# Study on essential services poverty in the EU and the implications for environmental policy

## *Final Report*

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# Table of contents

# List of tables

# List of figures

# List of boxes

# List of abbreviations

| | |
|---|---|
| AFCP | After fuel cost poverty |
| AROPE | At risk of poverty and social exclusion |
| DHC | District heating and cooling |
| DG CLIMA | Directorate-General for Climate Action |
| DG COMM | Directorate-General for Communication |
| DG EMPL | Directorate-General for Employment, Social Affairs and Inclusion |
| DG ENER | Directorate-General for Energy |
| DG ENV | Directorate-General for Environment |
| DG MOVE | Directorate-General for Mobility and Transport |
| DWD | Drinking Water Directive |
| EEA | European Environment Agency |
| EGD | European Green Deal |
| EPR | Extended producer responsibility |
| EPSR | European Pillar of Social Rights |
| ETD | Energy Taxation Directive |
| ETS | Emissions Trading System |
| EU | European Union |
| EPSR | European Pillar of Social Rights |
| EU-SILC | EU Statistics on Income and Living Conditions |
| EV | Electric vehicle |
| EWRC | Energy and Water Regulatory Commission |
| GHG | Greenhouse gas |
| GMI | Guaranteed minimum income |
| HFCS | Household Finance and Consumption Survey |
| HBS | Household Budget Survey |
| HEP | Hidden energy poverty |
| HFCS | Household Finance and Consumption Survey |
| ICW | Income, consumption and wealth |
| JRC | Joint Research Centre |
| JTM | Just Transition Mechanism |
| LIHC | Low-income high-cost |
| MIS | Minimum income standard |
| NECP | National Energy and Climate Plan |
| OECD | Organisation for Economic Co-operation and Development |
| PES | Payment for ecosystem services |

| | |
|---|---|
| RP | Representative person |
| SCF | Social Climate Fund |
| UK | United Kingdom |
| UNDP | United Nations Development Programme |
| UWWTD | Urban Wastewater Treatment Directive |
| WFD | Water Framework Directive |
| WSS | Water and sanitation services |

# Executive summary

The study analyses poverty in energy, transport, and water and sanitation services (WSS) with a direct link to environmental objectives. It defines essential services poverty as the inability of a household to access or afford the necessary levels of these services to meet its basic needs for well-being and economic and social inclusion.

The study uses a 23% threshold, meaning a household is considered essential services poor if their combined spending on energy, transport, and WSS exceeds 23% of their disposable income. While acknowledging its limitation, this single threshold approach provides a practical and comparable measure across EU Member States. Key findings from the application of this threshold to Eurostat data include:

- In 2020, an estimated 20.9 million EU households (6.2% of the population) experienced essential services poverty, a decrease from 8.5% in 2015.
- There exists large variation across Member States both at the overall, from less than 10% to 30% of the population defined as essential services poor, and more granular levels of analysis.
- Energy poverty is the most significant contributor to overall essential services poverty.
- The poorest income groups consistently spend a higher proportion of their income on essential services compared to the wealthiest groups.
- Rural households spend a higher proportion of their income on essential services, particularly energy and water, than urban households.
- Household composition plays a role, with single-parent and retired persons households facing higher risks of essential services poverty, while single parent households saw the percentage of income spent on essential services decrease from 2015 to 2020.
- Unemployed individuals are more likely to be affected by essential services poverty, although the study could not determine if this is due to expenditure limitations or targeted subsidies.
- A statistically significant difference exists in the median percentage of income spent on essential services between those who are and are not facing deprivation, overburdeness, or are at risk of poverty.

Looking forward, the study identifies the potential impact on essential services poverty that several megatrends will have in the future. These megatrends present both risks and opportunities for vulnerable groups when it comes to the cost of essential services. Some highlights of the analysis are as follows.

Increasing temperatures are expected to drive up energy demand for cooling, particularly in Southern Europe, while higher carbon prices will raise energy costs. Conversely, a reduction in heating demand may benefit Northern European countries in the long term.

Climate change in combination with increased demand means resource scarcity could be a challenge. Growing shortages of key materials (e.g., lithium for batteries) may increase costs for renewable energy technologies or electric vehicles (EVs), possibly resulting in higher energy and transport costs. The risk of water scarcity may also drive up the cost of water services, particularly in arid regions.

The trend of an ageing population will increase demand for energy and transport services, potentially driving up prices, while also straining public infrastructure and social safety nets. The digital divide may exacerbate essential services poverty by limiting older people's access to modern transport systems or mobility information.

The trend of rapid urbanisation presents both risks and opportunities to the affordability of essential services. While urban areas benefit from economies of scale in essential services provision, infrastructure development must keep pace with population growth to avoid widening inequalities. Meanwhile, rural areas risk being left behind without sufficient public investment.

New technological advancements is the megatrend with the greatest opportunity to reduce the burden of essential services. The areas of energy storage, transport (beyond just EVs), and water management present opportunities for reducing long-term costs, but require significant upfront, public investment.

To address essential services poverty and ensure a fair and just transition as part of the European Green Deal, the study offers several recommendations, including:

**Take a holistic approach to essential services.** Policymakers should adopt a holistic approach to essential services poverty, considering the interconnections between energy, transport, and water poverty. Integrated policies will help to ensure that the transition to a low-carbon economy benefits all EU citizens and does not exacerbate existing inequalities.

**Adopt a common EU definition of essential services poverty**. A harmonised definition is crucial for measuring and addressing essential services poverty consistently across Member States. This will facilitate better comparison and more targeted policy interventions.

**Strengthen data collection and harmonisation.** Improving data collection on essential services access and affordability, especially among vulnerable groups (e.g., low-income households, rural populations), is critical for informed policy decisions. Indicators should include not only affordability but also accessibility and quality of services.

**Invest in infrastructure and sustainable solutions.** The EU should prioritise investments in energy efficiency, sustainable public transport systems, and water management infrastructure. This includes expanding access to renewable energy, improving building insulation, and ensuring affordable, reliable public transport, particularly in underserved rural areas.

**Provide targeted financial support**: Instruments such as the Social Climate Fund (SCF) and Just Transition Mechanism (JTM) should be expanded to provide targeted financial support to households most at risk of essential services poverty. Additionally, revenues from the EU Emissions Trading System (ETS) can provide direct support to vulnerable groups.

**Enhance public awareness and capacity building.** Alongside infrastructure investments, there is a need for awareness campaigns and training programmes to help households adopt energy-saving and water-saving behaviours, switch to sustainable transport alternatives and use new technologies effectively, ensuring long-term reductions in essential services costs.

The European Green Deal offers significant opportunities to address essential services poverty while achieving climate and sustainability goals. However, without careful policy design, the transition to a low-carbon economy could exacerbate inequalities, leaving vulnerable populations behind. Addressing essential services poverty through a comprehensive, integrated approach will be critical to ensuring that no one is left behind during Europe's environmental transition.

# 1 Introduction and approach

## 1.1 Context and objectives of the study

Given the urgent need to address climate change, environmental degradation, resource scarcity and increasing economic and social inequality, there is a growing need for radical change, particularly changes in production and consumption systems and behaviours that can transition societies to more sustainable economies. Achieving sustainability requires careful consideration of all environmental, social, and economic aspects to ensure little or no adverse impacts. This multifaceted view of sustainability is recognised in the European Green Deal (EGD). The EGD establishes three ambitious objectives for Europe: climate neutrality by 2050; economic growth decoupled from resource use; and no person and no place left behind. The latter is particularly important given the rise in economic inequalities within countries around the globe (despite decreasing inequalities between countries) and growing political tensions and extreme ideologies. It recognises that inequalities exist between regions and social groups in Europe and, if ignored, are likely to affect the pace and acceptability of change.

Leaving no one behind, including in a society undergoing environmental and social transition, encompasses issues such as eradication of poverty, creation of an equitable and inclusive environment, and provision of basic services and decent living conditions for everyone. Ensuring equitable access to essential services for well-being, such as water, transport or energy, clean environment or communication services in a digital era, is a precondition to fulfil this principle. The European Pillar of Social Rights (EPSR)[1] aims to guarantee and safeguard access to a minimum number of essential services for all Europeans.

Principle 20 of the EPSR states that everyone has the right to access essential services of good quality, including water, sanitation, energy, transport, financial services and digital communication. While the majority of the EU population has access to essential services, access may be particularly challenging for poorer and disadvantaged members of society (DG EMPL, 2023b). Access to services has several dimensions, including affordability, which can constitute an important barrier to equal access for economically disadvantaged groups. However, availability and accessibility of services can also pose risks to universal access to services. These may be linked to factors such as lack of skills or geographical situation. Access to essential services may also be aggravated during the green and digital transitions, which may have an impact on the prices of certain goods and services. This impact tends to be regressive, i.e. disproportionately impacting poorer households.

Within the EPSR framework it is understood that essential services are necessary to meet basic human needs, provide well-being and increase social inclusion, especially for disadvantaged groups. Nevertheless, there is no common European definition of essential services poverty, nor are there definitions for all services, leading to a variety of national definitions and thresholds for measurement across the Member States.

In this context, the general objective of this study is to support the European Environment Agency (EEA) to analyse the social dimension of sustainability transitions by developing the evidence on the affordability of essential services, essential service poverty (particularly for vulnerable and low-income households), and the implications for environmental policy.

Specific objectives include: a proposal for an initial definition of ‘essential services poverty’, together with a quantitative measure; analysis of essential services poverty across the European Union (EU) and in selected Member States; and an analysis of the potential impacts and cost implications of sustainability transitions on essential services poverty, in the context

[1] The 20 EPSR principles can be found here: https://ec.europa.eu/social/main.jsp?catId=1567&langId=en. Information on access to essential services as understood at EU level can be found here: https://ec.europa.eu/social/main.jsp?catId=1592&langId=en.

of megatrends.

The scope of the study is essential services with a direct link to environmental objectives. This includes energy, transport and water and sanitation services (WSS). While all essential services defined under the EPSR are relevant to achieving the transformations necessary to deliver the EGD goals, access to WSS, energy, and transport are particularly relevant from the perspective of environmental sustainability. Other environmental objectives linked to waste, biodiversity or ecosystem services are not defined as essential services under the EPSR and are not extensively covered in the study. At the request of the EEA, an exception was made for waste services, which are covered to the extent allowed by available data, but in less detail than energy, transport and WSS. In the context of this study, essential services poverty thus refers to 'essential services poverty with a link to environment'.

## 1.2 Methodological approach and limitations

The study relies on existing information and a combination of quantitative and qualitative analysis to provide insights about essential services poverty in the EU. The framing of the concept and the development of a definition, including quantitative benchmarks of essential services poverty, is based on a review of both academic and grey literature, including policy papers. Publications on essential services, both general and specific, are systematically reviewed to extract and compare findings on definitions, thresholds and issues relevant for the conceptualisation of services poverty. The literature review provides an overview of the most common frameworks and measurement approaches for different essential services. The results of the review are then used to develop a definition of essential services poverty containing a quantitative threshold.

The assessment of essential services poverty in the EU relies on analysis of quantitative data from Eurostat, specifically the Income, Consumption and Wealth (ICW) dataset, which comprises the Household Budget Survey (HBS), the EU Statistics on Income and Living Conditions (EU-SILC), and the Household Finance and Consumption Survey (HFCS). EU data are used to provide an overview of the EU population in essential services poverty (based on the definition developed) and analyse the main factors influencing that poverty. Three Member States (Bulgaria, Italy, Sweden) are analysed in more detail to provide additional information on factors and policies impacting essential services poverty in different contexts. They were selected in consultation with the EEA to ensure a balanced coverage of locations, population sizes, and duration of EU membership. The final criterion for the selection was the availability and quality of relevant data.

The forward-looking analysis and discussion of the possible evolution of essential services poverty in the EU is based on a combination of literature review, expert interviews (with individual experts or organisations specialised in the relevant sectors for the services in scope) and expert judgement. As a starting point, the megatrends[2] identified by the Joint Research Centre (JRC) are mapped, together with key policies for each essential service in scope. Based on a review of EU foresight reports, relevant academic and grey literature and expert interviews, the study identifies the potential impacts of each trend on the different essential services, as well as the potential impacts of key EU policies on the affordability of such services. This serves as the basis for an analysis of the risks and opportunities for the evolution of essential services poverty in the EU. Finally, the different findings are used to draw conclusions and develop policy recommendations.

While the study covers a significant portion of the existing literature and available data, it aims to give a broad overview of the issues rather than examining each essential service in detail. Delving into issues for each service would require more extensive and targeted research. Waste management services is not treated the same as other essential services, being neither

[2] JRC Megatrend Hub can be found here: The Megatrends Hub | Knowledge for policy (europa.eu).

well-studied in the literature nor systematically recognised in Member States. More research is needed to conceptualise waste-related poverty, although this study touches on it where possible (see Boxes 2, 4, 5). Finally, quantitative data to assess essential services poverty in the EU are present, but imperfect: the same data are not always collected in each Member State, and even Eurostat data has gaps in the coverage of specific countries over the years. These issues limit the possibilities for direct comparisons of trends across countries. Further efforts are needed to improve the definition of relevant indicators and the collection of comparable data for further analyses (see Box 1).

## 1.3 Structure of the study

The study is structured as follows:

Section 2 summarises the literature review and introduces the definition of essential services poverty used in this study. It is complemented by more detailed mappings of specific service definitions and a complete discussion of the testing and selection of the essential services' quantitative definition in Annex 2.

Section 3 outlines the results of the EU-level analysis of quantitative data, together with information on essential services poverty in Bulgaria, Italy and Sweden. Additional EU-level information (e.g. detailed statistics, references) is provided in Annex 3, with information on each country case in Annex 4. Details on the regression methodology are provided in Annex 5.

Section 4 provides the forward-looking analysis of risks and opportunities for essential services poverty in the EU, based on a discussion of megatrends and key EU policies. Annex 6 provides detailed definitions about the megatrends used.

Section 5 provides conclusions and recommendations.

Annex 1 provides a list of the references used in the EU analysis throughout the study.

**Box 1 Data caveats**

The ICW data are a combination of three datasets collected from different samples at potentially different times. While the dataset is referenced by a single year (e.g. 2020 or 2015), the datasets are around the indicated year. EU-SILC data are collected every year and used to align with the reference period of the HBS. The closest HFCS year to the HBS is used. HBS fieldwork data collection took place between 2018 and 2022 for the majority of the Member States, with 12 in 2020. As stated by Eurostat, 'The data collection and expenditure patterns of households in some EU Member States could have been affected by the COVID-19 pandemic and related restrictions'[3] Data for Cyprus, Malta and France were collected between 2015 and 2017, while no data are available from Eurostat for Finland, Ireland, Italy, Portugal, Romania, and Sweden (see Table 5 in Annex 3 for breakdown of years by Member State).

[3] Eurostat (2024). Household budget survey - statistics on consumption expenditure, Footnote #1. Available at: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Household_budget_survey_-_statistics_on_consumption_expenditure#cite_note-1

# 2 Understanding and definition of essential service poverty

This section presents the findings from the literature review of essential services poverty. The review summarises the current body of knowledge on access to and affordability of essential services, as well as identifying a quantitative threshold to measure essential services poverty within the scope of this study. Within each service, emphasis is placed on the definitions that are quantifiable and can feed into a larger definition of poverty across all essential services. The section concludes with a presentation of a definition of essential services poverty and a quantitative threshold.

## 2.1 Energy

Recent decades have seen growing research to define and measure energy poverty and to map the associated drivers and impacts. In the EU, energy poverty is now a key consideration in energy policy and sustainable transition strategies. A common EU definition of energy poverty was adopted with the introduction of the Social Climate Fund (SCF) in 2023: energy poverty occurs when a household lacks 'access to essential energy services that underpin a decent standard of living and health, including adequate warmth, cooling, lighting, and energy to power appliances, in the relevant national context, existing social policy and other relevant policies' (Article 2 of Regulation (EU) 2023/955). This definition reflects state-of-the-art thinking, including the need to consider energy poverty in light of an evolving understanding of 'basic needs' that encompasses heating and cooling (given the impacts of climate change in many European regions) and electricity use for appliances and digital connectivity, hot water and other essential needs (see for example Gouveia, Palma and Simoes, 2019; European Energy Network, 2019; Halkos and Gkampoura, 2021; Castano-Rosa et al, 2019). The need to ensure adequate thermal comfort during heatwaves and high summer temperatures is attracting more attention and highlighting the need to consider the risks of 'summer energy poverty' in Europe (EEA, 2022a).

The literature highlights two principal approaches to measuring energy poverty: an expenditure approach and a consensual approach. The former considers energy poverty from the point of view of expenditure and defines a threshold that can be considered indicative of such poverty. The latter takes into account people's perceptions about comfort and housing conditions that can be considered indicative of energy poverty (see Table 1 in Annex 2 for key considerations and relevant quantitative thresholds). A direct measurement approach is sometimes mentioned, consisting of temperature measurements in people's dwellings, but is generally considered less feasible due to technical and privacy issues (Rademaekers et al, 2016; Thomson, Bouzarovski and Snell, 2017). Some authors combine elements/indicators of the expenditure and consensual approaches to develop composite indices of energy poverty, such as the Energy Poverty Index (Bouzarovski and Tirado-Herrero, 2015), European Domestic Energy Poverty sub-Index (OpenExp, 2019), or multi-indicator approach (Castano-Rosa et al, 2019).

Several thresholds emerge from literature (see Table 1 in Annex 2). The most commonly used for measuring energy poverty with the expenditure approach are described below.

**The '10% of income' indicator** is based on the first approach adopted in the United Kingdom (UK) in the 1990s. Its main advantage is its simplicity. However, it is criticised because: 1) it is highly influenced by energy prices, giving high results if energy prices rise; 2) it may be out-of-date, as the threshold was established based on the socioeconomic situation in the UK in the 1990s and may not be equally applicable now or in other contexts. Nor does it consider energy consumption or expenditure choices of households (Rademaekers et al, 2016; Castano-Rosa et al, 2019; Palma et al, 2024).

**The 'twice the median' (2M) indicator** is based on the idea that energy poverty occurs if a household pays more than double the median share of its income on energy. This indicator ensures that high-income households are not mistakenly counted as energy poor and can capture potentially hidden energy poverty (HEP). It also considers country characteristics and annual changes in income and expenses distribution. However, the indicator is more sensitive to habit changes, such as where rich households increase their energy consumption, raising the median energy expenditure for society as a whole (Rademaekers et al, 2016; Castano-Rosa et al, 2019; Palma et al, 2024).

**The 'minimum income standard' (MIS) indicator** reflects the income that allows a household to meet its basic needs. This indicator can be precise and capture more accurately those households that become energy poor when their income after energy expenses (or all other essential expenses) is below the MIS for the corresponding characteristics of the household. However, this indicator is complex and requires precise definition of the MIS for different household characteristics (e.g. size, job status, health) and basic needs, as well as participatory data collection (Rademaekers et al, 2016; Castano-Rosa et al, 2019; Palma et al, 2024).

**The 'low-income high-cost' (LIHC) indicator** establishes energy poverty when a household's income is lower than the monetary poverty threshold (usually 60% of the median equalised disposable income) and the energy-consumption expense (usually modelled) is higher than the threshold. This indicator faces multiple criticisms, including its complexity and need for modelling, non-consideration of actual household costs, a tendency to consider energy efficiency measures a general measure to alleviate poverty, and an inability to capture hidden energy poverty (Castano-Rosa et al, 2019; Palma et al, 2024).

**The 'after fuel cost poverty' (AFCP) indicator** defines a household as energy poor when its income falls below the minimum acceptable income after energy expenses are paid. The advantage of this approach is the possibility to capture households with monetary problems who are vulnerable to energy poverty better than LIHC by establishing the minimum income necessary to guarantee general well-being not just energy comfort (Castano-Rosa et al, 2019).

**The HEP indicator** considers low-income households whose absolute energy expenditure is below half the median of absolute energy expenditure (in monetary terms rather than the share of income spent on energy). The principal advantage of HEP is the possibility to identify households that have to choose between paying for energy or for other essential expenses, such as food, due to their general low income (Castano-Rosa et al, 2019; Rademaekers et al, 2016).

The Energy Union Regulation (Regulation (EU) 2018/1999) established EU-wide requirements for reporting on energy poverty objectives and measures in National Energy and Climate Plans (NECPs). Although slow, progress has been observed, with some European countries establishing official or unofficial definitions and/or indicators with quantitative thresholds to assess energy poverty (see Table 2 in Annex 2) and most Member States adopting measures to address the issue (DG ENER 2020a). In 2023, the European Commission published recommendations on energy poverty, emphasising the need to take advantage of the holistic framework set out by the NECPs to address the issue, use new instruments such as Social Climate Plans, and adopt structural measures to address affordability and accessibility of energy (C/2023/4080; SWD (2023) 647 final).

Further details about the available definitions of energy poverty are provided in Annex 2.

## 2.2 Transport

Similar to energy poverty, transport poverty is extensively researched, encompassing a diverse array of definitions and potential indicators. The standardised definition of transport poverty at EU level is: 'individuals' and households' inability or difficulty to meet the costs of private or

public transport, or their lack of or limited access to transport needed for their access to essential socioeconomic services and activities, taking into account the national and spatial context' (Article 2 of Regulation (EU) 2023/955). This definition considers both the affordability and accessibility of transport. As highlighted by the European Commission (DG EMPL, 2023b), affordability is not always the most significant barrier to access: for transport, access is complex to assess and depends on factors such as transport availability and infrastructure, distance to the service, alternative means of transport, and transport need (see also Pérez-Peña et al., 2021 or Lucas et al., 2016).

There are three common ways of measuring transport poverty in the literature (see Table 3 in Annex 2): (1) expenditure approach; (2) accessibility approach; and (3) consensual approach. The expenditure approach considers transport in terms of expenditure and defines a threshold that can be considered indicative of such poverty. However, unlike energy and water, finding a suitable quantitative threshold for transport poverty is more challenging. Transport needs are highly personalised, with essential transport expenses differing greatly depending on geographical location, availability of public transport, and personal lifestyle preferences (Mattioli, Lucas and Marsden, 2017).

For the moment, measuring transport poverty is most often discussed in academic literature rather than in the policy field. Despite the EU-wide definition of transport poverty, this definition is mostly qualitative, and the literature review reveals no universal measure of transport poverty in a policy setting. The most common threshold in the literature defines a household as transport poor if it spends more than 10% of its expenditure on public and private transport (RAC Foundation, 2012; Mattioli et al., 2017). This encompasses expenses for both private vehicle use and short to medium-distance public transport services (trains, flights and holiday transport are generally excluded). However, some policy papers use a narrower focus, particularly on energy purchases for transport fuels, where price increases during the energy crisis were most significant. In such cases, considering that approximately 60% of the 10% budget share is spent on fuels and lubricants for personal transport equipment, a more conservative threshold of 6% has been adopted to identify transport poor households (DG EMPL, 2023a).

Some academics and policymakers define a transport poverty threshold in relation to household income rather than expenditure (Falavigna and Hernandez, 2016; Lovelace and Philips, 2014). For instance, choosing to maintain the 10% threshold and define a household as transport poor if it spends more than 10% of its income on transportation (Lovelace and Philips, 2014). However, the threshold can vary across countries. For instance, Venter and Behrens (2005, cited in Estupiñán et al., 2007) note that the South African government set a 10% income threshold as a policy benchmark in its 1996 White Paper on Transport Policy. In contrast, Gomide et al. (2004, cited in Estupiñán et al., 2007) apply a 6% threshold to assess the affordability of public transport in Belo Horizonte, Brazil.

While identifying a uniform threshold defined as a percentage of income or expenditure is attractive because of the simplicity of measurement, it is sometimes criticised for not adequately reflecting the spending patterns of different income groups. Transport needs are highly individualised: research has shown that wealthier households tend to spend a higher proportion of their income on transport, often due to factors like greater car ownership and longer travel distances. This can lead to the misleading inclusion of mid-to-high-income households in transport poverty assessments, despite their sufficient residual income. Consequently, this approach may not accurately identify those who are genuinely at risk of transport poverty, making it a contested method. Another critique of an expenditure-based approach stems from the fact that it may be too limited in scope, concentrating on actual spending rather than considering the necessary transportation needs and overlooking the

issue of suppressed travel demand[4] (Kelly et al., 2023). Households spending less than 10% of their income on transport are not necessarily better off than those spending more (Serebrisky et al., 2009). For instance, due to the high costs of public transportation, individuals with lower incomes may opt to walk or limit their travel altogether. As a result, their transport expenses may appear low, but this reflects a reduction in motorised trips due to financial constraints rather than an indication of higher income levels (Serebrisky et al., 2009).

Some scholars prefer to use composite indicators such as the LIHC. According to this indicator, a household is considered vulnerable to transport poverty if its disposable income, after deducting housing and transport costs, falls below the poverty line, and if it spends more than the median amount on transportation. This measure captures households that not only have high transport expenses but also remain in poverty once their transport and housing costs are factored in (see Annex 2 for the remaining indicators using the expenditure approach).

The accessibility approach focuses on the accessibility of public transport. Accessibility is measured and defined by assessing how easily households can access essential services such as employment, education, healthcare and shopping (Pérez-Peña et al., 2021; Lucas, Mattioli, Verlinghieri and Guzman, 2016). The consensual approach seeks to identify scenarios in which the high cost of public transport limits individuals' ability to travel, particularly affecting low-income households (Falavigna and Hernandez, 2016). It also considers the financial burden of transport that forces people to either choose more affordable alternatives, such as walking or cycling, or to avoid essential trips altogether (Falavigna and Hernandez, 2016).

Annex 2 provides a summary of the main considerations of all three approaches.

## 2.3 Water and Sanitation

Water affordability is generally defined as ‘the ability to pay for water consumption required to fulfil all basic needs’ (Miniaci, Scarpa, & Valbonesi, 2008; Smets, 2008; in: Vanhille. J., 2018). A conventional way to assess affordability risk with respect to WSS is to estimate the share of households for which the ratio of WSS expenses vs household income exceeds a predefined threshold. To exclude affluent households with high water consumption, the sample is often restricted to the bottom (usually 10% or 5%) of the income distribution. There is no consensus in literature and no clear international guidance on the threshold levels for WSS affordability, but several sources, including the United Nations Development Programme (UNDP) and the Organisation for Economic Co-operation and Development (OECD) propose a 3% threshold (see Table 4 in Annex 2).

This approach to assessing the affordability of WSS is based on estimating water expenses of households below the poverty threshold. The value of 3% or similar is widely used in literature as water affordability benchmarks (for a summary, see Martins at al., 2016). However, some studies find the 3% threshold too high for developed countries. Vanhille (2018) estimated that in 2015, the median of Flemish households with an income below the at-risk-of-poverty threshold spent 1.4% of their disposable income on WSS. Miniaci et al. (2008) proposed using the median share spent on water by households in poverty[5], resulting in a threshold for Italy of 1.8%.

