes by either road or rail[6]. These latter two indicators highlight the importance of travel duration when assessing accessibility, establishing a clear link with the issue of 'time poverty' (for a more comprehensive discussion on the estimation methods and limitations of accessibility indicators, see **Annex III**). Other types of indicators, such as relative network efficiency, seem not to have been used in this context. The overall findings of the literature review on the indicators, metrics and data sets found in the research on transport poverty are presented in **Annex II**.

1.2.2. Selection of mobility poverty indicators

The findings of the literature review have guided the definition and selection of mobility poverty indicators along the six above-listed aspects: availability, accessibility, affordability, time poverty, transport conditions and negative transport externalities. For instance, accessibility is represented by an indicator that follows the cumulative model approach that sets a time (1h30) and distance (120 km) threshold, while transport affordability is represented by an indicator linking transport expenditures and disposable income. Independently of the theoretical discussions and the different aspects of the definition discussed in the literature review, the selection of operational indicators (or composite indicators) necessarily depends on **data availability**. For instance, 'transport availability' relies on the number and frequency of transport options, so that the type of transport options (i.e. transport modes) to be considered and the geographic area within which availability should be estimated must first be determined.

In the outermost regions, insularity and difficult topography (e.g. volcanic landscapes, Amazonian Forest) reinforce the lack of intraregional transport options (i.e. mobility poverty). Closely related to the issue of 'transport availability' is that of '**transport substitutability**', whereby one transport mode can easily (or not) be replaced by or compensate for the disruption of another one (see example in **Box 2**). On the European continent, short-haul flights can be more easily substituted by train or car rides than in the outermost regions where e.g. rail transport is non-existent.

[4] Gravity potential models include the distance, time, or generalised cost as friction variables in the model that tell apart the potential interaction between the territories. Meanwhile, cumulative opportunities fix a time or cost threshold for interacting with other distant territories.

[5] See, for instance, pp.107-108 of the European Commission's Eighth Cohesion Report (2022a).

[6] See, for instance, pp.99-100 of the European Commission's Ninth Cohesion Report (2024a).

Box 2: Transport options in French Guiana

In the absence of roads, air travel is the fastest mode of transport to serve the communes of southern French Guiana, otherwise accessible only by river. Until 1 October 2023, Air Guyane, a subsidiary of the Caire group (Compagnie Aérienne Inter Régionale Express), was the only airline authorised to offer domestic flights, under a PSO regime. But since the company's receivership, difficulties have become more acute for some 50,000 people who find themselves isolated. River navigation by pirogue is slow, uncomfortable and not always practicable in periods of low water, due to the presence of rapids on the course of the rivers. For example, it takes four days to travel up the Maroni to Maripasoula, a commune in French Guiana's Amazonian Park. Air services were gradually resumed from December 6, 2023, thanks to an emergency PSO, awarded by the regional authority (Collectivité Territoriale de Guyane) to a consortium of three companies. But the small number of seats available still limits the offer for residents (who benefit from reduced fares) and tourists wishing to travel within the vast territory of French Guiana. On July 4, 2024, a new social aid scheme entered into force for a period of one year, whereby the regional authority (Collectivité Territoriale de Guyane) pays companies subject to PSOs a flat-rate subsidy per passenger carried.

Source: authors' own elaboration

Note: The OECD (2024) defines Public Service Obligations (PSOs) as "obligations placed upon selected market actors in order to ensure to all consumers an appropriate access to essential services, which would not be provided by the market under commercial conditions". EU legislation, in order to avoid disparities between Member States in the procedures and conditions they apply to the execution of PSOs, covers land, maritime and air transport, with dedicated TFEU articles and regulations.

As a result, two series of indicators have been selected: the first one to measure mobility poverty within regions (**intraregional mobility poverty**) (**Table 2**); the second one to measure mobility poverty from and to regions (**interregional mobility poverty**) (**Table 3**). It is very important to note that the availability of regional-level, harmonised transport-related statistics covering all outermost regions is limited. At the same time, resorting to national-level statistics to fill the gaps would ignore the territorial specificities of the outermost regions and probably conceal a large part of the mobility poverty issue. Hence, the selection of indicators depicted in the tables below is not exhaustive but reflects how the different aspects of the mobility poverty concept (see again **Chapter 1.1**) can be translated into quantitative measures, drawing from the most common methodological approaches (see again **Chapter 1.2.1**).

Table 2: List of intraregional mobility poverty indicators (within regions)

Aspect	Indicator code	Indicator definition	Year	Source
Availability	Av1	Length of road network in km, per km²	2022	Eurostat and regional sources
	Av2	Number of buses, per km²	2017-2024	Calculated by the authors based on regional sources
Accessibility	Acc1	Population reachable within a 1h30 travel / population within a 120 km radius (= transport performance by car)	2018	DG REGIO
Affordability	Aff1	Share of households' disposable income (budget) spent on transport, in %	2017	Calculated by the authors based on regional sources

Time poverty	TP1	Average commuting time, in minutes	2021	Calculated by the authors based on regional sources
Transport conditions	TC1	Daily average of victims in road accidents, per million inhabitants	2021-2022	Eurostat and regional sources
Transport externalities	TE1	Share of commuting trips made by car, in % (proxy for congestion, noise and pollution)	2021	Calculated by the authors based on regional sources
	TE2	GHG emissions from car use, in tons of CO2e per person and per year	2019	Calculated by the authors based on regional sources

Source: authors' own elaboration

Table 3: List of interregional mobility poverty indicators (to/from regions)

Aspect	Indicator code	Indicator definition	Year	Source
Availability	Av3	Number of direct flights to the mainland's capital per week, per million inhabitants	2024	Calculated by the authors based on regional sources
Accessibility	Acc2	Accessibility to passenger flights	2019	DG REGIO
Time poverty	TP2	Average direct flight duration (to the mainland's capital)	2024	Calculated by the authors

Source: authors' own elaboration

Note: maritime transport was not considered in the selection of indicators due to the minor role it plays for the mobility of people (owing to the distances to be covered). It is, however, addressed in the qualitative analysis that follows in the subsequent sections.

1.3. Quantification of mobility poverty in the outermost regions

1.3.1. Intraregional mobility poverty

The indicators listed in **Table 2** have been collected, calculated and/or estimated, where needed, to provide quantitative measures of mobility poverty in the outermost regions. **Annex IV** details the collection, calculation and estimation methods used, including the source of the data. Where possible, the indicators have also been calculated for three other EU regions used as a benchmark for the outermost regions, namely:

- The **Balearic Islands**, a Spanish archipelago that is located around 80 km off Spain's closest land territory: its population (1.2 million inhabitants) is slightly more than half that of the Canary Islands (2.2 million inhabitants) while its land area is also smaller (i.e. 4,990 km^2 against a value of 7,447 km^2 for the Canary Islands);
- **Corsica**, a French island region that is located around 160 km away from France's mainland: it has a population of the same size as Martinique (i.e. around 353,000 inhabitants as of 2023) but a land area that is considerably larger (i.e. 8,726 km^2 against a value of 1,108 km^2 for Martinique). Contrary to the outermost regions, Corsica has a rail network of around 230 km[7]; and

[7] Source: Collectivité de Corse

- **Algarve**, the southernmost Portuguese mainland region with a long Atlantic coastline: its population (around 479,000 inhabitants) is twice as large as the Azores' total population (around 240,000 inhabitants), just like its land area (i.e. 4,997 km^2 against a value of 2,322 km^2 for the Azores).[8]

The comparison between the mobility poverty situation in the outermost regions and that of other regions sharing similar geographic characteristics (e.g. insularity, exiguity) but located either directly on the Member State's mainland (Algarve) or in the vicinity of the Member State's mainland (Corsica and the Balearic Islands) allows for an assessment of the 'added mobility poverty' from being an 'island' and being 'outermost', respectively.

[8] Source: Eurostat, Population on 1 January by age, sex and NUTS 2 region (indicator demo_r_d2jan) and Area by NUTS 3 region (indicator reg_area3).

Table 4: Measures of intraregional mobility poverty using the indicators from Table 2

		Av1 Length of road network in km, per km²	Av2 Number of buses, per km²	Acc1 Population within a 1h30 travel / population within a 120 km radius	Aff1 Households' disposable income (budget) spent on transport, in %	TP1 Average commuting time, in minutes	TC1 Daily average of victims in road accidents, per million inhabitants	TE1 Share of commuting trips made by car, in %	TE2 GHG emissions in tons of CO2e from car use, per person and year
Outermost regions	Canary Islands	0.6	6.1	92.4	N/A	N/A	7.0	78.7	N/A
	Guadeloupe	1.9*	N/A	83.4*	19.7	N/A	4.6	85.3	1.3
	Martinique	2.6	0.4	81.1	20.0	19.9	5.6	84.6	1.2
	French Guiana	0.03	N/A	59.0	18.1	N/A	7.1	75.7	0.7
	Réunion	1.9	0.3	90.0	19.8	21.1	3.0	80.1	1.1
	Mayotte	0.6	0	76.4	18.2	N/A	2.4	N/A	N/A
	Saint-Martin	N/A	0	N/A	N/A	N/A	3.9	N/A	N/A
	Azores	0.6**	0.1	89.9	N/A	N/A	9.3	N/A	N/A
	Madeira	N/A	N/A	94.4	N/A	N/A	11.7	N/A	N/A
Benchmark regions	Balearic Islands	0.4	11.0	94.6	N/A	N/A	8.9	N/A	N/A
	Corsica	1.0	N/A	47.3	N/A	48.5	6.9	82.4	1.1
	Algarve	N/A	N/A	93.0	N/A	N/A	14.7	N/A	N/A

Source: Authors' own elaboration based on the data sources indicated in Annex IV.
Notes: *Eurostat groups Guadeloupe and Saint-Martin in a single NUTS 2 region. Hence, the values of the indicators Av1 and Acc1 for Guadeloupe actually correspond to Guadeloupe and Saint-Martin combined. By construction, higher values of indicators can indicate either higher mobility poverty (e.g. for the indicator TP1) or lower mobility poverty (e.g. for the indicator Acc1). Each indicator has its own order scale. **For the Azores, the length of the road network refers to regional roads only, excluding municipal roads.

Findings from the mobility poverty indicator analysis

The scores of the outermost regions on the selected indicators of intraregional mobility poverty reveal a wide array of values both across indicators and across regions.

Availability

Availability of road transport infrastructure presents an extreme contrast between some of the French regions like Guadeloupe, Martinique and Réunion that boast a relatively extensive road network (in relation to their size) and French Guiana (where more than 90% of the territory is covered by the Amazonian Forest) that has only 440 km of national roads along the coastline, 408 km of regional roads and 1,311 km of local roads, without any motorway, for a total land area of 83,383 km^2.[9] Likewise, Mayotte and Saint-Martin do not have established bus services with regular route patterns. In Mayotte, collective taxis and barges are the only two modes of public transport while in Saint-Martin, collective taxis (minibuses) serve many locations around the island, albeit without any fixed schedule. In the Azores, the number of operating buses across all nine islands of the archipelago is also relatively small.

Accessibility

In terms of accessibility, all outermost regions except French Guiana demonstrate relatively high scores (in the range of 76.4 to 94.4), with some variation between the Spanish and Portuguese regions, on the one hand, and the other French regions, on the other hand. Still, outermost island regions (i.e. all outermost regions bar French Guiana) are not less endowed than the Balearic Islands and Corsica, with the former having a lower availability score (0.4) and the latter having a lower accessibility score (47.3) – pointing to the major role played by road transport in the outermost regions where there are no rail transport options (contrary to both the Balearic Islands and Corsica).

Affordability

The share of the households' budget spent on transport range from 18% to 20% in the French outermost regions (against a national average of 16.3%). However, one should be cautious when interpreting these values, as wealthier households tend to spend more on transport as they can afford to travel further and/or more often. For instance, very low income households in Mayotte spend 8% of their budget on transport, low income households spend 13% and non-poor households spend as much as 25%. In the region, the collective taxi fare is set at EUR 1.40 during the day and EUR 2.10 in the evening in urban areas, and the barge ticket for a pedestrian is set at EUR 0.75.[10]

Transport conditions and externalities

Little data could be collected on the issue of time poverty, especially in the outermost regions that are deemed highly congested (i.e. the French and Spanish outermost regions), but in Martinique and Réunion, commuting takes less than half of the time it takes in Corsica (19.9 and 21.1 minutes, respectively, against 48.5 minutes). The lack of road safety is particularly pronounced in the Portuguese regions, followed by French Guiana and the Canary Islands, and finally the remaining outermost regions. At the same time, road safety remains higher in the outermost regions (except French Guiana) than in the benchmark region of the same Member State (i.e. the Balearic Islands for the Spanish outermost region, Corsica for the French outermost regions and Algarve for the Portuguese outermost regions), a finding that tends to negate the disadvantageous nature of transport conditions in the outermost regions compared to their peers. Car is by far the most prevalent transport mode for

[9] Source : Préfecture de Guyane, *Document Général d'Orientations, Guyane 2018-2022* for the road network and Eurostat, Area by NUTS 3 region (indicator reg_area3) for the land area.

[10] Source : Préfecture de Mayotte

commuting journeys in all French outermost regions, entailing congestion, noise and air pollution especially in and around cities. GHG emissions from car use are notably high in the French West Indies (Guadeloupe and Martinique).

Findings from the stakeholder consultation and literature review

The interviews conducted with key transport stakeholders in the outermost regions largely confirmed these observations.

Spain's outermost region

In the **Canary Islands**, travel times for inter-island trips between provincial capitals are excessively long, not because of the flight duration (which lasts around 30 minutes) but because of the road traffic around the airports which is very dense at certain times of the day, leading to time poverty. Furthermore, air operations during peak hours in Gran Canaria are made difficult by the large mix of aircrafts with very different performances, such as those carried out by ATR-type aircraft covering inter-island (intraregional) connections and those of the B737-800 or A320 type connecting the island with Europe (interregional transport). This results in long waiting times to take off on the runway and prolongs the flight in terms of arrival procedures to fit the aircraft into the landing sequence, thereby leading to higher fuel consumption and additional CO2 emissions. More generally, the availability of public transport is very limited in certain islands, and intermodality is still underdeveloped. Conversely, safety was not seen as an issue by the interviewed stakeholders.

France's outermost regions

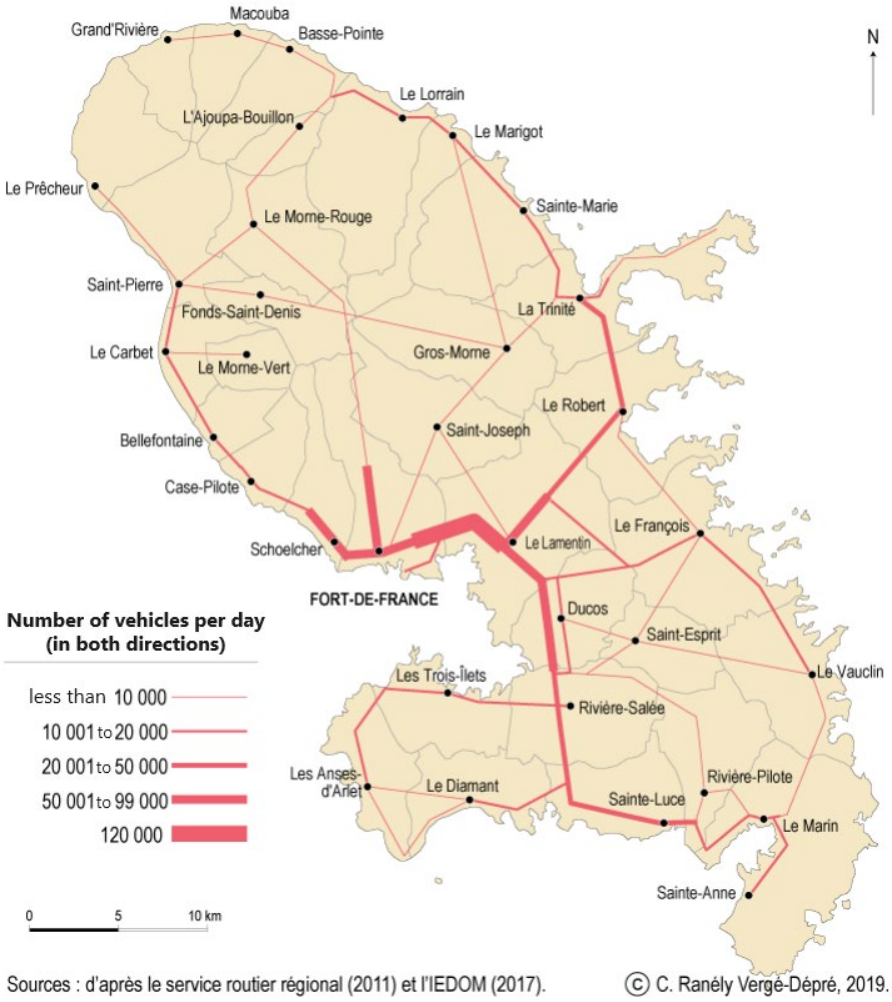
In **Guadeloupe**, interviewed stakeholders reported that the availability and quality of public transport services is not uniform across the territory, owing to the fact that public transport services are managed by five different authorities ('Autorités Organisatrices de la Mobilité' or AOM in French) whose financing capacity stems from businesses' contributions. In the economic hub of the region (i.e. the agglomeration of Pointe-à-Pitre), public transport services are deemed well organised and efficient. In the other parts of the territory, the responsible authorities have constrained budgets to finance transport services because business activities are considerably more limited. Transport accessibility in terms of infrastructure is also problematic due to the insularity and exiguity of the territory, whereby the creation of new infrastructure (e.g. new lanes, new bus stations) is challenging. Furthermore, the different public transport networks are fragmented (i.e. not well connected), prompting the local population to use their car to reduce travel times – which, in fact, contributes to congestion especially during the morning. It is important to note that public services are more widely used by those who cannot afford to use a car (elderly, deprived households, etc.), which aggravates social inequalities. The conditions of bus transport are also deemed inadequate (lack of reliability of the bus schedule, unsafety, etc.).

In **Martinique**, interviewed stakeholders considered that the region is concerned by all six aspects of mobility poverty, but that the amount of time spent travelling (i.e. time poverty) is the most sensitive issue. More specifically, the time spent travelling on public transport is high because buses (including the right-of-way public transport[11]) have to cohabit with taxis. Congestion is also fuelled by the massive reliance on personal cars to travel (the region's average motorisation rate is 0.97 vehicle per household, albeit with significant differences between the central parts of the island - where the motorisation rate

[11] A right-of-way public transport system ('transport collectif en site propre' in French) is a public passenger transport system (typically bus) using a track or space dedicated solely to its operation (e.g. dedicated lanes), generally benefiting from priority at traffic lights and operating with equipment ranging from buses to tramways and subways. There are currently two such bus lines in Martinique, operated by 14 high service level buses ('Bus à Haut Niveau de Service' in French) and serving 18 stops.

reaches 1.1-1.2, just below the national average of 1.3 – and the northernmost parts of the island – where the motorisation is as low as 0.6[12]). Congestion is especially acute in and around the main city of Fort-de-France (**Figure 2)**, thereby lengthening travel times. This also implies that buses cannot reliably operate on schedule. Moreover, Martinique is also affected by a poor availability of transport options in terms of transport complementarity and continuity (i.e. combining different transport modes for a single journey). Car-sharing and active travel modes (e.g. walking) are not sufficiently facilitated to cover 'the first kilometre' up to a bus stop. In Martinique as well, there exists a large divide in terms of transport infrastructure between the densely built areas and the more rural areas, with a social impact on mobility.

Figure 2: Car traffic in Martinique



Source: Ranély Vergé-Dépré (2019) based on data from the regional road service (2011) and IEDOM (2017)
Note: Authors' own translation

In **Saint-Martin**, interviewed stakeholders recalled that the road network is old and marked by traffic jams, especially to around the main city of Marigot. In fact, the road network is characterised by one main road that runs around the entire island and several secondary roads, which renders the main road traffic highly vulnerable to disruptions in case of accidents or engineering works. The so-called 'single line' nature of the road network also prompts congestion on the main road (more than a decade ago,

[12] Source : Martinique Transport, 2024, *PDM Martinique, Rapport de diagnostic*, based on INSEE data (base logement 2019)

there were already 20,000 vehicles per day on that road deemed saturated)[13]. In 1963, there were only 200 cars circulating in the region for a population of around 5,000, but households now have 2.5 cars on average (representing more than 20,000 vehicles in total).

In **French Guiana**, interviewed stakeholders reported that the road network is incommensurate with the mobility needs of the region's population: there are too few roads, these are concentrated on certain parts of the territory only and highly degraded on some portions. For instance, there are less than 500 vehicles per day on the national road running between Régina and St Georges, but more than 48,000 vehicles per day on some sections in the periphery of Cayenne, the main city of the region, causing huge traffic jams.[14] Urban sprawl around Cayenne is a long-standing phenomenon that aggravates congestion and reduces the reliability of collective taxis' travel times. Even around Kourou, where Europe's Spaceport is located, public transport services are scarce and irregular. As a result, some parts of the region are depopulating as inhabitants seek better access to economic activities, while Cayenne's metropolitan area is steadily growing.

French Guiana, unlike other outermost regions, also relies on inland waterways as a means of transport where other transport modes are impractical. In fact, around 40,000 inhabitants of inner Guianan territories (or close to 14% of the region's total population) use inland waterways as their main transport mode, and thousands of children use it daily to reach their schools.[15] However, inland waterways are linked to poor transport conditions, in particular in terms of comfort and safety, owing to rapids (i.e. parts of the river where the water flows very fast) and frequent changes in water levels and flows due to rain. Moreover, mobility on inland waterways is slow (from 15 to 30 km/h), leading to high time poverty.[16]

In **Réunion**, interviewed stakeholders expressed a slightly different perception of mobility poverty as what the indicators suggest. In particular, they viewed the availability of public transport options in the region as better than that in the other French outermost regions, owing to well-structured inter-urban transport networks covering the five intercommunalities. This opinion underpins the fact that accessibility (as measured by the selected indicator) is comparatively high in the region. The stakeholders further explained that public transport still accounts for a minor share of mobility patterns within the region, as the car remains the prevalent mode of transport. This, in turn, contributes to higher time poverty. Importantly, the region's road network can also be (and is often) damaged by unpredictable events such as cyclones (leading to the destruction of transport infrastructure like bridges), volcanic eruptions and landslides (Lamy-Giner, 2011).

In **Mayotte**, interviewed stakeholders confirmed that all six aspects of mobility poverty are very relevant: transport availability (without any public transport options besides barges and collective taxis) is drastically limited, transport accessibility is constrained by the region's difficult topography and poor transport planning (the road network is little meshed), travel times are exceptionally high due to congestion, transport conditions are poor (due to a high level of unsafety), transport affordability remains challenging despite the fixed prices for public transport set in place, as 77% of Mayotte's population lived under the national poverty threshold in 2018.[17] Transport externalities occur as a result of all aforementioned issues, in particular congestion. More critically, interviewed stakeholders

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13 Source : Collectivité de Saint-Martin, *Schéma Directeur Routier 2015*.

14 Source : Direction Générale des Territoires et de la Mer de Guyane

15 Source: Préfet de la Région Guyane, Réglementation du transport fluvial. Accessible at : https://www.guyane.gouv.fr/Actions-de-l-Etat/Mer-Littoral-et-Fleuves/Fleuves-et-eaux-interieures/Navigation-et-securite-fluviale/Reglementation-du-transport-fluvial

16 Source: Courtiade, P. (ADEME), *Assises de la Mobilité et Assises de l'Outre-Mer - Situation, enjeux et propositions pour la Guyane, sur la base des travaux des ateliers nationaux des Assises de la Mobilité*.

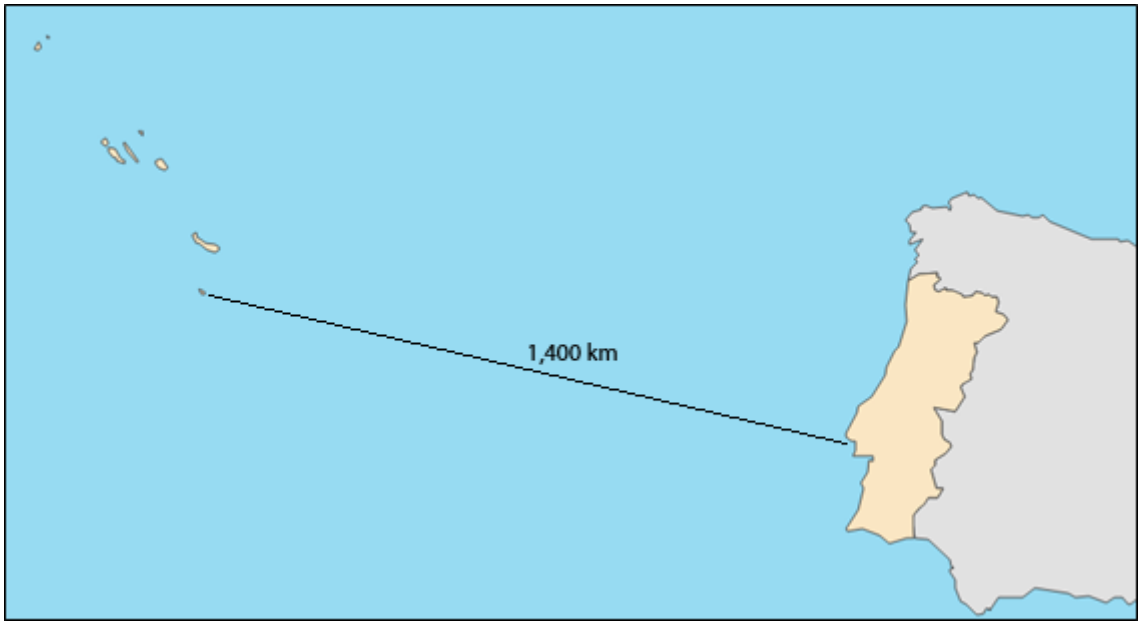
17 Source : Insee, *L'essentiel sur…. Mayotte, Chiffres-clés*, February 2024.

pointed out that, even with a strong development of public transport, congestion would remain an important issue. In fact, car ownership is still perceived as a marker of social recognition, prompting households to buy and use one when they can afford it. At the same time, active travel modes (e.g. cycling) are stymied by a dramatic lack of infrastructure.

Portugal's outermost regions

In the **Azores**, the interviewed stakeholder explained that intraregional, inter-island mobility poverty is driven by the geography of the region: the archipelago is fragmented into nine small islands, very heterogeneous in their size and concentration of inhabitants, with dispersion between them, causing several constraints to sea or air connections (**Figure 3**). It is further accentuated by the aggressiveness and meteorological volatility of the North Atlantic, which repeatedly cause disruptions in the regional transport system.

