

**Institute for Environmental Policy**

# **Analysis of Transport Poverty in Slovakia in Support of the Social Climate Plan**

**February 2025  
Economic analysis 19**



The Institute for Environmental Policy (IEP) is an analytical unit of the Ministry of Environment of the Slovak Republic. The IEP's mission is to provide high quality and reliable environmental analyses and forecasts to the Slovak government and the public.

Ministry of  
Environment  
of the Slovak  
Republic

### **Reviews**

The analysis was approved as peer-reviewed by the Council of Analytical Units on the basis of the evaluations by Ján Mykhalchyk Hradický (Ministry of Finance of the Slovak Republic), Radovan Slávik (Ministry of Transport of the Slovak Republic) and Marcela Veselková (Ministry of Labour, Social Affairs and Family of the Slovak Republic).

### **Disclaimer**

This analysis expresses the views of the authors and the Institute for Environmental Policy (IEP), which do not necessarily reflect the official views of the Ministry of Environment of the Slovak Republic (MoE SR). The goal of the publication of IEP's analyses is to encourage and improve public and expert discussions on economic topics. Therefore, all quotations of the text should be attributed to the IEP (instead of the MoE SR).

### **Acknowledgements**

Special thanks to Jakub Fegyveres and colleagues from the Institute for their help in preparing the text and drafting the measures. For providing data and comments on the study we thank the following people: Róbert Berežný (IDS Východ), Rastislav Farkaš (Ministry of Finance of the Slovak Republic), Branislav Hábel (Ministry of Labour, Social Affairs and Family of the Slovak Republic), Peter Klučka (Ministry of Transport and Construction of the Slovak Republic), Lukáš Kováč (Ministry of Transport of the Slovak Republic), Valéria Šimorová (NSK Office), Jakub Zapotocký (Ministry of Finance of the Slovak Republic) and many others.

### **Authors**

Stella Košíková  
Hana Arnold

stella.kosikova@mfsr.sk  
hana.arnold@enviro.gov.sk

# Table of Contents

<b>List of tables, graphs, figures and boxes .....</b>	<b>4</b>
<b>List of abbreviations.....</b>	<b>5</b>
<b>Summary .....</b>	<b>6</b>
<b>Introduction .....</b>	<b>8</b>
<b>1 How do we travel?.....</b>	<b>11</b>
1.1 How we travel and how much it costs .....	11
1.2 Who provides public passenger transport? .....	13
<b>2 Which regions are transport poor? .....</b>	<b>15</b>
2.1 How to quantify transport poverty .....	16
2.2 Transport poverty in Slovakia .....	17
<b>3 Measures for cleaner and fairer transport .....</b>	<b>22</b>
3.1 Temporary direct income support .....	23
3.2 Improving access to public, shared and active and on-demand transport .....	25
3.3 Improving access to zero-emission passenger vehicles and infrastructure .....	31
3.4 Challenges in the preparation and implementation of the Social Climate Plan ....	33
<b>Bibliography.....</b>	<b>35</b>
<b>Annexes .....</b>	<b>39</b>
Annex A: Overview of indicators used .....	39
Annex B: Methodology for the construction of the composite index.....	43
Annex C: Estimated costs of measures .....	46

# List of tables, graphs, figures and boxes

Box 1: Estimating the costs of ETS2 in transport.....	10
Box 2: Institutional framework for transport in Slovakia .....	14
Box 3: The concept of transport poverty .....	21
Graph 1: Emissions from road transport in Slovakia (index 1990 = 100).....	8
Graph 2: Maximum financial allocation per Member State from the Social Climate Fund (EUR) .....	9
Graph 3: ETS2 direct annual costs from passenger road transport (€ million, 2023 prices).....	10
Graph 4: Purpose of trip.....	11
Graph 5: Mode of commuting to work and school .....	11
Graph 6: Transport expenditure in Slovakia (euro/person/year).....	12
Graph 7: Transport and energy costs (person/year) in Slovakia.....	12
Graph 8: Development of costs and number of passengers in regional public passenger transport in the Self-Governing Prešov Region.....	14
Graph 9: Population at risk of transport poverty (in thousands).....	18
Graph 10: Temporary direct support by exposure to transport poverty .....	24
Graph 11: Proposed subsidy for the purchase of intercity buses at county level .....	26
Graph 12: Median distance travelled for school by income.....	27
Graph 13: Share of electric vehicles in use relative to new registered electric vehicles .....	32
Graph 14: Number of vehicles by emission standard (in thousands) .....	32
Graph 15: Number of monthly equivalised disposable incomes per person needed to buy a car .....	33
Table 1: Increase in costs due to ETS2 (euros per year, 2023 prices).....	10
Table 2: Indicators used .....	16
Table 3: Transport poverty risk* in Self-governing regions .....	17
Table 4: Summary of recommended measures .....	23
Table 5: Comparison of subsistence and income poverty (euro/household/month) .....	34
Figure 1: Degrees of vulnerability of municipalities to transport poverty .....	6
Figure 2: Three dimensions of transport poverty.....	15
Figure 3: Transport poverty risk levels in municipalities .....	17
Figure 4: The impact of travel time and number of public passenger transport connections on the transport poverty risk level in the districts of Snina and Sobrance.....	18
Figure 5: The impact of travel time and number of public passenger transport connections on the transport poverty risk level in municipalities in the Krupina district.....	19
Figure 6: The impact of age of vehicles, number of vehicles and unemployment rate on the transport poverty risk level in the districts of Rimavská Sobota and Revúca .....	19
Figure 7: The impact of the number of PT connections and travel time on the transport poverty risk level in the districts of Malacky and Senica .....	20
Figure 8: The impact of the distance of PT stops on the transport poverty risk level in the municipalities of Rakúsy and Stráne pod Tatrami.....	20
Figure 9: Number of inhabitants travelling within 5km outside their municipality in Rimavská Sobota district .....	30
Figure 10: Number of inhabitants travelling within 5km outside their municipality in Trebišov district ..	30

# List of abbreviations

CI	Composite index
DNSH	Do No Significant Harm
EC	European Commission
IDS	Integrated Transport System
MoT SR	Ministry of Transport of the Slovak Republic
MLSAaF SR	Ministry of Labour, Social Affairs and Family of the Slovak Republic
MoE SR	Ministry of the Environment of the Slovak Republic
NADA	National Transport Authority
POO	Recovery and Resilience Plan
PSK	Programme Slovakia 2021 – 2027
PT	Public transport
SCF	Social Climate Fund
SCP	Social Climate Plan
SODB2021	Population and Housing Census 2021
SO SR	Statistical Office of the Slovak Republic
VOD	Public passenger transport
ZSSK	Railway Company Slovakia

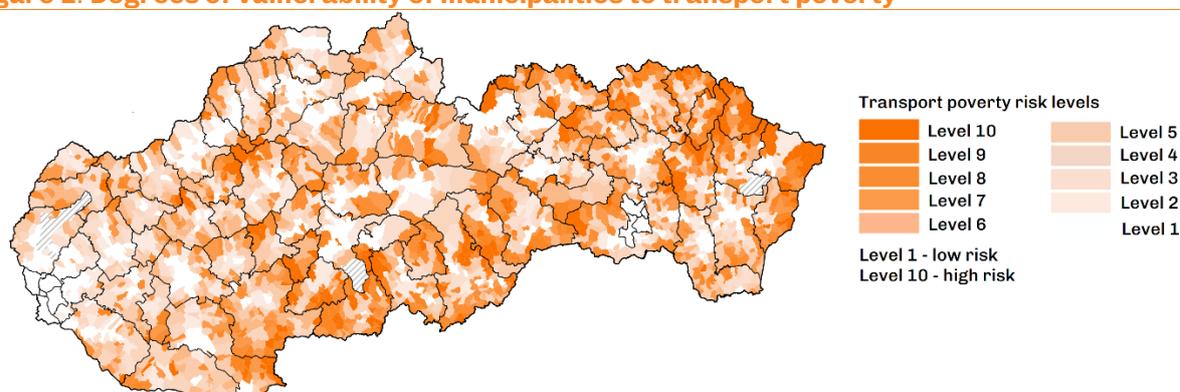
# Summary

**The socio-economic impacts of emissions reductions pose a significant challenge in implementing climate policies.** One of the most socially sensitive measures is the introduction of a new emissions trading scheme for the road transport and buildings sectors (ETS2). This policy would raise fuel prices, potentially placing a disproportionate burden on vulnerable households. At the same time, transport remains the only sector where greenhouse gas emissions continue to rise.

**The European Union has established the Social Climate Fund (SCF), allocating €1.5 billion to Slovakia.** With Slovakia's mandatory contribution of at least 25% of the estimated costs of the Plan, the total available funding could exceed €2 billion. The fund aims to support households and micro-enterprises at risk of transport and energy poverty through green investments, measures and direct income support. Member States have discretion over how to use the funding and must prepare Social Climate Plans (SCPs) by June 2025. **This study can serve as a foundation for developing Slovakia's Social Climate Plan.**

**This study evaluates the risk of transport poverty across municipalities and recommends cost-effective measures for the transport component of Slovakia's Social Climate Plan.** Transport poverty occurs when individuals or households cannot afford transport or have limited access to public or private mobility options, restricting their ability to travel for work, education, or healthcare. This can lead to reduced social participation in society and, over time, social exclusion.

**Figure 1: Degrees of vulnerability of municipalities to transport poverty**



Source: IEP

**Around 7% of Slovakia's population resides in areas at high risk of transport poverty.** In the Prešov and Banská Bystrica regions, nearly half of the municipalities are affected, with the most vulnerable areas including Gemer, Horný Zemplín, and Northern Šariš. Transport poverty risk there is primarily driven by limited public transport options and the need to travel long distances. Additionally, municipalities near district towns with few public transport connections, as well as some in western Slovakia where long travel times are a major challenge, are also at risk.

**The Social Climate Plan should focus on reducing existing inequalities.** The transport measures proposed in this study align with the SCF Regulation. Resources should primarily support public transport, shared mobility, demand-responsive services, and active transport for vulnerable groups and regions. Investment measures should be tailored to municipalities most at risk of transport poverty, while other investments and measures should provide direct assistance to affected individuals.

**We recommend supporting public transport by investing in zero-emission buses and minibuses and offering discounted fares for vulnerable groups.** Expanding the vehicle fleet will aid decarbonisation while preventing potential reductions in service frequency. Additionally, we propose free travel for secondary school students from low-income families and discounted fares for other family members using public transport.

**Transport accessibility and efficiency can be improved through investments in cycling infrastructure, "social taxis", and an information system for demand-responsive transport.** Expanding cycle paths and providing bike racks and cargo bicycles for transporting children can enhance access to active transport. Purchasing low-emission vehicles for the "social taxi" service will allow more municipalities to support citizens with reduced mobility. Additionally, demand-responsive public transport can improve mobility in areas with limited regular public transport. Providing incentives for drivers who offer carpooling in municipalities at transport poverty risk can also help reduce reliance on personal cars.

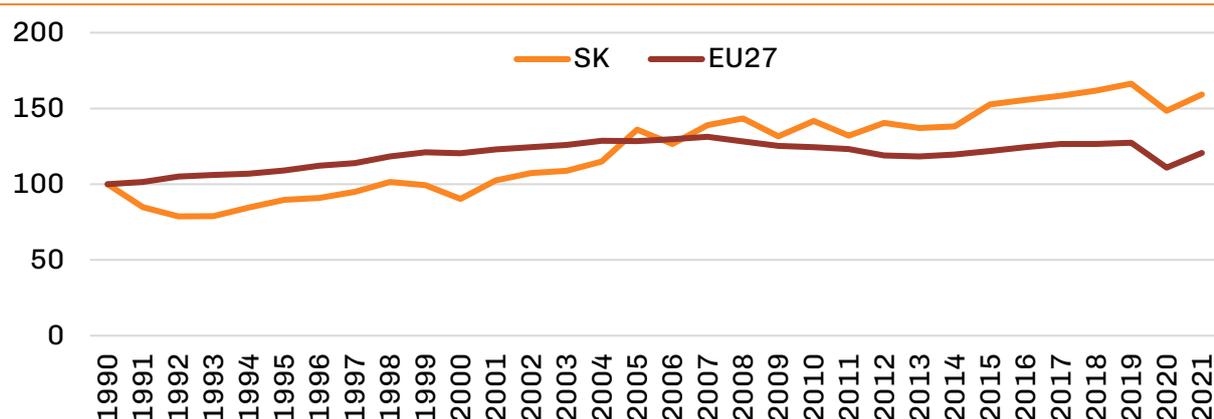
**Support for individual transport and EVs can be provided through social leasing and subsidies for purchasing used electric vehicles.** Assistance should primarily target micro-enterprises that support mobility for vulnerable groups or deliver essential services. For example, offering leasing bonuses for EVs used in social outreach services would be an effective measure. In transport-vulnerable regions, residents could also qualify for subsidies to purchase a used electric vehicle if they scrap their old ICE vehicle.

**In order to have the desired effect, direct income support should primarily benefit low-income individuals in vulnerable municipalities most affected by transport poverty.** At present, direct income support can only target households in material need without significant additional administrative burden. However, households in material need represent only a small proportion of all households in income poverty. Direct income support is intended as temporary assistance during the transitional period of implementation of transport poverty reduction investments and needs to be progressively reduced. According to the SCF Regulation, it can amount to a maximum of 37.5% of the total allocation in the Social Climate Plan.

# Introduction

**Transport is the only sector where greenhouse gas emissions continue to rise.** The transport sector accounts for 18% of all emissions in Slovakia (SHMÚ, 2023), the highest after energy and industry. Compared to 1990, emissions from road transport in Slovakia have increased by 60%, almost three times faster than the EU average. The faster growth in Slovakia is primarily due to the increase in individual car transport. However, 97% of GHG emissions from transport are attributable to road transport, with passenger cars responsible for more than half (SHMÚ, 2023).

**Graph 1: Emissions from road transport in Slovakia (index 1990 = 100)**



Source: IEP by Eurostat (env\_air\_emis)

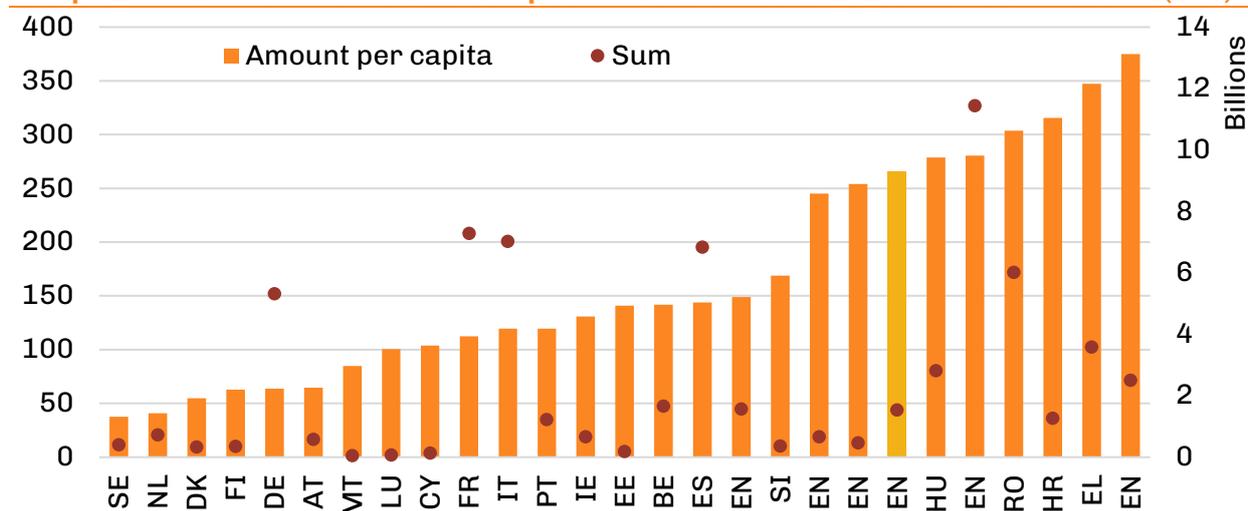
**The European Union is targeting emissions reductions in the transport sector through the Fit for 55 package.** As part of this initiative, a new ETS2 emissions trading scheme for the road transport and buildings sectors is set to be introduced (European Commission 2023/959). For new passenger cars and light commercial vehicles, the EU aims for a 100% reduction in average CO2 emissions by 2035 (European Commission 2023/851). Manufacturers who fail to meet these targets will be required to pay an excess emissions premium. The target for new heavy-duty vehicles is a 90% reduction in average CO2 emissions by 2040, compared to 2019 levels. For new urban buses and coaches, the targets are a 90% reduction by 2030 and 2035, respectively (European Commission 2023/0042). Additionally, there are goals to reduce greenhouse gas emissions and increase the use of renewable energy sources in transport (European Commission 2023/857 and European Commission 2023/2413).

**The decarbonisation of transport may limit access to essential services for some households, increasing their risk of transport poverty** (Eden, et al, 2023). Including road transport in ETS2 will likely lead to higher fuel prices, with disproportionate impacts on different groups. Residents with lower incomes, older vehicles that consume more fuel, or those reliant on personal car transport due to health disadvantages will be most affected. However, deficiencies in public transport—particularly in rural and remote areas—restrict these individuals' ability to shift from private car use to more sustainable transport options. As a result, limited access to transport can hinder their ability to travel for work, healthcare, or education.