The ability to pay is determined by the structure and components of the water bill (e.g. inclusion of wastewater services, existence of social tariffs) and financial capacities of households, among other things. Another important factor omitted in the approaches based on actual expenditure is the definition of basic water needs. Most empirical studies do not incorporate the needs-based concept in the definition of water affordability. García-Valiñas et al. (2010)

[4] Suppressed travel demand occurs when individuals forgo using public or private transportation to allocate their income toward other expenses. Even if these individuals spend a relatively small portion of their income on transport, they may still experience transport poverty, simply because they cannot afford the costs associated with travel.

[5] Defined in Italy as households with an equivalent disposable household income below 60% of the median.

and Vanhille (2018) propose a needs-based indicator of water affordability. The latter defines an affordability problem as having a disposable household income that is too low to spend the amount equal to the assumed threshold on water use estimated according to the needs (set in the study at 1.4% and 3.0% of the income).

While most water affordability studies based on macro assessments (i.e. looking at national averages) indicate no affordability problems on average, potential problems can be observed in specific groups of the population, particularly in poorer households and single parent families (Martins et al, 2016).

Further details about the available definitions of water and sanitation poverty are provided in Annex 2.

**Box 2 Waste management**

Waste management differs from other essential services, such as transport and energy, in several ways. Firstly, regulation in waste management focuses intensely on environmental protection and public health, ensuring proper disposal to prevent contamination and disease (OECD, 2019). Unlike the continuous supply and demand dynamics of transport and energy, waste management operates on a collection and disposal cycle, presenting different challenges (EEA, 2016). Economically, while transport and energy often involve direct user fees and market-driven pricing, waste management costs are typically covered by municipal taxes or fees, with economic models including incentives for recycling and penalties for improper disposal (OECD, 2019). Similarities between waste management and the WSS sector include: sanitation (wastewater collection and treatment) is the same type of service, in that it is based on disposal rather than the provision of a good; and both wastewater and waste-related expenses are typically incurred in the form of local or regional tariffs or fees, with penalty fees for illegal disposal.

Taking this into account, waste poverty can refer to the inability or difficulty of individuals or households to access or afford adequate waste management services, such as regular collection, recycling, and safe disposal (UNEP, 2015; OECD, 2019). This can result from factors such as high service costs, lack of infrastructure, or insufficient municipal support (UNEP, 2015). Waste poverty not only affects environmental sustainability but also poses significant public health risks and exacerbates socioeconomic inequalities by limiting communities' ability to manage waste effectively and sustainably (WHO, 2018).

This report approaches waste differently to the other services by focusing on specific data rather than presenting comprehensive indicators and potential generally applicable thresholds. The data presented focus on waste collection tariffs and mechanisms of their creation in the countries studied. These data are fragmented (e.g. relating to specific regional or local contexts) and do not provide a good basis for aggregation or extrapolation.

## 2.4 Definition of Essential Services Poverty

The concept of essential service poverty does not have a clear and aligned definition across the Member States. A general characterisation of the concept of ‘essential services’ is the fulfilment of basic human needs and services that are key to well-being and social inclusion, especially for disadvantaged groups (European Commission, 2023). The lack of common European definitions affects each essential service, leading to a variety of national differences, or even the lack of definitions for certain services (Baptista, I. and Marlier, E., 2020). Similarly, the proposed thresholds and quantitative methods applied to identify households at risk of service poverty are not always comparable (DG EMPL 2023b), making cross-country analysis and comparison challenging.

The lack of a clear and aligned definition of essential services poverty across the Member

States, coupled with varying national definitions and measurement methods, complicates cross-country analysis. The literature also highlights a negative and disproportionate impact of environmental and social policies on lower-income households, including increased energy costs and social inequities due to climate policies (see EEA 2021 for an overview). The challenge of defining and measuring essential services poverty from a pan-European perspective is undertaken and a quantitative threshold put forward within this context.

This section presents a framework for understanding essential service poverty as covered in the scope of this study, including key concepts, considerations, and a definition. It also presents a quantifiable threshold of essential services poverty based on the literature, as well as data accessibility, and ease of measurement across the Member States.

When considering any form of poverty, the predominant factor is affordability, defined here as the cost of accessing essential services in relation to household disposable income (see Box 3). The concept of accessibility (ease with which households can access essential services) is not the focus of this study but should also be taken into account. Other factors that influence accessibility and affordability could be considered, including the quality of the service provided and its equitability (i.e. provision of services to all demographic groups, particularly disadvantaged groups). However, these aspects are difficult to quantify and compare across regions and countries.

Within this framework of concepts and relationships, as well as the individual definitions of poverty for each environmental service, the following definition is used in this study:

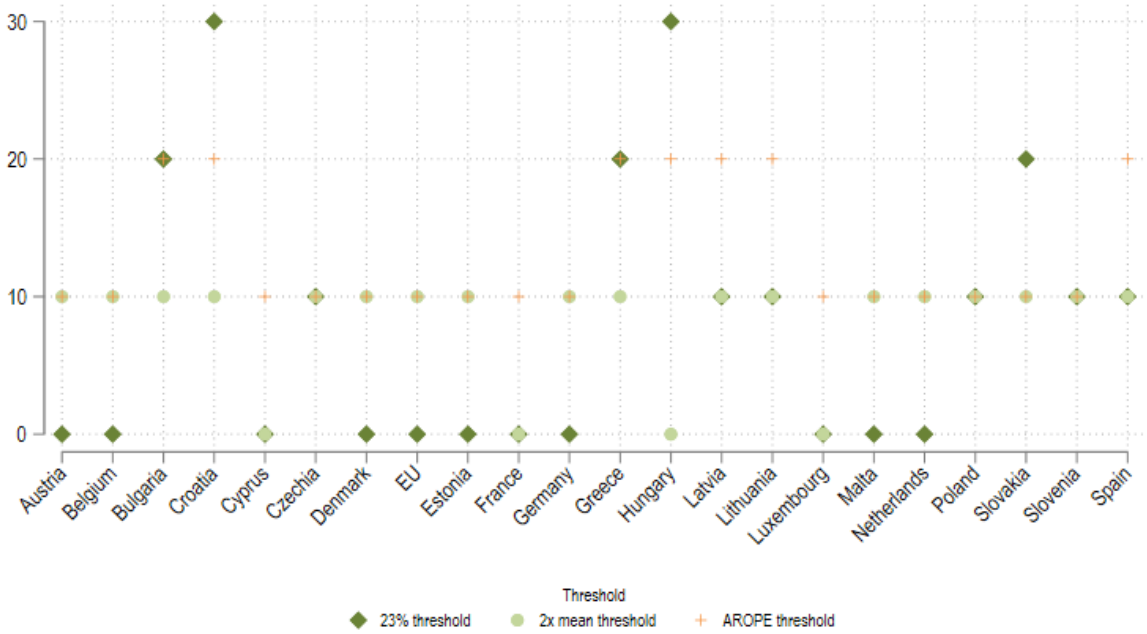
*Essential services poverty refers to the situation in which a household is unable to access or afford the necessary levels of water and sanitation, energy, and transport to meet its basic needs, and which are essential for their well-being and economic and social inclusion.*

This definition does not provide a method or threshold to measure essential services poverty. Based on the literature, a mixed approach that includes including quantitative and qualitative measures would be preferred to capture the concepts of affordability, accessibility, and quality. As this is beyond the scope of this study, it instead focuses on a definition that can be easily understood and allows for implementation and comparability across Member States, given the various data constraints.

Determining the threshold is heavily dependent on the existence of a readily available source of data for most Member States that does not create additional data collection burdens and includes information on income and expenditure. The ICW dataset compiled by Eurostat meets these needs. Notwithstanding its limitations[6], the dataset is unique in that the information provided is an easily accessible format. Various approaches and thresholds were considered, taking into account the specific country context, with some then disregarded for methodological and data limitation reasons. A single threshold based on the summation of thresholds per essential service was determined to be the most practical and accurate option, given data availability and sensitivity analysis. Figure 1 represents graphically the application of the three thresholds tested to the ICW dataset. Annex 2 provides a further discussion of the thresholds and analysis.

[6] Lamarche, P. (2017). Measuring income, consumption and wealth jointly at the micro-level. European Commission, Eurostat Methodological Note, Luxembourg, available at http://ec. europa. eu/eurostat/documents/7894008/8074103/income_methodological_note. pdf. f

**Figure 1 Rate of essential services poverty: comparison of thresholds**




Note: Data missing for Finland, Ireland, Italy, Portugal, Romania and Sweden.

There are limitations to the single threshold approach, as discussed above, as well as concerns about grouping the services, which can lead a substitution of one poverty type by another. Nevertheless, the single threshold approach is still attractive because of its simplicity and ability to highlight the differences in the context and policies around the provisions of essential services. For example, two countries with similar levels of Gross Domestic Product (GDP) can record strikingly different levels of essential services poverty with a single threshold. This may be due to government subsidies, the source of energy for the country (whether imported or energy produced within its borders), or the quality or accessibility of service infrastructure. Although this measure cannot pinpoint which of these elements is at work, it can highlight the different realities faced by residents of the different Member States. A single threshold also facilitates analysis within Member States across different types of households and geographical regions. While substitution across the three services may occur, this report is interested in the combined burden placed on households. As climate change and the EU's policy response affect these areas in various and overlapping ways (see Section 4), the threshold reflects this. It is also possible that a single threshold encourages policymakers to consider these essential services as interconnected, fostering an integrated approach to tackling the challenge of essential services poverty.

The value of the threshold was determined by summing the most common thresholds for each environmental service: water and sanitation (3%), energy (10%), and transport (10%). This resulted in a first attempt at a quantitative definition covering the three environmental dimensions:

*Essential services poverty is when a household spends more than 23% of its disposable income on the essential services of water and sanitation, energy, and transport.*

**Box 3 Income versus expenditure**

The essential services poverty threshold proposed here is defined as a percentage of disposable income. Eurostat defines disposable income as including 'all income from work (employee wages and earnings from self-employment); private income from investment and property; transfers between households; all social transfers received in cash including old-age pensions' (Eurostat, 2021).

The discussion about whether to use income or expenditure data extends beyond essential services to the larger poverty and measurement debate. Previously, the common understanding was that expenditure data was better suited to developing countries where income is more difficult to measure, whereas income was the more suitable measure in developed countries (Ravallion, 2010; Raitano, 2021).

Measurement as a percentage of income is straightforward, comparable across countries, and relevant to policy, i.e. eligibility for social assistance with essential services is usually based on total income (Raitano, 2021). Income can be used generically or according to household type/size, it can be gross or net, before or after housing costs, yielding different results. However, it is not able to take into account actual spending, savings, nor cost of living differences. By contrast, using measurements that are a percentage of expenditure better reflect actual expenditure, the expenditure priorities of a household, and the cost of living. Expenditure can be relative to actual or modelled consumption, which can also yield varying results. Palma et al (2024) found that actual consumption may not capture energy-poor households that simply restrict their energy consumption. Some authors prefer expenditure data, as income reporting in the HBS from 2015 had some shortcomings due to income underreporting and there is a possibility to use households with equivalised total expenditure below 60% of the national median as an indicator of 'at risk of energy poverty' (DG EMPL, 2023a). However, accurate expenditure data is difficult and time consuming to collect – at present the HBS is collected only every five years – and does not account for income volatility nor households choosing to cut back on an expenditure category.

Recent research highlights that poverty measured via expenditure is more applicable to advanced economies than the traditional use of income, as seen when analysing developing economies (Menyhert, B. 2024). As for the elements that comprise essential services poverty in this study, transport poverty is most commonly calculated as a percentage of expenditure, whereas water and sanitation and energy are almost universally calculated as a percentage of income.

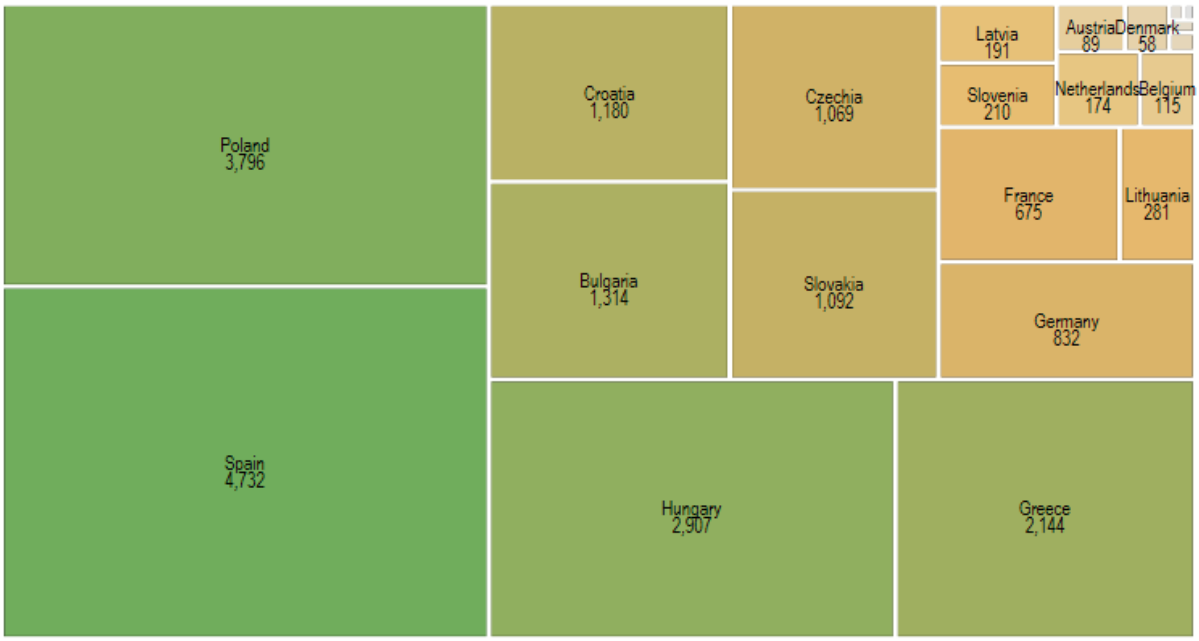
# 3 Quantitative analysis of essential services poverty

This section complements the qualitative understanding of essential services poverty with a quantitative analysis of EU-level ICW data from Eurostat and examples from three Member States (Bulgaria, Italy and Sweden). This additional analysis applies the definition and thresholds presented in Section 2 to existing datasets to provide information on the distribution of essential services poverty across the EU and the main underlying factors. The examples from the Member States offer further context-specific considerations and examples of policy responses to tackle essential services poverty.

## 3.1 EU-level analysis

The ICW dataset and its disaggregation allows for an investigation of essential services poverty and illuminates the variation across and within Member States as well as over time. When applying the 23% threshold, the macro-level view of the problem identifies 20.9 million EU households (6.2%) as experiencing essential services poverty in 2020 (see Figure 2)[7]. This is a decrease from the 2015 number of 28.4 million EU households (8.5%). This is likely an underestimation, as an income group (designated based on deciles of income) is only classified as essential service-poor if the median expenditure of the entire group on the service exceeds the 23% threshold. Thus, it is possible that there are households within an income group that exceed the threshold but are unidentified due to the median being below the threshold.

**Figure 2 Estimated household population (1,000s) per Member State experiencing essential services poverty, 2020**

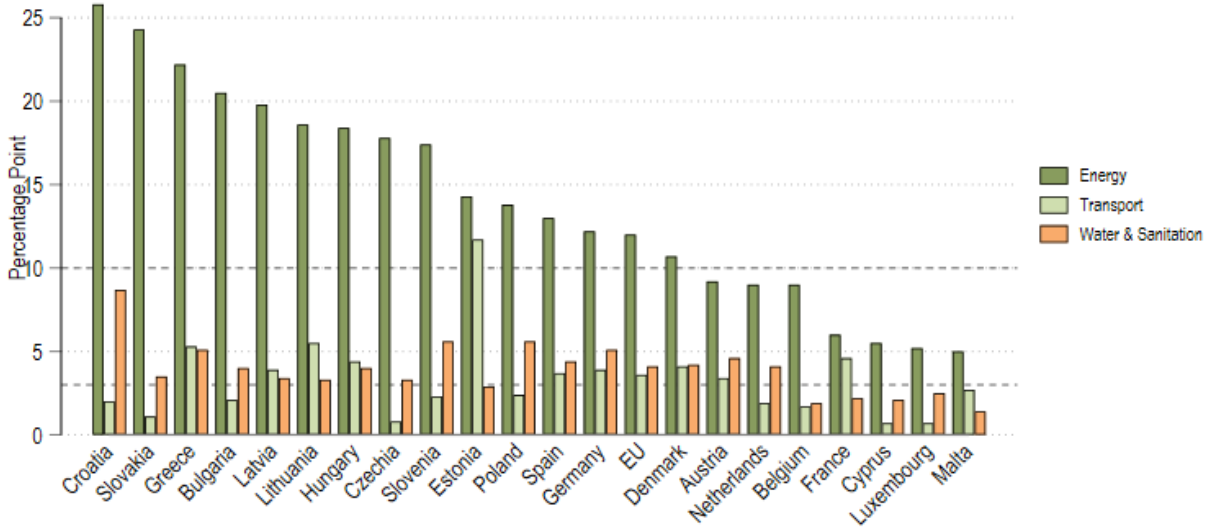



Source: Authors' elaboration based on ICW data. Note: Data missing for Finland, Ireland, Italy, Portugal, Romania and Sweden. The four smallest populations (top right corner) not included for readability concerns are Estonia (13), Cyprus (9), Luxembourg (6) and Malta (5).

[7] This is calculated by applying the percentage of the population classified as essential services-poor based on the 23% threshold to the total population of each of the 22 Member States that reported the data for the ICW dataset in 2020, as reported by Eurostat. For Austria, Belgium, Cyprus, Denmark, Estonia, France, Germany, Luxembourg, Malta and the Netherlands, the percentage of poverty was set to 1%. For these countries, even their poorest decile of income did not spend a median value higher than the 23% threshold. However, it is likely naive to assume that none of their residents are experiencing essential services poverty. Therefore, the conservative estimate of 1% was used.

Looking more closely at the elements of essential services poverty for those most impacted, the first decile of income, or poorest 10%, provides insights into the different circumstances of each Member State. Figure 3 shows that energy accounts for the largest portion of income spent in all Member States, varying from over 25% in Croatia to 5% in Malta. Strikingly, only one Member State exceeds the 10% threshold for transportation, a possible indication of suppressed demand for transport. In 14 Member States, WSS is a higher percentage of income than transport. In Croatia, Cyrus, Czechia, Luxembourg, the Netherlands, Poland, Slovakia and Slovenia, the income spent on WSS is twice that spent on transport. In seven Member States, transport is higher, notably in Estonia and France, where it is twice as high. Figure 3 also highlights the burden of essential services on the poorest segment of the population: 14 Member States report energy expenditure greater than the 10% threshold, while 15 report WSS expenditure above the 3% threshold. As noted above, only in Estonia does this decile spend more than the 10% threshold. This could indicate that the 6% threshold is a better indicator, though even in that case, still only Estonia would pass the threshold.

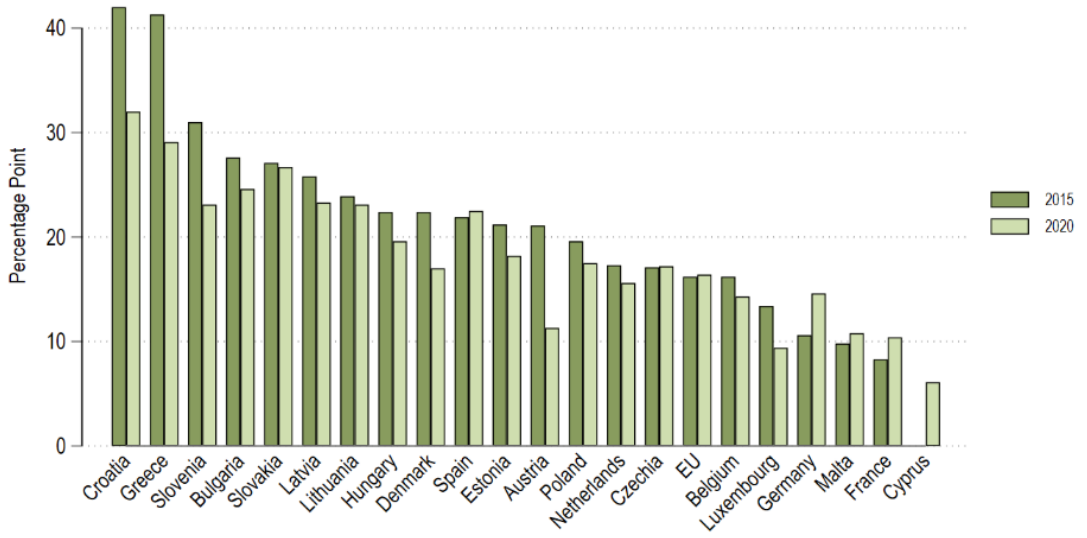
**Figure 3 Median percentage of income spent on energy, transport, and WSS, first decile of income, 2020**




Source: Authors' elaboration, based on ICW data. Note: Data missing for Finland, Ireland, Italy, Portugal, Romania and Sweden. Dash line = 10% threshold for energy and transport poverty. Dash line = 3% threshold for WSS poverty.

Examining the difference in the percentage of income paid between the poorest and richest within Member States can highlight the extent of the inequality. In this case, all but two Member States recorded differences of 10% or more in 2020, the same as in 2015. Meanwhile, eight of those Member States had differences greater than 20%, down from 13 in 2015 (see Figure 4). Over time, some Member States saw sizeable reductions in the disparity between the poorest and richest income groups: in Croatia, the disparity between groups fell from 42% in 2015 to 32% in 2020, in Greece, from 41% to 29%, and in Austria, from 21% to 11% (see Figure 4). By contrast, Germany and France witnessed increases in the disparity between the richest and poorest deciles between 2015 and 2020, from 10% to 14% and 8% to 10%, respectively.

**Figure 4 Difference in median percentage of income spent on essential services between poorest and richest income groups (1st and 10th decile) in 2015 and 2020**



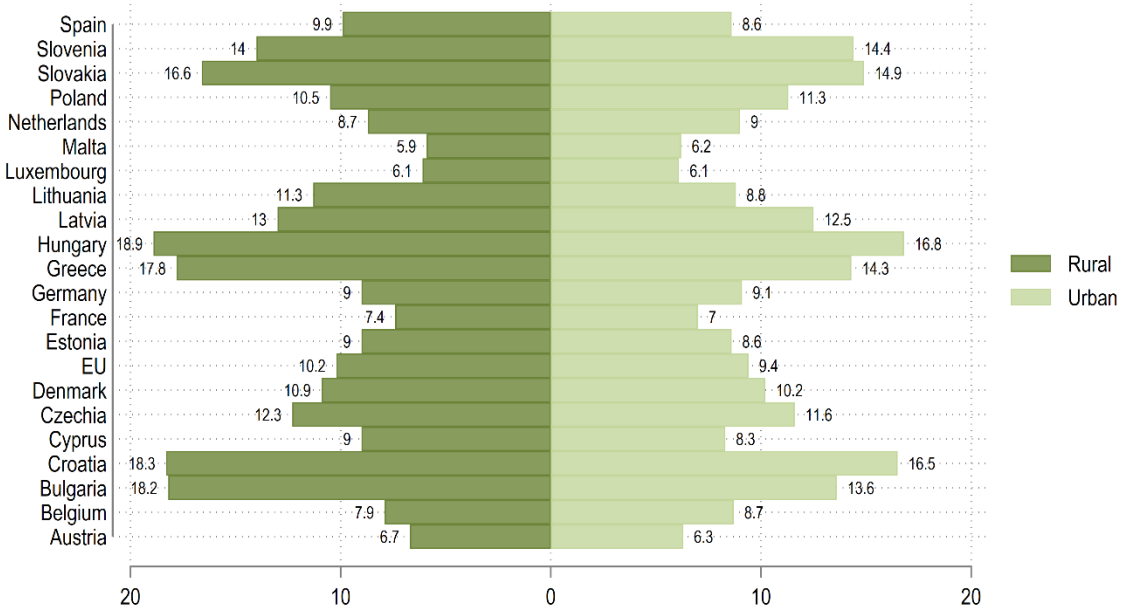

Source: Authors' elaboration, based on ICW data. Note: Data missing for Finland, Ireland, Italy, Portugal, Romania and Sweden.

The ICW dataset does not provide income data, so understanding the euro value of these percentages is not possible on its own. However, it is possible to combine these results with publicly available income data from Eurostat to obtain an estimate. Eurostat, based on EU-SILC and the European Community household panel, provides the top income cut-off point by decile. More specifically, the data point used is the top income of the poorest 10% of each Member State. When multiplied by the median percentage of income spent on essential services poverty in that decile, it gives an estimate of the money spent. Those estimates include Denmark at one end of the spectrum, with EUR 3,800 spent annually on essential services, and Bulgaria at the other end, spending EUR 570. When comparing the Member State with the highest and lowest percentages of income paid for essential services, the difference in total amount is not striking. Croatia has the highest median percent of income spent, at 41%, resulting in an estimate of EUR 1,400, while Cyprus has a median income spent of 12%, with an estimate of EUR 1,000 (see Figure 13 in Annex 3). This calculation is imperfect because it multiples the median percentage of income spent on essential services by the maximum income in the poorest decile. The estimates presented here are thus likely to be an upper bound.

ICW data also allow for a more nuanced examination of essential services poverty by various characteristics, including across the urban-rural divide[8]. As expected, in the majority of the sample Member States, rural households spend more of their income on essential services than their urban counterparts (see Figure 5). Of those 15 Member States, the largest differences between geographical areas are in Bulgaria (3.6 percentage points (pp)), Greece (3.5 pp), Lithuania (2.5 pp), and Hungary (2.1 pp). At the other end, in Poland, Belgium, Slovenia, Malta, Netherlands, and Germany the median percentage of income spent on essential services is higher in urban than rural areas, although that difference is never greater than 1 pp. Luxembourg is the only Member State with equal percentages across areas.

[8] ICW data are presented by the following categories: cities, towns and suburbs, and rural areas. In nine Member States, the percentage of income spent on essential services fell between those of cities and rural areas. In five Member States, towns and suburbs spend a lower percentage of income than both cities and rural areas, while in six Member States, it is a higher percentage. For data presentation and discussion reasons, towns and suburbs are excluded from the analysis.