Figure 3: Location and dispersion of the Azorean islands off Portugal's mainland



Source: Eurostat - GISCO

In **Madeira**, the largest island of the region (also called Madeira) is characterised by very pronounced mountains and valleys that pose great challenges in terms of intraregional mobility, reflected in the supply of public transport and the high costs associated with its provision. The region's airport is also highly vulnerable to the frequency and intensity of winds that cause frequent and prolonged cancellations of flights. In contrast, the orography of the island of Porto Santo, one of the smaller islands, impinges less on intraregional mobility, but the island suffers from the common problems of territories with low population density, and, above all, double insularity. Connection with the island of Madeira is mainly made by boat on a daily basis which ensures the transport of people and goods. On both islands (Madeira and Porto Santo), intermodality between the airport, the road network and maritime ports (e.g. for passenger transfers) is very important.

1.3.2. Interregional mobility poverty

The indicators listed in **Table 3** have been collected, calculated and/or estimated, where needed, to provide quantitative measures of mobility poverty in the outermost regions. **Annex IV** details the

collection, calculation and estimation methods used, including the source of the data. Where possible, the indicators have also been calculated for the same three benchmark regions.

Table 5: Measures of interregional mobility poverty using the indicators from Table 3

		Av3 Direct flights to mainland's capital per week, per million inhabitants	Acc2 Accessibility to passenger flights	TP2 Direct flight duration to the mainland's capital
Outermost regions	Canary Islands	169.5	300.8	160
	Guadeloupe	51.2	62.0	534
	Martinique	59.4	44.5	541
	French Guiana	37.6	9.3	557
	Réunion	42.0	36.5	729
	Mayotte	*	1.2	629
	Saint-Martin	124.7	N/A	510
	Azores	424.8	39.7	138
	Madeira	350.3	61.2	103
Benchmark regions	Balearic Islands	217.4	463.3	71
	Corsica	294.7	52.6	99
	Algarve	N/A	171.1	46

Source: Authors' own elaboration based on the data sources indicated in Annex IV.
Notes: Eurostat groups Guadeloupe and Saint-Martin in a single NUTS 2 region. Hence, the value of the indicator Acc2 for Guadeloupe actually corresponds to Guadeloupe and Saint-Martin combined. * There was no direct flight to Paris from Mayotte in the week when the data was collected in September 2024 (however, seasonal patterns show a weekly number of direct flights ranging from zero to seven, thereby raising the maximum indicator value to 23 – still the lowest record among the outermost regions).

Findings from the mobility poverty indicator analysis

The scores of the outermost regions on the selected indicators of intraregional mobility poverty also reveal a wide array of values both across indicators and across regions.

Availability and accessibility

The availability of air transport in terms of direct flights to the mainland's capital is very high in the Portuguese outermost regions (with 425 and 350 weekly direct flights to the mainland's capital per million inhabitants, respectively), less so in the Canary Islands (170) and Saint-Martin (125), noting that the airport offering direct connections to Paris is actually located in the Dutch part of the island), and very low in Guadeloupe (51), Martinique (59), Réunion (42) and French Guiana (38). Furthermore, the availability scores of the French and Spanish outermost regions are lower than their island counterparts in Europe (i.e. the Balearic Islands and Corsica). Accessibility to passenger flights (measured as the population-weighted average number of flights per day, accessible within 90 minutes by road) is very

high in the Canary Islands (301) - the region has many international airports -, but is relatively low in the other outermost regions, including the Azores (37) and Madeira (61), and lowest in Mayotte (1) and French Guiana (9). Here as well, the accessibility scores of the French and Spanish outermost regions (except Guadeloupe) are lower than those of their island counterparts in Europe (i.e. the Balearic Islands and Corsica) and the accessibility scores of the Portuguese outermost regions are lower than that of their mainland coastal counterpart (i.e. Algarve), pointing to a significant 'outermost drawback'.

Time poverty

Using the duration of a direct flight to the Member State's capital as a proxy for time poverty, it comes as no surprise that the French outermost regions suffer from a very high level of time poverty, relative to both their outermost peers and, logically, the French island region Corsica (in the case of Réunion, time poverty is more than seven times greater than in Corsica). Similarly, the time poverty score of the Canary Islands is 2.2 times greater than that of the Balearic Islands, and that of the Azores and Madeira are 3 times and 2.2 times higher, respectively, than that of Algarve.

Findings from the stakeholder consultation and literature review

Here again, the interviews conducted with key transport stakeholders in the outermost regions largely confirmed these observations.

Spain's outermost region

In the **Canary Islands**, air transport is generally not considered 'poor' in the sense that the region's airport infrastructure and air navigation system allow to meet the transport needs of the region. Notwithstanding this observation, air mobility poverty is acknowledged in the following islands of the archipelago: La Palma, La Gomera and El Hierro, due to the specific island orography that does not allow for the development of transport solutions with reasonable investments, as well as Lanzarote due to its special environmental protection statutes. At the same time, and going beyond the main aspects of mobility poverty used in the study, the Canary Islands are characterised by two important features that undermine the development of hub airports in their territory and, therefore, the real possibilities of achieving greater air connectivity with Madeira, Africa and South America. These two important air transport development barriers are:

- Absence of industrial activity and development in the vicinity of airport facilities that could help compensate for the restrictions and easements caused by air operations, including their decarbonisation; and
- Impossibility to compete with other airports and attract the interest of air operators and improve connectivity due to the network model applied by Spanish airports that limits the competitiveness of each airport at individual level.

France's outermost regions

In **Guadeloupe** and **Martinique**, air mobility poverty materialises in poor transport availability in terms of connections and frequencies. In fact, air transport connections are little diversified, as evidenced by the fact that 60% to 70% of the tourists in both regions come from France's mainland.[18] For example, while Martinique's international airport (i.e. Martinique Aimé Césaire International Airport) demonstrates a similar level of traffic as Sint Maarten's international airport located in the Dutch part

[18] Source: French Ministry for Overseas, Atout France, *les destinations d'outre-mer, Bilan annuel de fréquentation 2023*.

of the island, south of Saint-Martin (i.e. 1.8 million air passengers vs. 1.4 million air passengers in 2023)[19], its connections are much less diversified.

Indeed, **Saint-Martin** (i.e. the EU outermost region that corresponds to the French part of the island) has a unique position among the EU outermost regions as the region does not have its own international airport but relies on that of the Dutch part of the island (Sint Maarten's Princess Juliana International Airport), which is easily accessible and a major international hub with connections towards Europe, the US, Canada and other Caribbean islands, among others. Multi-destination tourism linking islands from the northern and southern parts of the West Indies[20] is thus growing. The region's local Grand Case-Espérance airport only serves Guadeloupe (and a few neighbouring islands), as the runway does not allow to operate wide-body aircrafts, whereas that is possible in Sint Maarten. To go to Paris from that airport, one must thus stop over in Guadeloupe first, implying increased costs and travel times. Interviewed stakeholders also stressed the increased costs of flights compared to pre-pandemic levels: as of 2024, a return flight from Grand Case-Espérance Airport to Guadeloupe and back costs around EUR 560, while a flight from Sint Maarten's Princess Juliana International Airport to Miami costs only EUR 210. In addition, the main French airline company operates in quasi-monopoly conditions and flight prices to Paris are considered high. Overall, the number of seats offered on flights to Saint-Martin amounted to around 154,700 in 2023, that is 11% of the number of seats to Guadeloupe (noting that Saint-Martin's population equals 9% of that of Guadeloupe).[21] As for maritime transport, mobility poverty stems from limited capacity and the depth of the access channel in comparison to the Dutch part of the island. Nevertheless, interregional connections for passengers between Marigot Port and nearby Saint-Barthélemy and Anguilla run daily.

In **French Guiana**, there is only one international airport, although the region is as vast as a country like Austria (but also significantly less densely populated). The availability of air transport options is significantly lower than that in Guadeloupe and Martinique, although its population is only slightly lower than theirs. For instance, the number of seats offered on flights to French Guiana was close to 300,000 in 2023, but 1.4 million for Guadeloupe and 1.2 million for Martinique.[22]

In **Réunion**, the number of seats offered on flights to the region reached 1.7 million in 2023, for a population of around 881,000, while in **Mayotte**, that number surpassed 350,000 in 2023, for a population estimated at 310,000.[23] Using the number of seats offered on flights to these destinations, the availability of transport options improved in both regions in 2023 compared to the year before, with an increase of 2% and 7%, respectively (as opposed to the other French outermost regions where it decreased).

Portugal's outermost regions

In the **Azores**, the transport system is necessarily highly complex: on the one hand, air transport is the only viable transport mode for the movement of passengers on a large scale, but this also implies that the air transport system must be 'divided' into two functions, which are the connection to the outside and the inter-island connections; on the other hand, maritime transport is the only viable way to

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19 Source: Dussud, F.-X. (Insee), 2024, *Transport aérien - En Martinique, le trafic aéroportuaire progresse, sans pour autant retrouver les niveaux d'avant crise Covid-19 - Bilan économique 2023* and Bay, S., 2024, *Princess Juliana International Airport Soars in 2023 and 2024, Exceeding Passenger Traffic Targets*, available at: https://www.sxmairport.com/news-06052024-PJIA-Soars-In-2023-And-2024-Exceeding-Passenger-Traffic-Targets.php

20 The West Indies are a group of more than 7,000 islands located between the Caribbean Sea and the Atlantic Ocean.

21 Source: French Ministry for Overseas, Atout France, *les destinations d'outre-mer, Bilan annuel de fréquentation 2023*.

22 Source: French Ministry for Overseas, Atout France, *les destinations d'outre-mer, Bilan annuel de fréquentation 2023*.

23 Source: French Ministry for Overseas, Atout France, *les destinations d'outre-mer, Bilan annuel de fréquentation 2023* and Eurostat, Population on 1 January by age, sex and NUTS 2 region, indicator demo_r_d2jan.

transport goods on a large scale, but this also implies that the system is 'divided' into two functions, which are the connection with the outside world (island cabotage), from where most of the freight comes from – as the region has a deficit trade balance –, and the inter-island connections (local traffic) that ensure regular supply to the more peripheral islands. It should also be added that maritime passenger transport is the most rational transport mode for three of the nine islands constituting the Azores, due to their proximity, but its implementation grows in complexity – including ocean navigation (which involves larger vessels and higher costs) – and makes it an unviable uniform system between all islands.

This geography creates evident adverse conditions for the mobility of people and goods in the Azores, in the form of e.g. great exposure to externalities and meteorological restrictions, systemic asymmetries in the coverage and availability of inter-island transport, extreme and inevitable dependence on air transport for trips to the Portuguese mainland. In fact, these trips require at least two hours of travel to which is added all the logistical time before and after the flight, and serious constraints imposed by the size and fragmentation of the market, making economies of scale unfeasible, influencing prices, competition and transport availability.

In **Madeira**, interviewed stakeholders considered interregional mobility supply on the main island to be large, chiefly thanks to the influx of tourists, but at prices that are not always affordable and with costs in terms of time spent travelling that are much higher than those of trips made on continental land. Furthermore, the island's orography and atmospheric conditions sometimes leave the population (and tourists) isolated due to the inoperability of the international airport and the absence of alternative transport solutions.

1.4. A holistic concept of mobility poverty

The functional definition of mobility poverty using the set of indicators listed in the previous sections does not provide a single, holistic measure of mobility poverty that could simplify the analysis of mobility poverty across regions or across time. In addition, the individual indicators selected in this definition can only imperfectly reflect the multifaceted nature of mobility poverty, some of the indicators being only proxies of the various aspects of mobility poverty. Two novel approaches using a Spatial Interaction Model (SIM)[24] and an Input-Output Model (IOM)[25], respectively, could be experimented as a way to produce a single, more global estimate of mobility poverty.

1.4.1. The SIM-based approach

The SIM assumes that basic employment or the employment associated to the export sectors and/or created by external transfers (public transfers or remittances) generates multiplier effects creating non-basic employment that provides goods and general services to the local population. In short, the SIM allows for the estimation of three mobility indicators:

- Per capita cost to access goods and services in a given region;
- Per capita cost to access work in a given region; and

[24] A Spatial Interaction Model is a type of model that involves the analysis of flows between places (i.e. an origin point and a destination point) based on 1) their spatial separation (i.e. a distance-dependent measure of cost or time), 2) their complementarity (i.e. the suitability of the pair of two places for the flow in question, and 3) any other intervening opportunities or spatial structural elements that affect the expected flow (O'Kelly, 2009).

[25] An Input-Output Model is a type of model that involves the analysis of the flows of products from industries considered producers (output) to industries considered users (input). These flows are often physical or material in nature, but they are usually expressed in monetary terms and described in an interindustry transactions table (van Leeuwen et al., 2005).

- Total cost to access goods, services and work in a given region (i.e. the sum of the former two).

The technicalities of the SIM are specified in **Annex V**, along with an experimentation focusing on the Azores for which the required data is available. The results show that accessibility does not depend only on the distance to a place assumed as central, but on the economic structures of the regions influenced by the degree of integration in external markets.

1.4.2. The IOM-based approach

Using an Interregional IOM for the Azorean archipelago (see **Annex VI**) shows that accessibility indicators are not static because they include both the flows and the costs of interaction. Assuming that the transport of intersectoral flows is distributed among all, the movements of commuting, shopping and equivalent import and export movements can be used to assess the accessibility of places and regions.

In other words, the modelling results show once again that accessibility does not depend only on the distance to a place assumed as central. It depends on the economic structures of the regions (or territories constituting a region) influenced by the degree of interaction within each of them, between them and between them and the outside world.

1.4.3. Concluding remarks on model-based approaches

Using a model-based approach allows for the possibility to create indicators that include both the cost of transport and the quantity of transport.

The use of the Interregional IOM applied to the Azores provides interesting results but requires the weighting of transport costs per sector according to the attrition of space in the movement of goods and services that differs from sector to sector.

The use of a SIM with commuting and shopping flows and equivalent export and import flows can be more easily applied based on census data and lead to results that are more in line with expectations.

In the absence of such modelling possibilities applicable to all outermost regions due to data constraints, the effects of mobility poverty on the outermost regions' key economic sectors, in particular the transport and tourism sectors, are investigated using relevant literature and stakeholder consultation.

2. EFFECTS OF MOBILITY POVERTY ON THE TRANSPORT AND TOURISM SECTORS

KEY FINDINGS

- The effects of mobility poverty on the transport and tourism sectors of the outermost regions are manifold and can hardly be fully captured by the research, but recent trends demonstrate the crucial role of transport and mobility for tourism and economic growth in those remote regions.
- The past decades have witnessed a staggering growth in the number of visitors recorded in the outermost regions, which was, however, severely impaired by the travel restrictions imposed in response to the Covid-19 pandemic.
- Yet, this growth was mostly confined to establishing or strengthening connections with each other (for those located in the same geographical area), their Member States' mainland and, in some cases, other EU countries. In fact, their integration in their respective sea basin remains limited.
- In the French outermost regions in particular, the dependence of tourism on the connections with the country's mainland results in an untapped tourism potential and high flight prices for both residents and tourists.

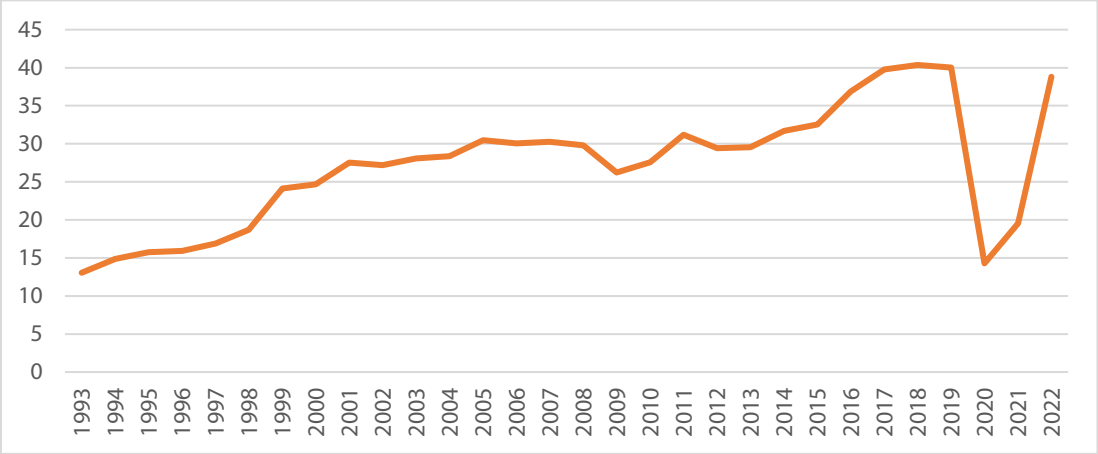
2.1. Recent developments as a pointer of mobility poverty effects

While a fully-fledged quantitative assessment of the direct and indirect effects of mobility poverty on the transport and tourism sectors is constrained by data limitations, the example of the Covid-19 crisis provides useful insights into the impact of a sudden increase in mobility poverty on these two sectors. As a matter of fact, the mitigation measures taken by regional and national authorities to contain the spread of the pandemic (e.g. lockdowns and border closures) have resulted in a **sharp decrease in the availability and accessibility of transport options**, especially in the air and maritime transport sectors for interregional and international mobility.

For the outermost regions whose economies rely extensively on the tourism sector, the impossibility to travel has harshly affected their economic output and labour markets in 2020 with, in some cases, lasting effects on the regions' recovery and growth prospects. The effect of the pandemic was particularly severe in the **Canary Islands** (as shown by the sudden drop in the number of air passengers in 2020 in **Figure 4**) where the tourism sector accounted for a third of the region's Gross Domestic Product (GDP) in 2019 but only 17.6% in 2020.[26] A study carried out for the European Commission (2022b) indicates that the tourism sector has been by far the worst-hit sector in the Canarian economy, largely as a consequence of the restriction measures imposed.

[26] Source: Gobierno de Canarias, Consejería de Economía, Conocimiento y Empleo. Exceltur based on CSTE (INE).

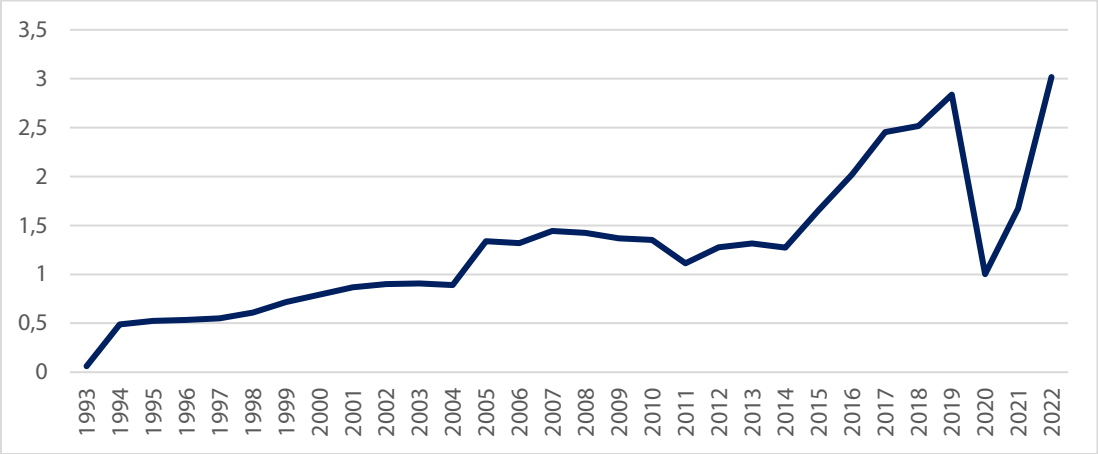
Figure 4: Air transport of passengers in the Canary Islands, in million passengers



Source: Eurostat, Air transport of passengers by NUTS 2 regions, indicator tran_r_avpa_nm

Similarly, the flow of air passengers in the **Azores** has grown steadily as shown in **Figure 5**: in 1993 there were only 61,000 passengers carried by flights in the Azores, but by 2019 that had risen to 2.8 million. In particular, the liberalisation of the Azores' airspace completed in 2015 resulted in a larger number of air transport options as well cheaper flights through low-cost airlines, thereby increasing the availability and affordability of transport options from and to the Azores: it was found to have positive effects on tourism, in terms of e.g. increasing tourist numbers in inter-island, national, and international flights, new routes opening to Europe and the USA, higher accommodation occupancy, and market diversification (Silveira et al., 2023). In 2020, there were only 1 million air passengers, but already 1.7 million the year after. Statistics on cruise and sea travel also bespeak the attractiveness of the outermost region as a tourism destination, even though the numbers are substantially lower than for air travel (for instance, the Azores record around 300,000 passengers embarked and disembarked on average per year).[27]

Figure 5: Air transport of passengers in the Azores, in million passengers



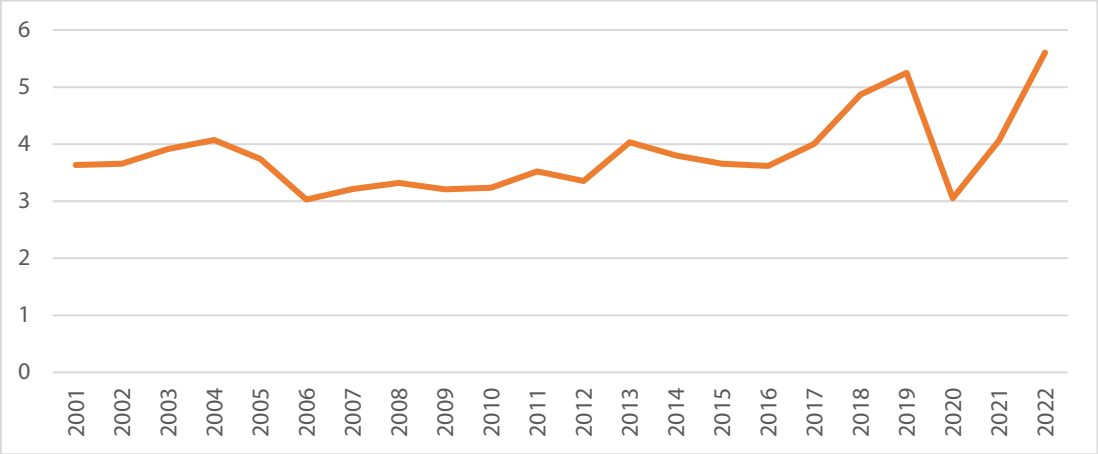
Source: Eurostat, Air transport of passengers by NUTS 2 regions, indicator tran_r_avpa_nm

As shown in **Figure 6** with the example of the **Canary Islands**, the increase in the maritime transport of passengers came more recently than for air transport and was, overall, more moderate. Still, the impact of the travel restrictions induced by the Covid-19 pandemic is, here as well, evident: the number

[27] Source: Eurostat, Maritime transport of passengers by NUTS 2 regions, indicator tran_r_mapa_nm.

of maritime transport passengers in the Canary Islands fell from 5.2 million in 2019 to 3.1 million in 2020, or the lowest level recorded in more than ten years. In 2022 however, the impact of the pandemic was withstood, with the region reaching an all-time high of 5.6 million maritime transport passengers.

Figure 6: Maritime transport of passengers in the Canary Islands, in million passengers



Source: Eurostat, Maritime transport of passengers by NUTS 2 regions, indicator tran_r_mapa_nm

All in all, travel restrictions, especially for long-distance journeys that cannot be made by private means of transport, took a heavy toll on the transport and tourism sectors of the outermost regions that can only be reached via air or maritime transport from their Member State's mainland. In the **Azores** and **Madeira**, for example, the year 2020 showed a decrease in airport flows of 65.5% and 65.8% compared to 2019, respectively (against a national average of -70%), and a decrease in maritime port flows of 85.9% and 74.5%, respectively (against a national average of -83.9%) (Costa, 2021). This tremendous fall in passenger flows is logically reflected in the decline of tourism accommodation total income[28] of 74.2% and 68.1%, respectively (against an average of 66.1%).

As regards road transport, the effects of the Covid-19 pandemic related restrictions are very different than for air and maritime transport. Indeed, lockdowns have resulted in a decrease in transport demand and visibly **lower congestion levels** in most European cities (Christidis et al., 2023). Consequently, time poverty decreased (due in particular to fewer traffic jams), transport conditions improved (through increased road safety[29]) and negative transport externalities such as GHG emissions and noise dwindled, all three factors contributing to reducing mobility poverty for the residents and the few visitors who could actually travel.

2.2. Current mobility poverty issues and impacts on transport and tourism

Yet, the staggering growth in air passengers in the outermost regions was mostly confined to **establishing or strengthening connections with each other** (for those located in the same geographical area), the Member States' mainland and, in some cases, other EU countries. To illustrate, one can refer to the case of **Mayotte** where, in 2013, around 53% of the tourists originated from

[28] Total income is the value resulting from the activity of the tourist accommodation facilities: room, food and beverage, and other income resulting from the activity itself (room rental, laundry, tobacco shop, telephone, etc.).

[29] The European Transport Safety Council (2020) reports that the Covid-19 lockdowns led to major reductions of road deaths in April 2020 (compared to the month of April in the previous three years), when most EU countries' governments had imposed such restrictions, but also that road deaths did not usually decrease to the same degree as traffic volume.

France's mainland, around 40% from Réunion, and only 7% from the rest of the world.[30] In 2019 (five years after Mayotte became an EU outermost region), the figures were very similar: 59% of tourists originated from France's mainland, 37% from Réunion and only 4% from the rest of the world.[31] In the **Canary Islands**, the tourism industry is considerably more developed and the profile of tourists is logically more diversified, but Spain's mainland still accounted for 11% of the region's tourist arrivals in 2018, and other EU countries (including the UK) for at least 74%.[32] Correspondingly, not more than 15% of the tourists came from other third countries.

Box 3: Tourism potential in the Canary Islands and Mayotte

The Canary Islands and Mayotte are two EU outermost regions exhibiting very different socio-economic records. On the one hand, the Gross Domestic Product (GDP) in Purchasing Power Standard (PPS) per capita of the Canary Islands amounts to 68% of the EU average in 2022, against a value of only 30% for Mayotte. On the other hand, this figure has been steadily declining in the former region (down from 95% in 2000) and steadily growing in the latter (up from 18%). In the Canary Islands, tourism has undeniably been a key driver of economic growth. However, the reliance of the region on a traditional tourism model, coupled with a dearth of innovation to boost productivity and competitiveness, is hindering its growth prospects (Maucorps et al., 2024). In Mayotte, tourism remains largely an untapped potential, whose development is undermined by overlapping crises and persisting vulnerabilities (e.g. deficient water sanitation systems, unsafe living conditions, etc.). Crucially, the tropical cyclone Chido that hit Mayotte on December 14, 2024 devastated the region's transport, healthcare, education, tourism and housing infrastructure, leaving the region with a tremendous need for humanitarian assistance and reconstruction investments.