**To address energy and transport poverty, the European Union has established the Social Climate Fund, with €65 billion allocated for the period 2026 to 2032** (European Parliament and EU Council, 2023). This fund is designed to support households, transport users, and micro-enterprises at risk of transport and energy poverty through measures, green

investments and direct income support. Member States have discretion over how to allocate the funding, with eligible measures and investments defined by the Social Climate Fund Regulation (European Parliament and Council of the EU, 2023). Countries are required to submit their Social Climate Plans by the end of June 2025. The Plans should outline investments aimed at reducing dependence on fossil fuels in the long term, while also preventing further exacerbation of energy and transport poverty during the interim period before these investments are fully realized.

**Graph 2: Maximum financial allocation per Member State from the Social Climate Fund (EUR)**



Source: Regulation (EU) 2023/955

**Slovakia has been allocated €1.5 billion from the Social Climate Fund<sup>1</sup>, i.e. approximately €265 per capita.** Slovakia is one of a third of EU countries with the highest per capita contribution. Several indicators were taken into account when distributing the funding between countries, such as the country's population, the population at risk of poverty in rural areas, the percentage of households with energy arrears, and the production of greenhouse gas emissions from household fuel combustion. As the Fund's support does not address the causes of transport poverty, but only temporarily reduces the negative impacts on the most vulnerable groups, it is not intended to be permanent.

**The aim of this publication is to identify regions at risk of transport poverty and to propose measures to reduce transport poverty.** The implications of higher fuel prices will vary according to different levels of transport accessibility and socio-economic characteristics. Higher prices will exacerbate transport poverty, particularly in already vulnerable regions, where measures under the Social Climate Fund can mitigate these impacts. The study offers a transport poverty index that identifies municipalities at risk of transport poverty and proposes and quantifies appropriate measures from the Social Climate Fund to reduce transport poverty. The results of the study can serve as a basis for the development of the Social Climate Plan in Slovakia.

<sup>1</sup> If the launch of ETS2 is postponed until 2028, Slovakia will be allocated just under €1.3 billion.

### Box 1: Estimating the costs of ETS2 in transport

Depending on car consumption, the introduction of ETS2 will increase the annual cost of petrol and diesel for passenger transport users by between €47 and €100<sup>2</sup>. For buses, fuel costs will increase by between €773 and €1,905 per year per bus. The price per litre of petrol or diesel will increase by an average of 6 eurocents in 2027 to 12 eurocents (excluding VAT) in 2030. Diesel is expected to increase between 7 and 13 eurocents per litre (excluding VAT) over this period. Depending on the type of vehicle, consumption and kilometres driven<sup>3</sup>, costs will vary.

**Table 1: Increase in costs due to ETS2 (euros per year, 2023 prices)**

Type of vehicle	2027	2028	2029	2030
Passenger car				
<i>Petrol</i>	47	78	85	92
<i>Diesel</i>	51	85	93	100
Urban bus	773	1288	1417	1546
Long-distance/regional bus	952	1587	1746	1905

Source: IEP

The direct annual cost to passenger road transport associated with the introduction of ETS2 will be between €140 million in 2027 and €335 million in 2032. Passenger cars account for 94% of these costs. With the increasing price of ETS2, fuel costs will gradually increase. The estimate also includes the projected growth of zero-emission vehicles due to the rising cost of internal combustion vehicles as well as in the context of emission reduction targets. Around half of passenger cars in Slovakia are owned by legal entities, but most of these vehicles are also used for private transport. The impact on households and businesses cannot therefore be estimated separately.

**Graph 3: ETS2 direct annual costs from passenger road transport (€ million, 2023 prices)**



Source: IEP

Emission-free vehicles are often unavailable today because of their purchase price, but also because of a lack of infrastructure (Joint Research Institute, 2022). Based on data from manufacturers in the Slovak market, passenger cars in the lower and mid-range classes were on average 65-80% more expensive in 2022 compared to internal combustion-powered vehicles (Environmental Policy Institute, 2023). Purchase prices of zero-emission vehicles for public passenger transport are currently 80 to 150% higher compared to diesel-powered vehicles (ibid). However, in addition to the purchase price, uncertainty in the decision to purchase zero-emission vehicles is also introduced by the availability of infrastructure for recharging or refuelling, the lifetime of batteries and fuel cells, and the future cost of electricity or hydrogen.

<sup>2</sup> The ETS2 price estimate is based on internal EC documents and ranges from €30/tonne in 2027 to €60/tonne in 2030 (in 2023 prices). The price development in the following years is based on the development of the ETS according to the EC in a climate neutral scenario in 2050.

<sup>3</sup> The average annual mileage for a passenger car is 12 thousand km according to the CPS model. For an urban bus it is 31 thousand km and for regional or long-distance buses it is 34 thousand km according to SHMÚ data for 2018-2021.

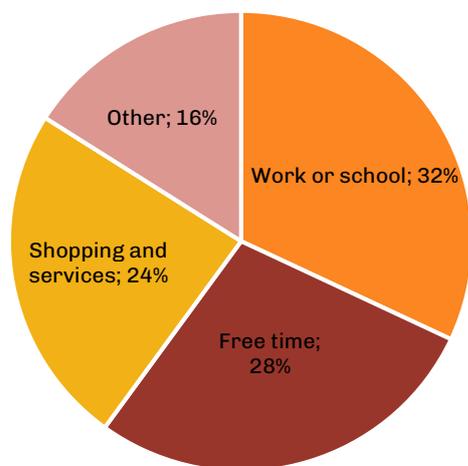
# 1 How do we travel?

**Transport expenditure in Slovakia is growing, yet not everyone has the same access to transport today.** While the average household spends 9% of its expenditure on transport, households in income poverty spend only 2%, due to their limited ability to travel for work or school. In Slovakia, there are discounts on public transport for some groups, but not all vulnerable groups are sufficiently covered. In addition, due to rising public transport operating costs and investment debt, service reductions and the cancellation of less-used lines are occurring. This problem may be exacerbated by the decarbonisation of transport, which could have a disproportionate negative impact on the population.

## 1.1 How we travel and how much it costs

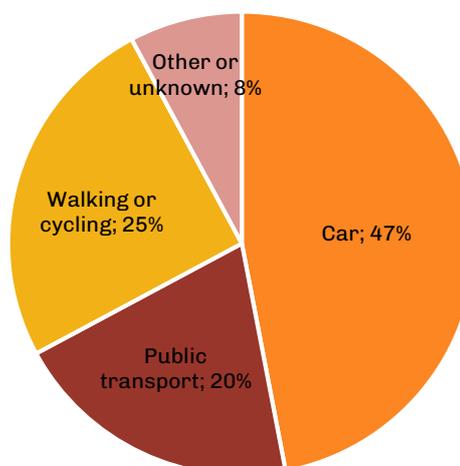
**Cars are the dominant means of transport in Slovakia and the EU.** In Slovakia, individual car transport accounts for up to 84% of the transport performance in inland passenger transport<sup>4</sup>. The remaining transport performance is divided between road and rail public transport<sup>5</sup>, each with a share of 10%. Nearly a third of journeys are made to school or work (Transport Policy Institute, 2022). According to the Census of Population and Housing, about 20% of the population uses public passenger transport to work or school, with a quarter cycling or walking (National Statistics Office, 2023)<sup>6</sup>. Trains account for only 15% of the public passenger transport used for daily commuting.

Graph 4: Purpose of trip



Source: IDP Mobility Survey

Graph 5: Mode of commuting to work and school



Source: IEP according to SODB 2021

**How we travel is related to a variety of demographic, socio-economic and spatial variables.** While women are more likely to use public transport, just over a third of women travel by private car, compared to over half of men (Statistical Office of the Slovak Republic, 2023). Both working-age and post-working-age residents use individual car transport to the same extent at around 52%. In contrast, 42% of children walk or cycle, which is also due to shorter commuting distances to schools compared to work.

**The level of coverage, connectivity and reliability of public transport typically decreases as population density decreases, increasing the level of need to own a car** (Tikoudis, and others, 2024). Urban residents use a car for 43% of trips, while residents of municipalities

<sup>4</sup> Transport performance in terms of total passenger-kilometres transported, i.e. the transport of one person over a distance of one kilometre. The performance compares only journeys made by car or public transport.

<sup>5</sup> Including public transport (including trams).

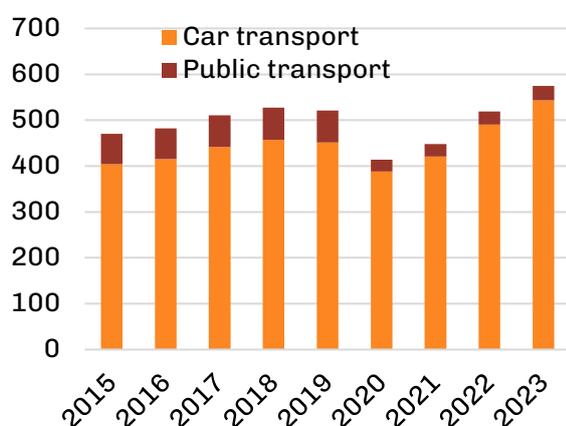
<sup>6</sup> 'Mode of transport to work or school' reflects the predominant mode of transport during the longest part of the journey.

use a car for up to 53% (Statistical Office of the Slovak Republic, 2023). Urbanization enables travel over shorter distances, while making PT more accessible in cities (Transport Policy Institute, 2022). In the Netherlands, where there is a high availability of quality public transport, 43% of the inhabitants of municipalities use a car to travel to work or school. By contrast, in Dutch cities, just under a third of the population uses a car (CBS, 2023).

**In 2023, transport spending averaged €574 per capita, equivalent to 9% of all spending.** More than 90% of this expenditure is allocated to the operation and purchase of cars (Statistical Office of the Slovak Republic, 2024). Seniors spend more than 40% less on transport than the employed, which is related to their lower mobility. In recent years, spending on transport has been rising until the start of the pandemic in 2020, when spending on PT in particular fell. In Slovakia, the decline in PT use has been more pronounced compared to the EU. From 2022 onwards, spending on individual transport is at pre-pandemic levels, while spending on public transport is still half of what it was before the pandemic.

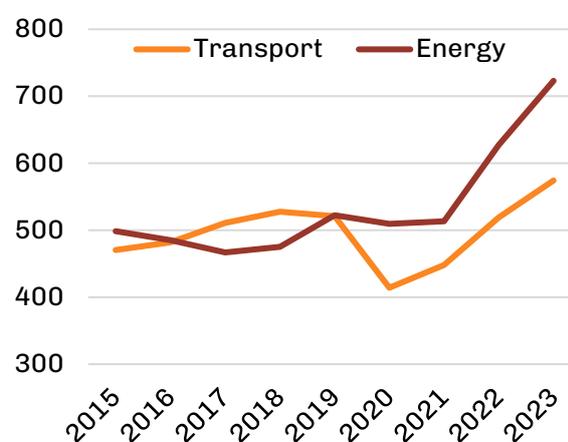
**Households in income poverty travel significantly less,** spending on average only 2% of their transport expenditure in 2022, or around €80 per person per year (Statistical Office of the Slovak Republic, 2024). In 2023, 14% of Slovakia's population faced income poverty<sup>7</sup>, with more than 20% in the Prešov and Košice regions. Income poverty in Slovakia has been declining for a long time, but has started to increase since the pandemic. The most vulnerable groups are single-parent families with children, families with three or more children and elderly, where income poverty threatens more than 30%.

**Graph 6: Transport expenditure in Slovakia (euro/person/year)**



Source: SO SR

**Graph 7: Transport and energy costs (person/year) in Slovakia**



Source: SO SR

**Within public transport in Slovakia, basic fare groups are defined for the purpose of providing discounts, but the amount of discounts is not uniform across the country.** The basic fare groups defined by the Decree of the Ministry of Transport of the Slovak Republic (MoT SR)<sup>8</sup> include children, pupils, students, seniors and persons with severe disabilities and their companions. Fares and the amount of discounts are determined by each PT provider. State legislation does not specify a minimum discount amount, so PT discounts vary across the country. The commissioning authority may determine discounts for other groups beyond the ordinance. An example is the Integrated Transportation System East, which offers discounts for pregnant women.

<sup>7</sup> The income poverty line is set at 60% of the median equivalised disposable household income

<sup>8</sup> Decree of the Ministry of Transport and Construction 269/2024 Coll.

**The state also contributes to travel for some vulnerable pupils and staff.** The transport allowance is provided to schools at the rate of the lowest pupil discounted fare on a regular bus service for pupils without a school in the place of residence<sup>9</sup>. At present, around 50 thousand children receive the transport allowance through the school, most of them in the Košice - surroundings, Prešov and Rimavská Sobota districts. Employees who have been unemployed for at least three months may receive a commuting allowance of up to €200 per month for six months.<sup>10</sup> The amount of the allowance depends on the distance between the place of residence and the place of work. In 2023, almost 32 thousand employees received the allowance, amounting to an average of €264 per person.

**In 2014, free train passenger transport was introduced for selected groups, but the measure did not target the most vulnerable population.** The 100% discount on train tickets applies to children, students, pensioners and senior citizens over 62 years of age<sup>11</sup>. One year after the introduction of the measure, the share of rail passenger transport in total passenger transport has increased by 2 percentage points (Eurostat, 2024), with passenger kilometres increasing by more than a third. However, free train travel mainly benefits passengers in regions with better rail network coverage. Moreover, even without taking into account discounts, the Railway Company Slovakia (ZSSK) is loss-making without state transfers. Today, train fares cover only 20 % of the costs of operating train transport and this share is decreasing every year.

## 1.2 Who provides public transport?

**The standards of public transport in Slovakia are defined relatively generously** and are to be taken into account in the transport service plans developed by the transport authorities. Employers must ensure that public demand is met, especially with regard to the provision of transport to work, schools, offices and health care<sup>12</sup>. The standards define, for example, transfer times, intervals between services or maximum commuting distances. For regional transport, it should cover an area for more than 90 % of the population in the area of interest and the maximum commuting distance should be 1 500 metres. For urban transport, it should cover an area for 85 % of the population within a distance of 700 metres. Neighbouring Czech Republic, Poland or Hungary do not have a maximum distance to a bus stop defined by law.

**In practice, however, the real serviceability of public passenger bus transport is conditioned by the financial situation of the regions, which are forced to reduce it despite the minimum standards.** Local governments and local authorities are often forced to cancel less profitable routes due to lack of funding. If a municipality wishes to keep a service, it enters into a contract with the carrier and pays extra. The alternative to austerity is to increase fares, which according to the legislative framework should be calculated according to the purchasing power of the region, but in practice the political leadership often tries to keep ticket prices as low as possible.

**The cost of operating public transport has been increasing for a long time.** The long-term trend in regional public transport in the Prešov Autonomous Region shows that the cost per passenger is increasing, mainly due to lower passenger numbers (see Chart 8). The most significant decrease in passengers occurred during the pandemic years 2020 and 2021, leading to a significant increase in the cost per passenger. However, the trend is returning to pre-pandemic levels. Higher costs are also experienced by regions due to

<sup>9</sup> Transport fees pursuant to § 4aa (3) (a) to (j) of Act No. 597/2003 Coll.

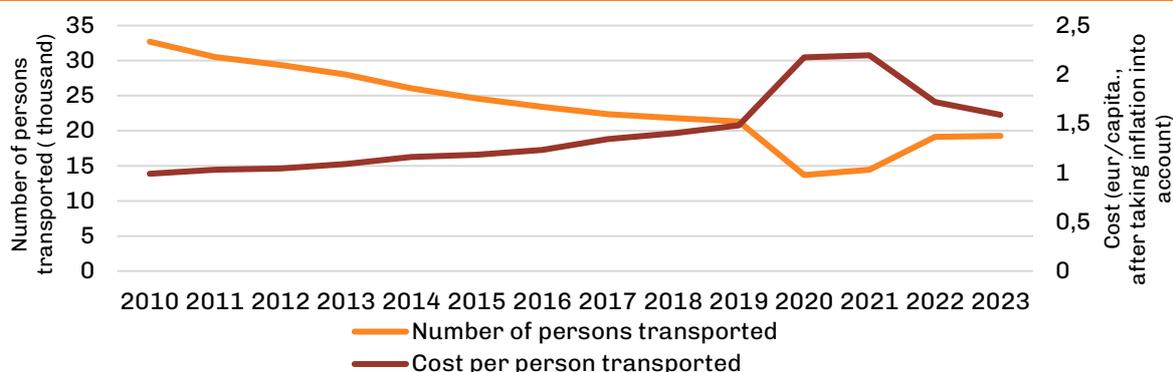
<sup>10</sup> Allowance for commuting to work according to § 53 of Act No. 5/2004 Coll. on Employment Services

<sup>11</sup> On trains operated by ZSSK and Leo Expres on the line Bratislava - Dunajská Streda - Komárno.

<sup>12</sup> Act on Public Passenger Transport and on Amendments and Additions to Certain Acts 332/2023 Coll.

rising fuel prices. The shortage of bus drivers is also one of the biggest problems at the moment.