**Figure 5 Comparison of percentage of income spent on essential services, by rural and urban household, 2020**

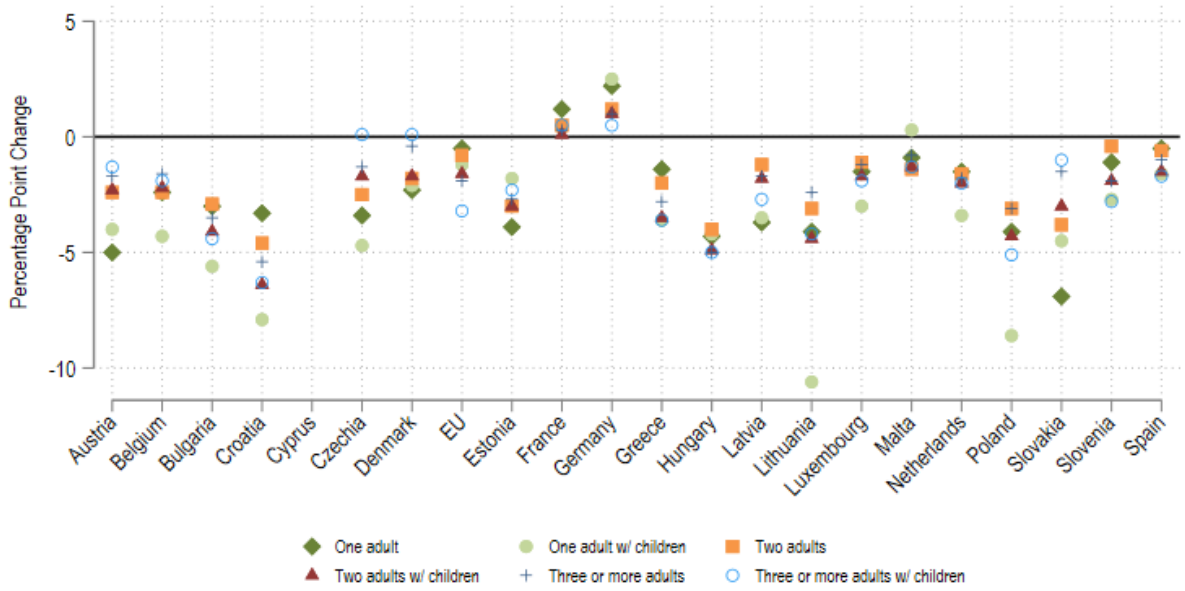



Source: Authors' elaboration, based on ICW data. Note: Data missing for Finland, Ireland, Italy, Portugal, Romania and Sweden.

When broken down by each of the essential services, a different picture arises in each Member State. In 16 Member States, energy accounts for a larger percentage of income spent among households in rural areas than urban areas. Greece has the highest difference between areas, at 3.6 pp, followed by Bulgaria (3.2 pp) and Slovakia (2.6 pp). In four of the five Member States where the percentage is higher in urban areas, the difference is less than 0.5 pp. For transport, the situation is not as stark, with the difference ranging from 0.7 pp to -0.6 pp. In 10 Member States, households in urban areas spend a larger percentage of income on transport, while seven Member States have the opposite pattern. Transport costs do not reflect accessibility, but, rather, the costs associated with the transport available. Finally, WSS is more expensive in the rural areas of 13 Member States, although the difference is at or below 0.5 pp. In four Member States, WSS is less expensive in rural areas, but by less than 0.5 pp (see Annex 3 for graphical representations of each service).

ICW data provide insights into differences in the percentage of income spent on essential services across types of households, whether by household composition, employment status, age, and education of the person of reference. In terms of household composition, the groups with the highest percentages of income spent are one-adult households, followed by one-adult-with-children households, with the exception of Cyprus, Estonia, Hungary, Malta and Spain, where the latter group spends more (see Figure 14 in Annex 3). From 2015 to 2020, the percentage of income spent decreased for all types of households, except in France and Germany where the percentage increased for all types of households (see Figure 6). Notably, the one-adult-with-children households saw the largest decreases in the percentage spent on essential services in Belgium, Bulgaria, Croatia, Czechia, Lithuania, Luxembourg, the Netherlands and Poland, indicating potential improvements in targeted assistance.

**Figure 6 Change in median income spent on essential services, by household composition, 2015-2020**




Source: Authors' elaboration, based on ICW data. Note: Data missing for Finland, Ireland, Italy, Portugal, Romania and Sweden.

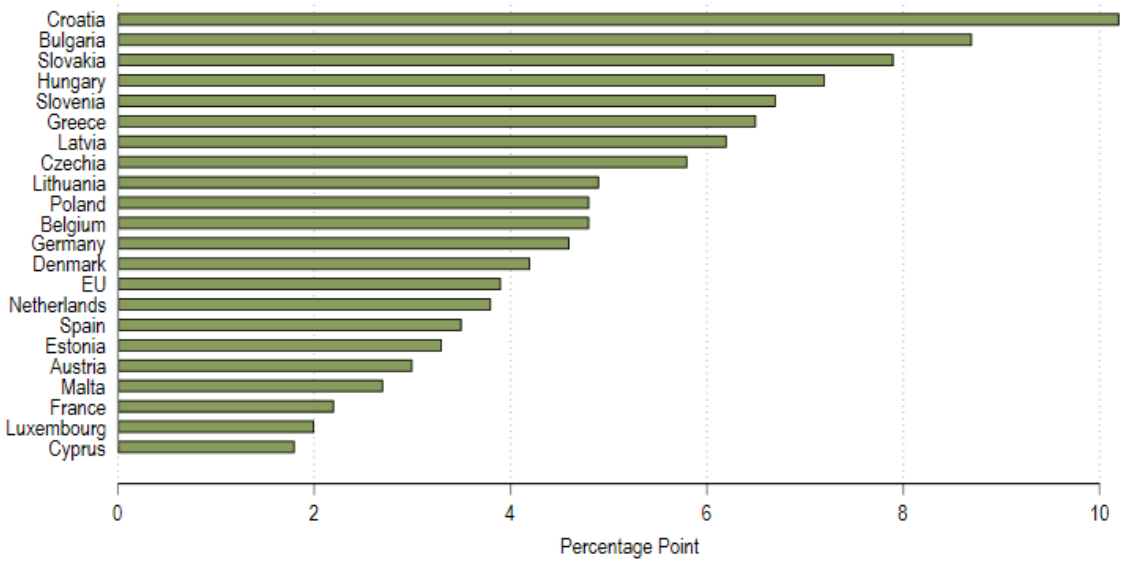
Across the Member States, unemployed status is linked to a higher percentage of income spent on essential services. However, this group crosses the 23% threshold in just four Member States (see Figure 16 in Annex 3). In most cases, the unemployed group spends less than 20% of their income on essential services. However, it is impossible to determine from the data whether households are limiting their expenditure because of their unemployed status or targeted subsidies are effective.

Generally, age is associated with higher percentages of income spent on essential services when the person is 65 years and older, with little difference between other age groups (see Figure 17 in Annex 3). However, in Demark and Greece, the households with the highest percentages are those with a reference person 75 years and older and households with a reference person under 35 years of age.

Low educational attainment (defined as lower secondary or lower) is linked to a higher percentage of income spent on essential services[9]. However, the extent of that difference varies by Member State (see Figure 18 in Annex 3). In Croatia and Bulgaria, the largest gaps are found between those with low and high educational attainment, at 10% and nearly 9%, respectively. In France, Luxembourg and Cyprus, the difference is nominal (see Figure 7).

[9] Based on International standard classification of education (ISCE). Available at : http://uis.unesco.org/sites/default/files/documents/international-standard-classification-of-education-isced-2011-en.pdf

**Figure 7 Difference between high and low educational attainment (pp), 2020**




Source: Authors' elaboration, based on ICW data. Note: Data missing for Finland, Ireland, Italy, Portugal, Romania and Sweden.

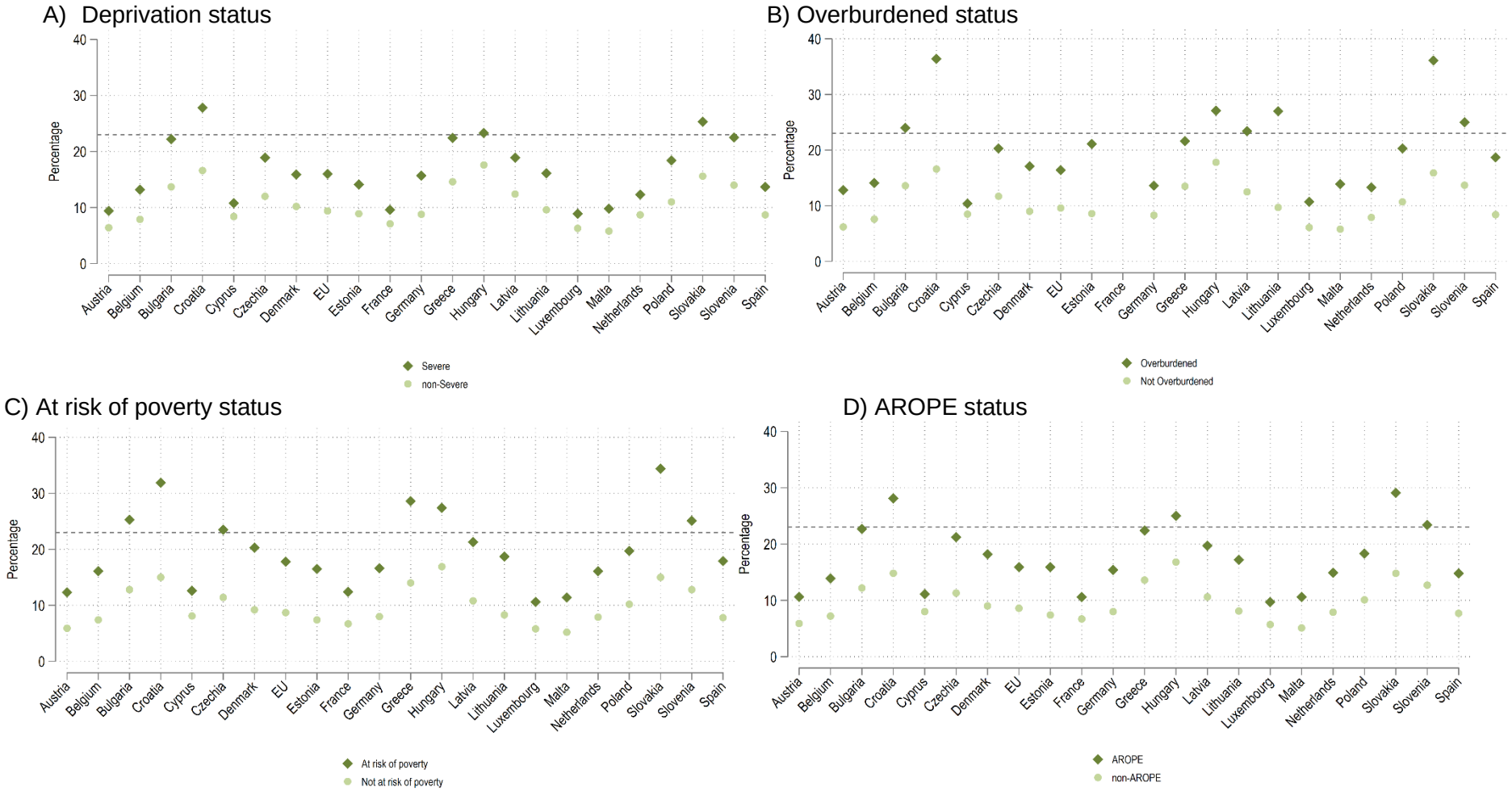
It is useful to examine the data by different socioeconomic characteristics: deprivation, overburdened, at risk of poverty, and at risk of poverty and social exclusion (AROPE)[10] to gain further insights into essential services poverty. When tested as a whole, the difference in the median percentage of income spent on essential services is statistically significant within the categories of each group. For example, the difference in percentage spent for those who are/are not at risk of poverty is statistically significant at the 0.01 level[11]. This result is consistent across all socioeconomic characteristic groups and indicates that the difference in the percentage of income paid for essential services is not due to chance, but, rather, a systematic difference between these groups.

Figure 8, Parts A, B, C, and D Figure 8present the median percentage of income spent on essential services poverty, by deprivation, overburdened, at risk of poverty, and AROPE status. These graphs highlight the consistent disparity within Member States between those experiencing severe deprivation or at risk of poverty and those who are not. For example, in Croatia, households that are experiencing severe deprivation spend less than 30% on essential services, compared to households that are overburdened, which spend just under 40% of income. Meanwhile in Greece, only households defined as at risk of poverty spend more than the 23% threshold on essential services. In some countries, notably Cyprus, Austria, Malta and the Netherlands, there is little difference in median income spent on essential services between groups, irrespective of the measurement.

[10] Deprivation is short for severe material and social deprivation (SMSD), which is a household's inability to pay for at least four out of nine predefined material items considered by most people to be desirable or even necessary to lead an adequate life. A household is considered overburdened when total housing costs are more than 40% of disposable income. A household is AROP if its equivalised disposable income is less than 60% of the national median. Households that are considered AROPE are either at risk of poverty, or severely materially and socially deprived, or living in a household with a very low work intensity. Eurostat definitions available at: https://ec.europa.eu/eurostat/cache/metadata/en/icw_esms.htm

[11] This indicates a less than 1% chance of the null hypothesis (i.e. medians of the two groups are equal). It is the highest level of statistical significance possible.

**Figure 8 Percentage of income spent on essential services by A) deprivation status, B) overburdened status, C) at risk of poverty status, and D) AROPE status**




Source: Authors' elaboration, based on ICW data.

Note: Data missing for Finland, Ireland, Italy, Portugal, Romania and Sweden. Dashed line is 23% threshold.

## 3.2 Country-level analysis

This section provides a comparative analysis of essential services poverty in three Member States: Bulgaria, Italy and Sweden. A detailed case study for each country is provided in Annex 4. Despite gaps in the data and differences in the indicators available, as well as a lack of a homogeneous definition of essential service poverty across these three Member States, this section presents an overview of the common aspects across the three countries and a brief overview of the regression analysis.

Each country represents a different aspect of economic development, social welfare systems, and policy approaches to essential services.

- Bulgaria faces persistent poverty challenges. It is one of the Member States with the highest AROPE rate, at 30%. Bulgaria does not have an official definition of essential services, nor related poverty. Access (including through affordable pricing) to the six essential services guaranteed by the EPSR is safeguarded by sectoral legislation.
- Italy's situation is less severe. In 2023, the Italian at risk of poverty rate was 22.8%, one of the eight highest shares across the EU and above the EU-27 average (21.4%). The Italian Constitution defines essential public services as 'those services of major public and general interest which must be guaranteed by the State and may be managed by public institutions and/or by private firms, under strict public regulation'.
- Sweden consistently shows lower AROPE rates than the EU average, at 18.4% in 2023. Its strong welfare system and universal access to essential services contribute to its relatively low poverty levels. However, Sweden does not have a national definition for essential services, either as a whole or individually.

### 3.2.1 Energy poverty

The energy poverty landscape across the three countries varies considerably and is intertwined with the specific context of each country. Bulgaria is one of the Member States most affected by energy poverty, with a significant portion of the population struggling to afford adequate heating and energy. In 2023, around 21% of Bulgarian households reported difficulties in keeping their homes adequately warm, while 18% were in arrears on utility bills. High energy prices relative to income, coupled with poor energy efficiency in buildings, exacerbate energy poverty. In addition, many homes lack central heating, with a large share of the population reliant on less efficient and more expensive heating sources. Access to energy for vulnerable consumers is guaranteed by the Energy Act, which regulates energy prices for domestic consumers. In-kind benefits are also provided to the most vulnerable consumers in the form of a 'targeted aid for heating'. This benefit considers the certain amount of energy to ensure minimum temperature comfort, estimated based on the monthly guaranteed minimum income (GMI), with higher eligibility thresholds to allow coverage of more persons and households at risk of energy poverty.

In Italy, energy poverty is formally recognised and monitored by the National Observatory on Energy Poverty (OIPE). Approximately 9.5% of households were unable to keep their homes adequately warm in 2023, below the EU average. For families at risk of poverty, however, this figure rises to 21.6%. Italy has implemented various measures to mitigate energy poverty, including a protected market for vulnerable consumers and in-kind benefits. Despite these efforts, rising energy prices continue to challenge low-income households and regional disparities further complicate the issue. Italy has a protection mechanism that supports vulnerable consumers, whereby in-kind benefits reduce the amount of energy bills for the entire household.

Sweden has historically been less affected by energy poverty, but recent years have seen a sharp increase in households unable to afford adequate heating. In 2023, 5.9% of households

reported difficulty keeping their homes warm, a significant rise from 1.1% in 2014. This increase is largely due to rising electricity prices, which grew by over 80% between 2014 and 2022, outpacing income growth. Despite Sweden's generally high standard of living, energy affordability is a growing concern, particularly in light of the country's harsh winter climate. A social assistance benefit and housing allowance cover the cost of household energy usage, with ad hoc measures implemented at specific times. This included a temporary progressive compensation scheme and an increase in the housing allowance for families with children from July to December 2022. The government has also introduced subsidies to encourage energy efficiency improvements.

### 3.2.2 Transport poverty

Limited data are available on transport poverty in Bulgaria. Quality of services and accessibility of public transport are limited, particularly in rural areas. In 2014, around 8% of the population could not afford regular use of public transport – the highest rate in the EU. Many households in vulnerable groups rely on discounted or free travel in rail and road transport, such as legally mandated discounts for older people, children, persons with disabilities, etc. For the population relying on private vehicles, the increasing price of fuel exacerbates affordability issues.

In Italy, transport poverty is relatively low, with only 0.6% of the population unable to afford public transport in 2014 (2.4% across the EU). However, this figure rises to 2.1% for people at risk of poverty. Italy has a well-developed public transport system, but regional disparities mean that transport accessibility and affordability vary, particularly between the north and south. Expenditure on transport services has fluctuated in recent years, largely due to the impact of COVID-19 restrictions. Transport is the only essential service for which the benefit is not based on in-kind benefits. Until 2023, only people with an ISEE below a certain threshold could request a bonus to purchase seasonal tickets.

Sweden has one of the most accessible public transport systems in the EU, with 78.6% of residences located within 400 metres of a public transport stop. The country prioritises proximity to public transport in urban planning, particularly for new housing developments. Despite this, in 2023, around 33% of the population rated the ease of using public transport for everyday travel as poor or very poor, highlighting some dissatisfaction with service quality or coverage, especially in rural or remote areas. Public transport strategies can differ across various parts of the country. National measures are in place to support work commutes, including a tax deduction.

### 3.2.3 WSS

In Bulgaria, access to clean WSS is generally good in urban areas, with 99.2% of households connected to the water supply in 2023. However, in rural areas, only 45.6% of households have access to sewerage systems, highlighting a major disparity between cities and villages. The cost of water services is considered high for low-income households (despite legally mandated controls of tariffs for domestic users, similar to the energy tariffs), exacerbating essential services poverty in the country. Prices for WSS are regulated by the national regulator of energy and water, which ensures the 'social acceptability of the services' (the minimum monthly use of drinking water of 2.8m$^3$ per person does not exceed 2.5% of the average monthly income of the household in that region). This support is available to all domestic consumers without any differentiation of their income level, social group or other criteria. Nevertheless, accessibility of WSS is a more significant issue than affordability.

In Italy, no data are available on the share of the population with access to the water supply. On the other hand, around 88.7% of the population is connected to wastewater services. WSS have seen steady increases in cost, with average household expenditure on these services growing by 4.3% annually since 2014. Despite this, Italy remains below the EU average for households lacking basic sanitation facilities. In 2022, only 0.5% of the population lacked

access to indoor flushing toilets, rising to 0.8% among those at risk of poverty. Regional variations remain significant, with poorer households in southern Italy facing higher costs and less reliable service. Vulnerable households can request an in-kind benefit for assistance with water and sanitation, based on the ISEE. The discount provides 50 litres/habitant/day of free water to vulnerable households.

Sweden has seen significant improvements in access to WSS over the past decade. As of 2022, 93.1% of the population are connected to the public water network and 92.5% have access to public wastewater services. There is virtually no population segment lacking basic sanitation facilities. WSS costs are generally covered by social assistance for low-income households, ensuring broad access to these essential services.

**Box 4 Waste Management**

Bulgaria: As of 2024, Bulgarian municipalities are in the process of updating their waste tariffs. According to the general guidelines provided by the Ministry of Finance, municipalities can choose from the following tariff approaches (Poriazova, V. 2024):

- According to the number of waste bags of a certain size applying to the non-recycled waste;
- According to the waste bins – tariff estimated based on the number of waste containers provided by the municipality (for one-household dwellings);
- According to the number of users – tariff estimated based on the number of persons living in each household;
- According to the size of the dwelling – tariff based on the size/surface of the dwelling.

No targeted support is available for households that may not be able to afford municipalities' waste management fees. Exceptions are available where the home is not the primary residence of the household, but this option is available to all households regardless of their social circumstances.

Italy: Between 2014 and 2022, the price of waste management services increased by 1.5% (less than other services, except electricity, gas and other fuels (see Table 10 in Annex 4)). In 2022, the average monthly expenditure on waste was around EUR 21, and EUR 18 for households at risk of poverty (see Table 12 in Annex 3). Monthly expenditure on waste collection does not vary a lot across the macro regions. This may be because municipal service fees for waste collection are set using national rules.

According to legislation adopted in 2019, households that have an Equivalent Economic Situation Indicator (ISEE) lower than EUR 9,530 (EUR 20,000 for families with four or more children) are entitled to an in-kind benefit on waste tax. The amount is not equal for everyone and may vary from one municipality to another. However, due to the lack of an executive decree, this benefit has not yet been applied. As of September 2024, there are no measures in place to prevent waste-related poverty in Italy.

Poland: Pursuant to the provisions of the Act on cleanliness and order in municipalities (Official Journal of Poland, 2024), municipalities can use the following methods to set waste tariffs for dwellings used for living purposes:

- According to the number of persons who live in a dwelling;
- According to the water use recorded for the dwelling;
- According to the usable surface of the dwelling.

A municipality can diversify the tariffs depending on location (urban vs rural), type of development, and other factors. However, a maximum threshold is linked to the average monthly disposable income per person for the year preceding the year when the tariffs are set. If the municipality decides to set the monthly waste fee according to the number of persons registered in a dwelling, the upper limit equals 2% of monthly disposable income. Similar to Bulgaria, there may be exceptions from waste tariffs if a dwelling is not used as a

permanent residence, but these are not dependent on income.

the Netherlands: Waste tariffs in the Netherlands are imposed according to varying rules. In most urban municipalities, waste tariffs are set in the form of a tax imposed on the users of properties. Each municipality determines the level of the waste tax per property, which is linked to the number of people registered at a given address. The rates for the tax are fixed for each year. For example, in Amsterdam, the tax for 2024 is EUR 352 for a one-person household (City of Amsterdam, 2024).

Over 40% of the municipalities in the Netherlands (ca. 41% of the population coverage as of 2023[12]) use pay-as-you throw (PAYT) schemes, which are mainly applied in small, non-urban municipalities. PAYT schemes incentivise citizens to reduce their waste generation and sort better at source, with the tariffs for recyclables usually lower than for residual, mixed household waste. PAYT systems are often a combination of fixed fees for the service and a variable fee depending on the waste amounts. The tariffs in these schemes in the Netherlands are mainly based on volume, frequency and/or weight of disposed waste. Most municipalities apply a system based on volume and frequency (EEA, 2022b).

Sweden: Municipal waste tariffs in Sweden vary based on environmental requirements, taxes, and local conditions. In 2022, the annual fee for waste services was SEK 2,539 (EUR 220) for one- and two-family houses, and SEK 1,496 (EUR 130) for apartments. Municipalities manage household waste and are responsible for ensuring proper disposal, either directly or through outsourcing, while maintaining compliance with legal and environmental requirements. Fees are designed to reflect actual costs (Avfall Sverige, 2022).

### 3.2.4 Social variables and the probability of essential services poverty

A probit model is used to understand the relationship between social variables and the probability of a household experiencing essential services poverty. Using HBS data from 2020, households are identified as essential services poor if they spent 23% or more of their expenditure on essential services. The independent variables in the model include employment status, age, education, marital status, and sex of the person of reference, household income (or a proxy), number of persons in the household working, number of persons in the household not working, and geographical location. For data limitation reasons, the analysis is only possible for Bulgaria and Italy (see Annex 5 for a full description of the probit model specifications and results).

In Bulgaria, older persons of reference (45+) and having an additional person in the household who is not economically active are statistically significant in increasing the probability of a household being classified as essential services poor. On the other hand, households with higher income and a person of reference with tertiary education level are less likely to experience essential services poverty. More specifically, a 1% increase in net income decreases the probability of being essential services poor by 10.2%.

In Italy, households whose person of reference is a woman or older than 45 years have a higher probability of experiencing essential services poverty. A higher imputed rental value (a proxy for income, which was unavailable), more persons in the household who are economically active, and living in the capital region are all statistically significant in decreasing the probability of essential services poverty.

[12] Updated statistics provided by the EEA.

# 4 Forward looking analysis of risks in the context of sustainability transitions

This section examines how future megatrends are likely to affect the affordability and accessibility of essential services. The analysis identifies potential risks and opportunities that may shape poverty in essential services in the coming years. The megatrends considered include climate change, environmental degradation, resource scarcity, changing geopolitical landscapes, continuing urbanisation, growing inequalities, increasing consumption, demographic change, and accelerating technological progress. Detailed descriptions of these megatrends can be found in Annex 6.

The section is divided into two parts: first, an analysis of the expected impact of the megatrends on each essential service, followed by an assessment of current policies that affect affordability and availability of these services in the face of these megatrends and quantification of those potential impacts. Figure 9 presents a visual representation of the ecosystem of megatrends and policies in which energy, transportation and WSS poverty occur and thus contribute to overall essential services poverty. The icons in Figure 9 correspond to the specific megatrends examined, shaded to indicate whether they present a risk (red), i.e. decrease affordability or accessibility, or opportunity (green), i.e. increase affordability or accessibility, to essential services poverty.

**Figure 9 Forward-looking analysis of essential services poverty**

## 4.1 Possible impacts of megatrends

### 4.1.1 Energy

Energy poverty is the most significant driver of essential services poverty across Member States. It is also the area where future risks are most pronounced. Of the nine megatrends identified, eight are expected to have a significant impact on energy poverty in the coming years (see Figure 9). Five of these megatrends represent a risk, three may have a mixed impact depending on the accompanying factors, and one represents an opportunity. The channels through which these megatrends impact the services are analysed below.