Source: authors' own elaboration based on Eurostat for GDP data (indicator nama_10r_2gdp)

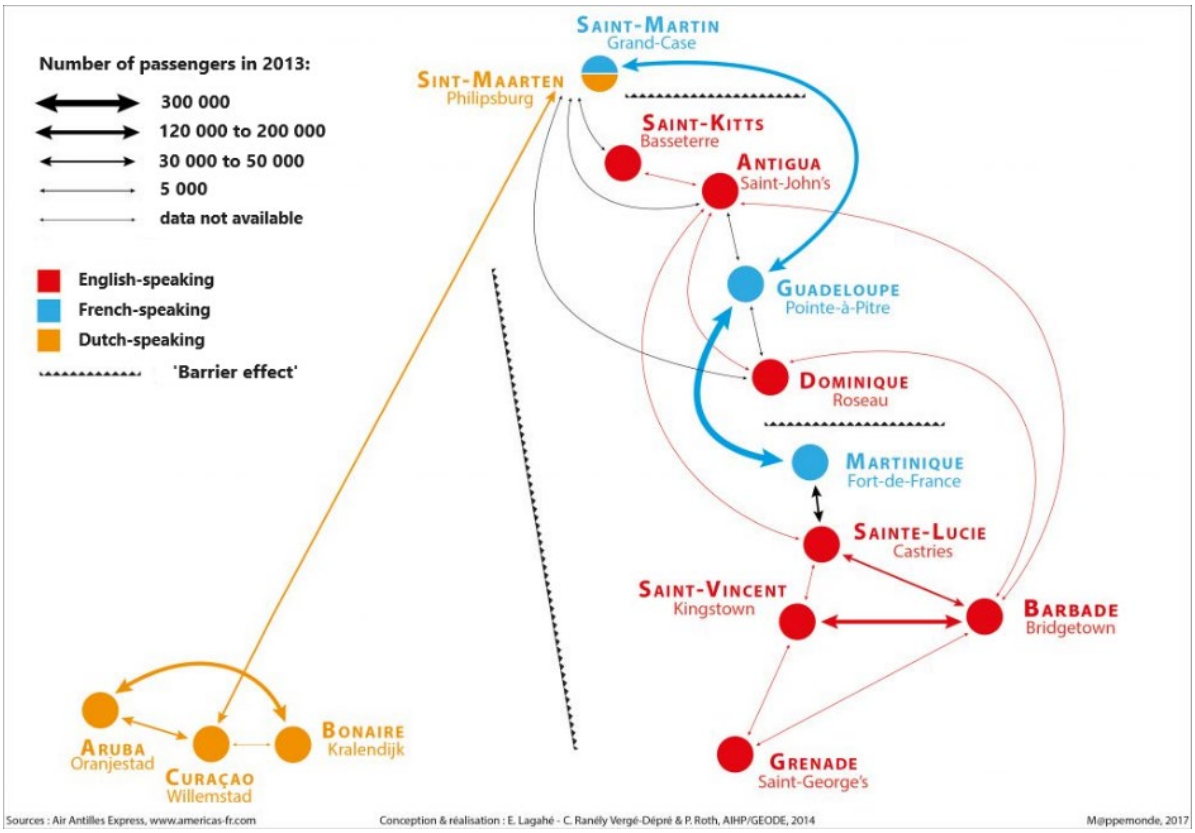
More generally, the **integration of the outermost regions in their respective sea basin remains limited**. For instance, mapping passenger flows in the Caribbean space reveals that air transport connections are still largely marked by historic, cultural and administrative relations, as reflected in e.g. the language spoken in the islands. Saint-Martin, Guadeloupe and Martinique are thus strongly interrelated (in terms of passenger flows), but little connected to the neighbouring foreign territories as shown in **Figure 7** - even those that are more closely located. Here, different administrative rules and high prices contribute to hindering flows, fragmenting markets and impeding economies of scale, thereby generating a so-called **'barrier effect'** between the Caribbean islands (Ranély Vergé-Dépré and Roth, 2017) that is still evident today. This barrier effect inflates interregional mobility poverty that, in turn, weakens international tourism development prospects. More recently, the number of seats available on air services in this part of the Caribbean space has reduced in the wake of the bankruptcy of the two major airlines: LIAT (covering the English-speaking islands) in 2020 and Air Antilles (covering the French West Indies) in 2023. These two companies recently resumed their activities, in August and July 2024, respectively, with the entry of new investors into their capital (e.g. the Community of Saint-Martin for Air Antilles).

[30] Source: Institut d'Émission des Départements d'Outre-Mer (IEDOM), 2015, *Le tourisme à Mayotte – Un potentiel de développement limité à réaliser*. Note expresse nr 319, March 2015.

[31] Source: Institut national de la statistique et des études économiques (Insee), Bourahima Ali Hadhurami, 2020, *Enquête Flux Touristiques 2019, Rebond de la fréquentation touristique en 2019*. Insee Analyses Mayotte No 27, August 2020.

[32] Source: Hernández-Martín, Raúl & Antonova, Natalia & Celis Sosa, Daniel & Fernández Hernández, Carlos & Hernández, Matías & Herrera Priano, Felix & González, Carmelo & Mendoza-Jiménez, Javier & Fumero, Noemi & González, Pablo & Santana Talavera, Agustin & Cruz, Moisés, 2021, *Tourism Observatory of the Canary Islands*. *Preliminary Report*. Based on data from STAC (Institute of Statistics of the Canary Islands).

Figure 7: Spatial partition in the Lesser Antilles based on air passenger flows (2013)



Source: Lagahé, E., Ranély Vergé-Dépré, C., and Roth, P., AIHP/GEODE, 2014, based on data from Air Antilles Express and www.americas-fr.com. In M@ppemonde, 2017. Authors' own translation.

The dependence of the French outermost regions on their own Member State (i.e. France's mainland as well as other French outermost regions) as their main market for air passengers remains very high in both absolute terms and relative to the main neighbouring third countries. For instance, there were 1.4 million and 1.2 million seats marketed on flights to **Guadeloupe** and **Martinique** in the year 2023, respectively, and France's mainland accounted for as much as 53% and 58% of this supply, respectively (**Table 6**). These two outermost regions relied also largely on each other for their air connections, representing 24% and 29% of the supply, respectively. In both cases, another French outermost region (Saint-Martin and French Guiana, respectively) was their third largest market base. Contrariwise, the Dominican Republic had a notably larger and more diversified market base. This observation also applies – though to a slightly lesser extent - to **Réunion**, in the Indian Ocean, where France's mainland accounted for 52% of the 1.7 million marketed seats, followed by Mauritius (28%) and Mayotte (10%), another French outermost region. In comparison, Mauritius had a notably larger and more diversified market base.

Table 6: Market base for air passengers in Guadeloupe, Martinique and Réunion compared with main third countries in the same sea basins (2023)

	Guadeloupe	Martinique	Dominican Republic	Réunion	Mauritius
Number of seats marketed	1.4 million	1.2 million	10.8 million	1.7 million	2.2 million
First largest market	France's mainland (53%)	France's mainland (58%)	USA (51%)	France's mainland (52%)	Réunion (21%)
Second largest market	Martinique (24%)	Guadeloupe (29%)	Canada (12%)	Mauritius (28%)	United Arab Emirates (18%)
Third largest market	Saint-Martin (10%)	French Guiana (7%)	Panama (6%)	Mayotte (10%)	France's mainland (14%)

Source: French Ministry for Overseas, Atout France, Les destinations d'outre-mer, *Bilan annuel de fréquentation 2023*.

In **French Guiana's international airport** located in Cayenne (i.e. Félix Éboué Airport), there were 232,035 external air passengers (i.e. coming from outside French Guiana) recorded for the year 2023. Of them, 71% came on a flight from Paris, 15% from Martinique's main city (Fort-de-France), 11% from Guadeloupe's main city (Pointe-à-Pitre), 2% from Belém in Brazil, and 1% from Santo Domingo in the Dominican Republic.[33] In other words, the vast majority of air connections are with France's mainland and two other French outermost regions located in the same geographic area. When looking at where the airport visitors are originally coming from, the picture is more nuanced: 61.3% of the external visitors reside permanently in mainland France, 15.7% in Martinique and 7.1% in Guadeloupe, but 8.5% in other American territories, 4.2% in other European countries, 2.8% in Brazil and 0.4% in the rest of the world.[34] In other words, 15.9% of the airport visitors reside outside of France's mainland and outermost regions. This figure is slightly higher than that of the year 2022, when 15.5% of the external visitors were residing outside of France's mainland and outermost regions.[35] Besides the lack of competition between airlines driving up flight tickets, international tourism development barriers encompass administrative and health factors such as visa requirements for visitors outside the Schengen area and a vaccine obligation against yellow fever. These factors altogether contribute to making international tourism in French Guiana more expensive (IEDOM, 2015).

Findings from the stakeholder consultation and literature review

Spain's outermost region

In the **Canary Islands**, interviewed stakeholders believed that intraregional mobility is not particularly problematic for the local population (except for congestion issues around the largest cities). As for inter-island mobility, they noted that tourists, that are not eligible for the resident subsidy currently in place, often face very high fares that potentially curb the expansion of tourism on the less populated

[33] Source : Collectivité Territoriale de Guyane, Guyane Amazonie, *Enquête de fréquentation touristique, vols extérieurs, Résultats globaux, Année 2023*.

[34] Source : Ibid.

[35] Source : Collectivité Territoriale de Guyane, Guyane Amazonie, *Enquête de fréquentation touristique, vols extérieurs, Résultats globaux, Année 2022*.

islands of the archipelago. In fact, the most challenging aspects of mobility poverty (i.e. excessive travel time between provincial capitals and deficient availability at Gran Canaria's airport) are not sufficiently problematic to prevent the number of air passengers from growing further. The continuous increase in air transport flows (except for the year 2020 due to the Covid-19 pandemic) reflects the dynamics of mass tourism that unfolded in the wake of the extraordinary development of aeronautical technology and the deregulation of European commercial aviation completed in 1998. The consulted stakeholders concluded their assessment by underscoring the need to find an innovative, alternative tourism model to both ensure its economic growth path and deliver its contribution to reducing GHG emissions.

France's outermost regions

In **Guadeloupe**, interviewed stakeholders expect the lack of transport options (in terms of inadequate or insufficient supply of transport services) to exacerbate mobility poverty in the region. Car ownership is often a selection criterion for employment in the enterprises active in the region. In fact, mobility poverty excessively affects socially vulnerable populations (i.e. lower-income households, elderly, people with disabilities) who can find themselves forced to decline a job offer or abandon their training due to the lack of adequate transport services (Préfet de la Guadeloupe, 2022). This situation tends to perpetuate the core-periphery socio-economic structure of the region: while the two urban agglomerations of Pointe-à-Pitre (economic pole) and Basse-Terre (administrative pole) attract most of the population and employment, the secondary towns and villages endure a lack of attractiveness coupled with a poor organisation of transport services (Ibid.).

In **Martinique**, the effects of mobility poverty are mostly of a social nature according to interviewed stakeholders, in the sense that road congestion influences the decision to travel, and when to travel, with an adverse impact on economic activities (due to delays). The main driver of mobility poverty in the region is the absence of a coherent territorial policy for mobility, which hinders the development of active travel modes. The stakeholders finally discussed the major issue that transport investments represent for the region: currently, the main source of funding for transport policies is fuel taxes (amounting to around EUR 100 million), but this should decrease with the green transition. In addition, the poor availability of transport connections translates into the tourism sector's strong dependence on its flight connections with mainland France. In turn, the high seasonality of tourism flows from mainland France puts Martinique's tourism sector in difficulty during the low season. This results in hotels not being renovated, whereby the poorer standings (in comparison to e.g. US expectations) leads to the region being an unattractive destination for American tourists, thereby reinforcing mobility poverty. Furthermore, Martinique is an expensive place in comparison to neighbouring islands (e.g. Sainte-Lucia, Barbados) that use weaker currencies and apply lower taxes. Affinity tourism (i.e. tourism to visit friends and family) is mainly geared towards mainland France but is plagued by high flight prices. Last but not least, local tourism is likewise undermined by the lack of attractiveness of hotel establishments and the growing popularity of cruises among the region's population.

In **Saint-Martin**, transport investments to tackle mobility poverty concern all types of transport: road transport (to mitigate congestion issues), air transport (to extend airport infrastructure at Grand Case-Espérance Airport) and maritime transport (to extend port infrastructure). Yet, as opposed to the other EU outermost regions, Saint-Martin is well-connected in its wider sea basin thanks to the air transport network of the international airport located in the Dutch part of the island. When focusing on Saint-Martin only, cruise also plays a significant role for tourism, in particular for upmarket clientele on small-sized vessels, after suffering from hurricane Irma in 2017 (which also considerably reduced host capacity for recreational boaters) and the Covid-19 pandemic in 2020-2021 (IEDOM, 2022; Jouannic et al., 2021). More specifically, Saint-Martin's port is located in the city of Marigot and consists of four zones: the commercial Galisbay Port located on the Potence Bay, the ferry terminal located on Marigot

Bay, the mooring area for small plaisance, grand plaisance and cruises located along Marigot Bay south of the ferry terminal, and the Marina Fort Louis located along Marigot Bay next to the ferry terminal. Although the port is substantially smaller than its Dutch counterpart (i.e. the port of Philipsburg) located in the southern part of the island, an existing extension project plans to expand capacity to compete with other ports handling transshipment in the wider sea basin.[36]

In **French Guiana**, the lack of transport availability and accessibility, especially around natural and cultural heritage sites, thwarts the development of tourism. Cruise has recently emerged as a new form of tourism, but is generally not affordable for the local population – in 2017, 53% of the region's population was recorded as living under the poverty line (i.e. living with less than EUR 1,010 per month).[37] Business tourism accounts for 50% of the tourism incoming from outside the region, affinity tourism accounts for 38%, recreational tourism for 19% and carnival tourism for 1%.[38] Business tourists usually have their mobility needs covered by their enterprise and affinity tourists by the friends and family they are visiting, so that mobility poverty affects primarily recreational tourists.

In **Réunion**, the car remains the preponderant mode of transport for daily trips (e.g. commuting) as well as touristic excursions. This causes traffic jams and, indirectly, stress and negative impacts on wellbeing at the workplace. Interviewed stakeholders reported that this also impacts tourism to the extent that tourists tend to limit their mobility (owing to congestion issues, fuel and car rental prices): tourism hence gradually shifts from 'discovery tourism' (i.e. visiting different sites and places around the region) towards 'resort-based tourism'. Interviewed stakeholders also mentioned that the region is forecast to have 585,000 on-road vehicles by 2035 on a territory that has only 2,512 km^2 of land, that is equivalent to 233 vehicles per square kilometre. This estimate represents a notable increase on the current figure: as of 2024, the region has close to 520,000 on-road vehicles (including 429,000 private cars), or 207 vehicles per square kilometre.[39] This is dramatically higher than the figure for Corsica with slightly more than 275,000 vehicles and 8,722 km^2 of land, or 32 vehicles per square kilometre.

In a similar manner as in French Guiana, affinity tourism makes up most of tourism flows in **Mayotte** (it accounted for 65% of the number of tourists in 2019). Business tourists (14%) rely mainly on taxis for their intraregional travel and recreational tourists (17%) usually resort to car rental.[40] Interviewed stakeholders also highlighted that flights to and from Mayotte are very expensive in comparison to e.g. Réunion, as price competition is almost non-existent due to the quasi-duopoly situation of the two main airlines serving France's mainland and Réunion from Mayotte. Mobility poverty is thus a key obstacle to tapping the tourism potential of the region.

Portugal's outermost regions

36 More information on the port extension project can be found on the Marigot Port's website.

37 Source : Jeanne-Rose, M., Creignou, A. (Insee), 2022, *29 % des Guyanais en situation de grande pauvreté en 2018*. Insee Analyses Guyane n°59. July 2022.

38 Source : Observatoire du Tourisme de la Guyane : les touristes récepteurs. Bilan d'enquête : étude réalisée en face à face, du 10 avril 2015 au 31 mars 2018 à l'aéroport Félix Éboué auprès de 4800 touristes à la fin de leur séjour. Data averaged over the period 2015-2018. Percentages add up to more than 100% as survey respondents may have ticked multiple categories.

39 Source: Ministères Territoires, Écologie, Logement, Données et études statistiques pour le changement climatique, l'énergie, l'environnement, le logement, et les transports, Données sur le parc automobile français au 1er janvier 2024. The number of on-road vehicles correspond to the sum of private cars, light-duty vehicles, trucks and buses that meet the following conditions: they have been registered in the vehicle registration system before January 1st of the year; no vehicle withdrawal has been declared before January 1st; and they are up to date with their roadworthiness test. Data provided and aggregated at regional level.

40 Source: Institut national de la statistique et des études économiques (Insee), Bourahima Ali Hadhurami, 2020, *Enquête Flux Touristiques 2019, Rebond de la fréquentation touristique en 2019*. Insee Analyses Mayotte No 27, August 2020. The remaining 4% of tourism correspond to other tourism motives and rounding.

In the **Azores**, interviewed stakeholders reported that the fragmentation and dispersion of the islands and their heterogeneity in size and population density induce the need to multiply transport infrastructures, such as ports and airports – in the Azores, there are 14 commercial ports and nine airports and aerodromes. Therefore, large volumes of investment are at stake not only for the (re)construction of these infrastructures, but also the multiplication of their operational costs. These come in addition to the amounts necessary for their maintenance and structural improvement, especially taking into account the pressure exerted by numerous, tougher and more recurrent meteorological phenomena. In particular, maritime transport works are very capital-intensive, due to the infrastructure's exposure to the natural elements as well as engineering requirements, while airports and small aerodromes alike must comply with a typically large number of legislative and regulatory provisions, in addition to technical requirements. All of this represents a structural burden on the regional budget.

According to the key stakeholders consulted, the specific territorial geography and complexity of the transport system in the Azores generates obvious impacts on tourism and the ability to attract airlines that, in a strictly competitive regime, wish to explore direct routes to the region. Whether due to the risk of operations (given the low scalability), the geographical distance between the region and the European continent (which requires medical aircraft and specific equipment installed on board), or the pressure of seasonality (imposed by summer-winter meteorological variability), it is very difficult to guarantee adequate international connectivity that enhances tourism growth in a sustained manner throughout the year. As tourism is the economic sector that currently contributes most to the creation of value added and employment in the region, mobility poverty is a critical issue.

Equally, the orography of **Madeira** entails higher public transport fleet maintenance costs in road transport (and, in the case of Porto Santo, higher airport maintenance costs that are disproportionate to the traffic observed at this airport) compared to other territories according to interviewed stakeholders. In fact, mobility poverty affects both short-haul and long-haul flights, not least because of the climate-induced unreliability of airport operations and the lack of diversification in transport options, hence also international tourism. In the specific case of maritime infrastructure, there are additional costs resulting from the impacts of natural events, which require large investments in maintenance and rehabilitation. It is noteworthy that those additional costs require a greater involvement of public resources and could even be passed on consumer prices. With limited public financing capacity, mobility poverty enters a vicious circle whereby investments in new public transport options are not made by fear of not being profitable (e.g. the discontinuation of maritime links for travellers between Madeira and Portugal's mainland).

Box 4: The impact of transport poverty on freight transport

Transport poverty also impacts the importation and exportation of goods in the outermost regions. Maritime transport is the main mode for freight transport in these territories, and it has followed different trends across the regions. In some regions (e.g. Réunion), freight volumes have been continuously growing; in others, freight volumes have been rather stable for more than two decades (e.g. Guadeloupe and Martinique) or for a shorter period of time (e.g. Madeira or in the Canary Islands from the mid-2010s onwards). In French Guiana (the only land territory among the outermost regions), goods are also chiefly carried by containers on sea, and these containers are then either directly transported and delivered to purchasing centres or transhipped to trucks (in the case of Cayenne, the region's main city). Still, transport intermodality (for both freight and passengers) remains poorly developed in the region.

For instance, casting a quick glance at freight transport in the Azores, consulted stakeholders reported that there are territory-specific costs and various inefficiencies throughout the logistics system that increase the cost of maritime transport of goods and affect the quality of life of the local population. These costs stem from difficulties in articulating connections between the Portuguese mainland and the Azores, difficulties of investment by shipowners given the requirements which the operation is subject to and the wear and tear that their ships experience in the sea conditions of the Azores, as well as the availability of these shipowners to comply with the defined schedules. There are thus major challenges to, first and foremost, ensure the supply of the nine islands, but also to export goods, especially perishable goods, which have the greatest potential for commercial appreciation in external markets. Some of these factors also end up contributing to what is called 'double insularity' or 'double periphery', to which smaller and more peripheral islands within the archipelago are exposed. This double penalty materialises in delays in the delivery of goods, reduced transport availability, increased travel costs and more time spent on each trip.

Source: authors' own elaboration based on information from Eurostat, Maritime transport of freight by NUTS 2 regions (indicator tran_r_mago_nm), ADEME French Guiana, Mobility and transport, and interviews.

All in all, mobility poverty appears to be a critical issue for the outermost regions, as it constrains the mobility of both the resident population (and, therefore, its access to job opportunities or other basic services) and visitors (and, therefore, the development of tourism). It also increases the costs of transport infrastructure and services and reduces the regions' competitiveness and attractiveness. As a result, it **jeopardises the socio-economic development prospects** of the regions. This, in turn, constrains the capacity of regional authorities to finance measures to tackle mobility poverty: mobility poverty and economic laggardness thus enter a vicious circle whereby each contributes to perpetuating the other. Concurrently, mobility poverty tends to exacerbate **territorial and social inequalities** within the outermost regions by predominantly affecting vulnerable segments of the population (e.g. low-income households and elderly). Mobility poverty is thus a complex and cross-cutting issue that requires coordinated policy action across sectors (i.e. transport, land planning, health and other social policies for e.g. labour market and income support measures, etc.).

3. THE NEW EU CLIMATE LEGISLATION AND ITS IMPLICATIONS FOR THE OUTERMOST REGIONS

KEY FINDINGS

- The Fit for 55 legislative package includes eleven transport-related regulations and directives, including the EU Emissions Trading System (ETS) reform, the Social Climate Fund, the CO2 emissions standards for cars and vans, the Alternative Fuels Infrastructure Regulation (AFIR), the ReFuel EU Aviation Regulation, and the FuelEU Maritime Regulation.
- This transport-related legislation provides for some regulatory adaptations for the outermost regions, such as temporary derogation from FuelEU Maritime Regulation requirements or exemption from ReFuelEU Aviation Regulation requirements.
- Several stakeholders representing the outermost regions and transport sector have raised concerns that the new Fit for 55 legislation results in significant additional costs for the transport services providers and, ultimately, higher prices for residents and tourists.
- A precise estimation of these additional costs and how they reverberate on prices is a challenging endeavour, considering that the effects on supply and demand remain uncertain, not least because of the temporary derogations.
- Still, some estimates from the literature covering either the air or maritime transport sector tend to confirm that cost and price increases are likely to happen – an impact also anticipated by interviewed stakeholders.
- This is all the more challenging for the outermost regions as they generally lack the technological and financial capacity to comply with the new requirements stemming from the Fit for 55 legislation.

3.1. EU response to the climate change issue

In December 2019, the European Commission presented the European Green Deal as an overarching policy framework for Europe to become the first climate-neutral continent by 2050. In March 2020, the European Commission presented its proposal to enshrine the EU's commitment to climate-neutrality in legislation and in June 2021, the European Climate Law became Regulation (EU) 2021/1119. Under this law, the EU committed to reduce its net GHG emissions by at least 55% by 2030, a goal supported by the **'Fit for 55' legislative package**. This package contains 19 regulations and directives that target many economic sectors, including transport, 18 of which being already adopted as of December 2024. The main transport-related pieces of legislation in this package consist of:

- the EU Emissions Trading System (ETS) reform:
    - Inclusion of maritime transport activities in the EU Emissions Trading System (and monitoring, reporting and verification of emissions of additional greenhouse gases and emissions from additional ship types),
    - Aviation's contribution to the Union's economy-wide emission reduction target (and appropriate implementation of a global market-based measure),

  - Amended Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA),
- the new EU Emissions Trading System for building and road transport fuels (ETS2),
- the Social Climate Fund,
- the CO2 emissions standards for cars and vans,
- the Alternative Fuels Infrastructure Regulation (AFIR),
- the ReFuel EU Aviation Regulation,
- the FuelEU Maritime Regulation,
- the revised Energy Efficiency Directive, and
- the revised Renewable Energy Directive.

Considering that the outermost regions hinge largely on imported fossil fuels for their energy supply, air transport for their connection with their Member State's mainland and tourism, and maritime transport for their supply of goods and cars for their everyday mobility, the new Fit for 55 transport-related legislation is expected to have major implications for these regions with geographical constraints. In that specific context, some **regulatory adaptations** (in the form of e.g. temporary derogations) are provided for the outermost regions in some pieces of that legislation.

Road transport

The **CO2 emissions standards for cars and vans** were initially set in 2019 and further strengthened by Regulation (EU) 2023/851 in 2023 for new passenger cars and vans. This latest amendment set more ambitious EU fleet-wide targets from 2025 onwards (i.e. a 55% reduction target for the average emissions of the new passenger car fleet, instead of 37.5%, and a 50% reduction for the average emissions of the new light commercial vehicles fleet, instead of 31%). It further lays down a 100% emission reduction target for both cars and vans from 2035 onwards, i.e. reaching zero gramme of CO2 emissions per kilometre. It also changes the levels of the zero- and low-emission vehicles' benchmarks for both car and van manufacturers.

The CO2 emission performance standards for cars and van do not include any adaptations for the outermost regions, although it recognises in its preamble that "the [green] transition will affect regions of the Union differently, especially structurally disadvantaged, peripheral and outermost regions" and that "It must therefore be ensured that the transition is just and inclusive, leaving no one behind".

The new **EU Emissions Trading System (ETS2)** covers emissions from fuel combustion in buildings, road transport and additional sectors, scheduled to be fully operational in 2027. It was integrated into the original ETS legislative framework and became the consolidated version of Directive 2003/87/EC. Revenues from the auctioning of emission allowances in ETS2 will feed the new **Social Climate Fund**, established in 2023 through Regulation (EU) 2023/955 to provide Member States with dedicated funding to support people that are vulnerable to energy and transport poverty. The fund should thus finance structural measures and investments in, among others, zero- and low-emission mobility solutions. In total, the fund should mobilise more than EUR 86 billion between 2026 and 2032.