**Graph 8: Development of costs and number of passengers in regional public passenger transport in the Self-Governing Prešov Region**



Source: IEP by Self-Governing Prešov Region

**The problem of investment debt in public transport may be exacerbated in the future by increasing requirements to reduce transport emissions.** The lack of funding for operations is already reflected in investment debt. As things stand, replacing old vehicles with zero-emission ones may result in higher investment costs, which may be associated with further cancellations of underused routes and increasing the vulnerability of the population to transport poverty.

### Box 2: Institutional framework for transport in Slovakia

In Slovakia, public passenger transport is managed by the MoT SR, higher territorial units (VÚC) and municipalities or cities. If transport services are not sufficiently provided on a commercial basis, these entities order transport services in the public interest under the Public Passenger Transport Act. Rail transport is ordered by the MoT SR, the state-owned ZSSK and Leo Expres. Higher territorial units order regional bus transport and municipalities and towns order urban bus or rail transport from carriers who are authorised to provide transport services on the basis of a contract for transport services in the public interest. Rail transport can also be ordered by a local authority, but this does not happen today due to lack of funding

Today, the integration of public passenger transport at the level of regions and functional areas is carried out by four organisers. The organisers are commercial companies that operate integrated transport systems and today operate in the Prešov, Košice, Banská Bystrica, Bratislava and Žilina regions with a view to including the Trenčín region. The integration is to ensure an integrated ticketing system, timetables, revenue sharing and information systems.

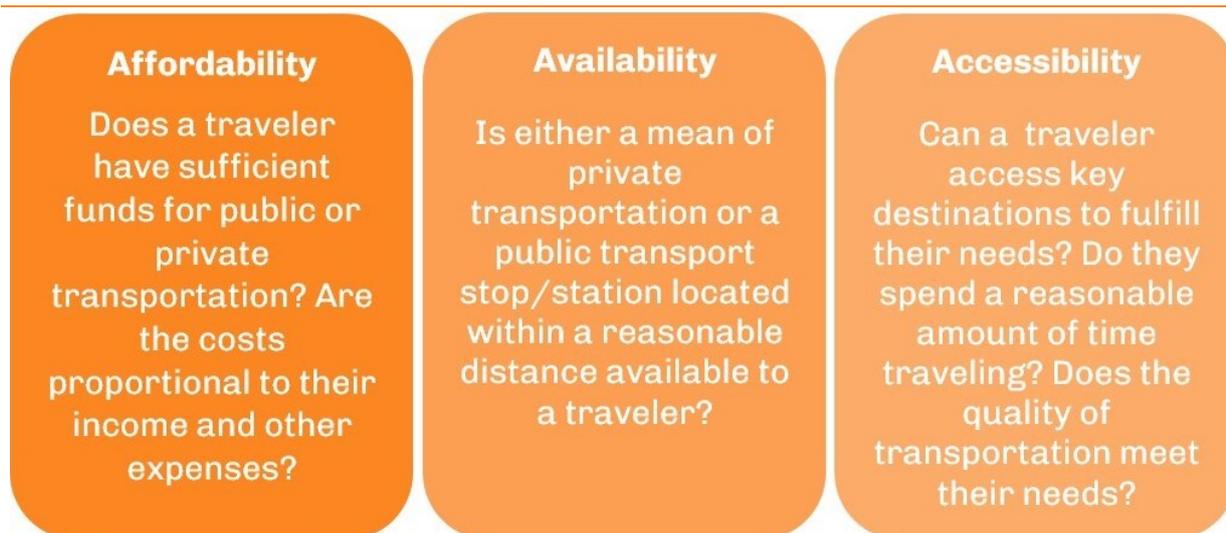
In 2024, the National Transport Authority (NADA) was established to integrate public passenger transport at the national level. Its role is to coordinate with regional integrators to create a national integrated transport system with unified fares. In the future, the NADA is to develop a national transport service plan and to integrate the transport system in terms of transport, legislation, information and tariffs. One of the main tasks of NADA is to establish uniform standards of transport service.

## 2 Which regions are transport poor?

**For the purpose of better targeting social policies in transport, the concept of transport poverty has been introduced.** "Transport poverty is the inability or difficulty of individuals and households to meet the costs of private or public passenger transport, or their lack of or limited access to transport necessary for their access to basic socio-economic services and activities, taking into account the national and spatial context" (European Parliament and Council of the EU, 2023). Those affected by it have a limited ability to participate in social life (Simcock, et al., 2021), which often compounds their exclusion from society (Lucas, 2012).

**The basic criteria of transport poverty are affordability, physical accessibility and accessibility to transport.** Although the definition of transport poverty varies across literature and countries, it largely consists of these three dimensions (European Parliamentary Research Service, 2022; Joint Research Institute, 2022; Lucas, Mattioli, Verlinghieri, & Guzman, 2016). The concept of transport poverty and its definition are further described in Box 3.

**Figure 2: Three dimensions of transport poverty**



Source: IEP

**In Slovakia, it has not yet been quantified to what extent and which households are affected by transport poverty.** According to the literature, transport poverty in Slovakia is mainly caused by inadequate public passenger transport, especially in rural areas where there is insufficient connectivity between villages and larger cities (Dokupilová, 2023). However, existing definitions of transport poverty in the Slovak context are insufficient for practical use.

## 2.1 How to measure transport poverty

**Vulnerability to transportation poverty is assessed through a composite index based on indicators describing affordability, physical accessibility, and accessibility to transportation** (Lowans, et al., 2021; Kelly, Kelleher, Guo, Deegan, & Patil, 2023). The individual indicators are selected based on the literature (Kelly, Kelleher, Guo, Deegan, & Patil, 2023; Sustrans, 2016; CBS & PBL, 2019) , consultations with experts and data availability. Due to the lack of household-level data, vulnerability is assessed at the village level. Larger units or groups of households are also considered in the international literature (Ireland, Scotland). For a detailed description of each indicator, see Annex A.

**Table 2: Indicators used**

Dimensions of transport poverty	Indicator	Impact on the risk of transport poverty
<b>Availability and accessibility</b>	Average time spent commuting to work or school in the morning and evening	increases
	Travel time to the nearest hospital or polyclinic	increases
	Number of connections to work or school in the morning and evening	reduces
	Ratio of time distance by public passenger and individual car transport in the morning and evening	increases
	Percentage of Roma population	increases
	Percentage of population with a PT stop within 500m	reduces
	Share of population over 65	increases
	Percentage of population of school age (6 to 18 years)	increases
	Proportion of population with severe disabilities	increases
	Number of passenger cars per inhabitant	reduces
<b>Affordability</b>	Unemployment rate	increases
	Median wage	reduces
	Average age of the passenger car	increases

Source: IEP

**Municipalities are divided into ten levels of transport poverty risk, with 1 being the lowest risk and 10 being the highest risk.** The composite index is created as the sum of the input indicators multiplied by an automatically assigned weight. The index is created through data envelopment analysis (DEA), which is described in more detail in Annex BB. For the indicators describing the availability of public passenger transport, expertly determined lower limits are set for their share of the resulting index, which must be reached. Socio-economic and demographic variables are considered as complementary variables and have maximum limits.

**The Transport Poverty Vulnerability Index identifies which municipalities are at risk of this problem and where investment assistance from the Social Climate Fund should be concentrated as a priority.** The aim of creating a transport poverty index is to incorporate several dimensions of transport poverty into a single indicator that can help to better target investment measures where they are most needed. The vulnerability risk levels thus assess the municipalities or regions that are already most exposed to transport poverty, which may be exacerbated by rising fuel prices. The index can be used as one of the criteria in future SCF calls when evaluating projects.

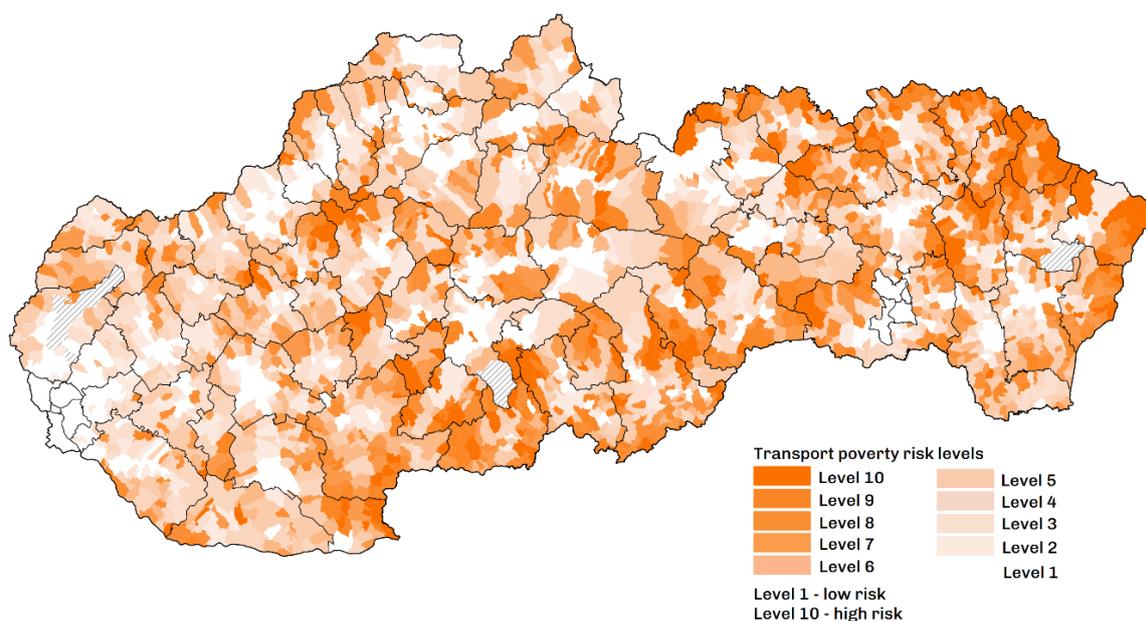
**Measures that target individuals are needed throughout Slovakia, not just in regions at risk of transport poverty.** In particular, these measures target populations or households that suffer from income poverty or have problems with accessibility to transport, such as in the case of people with disabilities, the elderly or children. An example is a single-parent household in material need - one living in Bratislava and one in a municipality at risk of transport poverty. In both cases, the household needs transport assistance in terms of income, for example in the form of fare discounts. In the case of a municipality at risk of transport poverty, such a household will be assisted in the form of investments to support VOD. Temporarily, a low-income household in such a municipality may receive direct income support until the investments are made. Similarly, an elderly person living in an

urban or municipality in transport poverty risk is left with the need for a social taxi, as he or she does not have physical access to regular public passenger transport.

## 2.2 Transport poverty in Slovakia

**Approximately 7% of Slovakia's population lives in areas with a high risk of transport poverty.** Approximately 364 thousand inhabitants of Slovakia live in municipalities with a transport poverty risk level of at least 8. In the Prešov and Banská Bystrica regions, this accounts for nearly half of the municipalities, with the most at risk being the regions of Gemer, Horní Zemplín and North Šariš. The transport disadvantage of the Gemer region, resulting from the reduced quality and capacity of public passenger transport, was already assessed in 2014 (Horňák & Rochovská, 2014).

**Figure 3: Transport poverty risk levels in municipalities**



Source: IEP

**Table 3: Transport poverty risk\* in Self-governing regions**

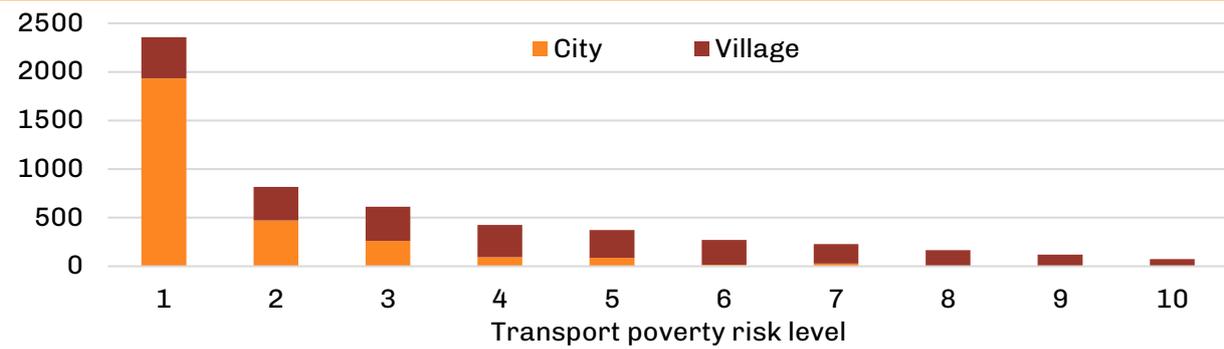
Country	Number of municipalities at risk		Population at risk	
		%	thousand	%
Banská Bystrica	224	43 %	72	12 %
Bratislava	2	3 %	2	0.2 %
Košice	130	30 %	58	7 %
Nitra	70	20 %	45	7 %
Prešov	293	44 %	107	13 %
Trenčín	58	21 %	26	5 %
Trnava	29	12 %	20	4 %
Žilina	60	19 %	33	5 %

\*risk level at least 8

Source: IEP

**In 289 municipalities with the highest degree of risk of transport poverty live 76 thousand inhabitants, half of them only in the Prešov Self-Governing region.** On the other hand, about 40% of the population lives in the municipalities with the lowest degree of vulnerability, most of them in urban areas. Urban dwellers have better access to public transport infrastructure and services, making them less at risk of transport poverty.

**Graph 9: Population at risk of transport poverty (in thousands)**

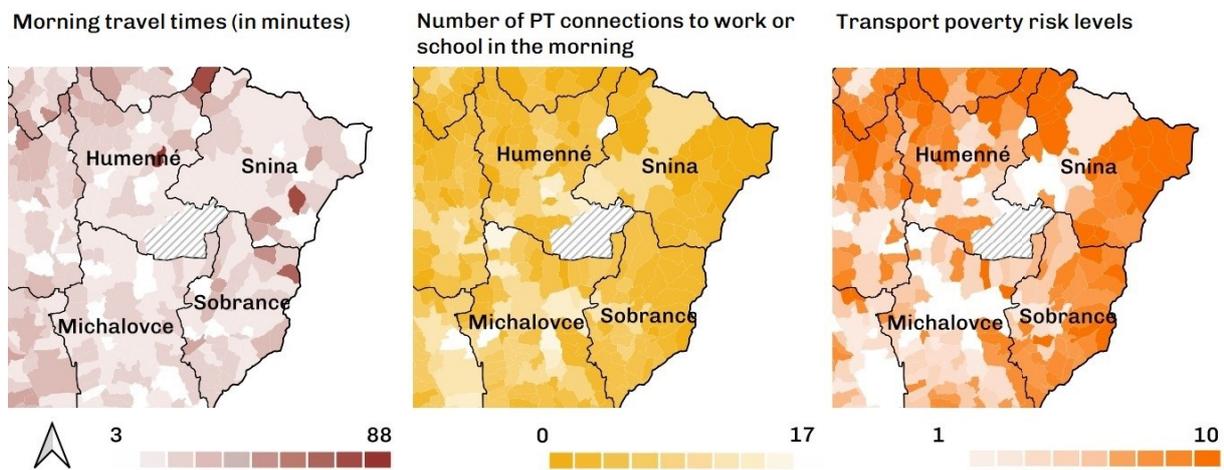


Source: IEP

**The low number of public passenger transport services is a key factor in increasing the risk of transport poverty in municipalities.** In most municipalities, the main cause of transport poverty risk is the low frequency of connections to places of work or school. Residents of vulnerable municipalities have less than three connections in the morning hours, while in low-risk municipalities the number of connections is three times as many.

**In the east of Slovakia, transport poverty is not only related to the lack of public passenger transport, but also to the need to travel longer distances.** In the districts of Snina, Medzilaborce and Sobrance, the vulnerability to transport poverty results mainly from the low number of PT connections and the long travel times to services such as work, school or health facilities. The easternmost municipalities of Zboj and Nová Sedlica are more than 45 minutes from the nearest health services. Meanwhile, the number of public passenger transport connections is low, which can be particularly problematic for the elderly, who make up to 40% of the population and may have limited access to a car.

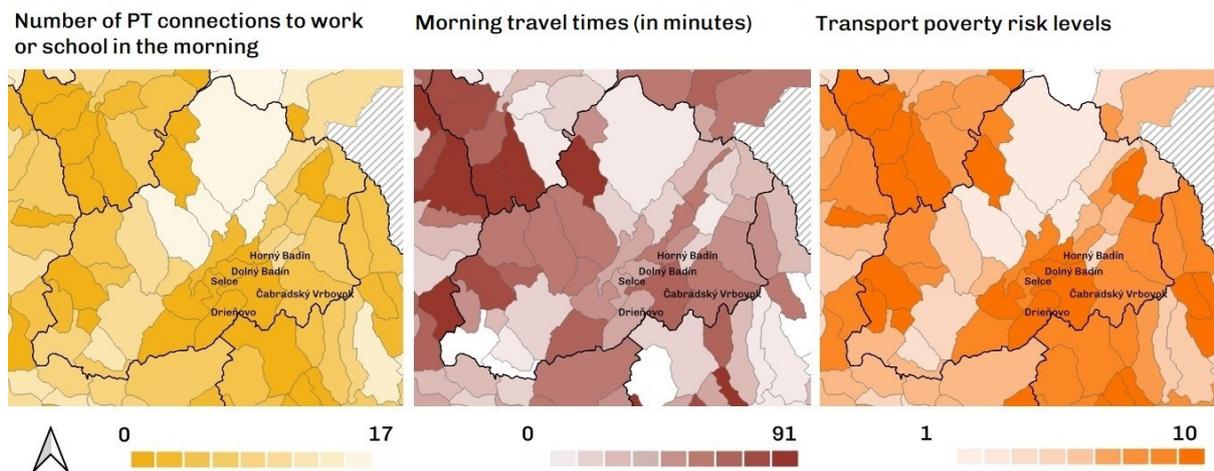
**Figure 4: The impact of travel time and number of public passenger transport connections on the transport poverty risk level in the districts of Snina and Sobrance**



Source: IEP

**Residents of municipalities that are close to the district capital but have few public transport connections are also at risk.** Examples include the municipalities of Dolný Badín, Horný Badín, Čabradský Vrbovok, Selce and Drienovo in the Krupina district, where residents have only two bus connections in the morning, while almost 170 people from these municipalities travel to Krupina, which is only 20 kilometers away (Statistical Office of the Slovak Republic, 2023). Insufficient public transport availability may be the reason why up to 80% travel to Krupina by passenger car. At the same time, in these municipalities there is one vehicle per 2 people, which is more than the Slovak average.