**Aggravating resource scarcity – risk**

The EEA (2015) highlighted the potential risk of future shortages of key raw materials such as cobalt, which is essential for the production of batteries used in energy storage systems, themselves an important component in energy transition (Fleischmann et al., 2023; JRC, 2024). The JRC (2024) warns that increasing water scarcity could lead to greater reliance on energy-intensive processes such as desalination to meet future water needs. Such shortages might lead to higher energy costs and increased energy prices for consumers.

**Widening inequalities - risk**

Widening inequalities will affect all sectors and might be worsened by the transition to a low-carbon economy. While wealthier households can more easily afford energy-efficient technologies and benefit from the transition, lower-income groups will struggle with high energy costs (Competence Centre on Foresight, 2023).

**Growing consumption - risk**

As the global consumption of goods, services, and technology continues to rise, particularly in urban areas, the demand for energy increases, putting upward pressure on energy prices. This trend exacerbates energy poverty, as low-income households, already struggling with energy affordability, are disproportionately affected by the increasing energy costs (IEA, 2022).

**Demographic changes - risk**

An ageing population in the EU can intensify energy poverty, primarily because older people are likely to experience a drop in income associated with retirement and an increase in health risks. The latter can be exacerbated in a changing climate (see case study on Bulgaria in Annex 4). Older adults, particularly retirees, often face financial constraints, making it difficult to cope with rising energy prices. Their energy consumption also tends to grow, as they spend more time at home and require higher than average heating and cooling. Older people are more vulnerable to temperature-related health issues, such as respiratory or cardiovascular conditions, making reliable and affordable access to energy even more crucial for their health and well-being (DG COMM, 2022).

**Climate change – risk/opportunity**

Climate change is projected to increase energy costs, driven by higher carbon prices and the significant investment needed in infrastructure, technology and improved energy efficiency (Temursho, Weitzel, and Vandyck, 2020). In addition, Europe's population is becoming more

vulnerable to heatwaves due to rising temperatures, ageing populations, and increasing urbanisation (EEA, 2022a). Many European countries are experiencing changing summer temperature patterns that significantly increase the need for cooling and air conditioning (see Bulgarian case study in Annex 4). The demand for cooling is

**Changing geopolitical landscape - risk/opportunity**

Geopolitical shifts such as conflicts and changing power dynamics have both positive and negative implications for energy services. Geopolitical conflicts such as Russian invasion of Ukraine and tensions in the Middle East pose significant risks to global energy supply chains and can drive up commodity prices (IMF, 2024). These disruptions highlight wider vulnerabilities in the energy market, with conflicts in key regions potentially leading to instability and impacting global energy affordability and security (Vesnic Alujevic, Muench and Stoermer, 2023). However, EU policies aiming to improve the domestic security of supply and promote the use of local renewable energy sources have the potential to increase energy independence and stabilise domestic energy prices, although potentially at a higher upfront cost.

**Continuing urbanisation- risk/opportunity**

Urbanisation increases energy demand in cities, which can strain power grids if infrastructure development does not keep pace with urban expansion (JRC, 2020). However, urbanisation also offers opportunities for more efficient energy distribution through systems such as district heating and cooling (DHC) systems (DG ENER, 2022).

**Technological advancements – opportunity**

Investments in technological advancements such as solar photo-voltaic energy (PV), wind energy and energy storage make the transition to renewable energy more efficient, affordable and accessible (IEA, 2023). DHC systems, particularly in urban areas, offer further opportunities to improve energy efficiency and lower greenhouse gas (GHG) emissions. By centralising heat generation, DHC systems can utilise waste heat, integrate renewable energy more effectively, and reduce costs through economies of scale (DG ENER, 2022).

### 4.1.2 Transport

Transport is likely to be influenced by seven of the nine megatrends. Of these, four represent risks, two could have a mixed impact depending on the accompanying policy responses, and one presents an opportunity. The channels through which these megatrends impact transport poverty are analysed below.

**Climate change – risk**

Climate change policies are expected to increase transport costs as economies shift away from fossil fuels and adopt new and (currently) more expensive technologies, such as electric vehicles (EVs) (Temursho, Weitzel, and Vandyck, 2020). As traditional fuel prices rise and demand for cleaner technologies increases, middle-income households will be particularly affected. Transport costs in the EU could increase by up to 2.8% by 2030 (Temursho, Weitzel, and Vandyck, 2020). Natural disasters such as floods and severe storms can lead to infrastructure failures, resulting in higher repair costs and widespread service disruptions (IPCC, 2023).

### Aggravating resource scarcity – risk

Progress has been made in the uptake of EVs: an EEA indicator shows that 21.6% of new car registrations in the EU in 2022 were electric. However, current transport needs are still largely met by fossil fuels, especially among lower income groups (EEA, 2023). The impact of the green transition on fossil fuel demand and thereby prices, which affect transportation affordability, remains ambiguous, as outlined by the European Central Bank (Panetta, 2022). If investment in fossil fuels declines and supply becomes scarce, prices could rise, exacerbating transport poverty for low-income households that rely on internal combustion engine vehicles. Conversely, if oversupply leads to lower prices, this could provide short-term relief for these households. However, given the long-term shift away from fossil fuels, this relief would be short-lived, as the need for these households to switch to alternative modes of transport would still be present. Irrespective of fossil fuel prices, the move to EVs will require greater production of batteries. These batteries rely on limited natural resources, such as lithium and cobalt, that may face shortages in the future, (Fleischmann et al., 2023; JRC, 2024).

### Widening inequalities – risk

The green transition may exacerbate transport poverty if lower-income households are unable to afford new green mobility technologies or are left behind by policies focused on sustainability (Competence Centre on Foresight, 2023). EVs and cleaner public transport often require significant upfront investment or access to digital platforms, which can exclude vulnerable groups (Competence Centre on Foresight, 2023). Without targeted support and inclusive policies, these transitions may deepen existing inequalities in transport access, leaving lower-income populations behind (Competence Centre on Foresight, 2023).

### Demographic changes – risk

An ageing population in the EU is likely to exacerbate transport poverty, as older adults are more likely to face mobility challenges due to disability or reduced mobility. Public transport systems will need to invest in accessible, barrier-free infrastructure to meet these needs. Many older adults, especially those in rural areas, may struggle with digitised and automated transport services, as they often lack basic digital skills. This digital divide can make it difficult for older people to access modern transport systems or mobility information, exacerbating transport poverty by limiting their ability to reach this essential service (DG COMM, 2022).

### Changing geopolitical landscape – risk/opportunity

The transition to EVs in the EU depends heavily on the availability of imported materials, such as lithium, cobalt and rare earth metals, from countries in Africa and Asia, as the EU lacks independent access to these critical resources (Fleischmann et al., 2023; JRC, 2024). Geopolitical tensions in these regions could disrupt supply chains, leading to shortages of materials and increasing the cost of producing EVs (Fleischmann et al., 2023). However, efforts to develop domestic manufacturing of vehicle components and increasing reuse and recycling could reduce dependency and provide long-term stability, albeit at a higher upfront cost.

### Continuing urbanisation – risk/opportunity

Increasing urbanisation could both mitigate and exacerbate transport poverty, depending on the policies implemented. Urban growth has the potential to improve access to public transport,

provided there is sufficient investment in efficient, modern transport systems. Without such investment, cities may struggle to adapt to rising populations, leading to increased reliance on cars, congestion, longer travel times, and higher pollution levels (European Commission, 2021; JRC, 2020). Urbanisation thus presents both a risk and an opportunity, depending on whether cities can modernise their transport infrastructure to keep pace with demand. Investments in public transport are also needed in non-urban areas to ensure that the rural population is not left behind (Competence Centre on Foresight, 2023).

**Technological developments – opportunity**

Technological advances, particularly in battery storage systems, represent a significant opportunity for the transport sector. Improvements in battery technology could reduce the cost and increase the availability of EVs, making cleaner transport more accessible to a wider population (IEA, 2023).

### 4.1.3 WSS

Water and sanitation poverty in the EU is likely to be shaped by seven of the nine megatrends. While five of these megatrends represent risks, one may have a mixed impact, and one represents an opportunity.

**Climate change - risk**

Climate change increases the frequency and severity of droughts, floods and extreme weather events, disrupting water availability and infrastructure (DG ENV, 2021). These may lead to interruptions in service, temporary severe shortages, and need to use expensive technological solutions to ensure access to good quality WSS. These impacts are likely to increase WSS poverty.

**Aggravating resource scarcity – risk**

This megatrend is closely linked to climate change, with the same consequences likely to exacerbate WSS poverty. Aggravating resource scarcity, in particular with respect to water, can also happen as a result of political conflicts.

**Environmental degradation – risk**

EU waters are heavily impacted by diffuse and point-source pollution, over-abstraction, and hydro-morphological changes[13] resulting from human activities (DG ENV, 2021). These activities alone can decrease the availability of water. Water legislation increasingly addresses the need to improve the quality of water by requiring removal of substances that are dangerous to human health and the environment, which implies increases in WSS costs and drives up water tariffs, potentially exacerbating WSS poverty.

**Growing consumption – risk**

Increased consumption, driven by rising living standards and expansion of the middle class,

[13] Point-source pollution originates from single identifiable sources of pollution such as industrial plants while diffuse sources of pollution are associated with substances that are spread on land or in water (e.g. coming from agricultural practises). Over-abstraction occurs if the amount of water taken (e.g. for irrigation or urbanisation purposes) is greater than the amount of water falling as rain. Hydro-morphological changes refer to changing the physical character of the river, including its flow, the course or the form and shape of the river channel.

leads to higher demand for water in industries and agriculture, increased water footprint and unsustainable water use, worsening water availability by straining already limited resources (EEA, 2015).

### Widening inequalities – risk

Widening inequalities can limit access to water, especially for low-income and marginalised communities, which may struggle to afford rising costs or suffer from inadequate infrastructure (UN, 2020). Wealthier households are in a better position to adapt to climate impacts and are more likely to live in wealthy areas that have a better infrastructure (UN, 2020).

### Continuing urbanisation – risk/opportunity

Urbanisation can damage the ecosystems that provide water and other natural resources essential for sustainable development (UN, 2020). As urban populations grow, the increasing demand for water often exceeds the capacity of existing infrastructure to provide clean water and effectively manage wastewater (UN, 2020). Urbanisation can result in increased costs for network extensions and storm water management. In certain cases, new drinking water sources may need to be developed[14]. However, urbanisation can also be beneficial, as it allows more people to be connected to centralised water services and maximise economies of scale (UN, 2020).

### Technological developments – opportunity

Technological developments, such as more efficient desalination and water purification methods, could play a crucial role in alleviating water poverty by increasing access to clean water, especially in water-scarce regions (European Commission, 2024). European Commission (2024) predicts that wealthier countries are likely to invest in advanced water management systems and water-saving technologies, increasing their resilience to water scarcity.

**Box 5 Waste management and megatrends**

Three megatrends are expected to have a significant impact on waste: (1) continuing urbanisation; (2) growing consumption; and (3) technological developments. Continuing urbanisation poses a risk, as growing cities generate more waste, often overwhelming existing waste management systems, especially in under-resourced urban areas (EEA, 2020). However, it can also create an opportunity, as waste collection (which usually constitutes the highest share of costs of waste services) is usually more cost-effective in more densely populated areas. The megatrend of growing consumption is also contributing to increased waste generation, putting further pressure on waste services (EEA, 2019). However, technological developments can offer an opportunity. Innovations such as improved plastics recovery and more efficient recycling technologies can improve waste collection and reduce reliance on household sorting behaviour (European Commission, 2021). However, this opportunity must be treated with caution. Recyclables can be collected together (commingling), but the types of waste to be collected for commingling have to be very well chosen. Very few recyclables can be extracted from mixed household waste at acceptable quality, e.g. metals and some plastics. Technological innovation can increase the efficiency of waste collection and recycling and lead to higher quality and quantity of recycled materials, for example by using advanced service fee systems (PAYT), labelling systems providing guidance for better sorting at source, substitution of hazardous

[14] Written feedback obtained from EurEau, 3 October 2024.

substances in products, tracers in products supporting waste sorting, or automated waste sorting technology.

Some policies can help to reduce the burden of waste services on citizens. For example, the introduction of extended producer responsibility (EPR) schemes makes producers pay for the end-of-life phase of the products placed on the market, so that their collection and management does not have to be covered by municipal waste fees or taxes. EPR is already mandatory in the EU for several product groups, e.g. waste electrical and electronic equipment and packaging, and will be extended to other product groups at EU-level (textiles) and other product groups in several Member States.

## 4.2 Policy responses and impacts

Principle 20 of the EPSR provides a framework for developing policies to address essential services poverty. It explicitly identifies the key types of services for which EU policies should ensure access, while mandating that support be made available to those in need. This section examines the main EU policy responses on a service-by-service basis. It explores how different policies impact the affordability of essential services, with a particular focus on more vulnerable groups. Figure 9**Error! Reference source not found.** provides an overview of the key policy responses for each essential service.

### 4.2.1 Energy[15]

The EU energy acquis includes a variety of instruments to deliver its key energy priorities: transition to a more sustainable and secure energy system, while ensuring security of supply and affordability for users, as outlined in the EU Energy Union Strategy (COM/2015/080). With growing recognition of the multifaceted issue of delivering the green transition (where the energy system has a pivotal role) in a fair and just manner, different instruments increasingly emphasise consumers and fairness. Within the Fit for 55 package[16], this includes the establishment of funding mechanisms such as the Just Transition Mechanism (JTM) and the SCF. The JTM targets employers and regional actors in regions deemed most vulnerable to the green transition and can thus address essential services poverty in general. Using revenues from the EU Emissions Trading System (ETS), the SCF provides direct support to vulnerable groups in energy and/or transport poverty. These instruments have a high potential to mitigate the negative distributional effect of sustainability transition, if directed towards those who need them most.

EU policies to increase the share of renewable energy in final consumption (including the Renewable Energy Directive (RED)[17] and legislation on the internal electricity market[18]) have the potential to lower energy prices for final consumers. According to the European Commission (DG ENER, 2021b), increased reliance on renewable energy is expected to reduce overall fossil fuel imports, generating savings of up to EUR 16 billion, which helps to stabilise energy costs. Energy-related expenditure for households (excluding transport) are projected to remain stable, representing 7.7-7.8% of household income by 2030, ensuring minimal increases in energy costs. Consumers may further benefit from a cleaner energy mix, lower pollution, and greater energy security. Initiatives such as (renewable) energy cooperatives and opportunities for own production of renewable energy have the potential to create savings for various consumers.

[15] The project team would like to thank Dr Rachel Guyet, research fellow at Sciences Po and Energy Programme Director for the Centre International de Formation Européenne, for the discussion of megatrends and policies that has inspired the analysis of EU energy policy (an expert interview was held on 12.09.2024).

[16] See: https://www.consilium.europa.eu/en/policies/green-deal/fit-for-55-the-eu-plan-for-a-green-transition/

[17] See DG Energy webpage: https://energy.ec.europa.eu/topics/renewable-energy_en

[18] See DG Energy webpage: https://energy.ec.europa.eu/topics/energy-strategy/clean-energy-all-europeans-package_en

EU policies on increased energy efficiency and renovation of buildings[19] are central to addressing climate change mitigation objectives and energy poverty, as more efficient dwellings can significantly improve comfort for inhabitants and result in cost savings (EEA and Eurofund, 2021). According to the Impact Assessment for the revision of the Energy Performance of Buildings Directive (EPBD), the introduction of minimum energy performance standards for buildings and zero emission buildings could reduce total energy costs by 12-28% by 2050, depending on the modelling scenario (DG ENER, 2021a).

While EU renewable energy and energy efficiency policies have significant potential to lower costs for consumers, other climate policies such as the EU Emissions Trading System (ETS) may have some adverse impacts. The newest ETS 2 extends the EU's carbon pricing to buildings and road transport and other small industries not covered by the current ETS. It will be fully operational in 2027, requiring suppliers of fossil fuels, such as natural gas and coal, to purchase emissions allowances[20]. This is expected to lead to significant price increases, for example, the highest natural gas price increase is estimated to be 37% in Hungary and Latvia, and the most significant coal price increase is estimated to reach 220.5% in Germany. These price hikes are expected to disproportionately affect low-income households, who rely more on fossil fuels for heating, spend a larger portion of their income on energy, and have fewer resources to invest in energy-efficient alternatives (IEEP, 2022).

Bajomi (2023) highlights that the extension of carbon pricing to heating fuels could have a devastating impact on households in Central and Eastern Europe, many of which rely on firewood or solid fuels for heating. In Hungary for instance, the price of firewood has doubled, leaving the poorest households struggling to cope with rising costs and limited alternatives. Although the EU has established a target for the maximum carbon price (at EUR 45 per ton of $CO_2$), this cap could be exceeded (despite the adjustment mechanisms planned in the ETS 2 legislation), leading to significant increase in costs, particularly for low-income households (Bajomi, 2023). The JRC's (Temursho, Weitzel and Vandyck, 2020) CPRICE scenario corroborates these findings, projecting that overall residential energy prices could rise by 9.9% across 25 Member States[21] with the implementation of ETS 2, disproportionately affecting low-income households. This model assumes a stronger carbon price signal and more ambitious transport policies[22] but no significant changes in energy efficiency or renewable energy measures.

The European Commission's impact assessment of the 2040 climate targets (DG CLIMA, 2024) highlights the disproportionate risk of rising energy costs on low-income households as a result of the EU's more ambitious climate policies. According to the projections, low-income households are expected to spend a significantly higher share of their private consumption on energy system costs than the average household. For the period 2031-2040, low-income households are projected to spend 14.0-14.4% of their total consumption on energy-related costs under all modelling scenarios, well above the energy poverty threshold of 10%. In comparison, the average household is projected to spend only 8.0-8.2% of its consumption on energy costs over the same period.

IEEP (2022) highlights that a redistribution of revenue from the ETS 2 can play a crucial role in mitigating the regressive effects of rising energy and transport costs, especially for low-income households. With careful design of revenue recycling mechanisms, the SCF and national ETS revenues can provide targeted support to the most vulnerable groups and ensure that the transition to greener energy and transport systems does not exacerbate inequality (IEEP, 2022; DG ENER, 2021a). Microsimulation models suggest that redistributing revenue

[19] See DG Energy webpage: https://energy.ec.europa.eu/topics/energy-efficiency_en

[20] See DG CLIMA website: https://climate.ec.europa.eu/eu-action/eu-emissions-trading-system-eu-ets/ets2-buildings-road-transport-and-additional-sectors_en

[21] Austria and the Netherlands are not included in the analysis.

[22] Moderate intensification of transport policies in this case refers to an increase in regulatory measures to reduce emissions in the transport sector.

through income support could lead to net welfare gains for the poorest households. Redistributing the new revenue from the Energy Taxation Directive (ETD), along with 25% of ETS revenues, to the poorest 50% in each Member State, the bottom 10% of households across the EU would experience net welfare gains of approximately 0.75% (around EUR 100 per year). However, additional redistribution of all national ETS 2 revenues to the poorest 50% of households in each Member State would extend welfare gains across income groups, with the bottom 10% benefiting most— a gain of more than 2% of their current expenditure (nearly EUR 300 per year) (Bajomi, 2023).

### 4.2.2 Transport

EU transport policies aim to achieve cleaner, more sustainable, and efficient mobility while ensuring accessibility and affordability for all citizens. Central to this agenda is the EGD, which sets ambitious targets for reducing GHG emissions in transport by 90% by 2050, compared to 1990 levels. This transition to clean mobility, while essential for environmental sustainability, presents challenges for affordability, accessibility and inclusivity, particularly for vulnerable populations (EC, 2020).

A key legislative instrument in this transition is the Sustainable and Smart Mobility Strategy, adopted in 2020[23], which outlines a pathway to sustainable transport by promoting multimodal and active mobility, public transportation, and zero-emission vehicles. The Strategy supports infrastructure development for EVs, such as charging stations, as well as investments in digitalisation to create smart transport systems (DG MOVE, 2021b).

Another important framework is the Alternative Fuels Infrastructure Regulation[24], part of the Fit for 55 package, which aims to ensure the widespread availability of charging and refuelling infrastructure for EVs and other low-emission vehicles across the EU. This infrastructure is essential for accelerating the adoption of EVs as a sustainable mobility option (DG MOVE, 2021b). The Alternative Fuels Infrastructure Regulation is expected to indirectly reduce external costs of $CO_2$ emissions by EUR 445 billion and air pollution by EUR 75 billion over the period 2021-2050. These reductions benefit society at large by lowering environmental damage and improving public health, with the infrastructure driving the transition to cleaner transport modes (DG MOVE, 2021a).

However, without adequate financial support, the shift to EVs could exacerbate transport inequalities, as wealthier households are more likely to benefit from their lower operating costs, while lower-income households may be excluded due to high upfront investment (EC, Competence Centre on Foresight, 2023). Nevertheless, while the upfront costs for zero- and low-emission vehicles may initially be higher, consumers will benefit from long-term savings on fuel and maintenance, with total cost of ownership savings expected to range from EUR 330-600 per car in 2030 to EUR 2,800-3,100 by 2040 for first users (DG CLIMA, 2021). Stronger CO2 emission performance standards for new passenger cars means that the final energy demand in cars and vans is projected to decrease by around 21-22%, 36-45% and 55-63% in 2030, 2035, 2040, respectively, compared to 2015. Over the 2030-2050 period, the cumulative savings of diesel and gasoline compared to the baseline amount to 913-1100 Mtoe25. This is equivalent to around EUR 200-300 billion at current oil prices. Economies of scale and entry of EVs to the second hand market should see the prices of EVs decrease in the future, making them more affordable for lower income groups (DG CLIMA, 2021).

For society, the shift towards zero-emission vehicles will lead to improved air quality, particularly in urban areas, with reductions in pollutants such nitrogen oxides (NOx) by up to 91% and particulate matter (PM2.5) by up to 88-91% by 2040, benefiting public health. These

[23] See DG MOVE website: https://transport.ec.europa.eu/transport-themes/mobility-strategy_en

[24] See DG MOVE website: https://transport.ec.europa.eu/transport-themes/clean-transport/alternative-fuels-sustainable-mobility-europe/alternative-fuels-infrastructure_en

[25] Millions of tons of oil equivalent

improvements will particularly help vulnerable populations in areas with high air pollution. Reduced reliance on fossil fuels and the adoption of EVs will contribute to achieving the EU's climate goals, enhancing energy security and lowering overall environmental impact, benefiting society at large (DG CLIMA, 2021).

The EU's Urban Mobility Framework encourages cities to develop Sustainable Urban Mobility Plans to reduce congestion and improve air quality while ensuring affordable access to public transport for all residents. Investment in public transportation infrastructure, such as metro, bus and tram systems, is crucial to meet the growing demand for mobility and reduce dependence on private car ownership (European Commission, 2021). However, rural and remote areas are at risk of being left behind unless specific policies address their unique mobility needs, such as expanding public transport networks and integrating digital solutions (Competence Centre on Foresight, 2023). Another policy indirectly related to the issue of transport poverty is air quality in cities[26]. Air pollution measures – particularly those targeting transport, as one of the largest contributors to urban air pollution – are increasingly common in European cities. These measures are part of larger efforts to meet EU air quality standards and reduce GHG emissions. Measures such as establishing low emission zones and bans on older, more polluting vehicles aim to reduce emissions from transport. However, they can disproportionately affect lower-income people who cannot afford newer, cleaner vehicles, potentially driving them out of city centres. This has led to political backlash in some regions, as seen in movements such as the 'gilets jaunes' in France (Zimmermann, 2023).

Finally, the latest ETS 2 also applies to road transport, where fuel suppliers will have to pay for emissions from petrol and diesel. This will increase transport costs, with petrol prices rising by up to 13.3% and diesel by up to 16% in some Member States, according to model estimates (IEEP, 2022). The impact of these price increases is expected to be most visible among lower-income households, especially those in rural areas, who often rely on older, less fuel-efficient vehicles and have fewer public transport options. This will further strain households already struggling to afford basic transport, as they are less able to switch to alternative solutions such as EVs (IEEP, 2022). These findings are corroborated by the JRC CPRICE model (Temursho, Weitzel and Vandyck, 2020). According to the model, the prices of transport services could increase by 1.6%, and operation of personal transport equipment could rise by 2.8%, again disproportionately affecting low-income households. However, efficiently designed redistribution measures under the SCF and JTM could mitigate adverse impacts on low-income households and potentially bring welfare gains to households in the lowest income decile (IEEP, 2022).

An interview with a representative from the Hot or Cool Institute[27] highlighted that redistributive policies need to effectively target the lowest income deciles. At present, a significant part of the policy on climate change in transport is focused on the provision and subsidisation of electric vehicles. However, this can be seen as a misallocation of resources, as public resources redistributed to middle income groups. When it comes to transport, efficient measures targeting transport poverty should focus on people in the lowest deciles and those who do not have a car, thereby addressing the issue of accessibility, rather than solely affordability.

### 4.2.3 WSS

The Water Framework Directive (WFD) was adopted in 2000 to protect water resources throughout the EU by ensuring that all bodies of surface water and groundwater achieve good ecological and chemical status. Article 9 of the WFD requires Member States to implement the principle of recovery of the costs of water services, including financial, environmental and

[26] https://commission.europa.eu/eu-regional-and-urban-development/topics/cities-and-urban-development/priority-themes-eu-cities/air-quality-cities_en

[27] An expert interview was held on 23 September 2024.

resource costs. This provision mandates water pricing mechanisms that promote efficient water use and ensure that users pay the full costs of the services they consume (DG ENV, 2021). More than two decades after its adoption, cost recovery has improved across the EU, although significant challenges remain, particularly for irrigation, environmental costs and the affordability of water services for vulnerable populations (OECD, 2024).

Implementation of the WFD has led to important improvements in water pricing, resulting in better adherence to the polluter pays principle and financial sustainability of water companies, but raising concerns in the context of essential services poverty. In countries where cost recovery has not yet been achieved, the prospect of water tariff increases poses a threat to vulnerable households. OECD (2020a) provides a forward-looking analysis of WSS affordability, simulating the impact of passing on the additional WSS expenditure needed to ensure full cost recovery (excluding environmental and resource costs)[28]. The analysis suggests that about half of the Member States are likely to face affordability issues for at least 5% of the poorest population. Looking at the poorest 10% of households, five or six countries are at risk of affordability issues for this segment (i.e. surpassing the threshold of 3% of disposable income spent on WSS).

To mitigate the risk of water affordability issues, the European Commission recommends ex-ante affordability assessments and the introduction of measures such as social tariffs, which can help alleviate the burden on low-income households (DG ENV, 2021). Member States face rising costs driven by demographic changes, climate impacts, and stricter environmental standards. These increasing pressures raise questions about the viability of full cost recovery in the future, particularly for communities with limited financial capacity (OECD, 2024). To address these challenges, innovative financing mechanisms such as payments for ecosystem services (PES) and EPR offer potential solutions to supplement traditional funding methods and improve equity in water service provision (OECD, 2024).