The **Social Climate Fund Regulation** states that each Member State shall draft a Social Climate Plan containing "a coherent set of existing or new national measures and investments to address the impact of carbon pricing on vulnerable households, vulnerable micro-enterprises and vulnerable transport users in order to ensure affordable heating, cooling and mobility". These plans need to include an explanation of how geographic specificities (such as islands, outermost regions and territories, remote

areas, and less accessible peripheries) have been taken into account in the plans, but only "where applicable and relevant".

Air transport

The **EU ETS reform** covers **air transport**, in particular by gradually increasing the auctioning of allowances and phasing out free allocation for aircraft operators under the EU ETS through Directive (EU) 2023/958. This Directive also applies **CORSIA** to extra-European flights, which was provisionally covered by Decision (EU) 2023/136 while the Directive was pending.

The new CORSIA-related Directive recognises that "Special consideration should be given to promoting accessibility for the outermost regions of the Union". It thus introduces a temporary derogation from the EU ETS until 31 December 2030 for emissions from:

- flights between an aerodrome located in an outermost region of a Member State and an aerodrome located in the same Member State outside that outermost region, as well as
- flights between aerodromes that are both located in the same outermost region or in different outermost regions in the same Member State,

but not flights between an aerodrome located in an outermost region and an aerodrome located in another Member State. The Decision that entered into force before the Directive did not include any outermost region exception.

Likewise, the ETS reserves a maximum of EUR 20 million of the total quantity of allowances for the period from January 1, 2024 until 31 December 2030 in respect of commercial aircraft operators for the use of sustainable aviation fuels and other non-fossil fuels derived aviation fuels, but also specifies that these allowances shall cover "100 % of the remaining price differential between the use of fossil kerosene and any eligible aviation fuel that is not derived from fossil fuels […] at airports located in an outermost region", thereby relieving pressure on the outermost regions.

The **ReFuelEU Aviation Regulation** (Regulation (EU) 2023/2405), also adopted in 2023, sets requirements for aviation fuel suppliers to gradually increase the share of sustainable aviation fuels blended into the conventional aviation fuel supplied at EU airports.

This Regulation recognises in its preamble that "It is essential that less-connected European regions, such as insular and outermost regions, that often rely on aviation as the sole means of connection, are not disproportionally affected by the obligations resulting from [the] Regulation and that access of these regions to essential goods and services is ensured". It further adds that "attention should be paid to the possible effects of the provisions in this Regulation with regards to the affordability, competitiveness and potential price increases of air routes connecting remote regions and other areas of the Union". Therefore, the Regulation specifically excludes airports located in the outermost regions from the scope of the regulatory requirements.

Maritime transport

The **EU ETS reform** also refers to the extension of the system to emissions from **maritime transport** through Regulation (EU) 2023/957 concerning the inclusion of maritime transport activities in the EU ETS and for the monitoring, reporting and verification of emissions of additional GHG and emissions from additional ship types. Furthermore, the **FuelEU Maritime Regulation** (Regulation (EU)

2023/1805), also adopted in 2023, sets maximum limits for the yearly average GHG intensity of the energy used by ships above 5,000 gross tonnage[41] calling at European ports, regardless of their flag.

In the EU ETS reform extending the system to emissions from maritime transport through Regulation (EU) 2023/957, there is no outermost-specific adaptation. In contrast, the consolidated version of Directive 2003/87/EC governing the ETS2 states that outermost regions are exempted, until December 31, 2030, from surrendering emission allowances linked to voyages and related port activities between an outermost region and its Member State (including between different outermost regions of the same Member State), but not between an outermost region and another Member State or region.

The FuelEU Maritime Regulation endeavours to take into account "the special characteristics and constraints of the outermost regions" and thus give "special consideration should be given to preserving their accessibility and efficient connectivity by maritime transport." To do so, the Regulation introduces two outermost-specific adaptations, namely that 1) "for ships falling under the scope of this Regulation only half of the energy used on voyages departing from or arriving at a port of call located in an outermost region should be included in the scope of this Regulation" and 2) "temporary exemptions should be allowed for voyages between a port of call located in an outermost region and another port of call located in an outermost region, and in respect of the energy used by ships during their stay within the ports of call of the corresponding outermost regions".

Multimodal transport and energy use in the transport sector

The **Alternative Fuels Infrastructure Regulation** (Regulation (EU) 2023/1804, also known as AFIR), adopted in 2023 and applicable since 2024, sets mandatory national targets for the deployment of alternative fuels infrastructure in the EU, for road vehicles, vessels and stationary aircraft.

The AFIR supports the ambition to have publicly accessible hydrogen refuelling stations in all Member States by December 31, 2030 but exempts the outermost regions from that goal "if the costs of the deployment of the infrastructure are disproportionate to the benefits". It also aims to provide shore-side electricity supply for seagoing container ships and seagoing passenger ships in TEN-T maritime ports, but also exempts the outermost regions that are not connected to the electricity grid of a neighbouring country, until such a connection has been completed or there is sufficient locally generated electricity capacity from non-fossil energy sources to cover the needs of the regions.

The **revised Energy Efficiency Directive** (Directive (EU) 2023/1791) strengthens the legal basis of the 'energy efficiency first' principle by which energy efficiency must be considered by Member States in all relevant policy and major investment decisions taken in both the energy and non-energy sectors (for transport infrastructure projects, investments are considered major when they have a value of more than EUR 175 million). It also sets ambitious targets for the reduction of energy consumption at EU level by 2030 (compared to the projections of the 2020 EU Reference Scenario). For these targets to be achieved, Member States need to ensure, among other things, that the total final energy consumption of all their public bodies combined is reduced by at least 1.9% each year, when compared to 2021. However, Member States may choose to exclude public transport from that obligation.

While the Directive recognises in its preamble that "Improvements in energy efficiency should be implemented as a priority among people affected by energy poverty, vulnerable customers and final users, people in low-income or medium-income households, people living in social housing, older people as well as people living in rural and remote areas and in the outermost regions", it does not include any outermost-specific regulatory adaptation.

[41] Gross tonnage refers to the size or carrying capacity of a ship measured in gross tons.

Finally, the **revised Renewable Energy Directive** (Directive (EU) 2023/2413) sets an overall renewable energy target of at least 42.5% at EU level by 2030, while aiming for 45%. It also sets increased sector-specific targets for renewables: for the transport sector, the amount of renewable fuels and renewable electricity supplied shall result in a share of renewable energy within the final consumption of energy of at least 29% by 2030 or GHG intensity reduction of at least 14.5% by 2030 (compared to the baseline set out in the Directive). It further specifies that the combined share of advanced biofuels and biogas produced from certain feedstock and of renewable fuels of non-biological origin in the energy supplied to the transport sector is at least 1% in 2025 and 5.5% in 2030, of which a share of at least 1 percentage point is from renewable fuels of non-biological origin in 2030. The Directive also aims to promote electric vehicles and smart recharging.

Owing to the challenging energy situation of the outermost regions (in particular their limited energy supply and dependence on fossil fuels), the Directive provides derogations for these regions concerning:

- the interdiction of supporting the production of electricity from forest biomass in electricity-only installations, but only for a limited period and with the objective of phasing down, to the greatest extent possible, the use of forest biomass, and
- the criteria used for the eligibility for financial support for the consumption of biofuels, bioliquids and biomass fuels, but also for a limited period of time only.

All in all, there are few adaptations made to the Fit for 55 legislation for the outermost regions, and most of them are expiring at the end of the year 2030, leaving these regions with only a few years to get compliance-ready (**Table 7**).

Table 7: Summary of the outermost-specific adaptations in the Fit for 55 legislation

	Fit for 55 legislation	Outermost-specific adaptation(s)	Article(s)
Road	CO2 emission performance standards for cars and vans	None	None
	ETS reform - air transport (CORSIA)	Exemption of emissions from flights linking an EU outermost region and its Member State until 31 December 2030. Full coverage of the remaining price differential between the use of fossil kerosene and SAF until 31 December 2030.	Article 1
	ReFuelEU Aviation Regulation	Outermost regions are exempted from all regulatory requirements.	Article 3
Maritime	FuelEU Maritime Regulation	For voyages that start or end in an outermost region, regulatory requirements apply to ships in respect of only one half of the energy used. Besides, Member States may request exemptions on routes linking different outermost regions as well as the stay within such a port until 31 December 2029.	Article 2
	ETS reform - maritime transport	None	None
	ETS2 – maritime transport	Outermost regions are exempted from surrendering emission allowances linked to voyages and related port	Article 12

		activities between the region and its Member State until 31 December 2030.	
Multimodal transport and energy use	AFIR	Outermost regions may be exempted from the regulatory requirements linked to the targets for hydrogen refuelling infrastructure of road vehicles and are exempted from those linked to targets for shore-side electricity supply in maritime ports as long as the relevant connection or capacity falls short.	Articles 6 and 9
	Revised Energy Efficiency Directive	None	None
	Revised Renewable Energy Directive	Derogations to the interdiction of supporting the production of electricity from forest biomass in electricity-only installations and to the eligibility criteria for financial support for the consumption of biofuels, bioliquids and biomass fuels, but for a limited period of time only.	Article 1
Funding	Social Climate Fund	The Social Climate Plans shall include an explanation of how geographic specificities, such as outermost regions, have been taken into account, where applicable and relevant.	Article 6

Source: authors' own elaboration

3.2. Effects of the new EU climate legislation on transport and tourism in the outermost regions

The fact that 'outermost specificities' are rather limited (in terms of the number and duration of derogations) backs the concerns raised by interviewed stakeholders that the new climate legislation is likely to have large **direct negative impacts on the transport sector** of the outermost regions and, consequently, **indirect negative impacts on their tourism sector**. It also echoes the final declaration of the 28th Conference of the Presidents of the Outermost Regions of the EU released on November 8, 2023, which insists on the potential detrimental impacts of the Fit for 55 legislation on the socio-economic development of the outermost regions: "The negotiation process of the *Fit for 55* legislative package is almost completed and the [outermost regions], even though they have obtained clearly insufficient and mostly transitory exceptions and derogations, remain extremely concerned about the effects that the relevant implementation will have on their economies, the mobility of their citizens, the provision of supplies at reasonable prices and their convergence with the European Union". It also calls for the difficulties in implementing the Fit for 55 legislation's objectives in the outermost regions to be duly considered.

The concerns raised by the Conference of the Presidents of the Outermost Regions of the EU have been shared by numerous stakeholders operating in or dealing with the outermost regions. For instance, the Conference of Peripheral Maritime Regions' Islands Commission reiterated the importance, in its Palma Declaration (2023), to "[improve] islands' connectivity and mobility, bearing in mind the high dependence of these territories on a limited number of means of transportation - air and maritime transport - for their connectivity needs" but also stressed that "The EU legislative devices adopted under the Green Deal strategy imply decarbonisation measures that have significant impacts on transport fees, resulting in extra costs for islands' businesses and citizens", calling for "transitional and compensatory measures in favour of island regions". In its Ponta Delgada Declaration (2024), it again

warned "about the substantial effects of certain [EU Green Deal] related measures on transport fees, resulting in extra costs for islands' businesses and citizens".

Findings from the literature review

As regards the road transport sector, costs borne by automotive manufacturers to comply with stricter performance standards are expected to reach a maximum of around EUR 1700 per car in 2035 when the 100% emission reduction target should be reached. The amount of **additional investments** in the automotive sector to meet the market demand of new vehicles and comply with stricter CO2 emission targets is expected to be in the range of EUR 1.2 billion to EUR 2.6 billion annually over the period 2021-2030, and in the range of EUR 12 billion to EUR 19 billion annually over the period 2021-2040 (European Commission, 2021e). For the outermost regions that experience higher material costs and lower R&D capacity, the required investments could well be larger.

The ReFuelEU Aviation Regulation aims to promote the increased supply and use of SAF to contribute to decarbonisation efforts. However, the Airlines International Representation in Europe (2022) notes that "The potential increase in flight ticket prices caused by the increase in the cost of aviation fuel may cause an uncontrolled decline in interest in flying [and], consequently, a reduction in the number of passengers served at European airports". Similarly, Airlines for Europe (2023) reports that, "Based on price forecasts and assumptions of future policy scenarios, the **annual cost of compliance** [for aircraft operators] to the measures presented under Fit for 55 could increase by 5-6 times by 2025 compared with costs in 2019. By 2030, the annual costs associated with these measures would be 13-14 times higher than in 2019 and would particularly impact intra-European journeys".

A study supporting the impact assessment of the ReFuelEU Aviation initiative (European Commission, 2021c) models different policy scenarios for the upcoming Regulation. The modelling exercise relies, in all scenarios, on the assumption that the increase in fuel costs is completely passed through on ticket prices borne by consumers. This leads to income and substitution effects[42] and, ultimately, a **reduction in passenger transport activity** in both intra-EU and extra-EU flights compared to the baseline scenario. In fact, substitution effects are likely to be very limited in the case of the outermost regions, since air transport cannot be easily and efficiently substituted. Conversely, income effects are likely to be large since income levels in the outermost regions are below the EU average. The study also finds that the Regulation is expected to generate a competitive advantage for those territories best placed to produce SAF. As per the ReFuelEU Aviation Regulation, these SAF include synthetic aviation fuels, advanced biofuels from waste and residues, biofuels from oils and fats as well as recycled carbon aviation-fuels. As regards the production of advanced and other biofuels, the outermost regions are generally at a disadvantage due to the relatively small size of their agricultural sectors.

A study by CE Delft and DLR (2021) forecasts the **additional costs of the reformed ETS for the maritime and aviation sectors**, respectively. Assuming a price of EUR 120 for an ETS allowance (i.e. for one tCO2e) in the aviation sector, the authors estimate a price increase of around EUR 10 per air passenger for an 800 km segment, that equals a 9% increase from 2019 levels. Likewise, assuming a price of EUR 45 for an ETS allowance in the maritime sector, the authors find that daily fuel costs would rise by 33% to 54% depending on the bunker fuel price. Using a price of EUR 40 per ETS allowance, Flodén et al. (2024) estimate a more moderate increase in the cost of using marine gas oil ranging from 12% to 21% for intra-EU voyages depending on the initial fuel price. However, the fuel cost increase is

[42] Income effects correspond to a loss of air transport activity to the extent that increased ticket prices are too costly for consumers. Substitution effects correspond to the part of air transport activity that switches to other modes of transport, such as rail transport for intra-EU flights.

expected to attain 18%-31% with a higher price of EUR 60 per ETS allowance and even 30%-52% with a price of EUR 100 per ETS allowance.

Focusing on the outermost regions specifically, a recent study (Gardner et al., 2024) found that "The 'Fit for 55' package may **negatively impact the connectivity of outermost regions**, such as Madeira and the Canary Islands, as their derogation for the ETS now is limited to flights from the outermost region to the Member State it belongs to". At the same time, it notes that the ETS reform provides for the establishment of a pool of up to 20 million allowances to be allocated to commercial airlines to compensate for the higher costs of SAF, making local SAF production a promising avenue for economic growth in the outermost regions.

The ultimate impact of these cost increases on the transport and tourism sectors depends on the extent to which transport providers will pass on cost increases to prices, on the one hand, and the price elasticity of demand – i.e. the extent to which consumers of transport and tourism services are sensitive to price changes, on the other hand. For instance, Smyth and Pearce (2008) estimate the elasticity of air travel demand for intra-European short-haul flights in the case of EU-wide aviation taxation to be 0.92 (average of outbound and inbound passengers), meaning that a 1% increase in flight prices will yield a 0.92% decrease in the demand for such travel. A study applied to the Azores (Moreira, 2018) has found that the price elasticity of demand for air travel is inelastic for residents and elastic for visitors, implying a **negative impact on the wellbeing of residents** that need to travel and have no other option aside from air transport and on the tourism industry that is also totally dependent on this means of transport.

More generally, Ballesteros, Neiva et al. (2022) point out that, for peripheral regions (like the outermost regions) where air connectivity is of utmost importance, there are often PSOs in place to ensure a minimum level of connectivity even when flight prices increase as a result of decarbonisation policies. However, smaller airports in peripheral regions generally operating with low-cost carriers without PSOs are the most exposed to declining demand and thus unprofitability, owing to the **higher price sensitivity** of their customer base.

In another assessment focusing on the EU ETS reform (European Commission, 2021d), the extension of the EU ETS to the maritime sector is expected to cause a minor reduction of 0.8% in total shipping activities in comparison to the baseline, with **direct costs for the regulated entities** in the form of ETS/carbon levy payments, as well as additional capital, fuel, operational and administrative costs, that would be only partially compensated by fuels savings. These would, in turn, represent an increase of 3% in total **direct costs for users** compared to baseline (when considering only intra-EEA emissions).

Findings from the stakeholder consultation process

Interviewed stakeholders generally found it difficult to assess the potential effects of the new EU climate legislation on the transport and tourism sectors of the outermost regions, mainly because they were not aware or not sufficiently knowledgeable about the scope and requirements of the various pillars of this legislation. Still, they expressed their concerns regarding the cost effects of the Fit for 55 package, even more so as the outermost regions are deemed **less prepared** to meet the related requirements both in terms of technology and investments. In particular, the insularity and small size of the outermost regions restrict the possibility for them to produce alternative fuels, implying that they will need to import such fuels – most likely at relatively high costs. Besides, the engines of the boats operating in the outermost regions (e.g. the Caribbean Sea) are **not adapted** to the new marine fuel requirements. In short, technological development has not yet achieved enough maturity to allow the transport sector of the outermost regions to meet the new regulatory requirements at low costs.

Likewise, in the Azores, the Fit for 55 requirements applicable to the maritime transport of goods could put the supply capacity of the Azorean islands at risk: navigation in the North Atlantic is very demanding and exhausting, requiring robust ships with the ability to overcome waves, currents, winds and strong storms, and comes without the possibility of refuelling. In addition, due to the difficulty in investing for shipowners (resulting from the size and contextual costs of the regional market), current fleets are old and practically impossible to convert in such a way that they are suited to new fuels. The new EU requirements relating to infrastructure – namely ports and airports – also bring about new concerns in terms of **public investment effort** and **future maintenance and reinvestment expenses**.

Furthermore, price increases in the air transport sector are likely to threaten the deepening of the ties between the outermost regions and their immediate neighbours, considering that prices are already a major - if not the main - drag on their integration in their wider sea basin. Interviewed stakeholders also expressed their fear that low-cost airlines end up reducing or abandoning their activities in the regions due to declining profitability and growth potential, leading to **lower competition** and **lower supply of flights** (hence higher prices). Likewise, the extension of the ETS to the maritime sector is likely to entail additional costs (one interviewed stakeholder mentioned an additional cost of close to EUR 30,000 for each port of call for large liners in the Caribbean Sea) that will reduce the competitiveness of the outermost regions' cruise and container ship sectors compared to neighbouring territories that do not apply such requirements.

In that context, it becomes indispensable that outermost regions benefit from regulatory adaptations and receive tailored financial support to tackle not only the effects of mobility poverty but also prepare for and counteract the anticipated negative effects of complying with the climate legislation that risks otherwise aggravating mobility poverty. This support should be primarily geared towards SMEs active in the outermost regions, as smaller businesses have generally limited resources to for greening investments (Koirala, 2019).

4. POLICIES AND MEASURES TACKLING THE EFFECTS OF MOBILITY POVERTY AND THE EU CLIMATE LEGISLATION IN THE OUTERMOST REGIONS

KEY FINDINGS

- As stated in the European Strategy for the Outermost Regions of 2022 and the latest report from the European Commission on its implementation published in 2024, the Connecting Europe Facility (CEF) and Cohesion Policy are major instruments to tackle mobility poverty in the outermost regions.
- These instruments come in addition to a large array of national measures and regional schemes and strategies, such as subsidies on travel tickets, development of right-of-way public transport networks and electric car infrastructures, etc.
- The CEF instrument and Cohesion Policy should also support investments in operations that make the transport and tourism sectors of the outermost regions more energy-efficient and competitive, and thus better prepared to comply with the new EU climate legislation. However, evidence of that support remains scarce.
- At national and regional level, measures specifically aimed at mitigating the potential adverse effects of the new EU climate legislation on the outermost regions are yet to be designed and implemented, especially as regards the air and maritime transport sectors.
- As for the road transport sector, measures to transition to low- and non-emitting vehicles focus on the development of environmentally friendly public transport and the incentivisation of switching to electric or hydrogen cars for personal transport.
- At the same time, it is worth noting that transport and tourism feature prominently in the Smart Specialisation Strategies (S3) of the outermost regions for the programming period 2021-2027, hinting at increased awareness around these issues.

4.1. EU policies and instruments

The European Strategy for the Outermost Regions (European Commission, 2022c), which sets the priorities for EU action towards the outermost regions, underlines the role that **EU funding** plays and can further play to tackle mobility poverty and dampen its adverse impacts on transport and tourism: "Various EU funds can support mobility, transport and tourism. The [Connecting Europe Facility] (CEF) can co-finance transport infrastructure, and its work programme specifically supports maritime ports to help improve outermost regions' connectivity". The latest legislation regulating the trans-European transport network (TEN-T) is Regulation (EU) 2024/1679, which was adopted in June 2024. It reflects outermost regions' accessibility and connectivity needs, adding their ports, urban nodes and roads to the TEN-T network maps and making them eligible for CEF support. These regions can also use the [European Regional Development Fund] (ERDF) and the Cohesion Fund (CF) for airport infrastructure and to support the tourism sector.

4.1.1. The Connecting Europe Facility (CEF)

More specifically, the CEF is one of the main EU funding instruments, with an adopted budget of close to EUR 34 billion for the programming period 2021-2027[43], to foster investments across three main types of infrastructures: transport infrastructure, energy infrastructure and digital infrastructure. Outermost regions benefit from a higher-than-regular co-financing rate of 70% for the CEF.[44] The CEF for Transport strand aims at boosting investments in building new transport infrastructure or rehabilitating and upgrading the existing one, contributing to the following long-term objectives set out in Regulation (EU) 2024/1679:

- Completion by 2030 of the **Core Network**, structured around nine multimodal Core Network Corridors and two horizontal priorities: the European Rail Traffic Management System (not applicable to the outermost regions) and the European Maritime Space - the latter promoting, among others, the development of maritime ports in EU countries and their hinterland connection (including outermost regions); Las Palmas de Gran Canaria and Santa Cruz de Tenerife in the Canary Islands are the only outermost territories with transport infrastructure (both airport and maritime port) that belong to the Core Network;
- Completion by 2050 of the **Comprehensive Network** in order to facilitate accessibility to all European regions – encompassing seaports located in outermost regions wherever their road-distance from another TEN-T port is at least 200 km on road; other territories in the Canary Islands (e.g. Fuerteventura, La Palma), the French outermost regions (i.e. Guadeloupe, Martinique, French Guiana, Réunion and Mayotte) and the Portuguese outermost regions (i.e. the Azores and Madeira) have airport and/or maritime port infrastructure that belong to the Comprehensive Network.

Interviewed stakeholders recognised the utility of the **CEF Transport funding** to reduce mobility poverty in the outermost regions, but also observed that few such projects are actually implemented in the outermost regions. This is mostly due to their location (bar a few exceptions) on the Comprehensive Network rather than the Core Network and the generally **high level of competition** for such funding. In fact, it appears that the CEF has so far been barely used in the French outermost regions, but more significantly in the Spanish and Portuguese outermost regions.[45]

[43] Source: European Commission. In the 2023 CEF Transport call for proposals, Portuguese outermost regions could even apply a co-financing rate of 85%.

[44] Source: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=legissum:4538697.

[45] The CINEA database indicates no project co-financed by the CEF Transport in the programming periods 2014-2020 and 2021-2027 (so far) in Guadeloupe, French Guiana and Mayotte, only one project in Martinique and Réunion each (for an EU contribution of EUR 842,500 and EUR 2.2 million, respectively), but five projects in the Canary Islands (for a total EU contribution of EUR 24.1 million), three projects in the Azores (for a total EU contribution of EUR 531,178), and three projects in Madeira (for a total EU contribution of EUR 713,180).

Box 5: Palmas Port Sphynx Dike Phase IV financed by the CEF in the Canary Islands

The project "Palmas Port Sphynx Dike Phase IV", running from 2021 to 2025, focuses on the seaport of Las Palmas, on the island of Gran Canaria in the Canary Islands, and is part of the European Maritime Space priority. With an EU contribution of EUR 20.6 million from the CEF Transport instrument, it aims to:

- Remove the disturbances of waves and resonance episodes, which suppose a bottleneck by the lack of operability in the basin.
- Increase the berthing capacity of the Africa basin, allowing to attend Very Large Crude Carrier (VLCC) vessels, mainly for refined products.
- Ensure and enhance the maritime accessibility and connectivity between the Canary Islands and the mainland of Spain.
- Promote the economically and efficient liquid bulk transport in VLCC vessels, with significant transport cost savings, contributing to the development of the Canary Islands.
- Efficient use of new/existing infrastructure, taking advantage of the caissons of the Sphinx Dike Phase III.
- Contribute to the sustainable development, reducing external costs of transport.
- Enhance safe standards for passenger and freight transport.

Source: authors' own elaboration based on information from the European Commission's EU Funding and Tenders Portal

The CEF also supports investments in operations that make the transport and tourism sectors **more energy-efficient and competitive**, thereby abating the potential negative effects of complying with the new EU climate legislation. For instance, the European Commission notes that "the CEF Transport […] supported additional needs for administrative expenditure resulting from the initiatives tabled by the Commission in the framework of the 'Fit for 55' package, in particular Fuel EU Maritime and ReFuel EU Aviation."

Box 6: Accelerating the decarbonisation of ports in Madeira through the CEF

The project "Accelerating decarbonisation of ports in the outermost region of Madeira", running from 2022 to 2024, contributed to developing a coordinated package of technical, financial and environmental studies to assess the pre-conditions to decarbonise ports in the region of Madeira that are part of the TEN-T Comprehensive Network. In particular, it sought to assess the feasibility of introducing onshore power supply in all three main ports of the region, meeting the EU's targets towards climate neutrality, and disseminate the results of this analysis with other outermost regions. The EU contribution from the CEF amounts to almost EUR 0.6 million.

Source: authors' own elaboration based on information from the European Commission's EU Funding and Tenders Portal

4.1.2. The Cohesion Policy

The Cohesion Policy is the EU's main policy to bridge the development gap between its various regions and foster economic, social and territorial cohesion, as stated in Article 174 TFEU. It has an adopted budget of EUR 392 billion for the programming period 2021-2027[46] that supports national-level and regional-level investments towards competitiveness, the green and digital transition, mobility, social outcomes and sustainable and integrated development. These investments are distributed at regional

[46] Source: European Commission.

and national level through four funds: the European Regional Development Fund (ERDF), the European Social Fund+ (ESF+), the Cohesion Fund (CF) and the Just Transition Fund (JTF)[47].