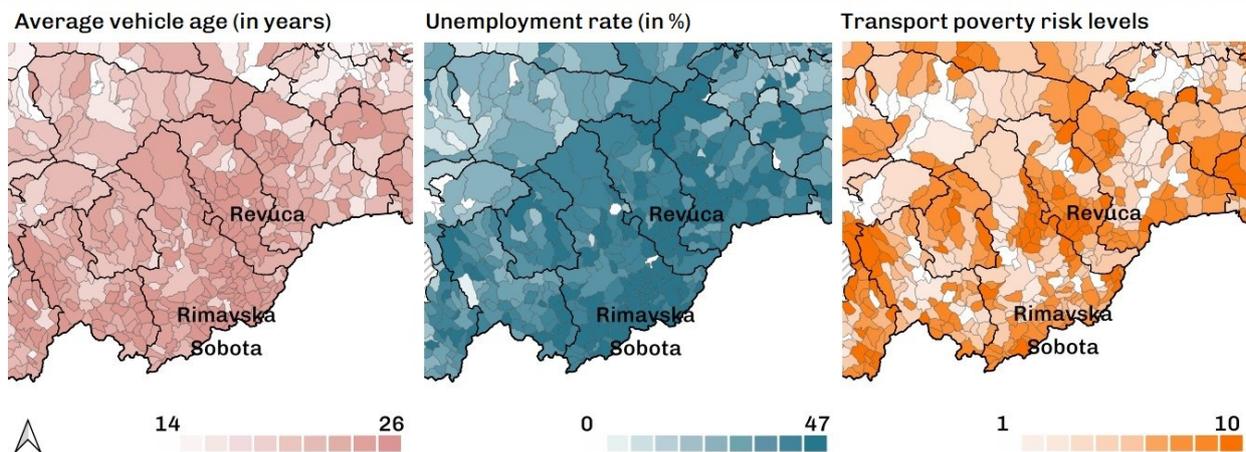
**Figure 5: The impact of travel time and number of public passenger transport connections on the transport poverty risk level in municipalities in the Krupina district**



Source: IEP

**Limited access not only to public passenger transport but also to individual car transport and finance further increases the risk of transport poverty.** An example is the residents of municipalities in the Rimavská Sobota district, where the problem of transport poverty is faced not only by the low number of PT connections, but also by low incomes and a high unemployment rate. Moreover, the average age of vehicles in these areas is 19 years, which is associated with higher fuel consumption and, thus, a greater impact from future price increases with the introduction of ETS2. The municipalities with the lowest number of passenger cars per capita are also located in the Rimavská Sobota district. While on average in Slovakia there is one car for less than 2.5 inhabitants, in these municipalities there is only one car for almost 7 inhabitants.

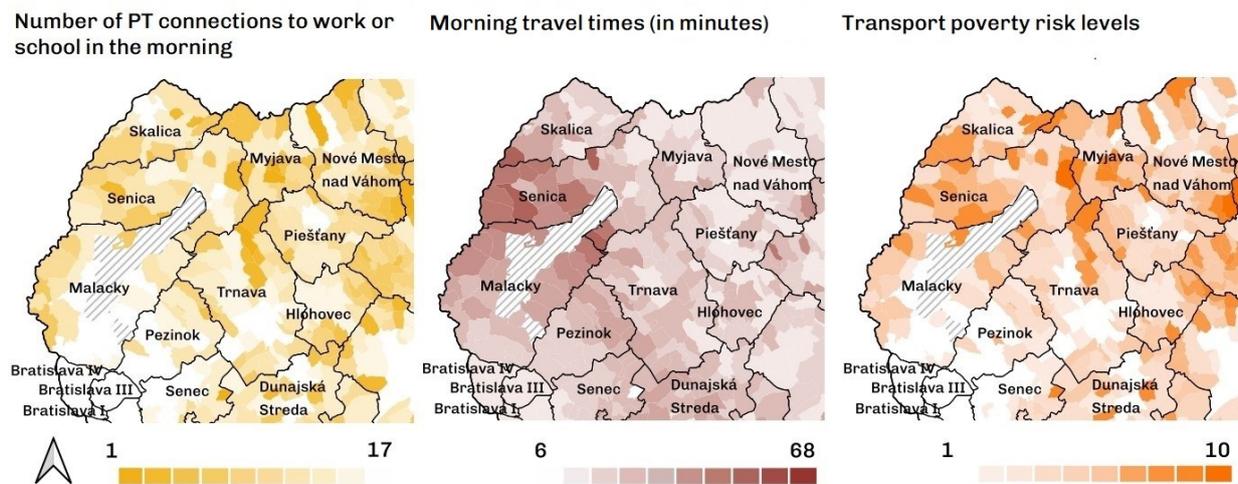
**Figure 6: The impact of age of vehicles, number of vehicles and unemployment rate on the transport poverty risk level in the districts of Rimavská Sobota and Revúca**



Source: IEP

**Some municipalities in western Slovakia are also at risk of transport poverty, often due to the time required to travel.** Residents of the vulnerable municipalities in the Malacky and Senica districts travel to work or school for almost an hour on average. An example is the municipality of Studienka with a risk level of 8, from where more than 20% of the population commutes to the capital city of Bratislava. Residents also have 4 connections to Bratislava in the morning, but the journey by public transport takes almost twice as long as by car. Long commutes can lead to a significant increase in costs due to the increase in fuel prices due to the introduction of ETS2.

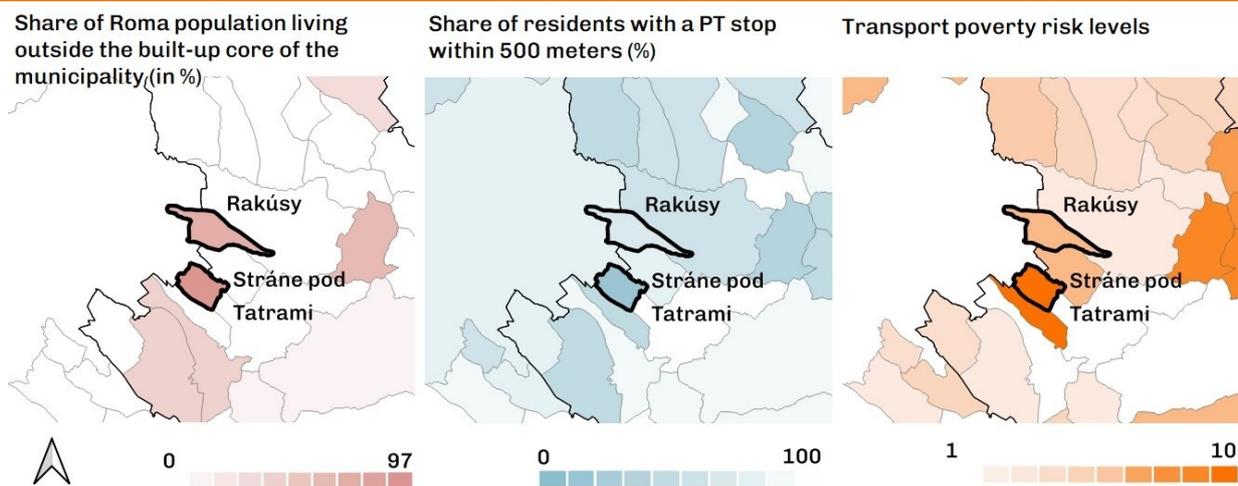
**Figure 7: The impact of the number of PT connections and travel time on the transport poverty risk level in the districts of Malacky and Senica**



Source: IEP

**The long distances to public transport stops are another factor increasing the risk of transport poverty.** In the municipalities of Rakúsy and Stráne pod Tatrami in the Kežmarok district, up to 85% of the population live in Roma communities outside the municipality core. Due to poor financial conditions and high unemployment of over 25%, there is low availability of cars in both municipalities and the residents are dependent on PT. While in the municipality of Rakúsy there is a PT stop directly in the community, in the municipality of Stráne pod Tatrami there is a stop 20 minutes walk from the community, where more than 1900 residents live. Up to 31% of the residents of this municipality live more than 1500 meters from the stop. The unavailability of public and individual transport makes it impossible for the residents of Stráne pod Tatrami to travel, for example, to nearby Kežmarok, which is only 6 kilometers away. While up to 42% of residents from Rakúsy commute to Kežmarok for work or school, only 12% of residents from Stráne pod Tatrami commute (Statistical Office of the Slovak Republic, 2023).

**Figure 8: The impact of the distance of PT stops on the transport poverty risk level in the municipalities of Rakúsy and Stráne pod Tatrami**



Source: IEP

### **Box 3: The concept of transport poverty**

Transport affordability speaks to a household's ability to purchase transport relative to its budget. It is usually determined by whether it is used by low-income groups and by comparing transportation expenditures to household income (Perrotta, 2017; Litman, 2016) using standard indicators<sup>13</sup> (Alonso-Epelde, García-Muros, & González-Eguino, 2023). The concept was also used in a study for the EC, which found that less than 8% of the Slovak population is at risk of transport poverty (Eden, et al., 2023).

Transport affordability does not necessarily reveal hidden transport poverty, so other indicators need to be taken into account. Comparing transport expenditures and household income does not provide information on trips that do not take place due to lack of funding or lack of transport accessibility given the need (Lucas, Mattioli, Verlinghieri, & Guzman, 2016). Such "invisible" poverty is also called hidden transport poverty. Therefore, other indicators need to be considered when evaluating transport accessibility (Kelly, et al., 2023).

The availability of transportation indicates whether the rider or rider has the means to travel. In practice, this means whether he or she has access to a car or to a public passenger transport stop that is not too far away in relation to the needs of passengers. This highlights the regional dimension of transport poverty, as the availability of a public passenger transport stop affects a group of several households or even an area. Transport poverty could thus be divided according to who it affects: the region, the household and the individual. This study focuses primarily on the analysis of just regional transport poverty.

Transport accessibility describes the extent to which transport systems allow an individual to get where they need to go in a reasonable amount of time (Geurs & Wee, 2004). It refers to the ability and possibilities of the traveller or passenger to get to, for example, work, business or school, without the journey taking an unreasonable amount of time, for example when comparing car travel and public passenger transport. Accessibility is thus closely linked or even interchangeable with the dimension of accessibility (Joint Research Institute, 2022). Typically, more deprived locations are further away from economic 'hotspots' where services or places of employment are concentrated (Carroll, Benevenuto, & Caulfield, 2021; Simcock, and others, 2021). In such deprived places, car use therefore becomes a necessity (Kamruzzaman & Hine, 2012). Accessibility is also understood as whether the available modes of transport meet quality parameters, such as being wheelchair accessible or safe.

Thus, low-income households, households living in rural areas, the elderly, children and people with disabilities are most at risk of transport poverty. Access to affordable transport correlates with socio-economic vulnerability, so poor households, the unemployed and the elderly are particularly vulnerable (European Parliamentary Research Service, 2022). Within low-income households, single-parent families, where one low-income parent provides mobility for themselves and their children, are particularly disadvantaged. Households on the periphery are also at risk, especially in disadvantaged regions in rural environments with a lower supply of employment positions and poor transport accessibility.

---

<sup>13</sup> The first indicator considers a household to be transport-poor if it uses more than 10% of its income for transport expenditure.

The second indicator "low income, high expenditure" considers a household to be transport poor if it spends more than the national median on transport and also if it falls below the income poverty line after paying for transport expenditure.

# 3 Measures for cleaner and fairer transport

**The Social Climate Fund is set up to support vulnerable groups and groups at risk of energy and transport poverty.** The SCF Regulation defines the potential uses of the funds. (European Parliament and Council of the EU, 2023). Measures should aim to increase accessibility to public transport, shared transport, transport on demand, and the development of active transport. Provision of access to zero- and low-emission vehicles, including charging and refuelling infrastructure, and measures to develop the market for zero-emission second-hand vehicles may also be supported. Temporary direct income support can amount to a maximum of 37.5% of total SCP funding and must be phased out in parallel with the implementation of investments. Technical assistance expenditure of up to 2.5% may also be included in the SCP. The Fund is intended to finance new measures or the extension of existing ones through an increase in budget, scope, or extension of time.

**The Fund is guided by the principles of supporting vulnerable groups and reducing emissions; therefore, some types of measures will not be supported.** Measures should contribute to decarbonisation (European Parliament and Council of the EU, 2023) and adhere to the guidance on the principles and criteria of 'Do No Significant Harm' (DNSH). For example, the Fund does not support fossil fuel-based vehicles, while low-emission vehicles can only be supported if an emissions-free alternative is considered unsuitable or unaffordable.

**Slovakia will be allocated up to €1.5 billion from the Fund, but must contribute at least 25% of the estimated total cost.** Thus, over €2 billion can be spent on measures. Other revenues from ETS2 can also be used to co-finance measures in the SCP, whether from the state budget or the Environment Fund, as is currently the case with the EU ETS. Unlike the funds committed under the SCF, the remaining ETS2 revenues can also be used for other environmental objectives.

**The use of SCF funds is conditional on the preparation of a Social Climate Plan, which must include a quantification of the impacts of ETS2, a list of measures, and a description of how they will address the social impacts of ETS2.** This should include the estimated costs of the Plan, along with an explanation of the cost-effectiveness of the measures in relation to the expected impact of the Plan. The Plan must include milestones, targets, and an indicative timetable for the implementation of measures and investments by 2032. In addition to the measures section, the Plan should also include an estimate of the impacts of ETS2 and the number of vulnerable households, micro-enterprises, and transport users. The implementation of the Plan will be monitored through appropriate indicators, which must also be included in the Plan. The Plan is to be submitted to the European Commission by the end of June 2025.

**This study provides an overview of the recommended actions for the Social Climate Fund.** The measures are based on the options outlined in the SCF Regulation, including the accompanying good practice documents. For each measure, an estimate of the cost to the duration of the Fund is provided, along with a proposal for relevant applicants and coverage—specifically, whether the measure targets a particular group of people and whether it takes into account the transport poverty index. The number of people targeted by the measure is also estimated. Table 4 provides an overview of the recommended

measures, with additional details available in the table in Annex C. The results of the study can serve as a basis for the development of a Social Climate Plan in Slovakia.

**Table 4: Summary of recommended measures**

Measure	Relevant applicants
<b><i>Improving access to public passenger, shared and active transport</i></b>	
Subsidy for the purchase of buses and charging infrastructure	Local authorities, transport enterprises/companies operating in municipalities at risk of transport poverty
Subsidy for the purchase of 8+1 minibuses and charging infrastructure	Local authorities, municipalities, transport enterprises/companies operating in municipalities at risk of transport poverty
Discounted fares for high school students from low-income families in the amount of 100% (including the provision of a transport pass)	Regional authorities, municipalities (ordering public passenger transport)
Discount on public transport for members of low-income families (50%) (including the provision of a transport pass)	Regional authorities, municipalities (ordering public passenger transport)
Subsidy for cargo bicycles for transporting children	Regional authorities, towns, municipalities
Construction of cycling infrastructure	Municipalities, cities, towns at risk of transport poverty
Carpooling allowance	Drivers living in towns and cities at risk of transport poverty
Support for public transport demand in the form of an information system	Municipalities, towns, cities, villages threatened by transport poverty
Subsidy for the purchase of vehicles for social taxis	Cities, Municipalities, Local Action Groups
<b><i>Improving access to zero-emission vehicles</i></b>	
Social leasing for selected social services	Providers of home nursing and outreach social services
Subsidy for the purchase of a running emission-free vehicle	Households from municipalities at risk of transport poverty
<b><i>Temporary direct income support</i></b>	
Income support for low-income households	Households in material need/income poverty living in transport-poor regions

Source: IEP

### 3.1 Temporary direct income support

**Direct income support for vulnerable households and transport users can help offset increased transport costs in a more targeted way until investments to improve transport accessibility are realized.** Households with limited access to transport and low-income households should be eligible for support. The support must reflect the expected rise in fuel prices following the introduction of ETS2 (European Parliament and EU Council, 2023). This measure provides temporary assistance until other structural measures and investments from the Plan become effective. As a result, the contributions would be gradually reduced, thereby also alleviating the impact of rising fuel prices.