In addition to the overarching WFD, two so-called daughter directives are pertinent to the issue of affordability and accessibility of WSS: the Drinking Water Directive (DWD) and the Urban Wastewater Treatment Directive (UWWTD). The DWD aims to ensure that drinking water is of high quality and that it is safe for drinking. According to the recast DWD in 2020, Member States are obliged to improve access to safe drinking water for all, particularly vulnerable and marginalised groups (DWD, 2020).

An impact assessment of the recast DWD provides estimates relating to the development of costs for water services according to a baseline scenario (European Commission 2018). In this scenario, the cost of water for households decreases from EUR 229 in 2015 to EUR 228 in 2050 with no visible change in affordability – this is expected to be due to a faster increase in disposable income than the estimated increase in costs of providing water to households. In 2015, water services accounted for an estimated 0.73% of disposable income, on average, while the share for the lowest income quintile was estimated at 1.01%. According to the forecast in that impact assessment, in 2050, the share of costs for water services would exceed 3% of disposable income for the lowest income quintile in Romania only, while Lithuania would fall just below the threshold[29].

The UWWTD ensures access to good quality wastewater treatment services. According to the assessment of UWWTD implementation (DG ENV, 2022), several Member States are not compliant with the Directive: in 2018, about 45 million person-equivalents[30] did not achieve the

[28] Expenditure data are augmented by projected additional level of effort needed to comply with the requirements of the UWWTD and DWD by 2030 as a share of business-as usual scenario (current level of expenditure). Household disposable income is assumed to be constant at 2011-2015 level.

[29] The costs reflect the sum of total annual operating and annualised set-up costs, divided by the population connected to the public water supply and assuming an average 2.4 persons per household based on Eurostat data. Policy packages investigated in the impact assessment would increase the costs of water provided to households by 0.5-4.5%.

[30] The UWWTD establishes this common measure for urban wastewater, which corresponds to 60g of Biological Oxygen Demand (BOD) per day.

secondary treatment required, while about 30 million person-equivalents did not achieve more stringent treatment required by the Directive, normally tertiary treatment. This means that a number of municipalities across the EU do not have access to good quality sanitation services. An evaluation of the UWWTD (European Commission, 2019) concluded that the general affordability of WSS is not at risk in the EU, although in some countries such as Romania and Bulgaria, the burden on the poorest households is higher than in other Member States. It stated that affordability issues are usually solved at national or local level by introducing social tariffs, social quotas or other specific supports.

Revision of the UWWTD is underway and will enlarge its scope to cover all cities with more than 1,000 inhabitants (the current scope covers agglomerations of 2,000+ inhabitants) (EP, 2024). This will increase the cost of compliance, due to the need to construct new wastewater treatment and connection facilities, which, given the WFD's full cost recovery requirement, is likely to add to the burden of costs of WSS to be borne by EU citizens.

An impact assessment accompanying the proposal for a revised UWWTD (European Commission, 2022) assessed affordability. It referred to the OECD (2020a) study and its forecasts, but also pointed to the expected increase in water tariffs by 2040 due to the advanced removal of toxic load from wastewater. For some countries with relatively high costs of such advanced treatment (Cyprus, Denmark, Italy, Malta, Portugal), implementation of the new requirements would lead to an increase in annual water tariffs per inhabitant by 2040 in the range of EUR 1.60 (Cyprus) to EUR 11.30 (Malta). As a result, the share of costs of WSS in disposable income would also increase, implying that in two countries, the population with the lowest 5% income would face WSS costs above the 3% threshold (3.81% of disposable income in Italy; 3.20% in Portugal[31]). According to EurEau, affordability risks are greatest for the lowest income households, particularly in rural areas. WSS tariffs in rural areas can be five times higher than the costs in large towns within the same country. This is due to the technical parameters – in rural areas with lower population density, extensive networks may be needed to provide services to a limited number of recipients[32].

The policies aimed at ensuring adequate access to high quality WSS are effective only if households are connected to the official water and sanitation networks. According to Eurostat data for 2022, in five Member States (Czechia, Hungary, Latvia, Lithuania, Hungary), the rate of connection to the collective wastewater services remains below 85%, despite significant improvement over the last decade (Eurostat 2024). According to the impact assessment of the DWD (European Commission, 2017), the rate of connection to public water services will increase from 95.5% in 2015 to 95.9 in 2050, equivalent to 18.5 million people (taking into account the projected increase in the EU population).

Certain citizens do not have access to public WSS, as the remote location of their homes makes connections to public networks impossible in terms of economic and environmental costs. They typically have private wells for drinking water supply and use individual systems such as septic tanks for the collection of wastewater. The situation is more complex for marginalised groups such as homeless people, certain groups of immigrants, and people without a permanent address (e.g. Roma). For those groups, social policy measures must be developed in cooperation with water operators[33]. While affordability is very important, ensuring equal access for all groups of the society is a critical precondition for reducing water and sanitation poverty in the future.

With growing resource scarcity, drought management is becoming vital in more and more Member States. The WFD encourages countries to consider drought and water scarcity in their water management strategies, while the EU circular economy policies encourage water and

[31] According to the same estimates, the share of WSS costs in disposable income for the 5% poorest population before the implementation of the new requirements would amount to 3.68% in Italy and 3% in Portugal.

[32] Written feedback obtained from EurEau, 3 October 2024.

[33] Written feedback obtained from EurEau, 3 October 2024.

sewage sludge reuse. To date, however, there is no EU directive or policy dedicated to combating drought. In most Member States, drought management plans are integrated into River Basin Management Plans, but without common EU standards or monitoring requirements (GWP CEE, 2020). Measures on water and sewage sludge reuse are somewhat limited by challenges such as negative perception of reclaimed water by potential users and risk of residual contamination in wastewater (IWRA, 2022). This can be a missed opportunity to tackle water and sanitation poverty. For these policies to have a positive impact on reducing water scarcity – and thus affordability of WSS – more efforts are necessary to urge Member States to consider water scarcity an urgent issue and to promote the wider uptake of water reuse as an important measure for efficient water use.

# 5 Conclusions and recommendations

This study shows that essential services poverty exists in the EU. However, it is a complex, multifaceted issue that is not easily measured or tracked. At the same time, global changes are likely to exacerbate essential services poverty, placing the most vulnerable groups in society at greater risk of exclusion.

In this context, several recommendations are proposed for essential services as a whole and specific services.

## 5.1 General recommendations

### 5.1.1 Understanding and measuring essential services poverty

- A common EU definition of essential services poverty should be adopted to aid the understanding of essential services poverty and allow for measurement and comparison across Member States. The inclusion of energy and transport poverty definitions of the SCF can be a good example. Similar definitions could be adopted for the other essential services covered by Principle 20 of the EPSR. The definitions of the different services could then be combined to provide an overall definition of essential services poverty. The definition of essential services poverty linked to the environment developed in this study could be a starting point.
- Common guidelines on measuring essential services poverty should be provided. The literature contains a variety of approaches and thresholds for assessing individual services poverty. While there are advantages and disadvantages of each approach, common guidelines and recommendations on measuring specific service poverty and essential services poverty in general would greatly aid research and policymaking. The guidelines should outline the thresholds (or ranges of thresholds) that can be applied to capture essential services poverty and ensure that the thresholds can capture the combined effect of individual services (e.g. indicating if a household is in poverty after all essential services are paid).
- The collection of relevant data should be improved. In addition to specific data needs for individual services, further data collection is required to gain insights into the distribution of general essential services poverty across different vulnerable groups, with the use of variables such as gender, age, education, type of housing, race/ethnicity, etc. Additional contextual information can improve understanding of the factors influencing essential services poverty and better target policies.
- Data and indicators of specific services or essential services poverty should be harmonised and comparable across sources. There are national and European sources of relevant statistics, as well as different observatories or repositories of information, which do not always report the same data. Clear guidelines (e.g. from Eurostat) would be valuable to ensure consistency of data across sources.
- Further research should look at behavioural aspects of individuals and households, especially the combined access and affordability of all essential services. For example, expenditure can be influenced by households' specific choices, while energy or water bills can be impacted by inefficient use behaviours. Having a better understanding of the decision-making processes behind different choices can help to address 'soft' issues such as energy or water use practices, distinguishing them from deeper and more structural issues such as low income or the absence of social protection.

### 5.1.2 Targeted policy responses to reduce essential services poverty

- Implementation of existing EU policies should be strengthened and improved. Various EU policies have significant potential to improve conditions for vulnerable groups and reduce

specific service or general essential services poverty (e.g. energy efficiency, wastewater treatment, urban mobility), but their implementation should be improved to ensure they deliver on that potential. Delays in implementation not only limit the availability of services but increase costs. Interactions between different policies should be carefully considered to ensure complementarity and avoid conflicts that can hinder positive effects. For instance, the SCF supports vulnerable households, but should be carefully and accurately targeted. This may require local or regional authorities or other relevant stakeholders to collect personal information on individuals and households, which may pose data protection concerns. Clarifying such issues at EU level can help Member States and other actors to implement policies more efficiently.

- Sectoral policies should consider essential services poverty and the megatrends affecting them and take adequate measures to address upcoming challenges. They should also recognise the role of energy, transport, and WSS as services to which all EU citizens are entitled, at an affordable price, rather than as commercial commodities, thus allowing for better consideration of the risks of essential services poverty. Policy responses could usefully consider all essential services (including the services mentioned in Principle 20 of the EPSR but not covered here) as minimum services needed for decent living conditions and aim to ensure that everyone has affordable access to all essential services combined.
- All policy measures should be accompanied by 'soft' measures such as training and awareness-raising to improve their impacts. While providing vulnerable households with access to energy cooperatives, renovated dwellings or efficient appliances, for example, is critical, they should also be supported in their understanding and management of the different services they use. This would help to avoid any rebound effects (e.g. increased energy consumption following reduced energy bills) and ensure long-term understanding and acceptance by stakeholders. This may also be important for recognising the role played by essential services-poor households in the low-carbon transition, albeit not always consciously.
- Essential services poverty should be tackled through a holistic policy approach rather than considered in silos. The growing emphasis on the just transition has strengthened the focus on energy poverty, but this may not be sufficient, as poverty in one essential service often goes hand-in-hand with poverty in access to other essential services. Transport and WSS poverty (as well as access to digital and financial services, in line with Principle 20 of the EPSR) should also be considered. Another important issue is the rising cost of housing, leading to housing affordability crises in different Member States. The twin green and digital transitions can serve as opportunities to address essential services poverty more holistically by designing policies that target access and affordability of essential services as a whole. Reducing resource use and switching to more sustainable sources of energy, transport fuel or efficient water use can reduce costs for consumers, including the most vulnerable groups, while achieving ambitious EGD goals. Considering housing policies more holistically, including renovation for example, can also help to address availability issues.
- The need to reduce essential services poverty is part of the broader policy to tackle poverty, growing inequality and social exclusion. Addressing such issues remains a prerogative of social and fiscal policies, which are decided at national rather than EU level. Finding solutions to underlying problems and preventing the push to cut public expenditures, sometimes at the expense of the most vulnerable members of society, is an important precondition to diminishing the likelihood that people will become poor and lack access to essential services.

## 5.2 Service-specific recommendations

### 5.2.1 Energy

- Specific guidance on the most appropriate measure for energy poverty would be useful. Compared to other essential services, energy poverty is well studied, with multiple indicators, thresholds and approaches developed for its assessment and mentioned in EU documents. Nonetheless, it would be valuable to provide an EU-wide measurement approach and threshold for energy poverty. This could be in the form of ranges for quantitative thresholds and suggestions of how quantitative indicators can be combined with subjective indicators.
- Existing data collection of relevant indicators could be expanded to better capture the evolving energy needs of European households. Examples of relevant indicators that could be developed and collected at EU level (e.g. through EU-SILC) include: whether homes are adequately cool in the summer; whether homes are equipped with air conditioning systems or other cooling technologies; whether households have adequate access to electricity to meet their needs to power appliances, charge batteries of different devices, and provide internet access; whether households are equipped with energy-efficient (e.g. energy grade A) appliances. Such information would be valuable for providing a more complete picture of the issue.
- In light of growing global temperatures, polices in the energy sector should consider cooling needs and the risk of exclusion or inadequate access to cooling services. This may necessitate targeted (re-)consideration of the design of buildings, the use of different building materials and/or energy efficiency measures to address the cooling (as well as heating) needs of European households.
- Policies should also consider energy as a service rather than a commodity. For instance, electricity provision in the EU often focuses on infrastructure without detailed consideration of the possibility for households to actually access and use that electricity (including at an affordable price).
- Measures to facilitate energy cooperatives, improve energy efficiency, or support energy-poor households must be accompanied by awareness-raising and/or training to ensure that policies have long-lasing impacts. For instance, managing a renewable energy cooperative can require specific knowledge of legal or technical requirements, so 'adding' vulnerable consumers to such a structure might not be sufficient without the necessary training and support to allow them to maximise the benefits of their participation.

### 5.2.2 Transport

- Transport should not be measured solely in relation to income, as transport accessibility is a more important measure (if people live in a more remote area without good public transport and do not have a car, they are transport poor even if they do not spend a large portion of their income on transport). When measuring transport poverty in relation to income it could be useful to have a measure that captures transport and housing expenditure (e.g. 30% on both, where 20% of income is spent on housing and 10% on transport). This could capture people who substitute one for the other, i.e. living further away and having a car to save on housing expenses or living in city centres where they do not need a car, but spend more on housing.
- Data on suppressed travel demand (as an indicator of transport poverty) and access to public transport and/or a personal vehicle should be collected regularly at EU level. There is a need to start collecting data on access to public transport as a precondition for accessing other essential services and goods, including green areas, schools, employment, hospitals. It is also vital to consider time poverty and whether people are able to access essential services and goods within a reasonable time, safely and comfortably.

- Discussion of the green transition in the transport sector should not only focus on EVs but on rethinking public transport systems. Focusing on EVs and the automotive sector keeps the focus on cars/personal vehicles (mostly relevant to higher income groups) and, especially for EVs, on more capital-intensive production (not always environmentally sustainable). A broader definition of the green transition is needed to capture sustainability options other than EVs. For example, road space reallocation would require thinking about spatial planning, space organisation and urban sprawl. As current construction practices continue, people become more car-dependent and policies continue to accommodate car-ownership or address environmental challenges (e.g. through carbon taxes that disproportionately affect poorer groups of society).
- Given the emerging challenges across the EU in the transport sector, the needs of older people, persons with reduced mobility and other vulnerable groups should be considered in the design of public transport system to ensure that all people can use public transport.

### 5.2.3 WSS

- Sufficient funding is needed to cover the investment needs to reach compliance with EU and national environmental legislation in the water sector. EU funding (in particular, cohesion policy funds, not only in a form of grants but a variety of financial instruments) can be used for this purpose, in combination with other sources of funding and water tariffs.
- A long-term water resilience strategy is needed to ensure that WSS will have access to sufficient water resources for future generations.
- Legislation should be implemented to prevent pollution at source and keep water treatment costs low. Additionally, the polluter pays principle should be implemented to ensure that private households do not have to bear the costs of removing pollutants from water, where that pollution cannot be controlled at source.
- Water scarcity challenges should be addressed through more widespread use of water reuse and sewage sludge management solutions, as well as behavioural change and awareness-raising. Clear standards for reused water and sewage sludge could help to raise social acceptance for such measures. Wider use of water-saving measures and recycled water or water obtained through desalination, etc. could reduce freshwater consumption and alleviate WSS poverty.

# Annex 1: References


Alonso-Epelde, E., García-Muros, X. and González-Eguino, M. (2023) 'Transport poverty indicators: A new framework based on the household budget survey', *Energy Policy*, 181, p. 113692. DOI: 10.1016/j.enpol.2023.113692.

Bajomi, A. (2023) 'EU ETS extension could have devastating impact on low-income households'. Available at: https://www.euractiv.com/section/emissions-trading-scheme/opinion/eu-ets-extension-could-have-devastating-impact-on-low-income-households/ (Accessed 11 October 2024).

Bell-Pasht, A. (2024) 'Combined Energy Burdens: Estimating Total Home and Transportation Energy Burdens', ACEEE Topic Brief. Available at: https://www.aceee.org/topic-brief/2024/05/combined-energy-burdens-estimating-total-home-and-transportation-energy-burdens#:~:text=Combined%20energy%20burdens%20include%20both,over%20half%20of%20this%20spending (accessed 8 August 2024).

Bouzarovski, S. and Tirado-Herrero, S. (2017) 'The energy divide: Integrating energy transitions, regional inequalities and poverty trends in the European Union', *European Urban and Regional Studies*, 24(I), pp.69-86. DOI: 10.1177/0969776415596449.

Castaño-Rosa, R. et al (2019) 'Towards a multiple-indicator approach to energy poverty in the European Union: A review', *Energy and Buildings*, 193, pp. 36-48. https://doi.org/10.1016/j.enbuild.2019.03.039.

City of Amsterdam (2024) Waste collection tax. https://www.amsterdam.nl/en/municipal-taxes/waste-collection-charge/

CIVITAS (2016) 'Thematic Policy Note: Transport Poverty'. Published on 4 October 2016. Available at: https://civitas.eu/resources/civitas-thematic-policy-note-transport-poverty-0 (accessed 18 August 2024).

Dobbins, A. And Pye, S. (2016) 'Member State level regulation related to energy poverty and vulnerable consumers' in Csiba, K., Bajomi, A. and Gosztonyi, A. (eds.) (2016) *Energy Poverty Handbook*, Brussels, The Greens/EFA group in the European Parliament. Available at: https://www.bpie.eu/wp-content/uploads/2016/11/energypovertyhandbook-online.pdf (accessed 8 August 2024).

DWD (2020) Directive (EU) 2020/2184 of the European Parliament and of the Council of 16 December 2020 on the quality of water intended for human consumption (recast), Official Journal of the European Union, L 435/1, https://eur-lex.europa.eu/eli/dir/2020/2184/oj

European Parliament, Legislative Observatory, Urban wastewater treatment. Recast. https://oeil.secure.europarl.europa.eu/oeil/popups/ficheprocedure.do?reference=2022/0345(COD)&l=en

Eurostat (2024) Population connected to wastewater treatment plants, https://ec.europa.eu/eurostat/databrowser/view/env_ww_con$defaultview/default/table?lang=en

Estupiñán, N., Gómez-Lobo, A., Muñoz-Raskin, R., & Serebrisky, T. (2007) *Affordability and subsidies in public urban transport: What do we mean, what can be done?* Policy Research Working Paper 4440. Washington, D.C.: The World Bank, Latin America and the Caribbean Region, Sustainable Development Department. Available at: https://www.researchgate.net/publication/23550440

Essex, B. et al (2020) Proposal for a National Blueprint Framework to Monitor Progress on Water-Related Sustainable Development Goals in Europe. https://link.springer.com/article/10.1007/s00267-019-01231-1

European Commission (2017) Commission Staff Working Document, Impact Assessment accompanying the document Proposal for a Directive of the European Parliament and of the Council on the quality of water intended for human consumption (recast), SWD(2017) 449 final.

European Commission (2019) Commission Staff Working Document, Evaluation of the Council Directive 91/271/EEC of 21 May 1991, concerning urban waste-water treatment, SWD(1019) 700 final.

European Commission (2020a) 'Transport and the Green Deal'. Factsheet. Available at: https://ec.europa.eu/commission/presscorner/detail/en/fs_20_2350 (Accessed 19 August 2024).

European Commission (2020b) 'How many people can you reach by public transport, bicycle or on foot in European cities? Measuring urban accessibility for low-carbon modes'. Luxembourg: Publications Office of the European Union. Available at: http://www.europa.eu (accessed 18 September 2024). DOI: 10.2776/021137.

European Commission (2021) Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: The New EU Urban Mobility Framework. COM(2021) 811 final.

European Commission (2022) Commission Staff Working Document, Impact Assessment accompanying the document Proposal for a Directive of the European Parliament and of the Council concerning urban wastewater treatment (recast), SWD(2022) 541 final.

European Commission (2023a) COMMISSION RECOMMENDATION (EU) 2023/2407 of 20 October 2023 on energy poverty, C/2023/4080.

European Commission (2023b) COMMISSION STAFF WORKING DOCUMENT EU guidance on energy poverty, SWD(2023) 647 final.

European Commission (2024) 'Desalination'. Blue Economy Observatory. Available at: https://blue-economy-observatory.ec.europa.eu/eu-blue-economy-sectors/desalination_en (accessed 18 August 2024).

European Commission, Competence Centre on Foresight (2023) 'Who can afford the digital and green transition?'. Available at: https://knowledge4policy.ec.europa.eu/foresight/who-can-afford-digital-green-transition_en (accessed 18 August 2024).

European Commission, Directorate-General for Climate Action (2021) Commission staff working document impact assessment part 1 accompanying the document proposal for a regulation of the European Parliament and of the Council amending Regulation (EU) 2019/631 as regards strengthening the CO2 emission performance standards for new passenger cars and new light commercial vehicles in line with the Union's increased climate ambition. SWD(2021) 613 final, 14 July.

European Commission, Directorate-General for Climate Action. (2024) 'Commission staff working document: impact assessment report, Part 1. Accompanying the document Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: Securing our future – Europe's 2040 climate target and path to climate neutrality by 2050, building a sustainable, just and prosperous society'. SWD(2024) 63.

European Commission, Directorate-General for Communication, (2022) *Green paper on ageing*. Publications Office of the European Union. https://data.europa.eu/doi/10.2775/785789

European Commission, Directorate-General for Employment, Social Affairs and

Inclusion, Fulvimari, A., Temursho, U., Vaitkeviciute, A. et al. (2023a) *Economic and distributional effects of higher energy prices on households in the EU*, Luxembourg, Publications Office of the European Union. https://data.europa.eu/doi/10.2767/49251.

European Commission: Directorate-General for Employment, Social Affairs and Inclusion, Hassan, E., Neumann, T., Siöland, L., Akbaba, B. et al. (2023b), *Access to essential services – Evidence from EU Member States – Final synthesis report*, Luxembourg, Publications Office of the European Union, https://data.europa.eu/doi/10.2767/44461.

European Commission, Directorate-General for Energy (2020a), *Member State reports on energy poverty 2019*. Available at: https://op.europa.eu/en/publication-detail/-/publication/b9a25ba4-9ef6-11ea-9d2d-01aa75ed71a1/language-en (accessed 7 August 2024).

European Commission, Directorate-General for Energy, Bouzarovski, S., Thomson, H., Cornelis, M. et al. (2020b) *Towards an inclusive energy transition in the European Union – Confronting energy poverty amidst a global crisis*, Luxembourg, Publications Office of the European Union. https://data.europa.eu/doi/10.2833/103649.

European Commission, Directorate-General for Energy (2021a) Commission staff working document impact assessment report accompanying the proposal for a directive of the European Parliament and of the Council on the energy performance of buildings (recast). SWD(2021) 453 final.

European Commission, Directorate-General for Energy (2021b) Commission staff working document impact assessment report accompanying the proposal for a directive of the European Parliament and the Council amending Directive (EU) 2018/2001 of the European Parliament and of the Council, Regulation (EU) 2018/1999 of the European Parliament and of the Council and Directive 98/70/EC of the European Parliament and of the Council as regards the promotion of energy from renewable sources, and repealing Council Directive (EU) 2015/652. SWD(2021) 621 final.

European Commission, Directorate-General for Energy, Bacquet, A., Galindo Fernández, M., Oger, A. et al. (2022) District heating and cooling in the European Union : overview of markets and regulatory frameworks under the revised Renewable Energy Directive. Annexes 6 and 7 : final version. Publications Office of the European Union. https://data.europa.eu/doi/10.2833/96390

European Commission, Directorate-General for Environment (2021) 'Economic data related to the implementation of the WFD and the FD and the financing of measures' Final Report. Publications Office. https://data.europa.eu/doi/10.2779/163850

European Commission, Directorate-General for Environment (2022) 11th Technical assessment on UWWTD implementation. Available at: https://environment.ec.europa.eu/topics/water/urban-wastewater/implementation-reports_en.

European Commission, Directorate-General for Mobility and Transport (2021a) Commission staff working document impact assessment accompanying the proposal for a regulation of the European Parliament and of the Council on the deployment of alternative fuels infrastructure, and repealing Directive 2014/94/EU of the European Parliament and of the Council. SWD(2021) 631 final.

European Commission, Directorate-General for Mobility and Transport (2021b) *Mobility Strategy and Action Plan*. Available at: https://transport.ec.europa.eu/transport-themes/mobility-strategy_en

European Commission, Joint Research Centre (2020) *Developments and Forecasts on Continuing Urbanisation*. Knowledge for Policy - Competence Centre on Foresight. Available at: https://knowledge4policy.ec.europa.eu/foresight/topic/continuing-urbanisation/developments-and-forecasts-on-continuing-urbanisation_en (Accessed 16

September 2024).

European Commission, Joint Research Centre (2024) *Raw Materials Information System (RMIS)*. Available at: https://rmis.jrc.ec.europa.eu/

European Energy Network (2019) *EnR Position Paper on Energy Poverty in the European Union*. Available at: https://enr-network.org/wp-content/uploads/ENERGYPOVERTY-EnRPositionPaper-Energypoverty-Jan-2019.pdf (accessed 7 August 2024).

European Environment Agency (EEA) (2015) European environment — state and outlook 2015: Assessment of global megatrends. *Publications Office of the European Union*, Luxembourg.

European Environment Agency (EEA) (2016) 'Municipal waste management across European countries'. Available at: https://www.eea.europa.eu/publications/municipal-waste-management-across-european-countries/copy_of_municipal-waste-management-across-european-countries (Accessed 18 August 2024).

European Environment Agency (2019) 'The European environment — state and outlook 2020: Knowledge for transition to a sustainable Europe'. Luxembourg: Publications Office of the European Union. Available at: https://www.eea.europa.eu (accessed 18 August 2024).

European Environment Agency (2022a) Cooling buildings sustainably in Europe: exploring the links between climate change mitigation and adaptation, and their social impacts, Briefing. Available at: https://www.eea.europa.eu/publications/cooling-buildings-sustainably-in-europe/cooling-buildings-sustainably-in-europe (accessed 4 October 2024).

European Environment Agency (2022b), Early warning assessment related to the 2025 targets for municipal waste and packaging waste: the Netherlands. https://www.eea.europa.eu/publications/many-eu-member-states/early-warning-assessment-related-to

European Environment Agency (2023) 'New registrations of electric vehicles in Europe'. Available at: https://www.eea.europa.eu/en/analysis/indicators/new-registrations-of-electric-vehicles#:~:text=Totalling%20close%20to%20two%20million,of%20new%20registrations%20in%202022 (accessed 12 October 2023).