All outermost regions receive funding from the **ERDF and ESF+**, but only the Portuguese outermost regions receive funding also from the **CF**. Besides, none of the outermost regions has territories eligible to the JTF. As for the CEF, outermost regions benefit from an increased co-financing rate – in that case of 85% - applicable to Cohesion Policy funding (all outermost regions alike, independently from their level of GDP per capita).[48] They are also granted a **specific additional allocation** to offset their structural social and economic situation together with the handicaps resulting from the factors referred to in Article 349 TFEU (i.e. remoteness, insularity, small size, difficult topography and climate, and economic dependence on a few products), amounting to EUR 1.5 billion over the seven-year period (European Commission, 2022d). This specific additional allocation helps, among others, to **compensate for high transport operating costs** in these regions. Not least, further flexibility in the use of ERDF funding (e.g. looser thematic concentration principles and the possibility to support investments in airports) is granted to the outermost regions.

Cohesion Policy also supports **transnational, cross-border and interregional cooperation** through Interreg programmes that, in the case of the five programmes covering the outermost regions, can bring together funding from the ERDF and from the Neighbourhood, Development and International Cooperation Instrument or the Overseas Territories Association Decision. These five programmes (i.e. Interreg Indian Ocean, Interreg Caribbean, Interreg Amazonia, Interreg Mozambique Channel and Interreg Madeira-Azores-Canaries) have a combined ERDF envelope of around EUR 280 million, that is, only 3.5% of the Cohesion Policy's total amount dedicated to Interreg programmes.

Box 7 provides an example among many others of how Cohesion Policy funding has supported the development of transport infrastructure in the outermost regions during the programming period 2014-2020. The European Commission's report on the implementation of the European Strategy for the Outermost Regions (2024b) indicates that, in the programming period 2021-2027, "the ERDF is due to invest **EUR 559 million in mobility and transport**, in particular EUR 338 million related to public transport in urban areas in the outermost regions".

[47] The Just Transition Fund is a new instrument of the Cohesion Policy 2021-2027 specifically dedicated to support the territories (defined at the sub-regional level) most affected by the transition towards climate neutrality.

[48] Source: Regulation (EU) 2021/1060 of the European Parliament and of the Council of 24 June 2021 laying down common provisions on the European Regional Development Fund, the European Social Fund Plus, the Cohesion Fund, the Just Transition Fund and the European Maritime, Fisheries and Aquaculture Fund and financial rules for those and for the Asylum, Migration and Integration Fund, the Internal Security Fund and the Instrument for Financial Support for Border Management and Visa Policy

Box 7: ERDF funding supporting the development of right-of-way public transport ('Transport en Commun en Site Propre' in French) in several cities of Réunion

In the programming period 2014-2020, EU funding from the operational programme ERDF Réunion contributed to developing right-of-way public transport lanes in several locations across the island:

- Near the port's trading hub (EUR 0.6 million),
- In the urban development zone of Beauséjour (EUR 2.1 million),
- In the urban development zone of Pierrefonds Aerodrome (EUR 2.3 million),
- On two streets of the city of Saint-André (EUR 1.6 million and EUR 1 million, respectively),
- In the city of Saint-Pierre (EUR 2.9 million), and
- In the city of Saint-Louis (EUR 11 million).

ERDF funding was also used to co-finance other transport-related projects, such as the ongoing construction of a new coastline road ('Nouvelle Route du Littoral') including a dedicated lane for public transport, with an EU contribution of EUR 117.3 million.

Source: authors' own elaboration based on information from the European Commission's Kohesio database

Cohesion Policy can also co-finance investments in the **modernisation and decarbonisation of transport infrastructure** as well as the development of environmentally friendly transport modes, that shall help meet the Fit for 55 legislative requirements and targets.

Box 8: Cohesion Policy funding supporting sustainable and multimodal mobility in Martinique

In the programming period 2021-2027, Martinique's regional Cohesion Policy operational programme has a budget of more than EUR 600 million (from the ERDF and ESF+) to bolster the region's socio-economic development and convergence process. One of the specific objectives it pursues consists in supporting sustainable and multimodal mobility in the region, including through the installation of charging stations for electric vehicles. This should incentivise the switch from high-polluting cars to non-emitting cars among the local population.

Source: authors' own elaboration based on information from Martinique's ERDF-ESF+ programme 2021-2027

4.1.3. Other European support measures

Besides the funding instruments stemming from EU policies, other support measures have helped (and continue to help) the outermost regions to develop their transport infrastructure and network, thereby reducing mobility poverty. These include, for instance, financing support from the **European Investment Bank**. Over the past decades, this support has contributed to the development of roads (e.g. in Guadeloupe and Réunion) as well as airports (e.g. in the Canary Islands, Guadeloupe, Martinique, Réunion and Madeira).

Box 9: European Investment Bank's support to airport development in Guadeloupe

In 2018, the European Investment Bank granted a EUR 60 million loan to the company managing Guadeloupe's airport (Société Aéroportuaire Guadeloupe Pôle Caraïbes SA) to support the expansion of the Pointe-à-Pitre/Le Raizet International Airport. More specifically, this financing aimed at contributing to the extension and reconfiguration of the passenger terminal to accommodate future growth in traffic, the purchase of equipment to improve safety and security performance, and the reconstruction of the airport's taxiways.

Source: authors' own elaboration based on information from the European Investment Bank

4.2. EU initiatives in support of regional strategies

Linking regional-level strategies with EU funding mechanisms, it is still worth noting that transport and, even more so, tourism feature prominently in the **Smart Specialisation Strategies (S3)**[49] of the outermost regions for the programming period 2021-2027 (**Table 8**), pointing to an increased awareness around these issues.

Table 8: Priorities of the outermost regions' S3 (2021-2027)

Region	S3 priorities (2021-2027)
Canary Islands	**Digital and sustainable tourism**, Health and wellness, Blue economy industry, Astrophysics, Space and aeronautics industry, Emerging industries, Digitalization, Sustainability.
Guadeloupe	Circular economy and innovative management of waste, Protection and preservation of the environment and biodiversity, fight against natural risks, Agriculture, development of production and local resources, Innovative renewable energies and energy control, **Sustainable mobility on land and sea and adapted mobility**, Demographic transition and health of Guadeloupeans, **Sustainable tourism**, respectful of the environment and culture, Sport, a vehicle for innovation and growth.
Martinique	Valorisation of endogenous resources (including for **tourism**), Digitalisation of society, Development and improvement of health and well-being solutions, Resilience and protection of the territory, Sustainable exploitation of maritime potential (including **coastal tourism**).
French Guiana	Smart Economy (Information and communication technology, digital), Social economy, united, circular, and resilient, Agriculture and Agro transformation, Smart Territory (Support for dynamic authorities in favour of research and innovation), Valuation and protection of natural heritage and cultural resources, Sustainable operation of the sea and development of maritime activities.
Réunion	Effectively deploy Smart Specialisation Strategy for Social and Sustainable development, Coordinate and support the research and innovation effort to meet the great challenges of the territory, Facilitate entrepreneurial initiatives and support procedures for innovation and business transformation, Integrate Réunion into international research and innovation networks.
Mayotte	Valorisation of natural resources, Tele-technologies, Energy and environment, Consideration of young people and isolated and vulnerable populations.
Saint-Martin	N/A
Azores	Agriculture and Agri-business, Sea and Blue Growth, **Tourism** and Heritage, Space and Data Science, Health.
Madeira	**Tourism**, Marine Resources and Technologies, Digital Technologies and Economy 4.0, Circular Economy, Energy Transition, Climate Action, and Biodiversity, Agriculture, Food, and Bioeconomy, Health and Well-being.

Source: authors' own elaboration based on the European Commission's S3 CoP Observatory

[49] Smart Specialisation Strategies (S3) for research and innovation (R&I) have been introduced by the European Commission in 2010 to foster regional competitiveness. The elaboration of an S3 using a participation-, prioritisation- and localisation-based approach is a Cohesion Policy requirement for any EU region or country to receive R&I investments.

At a more local level, **Sustainable Urban Mobility Plans (SUMP)** are designed to foster integrated and sustainable transport development within functional urban areas. Originally introduced by the European Commission as part of the 2013 Urban Mobility Package, these plans have become mandatory for urban nodes listed in the 2024 TEN-T Regulation.[50] Among other principles, SUMP should devise the integrated development of all transport modes (i.e. inter- and multimodality) while prioritising the most sustainable ones. They should also support innovation and the integration of new mobility services. In practice, they can take different shapes, building on the strategic frameworks already established in the respective countries.

4.3. National measures and regional strategies

In the outermost regions, the **limited financial capacity** of local and regional authorities is a major impediment to the implementation of public investments in transport infrastructure and services. In 2022, the GDP per capita level of the outermost regions ranged from 32% (Mayotte) to 76% (Martinique) of the EU average (measured in EUR per capita)[51] and outermost regions still rely to a large extent on financial transfers from their Member State's central government and EU funding to provide basic public services to their populations. Against this backdrop, regional policies to tackle mobility poverty can hardly be financed from regional budgets only, even more so as such an endeavour requires massive investments across all modes of transport (see again **Chapter 1**). In fact, national-level measures often play a predominant role – when they exist. In most cases, measures to tackle mobility poverty combine **route-based policies** (such as PSOs on certain links) and **passenger-based policies** (such as lower travel fares for the outermost regions' resident population).

Spain's outermost region

In the **Canary Islands**, there are incentives in place such as subsidies and discounts on the tickets to travel between islands for residents. At the same time, mobility mainly falls within the remits of the individual Island Councils (seven of the eight Canary Islands have their own Island Council), so that there is no specific plan directed from the regional or national government aiming to improve the deficiencies related to the concept of mobility poverty, except for isolated actions. One noteworthy policy development, though, is the upcoming Sustainable Mobility Law of the Canary Islands ('Ley de Movilidad Sostenible de Canarias' in Spanish), which should set the regulatory framework to enhance public transport and intermodality. To do so, it focuses on, among others, active mobility and GHG emissions reduction, and implement measures aimed at facilitating the mobility of people in situations of functional diversity.[52] Not least, the seasonality of tourism in the region means that demand for mobility is fluctuating and, therefore, that mobility solutions are flexible.

Measures focusing on air transport include the modification of navigation procedures to optimise trajectories and aircraft performance that reduce fuel consumption and GHG emissions, as well as investments to replace ground assistance material and aircraft equipment. Nonetheless, there is no measure yet regarding the decarbonisation of airports, and medium- and long-term environmental plans remain without firm commitments (except for Tenerife South and Fuerteventura).

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[50] In the outermost regions, the urban nodes are Las Palmas de Gran Canaria Metropolitan Area and Santa Cruz de Tenerife Metropolitan Area (Canary Islands), Cayenne (French Guiana), Point-à-Pitre - Les Abymes (Guadeloupe), Fort-de- France – Lamentin (Martinique), Dzaoudzi-Mamoudzou (Mayotte), Saint-Denis (Réunion), Funchal (Madeira), and Ponta Delgada (Azores).

[51] Source: Eurostat, Gross domestic product (GDP) at current market prices by NUTS 2 region, indicator code nama_10r_2gd.

[52] Source: Government of the Canary Islands.

France's outermost regions

In the **French outermost regions**, the national 'law on the orientation of mobility' ('loi d'orientation des mobilités' in French) adopted in 2019 offers a new regulatory and financing framework to foster alternative transport options (i.e. other than car), also called 'modal shift'. Likewise, the 'law on metropolitan regional express services' ('loi relative aux services express régionaux métropolitains' in French) adopted in 2023 aims to open up rural areas in relation to cities and decarbonise the transport sector. The Green Fund ('Fonds vert' in French) seeks to boost the development of innovative and sustainable mobility, such as carpooling and mobility in rural areas, and the deployment of low-emission mobility zones. Importantly, the French recovery plan ('France Relance' in French) has recently supported a number of public transport and electric car infrastructures in Guadeloupe, Martinique, French Guiana and Réunion (e.g. right-of-way buses, cycling lanes, refuelling stations for electric vehicles, interurban tramway, cable transport, etc.). The French Development Agency ('Agence Française de Développement') also provides funding support to transport infrastructure projects in the French outermost regions, such as for the right-of-way airport bus 'BAO-BAB' in Réunion (with EUR 600,000 of funding to co-finance assistance to the contracting authority) and for the new high service level bus ('Bus à Haut Niveau de Service' in French) in Mayotte (with EUR 750,000 of funding to pre-finance subsidies, among others). This latter project is also supported by a loan amounting to EUR 10 million from the French 'Banque des Territoires' (Banque des Territoires, 2024).

In **Guadeloupe**, the islands of the archipelago are only served by maritime shuttles since the cessation of regular air links, unprofitable, in 2006. In 2009, regional authorities established a support scheme for opening up the Southern Islands (Gwad'îles system). This allows residents of the secondary islands of the archipelago (Marie-Galante, Les Saintes and Désirade) to benefit from preferential rates, thanks to a subsidy granted to shipowners. In 2014, this aid was extended to new beneficiaries: residents of the 'mainland' working in one of the outbuildings, high school or college students residing in Guadeloupe but attending school on another island and people who can prove payment of a council tax in the Southern Islands. In addition, private initiatives that benefit from state support promote car-sharing. The region's 'Clean Vehicle Development Plan' ('Schéma de Développement du Véhicule Propre' in French) was adopted in 2023 and aims to provide inter-municipal and other public bodies such as the authorities in charge of mobility (AOM) and the authorities in charge of electricity distribution, a reference framework to elaborate sustainable mobility plans within their respective remits. These plans should ensure the coherence and effectiveness of sustainable mobility actions.

In **Martinique**, the Mobility Plan ('Plan de Mobilité' in French) aims to organise the mobility of people and transport of goods in the region over a 10-year period from 2025 to 2035. One of its main objectives is to strike a balance between mobility and accessibility needs, on the one hand, and environmental protection and health, on the other hand. With that plan, access to mobility services in rural and less densely populated areas should contribute to reinforcing territorial and social cohesion, car traffic should be reduced, transport safety should be improved, and environmentally friendly public transport and active travel modes (i.e. walking and cycling) as well as electric mobility should be encouraged.

In **Saint-Martin** two new roads are under construction to alleviate congestion: one between Marigot and Nouvelle Orléans along the coastline, and another to circumnavigate Marigot's city centre. Moreover, regional authorities are expected to co-finance the extension of the region's main port.

In **French Guiana**, the right-of-way public transport ('Transport en Commun en Site Propre' in French) is expected to begin operation in 2025, utilising high service level buses on two lines over 10 km.

The total cost of this project is estimated at EUR 166 million, including EUR 40 million of ERDF funding.[53] However, this represents only a fraction of the investment needs of the region to tackle mobility poverty. A study conducted for the French General Council of Environment and Sustainable Development (Labia and Geffrin, 2013) estimates that tackling mobility poverty by 1) developing local road networks and public transport services in the region's four main cities, 2) improving the reliability of existing road, air and maritime transport infrastructure, 3) implementing a place-based infrastructure maintenance policy and 4) improving multimodal transport with a focus on securing mobility on inland waterways and air connectivity would require just above EUR 1.5 billion of investments and EUR 1.8 billion for maintenance and operating costs between 2013 and 2025.[54]

In **Mayotte**, mobility poverty is addressed by a broad range of local initiatives as well as regional and national policies. For instance, a public transport service serving the conurbation of Mamoudzou (Mayotte's main city) and using high service level buses that run on partly right-of-way lanes should be launched between 2025 and 2027. The region's 'Global Transport and Trips Plan' ('Plan Global de Transports et Déplacements' in French) adopted in 2018 addresses the possibility to establish boat shuttles to link Mamoudzou with the north and south of the main island by 2026-2027 in order to reduce congestion and smoothen mobility in the region. Local authorities in Mamoudzou also subsidise the purchase of bicycles by private persons, while local initiatives support the deployment of cycling lanes.

Portugal's outermost regions

In Portugal, the Social Mobility Subsidy was established for the transport links between the Azores and Madeira as well as between these outermost regions and Portugal's mainland, fixing a maximum airfare to be borne by Azorean and Madeiran residents on these routes. In the **Azores**, the Azores Tariff was created in 2021 in addition. These schemes have been configured in a special way, aimed at resident passengers, to avoid undermining the precepts of free competition. In this region, inter-island passenger air transport is carried out under PSOs, the underlying financial effort of which is very significant in the regional budget, with a very small contribution from EU funds. Annually, these PSOs approach a cost of around EUR 60 million, in addition to EUR 6 million of PSOs for maritime passenger transport according to interviewed stakeholders. In comparison, the amount of EU funds allocated to sustainable transport interventions (excluding sustainable urban mobility) through Cohesion Policy in the 2021-2027 Operational Programme for the Azores is around EUR 110 million for the 7-year period from 2021 to 2027 (i.e. an average of EUR 15.7 million annually).[55] In addition, territorial PSOs are established to connect some islands in the region and the Portuguese mainland, according to the constitutional principle of territorial continuity, which must be ensured by the State Budget.

In **Madeira**, regional authorities have introduced in April 2019 a tariff reduction programme for public transport on road, precisely to incentivise the use of public passenger transport. As of 2024, the Regional Government of Madeira reinforced this measure, implementing free passes for people up to 23 years of age and for those over 65 years of age. As regards the maritime and air connections between the islands of Madeira and Porto Santo (which is also subject to PSOs), and also with the aim to improving intraregional mobility, the Regional Government grants a Social Mobility Subsidy to passengers that is even higher for the residents of Porto Santo (double insularity).

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53 Source : https://www.europe-guyane.fr/actualites/loperation-tcsp-avance/

54 Cost estimates in 2012 EUR.

55 Source: European Commission, Cohesion Open Data Platform. This amount corresponds to the total ERDF funding allocated to Policy Objective 3 "Connected Europe" in the 2021-2027 Operational Programme for the Azores.

Nevertheless, interviewed stakeholders could not mention national measures or regional strategies specifically aimed at counteracting the potential adverse effects of the new EU climate legislation on the outermost regions because these effects remain largely unknown, especially as regards the air and maritime transport sectors. As for the road transport sector, measures to transition to low- and non-emitting vehicles focus on the development of environmentally friendly public transport and the incentivisation of switching to electric or hydrogen cars for personal transport (e.g. in Guadeloupe, technical assistance and studies have been carried out for the development of hydrogen technology, and there are local initiatives to develop solar farms for hydrogen production, as well as support schemes for the purchase of hydrogen vehicles).

5. CONCLUSIONS AND POLICY RECOMMENDATIONS

5.1. Combined effects of mobility poverty and the new EU climate legislation on transport and tourism

The analysis of mobility poverty indicators, the review of literature and findings from the interviews with key transport and tourism stakeholders show that **costs, prices and relative income** are found to be interconnected in the concept of mobility poverty. In fact, transport supply is highly affected by inadequate investments for diversifying transport options (in relation to the public resources available) in particular due to the orography, climatic conditions and dispersion of the (islands constituting the) regions. This leaves their populations with few and costly options for their mobility, either in terms of prices (e.g. for air transport to the mainland in the case of the French outermost regions) or in terms of time (e.g. for road transport that is widely affected by congestion across all outermost regions). Current data shows that car remains by far the prevailing mode of transport in the outermost regions, contributing to **traffic jams** and, ultimately, waste of time, noise and GHG emissions. The lack of adequate public transport options also spurs the concentration of population in or around the main cities, thereby **deepening territorial disparities** within the regions themselves.

Interviewed stakeholders expressed their concerns regarding the risks of increasing mobility poverty in the outermost regions, since their specific geographic conditions will not disappear but only worsen as the effects of climate change intensify. This will give rise to **increasing operational costs** and bring about the need for cyclical investments for infrastructure resilience, leading to, in turn, a more recurrent and extensive mobilisation of public resources (the massive destruction of transport infrastructure in Saint-Martin by Hurricane Irma in 2017, in the Azores by Hurricane Lorenzo in 2019 and in Mayotte by Cyclone Chido in 2024 are just a few examples of how climate events impact investment needs). The financial capacity of the outermost regions, which all have a GDP per capita (in EUR and in PPS) below the EU average, is particularly limited and threatened by **decreasing revenues**. In that context, complying with the climate legislation might necessitate to crowd out other public services investments.

Additionally, interviewed stakeholders emphasised that the existing transport-related legislative framework imposes certain conditions of **operation** and **competition**, but is, above all, designed for the European mainland's reality, where there is more supply and competition, greater diversity of resources and types of transport options, lower transport operational and maintenance costs and larger markets. This greatly hampers the ability to resolve functional and structural problems in the transport systems of the outermost regions.

Most interviewed stakeholders concurred that compliance with the new EU climate legislation, and in particular the Fit for 55 transport-related package, will presumably incur **additional costs** to the transport sector that might reverberate through **price increases** for air, maritime and road transport. This is an even greater matter of concern, as prices are already a major limiting factor for both the quality of life of the local population (especially in the least developed outermost regions) and the development of more international tourism in the outermost regions. In a context where these regions are exposed to **stiff competition as tourism destinations**, primarily from neighbouring non-EU countries (e.g. from Morocco for the Canary Islands, Mauritius for Réunion, or the Dominican Republic, Puerto Rico and Cuba for Martinique, Guadeloupe and Saint-Martin), ensuring that the outermost regions are not penalised by the green transition but rather ready to seize the opportunities it offers (e.g. in terms of developing innovative technologies for SAF production) is a priority.

All in all, it appears that the main challenge for the outermost regions with respect to greening their economies lies essentially in their capacity to make the necessary investments, not least to abide by the EU legislation. Even though they have considerable potential to be exploited (e.g. in the field of renewable energy), they endure a **gradual loss of competitiveness** vis-à-vis their mainland counterparts, as shown by the decrease in the ranking of most outermost regions between 2016 and 2022 according to the European Commission's Regional Competitiveness Index. What is more, the resources they receive from fossil fuels taxation are foreseen to decrease as the green transition (including the Fit for 55 legislation) unfolds, rendering their future investments even more challenging. If the adverse effects of the new EU climate legislation are not mitigated, their transport and tourism sectors could experience a loss of both quantitative and qualitative value due to high prices. In fact, the dual issue of mobility poverty reduction and decarbonisation is, in the outermost regions, of both geographic (insularity, exiguity, etc.) and structural (lack of competitiveness, financial deficits, etc.) nature.

The CEF instrument and Cohesion Policy are already providing significant investments in the transport sector of the outermost regions, thereby reducing mobility poverty and making them more attractive tourism destinations. Importantly, this EU funding comes in addition to a large array of other European, national and regional instruments and development plans. However, there are few measures specifically aimed at counteracting the potential adverse effects of the new EU climate legislation on the outermost regions. This calls for **more cross-cutting and coordinated interventions**, where EU instruments – in combination with national measures and regional schemes – can play a pivotal role.

5.2. Policy recommendations

With due consideration of the challenges and caveats identified in this study, possible avenues for EU action in favour of the outermost regions, including adjustments to the current EU policy framework, include:

- **Mainstreaming** 'outermost specificities' in the Fit for 55 package (on the basis of Article 349 TFEU), notably by adapting the timing and scope of the regulatory requirements, at least until the necessary technologies are available and affordable (i.e. allowing for a more gradual compliance with the climate legislation);
- **Monitoring** the effects of mobility poverty and the new EU climate legislation on the transport and tourism sectors in each outermost region, especially after the temporary derogations end, to assess the need for further adjustments;
- **Raising** awareness and accessibility of current EU programmes and funding opportunities among potential beneficiaries in the outermost regions (e.g. from the Connecting Europe Facility and the Social Climate Fund), notably through project development assistance, best practice exchange and other forms of tailored communication and support;
- **Increasing** the capacity of outermost regions' Managing Authorities and other regional bodies involved in the management of EU funding to ensure that EU funding can be used timely and efficiently, including by achieving synergies with other forms of financial support (e.g. support provided by the European Investment Bank and national promotional banks and institutions). This can be achieved by using existing tools more extensively, such as the EU's Advisory tool for the EU Outermost Regions and the Joint Assistance to Support Projects in European Regions (JASPERS);
- **Providing** more funding to the outermost regions (e.g. in proportion to their GDP per capita) through a dedicated POSEI-like transport programme to improve the availability and

accessibility of transport options, accelerate the development, experimentation and adoption of innovative transport technologies (e.g. hydrogen technologies and electric vehicles), and boost the deployment of energy-efficient public transport options – beneficiaries of this new programme should be SMEs from the transport and tourism sectors and low-income households, as these are the groups most vulnerable to mobility poverty and less ready for decarbonisation imperatives; alternatively, the specific allocation granted to the outermost regions under Cohesion Policy could be significantly increased to also compensate for higher climate legislation compliance costs;

- **Fostering** knowledge-sharing and the dissemination of best practices in relation to these technologies and strategies across the outermost regions facing similar challenges by using existing tools such as the EU's Knowledge Exchange Platform;
- **Reinforcing** transnational cooperation with the countries situated in the vicinity of the outermost regions to support the development of integrated transport solutions (e.g. for better air connections between neighbouring third territories) and the adoption of a coherent green agenda within their wider geographic areas and avoid competition distortion – such cooperation could primarily take place within the framework of the European Territorial Cooperation (Interreg) Strand for the outermost regions, and taken up more widely as part of the EU's cooperation strategies;
- **Reviewing** the framework of competition legislation, considering the specificities of the outermost regions (whereby their small size and insularity cause economic fragility and low scalability) and their subsistence and investment needs, and adapting the conditions and rules of De Minimis Aid (e.g. by more systematically combining larger grants and financial instruments where the financial capacity is too limited to rely solely on loans) in the outermost regions to the concrete and specific reality of each region; and
- **Reviewing** the basic legislation that frames PSOs, with a more tailored adjustment to the reality of the outermost regions and economic exploitation by companies, including by redefining validity periods, investment, payback, profitability, etc. to ensure greater contractual stability. In parallel, sustaining the role of Cohesion Policy funding in supporting the costs of transport-related PSOs.

Building on the analysis of mobility poverty and the effects of the new climate legislation, further policy recommendations specific to each outermost region include:

- In the **Canary Islands**, reducing congestion and improving intermodality appear to be key priorities for transport policy action. Promoting an innovative model of competitive and sustainable tourism is also highly relevant for the region.
- In **Guadeloupe** and **Martinique**, reducing road traffic and stimulating the use of public transport should be at the forefront of policy action. Importantly, policy measures and investments should ensure that improvements in mobility services benefit all parts of their territory. Better integration within their sea basin should also be promoted, while making their tourism sector more connected to that of their main neighbours, more competitive and better prepared for the green transition.
- In **French Guiana**, **Mayotte** and **Saint-Martin**, policy action should focus primarily on the availability and accessibility of transport options. The affordability of transport options should likewise remain a main focus for policy-makers, as these regions suffer from very low income levels.