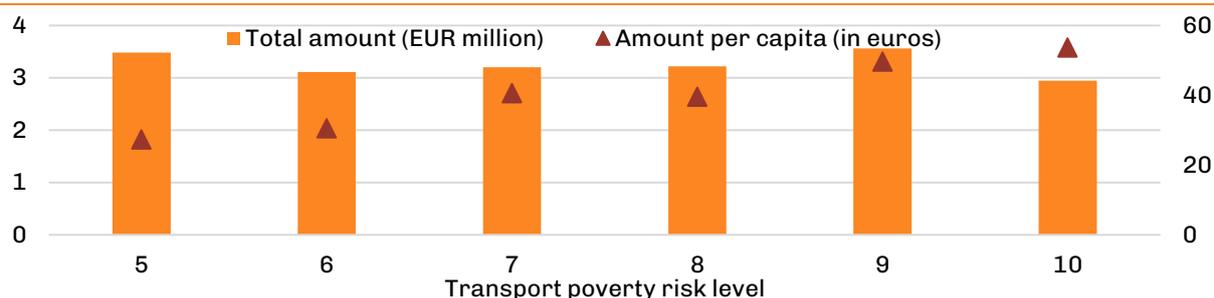
**An example of direct support is the Austrian Klimabonus, which is based on transport accessibility and compensates for price increases caused by a carbon tax.** The Klimabonus was introduced as part of the Ecological Tax Reform in 2022 to address the carbon tax. It is paid annually, directly into the account of anyone residing in Austria, without requiring an application. The amount of the allowance depends on the category of the region in which the recipient lives. In 2023, the minimum allowance for urban residents with good access to PT was €145 per person, while for rural residents with limited access,

it was up to €290 per person. Children receive 50% of the amount, and residents with disabilities receive the maximum amount of support, regardless of where they live.

**Temporary direct income support could be targeted at residents in material deprivation or income poverty living in municipalities at risk of transport poverty.** We propose discounting PT fares for all residents in material deprivation or income poverty. However, for residents in transport-poor municipalities, simply offering discounts on public passenger transport may not be sufficient if PT is unavailable. In such cases, temporary direct income support could be provided to ensure that household transport needs are met. It is essential to ensure that households in material need do not lose their entitlement to benefits as a result of direct income support, which aims to alleviate the risk of transport poverty. The availability of public transport in these municipalities would be improved through investment measures.

**We estimate the amount of temporary direct income support for people in material need living in transport-poor areas at nearly €3 million per year, or €20 million over the entire duration of the SCF.** Per capita support was calculated based on the median distance travelled to work or school, according to the 2021 Census data, and the expected increase in fuel prices due to ETS2. Residents in TP risk level 10 would receive 100% of the estimated impact, while residents in Level 9 would receive 90%, and residents in Level 5 would receive 50% of the amount. Children under the age of 18 would receive 50% of the amount. This approach takes into account transport accessibility, similar to the Austrian Klimabonus. Per capita support would decrease over time in line with the SCF Regulation.

**Graph 10: Temporary direct support by exposure to transport poverty**



Source: IEP

**Direct income support could be extended beyond individuals in material need to include all those in income poverty, increasing the cost of this measure to €10 million per year, or €70 million over the seven-year duration of the SCF.** While the number of recipients of material deprivation benefits has been declining over time, the number of people at risk of income poverty has remained stable. This is because income poverty is assessed relative to the income of other households, whereas material need is determined based on the subsistence minimum, which reflects household expenditure on basic necessities. For cost estimation, the number of people in income poverty within each stage of transport poverty has been estimated by applying the ratio between the number of people in material deprivation and those in income poverty at the county level, as more detailed data are unavailable.

**Providing direct support to residents in income poverty would require administrative adjustments and legislative modifications to redefine the concept of poverty.** Existing social support channels, such as the Office of Labour, Social Affairs and Family, could be used to distribute direct income support to residents in material need. Currently, residents can apply for material deprivation assistance by submitting household composition and income information (ÚPSVaR, 2024). However, adjusting the subsistence minimum or redefining poverty criteria would increase the number of households eligible for

assistance, leading to higher administrative costs. Additionally, implementing automatic disbursement without an application would require legislative changes, as there is currently no mechanism to accurately identify household members and assess their combined income and expenditures.

### **3.2 Improving access to public passenger, shared and active and on-demand transport**

**Public transport, shared, active, and on-demand transport are alternatives to individual car transport that are often not only greener but also more accessible and inclusive.** Public transport is more affordable than individual transport and is often essential for people who cannot drive, such as children or individuals with disabilities. Active transport, such as cycling, is an environmentally friendly and cost-effective alternative that can help passengers reach their destinations and is also well-suited for combining with other modes of transport. On-demand or demand-responsive transport can optimize public transport, particularly in underserved areas. Shared mobility services, such as carsharing and carpooling, can reduce costs and improve the efficiency of private vehicle use.

#### *Supporting public transport by subsidising the purchase of vehicles and infrastructure in transport-poor regions*

**We propose supporting the purchase of emission-free regional public transport vehicles through subsidies.** The current issue of investment debt and high operating costs makes it difficult to purchase cleaner, zero-emission vehicles, which are still more expensive than fossil fuel alternatives (see Box 1). The purchase price often outweighs considerations of the total cost of ownership. On average, a battery-electric urban bus is currently 80% more expensive than a diesel vehicle, while the hydrogen version can be up to 150% more expensive (Environmental Policy Institute, 2023). According to the SCF Regulation and the European Commission's guidance on the DNSH principles, zero-emission vehicles should be prioritized where they are an affordable and feasible solution. The draft quantification of the measure anticipates the purchase of zero-emission vehicles.

**This measure will help prevent future reductions in the frequency of public transport services, which would otherwise exacerbate transport poverty.** The purchase of buses can prevent route cancellations due to rising fuel costs. Increased costs may also result from fleet electrification and the need for additional vehicles, as a single electric vehicle may not initially be sufficient to replace one diesel bus. However, challenges related to limited range and longer charging times can be mitigated through scheduling adaptations, optimized charging, and real-time adjustments (Van Den Berg, 2022). Subsidizing bus purchases may not automatically lead to an increase in service frequency, as insufficient funding for operating costs remains a barrier.

**Subsidized buses should provide services to areas at risk of transport poverty.** The criteria for defining eligible areas for support implementation should reflect vulnerability to transport poverty, with priority given to the most affected regions. In practice, this means that the beneficiaries of these measures should be the contracting authorities of PT or transport operators providing public transport services in vulnerable regions. Ideally, subsidized buses should enhance service coverage, meaning they should be deployed on additional routes and services. The distribution of subsidized buses across countries should be based on the population at risk of transport poverty, specifically those scoring at least 8 on the index from subchapter 2.1.

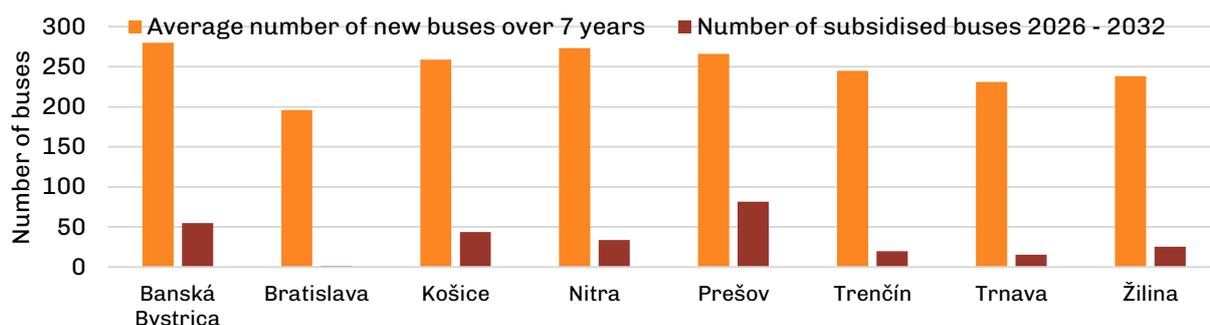
**The co-financing rate should be at least 25% of all eligible costs, which can improve the management of public goods** (Kengyel, 2022). We propose a co-financing rate of 25%, aligning with the required government contribution to the SCP under the SCF Regulation. The Slovakia 2021–2027 Programme (PSK) provides support for zero-emission buses and charging and refuelling infrastructure at full cost. To increase confidence in the transition to alternative fuels and support fleet electrification, the proposed co-financing rate is lower compared to similar foreign schemes.

**Smaller villages with limited transport services often do not justify operating a standard bus service.** Therefore, we propose including the use of zero-emission minibuses (8+1 passengers) in such areas. The inclusion of minibuses can help reduce operating costs while increasing service coverage, particularly in smaller villages. Additionally, minibuses address the shortage of bus drivers, as a Group B license is sufficient to operate them. A current example is the town of Hriňová, where minibuses run on regular public transport routes. During off-peak hours, minibuses could operate on a demand-responsive basis, improving efficiency (see next subchapter). The procurement of minibuses would be managed through tenders issued by transport companies and municipalities.

**We propose combining subsidies for vehicle purchases with support for charging and refueling infrastructure, particularly at depots.** Providing charging and refueling infrastructure is crucial to increasing demand for electric buses. A potential issue with regional buses is their range, as they cover longer distances and may require hydrogen-powered vehicles. Therefore, infrastructure will also need to be built along PT lines to ensure sufficient charging and refueling points. For charging infrastructure, we also recommend a co-financing rate of 25%. The beneficiaries of this measure should be transport operators and municipalities.

**The total support for purchasing public passenger transport vehicles and infrastructure is estimated at just under €130 million.** The number of subsidized buses is based on the need for zero-emission vehicles to meet EU requirements (Environmental Policy Institute, 2023). Over the duration of the SCF, approximately 280 buses are expected to be supported, representing 14% of the anticipated new intercity buses and 6% of the total registered intercity buses. The cost of a bus is estimated at €590,000, and a charging station at €51,000, based on the median price from the PSK call. However, purchase prices are expected to decrease over time (Environmental Policy Institute, 2023). The infrastructure requirement is estimated at one charging station per five buses. The estimated cost of a minibus is €45,000 based on market research, and the cost of a charger is €3,000, according to the maximum eligible unit price under the Recovery Plan. We estimate the need for charging infrastructure at one charging station per two minibuses. The cost projection includes support for 70 minibuses, corresponding to a quarter of the number of buses supported. All prices are stated net of VAT.

**Graph 11: Proposed subsidy for the purchase of intercity buses at county level**



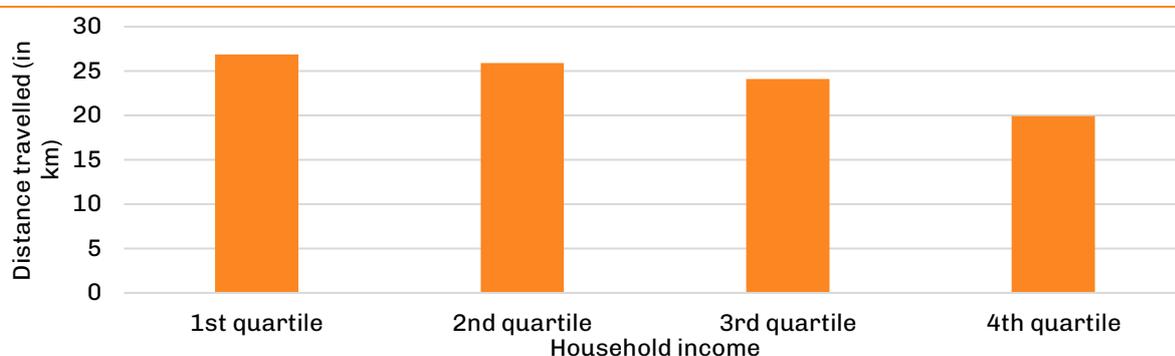
Source: IEP according to PZ SR and own calculations

## Support for public transport in the form of fare discounts

**We recommend reducing public transport fares for low-income households, as fare costs can often be a barrier to employment and school attendance.** Children from lower-income households tend to travel up to a third farther to school than those from higher-income communities because they live in more affordable areas further from city centers. In Vienna, a "social" fare system allows low-income earners to apply for a "Mobilpass," which reduces the monthly public transport ticket from €51 to €18.

**We propose discounts for members of families in material need and free travel for high school students from these families.** At present, only children from municipalities without a kindergarten or primary school receive travel allowances; secondary school children are not covered<sup>14</sup>. An exception is the Banská Bystrica region, where secondary school children from families in material need travel between their school and home municipality for free. Members of families in material need can simply certify this with a receipt from the authorities when purchasing a transport card. However, it should not be possible to purchase a discounted subscription or single ticket without a card due to the burden on the driver.

**Graph 12: Median distance travelled for school by income<sup>15</sup>**



Source: IEP according to SODB 2021

**The cost of the measure is estimated at €50 million, which should be allocated to compensate public transport providers for the provision of discounts and transport passes during the implementation of the SCF.** This amount is estimated based on the average mobility using public transport in Slovakia (Transport Policy Institute, 2023) the number of adults and secondary school children in households receiving the material deprivation allowance in 2023, and the available ticket prices in public transport. The estimated total also includes compensation for the issuance of transport passes, which is determined based on the number of benefit recipients and the cost of issuing the cards. Only the difference between the base ticket price and the discounted price that secondary school students currently enjoy will be compensated.

**Extending discounts to households in income poverty would incur a cost of €221 million, excluding VAT, over the duration of the SCF.** The number of people in income poverty in Slovakia is four times higher than the number of members of families currently receiving material deprivation benefits. Therefore, the income poverty allowance would cover a much larger number of people in need, including those living on the edge of material deprivation. Providing such a rebate would require administrative changes, as it is currently complicated to assess and verify eligibility. One of the measures we recommend is the introduction of a register of low-income individuals or households.

<sup>14</sup> The allowances are provided as a direct payment for each day a child attends school in a calendar month. In some regions, payments are made directly to carriers for the transport of the child, which the carrier keeps a record of.

<sup>15</sup> The figures do not include those travelling within their own village or town.

### *Promoting on-demand transport in transport-poor regions*

**We recommend making public transport more efficient by using demand-responsive transport and virtual PT stops.** At peak times, buses and minibuses in areas at risk would run at set times; at other times, they would respond to demand. During off-peak hours, the vehicle would stick to the most used route and stop at less frequently used stops only when requested via a mobile app or phone call. Virtual stops are a low-cost way to augment the existing bus stop system, with the bus stopping at these locations only on demand. This approach will reduce the distance passengers travel to the stops.

**On-demand transport exists in Slovakia and across Europe in various forms.** Most on-demand transport projects in Europe are implemented either in cooperation with the private sector or funded exclusively by public funds. To maximize passenger numbers, it is often integrated with existing public transport, such as through a single fare system (Pettersson-Löfstedt, 2019). In Slovakia, a bus-on-call service currently operates in the Trnava region in the municipalities of Prietrž and Rovensko, though the service can only be ordered by telephone. In the Czech town of Říčany, the Citya app is used, where minibuses complement the public transport system, improving accessibility to transport, especially in the less-provisioned parts of the town (Říčany, 2024). A similar system to the one we propose for Slovakia operates in Valliran, Spain, where vehicles respond to demand only during off-peak hours (Smarta, 2024).

**The measure requires the purchase of an information system and an in-depth analysis of the region to determine where it is appropriate to implement on-demand transport and how to integrate it with existing PT.** According to Citya, the cost of the information system is around 2 thousand euros per month for an area of approximately 100 km<sup>2</sup> for the management of 3 vehicles. If the information system were delivered to districts where the sum of the area of municipalities at risk of transport poverty<sup>16</sup> is at least 100 km<sup>2</sup>, the cost would be approximately 2.4 million euros per year.

### *Support for demand-responsive transport in the form of a subsidy for the purchase of vehicles for social taxis*

**We recommend that the Fund support social transport services, also known as social taxis, by subsidising the purchase of emission-free or low-emission minibuses.** Social taxis, as defined in the Social Services Act, serve people who are dependent on individual transport or have limited mobility. The service provided by social taxis differ between service providers; in some areas, they are also used for cultural or shopping purposes, while in others, they are only used for healthcare-related travel. Currently, there are 187 public and non-public social transport services in operation, which do not cover the entire territory of Slovakia. Municipalities are legally required to provide this service, either directly or through a non-public provider. Some municipalities provide the service, but it is not registered in the Register of Social Services, making it impossible to determine precisely where the service is currently unavailable.

**We estimate the cost of supporting social taxis at €11 million over the entire duration of the SCF.** We estimate the cost of a minibus adapted for wheelchair users at €53,000, with an additional €3,000 for the charger. The cost estimate is based on supporting one vehicle for each of the 187 social transport services in Slovakia. When specifying the vehicles, it is essential to take into account the needs of the beneficiaries, such as the height of the boarding area or the platform for electric wheelchairs. The beneficiaries of the purchase

---

<sup>16</sup> Degree of transport poverty according to an index of at least 8

subsidies will be municipalities and providers of social transport services from any region of Slovakia, as the measure is aimed at supporting vulnerable groups, regardless of location. We also recommend supporting low-emission vehicles, as social taxis often operate 24-hour services.