European Environment Agency, Cabrita, J., & Quefelec, S. (2021). Exploring the social challenges of low carbon energy policies in Europe. BRIEFING no. 11/2021. Available at: https://www.eea.europa.eu/publications/exploring-the-social-challenges-of

European Environment Agency (EEA) and Eurofound (2021) 'Exploring the social challenges of low-carbon energy policies in Europe'. Briefing No. 11/2021. Available at: https://www.eea.europa.eu/download (Accessed: 13 October 2024).

Eurostat (2021) Glossary: Disposable income. Available at: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Glossary:Disposable_income

Falavigna, C. and Hernandez, D. (2016) 'Assessing inequalities on public transport affordability in two Latin American cities: Montevideo (Uruguay) and Córdoba (Argentina)', *Transport Policy*, vol. 45, pp. 145-155.

Farnault, A. and Leflaive, X. (2024) 'Cost recovery for water services under the Water Framework Directive', *OECD Environment Working Papers*, No. 240. Paris: OECD Publishing. Available at: https://doi.org/10.1787/e2a363e3-en.

Fleischmann, J., Schaufuss, P., Linder, M., Hanicke, M., Horetsky, E., Ibrahim, D., Jautelat, S., Torscht, L. and van de Rijt, A. (2023) 'Battery 2030: Resilient, sustainable, and circular'. McKinsey & Company. Available at: https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/battery-2030-

resilient-sustainable-and-circular (accessed 18 August 2024).

French NECP updated June 2024, English translation available at:

https://commission.europa.eu/document/download/ab4e488b-2ae9-477f-b509-bbc194154a30_en?filename=FRANCE%20–%20FINAL%20UPDATED%20NECP%202021-2030%20%28English%29.pdf (accessed 17 September 2024).

García-Valiñas, M. et al. (2010) Measuring Water Affordability: A Proposal for Urban Centres in Developed Countries. https://www.researchgate.net/publication/240531191_Measuring_Water_Affordability_A_Proposal_for_Urban_Centres_in_Developed_Countries

Gomide, A., Leite, S. and Rebelo, J. (2004) 'Public transport and urban poverty: a synthetic index of adequate service', *The World Bank Urban Transport Program in Brazil*. Washington, D.C.: The World Bank.

Gouveia, J.P.,Palma, P. and Simoes, S.G. (2019) 'Energy poverty vulnerability index: A multidimensional tool to identify hotspots for local action', *Energy Reports*, 5, pp. 187-201. https://doi.org/10.1016/j.egyr.2018.12.004.

Global Water Partnership (GWP) Central and Eastern Europe (2020), Revision of the policy instruments and their potential to contribute to EU droughts and water scarcity policies. https://www.gwp.org/en/GWP-CEE/WE-ACT/news/2020/revision-of-the-eu-policy-instruments-related-to-drought-and-water-scarcity-mitigation/

Halkos, G.E. and Gkampoura, E.C. (2021) 'Coping with Energy Poverty: Measurements, Drivers, Impacts, and Solutions', *Energies*, 14(2807). https://doi.org/10.3390/en14102807.

IEA (2022) *World Energy Outlook 2022*. Paris: International Energy Agency. Available at: https://www.iea.org/reports/world-energy-outlook-2022. Licence: CC BY 4.0 (report); CC BY NC SA 4.0 (Annex A).

IEEP (2022) *Can Polluter Pays policies in the buildings and transport sectors be progressive? Assessing the distributional impacts on households of the proposed reform of the Energy Taxation Directive and extension of the Emissions Trading Scheme*. Institute for European Environmental Policy.

Kiss, M. (2022) *Understanding transport poverty*. EPRS | European Parliamentary Research Service, PE 738.181.

Kitous, A. & Després, J., 2018. *Assessment of the impact of climate change on residential energy demand for heating and cooling*. EUR 29084 EN, Publications Office of the European Union, Luxembourg. doi:10.2760/96778.

International Water Resources Association (2022) Water Reuse and Water Quality Challenges/barriers. Policy Brief No 20, February 2022. https://www.iwra.org/wp-content/uploads/2022/02/PB-20-january-2022-ok.pdf

LIFE Unify (2020) *Tackling energy poverty through National Energy and Climate Plans: Priority or empty promise?* Available at: https://caneurope.org/content/uploads/2021/01/Energy-poverty-report-_FInal_December-2020.pdf (accessed 8 August 2024).

Lowans, C., Furszyfer Del Rio, D., Sovacool, B.K., Rooney, D., and Foley, A.M. (2021) 'What is the state of the art in energy and transport poverty metrics? A critical and comprehensive review', *Energy Economics*, vol. 101. DOI: 10.1016/j.eneco.2021.105360.

Lovelace, R. & Philips, I. (2014) 'The "oil vulnerability" of commuter patterns: A case study from Yorkshire and the Humber, UK', *Geoforum*, 51, pp. 169-182. doi: 10.1016/j.geoforum.2013.11.005.

Lucas, K., Mattioli, G., Verlinghieri, E. and Guzman, A. (2016) 'Transport poverty and its

adverse social consequences', *Proceedings of the Institution of Civil Engineers - Transport*, 169(6), pp. 353-365. DOI: 10.1680/jtran.15.00073.

Martins, R et al. (2016) Water affordability issues in developed countries – The relevance of micro approaches. https://www.sciencedirect.com/science/article/abs/pii/S0957178715301119

Mattioli, G., Lucas, K. and Marsden, G. (2017) 'Transport poverty and fuel poverty in the UK: From analogy to comparison', *Transport Policy*, 59, pp. 93-105.

Mattioli, G. (2021) 'Transport poverty and car dependence: a European perspective', in Pereira, R.H. and Boisjoly, G. (eds.) *Social Issues in Transport Planning*. Elsevier.

Menyhert, B. (2024) Absolute poverty measurement with minimum food needs: A new inverse method for advanced economies. Social Indicators Research, pp.1-39.

Miniaci, R., Scarpa, C., Valbonesi, P. (2008) "Measuring The Affordability Of Basic Public Utility Services In Italy," Giornale degli Economisti, GDE (Giornale degli Economisti e Annali di Economia), Bocconi University, vol. 67(2), pages 185-230, July. https://ideas.repec.org/a/gde/journl/gde_v67_n2_p185-230.html

OECD (2019) Waste Management and the Circular Economy in Selected OECD Countries: Evidence from Environmental Performance Reviews. *OECD Environmental Performance Reviews*. OECD Publishing, Paris. Available at: https://doi.org/10.1787/9789264309395-en (Accessed 17 August 2024).

OECD (2020a) Financing Water Supply, Sanitation and Flood Protection. Challenges in EU Member States and Policy Options. OECD Studies on Water. https://www.oecd.org/en/publications/financing-water-supply-sanitation-and-flood-protection_6893cdac-en.html

OECD (2020b) Addressing the social consequences of tariffs for water supply and sanitation. https://www.oecd.org/en/publications/addressing-the-social-consequences-of-tariffs-for-water-supply-and-sanitation_afede7d6-en.html

OECD (2024) Cost recovery for water services under the Water Framework Directive. https://www.oecd.org/en/publications/cost-recovery-for-water-services-under-the-water-framework-directive_e2a363e3-en.html

Official Journal of Poland (2024) Act of 13 September 1996 on keeping cleanness and order in municipalities, with further amendments. https://isap.sejm.gov.pl/isap.nsf/DocDetails.xsp?id=WDU19961320622

OpenExp (2019) *European Energy Poverty Index: Assessing Member States' progress in alleviating the domestic and transport energy poverty nexus*. Available at: https://www.openexp.eu/sites/default/files/publication/files/european_energy_poverty_index-eepi_en.pdf (accessed 7 August 2024).

Palma, P. et al. (2024) 'Comparative analysis of energy poverty definition and measurement in Portugal and Spain', *Utilities Policy*, 90 (101770). https://doi.org/10.1016/j.jup.2024.101770.

Panetta, F., 2022. Greener and cheaper: could the transition away from fossil fuels generate a divine coincidence? Speech at the Italian Banking Association, Rome, 16 November 2022. Available at: https://www.ecb.europa.eu/press/key/date/2022/html/ecb.sp221116~c1d5160785.en.html [accessed 25 October 2024].

Pérez-Peña, M.D.C., Jiménez-García, M., Ruiz-Chico, J. and Peña-Sánchez, A.R. (2021) 'Transport poverty with special reference to sustainability: A systematic review of the literature', *Sustainability*, 13(3), p. 1451.

RAC Foundation (2012) *Transport poverty*. Available at: https://www.racfoundation.org/media-centre/transport-poverty (Accessed: 18 September 2024).

Rademaekers, K. et al. (2016), *Selecting Indicators to Measure Energy Poverty*, Final report. Available at: https://www.researchgate.net/publication/303446588_Selecting_Indicators_to_Measure_Energy_Poverty (accessed 7 August 2024).

Raitano, M. et al. (2021) Fighting poverty and social exclusion. Publication for the committee on Employment and Social Affairs, Policy Department for Economic, Scientific and Quality of Life Policies, European Parliament, Luxembourg.

Ravallion, M. (2010) Poverty Lines across the World, World Bank Policy Research Working Paper 5284.

Regulation (EU) 2023/955 of the European Parliament and of the Council of 10 May 2023 establishing a Social Climate Fund and amending Regulation (EU) 2021/1061. *Official Journal of the European Union*.

Snell, C. (2016) 'Definitions and indicators of energy poverty across the EU' in Csiba, K., Bajomi, A. and Gosztonyi, A. (eds.) (2016) *Energy Poverty Handbook*, Brussels, The Greens/EFA group in the European Parliament. Available at: https://www.bpie.eu/wp-content/uploads/2016/11/energypovertyhandbook-online.pdf (accessed 8 August 2024).

Thomson H., Bouzarovski S., and Snell C. (2017) 'Rethinking the measurement of energy poverty in Europe: A critical analysis of indicators and data', *Indoor and Built Environment*, 26(7), pp.879-901. DOI: 10.1177/1420326X17699260.

Temursho, U., Weitzel, M. and Vandyck, T. (2020) 'Distributional impacts of reaching ambitious near-term climate targets across households with heterogeneous consumption patterns'. EUR 30368 EN. Luxembourg: Publications Office of the European Union. ISBN 978-92-76-21604-9. doi:10.2760/89463.

UNESCO and UN-Water (2020) 'United Nations World Water Development Report 2020: Water and Climate Change'. Paris: UNESCO. ISBN 978-92-3-100371-4. Available at: https://www.unwater.org/publications/un-world-water-development-report-2020 (Accessed: 18 August 2024).

Vanhille, J et al. (2018) Measuring water affordability in developed economies. The added value of a needs-based approach. https://www.sciencedirect.com/science/article/abs/pii/S0301479718303396

Venter, C. and Behrens, R. (2005) 'Transport expenditure: is the 10% policy benchmark appropriate?', in *Proceedings of the 24th Southern African Transport Conference (SATC 2005)*, Pretoria, South Africa, July.

Vesnic Alujevic, L., Muench, S. and Stoermer, E. (2023) 'Reference foresight scenarios: Scenarios on the global standing of the EU in 2040'. Luxembourg: Publications Office of the European Union. doi:10.2760/490501, JRC132943.

Zimmermann, A. (2023) 'Europe's battle over clean air is coming for its streets', *Politico*, 19 October. Available at: https://www.politico.eu/article/clean-air-pollution-eu-quality-guidelines-transport-exhaust-emission-mission-impossible-european-union-cities/ (accessed 18 August 2024).

# Annex 2: Definitions of essential services poverty

## Energy

**Table 1 Overview of approaches and thresholds to measure energy poverty in the literature**

| Approach and possible thresholds | Issues to consider | Possible data sources for indicators | References |
|---|---|---|---|
| **Expenditure approach** | | | |
| Expenditure approach - ratio of household income to energy expenditure. | Energy costs can be quantified using theoretical spend or actual spend. The former is generally preferred, as the latter entails a potential bias of household decisions. | Eurostat Household Budget Survey (HBS)<br>Data can be used to calculate energy burden | Bouzarovski and Tirado-Herrero (2015); Thomson, Bouzarovski, and Snell (2017); Halkos and Gkampoura (2021). |
| Examples of thresholds:<br>■ 10% of income:<br>▪ household is considered energy poor if it spends more than 10% of income on energy;<br>▪ if the total residential energy budget share (REBS) (i.e. the sum of budget shares on electricity, natural gas, liquid fuels for heating like heating oil, solid fuels for heating like coal or wood, and district heating) exceeds 10%. | | | Thomson and Snell (2016); Thomson, Bouzarovski, and Snell (2017); Halkos and Gkampoura (2021); European Commission, DG EMPL, Fulvimari, A., Temursho, U., Vaitkeviciute, A. et al (2023). |
| ■ Above the median share or LIHC or AFCP - a household's energy expenditures are above the national median (as % of income) and if its income, after energy costs, is below the poverty line (usually 60% median income) or other acceptable level. | | | Rademaekers et al (2016); Thomson and Snell (2016); Castano-Rosa et al (2019); Halkos and Gkampoura (2021); European Commission, DG EMPL, Fulvimari, A., Temursho, U., Vaitkeviciute, A. et al (2023). |
| ■ Low absolute energy expenditure or HEP - share of households whose absolute energy expenditure is below half the national median energy spending. | | | European Energy Network (2019); LIFE Unify (2020); European Commission, Directorate-General for Energy, Bouzarovski, S., Thomson, H., Cornelis, M. et al. (2020). |
| ■ Twice the national median 2M:<br>▪ household's energy expenditure is above the national median multiplied by two (as % of income or in euro);<br>▪ proportion of households whose share of energy expenditure in income is more than twice the national median share. | | | Rademaekers et al (2016); European Energy Network (2019); LIFE Unify (2020); European Commission, Directorate-General for Energy, Bouzarovski, S., Thomson, H., Cornelis, M. et al. (2020); Halkos and Gkampoura (2021). |
| ■ Minimum Income Standard or MIS - if a household's income is lower than the minimum income necessary for someone's integration in society or if a household's income is lower than the necessary energy and housing costs. | | | Castano-Rosa et al (2019) Halkos and Gkampoura (2021). |

| Approach and possible thresholds | Issues to consider | Possible data sources for indicators | References |
|---|---|---|---|
| ■ United States (US) measurement - combined energy burdens (i.e. householder spending on electricity, natural gas, delivered fuels or wood) are considered high if they exceed 12% of household income, and severe if they exceed 20%. | | | Bell-Pasht (2024). |
| **Consensual approach** | | | |
| Using self-reported 'consensual' indicators of comfort and/or housing conditions.<br><br>Usually, energy poverty is declared if a household considers it cannot keep its home adequately warm. | Typically, this involves asking households direct questions, which means the resulting indicators can be subjective. Data collection can be time-consuming. It is important to consider various elements such as energy efficiency conditions of the households, ability to provide basic services and go beyond mere consideration of 'warmth'. | EU-SILC<br><br>Example indicators:<br>■ Ability to pay to keep the home adequately warm;<br>■ Being in arrears on utility bills;<br>■ Leaking roof, damp walls/floors/foundation, or rot in window frames or floor.<br>■ Dwelling comfortably warm during winter time;<br>■ Dwelling equipped with heating facilities;<br>■ Dwelling comfortably cool during summer time;<br>■ Dwelling equipped with air conditioning facilities. | Thomson and Snell (2016); Thomson, Bouzarovski, and Snell (2017); European Energy Network (2019); LIFE Unify (2020); European Commission, Directorate-General for Energy, Bouzarovski, S., Thomson, H., Cornelis, M. et al. (2020); Halkos and Gkampoura (2021). |

**Table 2 Examples of national definitions and thresholds for energy poverty**

| Examples of European countries that have established official or unofficial definitions or indicators with quantitative thresholds |
|---|
| ■ France: a 2010 law defines energy poverty as 'a person who has particular difficulties in obtaining the energy supply necessary to meet his or her basic needs because of the inadequacy of his or her resources or housing conditions'. This is supported by two indicators:<br>▪ Energy effort rate - a household is in energy poverty when 'its energy expenditure in the household exceeds 8% of its income, and its income per consumption unit (UC) is less than 3 decimal places per unit of income';<br>▪ Feeling cold - a household is in energy poverty if it declares (as part of Energie-info barometer carried out by the National Energy Ombudsman) that 'it feels cold according to at least one of the following five reasons: poor insulation, insufficient heating installation, failure of heating, limitation of heating due to cost, energy cut due to unpaid bill' (French NECP, 2024).<br>■ Hungary: a definition of energy poverty 'based on the share of households that spend more than 25% of their income on energy' was included in its 2019 NECP (LIFE Unify, 2020). |

| Examples of European countries that have established official or unofficial definitions or indicators with quantitative thresholds |
|---|
| ■ UK: household is in fuel poverty 'if it needs to spend more than 10% of its income on fuel to maintain an adequate level of warmth' (Thomson and Snell, 2016) or if it 'required fuel costs that are above average (the national median level) and having spent that amount hence they would be left with a residual income below the official poverty line [60% median income]' (Castano-Rosa et al, 2019).<br>■ Ireland: household is energy poor if it 'spends more than 10% of their income on energy' (Thomson and Snell, 2016).<br>■ Italy: unofficial definition states that 'a family is vulnerable when more than 5% of income is spent for electricity and 10% for gas' (Dobbins and Pye, 2016).<br>■ Definitions without quantitative metrics – Cyprus and Slovakia, for instance, have official energy poverty definitions that do not consider quantitative thresholds (Castano-Rosa et al, 2019), while Malta and Austria have unofficial definitions without quantitative metrics (Dobbins and Pye, 2016). |

## Transport

**Table 3 Overview of approaches and thresholds to measure transport poverty in the literature**

| Approach and possible thresholds | Issues to consider | Possible data sources for indicators | References |
|---|---|---|---|
| **Expenditure approach** | | | |
| Expenditure approach - the ratio of household income to energy expenditure. | Similar to energy costs, transport costs can be quantified using theoretical spend or actual spend. The former is generally preferred, as the latter entails a potential bias of household decisions. | Eurostat Household Budget Survey (HBS)<br>EU SILC | Falavigna and Hernandez (2016)<br>Alonso-Epelde, E., García-Muros, X., & González-Eguino, M. (2023)<br>Mattioli, G., Lucas, K., & Marsden, G. (2017).<br>RAC Foundation (2012) |
| Examples of thresholds:<br>■ 10% of expenditure:<br>▪ - Household is deemed transport-vulnerable if it allocates more than 10% of its total spending to cover its transport needs. This encompasses expenses for both private vehicle use and short to medium-distance public transport services (trains, flights and holiday transport expenditures are generally excluded).<br>■ 6% of expenditure on fuel expenses<br>▪ - Household is deemed transport-poor if it allocates more than 6% of its total expenditure on fuel expenses. This measure excludes public transport use, and focuses on car-owning households. | | | Alonso-Epelde, E., García-Muros, X., & González-Eguino, M. (2023).<br>RAC Foundation (2012)<br>European Commission (2023)<br>Mattioli, G., Lucas, K., & Marsden, G. (2017). |
| ■ 10% of income<br>■ Household is deemed transport-vulnerable if it allocates more than 10% of its income to cover its transportation needs. This encompasses expenses for both private vehicle use and short to medium-distance public transport services (trains, flights and holiday transport expenditures are generally excluded). | | | Lovelace and Philips (2014).<br>Falavigna and Hernandez (2016) |

| Approach and possible thresholds | Issues to consider | Possible data sources for indicators | References |
|---|---|---|---|
| ▪ Combined indicator measuring car-related economic stress<br>▪ Households with equivalised income after housing and running motor vehicle costs below 60% of the median.<br>▪ Percentage of income spent on running motor vehicles is more than twice the national median.<br>▪ Construction: combines both income and expenditure criteria to identify households under economic stress due to car ownership. | | | Mattioli, G., Lucas, K., Marsden, G (2017)<br>Lowans, C., Furszyfer Del Rio, D., Sovacool, B. K., Rooney, D., & Foley, A. M. (2021). |
| ▪ LIHC<br>▪ Household is classed as vulnerable to transport poverty if its disposable income, after subtracting housing and transport costs, is below the poverty threshold) and if it spends more than the median on transportation. This measure accounts for households that are not only spending a lot on transport but are also poor after accounting for their transport and housing expenses. | | | Alonso-Epelde, García-Muros, and González-Eguino (2023) |
| ▪ 2M:<br>▪ Household is classified as transport-vulnerable if its spending on transportation exceeds twice the national median expenditure. This indicates that these households allocate a disproportionately large portion of their budget to maintain necessary mobility. The median expenditure is determined using data from households that incur transport expenses, excluding those that do not. | | | Alonso-Epelde, García-Muros, and González-Eguino (2023) |
| ▪ Forced car ownership:<br>▪ Households that possess at least one car and experience challenges in paying for essential expenses such as rent, mortgage, home maintenance, utility bills, and food. It underscores the financial strain of car ownership, particularly when owning a car is a necessity rather than an option. | | | Mattioli (2017) |
| ▪ Potential Affordability Index (AffP):<br>▪ Corrected measure that accounts for suppressed travel demand, representing the expenditure required for low-income households to achieve the same motorised trip rates as middle-income households. | | | Falavigna, and Hernandez (2016) |
| ▪ US measurement - combined energy burdens and transportation fuel costs (i.e. householder spending on electricity, natural gas, delivered fuels or wood) are considered high if they exceed 12% of household income, and severe if they exceed 20%. | | | ACEEE (2024). |
| **Accessibility approach** | | | |
| Accessibility approach – evaluates transport poverty based on how easily households can access essential services such as employment, education, healthcare, and shopping. A household is considered transport-poor if it has limited access to these services due to inadequate transportation options. | | Urban Accessibility Framework by the European Commission, OECD, and International Transport Forum (ITF),<br>Open Street Map (OSM),<br>High-Resolution Geospatial Data on population and employment distribution,<br>Public Transport Timetables,<br>EU-OECD Functional Urban Area | Civitas (2016)<br>Lucas, K., Mattioli, G., Verlinghieri, E. and Guzman, A. (2016)<br>European Commission (2020)<br>Pérez-Peña et al., (2021) |

| Approach and possible thresholds | Issues to consider | Possible data sources for indicators | References |
|---|---|---|---|
| | | Definition<br>Annually updated population grids available for Europe from 2024.<br>Eurostat – Passenger mobility statistics | |
| ■ Access to public transport stops:<br>▪ Proportion of the population with access to a public transport stop within 500 metres walking distance. | | | European Commission (2020b) |
| ■ Frequency of public transport:<br>▪ Number of departures per hour from public transport stops, categorised into high, medium, and low frequency. | | | European Commission (2020b) |
| ■ Accessibility by public transport:<br>▪ Number of people that can be reached within a specified travel time (e.g. 30 or 45 minutes) by public transport from a given location. | | | European Commission (2020b) |
| ■ Performance and proximity:<br>▪ Ratio of the number of people accessible within a maximum travel time to the number of people living within a specified distance from the point of departure. This indicator evaluates how well the public transport network performs relative to the spatial distribution of the population. | | | European Commission (2020b) |
| ■ Accessibility of key services:<br>▪ Examines how transport access affects ability to reach essential services, especially for those without cars. | | | Civitas (2016)<br>Lucas, K., Mattioli, G., Verlinghieri, E. and Guzman, A. (2016)<br>Pérez-Peña et al., 2021 |
| ■ Time spent travelling | | | Kiss (2022)<br>Pérez-Peña et al., 2021 |
| ■ Transport conditions<br>▪ Safety and adequacy of available transport | | | Kiss (2022)<br>Pérez-Peña et al., 2021 |
| **Consensual approach** | | | |
| These indicators capture situations where (1) the costs of public transport are so high that they restrict people's ability to travel, especially among lower-income households, or (2) the financial burden of transport forces individuals to either substitute public transport with cheaper | Data not regularly collected at EU level. Ideally, a targeted survey could provide insights. | X | Falavigna, and Hernandez (2016) |

| Approach and possible thresholds | Issues to consider | Possible data sources for indicators | References |
|---|---|---|---|
| alternatives such as walking or cycling, or to forego necessary trips altogether. | | | |
| ■ Public transport trip rates:<br>▪ Indicate the number of trips made using public transport, which are used to determine how travel behaviour differs across income quintiles.<br>■ Immobility rates:<br>▪ Percentage of individuals who do not make any trips on the survey day, indicating potential supressed travel due to affordability issues | | X | Falavigna, and Hernandez (2016) |

## Water and sanitation

**Table 4 Overview of approaches and thresholds to measure water and sanitation poverty in the literature**

| Approach and possible thresholds | Issues to consider | Possible data sources for indicators | References |
|---|---|---|---|
| **Expenditure approach** | | | |
| Affordability thresholds are established in terms of share of water and sanitation expenditure in (disposable) income.<br><br>This approach is typically applied to the lower-income segments of the population (bottom 10% or 5%).<br><br>Affordability threshold can be calculated by looking at the median share of water bill expenses in disposable income for households below the poverty line (typically defined as 60% of median income). | Water and sanitation costs can be quantified using **actual expenditure** (based on water bills) or using **needs-based expenditure**. In the latter approach, water expenses for various categories of households are estimated, allowing them to fulfil a predetermined level of need. This approach enables filtering above-minimal use while revealing potential problems of underconsumption of water. | EU-SILC<br><br>Eurostat<br><br>National data on water and sanitation expenditure | Vanhille (2018)<br><br>Martins et al. (2016)<br><br>Miniaci et al. (2008)<br><br>OECD (2024) |
| Examples of thresholds: | | | OECD (2020), OECD (2024) |

| Approach and possible thresholds | Issues to consider | Possible data sources for indicators | References |
|---|---|---|---|
| ■ 3% of income used as a 'proxy of affordability limit' by the OECD, but considered highly debatable and not based on robust assessment (OECD, 2020). For Eastern Europe, Caucasus and Central Asia, OECD recommends using 4% (Martins at al., 2016).<br>■ For developed countries, possibly a lower affordability limit than 3% can be applied – some studies suggest 1.4-1.8% (Vanhille 2018).<br>■ Evaluation of the UWWTD considers 4% of disposable income an indicative affordability threshold.<br>■ DG ENV (2021) presents two thresholds for comparison of Member States: water tariffs constituting 3% and 5% of income.<br>■ Asian Development Bank uses 5% benchmark for water affordability (Martins at al., 2016).<br>■ International Water Association (IWA) proposes 3% threshold (Martins at al., 2016).<br>■ UK government uses 3% for the lowest income decile (Martins at al., 2016).<br>■ US Environmental Protection Agency proposes 2-2.5% threshold (Martins at al., 2016).<br>■ World Bank recommends 3-5% (Martins at al., 2016).<br>■ In the context of Sustainable Development Goal (SDG) 6 (water), indicator 6.1 requires universal and equitable access to safe and affordable drinking water for all, setting the affordability threshold at 4% of income (Essex et al., 2020).<br>■ In Reynaud (2008), 'water-poor' household was defined as a household spending 3% or more of its income on water charges. | | | European Comission (2019)<br>DG ENV (2021)<br>Vanhille (2018)<br>Miniaci et al. (2008)<br>Martins at al. (2016)<br>Essex et al. (2020)<br>Reynaud (2008) (in: García-Valiñas , M. et al (2010)) |

# Essential services poverty and development of definition

This annex provides details on the data and approaches used to test the different definitions and thresholds of essential services poverty before identifying the definition presented in Section 2.