- In **Réunion**, increasing public transport options grows in relevance as the population – and, together with it, the number of private cars – follows a steady upward trend. Diversifying the market base of its tourism sector is also expected to bring about economic benefits. Harnessing potential of the region to develop and produce innovative technologies for the green transition should remain a policy priority backed with sufficient investments.
- In the **Azores** and **Madeira**, improving transport infrastructure resilience has already proved essential and will further gain in importance in the near future.

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ANNEX I: STAKEHOLDER CONSULTATION PROCESS

Stakeholder consultation

In order to cross-check, illustrate and enrich the findings from the documentation review and the indicator analysis, a series of interviews have been conducted with key stakeholders from the transport and tourism sectors of all nine EU outermost regions.

Those stakeholders come from the public and private sectors as they work either in departments of regional governments and councils responsible for transport, mobility and tourism or in regional tourism committees and federations representing the interests of tourism organisations. In some cases, stakeholders from observatories or universities with a research focus on transport and tourism were also interviewed.

They have, therefore, first-hand experience with the challenges faced by outermost regions in relation to mobility poverty and climate legislation compliance, and have in-depth knowledge of the policy solutions to take up those challenges.

A total of 20 interviews have been conducted by phone or online, using semi-structured interview guidelines, between July 2024 and January 2025. The split of interviewed stakeholders across regions and sectors is as follows:

Table 9: Number of interviews conducted per outermost region and sector

Outermost region	Transport stakeholders	Tourism stakeholders
Canary Islands	2	2
Guadeloupe	2	0
Martinique	1	1
French Guiana	1	1
Réunion	1	1
Mayotte	1	1
Saint-Martin	1	1
Azores	1	
Madeira	1	2

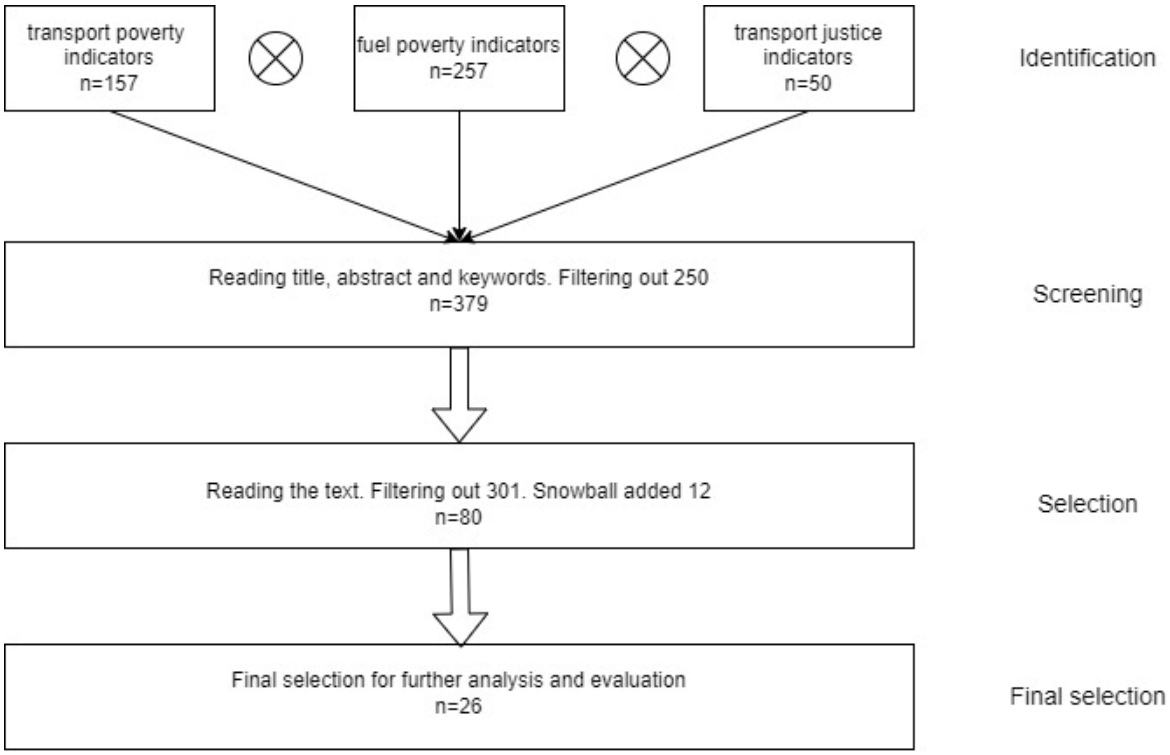
Source: authors' own elaboration

ANNEX II: LITERATURE REVIEW ON MOBILITY/TRANSPORT POVERTY

Methodological approach

The desk literature research is based on the PRISMA method (**Figure 8**) which provides consistency and complete coverage of the research concept under analysis. The PRISMA method comprises a checklist of 27 items and the following four-phase flow diagramme (identification of papers, screening of papers, eligibility of papers, and papers included in the further analysis) (Moher et al., 2010).

Figure 8: PRISMA Flow of desk research



Source: authors' own elaboration

The identification of papers consists of creating and executing a search strategy. At the search strategy stage, it was decided for research convenience to use the SCOPUS dataset to guarantee that the literature collected is of high quality and that much of the previous documents are available in the field of science under research. **Figure 8** shows that the search strategy is based on the following combination of three topics: 'transport poverty' + 'indicators', 'fuel poverty' + 'indicators,' and 'transport justice' + 'indicators'. The search strategy is made at the level of the article's title, abstract, or keywords. Only articles that are published in a scientific peer-reviewed journal were identified. At this stage, review papers, editorial letters, conference proceedings, studies that are not written in English and duplicated studies within the search documents were excluded.

The articles obtained during the search were assessed according to the study's objective in the appraisal step. Thus, only publications matching the search criteria were included. In selecting publications for analysis, the three steps PRISMA statement recommendations were as followed: (1) screening the papers from the identification phase after reading the abstract; (2) reading the screened papers to select the salient papers including some papers through a snowball approach; and (3) making the final selection to analyse and evaluate the papers. The figures of the papers included in each stage can be seen in **Figure 8**. It is worth mentioning that the most extensive number of indicators was found in studies that met search criteria 'fuel poverty' + 'indicators'. Meanwhile, the search for 'transport

justice' + 'indicators', produced the least significant figure. In fact, most indicators originate from the literature on energy poverty. However, Martens and Bastiaanssen (2019) contended that the applicability of the concept to transport requires careful consideration because the normative standards are not as common as in the case of energy and basic household needs. Not least, the information needs are also different. Lowans et al. (2021) add that travel standards need to be stipulated to unify the metrics of mobility poverty and potentially alleviate limiting conditions.

Literature review discussion

Martens and Bastiaanssen (2019) proposed an explicit normative yardstick, an explicit principle of justice, to evaluate and assess the observed accessibility patterns. Moreover, the authors proposed an approach to calculate an index that systematically assesses the equity performance of a regional transport system. The authors started arguing that people are treated fairly if they experience a sufficient level of accessibility to destinations within the city.

The authors contended that two dimensions should be considered in the equity assessment of transport systems: (1) The number of people experiencing an accessibility level below an agreed-upon accessibility poverty line. The more people below the accessibility poverty line, the less fair the transport system is; and (2) The accessibility shortfall as experienced by those people, that is, the difference between the accessibility level they enjoy and the accessibility poverty line. The lower the level of accessibility experienced by people below the accessibility poverty line, the less fair the transport system is.

The authors used 632 population groups in the Rotterdam - The Hague metropolitan region, measuring accessibility to employment in multiple ways through cumulative opportunities accessibility indices using three travel time thresholds (20, 30, and 45 minutes) and two periods of the day (peak and off-peak), and a gravity-based accessibility indicator using the friction for the two periods of the day. The authors have set the following thresholds for poverty lines: 50%, 40%, 30%, 20%, and 10% of the regional average accessibility level by car.

Mahadevia et al. (2019) analysed women's gender-based disadvantages, which usually resulted in 'time poverty' and have been largely neglected by previous analyses. The authors used the metropolitan cities of India, Bhopal and Pune, as case studies for integrating a gendered perspective in their development using the gender-responsive budgeting (GRB) tool from the expenditure side. Using Maxine Molyneux's conceptualisation of 'strategic gender needs' and 'practical gender needs', the authors proposed gender-sensitive indicators to assess progress on four categories of urban infrastructure: water supply, sanitation, housing and public transport. Using the benefit incidence analysis (BIA) of the public expenditure tool, the authors provided interesting insights into the expenditure benefits reaching women in both cities.

The authors found that no information on bus routes, in the form of maps or any other user-friendly form, was available at the bus stands. Most bus stands were poorly lit and, hence, deserted after sunset. Compared to Bhopal, public transport infrastructure facilities, such as walkable footpaths and functional streetlights, were observed as more user-friendly in Pune.

Tiznado-Aitken et al. (2018) complemented other studies of public transport accessibility which focused on proximity to stops, walking distances or time to reach them, including in the analysis an important accessibility barrier, such as the quality of the urban environment of these walks. To that aim, the authors proposed a methodology based on two indicators: walking accessibility to public transport stops and the quality of the walking environment, considering different attributes and dimensions. The results showed that 12 out of 34 municipalities in Santiago, Chile, are deprived of one or both

dimensions. Moreover, a correlation between low income and poor access and urban space quality was detected.

The authors measured the physical accessibility of the bus stops by a gravity potential accessibility index. Meanwhile, the level of service of the bus stops is measured by including different amenities in the bus stops, such as safety, comfort, furniture, cleanliness and other categories. Each of the attributes can be measured by binary or categorical variables. The authors calculated two indices, the Accessibility Fairness Index (AFI) and the Environment Fairness Index (EFI), reflecting poverty indices regarding accessibility to public transport stops and the quality of the walking environment. Finally, a sensitivity analysis is performed using two different percentiles of the distribution of both indices across all municipalities: 10th and 20th.

Berry et al. (2016) investigated the issue of transport poverty from the perspective of how households could be at risk of paying the costs if fuel prices increase. They showed that fuel poverty indicators from the domestic sector are not satisfactory in this regard because there are multiple complexities in transport which are not well resolved by common indicators: (1) the diversity of travel needs, (2) restriction behaviours, and (3) variable capacities to adapt. For this reason, the authors proposed a new composite indicator that considered factors of vulnerabilities. In contrast to the previous indicators, it did not solely focus on budgetary aspects but also reflected mobility conditions. Thus, it was possible to profile three households' transport poverty types: fuel-poor, fuel-vulnerable and fuel-dependent.

The new composite indicator proposal is based on multiple dimensions that expose households to a rise in fuel prices, combining financial resources, mobility practices, and households' mobility conditions. A household is considered fuel-poor if its fuel spending per person is higher than the median and if its residual income per consumption unit (CUi) is lower than the poverty line (60% median income per CUi). Fuel-vulnerable households are characterised by a low income and cumulating at least two disadvantageous mobility conditions among three. Fuel-dependent households combine high fuel spending with no adequate alternative mode of transport.

Mattioli et al. (2018) contended that British researchers, official policymaking bodies and NGOs have put forward the notion of 'transport poverty', building on an implicit analogy between (recognised) fuel poverty and (neglected) transport affordability issues. However, according to the authors, the conceptual similarities and differences between 'fuel' and 'transport' poverty remain largely unaddressed in the UK and in the world. A comparison and contrast between both concepts served to illustrate similarities and differences under four particular headings: (i) negative consequences of lack of warmth and lack of access; (ii) drivers of fuel and transport poverty; (iii) definition and measurement; (iv) policy interventions. The literature review mainly focused on the third heading, but a word of caution needs to be mentioned regarding the problematic issues that appear when a radical energy transition exists that puts some households at extreme risk of experiencing transport poverty, so a proper agenda needs to be envisaged paying attention to issues of equity and affordability.

The authors found four key components to the existing measurements of transport poverty and energy poverty: (1) The unit of analysis can be the individual or the household. Nevertheless, in the current report, we should make an effort to extend the analysis to islands and outermost regions; (2) required expenditures that maintain some living standards; (3) the estimation of an affordability threshold like the overused 10% or the more recent LIHC; and (4) the definition of a critical threshold of income, shares and thresholds.

The authors also contended that transport poverty has been studied as transport-related social exclusion, disadvantage, unaffordability, forced car ownership, and car-related economic stress. While the adoption of metrics developed in fuel poverty for use in the transport domain is tempting, it is not

without its challenges because of the conceptual differences between fuel poverty and transport affordability. An important factor of complexity is that of the unit of analysis because fuel poverty is clearly a household attribute, transport and accessibility problems reside with individuals rather than the whole household. Another important complexity factor resides in the fact that the accessibility needs are more complex than the energy needs. Thus, the authors concluded that they do not recommend developing metrics of transport poverty based on the modelling of required transport spending, and it is preferable to adopt transport poverty metrics based on actual transport expenditure figures.

Benevenuto and Caulfield (2020) proposed spatial accessibility poverty indicators for demarcation area units, estimating gravity local potential accessibility indicators. The authors calculated the Spatial Accessibility Poverty (SAP) index at a municipality level through a normalisation procedure that takes into account the difference between the maximum local accessibility of the entire region (Amax) and the Local Accessibility of each rural cell (i). The normalised difference is weighted by the number of people living in each rural cell. As a result, the SAP index expresses a weighted accessibility poverty experienced by the population of a given municipality, in which higher figures mean that the municipality experiences more transport poverty.

The authors made an interesting empirical exercise investigating the relationship between the SAP index and other socio-economic variables of the municipalities. The relationship is analysed with nineteen socio-economic and demographic variables: freedom of movement (motorway density, car ownership and motorbike ownership); housing facilities (toilet, electricity and sewage disposal); education (illiterate rates and density of rural schools); health (density of rural healthcare centres and hospitals, population affected by mental, visual, motor or hearing impairment); income (income-poverty levels); other information (GDP, population size, density and rural share). The analysis showed that only four out of the nineteen variables analysed, density of hospitals, rural illiteracy, population and road density, did not present any statistical difference of means among the five SAP quintiles. Meanwhile, the findings from the pairwise comparison among the SAP quintiles showed that several variables, namely population density, municipality area, density of rural primary schools and rural households with no toilet, presented significant mean differences among the five quintiles.

Awaworyi Churchill and Smyth (2019) analysed the relationship between transport poverty and subjective well-being in Australia using 12 waves of longitudinal data from the Household, Income and Labour Dynamics in Australia (HILDA) survey. They measured transport poverty using indicators that reflect transport affordability and accessibility. They found that a standard deviation increase in transport poverty is associated with a decline in subjective well-being between 0.318 and 0.544 standard deviations. "The general finding is robust to alternative ways of measuring transport poverty, alternative estimation approaches, alternative approaches to addressing the endogeneity of transport poverty, and holds irrespective of whether subjective well-being is measured using the single-item overall life satisfaction scale or composite scales such as the Mental Health Inventory (MHI-5) scale or the Kessler Psychological Distress Scale (K10) (p.1)."

The authors contended that despite the importance of affordable transport for keeping a reasonable quality of life, little attention has been devoted to examining the relationship between transport poverty and subjective wellbeing. The authors measured transport poverty using the 10% index for three different transport costs, namely (1) public transport and taxis, (2) motor vehicle fuel, and (3) total transport-related expenditure derived by taking the sum of household expenditures on public transport, taxis and motor vehicle fuel.

Mattioli et al. (2019) analysed how transport affordability in high-motorisation and car-dependent countries is intimately linked to the price of oil-derived motor fuels, which may become increasingly

volatile in the future due to global oil price movements and environmental taxation. The authors found that the negative impacts of fuel price spikes in terms of increased household expenditure and economic stress are unevenly spatially and socially distributed, consolidating previous research regarding that vulnerability to fuel price increases is higher in peripheral, periurban and rural areas and that low income tends to be co-located and highly affected by high car dependence and low vehicle fuel efficiency, with a compounding effect on vulnerability. The authors used England as a case study, analysing the vulnerability to fuel price increases spatially using small demarcation areas through a composite index that considered income, accessibility, vehicle inspection and vehicle registration. Contrary to what was previously found, within English city regions, the persistent concentration of poverty was seen in urban cores. In addition, the poor fuel economy of the vehicle fleet was found in wealthier areas due to the prevalence of powerful vehicles there.

Three main indicators are used in the analysis: the exposure measured as the share of the fuel costs with respect to the income, the sensitivity measured as the income median reflecting that higher income households will be more able to maintain current travel patterns, i.e. they will adapt better to a fuel price increase without suffering hardship, and the adaptive capacity to fuel price increases that is measured as the total travel time to the nearest facility for eight key destinations by the minimum travel time by public transport or walking. The last indicator measured to some extent how well residents are able to avoid using private cars while maintaining travel activity to eight key services, and it can be considered as a proxy for the level of 'car dependence'.

Iman and Herwangi (2021) defined transport poverty as a paradigm that limits transport use and affects mainly marginalised citizens. The poor are most often affected by the lack of vehicles, both private and public transport services, in terms of choice and quality of service, thus causing social exclusion and impeding people from economic, social, and political participation due to lack of access to transport. Transport poverty affects the travel patterns of the affected groups. The study identified and analysed the impact of transport poverty on the travel patterns of affected groups and compared them with unaffected groups, focusing primarily on home-based school and work travel patterns as these trips are the most frequently done in a household. The results showed that the phenomenon of poverty occurred in Bekasi Barat, Bekasi City in Indonesia, influencing communities' travel patterns with indicators of affordability, mobility, and accessibility, as well as impacting their social exclusion.

Transport affordability was measured by the share of the transport cost with respect to total income. Transport mobility was measured by using the travel distance made by individuals. Transport accessibility was measured by the number of possible transport alternatives to go to desired destinations by public transport and private cars. Finally, a transport poverty scale was developed using fifteen indicators with an answer format based on a five-point Likert scale.

Robinson and Mattioli (2020) analysed the spatial patterns using the Moran index of the double energy vulnerability (DEV) measured by the intersection of energy poverty and transport poverty. The authors contended that transport poverty has received less attention than the respective energy poverty , even though transport costs are usually higher than energy costs. The authors used England as a case study to analyse the spatial distribution of both energy poverty and transport poverty for the first time using three well-known poverty indicators: the ten per cent indicator, the newer LIHC indicator, and the vulnerability to fuel price increase indicator. Thus, the authors identified clusters of neighbourhoods with a high or low propensity to DEV, finding that as many as 6% of neighbourhoods (accounting for 3 million residents) have a high propensity towards DEV, typically concentrating in isolated, rural neighbourhoods. They discussed the findings in light of how lack of access to networked energy and transport infrastructures aggravated DEV. The findings support a cross-sectoral policy approach to resolve the problem of vulnerable citizens.

Pons et al. (2024) proposed a range of accessibility indicators to evaluate transport equity within urban areas and incorporate them in transport poverty metrics, focusing on insufficient access to general services and employment. They argued that the new measures could be of interest in assessing immediate households' vulnerability and could contribute to better information on local policies in the long term. The authors developed a methodology to analyse transport poverty risks at the metropolitan scale, studying the relationship between urban segregation and the transport divide. They used the French city of Lyon as the case study, finding that beyond the sensitivity of households living in the first-crown neighbourhoods and the growing exposure of medium-income families settling in peripheral municipalities, can also be highly affected by transport poverty.

The authors contended that "two similar households with equivalent initial resources may indeed have made different location choices involving different initial investments and subsequent levels of accessibility. This raises the question of what minimum accessibility should be guaranteed. The proposed metrics, nonetheless, struggle to identify accessibility poverty, asking whether these levels actually enable people to engage in everyday activities (p.4)". To that purpose, they employed one of the most common indicators, the cumulative accessibility measure, which counts the number of opportunities that can be reached from a given place within thirty minutes by public transport. The main advantage of such functions is the ease of interpretation and communication, but they do not inform well about actual travel behaviour, which is influenced by individual preferences, choices, and constraints (Geurs and van Wee, 2004). A second index in the article by Pons et al. (2024) is based on the availability of public transport that assesses transport poverty efficiency, calculating the minimum time needed to reach the primary nodes of the network where the different services and jobs are often concentrated. These hubs are both often necessary to transfer from suburbs and are characterised by abundant opportunities. The authors studied the transport poverty vulnerability using a bivariate map combining the local accessibility index with the median disposable income, characterising the most vulnerable areas as those with the lowest accessibility index and the minimum disposable income.

Bousquet and Sanin (2024) analysed how the energy price increase that followed the Ukrainian crisis made several European governments implement different generalised gasoline subsidies to counteract the effects on the more vulnerable households without considering that the reduction of fossil-fuel consumption is crucial to mitigate the current climate crisis. They found that this type of policy is mainly regressive as fuel consumption for transport increases with income, making affluent households the primary beneficiaries of generalised subsidies. In this context, they analysed three car-fuel poverty measures to identify car-fuel-poor household profiles, finding the main socioeconomic determinants of such vulnerability. The results showed that aside from income, household composition, region, access to public transport, and house ownership significantly impact the probability of being car-fuel-poor. A further evaluation of the impact of recent subsidies implemented suggested that other alternative targeted policies could have been implemented, highlighting that false positives and negatives can be crucial to the implementation of such policies that improve the policy efficiency and saves a lot of taxpayer contributions.

The authors employed the following well-known transport poverty measures: the Low Income High Transport Cost (LIHTC), the (M/2) for those households which have fuel expenditures for transport that are less than half the population's median (M/2), and the (2M) for those households that have a budget share for car fuel that is disproportionally high, above twice the national median (2M). They estimated an econometric model to determine the key drivers that affect the probability of becoming car-fuel-poor. The results showed that the most significant determinants are: (i) LIHTC: the number of cars, specific socio-professional categories of the household's head, being a tenant in isolated rural areas and with poor access to public transport; (ii) 2M: being multi-motorized, specific socio-professional

categories, being a tenant in either commuting or isolated rural areas with little or poor access to public transport; and (iii) M/2: owning only one car, living in urban centres with access to public transport, specific socio-professional categories and belonging to the poorest incomes deciles.

Bousquet and Sanin (2024) discussed some of the widely used transport poverty measures summarising that some of the most significant improvements are based on: (i) the 10% indicator restricted to the first three income deciles; (ii) versions of the LIHC indicator; and, (iii) a mixture of the other measures conjointly with a declared qualitative indicator about some consensual measurement about transport discomfort, transport unhealthy conditions, low accessibility to activities and destinations, and the presence of arrears on household transport bills. Some countries have started policies based on voucher schemes dedicated to paying transport-related bills to tackle transport poverty.

Boyd et al. (2023) reviewed the literature on fuel, energy, and transport poverty for the first time, highlighting that policy interventions should provide a mechanism for identifying vulnerable households. They found differences between the policy documents and the academic papers regarding the indicators used, the arbitrariness of the thresholds, and the high dependency on one possible driver, namely expenditure. They concluded that all the concepts have their complex multidimensional challenges requiring a combination of indicators to allow the policy to identify vulnerable households accurately, and that the whole set of poverty concepts is a complex issue with significant health, financial, and social implications.

They also provided a great discussion on the false negatives that are usually found when the 10% ratio is used. A complication is named 'hidden fuel poverty', where households will self-adjust fuel consumption or disconnect from utilities entirely as a means of managing their finances. 'Hidden fuel poverty' refers to a situation where a household is self-regulating their energy consumption so that they are living in de facto fuel poverty, but under the strictness of the indicator, they are not identified as vulnerable.

Verhorst et al. (2023) used a survey conducted in two Dutch cities to measure transport poverty by a new indicator obtained from a new measurement scale by factor analysis. They compared the results of this new indicator with three widely used indicators and performed a series of linear regression models on the generated scores to identify which aspects of each measurement can be highlighted in each definition. They concluded that each definition presented its pros and cons, and it is in the hands of the policymakers to evaluate the applicability of different transport poverty definitions in specific contexts because each indicator is appropriate for particular situations, so optimal measurements do not exist, and particular indices better address some problems.

Allen and Farber (2019) studied transport poverty in households at a national scale, defining transport poverty as the compounded lack of ability to travel to important destinations and activities. Commonly, studies use succinct frameworks, reducing the burden of excessive data collection, which increases adaptability and makes research more convenient. However, Verhorst et al. (2023) contended that "different dimensions of transport poverty demonstrated that the partial aspects of transport poverty recorded would be the key determinant in understanding who is affected, and the shape of the policy solutions brought forward. Thus, the measurement depends on the given group or geographical area, and the issues under consideration (p.4)". This issue will be crucial in the current study, as it will help adapt transport poverty measures to the context of the outermost regions of the EU. In this regard, the measurements will go from assessing individual characteristics and population segments to more territorial and geographical areas. Investigating groups and areas instead of individuals increases the scale of research. However, given the nature of this study, a more general notion of transport poverty

is needed at the territorial level to make the analysis more accurate. Thus, the results obtained could provide some policy adjustments to leverage all the potentialities of the outermost regions.

The authors employed the scale developed by Ettema et al. (2022), which contains nine transport poverty-related statements. For each statement, respondents indicated their agreement on a 5-point Likert scale, ranging from 'completely disagree' to 'completely agree'. The nine indicators included in the scale have the following wording questions: (1) With the transport options available to me, I can travel in a way that is suited to my physical condition and abilities; (2) The public transport options in my neighbourhood reach destinations or activities that are important to me; (3) With the transport options available I can reach all my regular destinations and activities; (4) With the transport options available to me I have to spend more on necessary travel in a week than I can afford; (5) With the transport options available to me I spend much more time travelling than I would like; (6) I feel safe while travelling to my regular destinations and activities; (7) I am concerned about road safety while travelling to my regular destinations and activities; (8) I can travel without negative consequences to my health; and (9) With the transport options available to me I have to spend more on necessary travel in a week than I can afford. They analysed different transport poverty measures regressing them against some socio-economic and transport-related variables, performing a two-step procedure using first only socio-economic variables, and, in a second step, transport-related variables.

Alonso-Epelde et al. (2023) presented a new framework for measuring transport poverty based on the Household Budget Survey (HBS). The HBS provides information on household spending on goods and services and very detailed information on particular household demographic and socioeconomic characteristics. The HBS is also carried out and standardised at the European level, so the authors contended that the methodology is replicable and comparable to other European countries, which is one of the main advantages of the proposed methodology.