### *Promotion of car-sharing by means of an allowance in transport-poor*

**Providing an allowance to car drivers who offer rides to other passengers as a form of shared transport can alleviate transport poverty and reduce "forced car ownership."**

Several French regions operate a subsidy for carpooling, with the amount of the allowance ranging between €2 and €4, not exceeding the cost of the journey (Forum Vies Mobiles, 2023). Co-passengers often do not pay, and the driver receives the allowance only from public funds. The introduction of the allowance has led to an increase in the number of monthly short-distance ridesharing trips, with an average of about 5.5 trips per 1,000 inhabitants (Wang & Monchambert, 2024).

**The cost of contributions for co-drivers could amount to €50 thousands to €100 thousands per year.** However, interest in carpooling in low-density regions may be severely limited. Based on the potential of carpooling, as shown by studies from French regions, promoting carpooling in transport-poor regions in Slovakia could lead to about 24,000 journeys per year at a cost of €50 thousand to €100 thousand. In France, however, the carpooling system is primarily used by lower-income individuals living in higher-density areas. In contrast, in small, low-density regions, the impact has proven negligible.

### *Promoting active transport through a subsidy for the purchase of cargo bicycles*

**Low-income households could be supported by providing access to cargo bicycles adapted for transporting children through long-term leases from municipalities.**

Cargo bikes are an appropriate measure for low-income households with children, especially in urban areas, in line with the EC guidance on the SCF, where their use is justified. In the German city of Aachen, an allowance is provided for the purchase of cargo bikes up to €1,250, e-bikes up to €2,500, and trailers up to €400, depending on household income (Aachen, 2024). Access can be provided on a long-term lease basis, with the lessor being the LDC, cities, or municipalities. The municipalities would therefore be the applicants for the subsidy.

**The purchase of cargo bicycles for households in material need with young children could cost between €1.2 million and €3.8 million over the duration of the SCF.**

In 2023, there were 7,096 households in Slovakia in material need with at least one child aged 2 to 5 years, for whom a cargo bicycle is a suitable means of transport. Based on data from the 2021 Census on the use of bicycles for commuting, an estimated 280 households in material need may be interested in a cargo bicycle. If only households in urban areas were considered, the estimated interest would be around 100 households. Providing a bicycle for 4 years (or for the duration of the child's use) would cost between €1.6 million and €4.9 million over the duration of the SCF, depending on whether the bicycles are available to households in urban areas or also in villages. The unit price is considered at €3,390, according to a market survey on cargo bikes and e-bikes.

### *Promoting active transport through the construction of cycling infrastructure in transport-poor regions*

**The construction of cycle paths in selected areas can reduce the need to travel by private car.**

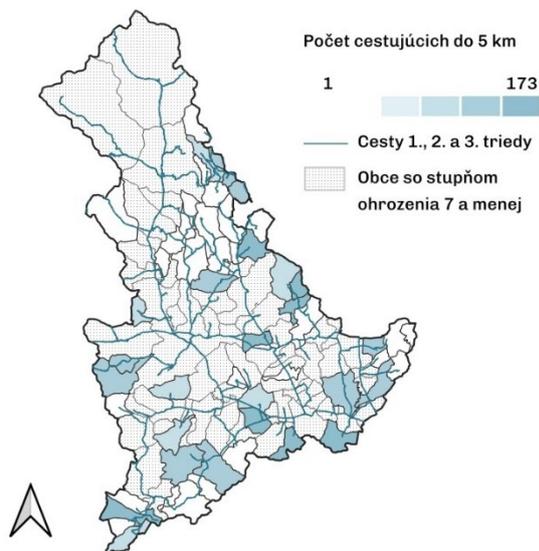
In municipalities with a vulnerability level higher than 8, up to 40% of residents travel by private car for distances up to 5 km outside their municipality (Statistical Office of the Slovak Republic, 2023). Only 12% of the population travels by bicycle in this context.

According to the literature, approximately 6 kilometers is considered a suitable distance for regular cycling (Wuerzer & Mason, 2015). The average bicycle journey in Slovakia is 4.4 kilometres (Inštitút dopravnej politiky, 2022).

**The construction of cycle routes from the SCF should be focused on transport-poor regions where there is sufficient potential demand. At the same time, the suitability of the terrain should be taken into account.** The suitability of construction depends on the potential demand so that the cost is not prohibitive. In 8 districts in the Prešov and Košice regions, more than 600 inhabitants of transport-poor municipalities are transported within 5 kilometres outside their municipality. In the districts of Trebišov and Vranov nad Topľou, the number of inhabitants is as high as 1300, only 10% of them travel by bicycle. The construction of bicycle routes to PT stops or stations that are far from village centres would also encourage its use (Cervero, Caldwell, & Cuellar, 2013). Such connections are suggested in locations where PT access is within 5 to 7 km of the road source (MD SR, 2013).

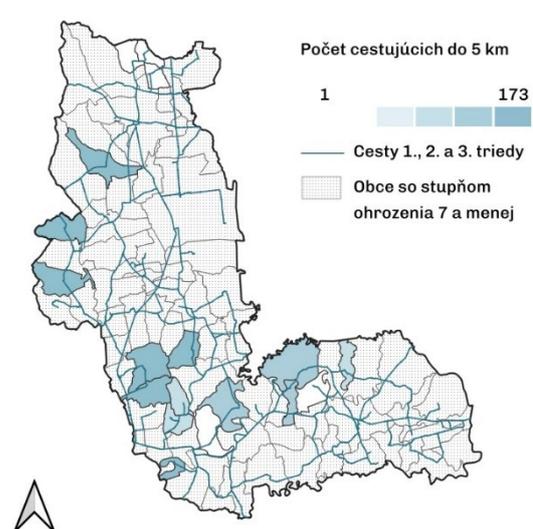
**We recommend investing in the installation of bicycle racks at rail and regional bus stations and stops to increase their catchment area.** Bicycles make public passenger transport more accessible to households that are located too far from a station or bus stop (Krizek & Stonebraker, 2011). Bike racks are essential for the combined use of public transport and cycling. In Denmark, covered bike rack stations have almost tripled the willingness of passengers to cycle to a public transport station (Halldórsdóttir, Nielsen, & Prato, 2017). The challenge is theft resistance, so it is recommended to install racks as close to the entrance as possible in railway stations, ideally indoors (Ravensbergen, Buliung, Mendonca, & Garg, 2018). Alternatively, stands located in parking boxes and cages (Arbis, et al., 2016).

**Figure 9: Number of inhabitants travelling within 5km outside their municipality in Rimavská Sobota district**



Source: IEP

**Figure 10: Number of inhabitants travelling within 5km outside their municipality in Trebišov district**



Source: IEP

**The estimated cost of supporting cycling infrastructure is €2 million per year, or €15 million throughout the duration of the Fund.** Within the permanent financial mechanism for implementing the strategy, the National Cycling Coordinator proposes €5 to €7 per capita for supporting the development of cycling and cycling tourism. These costs include not only the construction of cycle paths and bike racks but also operational expenses such as the repair and maintenance of cycle paths, education and awareness-raising activities,

and administrative costs. The proposed amount for cycling infrastructure support per capita is then multiplied by the number of inhabitants living in municipalities at risk of transport poverty. At this level of support, it is estimated that approximately 34 km of cycle paths will be built, along with associated infrastructure such as bike racks.

**The implementation of measures to support cycling infrastructure should be centralized.** Currently, projects aimed at constructing cycle paths are carried out by both the Ministry of the Interior and the Ministry of Regional Development, depending on who announces the call for proposals and which institution administers the program. For the SCF, the implementation of this measure should be concentrated within one institution to increase efficiency and reduce the administrative burden.

### 3.3 Improving access to zero-emission passenger vehicles and infrastructure

#### *Provision of discounted leasing for selected social services*

**We recommend that vulnerable micro-businesses make passenger cars available through discounted operating leases for electric vehicles. The measure must be accompanied by a subsidy for the purchase of charging infrastructure.** In France, discounted operating leases are available for a selected group of lower-income citizens, with up to €13 thousand per vehicle in state support. The resulting monthly repayment is therefore on average between €50 and €150.

**Suitable beneficiaries are home carers and field social workers.** Nurses who provide home care travel with their equipment to patients, so a vehicle is essential for their daily operations. Currently, part of their operating costs are covered by health insurance companies. However, given the range of electric cars, the scheme would also have to take into account the development of charging infrastructure, as nurses travel hundreds of kilometres a day. Field social workers<sup>17</sup> are also dependent on the use of a private vehicle to perform their work.

**The estimated cost of operational leasing of electric vehicles, with the support of 936 providers, or micro-enterprises, would reach almost 13 million euros during the SCF.** In the calculation, we follow the example of France with a support of €13,000 per vehicle. We estimate the subsidy per charger at €500. The number of nurses in home nursing care reaches 809 (Ministry of Labour and Social Affairs, 2021) and the number of providers of outreach social services, which are micro-enterprises, reaches 127.<sup>18</sup>

**The measure is not recommended for low-income households, as it may be financially burdensome for households in the Slovak context.** The above-mentioned social operational leasing in France applies to applicants with a reference income of less than €15,400 per year who travel more than 15 km to work. However, the median income in France is almost three times higher than in Slovakia (Eurostat, 2023). The amount of the monthly lease payment may therefore be high for Slovak low-income households.

#### *Promoting zero-emission plug-in vehicles by subsidising purchases in transport-poor regions*

---

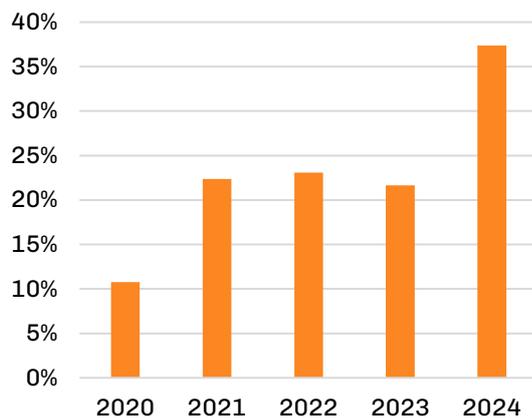
<sup>17</sup> Crisis intervention, early intervention, transport service and canteen, especially for people with disabilities and nursing care.

<sup>18</sup> Excluding the transport service, which is counted under social taxis.

**A subsidy for the purchase of a zero-emission plug-in vehicle can boost the market for plug-in electric vehicles.** In Lithuania, a subsidy of up to €2,500 applies to the purchase of electric vehicles less than four years old and a VAT deduction of up to €50,000 applies to the purchase of electric vehicles. Thus, up to 74% of the electric car fleet in Lithuania consists of used models. For more than a third of drivers, the subsidy for a driven electric vehicle has a significant impact on the use of such a vehicle (European Commission, 2024). In Slovakia, almost a quarter of electric vehicles are driven, and in 2024 the share of driven electric vehicles in the total number of newly registered vehicles was as high as 37%.

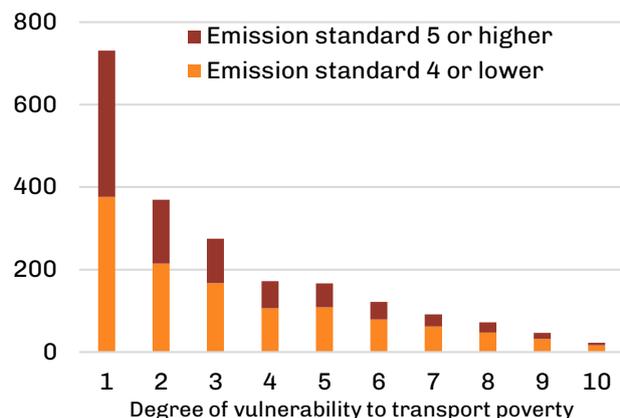
**Support for the purchase of zero-emission vehicles should be directed to transport vulnerable regions and should be conditional on the scrapping of the old vehicle in order to reduce emissions in the transport sector.** Measures to promote public transport may not sufficiently target all households in municipalities at risk of transport poverty and these households may continue to rely on individual car transport. At the same time, in municipalities with a higher degree of vulnerability to transport poverty, there is a higher proportion of older vehicles with lower emission standards. Up to two-thirds of passenger vehicles in these areas meet the EURO4 or lower emission standard, making them vehicles registered in 2010 or earlier.

**Graph 13: Share of electric vehicles in use relative to new registered electric vehicles**



Source: IEP

**Graph 14: Number of vehicles by emission standard (in thousands)**

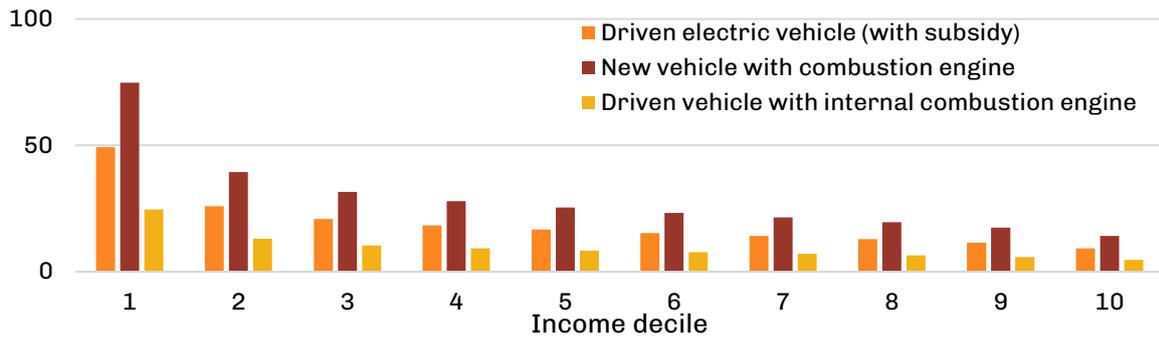


Source: IEP

**The potential for subsidizing plug-in electric vehicles is estimated at 100 vehicles per year.** The estimate is based on available data on the number of newly registered electric vehicles in 2023 and 2024 at district level, taking into account the share of the population living in municipalities at risk of transport poverty of at least 8. At the same time, the development of electromobility in Slovakia up to 2030 is taken into account under the scenario without further measures in the updated National Energy and Climate Plan 2024. The annual number of supported vehicles would thus be around 90. With a subsidy of €2,500, following the Lithuanian model, and support for the purchase of charging infrastructure of €500, the total cost of the measure would amount to €1.8 million over the duration of the SCF. In the context of the target to reduce CO<sub>2</sub> emissions of new passenger cars by 100 % by 2035, an increased demand for plug-in electric vehicles can be expected.

**All households living in transport-prone regions would be eligible for the subsidy, regardless of their income.** The total support of €3,000 represents approximately 20% of the purchase price of a running electric vehicle on the Slovak market. The average price of a new equivalent internal combustion engine vehicle is 22% higher compared to a driven electric vehicle, or 52% when the subsidy is taken into account. Conversely, a running internal combustion engine vehicle is half the price of a running electric vehicle, even after the subsidy is taken into account. Thus, for the poorest residents, it may still be more profitable to purchase a running ICE vehicle and no subsidy is expected to be of interest.

**Graph 15: Number of monthly equivalised disposable incomes per person needed to buy a car**



Source: IEP

### 3.4 Challenges in the preparation and implementation of the Social Climate Plan

**Investments and measures should either reflect the vulnerability of municipalities to transport poverty, or target individuals at risk directly.** The challenge in designing and implementing measures and investments in the SCP lies in effectively targeting vulnerable groups (Eden, et al, 2023). While some measures proposed in this study target specific groups at risk of transport poverty, such as discounts on public transport tickets for members of families in material need, other measures tend to have a more regional impact. An example of this is the purchase of public passenger transport vehicles. Measures with a regional dimension should be targeted to vulnerable areas based on the individual characteristics of the project, the context of the region, its needs, and its degree of vulnerability to transport poverty, ensuring that the measure provides the best value for money. Therefore, the assessment of municipalities' vulnerability to transport poverty should be one of the criteria for supporting projects.

**Measures should aim for the fairest possible effect and work to reduce existing inequalities.** When designing the Plan, it is important to consider the impact of measures in terms of how benefits are distributed both within a particular population group or similar groups and between different groups. For example, public transport discounts in Slovakia currently apply broadly to all students, seniors, or people with disabilities, but cheaper transport is not available to some members of households in material need. There is also the challenge of ensuring that those on the margins of eligibility do not fall below the poverty or transport poverty line.

**Existing support for low-income households currently only target those in material deprivation, yet these households represent only a small proportion of all households experiencing income poverty.** Material deprivation is currently the only measure used to identify low-income households. However, in 2023, up to 14% of the Slovak population faced income poverty (Statistical Office of the Slovak Republic, 2024), while less than 4% of the population was assessed for material deprivation assistance, according to the Ministry of Labour and Social Affairs of the Slovak Republic. Furthermore, the number of recipients of material deprivation benefits has been declining over the long term, while the number of people at risk of income poverty has remained stable. This discrepancy arises because income poverty is assessed relative to the income of other households, while material need is determined based on a subsistence minimum, which reflects household expenditure on basic needs. However, the subsistence minimum has only been indexed since 1998 and is increasingly seen as an absolute poverty line (Novysedlák, Siebertová, & Švarda, 2022).

**Table 5: Comparison of subsistence and income poverty (euro/household/month)<sup>19</sup>**

Household type	Living wage 2024	Income poverty 2023
Individual	274	461
Couple with 2 dependent children	715	967

Source: the IEP according to the SO SR and ÚPSVaR

**To be effective, the measures must be simple to use and should not impose an undue administrative burden.** Transport is a daily necessity for most people, so passengers tend to choose services that are easy to access and convenient. Currently, social taxi services provided by municipalities and cities often require extensive paperwork from applicants, which can discourage their use. For example, in Hnúšťa, the social taxi service was discontinued due to low usage, with passengers complaining about the number of receipts they had to provide. A key challenge is to implement measures that minimize the administrative burden, both for public administrations and for users, such as in the payment of direct subsidies or proving entitlement to public passenger transport discounts.