## *Data source*

Measurability is a challenge in essential services, as well as in its components – energy, transport and WSS. Many of the studies reviewed here were constrained by data availability. Data collection with the sole purpose of measuring essential services poverty is limited by cost and scale. The practical implementation of the threshold defined in this study across all Member States requires a dataset that contains nationally representative data with detailed expenditure information, as well as accurate income data.

Collecting the data required for an accurate picture of income, consumption and wealth of an EU household would be 'very cumbersome and almost impossible, if surveys are used'[34]. Instead, Eurostat employs a statistical matching method to bring together the EU-SILC, HBS, and the HFCS to create the ICW experimental dataset[35]. The variables by which the datasets are matched vary by country, but include all or some subset of the following variables: activity status of the person of reference, age of the person of reference, population density level, type of household, tenure status, main source of income, and income quintiles[36]. The outcome of this approach is that the data do not actually reflect the income, consumption, or wealth of one household, but, instead, combines data from (most likely) three households with similar characteristics. A further limitation is that the final version of the dataset is not publicly available for use.

Although an imperfect data source, the ICW has advantages beyond the kinds of data it brings together. It contains ready-made indicators of essential services poverty, allowing for ease of application of the threshold and removing the need for calculations. Eurostat provides pre-calculated datasets at Member State level. This includes the median percentage of income spent on essential services by the following socioeconomic categories:

- Income deciles and quintiles;
- Risk of income poverty, level of expenditure and material deprivation;
- Risk of income poverty or social exclusion;
- Household composition;
- Degree of urbanisation;
- Income deciles and quintiles;
- Age group of reference person;
- Educational attainment level of the reference person;
- Overburden status.

## *Approach comparison*

Based on the review of the literature and the constraints presented by the data, three approaches were considered before the 23% threshold was selected.

The first approach considered and tested was intended to incorporate a social aspect in the measure and reflect the reality of each Member State. This approach, the AROPE threshold, is defined as the median percentage of expenditure on essential services by those households

[34] Income, Consumption, and Wealth. Eurostat.

[35] Lamarche, P., 2017. Measuring income, consumption and wealth jointly at the micro-level. European Commission, Eurostat Methodological Note, Luxembourg.

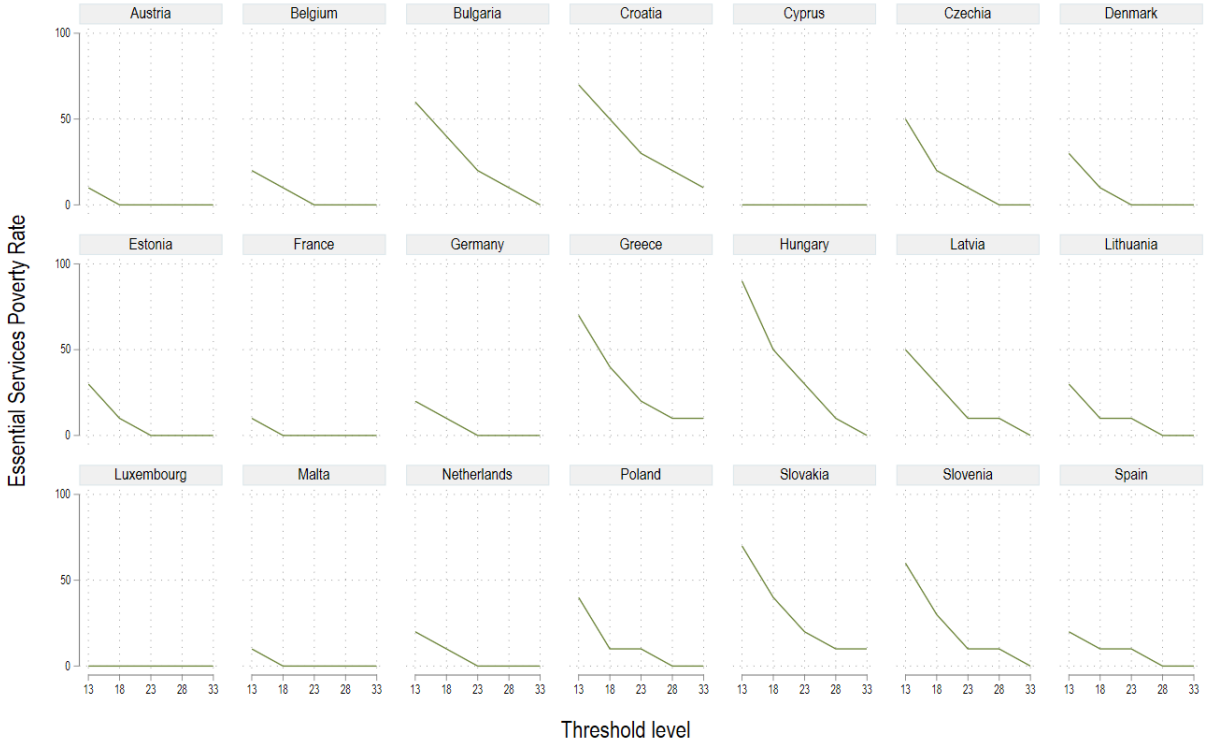
[36] Ibid.

defined as at risk of poverty and social exclusion (AROPE), as calculated by Eurostat. This threshold is then applied to the income decile data described above. An income decile is defined as essential services poor if the median expenditure of that decile is greater than or equal to the AROPE threshold. All Member States had at least a single decile of the population defined as essential services poor, while a further seven Member States recorded two deciles of population as essential services poor. The second approach (2M) was inspired by the literature, where most examples took twice the median,. This approach was calculated by multiplying by two the Member State's median percentage of expenditure on essential services by households, as calculated by Eurostat. Again, this threshold aims to account for different circumstances across the Member States. When the threshold is then applied to the decile data, all but four Member States were found to have 10% of their population identified as essential services poor. Those four exceptions registered an essential services poverty rate of zero. The third and final approach was a summation of the most often cited thresholds presented for each service: WSS (3%), energy (10%), and transport (10%). The 23% threshold allows for ease of understanding, uniform application across Member State, and greater variation in results. The 23% threshold, when applied, classifies 10 Member States with zero essential services poverty, six Member States with 10% poverty, three with 20% poverty, and two with 30 essential services poverty% (see Figure 1).

### *Sensitivity analysis*

A sensitivity analysis assesses how changes to the threshold value or definition can affect the classification of households as experiencing essential services poverty. It also tests the robustness of the essential services poverty definition. Figure 10 provides a visual aid to understanding the sensitivity of each Member State to changes in the threshold of essential services poverty. The individual country graphs display essential service poverty thresholds on the horizontal axis, from 13% to 33%, plus/minus 10% of the 23% threshold. The vertical axis is the percentage of the population classified as essential services poor at that threshold. The sensitivity is starkest with decreases in the threshold, whereas increases in the threshold do not result in large changes in proportion. That is unsurprising given the structure of the data and that, at the 23% threshold, only five Member States register more than 10% of the population as essential services poor. When examining the sensitivity of countries to decreases in the threshold, three groups emerge. Firstly, the 'stable' countries, where any change in the threshold would see no more than a 10% increase in the population classified as essential services poor. These include Austria, Cyrus, France, Luxembourg and Malta. Countries considered 'sensitive' to changes in the threshold would experience an increase of 20-40% of the population defined as essential services poor. These countries are Belgium, Denmark, Estonia, Germany, Lithuania, the Netherlands, Poland and Spain. The final 'hyper-sensitive' group would classify 50% or more of their population as essential services poor, depending on the threshold selected. These are Bulgaria, Croatia, Czechia, Greece, Hungary, Latvia, Slovakia and Slovenia.

**Figure 10 Sensitivity analysis of essential service threshold across Member States**




Some countries exhibit sensitivity to changes in the threshold, particularly with decreases. The 'stable' group shows minimal variation when the threshold is adjusted, while even in the 'sensitive' countries, the changes are manageable. For many in this group, a decrease of 5 pp in the threshold leads to 10% of the population identified as essential services poor. For the 'hyper-sensitive' group, that same decrease results in significant changes in the rate of essential service poverty. Meanwhile, an equal increase in the threshold does not reflect an equivalent decrease in the poverty rate. The 23% threshold therefore strikes a balance between inclusivity and practicality.

# Annex 3: Data and Additional Graphs For EU-Level Analysis

**Table 5 Exact reference years for ICW data**

| | 2015 | | 2020 | |
|---|---|---|---|---|
| **Country** | **HBS & SILC** | **HFCS** | **HBS& SILC** | **HFCS** |
| Austria | 2015 | 2014 | 2019 | 2021 |
| Belgium | 2014 | 2014 | 2020 | 2020 |
| Bulgaria | 2015 | - | 2019 | - |
| Cyprus | 2015 | 2014 | 2015 | 2021 |
| Czechia | 2015 | - | 2019 | 2021 |
| Germany | 2013 | 2014 | 2018 | 2021 |
| Denmark | 2015 | - | 2020 | - |
| Estonia | 2015 | 2013 | 2020 | 2021 |
| Spain | 2015 | 2014 | 2020 | 2020 |
| Finland | 2016 | 2017 | 2022 | 2019 |
| France | 2017 | 2017 | 2017 | 2020 |
| Greece | 2015 | 2014 | 2020 | 2021 |
| Croatia | 2014 | | 2019 | 2020 |
| Hungary | 2015 | 2014 | 2020 | 2020 |
| Ireland | 2015 | 2013 | 2022 | 2020 |
| Italy | 2015 | 2014 | 2020 | 2020 |
| Lithuania | 2016 | - | 2021 | 2021 |
| Luxembourg | 2015 | 2014 | 2020 | 2021 |
| Latvia | 2015 | 2014 | 2019 | 2020 |
| Malta | 2015 | 2013 | 2015 | 2020 |
| Netherlands | 2015 | 2013 | 2020 | 2021 |
| Poland | 2015 | 2014 | 2020 | - |
| Portugal | 2015 | 2013 | 2022 | 2020 |
| Romania | 2015 | - | 2020 | - |
| Sweden | 2012 | - | - | - |
| Slovenia | 2015 | 2014 | 2018 | 2021 |
| Slovakia | 2015 | 2014 | 2020 | 2021 |

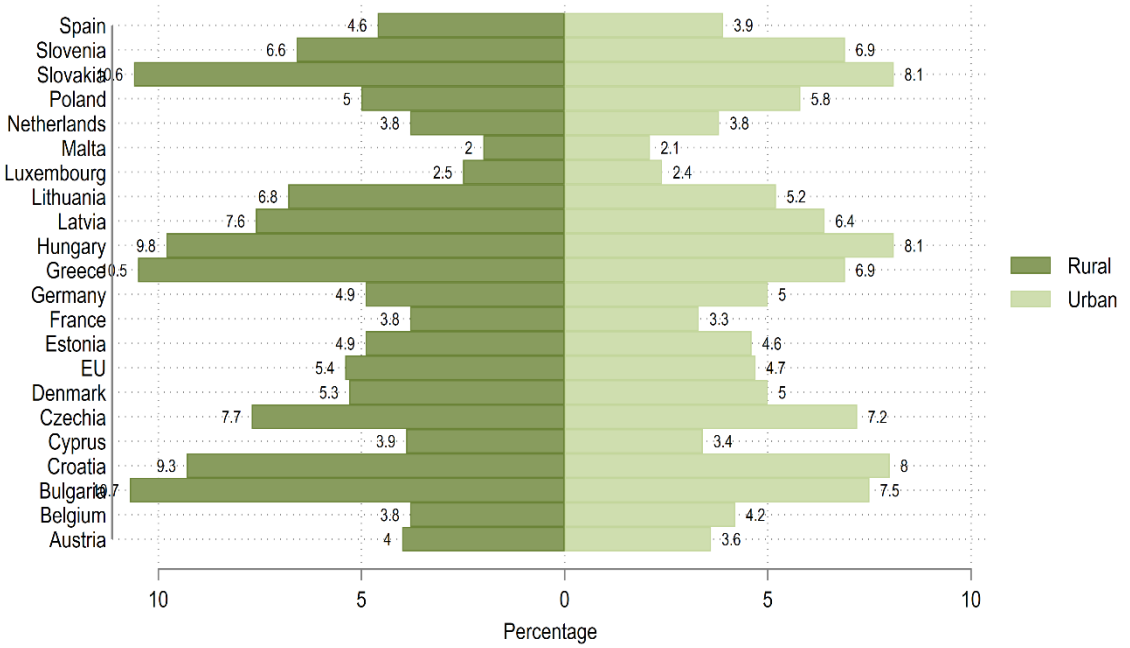
Source: Eurostat and European Central Bank[37].

[37] Available at: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=File:Table1_HBS-HFCS_reference_years.png

**Figure 11 Estimated expenditure on essential services of the poorest (first) decile of income, EUR, 2020**

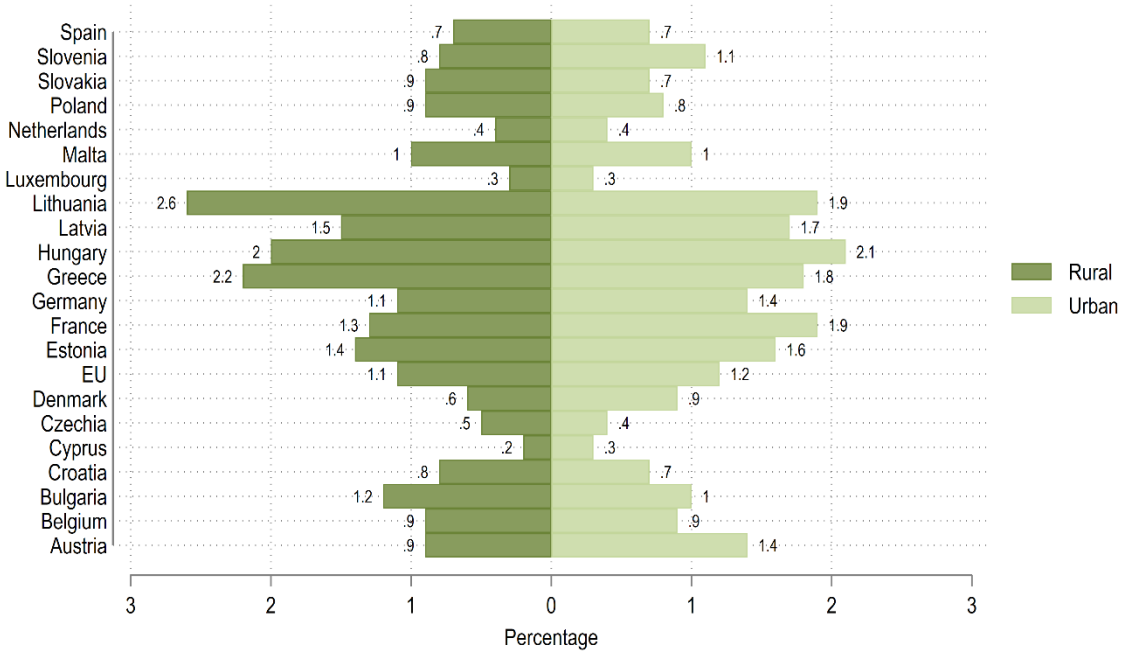

Source: Authors' elaboration, based on ICW, EU-SILC, and European Community household panel data (ilc_di01).

**Figure 12 Comparison of percentage of income spent on energy, by rural and urban household, 2020**



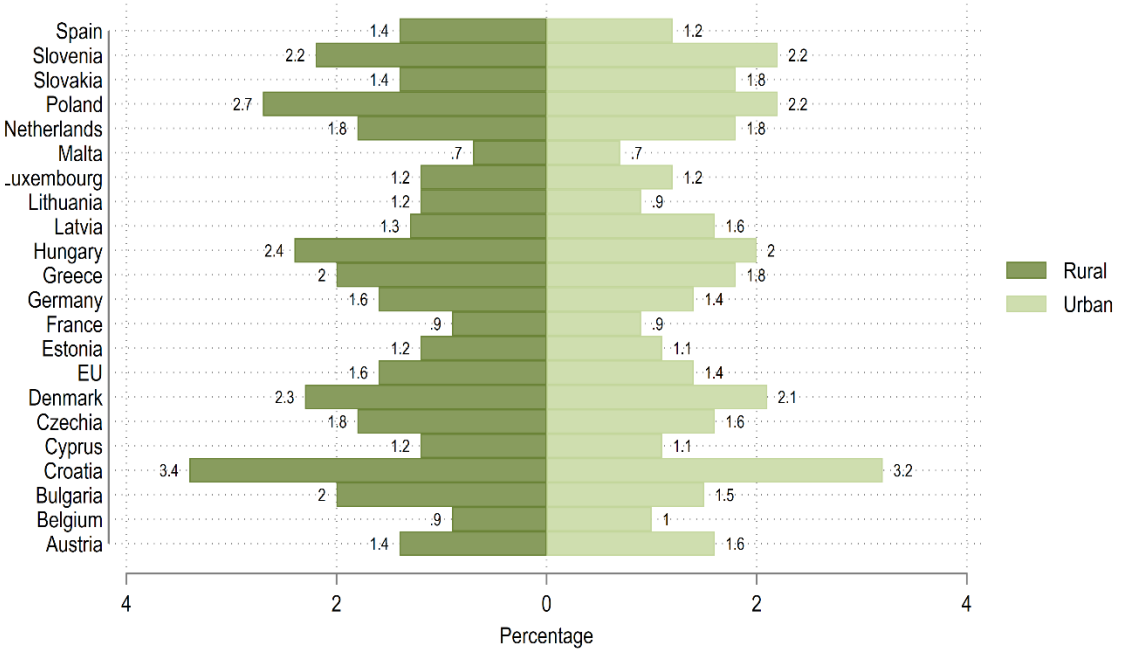

Source: Authors' elaboration, based on ICW data. Note: Data missing for Finland, Ireland, Italy, Portugal, Romania and Sweden.

**Figure 13 Comparison of percentage of income spent on transport, by rural and urban household, 2020**



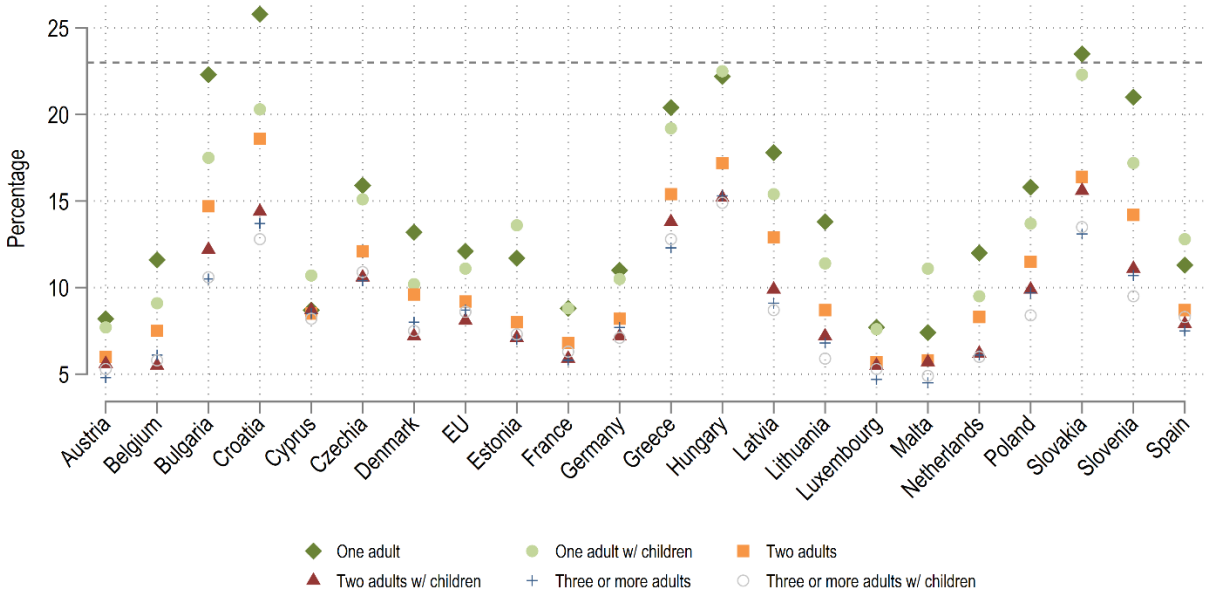

Source: Authors' elaboration, based on ICW data. Note: Data missing for Finland, Ireland, Italy, Portugal, Romania and Sweden.

**Figure 14 Comparison of percentage of income spent on WWS, by rural and urban household, 2020**



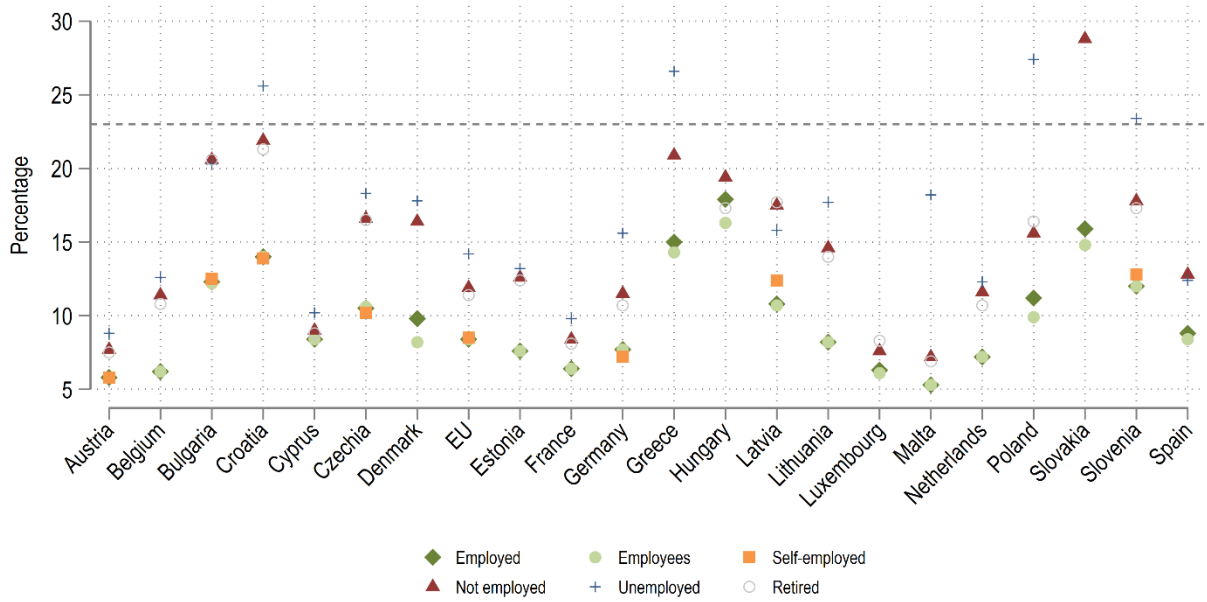

Source: Authors' elaboration, based on ICW data. Note: Data missing for Finland, Ireland, Italy, Portugal, Romania and Sweden.

**Figure 15 Percentage of income spent on essential services, by household composition, 2020**



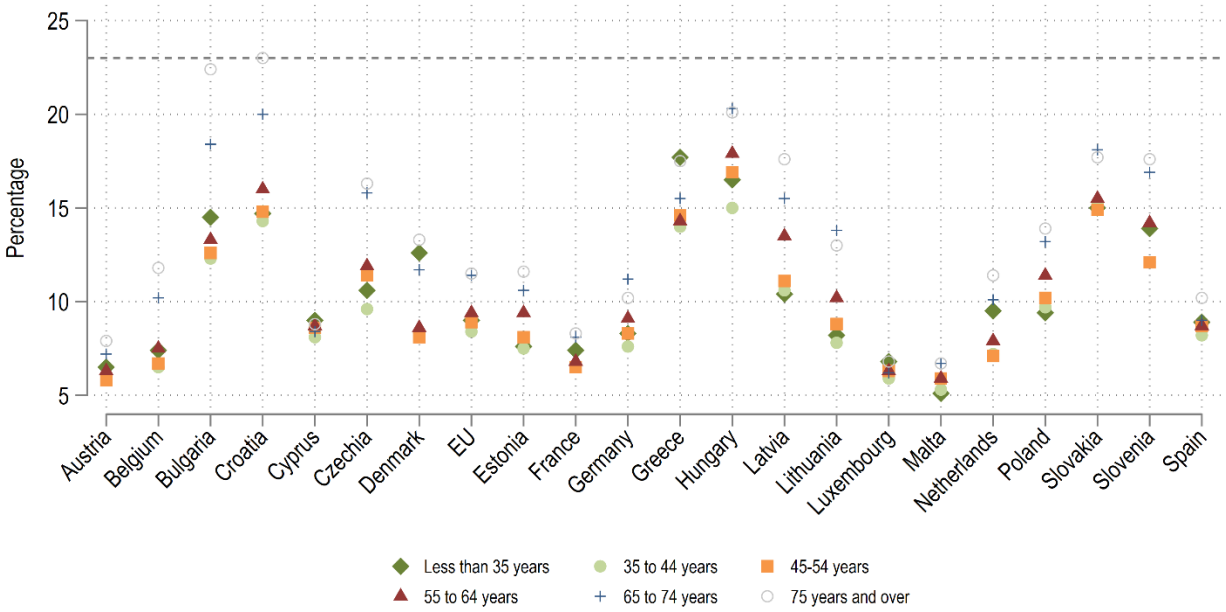

Source: Authors' elaboration, based on ICW data. Note: Data missing for Finland, Ireland, Italy, Portugal, Romania and Sweden. Dashed line is 23% threshold.