Thus, using the HBS microdata as inputs, households are identified as vulnerable to transport poverty under the umbrella of four complementary indices. Each index is related to one or more dimensions of transport poverty and uses different metrics and thresholds of expenditure and income variables to identify transport-poor households. The criteria to identify vulnerable households range from less restrictive and well-known transport poverty indices (10%, 2M) to more restrictive (LIHC) and a new method named vulnerable transport user (VTU) which is based on households that: i) have disproportionate expenditure on private transport and transport services; ii) suffer from an unfavourable economic situation that makes investments in energy efficiency or new carbon neutral technologies difficult; and iii) do not have accessible, affordable transport alternatives in a reasonable time. Therefore, according to this index, a household is considered a VTU if it meets the following three conditions at the same time: i) its expenditure on transport is more than double the national median; ii) its income is below the median for all households; and iii) its expenditure on public transport services is less than the national median for the households that report expenses in these categories. It can be seen that this index is more restrictive than those based on expenditure shares of transport and thresholds, including the expenditure shares on public transport costs as a proxy of having good transport alternatives. The 10% and 2M metrics identify households vulnerable to changes in transport goods and services prices, and the LIHC and VTU metrics identify severely vulnerable households for whom transport can aggravate their poverty.

Interestingly, the authors showed that 10% and 2M are not good indices for measuring transport poverty because they found some false positives when comparing the results of these indices with LIHC and VTU. However, other problems are associated with some false negatives of some households that do not spend any money on transport services because of a lack of resources. Several studies use the 10% and 2M because they are easy to calculate and communicate to policymakers. However, one of

the main disadvantages is that the indices overestimate transport poverty by showing numerous "false positives". Alonso-Epelde et al. (2023) showed that many households identified as transport vulnerable according to the 10% and 2M indices are in the five upper deciles of the income distribution. Transport poverty is a component of overall poverty, so it seems that wealthier households, which, for whatever reason, decide to spend more than ten per cent of their income, should not be identified as transport-vulnerable. These shortcomings can be overcome with measures that introduce the transport cost shares with income thresholds, such as the LIHC and VTU indices. Indeed, they make it possible to identify households that, in addition to being in the lower part of the income distribution, face a situation of poverty that can arise because of the high percentage of income that they have to dedicate to satisfying their mobility, housing, food, health or energy needs. For this reason, they are obliged to be deprived of some of the needed services, reporting difficulties in affording rent, mortgage, transport, dentist, household maintenance, energy bills or food, not by preference but by lack of resources (Mattioli et al., 2017).

Mendoza Aguilar et al. (2019) proposed a new index for energy poverty in the Canary Islands, using a different quantitative approach that corrected some specificities of the archipelago regarding high poverty rates combined with low energy consumption. This makes introducing an alternative, more robust indicator than those existing in the literature necessary. They compared five different energy poverty indices (10%, 2M, LIHC, AFCP and MIS), finding that the Canaries presented much lower energy poverty levels than Spain for the first three indices - 10%, 2M and LIHC, but significantly higher in the cases of the AFCP and MIS. In part, this was easily explained by the fact that in the last two indices, AFCP and MIS, the average net household income plays a determinant role in identifying households that are energy-poor. In the Canary Islands, net household income was lower than the average in the rest of Spain.

The authors proposed a new energy poverty index, named 'Compound Energy Poverty Indicator' (CEPI), characterised by: (i) Households whose net income (energy expenditure and housing deducted) is below 60% of the national median for all households and (ii) whose energy expenditure is higher than the minimum of the energy expenditure of all households' and 10% of their income. The authors found that "The results of the CEPI showed a more reliable characterisation of energy poverty in the archipelago. First, before the crisis of 2008, despite the lower income level of families in the Canaries, the lesser need for expenditure meant a lower level of energy poverty than in Spain. However, the greater effect of the crisis, which slowed down the process of economic convergence in the Canaries, meant a very strong increase in general poverty that eventually affected energy poverty in the Canary Islands (in a way that it almost reached average national values) (p.11)". Interestingly, the authors concluded that CEPI results are more coherent than those from the individual indicators considered above, so it seems evident that compound indices are better tailored to study energy poverty.

Bouscasse et al. (2023) contended that transport poverty and vulnerability concepts need to include the idea of adaptive capacity. They affirmed that "Indeed, depending on the capacity of households to adapt in order to reduce their car use, the level of vulnerability will not be the same. For example, an increase in fuel prices will have a different impact on a low-income household that uses a car a lot, depending on whether they can switch to public transport, walking or cycling. A household with a member who works nights will also be less adaptable than a household with active members working at traditional work hours. Certain family structures, such as single-parent families or families with several children, may also reduce adaptive capacity, but again this depends on travel distances and modal shift opportunities. Vulnerability thus depends on a combination of factors relating to different dimensions: financial dimension, specificity of distances and trips, family structure, ability to switch to other modes of transport (p.2)."

Bouscasse et al. (2023) developed the VulMob indicator, proposing a multi-criteria indicator that takes into account financial resources (2), work constraints (3), heavy car use (4), and structural constraints (4). Thus, it was possible to identify transport-poor and/or mobility-vulnerable households and conduct ex-ante or ex-post assessments of any transport policy or shock affecting mobility. The number of indicators for each dimension appears above, so it can be seen that the authors included thirteen indicators to calculate VulMob.

Recalde et al. (2019) constructed a structural energy poverty vulnerability index using a well-known methodology, the three-step Carr-Hill and Chalmers-Dixon method (Carr-Hill & Chalmers-Dixon, 2005), to build a composite index which was first based on forty-seven indicators. First, the authors identified a set of forty-seven country-level indicators that were available for the EU-27 countries in different data sources. Second, they performed a Spearman correlation analysis among the indicators, and pairs of indicators with a correlation higher than 0.8 were identified. One indicator of the set was selected by consensus with a group of experts. Third, a principal component analysis (PCA) with varimax orthogonal rotation was used to create the index. This extraction method is still one of the most widely used techniques to reduce the dimensionality of large datasets while preserving as much variability as possible (Jolliffe et al., 2016). Fourth, the final index is obtained with a further step, finding the correlation of the first component of the PCA with all the indicators and dropping all those that correlated lower than 0.5. After that, they conducted a second PCA with these indicators, and the first component was extracted again. Its scores were predicted and standardised to obtain the index, which depended on only thirteen indicators.

The literature review includes this study because it appears to be one of the exceptions exploring energy poverty at the national level for the first time, thus contributing to a more comprehensive perception of energy poverty at this scale. If one finds a proper dataset at NUTS 2 level, a similar index for transport poverty can be constructed, producing indices that can be used to better understand the inequalities prevailing within the EU and find if outermost regions present some disadvantage in comparison with other continental regions.

Lowans et al. (2021) made an exhaustive literature review on energy and transport poverty. They found that the Social Exclusion Unit (SEU) identified five key transport barriers which can be important factors for increasing transport poverty for some individuals: 1) availability and physical accessibility of transport, both public and private; 2) the cost of personal and public transport; 3) the inaccessible locations of services or other desirable locations; 4) safety and security of transport modes, (e.g. the safety of public transport at night); and lastly 5) travel horizons, (i.e. a person's willingness to travel long distances) (Social Exclusion Unit, 2003). Interestingly, the fifth barrier could be more common in the outermost regions of the EU.

Lowans et al. (2021) discussed that the metrics known as minimum income scores (MISs) were first introduced under the prism of energy by Moore (2012), saying that a household is in fuel poverty if (fuel costs > net household income – housing costs – minimum living costs). Moore considered this budget standard approach a fairer and more meaningful indicator for household comparison. However, in our view, it is difficult to admit that housing costs and other minimum living costs can be considered more important or urgent than fuel costs. In other words, it is difficult to disentangle fuel costs from the basket of important living costs. Lucas et al. (2016) put this as it is much harder (and likely varies by household) to define a required 'necessary' standard of transport. For this reason, income-based metrics alone are likely insufficient measures to address transport poverty.

Lowans et al. (2021) recommended after the state-of-the-art literature review that "social science, econometric and engineering concepts be integrated innovatively to capture the breadth and depth of energy and transport poverty, with a view to guiding decarbonisation pathways along fair routes,

whilst attempting to tackle the competing technical, operational, and administrative issues which arise when considering these issues (p.16)".

The European Parliament (2022) defines transport poverty as "poverty affecting households that have a high share of mobility expenditure to disposable income or a limited availability of affordable public or alternative modes of transport required to meet essential socio-economic needs, with a particular focus on households in rural, insular, mountainous, remote and less accessible areas or less developed regions or territories, including less developed peri-urban areas, caused by one or a combination of the following factors: high fuel expenditures, the phase-out of internal combustion engine cars, high costs for the replacement of internal combustion engine cars with zero-emission cars, high costs or lack of availability of adequate, affordable public or alternative modes of transport". Interestingly, in the definition itself, the European Parliament recognises that the pace for replacing internal combustion engines with zero-emission cars might have been too ambitious.

Mejía Dorantes and Murauskaite-Bull (2022) summarised the issues that affect transport poverty finding the following eight causes: (1) Spatial mismatch and social exclusion; (2) Housing and gentrification; (3) Rural and remote locations; (4) Accessibility, Affordability and Availability; (5) Car dependence; (6) Time-poverty; (7) Health and climate change related risks; and (8) Technological barriers and digital divide.

Lowans et al. (2023) applied two seemingly contradictory measures based on expenditures and their relative position with respect to the median to classify households or individuals as energy/transport poor. They classified a household (energy) or individual (transport) as energy/transport poor if expenditure on energy/transport exceeds twice the sample median. The index is known as 2M. For both measures, the index may capture households or individuals that are energy/transport inefficient and spend excessively. However, it may also capture the richest individuals who have the most to spend and may not, therefore, be an index with a limited ability to measure energy/transport poverty. However, sometimes, it is a measure that can capture car-related economic stress (Mattioli et al., 2016) for those who have problems in substituting an old car, which is mileage inefficient and needs a lot of repairmen visits. They use a similar measure (M/2) on the other side of the expenditure distribution, classifying a household (energy) or individual (transport) as energy/transport poor if the absolute energy/transport expenditure is below half the national median or abnormally low. Similarly to the previous case, it can be the case that some individuals could telework or work near the homes that can be in this category, and they are false positives.

Besides these two measures based on the expenditures, they also use four consensual measures of energy and transport poverty: (1) Arrears on bills: households that report falling into arrears on their energy (or transport) bills once or more during the past 12 months. This metric is useful for uncovering households that self-report financial difficulties in paying for energy or transport; (2) Inability to keep warm: households that self-report the inability to keep their home adequately warm when needed are considered energy-poor under this metric. This can uncover either financial hardship caused by energy bills or the effects of buildings in poor conditions of climate isolation; (3) Essentiality of car ownership: an individual is transport poor if they consider a car essential to meet their needs. In our view, this measure is quite stringent as in the current hypermobile societies, most of us could consider that the private car is essential to meet our mobility needs; and (4) Adequacy of public transport: as a complement to the essentiality of car ownership, individuals can be considered transport poor if they do not believe public transport in their area is sufficient to meet their needs. Again, this measure is evidently of interest, but it cannot be applied in isolation as it can be the perfect justification for the need to have a car.

The literature review showed that several indicators for measuring transport poverty exist and that each approach has advantages and limitations. As discussed, most of the indicators originate from the literature on energy poverty. However, Martens and Bastiaanssen (2019) contended that the applicability to transport required careful consideration because the normative standards are not as common as in the case of energy and basic household needs. The information needs are also different, and four main datasets have been found: the household budget surveys, the mobility and transport annual surveys, the specific transport surveys carried out for vulnerable households, and the accessibility gravity and cumulative opportunity indicators calculated at some territorial demarcation unit. The literature review also found different indicators based on single measures rooted in transport cost-share expenditures, in multiple indicators that related these with income distribution, or in scales measuring the transport poverty concept. Interestingly, setting standards or norms regarding the number of trips or the minimum travel time needed for a given period to participate in basic activities is an approach that has not been proposed as much as in the case of energy poverty. This budget approach to finding a sort of minimum income scale (MIS) is likely more problematic in the transport field because of the complexity of finding norms for activity participation that highly depend on urban planning and the car dependence of hyper-mobile societies. Nevertheless, it would be possible to compare the extent to which mobility needs and transport poverty are related, even though subjective measures are affected by the tuned analysis.

Using *single* indicators such as 10 percent, the half and double median shares (M/2 or 2M). These single indicators identify households with particular transport cost patterns. However, research shows that there are many false positives and negatives when these single indicators are applied. For this reason, comparing these indicators with the income distribution leads to indicators such as 'Low Income High Costs' (LIHC) that basically analyse households according to the *bivariate* distribution of transport cost shares and income or residual income. This latter approach benefits from the existing literature on income poverty, for which thresholds such as 60 per cent of the median are already extensively used. In addition, previous literature has shown that households and individuals misclassification is highly reduced when using the bivariate approach (in contrast to the single indicator approach). In a similar trend, the multidimensional composite indicator which is based on some measurement that synthesizes multiple single indicators can also be cited here.

Another interesting and new approach is based on studying transport poverty through administering specific questionnaires that include developed scales that measure the concept of transport poverty. At the same time, one of the main disadvantages cited for this type of approach is that the measurement is more subjective than that used in the other approaches, as the answer format of the questionnaires is mainly based on the Likert scale.[56] It limits the possibility to make cross-country or cross-region comparisons because the same questionnaire and the same answer scale should be used in all targeted territories. Nevertheless, it appears crucial to analyse the degree of similarity that this approach brings to the field in comparison with the indicators mentioned above.

A final approach is based on spatial accessibility indicators that measure the number of opportunities that can be achieved through gravity potential models or cumulative models. Other types of indicators, such as relative network efficiency, have not been used to our knowledge.

Table 10 provides a summary of the main studies analysed in the literature review regarding the indicators and metrics proposed according to the approaches discussed, the datasets and information

[56] The Likert scale is a rating scale widely used in surveys that typically asks the level of agreement of the respondent with a given statement. The answer scale therefore uses a definite number of levels, e.g. a five-level scale ranging from 'strongly disagree', 'disagree', 'neither disagree nor agree', 'agree' to 'strongly agree'.

needed to calculate these indicators, along with some explanatory comments. At this stage, it is important to note that one first needs to have detailed information on the household budget surveys as well as the European Union Statistics on Income and Living Conditions (EU-SILC) to make use of these indicators in the case of the outermost regions, as this is necessary to examine transport a household's expenses and some other more consensual transport poverty measures. Notably, some of the indicators described in the table can be calculated not only to characterise transport poverty but also to shed light on the number of households facing transport poverty.

Table 10: Overview of transport poverty indicators and metrics found in the literature

Study	Indicators/metrics	Data sets/information	Comments
Awaworyi Churchill and Smyth (2019)	10%, M/2, 2M	Households Budget Surveys	Subjective Well-Being scales are also used
Berry et al. (2016)	LIHC	Households Budget Surveys	Two indicators are jointly used to tell apart vulnerability and dependency
Bousquet and Sanin (2024)	M/2, 2M, LIHC	Households Budget Surveys	An econometric model is used to find key determinants that explain transport poverty
Mattioli et al. (2019)	10%, LIHC, Weighted Public Transport travel time	Vehicle inspection data	The travel time is calculated for eight key destinations
Robinson and Mattioli (2020)	10%, LIHC	Households Budget Surveys	Energy poverty and transport poverty are analysed to study Double Energy Vulnerability
Alonso-Epelde et al. (2023)	10%, 2M, LIHC and Vulnerable Transport User	Households Budget Surveys	Vulnerable Transport User is a composite indicator that depends on three components
Lowans et al. (2023)	M/2, 2M	Households Budget Surveys	The indicators are also complemented with four consensual measures
Verhorst et al. (2023)	Factor Analysis	Specific Survey containing transport poverty scale	Nine transport-related items are included in the scale
Recalde et al. (2019)	Factor Analysis	EU27 different datasets	A cascade method to choose only thirteen indicators
Bouscasse et al. (2023)	Multiple Criteria Indicator	Specific survey	Thirteen indicators are used to calculate the 'VulMob' indicator
Pons et al. (2024)	A cumulative accessibility indicator to jobs	GIS	A bivariate map that combines the accessibility index and the median disposable income

Benevenuto and Caulfield (2020)	A normalised gravity potential accessibility indicator	GIS	The indicator is normalised according to the distance to the maximum accessibility area
Martens and Bastiaanssen (2019)	Accessibility Gravity and Cumulative measures to job	GIS	Thresholds for income and accessibility measures
Tiznado-Aitken et al. (2018)	Walking accessibility to bus stops and the quality of the walking environment	GIS	10% and 20% of the bivariate distribution are used to analyse the results

Source: authors' own elaboration

Conclusions

Lucas et al. (2016) identified mobility poverty as one subcomponent of transport poverty, jointly with others such as accessibility, affordability or exposure to externalities. Karner et al. (2024) contended, upon closer investigation, that "these three additional components all relate to accessibility in the sense that greater mobility and affordability are associated with greater access. Reduced exposure to externalities also facilitates access by enhancing safety and physical health, for example. Still, some analysts may prefer to evaluate mobility, affordability, or exposure to externalities without reference to accessibility. Accordingly, we use accessibility inequality and poverty when referring to our analysis and transport inequality and poverty when speaking more broadly about potential applications and insights (p.3)".

Being one subcomponent of 'transport poverty' as laid down in Regulation (EU) 2023/955, it is clear that transport cost shares and income distribution will play a determinant role. However, it is not clear what can be considered an 'adequate' level of mobility/accessibility or transport system as this is ultimately related to both a political decision and a moral judgement that reflects the citizens' vision and aspiration of what a fair city with equal opportunities should be, and how the transport system should be organised for such an aim. Defining poverty thresholds, independently of the used concepts like mobility or accessibility, inevitably collides with paternalistic assumptions regarding individual preferences and needs (Martens, 2020; Preston & Rajé, 2007; Vanoutrive & Cooper, 2019).

Vanoutrive and Cooper (2019) discussed the definition provided by Martens in previous studies, claiming that transport poverty and a lack of accessibility are the main problems to be addressed by transport policy since citizens need an adequate accessibility level to participate in society. However, establishing the adequate level reflects a normative approach that, according to Martens (2020), only provides a partial vision of his ambition on the issue of transport justice. The existence of transport poverty is irrevocably an essential motivation for exploring transport justice, but his vision does not only affect the needs of weak or disadvantaged citizens. It is just widening the policy transport planning vision as a key domain of government intervention. In his own words, "Transport Justice is an account of the fundamental duties of government in the domain of transport, seeking to challenge the current status quo by challenging the system of road and gasoline taxes as a basis for financing infrastructure investments. It is essential to change the professional basis of transport planning beyond the functioning of the transport system to a more pragmatic concern for people's needs, radically revising the entire transport domain as one to be based on rights rather than on the principle of demand in combination with some limited level of benevolence towards the mobility disadvantaged (p.1)". It is time for governments to include in the respective constitutions the transport domain alongside other domains of government intervention like housing, education and health care, which in many countries are firmly based on principles of justice.

Summarising, it can be seen that the proposed indicators are consistent with the literature review and with the definition of energy poverty also laid down in Regulation (EU) 2023/955. Likewise, the proposed indicators include two factors that shape the concept of mobility poverty: first, the concept involves the lack of mobility services necessary for participation in society, resulting from the inaccessibility, unaffordability or unavailability of transport (Lucas, 2012); second, there is the need to stipulate travel standards to unify the metrics of mobility poverty and potentially alleviate limiting conditions (Lowans et al., 2021). The first of the factors can be analysed with the indicators based on the bivariate analysis, and the second factor can be analysed by the comparison of the areas of the outermost regions with similar areas of the EU that are not affected by their remoteness and isolation.

Lucas et al. (2016) identified numerous concepts that are related to the concept of transport poverty such as mobility poverty, accessibility poverty, transport affordability and exposure to transport externalities. The authors defined transport poverty as follows: "An individual is transport poor if, in order to satisfy their essential activity needs, at least one of the following five conditions apply: There is no transport option available that is suited to the individual's physical condition and capabilities; The existing transport options do not reach destinations where the individual can fulfil his/her daily activity needs, in order to maintain a reasonable quality of life; The necessary weekly amount spent on transport leaves the household with a residual income below the official poverty line; The individual needs to spend an excessive amount of time travelling, leading to time poverty or social isolation; and The prevailing travel conditions are dangerous, unsafe or unhealthy for the individual (p. 356)."

ANNEX III: DISCUSSION AROUND ACCESSIBILITY INDICATORS

Accessibility indicators can be calculated to compare intraregional and interregional mobility patterns in the form of gravity and cumulative indicators, using a fixed number of main destinations (e.g. 10 and 20) and e.g. the whole set of the capital cities of the EU. In this regard, it is important to distinguish between intraregional and interregional mobility, as the purpose, transport modes, duration and costs of the journeys are radically different. In particular, measuring accessibility and connectivity in air transport networks for interregional mobility appears to be better suited to evaluate the disadvantageous position of the outermost regions. This approach draws from the analysis by Voltes-Dorta and Martín (2022) and seeks to compare the accessibility indicators of the airports of the outermost regions with those of the main cities of other comparable NUTS2 regions such as the Balearic Islands and Corsica for being also insular territories but located closer to their Member State's mainland. These can be calculated for e.g. two different scenarios: (1) fixing the 25 or 50 Origin-Destination (OD) busiest routes for each airport; and (2) fixing the network of the airports of the outermost regions and the 27 largest airports of the capital cities of the EU Member States. In this case, the accessibility indicators embody significantly more than 'pure accessibility' measured by distance. More precisely, four different accessibility indicators can be estimated:

- The potential indicator: a gravity-model-based index that takes into account travel costs and attractiveness;
- The daily accessibility indicator: an indicator that uses a travel time threshold to measure the possibilities for interaction, also known as a 'cumulative opportunities' model;
- The location indicator: an indicator measuring a weighted average of travel times, travel costs or equivalent distances from a given origin to all destinations included in the analysis; and
- The relative network efficiency indicator: an interesting extension of the location indicator whereby the travel time between two airports is compared to a hypothetical 'optimal' travel time.

In principle, the main bivariate indicators that depend on shared costs and income distributions must be analysed to assess the level of 'transport affordability'. The main idea of these bivariate indicators is to have at least five percentiles of the two variables such as the 10th, 30th, 50th, 70th and 90th percentiles. To do so, the income distribution is used as one of the two variables and the shared costs in transport, private transport, public transport, housing and energy as the other variable to provide the household income distribution. In a more operational way, the systematised results of the literature analysis produced by Siksnelyte-Butkiene et al. (2021) can be adapted by identifying, among the different indices used, the most popular indicators: 10% indicator; Twice the National Median indicator (2M); Minimum Income Standard indicator (MIS); Low Income High Costs indicator (LIHC); After-Transport-Cost Poverty indicator (ATCP); EU-SILC – capacity to afford paying for one week annual holiday away from home; EU-SILC – car ownership; EU-SILC – Arrears on utility bills.

The main ideas extracted from Voltes-Dorta and Martín (2022) are the foundation of this part of the research. The main idea is to compare the accessibility indicators (AIs) of the airports of the outermost regions with the AIs of the capital cities of the EU27. The AIs can be calculated for three different scenarios: (1) fixing the 25 OD busiest routes for each airport; (2) fixing the 50 OD busiest routes for each airport; and (3) fixing the network of the airports of the outermost regions and the 27 airports of the capital cities of the EU Member States.

The potential indicator

The potential indicator is a gravity-model-based index that takes into account travel costs and attractiveness. The index ranks the accessibility of the airports or catchment areas as high values mean that a great economic potential is achievable from the origin. Thus, the potential P_i for an airport i can be defined as:

$$P_i = \sum_{j=1}^{n} \frac{GDP_j}{t_{ij}} \quad (1)$$

GDP_j is equal to the gross domestic product of the NUTS3 area in which the airport is located, and t_{ij} denotes the travel time between the airports.

The daily accessibility indicator

Daily accessibility indicators use a travel time threshold to measure the possibilities for interaction and they are also known as a 'cumulative opportunities' model. These indicators have more relevance when normative aspects of accessibility are highlighted (Páez et al., 2012). For example, when policy planners expect that citizens must not travel to some facilities such as hospitals, medical doctors, pharmacies, or schools more than 30 minutes. Air transport is not an exemption to these normative aspects, as, for example, 90% of travellers within the EU are expected to be able to complete their door-to-door trips within 4 hours (European Commission, 2011).

Hesse et al. (2013) chose a threshold figure of three hours to measure the daily accessibility provided by air transport, but it is adapted to four hours in the case at hand for obvious reasons. The daily accessibility indicator DA_i is obtained as follows:

$$DA_i = \sum_{j=1}^{n} Pop_j * \delta_{ij}$$

$$where \quad (2)$$

$$\delta_{ij} = 1 \quad if \quad t_{ij} \leq 4; \text{ and 0 otherwise}$$

Pop_j considers the population of the NUTS3 area in which the airport is located, and the delta parameter denotes the threshold figure. As said, we have fixed four hours as the threshold, but this can be adapted according to research needs. The figure should also vary according to the number of daily frequencies between each city pair.

The location indicator

The location indicator measures a weighted average of travel times, travel costs or equivalent distances from a given origin to all destinations included in the analysis. The higher the index, the lower is the accessibility of the node. It is highly correlated with the centrality index measured by the network analysis and reflects the locational disadvantage that is experienced by peripheral cities. Hesse et al. (2013) calculated the location indicator according to:

$$L_i = \sum_{j=1}^{n} t_{ij} s_j$$

where (3)

$$s_j = \frac{GDP_j}{\sum_{k=1}^{n} GDP_k}$$

The variables included in the index are the same ones as in the potential indicator. It does not define a decay function for distant nodes, so the calculation considers each city pair as equally representative, which is a very strong assumption made by this indicator. As in the rest of the indices, the role that flight frequency can play in the analysis is missed.

The relative network efficiency indicator

The relative network efficiency indicator NE_i is an interesting extension of the location indicator. In this case, the travel time between the two airports is compared to a hypothetical "optimal" travel time. This optimal travel time can be either estimated or obtained from empirical observations included in the analysis. This index has been used by Hesse et al. (2013) and Martín et al. (2004), and can be obtained as follows:

$$NE_i = \sum_{j=1}^{n} \frac{t_{ij}}{\tilde{t}_{ij}} s_j$$

where (4)

$$s_j = \frac{GDP_j}{\sum_{k=1}^{n} GDP_k}$$

Hesse et al. (2013) calculated the optimal travel time for each pair as the straight line distance between i and j converted to time with a ratio of 600 km per hour. Again, this could be normalized according to the densest route in the dataset in terms of flight frequency. Another interesting issue is the sensitivity of the index to non-stop, one-stop and two-stop connections to analyse in which cities the accessibility index is more or less affected by the structure of airline networks.