**The implementation process should also take into account the knowledge of local experts, particularly in targeting measures.** Local governments have significant experience in providing social and transport services to citizens and are well-equipped to assess the specific needs and methods for implementing measures. For instance, regions, cities, and municipalities are adept at identifying areas with transport access issues or understanding which groups need social taxi services. Therefore, local authorities should be involved in the design of measures and given the flexibility to adapt them to the local context. **However, care should be taken to ensure that smaller municipalities are not disadvantaged when accessing funds, as they may lack the capacity to develop large-scale projects or manage extensive funding.**

**When designing the Social Climate Plan, it is crucial to verify its complementarity and continuity with other funds, such as the Recovery and Resilience Plan (RRP) and the Slovakia Programme 2021-2027.** While the Slovakia Programme will run until 2029, the Recovery Plan is set to be completed by 2026. The continuity of measures and objectives should be carefully considered. The SCF can finance the extension of existing measures through an increase in budget, scope, or duration. This means that the Fund can support measures that have already been funded by other sources and are at risk of being discontinued, or it can subsidize the expansion of existing initiatives. **Additionally, technical assistance for implementing measures should be provided by institutions that have prior experience with each type of measure.**

<sup>19</sup> The amounts in the table have been rounded for clarity.

# Bibliography

Aachen, 2024. *Lastenradförderprogramm für Aachener Familien*. [Online]

Available at:

[https://www.aachen.de/DE/stadt\\_buerger/verkehr\\_strasse/clevermobil/lara/index.html](https://www.aachen.de/DE/stadt_buerger/verkehr_strasse/clevermobil/lara/index.html)

Alonso-Epelde, E., García-Muros, X. & González-Eguino, M., 2023. Transport poverty indicators: A new framework based on the household budget survey. *Energy Policy* 181.

Arbis, D., Rashidi, T. H., Dixit, V. & Vandebona, U., 2016. Analysis and planning of bicycle parking for public transport stations. *International Journal of Sustainable Transportation*, pp. 495-504.

Bruyas, M.-P. & Simões, A., 2010. Are elderly drivers more at risk when interacting with more than one in-vehicle system simultaneously?. *Le travail humain* 73, pp. 53-73.

Carroll, P., Benevenuto, R. & Caulfield, B., 2021. Identifying hotspots of transport disadvantage and car dependency in rural Ireland. *Transport Policy* 101, pp. 46-56.

CBS & PBL, 2019. *Indicator risico op vervoersarmoede*. [Online]

Available at: <https://www.pbl.nl/sites/default/files/downloads/pbl2019-indicator-risico-op-vervoersarmoede-3824.pdf>

CBS, 2023. *Mobility, per person, modes of travel, purposes of travel and regions*. [Online]

Available at:

<https://opendata.cbs.nl/#/CBS/en/dataset/84710ENG/table?searchKeywords=bicycle>

Cervero, R., Caldwell, B. & Cuellar, J., 2013. Bike-and-Ride: Build It and They Will Come. *Journal of Public Transportation* 4, pp. 83-105.

Dokupilová, D., 2023. Dopravná chudoba: Prehľad o dopravnej chudobe v Strednej a Východnej Európe: Slovensko. *Prognostický ústav CSPV SAV*.

Eden, A. et al., 2023. Putting the ETS 2 and Social Climate Fund to Work: Impacts, Considerations, and Opportunities for European Member States.

El-Geneidy, A., Grimsrud, M., Rania, W. & Tétreault, P. R., 2014. New evidence on walking distances to transit stops: Identifying redundancies and gaps using variable service areas. *Transportation* 41, p. 193-210.

European Parliamentary Research Service, 2022. Understanding transport poverty.

Európska komisia, 2024. *Consumer Monitor 2023: EUROPEAN ALTERNATIVE FUELS OBSERVATORY*. [Online]

Available at: [https://alternative-fuels-observatory.ec.europa.eu/system/files/documents/2024-06/EU%20Aggregated%20Report%202023\\_0.pdf](https://alternative-fuels-observatory.ec.europa.eu/system/files/documents/2024-06/EU%20Aggregated%20Report%202023_0.pdf)

Európsky parlament a rada EÚ, 2023. Nariadenie Európskeho parlamentu a rady (EÚ) 2023/955 z 10. mája 2023 ktorým sa zriaďuje Sociálno-klimatický fond a mení nariadenie (EÚ) 2021/1060.

Eurostat, 2023. Mean and median income by age and sex - EU-SILC and ECHP surveys.

Eurostat, 2024. *Share of buses and trains in inland passenger transport; sdg\_09\_50*. [Online].

Forum Vies Mobiles, 2023. *Y a-t-il un passager dans l'auto ?*. [Online]

Available at: [https://base.citego.org/docs/2023.09.11\\_vf\\_etude\\_covoiturage.pdf](https://base.citego.org/docs/2023.09.11_vf_etude_covoiturage.pdf)

Geurs, K. T. & Wee, B., 2004. Accessibility evaluation of land-use and transport strategies. *Journal of Transport Geography* 12, p. 127–140.

Gutiérrez, J. & García-Palomares, J. C., 2008. Distance-Measure Impacts on the Calculation of Transport Service Areas Using GIS. *Environment and Planning B: Urban Analytics and City Science* 35.

Halldórsdóttir, K., Nielsen, O. A. & Prato, C. G., 2017. Home-end and activity-end preferences for access to and egress from train stations in the Copenhagen region. *International Journal of Sustainable Transportation* 11 (10), pp. 776-786.

Hermans, E., Van den Bossche, F. & Wets, G., 2008. Combining road safety information in a performance index. *Accident Analysis and Prevention*, 40(4), p. 1337–1344.

Hluško, R., Horňák, M. & Polačková, Z., 2024. Slovakia's Roma Population and Unemployment: Does public transport quality matter?. *GEOGRAFICKÝ ČASOPIS / GEOGRAPHICAL JOURNAL* 76, pp. 249-264.

Horňák, M. & Rochovská, A., 2014. Do mesta čoraz ďalej – dopravné vylúčenie obyvateľov vidieckych obcí Gemera. *Geographia Cassoviensis* 8, pp. 141-149.

Inštitút dopravnej politiky, 2020. Ako sa „hýbeme“.

Inštitút dopravnej politiky, 2022. (Ne)Máš na výber? Modelovanie výberu dopravného prostriedku.

Inštitút dopravnej politiky, 2023. IDP Interactive - Mobilita.

Inštitút environmentálnej politiky, 2023. Čisto a zbesilo: Analýza znižovania emisií v cestnej doprave.

Joint Research Institute, 2022. Transport poverty: a systematic literature review in Europe. *Publications Office of the European Union, Luxembourg*.

Kamruzzaman, M. & Hine, J., 2012. Analysis of rural activity spaces and transport disadvantage using a multi-method approach. *Transport Pol.* 19 (1), pp. 105-120.

Kelly, J. A. et al., 2023. Transport poverty risk – A composite spatial index to support policy design and investment targeting as part of a just climate transition. *Environmental and Sustainability Indicators* 18.

Kengyel, Á., 2022. Would Renationalisation and Co-financing of the Common Agricultural Policy Be Justified?. *Intereconomics* 57, Volume 57, pp. 113-119.

Krizek, K. J. & Stonebraker, E. W., 2011. Assessing options to enhance bicycle and transit integration. *Transportation Research Record* 2217, 2217(1), pp. 162-167.

Lachapelle, U. & Boisjoly, G., 2023. Breaking down public transit travel time for more accurate transport equity policies: A trip component approach. *Transportation Research Part A: Policy and Practice* 175.

Litman, T., 2016. *Transportation Affordability: Evaluation and Improvement Strategies*. Victoria Transport Policy Institute.

- Lowans, C. et al., 2021. What is the state of the art in energy and transport poverty metrics? A critical and comprehensive review. *Energy Econ.* 101.
- Lucas, K., 2012. Transport and social exclusion: Where are we now?. *Transport Policy* 20, pp. 105-113.
- Lucas, K., Bates, J., Moore, J. & Carrasco, J. A., 2016. Modelling the relationship between travel behaviours and social disadvantage. *Transportation Research Part A: Policy and Practice* 85, pp. 157-173.
- Lucas, K., Mattioli, G., Verlinghieri, E. & Guzman, A., 2016. Transport Poverty and Its Adverse Social Consequences. *Proceedings of the Institution of Civil Engineers - Transport*, Vol. 169, No. 6.
- MD SR, 2013. *Trvalý finančný mechanizmus na implementáciu Národnej stratégie rozvoja cyklistickej dopravy a cykloturistiky v Slovenskej republike*. [Online].
- MPSVR SR, 2021. *Stratégia dlhodobej starostlivosti v Slovenskej republike*. [Online]  
Available at: <https://www.employment.gov.sk/files/sk/rodina-socialna-pomoc/socialne-sluzby/strategia-dlhodobej-starostlivosti-sr/strategia-dlhodobej-starostlivosti-sr-sept-2021.pdf>
- Novyzedlák, V., Siebertová, Z. & Švarda, N., 2022. *Dvojaká chudoba ...alebo keď nevieme, kto je chudobný*. [Online]  
Available at: <https://www.rrz.sk/dvojaka-chudoba-alebo-ked-nevieme-kto-je-chudobny/>
- OECD/European Union/EC-JRC, 2008. *Handbook on Constructing Composite Indicators*. Paris: OECD Publishing.
- Perrotta, A., 2017. Transit Fare Affordability: Findings From a Qualitative Study.. *Public Works Management & Policy* 22, p. 226–252.
- Pettersson-Löfstedt, F., 2019. An international review of experiences from on-demand public transport services.
- Ravensbergen, L., Buliung, R., Mendonca, M. & Garg, N., 2018. Biking to Ride: Investigating the Challenges and Barriers of Integrating Cycling with Regional Rail Transit. *Transportation Research Record* 2672(8), pp. 374-383.
- Rochovská, A. & Rusnáková, J., 2018. Poverty, segregation and social exclusion of Roma communities in Slovakia. *Bulletin of Geography*, pp. 195-212.
- Říčany, 2024. *Sdílená doprava CITYA*. [Online]  
Available at: <https://www.ricany.cz/mesto/mestska-doprava/sdilena-doprava-citya/>
- Shen, Y., Hermans, E., Brijs, T. & Wets, G., 2012. Data Envelopment Analysis for Composite Indicators: A Multiple Layer Model. *Social Indicators Research*, Volume 2, p. 114.
- SHMÚ, 2023. *Emisie skleníkových plynov a znečisťujúcich látok zo sektora doprava*. [Online].
- Simcock, N. et al., 2021. Identifying double energy vulnerability: A systematic and narrative review of groups at-risk of energy and transport poverty in the global north. *Energy Research & Social Science*.
- Smarta, 2024. *Vallibus Connectat*. [Online]  
Available at: <https://ruralsharedmobility.eu/demonstrators/vallibus-connectat/>

Sovacool, B. K. & Del Rio, D. D. F., 2022. "We're not dead yet!": Extreme energy and transport poverty, perpetual peripheralization, and spatial justice among Gypsies and Travellers in Northern Ireland. *Renewable and Sustainable Energy Reviews*.

Sustrans, 2016. *Transport Poverty in Scotland*. [Online]

Available at:

[https://www.sustrans.org.uk/media/2880/transport\\_poverty\\_in\\_scotland\\_2016.pdf](https://www.sustrans.org.uk/media/2880/transport_poverty_in_scotland_2016.pdf)

Štatistický úrad SR, 2023. *Sčítanie obyvateľov, domov a bytov 2021*. [Online]

Available at: <https://scitanie.sk/>

Štatistický úrad SR, 2024. *Demografia a sociálne štatistiky*. [Online]

Available at:

[https://slovak.statistics.sk/wps/portal/ext/products/informationmessages/inf\\_sprava\\_detail/lut/p/z1/tVZdc6IwFP01fWS4SUGIj0AREPxAPIp52aFWK9sWbevY7b\\_fQLedFWviTmfxRSfn3JP74bnopX6tl021r--qXb1pqgfxe16yH4kZcsdBN0ATEwiHUTo03AH2c6pfdYAir4DJmluQziehdSNHcIHVC9PH08](https://slovak.statistics.sk/wps/portal/ext/products/informationmessages/inf_sprava_detail/lut/p/z1/tVZdc6IwFP01fWS4SUGIj0AREPxAPIp52aFWK9sWbevY7b_fQLedFWviTmfxRSfn3JP74bnopX6tl021r--qXb1pqgfxe16yH4kZcsdBN0ATEwiHUTo03AH2c6pfdYAir4DJmluQziehdSNHcIHVC9PH08)

Štatistický úrad SR, 2024. *Príjmová chudoba podľa krajov SR - ročne [ps3813rr]*, s.l.: s.n.

Štatistický úrad SR, 2024. *Výdavky súkromných domácností v SR 2023*.

Tikoudis, I. et al., 2024. Household transport choices: New empirical evidence and policy implications for sustainable behaviour. *OECD Environment Working Papers No. 246*.

ÚPSVaR, 2024. *Žiadosť o pomoc v hmotnej núdzi*. [Online]

Available at:

[https://www.upsvr.gov.sk/buxus/docs/SSVaR/tlaciva/ziadost\\_o\\_pomoc\\_v\\_hmotnej\\_nudzi.pdf](https://www.upsvr.gov.sk/buxus/docs/SSVaR/tlaciva/ziadost_o_pomoc_v_hmotnej_nudzi.pdf)

Úrad splnomocnenca vlády SR pre rómske komunity, 2019. *Atlas rómskych komunit 2019*. [Online]

Available at: <https://www.romovia.vlada.gov.sk/atlas-romskych-komunit/atlas-romskych-komunit-2019/?csrt=12534900861722956753>

Van Den Berg, P., 2022. Electrifying Buses in Rotterdam. *Impact* 1, pp. 16-18.

Wang, Y. & Monchambert, G., 2024. Does subsidy increase carpooling usage? The case of short-distance carpooling in France. *Transport Urban Planning Economics Laboratory*.

Wuerzer, T. & Mason, S. G., 2015. Cycling willingness: Investigating distance as a dependent variable in cycling behaviour among college students. *Applied Geography*, Volume 60, pp. 95-106.

# Annexes

## Annex A: Overview of indicators used

### **Time travelled in the morning and evening**

The time individuals must spend traveling to key services, such as work and school, contributes to increasing the risk of transportation poverty (Kelly, Kelleher, Guo, Deegan, & Patil, 2023). According to the literature, there is an increased risk of transport poverty in rural areas where there are limited employment opportunities (Carroll, et al., 2021).

Travel time is calculated as a weighted average of the time spent commuting to work or school by public passenger transport or individual car transport to each municipality, using the population travelling by each mode of transport as weights.

The indicator only includes commuting by road transport, commuting by walking or cycling is not taken into account as this mode of transport is mainly within the municipality and it is not possible to estimate the duration of the journey. At the same time, travelling on foot or by bicycle is not associated with fossil fuel costs and so price increases due to ETS2 do not have a direct impact on those who already travel this way. Furthermore, the effect of travelling on foot or by bicycle is ambiguous. While a high proportion of cycling or walking in cities indicates proximity to jobs and other opportunities, in smaller municipalities it can be a sign of hidden poverty.

Data on the number of residents travelling to work or school from the municipality of current residence to the municipality of attendance by each mode of transport are from the 2021 Census. The data are adjusted for unknown modes of travel and unknown places of attendance, including where the place of attendance is abroad. The adjusted set for the analysis covers a total of 2.1 million inhabitants in Slovakia, of which 1.4 million inhabitants travel by road transport (car, train, public transport or bus other than public transport). The number of the census population travelling outside the zone of their municipality by road transport amounts to 824 thousand.

The time travelled by individual car transport is based on the shortest distances on the road network, and does not take into account peak hours. Data on public passenger transport were obtained using the timetable search engine<sup>20</sup>. The information obtained includes the number of connections, journey length in kilometres and minutes in the morning between 6.00 and 9.00 a.m. and the number of connections in the afternoon between 3.00 and 6.00 p.m. The advantage of timetable data is its accuracy, as both time and kilometre distances take into account the need for transfers, waiting times and the route of public passenger transport.

### **Ratio of time distance by public passenger and individual car transport**

The ratio is indicative of the efficiency of PT compared to individual car transport. The indicator is based on the same data as time travelled, but does not take into account the number of passengers travelling by each mode of transport, it only compares the travel time by public passenger transport and individual car transport.

### **Number of PT connections in the morning and evening**

---

<sup>20</sup> Connections were searched as of 13.6.2024

The number of PT connections again speaks to time availability or convenience. Compared to the travel time indicator, frequency provides additional information on whether public passenger transport is available at all at the desired times (Sustrans, 2016). An example might be travelling from a village to a nearby district town, where the time travelled is relatively short relative to the distance, but the frequency of services in the morning or evening may be low.