ANNEX IV: DATA SOURCES FOR MOBILITY POVERTY INDICATORS

Av1: Length of road network in km, per km²

The transport poverty indicator Av1 represents the ratio of the total length of the road network (motorways and other types of roads taken together) over the total land area of the region. It is thus a measure of the road network density. Of note, the Canary Islands are the only outermost region with motorways. A lower value contributes to a higher transport poverty.

Indicator components	Unit	Region	Year	Source	Indicator name (code)
Total length of the road network	Km	All	2022	Eurostat	Road, rail and navigable inland waterways networks by NUTS 2 regions (tran_r_net)
Length of the regional road network (excl. municipal roads)		Azores	2024	Directorate of Transport of the Government of Azores	N/A
Total land area	Km²	All	2022	Eurostat	Area by NUTS 3 region (reg_area3)

Av2: Number of buses, per km²

The transport poverty indicator Av2 represents the ratio of the total number of buses (fleet of buses excluding school buses) over the total land area of the region. Of note, Mayotte and Saint-Martin do not have bus services, however Saint-Martin has a system of on-demand taxi-bus services with no regular travel routes and times. A lower value contributes to a higher transport poverty.

Indicator components	Unit	Region	Year	Source	Indicator name (code)
Total number of buses	/	Martinique	2023	Martinique Transport, *Rapport d'Activités 2023*.	N/A
		Réunion	2017-2024	Payet and Turpin, *Etude Spécifique : Suivi du transport collectif de personnes, Rapport d'étude*, Observatoire Energie Réunion en partenariat avec l'AGORAH, complemented by information from the bus company websites	N/A
		Azores	2024	Directorate of Transport of the Government of Azores	N/A
Total land area	Km²	All	2022	Eurostat	Area by NUTS 3 region (reg_area3)

Acc1: Population reachable within a 1h30 travel / population within a 120 km radius (= transport performance by car)

The transport poverty indicator Acc1 represents the ratio of the population accessible within 1h30 by road around a given point of departure over the population living within a 120 km radius, multiplied by 100. This measure thus corresponds to a ratio of accessibility over proximity and is also referred to as 'transport performance by car'. A lower value contributes to a higher transport poverty.

Indicator components	Unit	Region	Year	Source	Indicator name (code)
Population accessible within 1h30 by road	/	All	2018	DG REGIO	Transport performance by car

Population living within a 120 km radius	/	All	2018	DG REGIO	

Aff1: Share of households' disposable income (budget) spent on transportation

The transport poverty indicator Aff1 represents the share of households' disposable income (budget) spent on transport. A higher value does not necessarily contribute to a higher transport poverty because more affluent households can afford to spend more on transport, e.g. to travel internationally, thereby potentially spending a higher share of their budget on this consumption item. For instance, wealthier households in Mayotte spend as much as 25.2% of their budget on transport, while very low income households spend only 7.8% of their budget on transport.[57]

Indicator components	Unit	Region	Year	Source	Indicator name (code)
Share of households' disposable income (budget) spent on transportation	%	Martinique, Guadeloupe, Réunion, French Guiana Mayotte	2017 2018	Insee, enquête Budget de famille	N/A

TP1: Average commuting time, in minutes

The transport poverty indicator TP1 represents the average time of the journey from home to the workplace. A higher value reflects a higher time poverty and thus contributes to a higher transport poverty.

Indicator components	Unit	Region	Year	Source	Indicator name (code)
Average commuting time	mins	Martinique, Réunion	2021	Insee, Recensement de la Population 2020, Metric 2021	N/A

TC1: Daily average of victims in road accidents, per million inhabitants

The transport poverty indicator TC1 represents the number of persons injured and killed in road accidents in one year, averaged per day (i.e. divided by 365), per million inhabitants. A higher value reflects poorer transport conditions due to higher unsafety and thus contributes to a higher transport poverty.

Indicator components	Unit	Region	Year	Source	Indicator name (code)
Daily average of victims in road accidents, per million inhabitants	/	All except Saint-Martin and Guadeloupe Saint-Martin and Guadeloupe	2022 2021	Eurostat French Road Safety Observatory, *La sécurité routière en France - bilan de l'année 2021*	Victims in road accidents by NUTS 2 regions (tran_r_acci)

[57] Source: Insee, enquête Budget de famille 2018.

TE1: Share of commuting trips made by car (proxy for congestion, noise and pollution)

The transport poverty indicator TE1 represents the proportion of commuting trips (i.e. trip from home to the workplace) that are made by car, as a proxy for the potential intensity of traffic jams. A higher value reflects higher transport externalities (because the car produces more congestion, noise and pollution than public transport and active travel modes) and thus contributes to higher transport poverty.

Indicator components	Unit	Region	Year	Source	Indicator name (code)
Share of commuting trips made by car	%	All French regions except Saint-Martin	2021	Insee, *Recensement de la Population 2021*	N/A

TE2: GHG emissions from car use, per person and per year

The transport poverty indicator TE2 represents the level of greenhouse gas emissions stemming from car use (for all types of trips), per person and per year. A higher value reflects higher transport externalities and thus contributes to higher transport poverty.

Indicator components	Unit	Region	Year	Source	Indicator name (code)
GHG emissions from car use, per person and per year	Tons of CO2e	All French regions except Saint-Martin	2019	SDES, RSVERO 2019 ; Insee, *recensement de la population 2019*, exploitation complémentaire.	N/A

Av3: Number of flights to the mainland's capital on a given day of the week, per million inhabitants

The transport poverty indicator Av3 corresponds to the total number of direct flights from the outermost region (all airports aggregated) to the Member State's capital city (i.e. Madrid, Paris or Lisbon) per week, per million inhabitants. A lower value contributes to a higher transport poverty.

Indicator components	Unit	Region	Year	Source	Indicator name (code)
Number of flights	/	All	2024	Flightradar24.com	N/A
Population	/	All except Saint-Martin Saint-Martin	2023	Eurostat World Bank	Population on 1 January by age, sex and NUTS 2 region (demo_r_d2jan)

Note: for Saint-Martin, there is no airport located in the outermost region, i.e. the French part of the island. The international airport is located nearby in the Dutch part of the island, which is however not an EU outermost region. This airport has been considered for Saint-Martin, as it has direct flights to Paris. Data accessed on 12 September 2024.

Acc2: Accessibility to passenger flights

The transport poverty indicator Acc2 represents the population-weighted average number of flights per day, accessible within 90 minutes by road. A lower value contributes to higher transport poverty.

Indicator components	Unit	Region	Year	Source	Indicator name (code)
Accessibility to passenger flights	/	All	2019	DG REGIO analysis based on data from Eurostat, EuroGeographics, TomTom and JRC (GEOSTAT-JTC 2018 grid)	N/A

TP2: Average direct flight duration (to the mainland's capital)

The transport poverty indicator TP2 corresponds to the duration of a direct flight from the outermost region to the respective Member State's capital. A higher value contributes to higher transport poverty.

Indicator components	Unit	Region	Year	Source	Indicator name (code)
Direct flight duration	Minutes	All	2024	Travelmath.com, assuming an average flight speed for a commercial airliner of 805 km/h and adding an extra 30 minutes for take-off and landing.	N/A

ANNEX V : SPATIAL INTERACTION MODEL

Spatial Interaction Model to estimate mobility poverty in the Azores

The Spatial Interaction Model assumes that basic employment or the employment associated to the export sectors and/or created by external transferences (public or remittances), generates multiplier effects creating non-basic employment that provides goods and services to the local population.

In line with Accessibility Indicators the spatial interaction commuting flows $T_{j(ik)}$ from (i) to (j) in sector (k) equal to:

$$T_{j(ik)} = E_{ik} \frac{r\, A_{kj}\, e^{(-\alpha_k d_{ij})}}{\sum_j A_{kj}\; e^{(-\alpha_k d_{ij})}}$$

and the Population of each zone (j) P_j

$$P_j = \sum_{ik} T_{j(ik)}$$

Where P_j is the resident population of the zone j and which depends on the activities k of the all zones i; r it is the inverse of the activity rate; A_{jk} it is the residential attractiveness in the residential zone j; $\alpha_k$it is the parameter that defines the friction produced by the distance travelled by commuters that depend on the sector (k); d_{ij} is the distance between the zones i and j.

In addition, all non-basic activities generated in a given sector of a zone are also used can be defined by the expression:

$$S_{i(jk)} = P_i \frac{s_{ki}\;\; B_{ki}\; e^{(-\beta_k d_{ij})}}{\sum_i \left[s_{ki}\; B_{ki}\;\; e^{(-\beta_k d_{ij})}\right]}$$

Being E_{jk} is the employment of the activity sector k in the zone j, we have:

$$E_{jk} = \sum_i S_{i(jk)}$$

Where $S_{i(jk)}$is the activity generated in sector k in the area j that serves the population in the area i; B_{ki} it is the attractiveness of class services k in the area i; β_k it is the calibrated parameter that defines the friction produced by the distance travelled by the population in search of the service in the sector of activity k; s_{ki} is the coefficient Service/Population of the sector of activity k that relates to consumption patterns (ρ_k = the quotient between the consumption of the activity k and the population), and productivity μ_{ki} = production per employment of sector of activity k in zone (i)

$$s_{ki} = \left(\frac{\rho_k}{\mu_{ki}}\right)$$

Endogenous variables P_j and E_{jk} can be obtained through the exogenous variable basic employment (Eb_{jk}), using the matrix [A], the matrix [B], an identity matrix I.

$$E_{jk} = \{I - [A][B]\}^{-1}\; \left[Eb_{jk}\right]$$

$$P_j = \{I - [A][B]\}^{-1} \left[Eb_{jk}\right] [A]$$

Where:

$$[\mathrm{A}] = \frac{r\, A_{kj}\, e^{(-\alpha_k d_{ij})}}{\sum_j A_{kj}\ e^{(-\alpha_k d_{ij})}}$$

and

$$[\mathrm{B}] = \frac{s_{ki}\ B_{ki}\, e^{(-\beta_k d_{ij})}}{\sum_i \left[s_{ki}\, B_{ki}\ e^{(-\beta_k d_{ij})}\right]}$$

Mobility Indicators

The Spatial Interaction Model allows three types of Mobility Indicators:

Per capita cost to access goods and services per region.

$$CSpc_i = \sum_j (S_{i(jk)}\, d_{ij})/P_i$$

Per capita cost to access work per region.

$$CLpc_i = \sum_j (T_{i(jk)}\, d_{ij})/P_i$$

Total cost to access goods and service and work per region.

$$CTpc_i = CSpc_i + CLpc_i$$

Application to the Azores

The application of the SIM model to the Azores is based on the work by Dentinho et al. (2016).

Concepts

Table 11 presents the elements of internal demand of regions (k) on regions (l) for products of sectors (i) ($\mathrm{D}_{kl,i}$); the external demand of regions (k) for products of sectors (i) ($\mathrm{E}_{k,i}$); the primary inputs of regions (k) on regions (l) for products of sectors (i) ($\mathrm{W}_{kl,i}$) and the imports of regions (k) for products of sectors (i) ($\mathrm{I}_{k,i}$).

Table 11: Spatial Interaction Matrix

		Region N		Region M		Internal Demand		External Demand	Total Production
		Sector 1	Sector 2	Sector 1	Sector 2	Region N	Region M		
Region N	Sector 1					D_{NN1}	D_{NM1}	E_{N1}	T_{N1}
	Sector 2					$D_{NN,2}$	$D_{NM,2}$	$E_{N,2}$	$T_{N,2}$
	Sector 1					D_{MN1}	D_{MM1}	E_{M1}	T_{M1}

		Region N		Region M		Internal Demand		External Demand	Total Production
		Sector 1	Sector 2	Sector 1	Sector 2	Region N	Region M		
Region M	Sector 2					$D_{MN,2}$	$D_{MM,2}$	$E_{M,2}$	$T_{M,2}$
Primary Inputs N	Region N	W_{NN1}	W_{NN2}	W_{NM1}	W_{NM2}				W_N
	Region M	W_{MN1}	W_{MN2}	W_{MM1}	W_{MM2}				W_M
Imports		I_{N1}	I_{N2}	I_{M1}	I_{M2}				I
Total Production		T_{N1}	T_{N2}	T_{M1}	T_{M2}	TD_N	TD_M	E	T

Source: authors' own elaboration

Table 12 presents the transport costs per unit of flow (C_{NM}) of spatial interaction flows with two sectors (i,j) and two regions (N,M). Notice that the flows are flows of commuters and shoppers which costs are assumed to be similar for all sectors.

Table 12: Spatial Interaction Costs

		Region N		Region M		Internal Demand		External Demand
		Sector 1	Sector 2	Sector 1	Sector 2	Region N	Region M	
Region N	Sector 1					C_{NN}	C_{NM}	C_{NE}
	Sector 2					C_{NN}	C_{NM}	C_{NE}
Region M	Sector 1					C_{MN}	C_{MM}	C_{ME}
	Sector 2					C_{MN}	C_{MM}	C_{ME}
Primary Inputs N	Region N	C_{NN}	C_{NM}	C_{NN}	C_{NM}			
	Region M	C_{NN}	C_{NM}	C_{NN}	C_{NM}			
Imports		C_{NI}	C_{NI}	C_{MI}	C_{MI}			

Source: authors' own elaboration

Based on the data of **Table 11** and **Table 12** it is possible to estimate the Internal and the External Demand Interaction Costs using the following formulas:

a) Estimates of the Internal Demand Interaction Costs for each Region (N) (FDIc_N) considering the flows from all sectors (U) of region (N), to the Internal Demand of all and regions ($D_{NM,i}$).

$$\mathrm{FDIc}_N = \left(\sum_{iN=1.1}^{T.U} \sum_{ik=1.1}^{T.K} C_{NM} D_{NM,i} \right) / \sum_{jN=1}^{T.U} D_{NM,i}$$

b) Estimates of the External Demand Interaction Costs for each Region (N) (EDIc_N) considering the flows from all sectors (U) of region (N), to the External Demand of all and regions ($D_{NM,i}$).

$$\mathrm{EDIc}_N = \left(\sum_{iN=1.1}^{T.U} \sum_{ik=1.1}^{T.K} \mathrm{C}_{NE} E_{NM,i} \right) / \sum_{jN=1}^{T.U} E_{NM,i}$$

Based also on the data of **Table 11** and **Table 12** it is possible to estimate the Primary Inputs Interaction Costs and the Imports Interaction Costs in Km per Unit of Interaction using the following formulas:

a) Estimates of the Primary Inputs Demand Interaction Costs for each Region (N) (PIIc_N) considering the flows from all sectors (U) of region (N), to the Internal Demand of all and regions ($W_{NM,i}$).

$$\mathrm{PIIc}_N = \left(\sum_{iN=1.1}^{T.U} \sum_{ik=1.1}^{T.K} \mathrm{C}_{NM} W_{NM,i} \right) / \sum_{jN=1}^{T.U} W_{NM,i}$$

b) Estimates of the Imports Interaction Costs for each Region (N) (IIc_N) considering the flows from all sectors (U) of region (N), to the External Demand of all and regions ($I_{NM,i}$).

$$\mathrm{IIc}_N = \left(\sum_{iN=1.1}^{T.U} \sum_{ik=1.1}^{T.K} \mathrm{C}_{NE} I_{NM,i} \right) / \sum_{jN=1}^{T.U} I_{NM,i}$$

Finally, the Total Interaction Costs in Km per unit of flow (Table 5B) can be estimated by summing all the costs.

- $\mathrm{TICtp}_N = \mathrm{FDIc}_N + \mathrm{EDIc}_N + \mathrm{PIIc}_N + \mathrm{IIc}_N$

Results

The biggest island of São Miguel and the smaller and remote island of Corvo show the lower transport costs for all outputs: the former because all costs are lower, and the latter because the external input and output flows are low.

Conclusions

Accessibility does not depend only on the distance to a place assumed as central. It depends on the economic structures of the regions influenced by the degree of integration in external markets.

If we want to evaluate the difference between the actual accessibility and the optimal accessibility some more work should be done, namely simulating the impact of changes in unilateral public transferences.

ANNEX VI: INTERREGIONAL INPUT-OUTPUT MODEL

Interregional Input-Output Model to estimate mobility poverty in the Azores

Application to the Azores

The application of the IOM model to the Azores is based on the work by Haddad et al. (2012).

Concepts

Table 13 presents the elements ($X_{ij,NM}$) of an interregional input-output matrix of an economy with two sectors (i,j) and two regions (N,M).

Table 13: Interregional Input-Output Matrix

		Region N		Region M		Internal Demand	External Demand	Total Production
		Sector 1	Sector 2	Sector 1	Sector 2			
Region N	Sector 1	$X_{NN,11}$	$X_{NN,12}$	$X_{NM,11}$	$X_{NM,12}$	D_{N1}	E_{N1}	T_{N1}
	Sector 2	$X_{NN,21}$	$X_{NN,22}$	$X_{NM,21}$	$X_{NM,22}$	$D_{N,2}$	$E_{N,2}$	$T_{N,2}$
Region M	Sector 1	$X_{MN,11}$	$X_{MN,12}$	$X_{MM,11}$	$X_{NM,12}$	D_{M1}	E_{M1}	T_{M1}
	Sector 2	$X_{MN,21}$	$X_{MN,22}$	$X_{MM,21}$	$X_{MM,22}$	$D_{M,2}$	$E_{M,2}$	$T_{M,2}$
Imports		I_{N1}	I_{N2}	I_{M1}	I_{M2}			I
Primary Inputs		W_{N1}	W_{N2}	W_{M1}	W_{M2}			W
Total Production		T_{N1}	T_{N2}	T_{M1}	T_{M2}	TD	TE	T

Source: authors' own elaboration

Table 14 presents the transport costs per unit of production ($C_{ij,NM}$) of interregional input output economic flows with two sectors (i,j) and two regions (N,M).

Table 14: Interregional transport costs per sector

		Region N		Region M		Internal Demand	External Demand
		Sector 1	Sector 2	Sector 1	Sector 2		
Region N	Sector 1	$C_{NN,11}$	$C_{NN,12}$	$C_{NM,11}$	$C_{NM,12}$	Cd_{N1}	Ce_{N1}
	Sector 2	$C_{NN,21}$	$C_{NN,22}$	$C_{NM,21}$	$C_{NM,22}$	$Cd_{N,2}$	$Ce_{N,2}$
Region M	Sector 1	$C_{MN,11}$	$C_{MN,12}$	$C_{MM,11}$	$C_{NM,12}$	Cd_{M1}	Ce_{M1}
	Sector 2	$C_{MN,21}$	$C_{MN,22}$	$C_{MM,21}$	$C_{MM,22}$	$Cd_{M,2}$	$Ce_{M,2}$
Imports		Ci_{N1}	Ci_{N2}	Ci_{M1}	Ci_{M2}		
Primary Inputs		Cw_{N1}	Cw_{N2}	Cw_{M1}	Cw_{M2}		

Source: authors' own elaboration

Based on the data of **Table 13** and **Table 14** it is possible to estimate the Average Transport Costs in Km per Unit of Production Sold in thousand EUR using the following formulas:

a) Estimates of the Intermediary Average Transport Costs for each Region (N) (ATCin_N) considering the flows from all sectors (U) of region (N), to all sectors (T) and regions (U), ($X_{ij,NM}$).

- $\mathrm{ATCin}_N = \left(\sum_{iN=1.1}^{T.U} \sum_{jN=1.1}^{T.U} \mathrm{C}_{ij,NM} X_{ij,NM} \right) / \sum_{jN=1}^{T.U} X_{ij,NM}$

b) Estimates of the Final Demand Average Transport Costs for each Region (N) (ATCcf_N) considering the flows from all sectors (U) of region (N), to the Final Demand of Region(N) ($D_{ij,N}$).

- $\mathrm{ATCfd}_N = \left(\sum_{iN=1.1}^{T.U} \sum_{jN=1.1}^{T.U} \mathrm{C}_{ij,N} D_{ij,N} \right) / \sum_{jN=1}^{T.U} D_{ij,N}$

c) Estimates of the Exports Average Transport Costs for each Region (N) (ATCex_N) considering the flows from all sectors (U) of region (N), to the Final Demand of Region (N) ($E_{ij,N}$)

- $\mathrm{ATCex}_N = \left(\sum_{iN=1.1}^{T.U} \sum_{jN=1.1}^{T.U} \mathrm{C}_{ij,N} E_{ij,N} \right) / \sum_{jN=1}^{T.U} E_{ij,N}$

d) Estimates of the Government Average Transport Costs for each Region (N) (ATCgo_N) considering the flows from all sectors (U) of region (N), to the Final Demand of Region (N) ($E_{ij,N}$)

- $\mathrm{ATCgo}_N = \left(\sum_{iN=1.1}^{T.U} \sum_{jN=1.1}^{T.U} \mathrm{C}_{ij,N} G_{ij,N} \right) / \sum_{jN=1}^{T.U} G_{ij,N}$

e) Estimates of the Total Production Average Transport Costs for each Region (N) (ATCtp_N) considering all the flows from all sectors (U) of region (N), to the Total Production of Regionl (N).

- $\mathrm{ATCtp}_N = \left(\sum_{iN=1.1}^{T.U} \sum_{jN=1.1}^{T.U} \mathrm{C}_{ij,NM} X'_{ij,NM} \right) / \sum_{jN=1}^{T.U} X'_{ij,NM}$

Based on the data of Tables 1 and 2 it is also possible to estimate the Average Transport Costs in Km per Unit of Production Bought in EUR 1000 (Table 4) using the following formulas:

f) Estimates of the Intermediary Average Transport Costs for each Region (N) (ATCin_N) considering the flows from all sectors (T) and for all regions (U), to all sector of region (N), ($X_{ij,NM}$).

- $\mathrm{ATCin}_N = \left(\sum_{jN=1.1}^{T.U} \sum_{iN=1.1}^{T.U} \mathrm{C}_{ij,NM} X_{ij,NM} \right) / \sum_{jN=1}^{T.U} X_{ij,NM}$

g) Estimates of the Imports Average Transport Costs for each Region (N) (ATCim_N) considering the flows from all sectors (T) of outside (Im) to all sector of region (N), ($Im_{ij,N}$).

- $\mathrm{ATCim}_N = \left(\sum_{jN=1.1}^{T.U} \sum_{iN=1.1}^{T.U} \mathrm{C}_{ij,N} Im_{ij,N} \right) / \sum_{jN=1}^{T.U} Im_{ij,N}$

h) Estimates of the Primary Imputs Average Transport Costs for each Region (N) (ATCpi_N) considering the flows from all sectors (T) of outside (Im) to all sector of region (N), ($Pi_{ij,N}$).

- $\mathrm{ATCim}_N = \left(\sum_{jN=1.1}^{T.U} \sum_{iN=1.1}^{T.U} \mathrm{C}_{ij,N} Pi_{ij,N} \right) / \sum_{jN=1}^{T.U} Pi_{ij,N}$

i) Estimates of the Total Inputs Average Transport Costs for each Region (N) (ATCti_N) considering all the flows from all sectors (U) of region (N), to the Total Inputs of region (N).

- $\mathrm{ATCti}_N = \left(\sum_{iN=1.1}^{T.U} \sum_{jN=1.1}^{T.U} \mathrm{C}_{ij,NM} X''_{ij,NM} \right) / \sum_{jN=1}^{T.U} X''_{ij,NM}$

Finally, the Average Transport Costs in Km per 1000 Euros of Production (Table 5) can be estimated by summing the Total Production Average Transport Costs for each Region (N) (last column of Table A3) with Average Transport Costs in Km per Unit of Production Bought in EUR 1000 (last column of Table A4) and deducting the costs of the flows internal to each region to avoid double counting.

- $$\mathrm{ATCtp}_N = \mathrm{ATCtp}_N + \mathrm{ATCti}_N - \left(\sum_{iN=1.1}^{T.N} \sum_{jN=1.1}^{T.N} \mathrm{C}_{ij,NN} X_{ij,NN}\right) / \sum_{jN=1}^{T.N} X_{ij,NN} +$$

Data

Data on flows and distances are taken from the study of Eduardo Haddad and colleagues of 2012 named above. Distances involved an embarkment costs of 100 Km but with an on-cruise cost of 10% of the distances. Distances per sector were weighted by the attrition factor estimated in the work of Dentinho et al. (2016) indicated in the Spatial Interaction exercise of **Annex V**.

Results

Using Spatial Interaction Framework and focusing on output costs the 'better off' island is Terceira and the 'worst off' are Santa Maria and Corvo (**Table 15**).

Table 15: Internal and External Output Interaction Costs in Km per Unit of Flow

	Internal Output Costs	External Output Costs	Total Output Costs
Santa Maria	7	292	73
São Miguel	6	295	31
Terceira	8	308	25
Graciosa	8	312	31
São Jorge	11	312	34
Pico	8	316	32
Faial	11	319	42
Flores	6	340	33
Corvo	6	339	73

Source: authors' own elaboration

The same happens focusing on input costs according to which the better island is also Terceira and the worst are Santa Maria and Corvo (**Table 16**).

Table 16: Internal and External Input Interaction Costs in Km per Unit of Flow

	Internal Input Costs	External Input Costs	Total Input Costs
Santa Maria	3	292	70
São Miguel	5	295	30
Terceira	5	308	22
Graciosa	3	312	27
São Jorge	4	312	28
Pico	5	316	29
Faial	4	319	36
Flores	3	340	30
Corvo	2	339	70

Source: authors' own elaboration

The lowest internal and external interaction cost is for Terceira island, most probably because it is more central in the archipelago and more 'compact' than the other islands.

Table 17: Internal and External Interaction Costs in Km per Unit of Flow

	Total Costs
Santa Maria	143
São Miguel	61
Terceira	46
Graciosa	58
São Jorge	62
Pico	62
Faial	78
Flores	64
Corvo	143

Source: authors' own elaboration

Discussion

Accessibility indicators are not static because they should include both the flows and the costs of interaction. Assuming that the transport of intersectoral flows is distributed among all, the movements of commuting, shopping and equivalent import and export movements can be used to assess the accessibility of places and regions.

Conclusion

Accessibility does not depend only on the distance to a place assumed as central. It depends on the economic structures of the regions influenced by the degree of interaction within each of them, between them and between them and the outside world.

Using an own, newly elaborated functional definition of mobility poverty, this study first estimates mobility poverty in the nine EU outermost regions and assesses its effects on their transport and tourism sectors. It then reviews the Fit for 55 transport-related legislation and analyses its implications for these remote territories. It also outlines the main EU, national and regional measures tackling the effects of both mobility poverty and the new climate legislation, and finally concludes with policy recommendations.

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