The number of PT services is calculated as a weighted average of the number of services in minutes from the village to other villages to which residents travel for work or school according to the 2021 Census data. The frequency data is taken from timetables, with data obtained for morning and evening services, i.e. the frequency of services between 6.00 and 9.00 a.m. in the morning and between 3.00 p.m. and 6.00 p.m. in the evening. These data thus cover the majority of the population that commutes to work or school during these hours. Accounting for other times, such as those suitable for shift work, is not available due to the high difficulty of data collection

### **Percentage of population living within 500 metres of a PT station or stop**

The proportion of residents living within 500 of a public passenger transport stop again describes the accessibility of public passenger transport in terms of proximity.

Existing literature on maximum acceptable distances from a station or stop or public passenger transport indicates 400 to 500 metres for bus stops and stations (Gutiérrez & García-Palomares, 2008) , (Lachapelle & Boisjoly, 2023) and 800 to 1000 metres for rail stops (El-Geneidy, et al., 2014).

The indicator is calculated on the basis of data on the location of individual stops and the location of individual household address points in Slovakia. The address points provide the coordinates of all addresses in Slovakia. The data can be found on [data.gov.sk](http://data.gov.sk). This data can be linked to data on the number of permanent residents at each address according to the Register of Natural Persons (RFO), resulting in a list of occupied addresses. Data are available for the year 2020.

For each household or address point, it shall be ascertained whether there is at least one public passenger transport stop within 500 metres as the crow flies. The proportion of the population living in households or address points within 500 metres of the total population living in the municipality shall then be calculated at the municipality level

The three indicators - distance, frequency, travel time - complement each other as they describe the three parts of public passenger transport travel. An individual makes a decision based first on whether there is a bus stop nearby, then how often public passenger transport runs, and then how long the journey will take, including a comparison with individual car transport if they have the option.

### **Share of population over 65**

Older residents have poorer access to transportation due to physical limitations. Longer walking distances, inadequate bus stop facilities (e.g. seats), the need for transfers, all place a greater burden on older people who are more vulnerable. Older people also have poorer access to individual car transport (Bruyas & Simões, 2010) , with drivers over 65 years of age having to undergo regular medical check-ups. This is also why older people make fewer journeys and also shorter ones (Transport Policy Institute, 2020). The indicator data is from the 2021 Census, taking into account current residence.

### **Proportion of pupils and students**

Pupils and students travelling to school are among the population groups at risk due to the unavailability of individual car transport. Without access to public passenger transport, they are dependent on parental transport. The figure is based on the 2021 Census, taking into account current residence.

### **Proportion with disabilities**

Similar to the elderly population, severely disabled residents have difficulty accessing transportation due to physical barriers and therefore travel less and shorter distances (Lucas, Bates, Moore, & Carrasco, 2016). The proportion of people with severe disabilities at the municipal level comes from the Social Policy Institute for 2023

### **Getting to the hospital**

Travel time to hospital is calculated as the travel time to the nearest hospital in minutes according to the Institute for Healthcare Analysis. Distance to hospital describes the dimension of transportation accessibility to key services such as health care (Lucas, Mattioli, Verlinghieri, & Guzman, 2016; Simcock, et al., 2021)

### **Percentage of Roma population**

Poor accessibility of transport infrastructure is one of the reasons for segregation of the population living in marginalised Roma communities, who thus have limited access to education and work (Hluško, Horňák, & Polačková, 2024; Horňák & Rochovská, 2014). Up to 22% of the Roma population live in settlements outside the built-up core of the municipality, with an average distance of 700 metres from a bus stop and up to 8 kilometres from a railway stop (Office of the Government Plenipotentiary for Roma Communities, 2019). As a result of transport disadvantage, very poor households can easily become socially excluded or marginalised (Rochovská & Rusnáková, 2018). As residents living in marginalised communities have limited access to individual car transport, the lack of access to public passenger transport affects them disproportionately (Sovacool & Del Rio, 2022). In municipalities with a higher proportion of Roma inhabitants, public passenger transport services have been cancelled in the past, contributing to the vulnerability of the area to transport poverty. The number of Roma inhabitants living in settlements outside the built-up core of the municipality is based on data from the Roma Community Atlas 2019.

### **Median wage**

The median wage at the municipal level describes the affordability of transportation. Household income is a commonly used indicator across the literature on transport poverty indices (Sustrans, 2016), (Kelly, Kelleher, Guo, Deegan, & Patil, 2023). Low-income individuals often live in rural areas where there are limited amenities or access to employment. Thus, the lower availability of public passenger transportation in these areas may limit individuals' participation in socioeconomic life and require car ownership (Kamruzzaman & Hine, 2012). Due to the unavailability of income data for residents or households at the municipality level, the median wage figure was used. The figure comes from the Financial Policy Institute's 2022 output.

### **Unemployment rate**

The unemployment rate captures income poverty in a given municipality, i.e., it describes the affordability dimension of transportation. According to data from the 2015 Mobility Survey, unemployed residents in Slovakia have reduced mobility and their trips are shorter. Unemployment rates are based on data from the SO SR registered at the end of 2023 (Štatistický úrad SR, 2024).

**Age of passenger vehicles**

Rising fuel prices will have a greater impact on residents or households that have an older, more fuel-efficient vehicle. The average age of passenger cars owned by individuals is based on data from the Institute for Financial Policy.

**Average number of passenger vehicles per inhabitant**

Ownership of passenger cars by residents of a given municipality speaks volumes about the accessibility of individual automobile transportation, which reduces the vulnerability to transportation poverty (CBS & PBL, 2019). The average number of passenger cars owned by individuals per resident of a municipality is based on data from the Financial Policy Institute.

**In the Netherlands, there is the possibility to link the necessary data at the level of each household.** One of the most comprehensive indices in terms of data availability has been created by the Netherlands for two selected regions (CBS & PBL, 2019). The data does not come from a sample survey, but from actual data at the level of each household living in the region. The index includes information on car accessibility, distance to public passenger transport stops, shops and family members. Among socio-economic and demographic data, the index includes household income, migration background, household age structure, employment and information on health disadvantages of household members. The index was made possible by linking anonymised data from the social and health insurance, the Ministry of the Interior and the tax office available at the Central Statistical Office in the Netherlands.

## Annex BB: Methodology for the construction of the composite index

Composite indices allow complex, multidimensional information to be aggregated into a single indicator that compares the relative positions of individual municipalities in a given area (Hermans, Van den Bossche, & Wets, 2008). The individual input indicators used to create a composite indicator are often simply averaged or multiplied by expert weights to sum into a composite index (Kelly, Kelleher, Guo, Deegan, & Patil, 2023). The results of such an approach depend largely on the subjective views of their creators and may give more weight to less relevant factors when input indicators are inappropriately selected. At the same time, these approaches do not allow to incorporate the specific context of the municipalities, but across the board determine a level playing field.

Various mathematical methods allow to reduce the subjectivity of arbitrarily selected expert weights through automatically generated weights for individual indicators. One method is the use of so-called DEA (data envelopment analysis or data envelopment analysis), which makes it possible to evaluate the efficiency of production units, in our case municipalities, using individual indicators without a known functional relationship between these indicators. Municipalities can achieve efficiency in different ways based on an assigned set of weights that is different for each municipality and takes into account its specific conditions. Any shortcomings in one area can thus be compensated for by improvements in another.

All input indicators were standardized using a linear transformation with respect to maximum and minimum values to eliminate differences in the scale of individual indicators. Each indicator was thus transformed to a value in the range 0 to 1. In addition, it was ensured that all indicators had the same direction or polarity, given their expected impact on vulnerability to transport poverty. Thus, a higher indicator value always corresponds to a lower risk of transport poverty, i.e. the municipality is trying to achieve efficiency by reducing the risk of transport poverty.

Our analysis follows the methodology described in the manual from the OECD (OECD/European Union/EC-JRC, 2008), where the composite index  $CI_e$  is defined as the ratio of the performance of the municipality under study  $e$  to that of the benchmark:

$$CI_e = \frac{\sum_{q=1}^Q I_{qe}^M w_q}{\sum_{q=1}^Q I_{qk}^* w_q}$$

where  $I_{qe}$  is the normalized score of the  $q$ -th indicator ( $q=1, \dots, Q$ ) for municipality  $e$  ( $e=1, \dots, M$ ),  $w_q$  is the associated weight, and  $I^*$  is the benchmark vector that maximizes the overall performance with respect to the unknown set of weights  $w$ . The benchmark is a solution to the maximization problem

$$I^* = \arg \max_{I_{k,k \in \{1, \dots, M\}}} \left( \sum_{q=1}^Q I_{qk}^M w_q \right)$$

The set of optimal weights is obtained as the result of the optimization problem for all municipalities  $e=1, \dots, M$ :

$$CI_e = \max_{w_q \geq 0, q=1, \dots, Q} \frac{\sum_{q=1}^Q I_{qe}^M w_q}{\max_{I_{k,k \in \{1, \dots, M\}}} \left( \sum_{q=1}^Q I_{qk}^M w_q \right)}$$

The index values range between 0 and 1, with higher values indicating better efficiency.

Given the large number of municipalities, it is likely that a large number of municipalities would be assessed as efficient, making the analysis trivial and limiting the ability to distinguish between different levels of efficiency. However, DEA has the advantage of being able to include expert bounds on the weights in the model. Several weight constraint techniques have been proposed in the literature, such as absolute weight constraints, relative weight constraints, ordinal weight constraints, and virtual weight constraints (Shen, Hermans, Brijs, & Wets, 2012) . In the model, we applied so-called virtual weight constraints, which limit the proportion of the product of an indicator and its weight in the total score:

$$L_q \leq \frac{I_{qe}W_q}{\sum_{q=1}^Q I_{qe}W_q} \leq U_q \text{ kde } q = 1, 2, \dots, Q.$$

The thresholds were set based on expert judgement to ensure that the different dimensions of transport poverty were sufficiently covered while highlighting the impact of important indicators. The thresholds are set so that the transport poverty index serves to target measures from the SCF to regions at risk. Thus, a municipality cannot be p considered to be affected by transport poverty solely on the basis of high unemployment and low income of its inhabitants if it has accessible public transport.

The virtual weighting constraints used are as follows:

- Time travelled in the morning and evening - total min. 10%
- Number of public passenger transport connections morning and evening time - total min. 10%
- Percentage of inhabitants living within 500 m of a public transport stop - min. 10%
- Ratio of time distance by public passenger and individual car transport up to 500 m - min. 5%
- Availability of a passenger car - max. 10%
- Average age of passenger car - max 5%
- Income and unemployment - together max 25%
- Proportion of population over 65, proportion of pupils and students, proportion of disabled and proportion of Roma population outside the village core - each max. 5%

For ease of interpretation, the resulting composite index for each municipality was rotated using min-max scaling and then scaled to a 10-point scale using percentile scaling. These scores indicate the level of risk of exposure to transport poverty, with a value of 1 representing the lowest risk and a value of 10 representing the highest risk.

The index created by the DEA assesses vulnerability to transport poverty in relative terms; it does not set a specific threshold for transport poverty. The individual indicators used in the index do not have a predetermined threshold that defines transport poverty, as no such threshold is known. Thus, municipalities with the lowest risk of transport poverty are defined only in comparison to other municipalities, which may mask the true level of transport poverty. On the other hand, the introduction of ETS2 is expected to increase fuel prices, which may lead to worsened transport accessibility across Slovakia. The vulnerability to transport poverty will thus increase, but the relative ranking of municipalities within the index will remain unchanged.

A limitation of the index is the limited availability of some of the data and the more difficult interpretation of the results. Due to the lack of data at the household level, vulnerability is assessed at the village level. Thus, the index does not capture possible differences between households living in the same municipality. Moreover, the individual indicators

provide only a snapshot view and do not account for changes over time. Data on transport expenditure is not available at the required level, so proxy indicators such as travel time or age of vehicles were used. The DEA method used to create the composite index assigns implicit weights for each municipality, which increases objectivity over expert weights or simple averaging, but also complicates the interpretation and justification of the results.

### **Alternative method of principal component analysis**

At the same time, we verified the robustness of the results by constructing a composite index using an alternative principal component analysis (PCA) method following the OECD (2008) methodology. PCA is a multivariate statistical method that transforms correlated variables in order to reduce dimensionality and keep the variability of the data as high as possible.

The PCA method requires testing the correlation between the input indicators and normalizing the input indicators to the same scale, and the so-called min-max scale was chosen. For the choice of principal components, the required eigenvalue of the component is at least 1, the individual explanation of variability is 10% and the cumulative explanation of variability is 60%. Subsequently, varimax rotation was used to increase the interpretability of the individual components. Thus, each input indicator is used in only one sub-component.

The first sub-component highlights the efficiency of public passenger transport through the variables number of public passenger transport connections and the ratio between individual car and public passenger transport. The second sub-component includes variables related to the affordability of transport, as it takes into account variables such as the unemployment rate, the median wage and the share of Roma population. The third sub-component is mainly related to travel time, it includes travel time to work and school and travel time to the nearest hospital.

The resulting composite index was constructed through 4 subcomponents, which are assigned a weight based on the proportion of explained variability to the total variability of the 4 components. The PCA method has the advantage of high objectivity as no expert estimates enter into the calculations. On the other hand, the weights of each indicator are the same for all units or municipalities. In addition, without restricting the weights of some indicators, municipalities with good public passenger transport coverage but with significantly worse economic parameters may appear as transport poor in the PCA method.

By comparison, the difference in the degrees of exposure to transport poverty, as determined by DEA and PCA methods, exceeds 2 in 24% of the municipalities. Overall, 11% of municipalities are rated by the PCA method with a degree of vulnerability above 7, while the DEA is below 7, i.e., the municipality is not rated as transport poor by the DEA. The main reason for this is that the PCA method identifies these towns and villages as being at risk primarily due to high unemployment, low median wages and a high proportion of the Roma population, which is given more importance by the PCA method compared to the DEA method. At the same time, however, there is sufficient transport accessibility in these towns in terms of proximity to bus stops and the number of services.

## Annex CC: Estimated costs of measures

Table: Overview of measures

Measure	Costs in 2026-2032 (without VAT)	Coverage	Relevant applicants	Number of persons at risk targeted by the measure	Relevant indicator under the EPR Regulation on the SCF	Indicator value
<b><i>Improving access to public passenger, shared and active transport</i></b>						
Subsidy for the purchase of buses and charging infrastructure	€ 127 million	Consideration of transport poverty	Local authorities, carriers	-	Number of vehicles/Number of refuelling/charging stations	276 buses / 59 charging stations
Subsidy for the purchase of 8+1 minibuses and charging infrastructure	€ 2.4 million	Consideration of transport poverty	Regional authorities, municipalities, carriers	-	Number of vehicles /Number of refuelling/charging stations	70 minibuses and 14 charging stations
100% fare discount for secondary school students from families in material need (including the provision of a transport pass)	€ 7 million	All of Slovakia	Regional authorities, cities (ordering public passenger transport)	17 thousand	Number of users	17 thousand eligible passengers
100% fare discount for high school students from families in income poverty (including the provision of a transport pass)	€ 26 million	All of Slovakia	Regional authorities, cities (ordering public passenger transport)	60 thousand	Number of users	76 thousand eligible passengers
50% discount on public transport for members of families in material need (including the provision of a transport pass)	43 million €	All of Slovakia	Regional authorities, cities (ordering public passenger transport)	117 thousand	Number of users	117 thousand eligible passengers
50% discount on public transport for members of families in income poverty (including the provision of a transport pass)	€ 195 million	All of Slovakia	Regional authorities, cities (ordering public passenger transport)	531 thousand	Number of users	531 thousand eligible passengers
Subsidy for cargo bicycles for transporting children	€ 1.2 - 3.1 million	All of Slovakia (especially cities)	Regional authorities, towns, municipalities	Thousand to 3 thousand	Number of users	1,000 to 3,000 household members in material need

						with children aged 2 to 5 years
Construction of cycling infrastructure	€ 15 million	Consideration of transport poverty	Regional authorities, towns, municipalities	36 to 364 thousand	Number of km	34 km of roads and associated ancillary infrastructure
Carpooling allowance	€ 0.3 - 0.7 million	Consideration of transport poverty	Female and male drivers	-	-	-
Support for demand-response transport	€ 17 million	Consideration of transport poverty	Regional authorities, towns, municipalities	76 to 303 thousand	Number of users/units	76 to 303 thousand inhabitants
Subsidy for the purchase of vehicles for social taxis	€ 11 million	All of Slovakia	Cities, Municipalities, Local Action Groups	-	Number of vehicles /Number of refuelling/charging stations	187 vehicles and chargers
<b><i>Improving access to zero-emission vehicles</i></b>						
Discounted leasing for selected social services	€ 13 million	All of Slovakia	Providers of home nursing and outreach social services	-	Number of vehicles/Number of refuelling/charging stations	936 vehicles and chargers
Subsidy for the purchase of a running emission-free vehicle	€ 2 million	Consideration of transport poverty	Households from villages and towns at risk of transport poverty	1766	Number of vehicles /Number of refuelling/charging stations	609 vehicles and chargers
<b><i>Temporary direct income support</i></b>						
Income support for households in material need	€ 20 million	Transport-poor regions	Households in material need	74 thousand	Number of households supported	74 thousand assessed persons in material need
Income support for households in income poverty	€ 70 million	Transport-poor regions	Households in income poverty	268 thousand	Number of households supported	268 thousand people in income poverty
<b>TOTAL</b>	<b>€ 260 - 481 million</b>					

Source: IEP