**Figure 16 Percentage of income spent on essential services, by employment status, 2020**



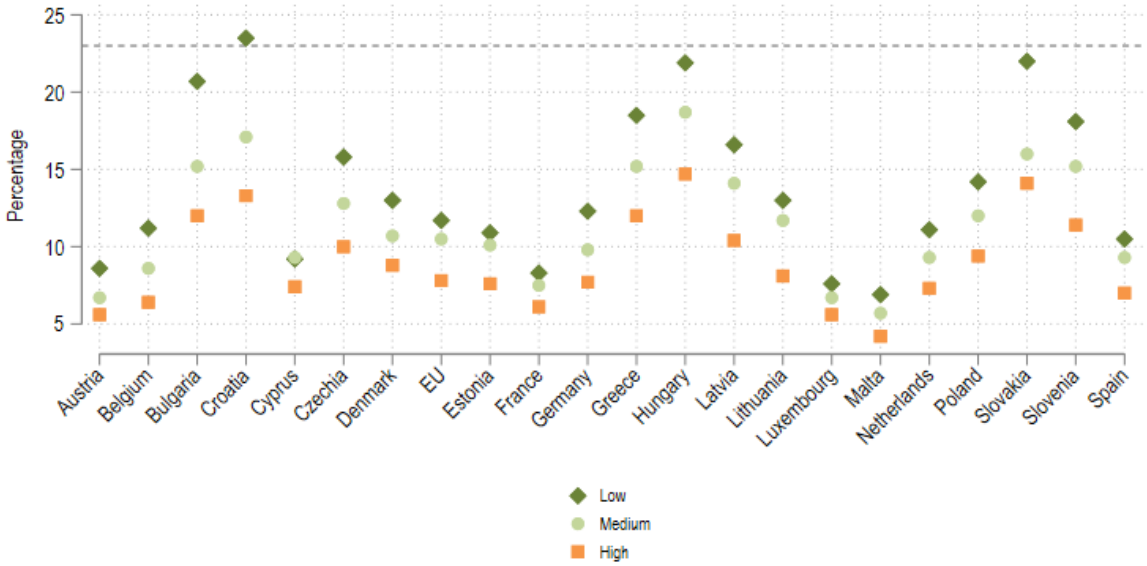

Source: Authors' elaboration, based on ICW data. Note: Data missing for Finland, Ireland, Italy, Portugal, Romania and Sweden. Dashed line is 23% threshold.

**Figure 17 Percentage of income spent on essential services, by age, 2020**




Source: Authors' elaboration, based on ICW data. Note: Data missing for Finland, Ireland, Italy, Portugal, Romania and Sweden. Dashed line is 23% threshold.

**Figure 18 Percentage of income spent on essential services, by education level, 2020**




Source: Authors' elaboration, based on ICW data. Note: Data missing for Finland, Ireland, Italy, Portugal, Romania and Sweden.

# Annex 4: Country cases

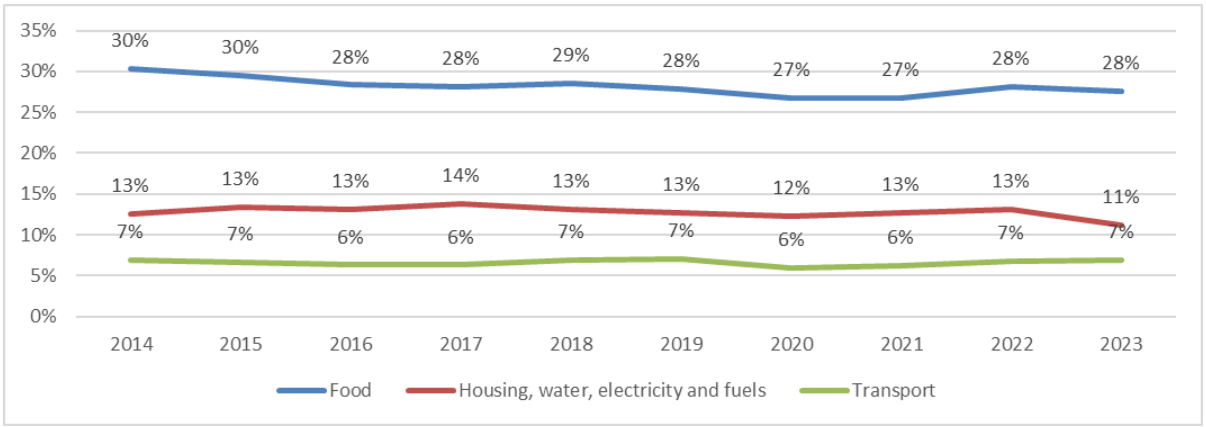
## Bulgaria

There is no official definition of 'essential services' or related poverty in Bulgaria, but access (including through affordable pricing) to the six essential services guaranteed by the EPSR is safeguarded by sectoral legislation (DG EMPL, 2023b). General poverty is a well-recognised issue and the 2030 Poverty Reduction and Social Inclusion Strategy aims to address the key drivers (e.g. unemployment) and improve social inclusion for vulnerable children and people with disabilities, as well as financial literacy and housing conditions (Ministry of Labour and Social Policy, n.d.). As of 2023, Bulgaria is one of the Member States with the highest shares of population at risk of poverty – 30% (compared to the EU average of 21%) (Eurostat, 2024), when the official poverty line[38] was set at BGN 504 (EUR 258[39]) per month (Ministry of Labour and Social Policy, 2022). Despite being one of the poorest Member States, Bulgaria has seen an increase in average household income over time (National Statistical Institute (NSI), 2024b).

### Data on essential services poverty

According to NSI data (2024a), the largest share of consumer expenditure[40] of an average household or person goes towards food, followed by housing, water, electricity and fuel[41], and transport. Comparing specific expenditure levels and total income of an average household in 2023 suggests that nearly 28% of income is spent on food, 11% on housing, water, electricity and fuel, and 7% on transport (NSI, 2024a and 2024b). These shares have remained similar over the last 10 years (see Figure 19).

**Figure 19 Top three consumer expenditure shares of an average Bulgarian household as part of its total income, 2014-2023**




Source: Authors' elaboration, based on NSI (2024a and 2024b) data.

These data provide income and expenditure information per average household and cannot be distinguished by income level. An indication of the burden of essential services expenditure on the poorest groups in society is provided in Section 3.1.

**Energy**: According to multiple indicators and various sources, Bulgaria is considered one of

[38] The poverty line is defined according to EU-SILC guidelines/definitions and represents 60% of equivalent median income after social transfers (National Statistical Institute – NSI, 2024f). It is thus adjusted each year based on the median income.

[39] All conversion is based on the fixed exchange rate of EUR 1 = BGN 1.9558.

[40] Consumer expenditure covers expenses on items such as food, clothes and shoes, healthcare, leisure, etc. They exclude expenditure on taxes, social security contributions, or regular transfers to other households.

[41] The category is presented together and no disaggregated data are publicly available.

the most energy-poor Member States (e.g. DG ENER, 2019). According to the latest data from the Energy Poverty Advisory Hub (EPAH), the share of energy expenses as part of income among those with the lowest income is high compared to other countries (nearly 15% in 2020). A fairly large share of households report struggling to keep their homes adequately warm (21% in 2023) or to pay their utility bills (18% in 2023). At the same time, the population reporting living in a dwelling with leak, damp and rot is fairly low compared to the rest of the EU and this share has been steadily falling over the last 20 years (8% in 2023). The trends also appear to be improving over time for other indicators, such as arears on paying utility bills or inability to keep homes adequately warm. However, an important indicator is missing – the ability to keep homes adequately cool. Given the increasing number of days when cooling is required in the year for Bulgaria, this may be an important indicator to consider in the future. While positive trends are observed for many indicators, the share of energy expenditure in income does not appear to have fallen substantially over time (see Table 6). This may be partially explained by rising energy prices.

**Table 6 Overview of relevant essential services poverty indicators for Bulgaria**

| Indicator | Year | Value | EU-27 ranking | Trend |
|---|---|---|---|---|
| Context | | | | |
| Cooling degree days[42] | 2023 | 248.43 days | 6th | Increasing |
| Heating degree days[43] | 2023 | 2081 days | 19th | Decreasing |
| AROPE rate | 2023 | 30% of population | 2nd | Decreasing |
| Housing cost overburden rate | 2023 | 11.1% of population | 5th | Fluctuating |
| Energy poverty | | | | |
| Population living in a dwelling with presence of leak, damp and rot | 2023 | 8.4% of population | 20th | Decreasing |
| Inability to keep home adequately warm | 2023 | 20.7% of households | 3rd | Decreasing |
| Arrears on utility bills | 2023 | 17.8% of households | 2nd | Decreasing |
| Share of energy expenses in income, for income quintile 1 | 2020 | 14.9% of income | 3rd (of 17) | Increasing |
| High share of energy expenditure in income (2M)[44] | 2020 | 13.9% of households | 11th (of 17) | Fluctuating |
| Low absolute energy expenditure (M/2)[45] | 2020 | 7.4% of households | 17th (of 19) | Decreasing |
| Transport poverty | | | | |

[42] According to Eurostat Cooling and heating degree days by country - annual data (see metadata explanation of dataset): Cooling degree day (CDD) index is a weather-based technical index designed to describe the need for the cooling (air-conditioning) requirements of buildings. CDD looks at the severity of the heat in a specific time period, taking into consideration outdoor temperature and average room temperature. The calculation of CDD relies on the base temperature, defined as the highest daily mean air temperature not leading to indoor cooling, it is set to a constant value of 24°C in the CDD calculation.

[43] According to Eurostat Cooling and heating degree days by country - annual data (see metadata explanation of dataset): Heating degree day (HDD) index is a weather-based technical index designed to describe the need for the heating energy requirements of buildings. HDD looks at the severity of the cold in a specific time period, taking into consideration outdoor temperature and average room temperature. The calculation of HDD relies on the base temperature, defined as the lowest daily mean air temperature not leading to indoor heating, it is set to a constant value of 15°C in the HDD calculation

[44] Represents the proportion of households whose share of energy expenses in income is more than twice the national median.

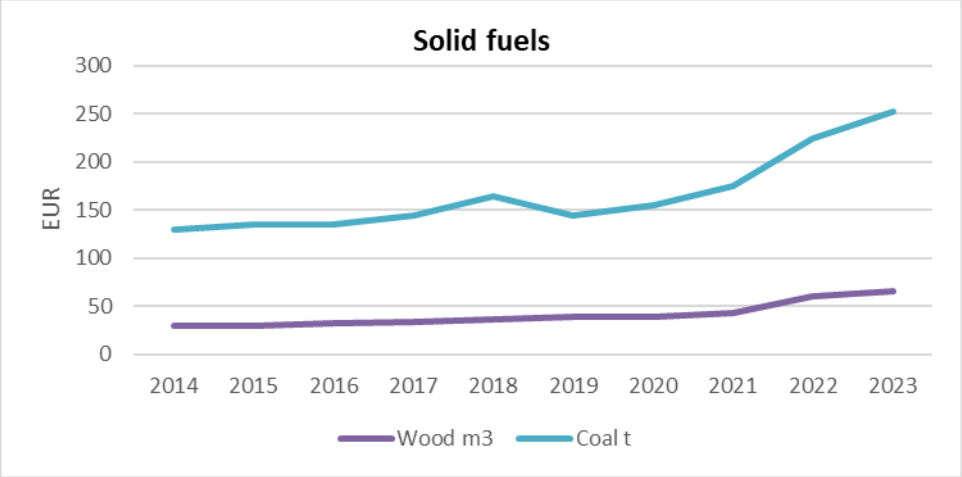
[45] Represents the share of households whose absolute energy expenditure is below half the national median.

| Indicator | Year | Value | EU-27 ranking | Trend |
|---|---|---|---|---|
| Population who cannot afford regular use of public transport | 2014 | 8.4% | 1st | Not available |

Source: Authors' elaboration, based on EPAH (2024).

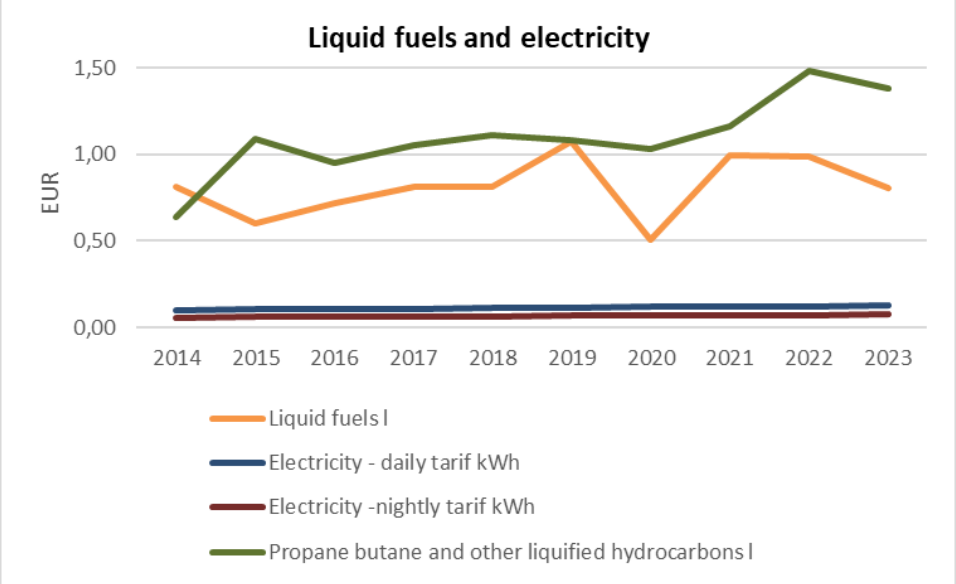
At the same time, some energy prices in Bulgaria have remained fairly stable over time, such as the regulated electricity tariffs paid by households (see next section on policy context). Other energy prices have fluctuated but generally increased over the last 10 years (NSI, 2024c) (see Figure 20 and Figure 21).

**Figure 20 Average energy prices, by type of solid fuel used by Bulgarian households for lighting, heating and energy, prices in EUR per unit**




Source: Authors' elaboration, based on NSI (2024c).

**Figure 21 Average electricity tariffs and energy prices, by type of liquid fuel used by Bulgarian households for lighting, heating and energy, prices in EUR per unit**




Source: Authors' elaboration, based on NSI (2024c).

Data from the NSI show that in 2023[46], nearly all households have access to electricity and

[46] Data on households' access to services and equipment with essential appliances is only available for one year.

many are equipped with essential appliances such as fridges, washing machines or mobile phones. Most households are also equipped with air conditioning, which is likely to improve indoor comfort in the context of growing needs to cool buildings in high temperatures. However, a relative low share of the households have access to central heating, which may increase individual energy consumption and/or the costs of energy for heating (NSI, 2024d and 2024e) (see Table 7 and Table 8).

While specific statistics on the energy efficiency of the building stock in Bulgaria are not available, various sources point to underlying issues. According to experts, there are over 66,000 multi-family residential buildings, of which about 90% need deep energy renovation. In addition, there are nearly 1,300,000 single-family buildings whose energy performance is unknown (Bulgarian Industrial Association, 2023). There is reportedly a prevalence of underperforming renovation in public buildings, with renovated buildings frequently exhibiting poorer energy performance than initially recommended. This trend is linked to a lack of regulatory framework ambition, high financial support offered against low energy efficiency requirements, superficial municipal energy planning, low quality construction activities, and a lack of monitoring and verification of energy savings (Simeonov, 2024). Finally, Bulgaria will lack an estimated 50,000 building renovations specialists by 2030 (BUILD UP Skills, 2023).

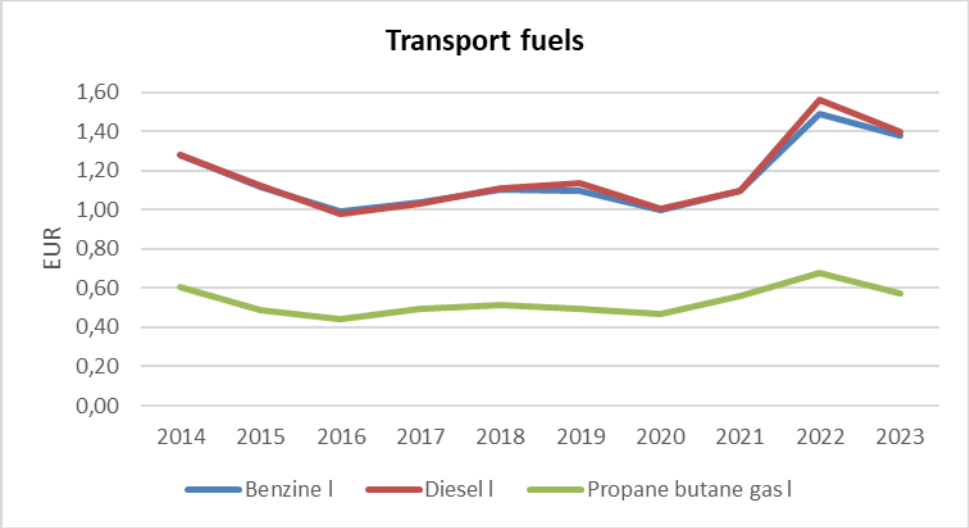
**Table 7 Share of Bulgarian households equipped with items for long-term use, 2023**

| Relative share of households (%) | Total (%) | In cities/towns (%) | In villages (%) |
|---|---|---|---|
| Televisions | 99.3 | 99.4 | 98.9 |
| Computers | 54.8 | 62.3 | 32.3 |
| Internet connection | 75.3 | 82.0 | 54.9 |
| Washing machine | 97.3 | 98.6 | 93.1 |
| Dishwasher | 22.6 | 27.4 | 8.1 |
| Refrigerators, freezers | 99.2 | 99.5 | 98.3 |
| Mobile phones | 98.0 | 98.7 | 95.8 |
| Air conditioners | 61.0 | 68.2 | 39.0 |
| Personal vehicle | 57.7 | 60.9 | 48.0 |

Source: Authors' elaboration, based on NSI (2024e).

**Transport**: The share of the population unable to afford public transport was the highest in Bulgaria among all Member States in 2014 (around 8%) (EPAH, 2024). The share of households with personal vehicle was 58% in 2023 (see Table 7). In the last 10 years, the prices paid by households for fuel have increased, especially more recently (NSI, 2024c) (see Figure 22). No information is available on the prices of public transport. Rail passenger transport in Bulgaria is operated by a public company, and road passenger transport is operated by various private or municipal companies, but no centralised data on prices are available.

**Figure 22 Average prices paid by Bulgarian households for fuel, by sources, prices in EUR per unit**




Source: Authors' elaboration, based on NSI (2024c).

**WSS**: Bulgarian households are well connected to drinking water but their access to sewerage/sanitation is poorer (Ministry of Regional Development, 2014 and Table 8). In addition, the price of water services is considered high for poor households (Ministry of Regional Development, 2014). No disaggregated data on the cost of WSS are available, as expenditure is considered together with housing and energy expenses.

**Table 8 Housing conditions of Bulgarian households, 2023**

| Relative share of households (%) | Total (%) | In cities/towns (%) | In villages (%) |
|---|---|---|---|
| Water supply | 99.2 | 99.7 | 97.6 |
| Sewerage/sanitation | 83.6 | 96.2 | 45.6 |
| Electricity | 99.6 | 99.6 | 99.8 |
| Central heating | 20.3 | 26.6 | 1.2 |
| Toilet inside the housing/dwelling | 96.3 | 99.2 | 87.4 |
| Bathroom inside the housing/dwelling | 97.9 | 99.2 | 93.8 |

Source: Authors' elaboration, based on NSI (2024d).

## Policy context

The main instrument for supporting vulnerable people in Bulgaria is through social assistance and benefits based on a monthly GMI and a differentiated minimum income (DMI) calculated based on the GMI for different vulnerable groups. Persons whose income is below the DMI and who meet certain criteria defined in the Social Assistance Act are eligible for social support, including energy aid (Bulgarian Law Portal, 2024a).

**Energy**: Access to energy for vulnerable consumers is guaranteed by the Energy Act, whereby domestic consumers receive targeted aid for electricity, heating or gas in accordance with the Social Assistance Act. The Energy Act mandates the Energy and Water Regulatory Commission (EWRC) to regulate the energy prices (including electricity and central heating) for domestic consumers to ensure that they remain affordable despite fluctuations in market prices (Bulgarian Law Portal, 2024b).

In addition to this protection for all domestic consumers regardless of their social status, cash

and in-kind benefits are provided to the most vulnerable consumers in the form of a 'targeted aid for heating'. This monthly target aid is determined based on the average price for 500kWh of electricity for domestic consumers as of 31 October in the calendar year and is provided either as cash benefits for heating, electricity or natural gas, or in-kind (as heating wood, coal, wood pellets) (Bulgarian Law Portal, 2024c). The aid is designed to take into account the cost of a certain amount of energy considered necessary to ensure minimum temperature comfort in the home (Shopov, 2016). The targeted aid for heating is estimated based on the GMI but with higher eligibility thresholds to allow coverage of more persons and households at risk of energy poverty (Terziev et al., 2018). In exceptional circumstances, one-time aid for heating may also be provided (e.g. in the 2021-2022 heating season, in response to rising energy prices and the COVID-19 pandemic – Agency for Social Assistance, 2021).

Energy poverty in Bulgaria is linked to the energy efficiency of the buildings and/or dwellings, often in combination with household members' behaviour and readiness to use energy more efficiently, as well as a lack of access to energy justice (Shopov, 2016; Shopov and Peneva, 2018; Peneva, 2021).

**Transport**: The main approach to addressing transport poverty in Bulgaria is through legally mandated discounts for the most vulnerable persons. This includes lower tariffs/discounts or even free travel for certain passengers on rail and road transport. These discounts are applied by the rail or road transport operators whose costs are then compensated by the state budget (Executive Agency 'Automobile Administration', 2024a and 2024b; Bulgarian Law Portal, 2024d; Ciela, 2024).

**WSS**: Access to water for drinking and domestic needs is defined as a basic life necessity in the Social Assistance Act and its provision is considered a public interest (Bulgarian Law Portal, 2024a and 2024e). Prices for WSS are regulated by the EWRC, which must ensure 'social acceptability of the services'. The social acceptability is ensured when the minimum monthly use of drinking water of 2.8m$^3$ per person does not exceed 2.5% of the average monthly income of the household in that region (Bulgarian Law Portal, 2024e). Similar to energy price regulation, this support is available to all domestic consumers without any differentiation by income level, social group or other criteria.

Generally, accessibility of WSS is considered a more significant issue than affordability. A 2018 study found that most vulnerable groups and public spaces in Bulgaria had adequate access or provision of WSS. However, groups of persons who lacked adequate access (or whose access could not be properly estimated) included homeless people and those living in illegal buildings/dwellings (this affected Roma people more, as they more frequently lived in illegal buildings) (Iskreva et al, 2018). Despite good quality drinking water and wide-reaching access, there are areas with seasonal rationing of services due to water shortages and drought. Bulgaria's late implementation of the UWWTD is one of the reasons for insufficient access to sanitation services (Ministry of Regional Development, 2014).

**Information and data sources for Bulgaria:**

Agency for Social Assistance, 2021, Report of the activity of the Agency in 2021, available at: https://asp.government.bg/uploaded/files/6395-YearlyASP-site.pdf (accessed 13 August 2024).

BUILD UP Skills (2023) Current state, practices and trends in the construction sector in Bulgaria, Deliverable 3.4 of the BUILD UP Skills Bulgaria 2030 project, Version 1.0, August 2023, available at: http://www.buildupskillsbg.eu/uploads/9/8/8/4/9884716/d3.4_busbg2030_final_sqa_en.pdf (accessed 7 October 2024).

Bulgarian Industrial Association (2023) 90% OF THE BUILDING STOCK NEEDS DEEP ENERGY RENOVATION, Interview with Dr. Dragomir Tsanev, 31.10.2023, available at: https://en.bia-bg.com/magazine/view/32326/ (accessed 7 October 2024).

Bulgarian Law Portal (2024a) Social Assistance Act ЗАКОН ЗА СОЦИАЛНО ПОДПОМАГАНЕ, last amended 22 December 2023 (accessed 13 August 2024).

Bulgarian Law Portal (2024b) Energy Act ЗАКОН ЗА ЕНЕРГЕТИКАТА, last amended 1 May 2024 (accessed 13 August 2024).

Bulgarian Law Portal (2024c) Ordinance on the conditions and procedure for provision of targeted aid for heating Наредба № РД-07-5 от 16 май 2008 г. за условията и реда за отпускане на целева помощ за отопление, last amended 9 June 2023 (accessed 13 August 2024).

Bulgarian Law Portal (2024d) Rail Transport Act ЗАКОН ЗА ЖЕЛЕЗОПЪТНИЯ ТРАНСПОРТ, last amended 9 June 2023 (accessed 13 August 2024).

Bulgarian Law Portal (2024e) Regulation of Water Supply and Sewerage Services Act ЗАКОН ЗА РЕГУЛИРАНЕ НА ВОДОСНАБДИТЕЛНИТЕ И КАНАЛИЗАЦИОННИТЕ УСЛУГИ, last amended 18 September 2018 (accessed 13 August 2024).

Ciela (2024) ПОСТАНОВЛЕНИЕ № 295 ОТ 20 ДЕКЕМВРИ 2001 Г. ЗА ОПРЕДЕЛЯНЕ НА ГРУПИТЕ ПЪТНИЦИ, ПОЛЗВАЩИ ПРАВО НА БЕЗПЛАТНИ И С НАМАЛЕНИ ЦЕНИ ПЪТУВАНИЯ ПРИ ПРЕВОЗ С ЖЕЛЕЗОПЪТЕН ТРАНСПОРТ, И ЗА ОПРЕДЕЛЯНЕ РАЗМЕРА НА НАМАЛЕНИЕТО, last amended 26 March 2024 (accessed 13 August 2024).

EPAH (2024) National indicators by indicator or by country: https://energy-poverty.ec.europa.eu/epah-indicators (accessed 13 August 2024).

Executive Agency 'Automobile Administration' (2024a) ПОСТАНОВЛЕНИЕ № 66 на МС от 15.04.1991 г. за определяне минимални размери на намаленията на превозните цени по автомобилния транспорт на някои групи граждани, last amended 13 May 2022 (accessed 13 August 2024).

Eurostat (2024) Persons at risk of poverty or social exclusion by age and sex, Online data code:ilc_peps01n, DOI:10.2908/ilc_peps01n, available at: https://ec.europa.eu/eurostat/databrowser/view/ILC_PEPS01N__custom_12849864/default/table?lang=en (accessed 12 September 2024).

Executive Agency 'Automobile Administration' (2024b) НАРЕДБА за условията и реда за предоставяне на средства за компенсиране на намалените приходи от прилагането на цени за обществени пътнически превози по автомобилния транспорт, предвидени в нормативните актове за определени категории пътници, за субсидиране на обществени пътнически превози по нерентабилни автобусни линии във вътрешноградския транспорт и транспорта в планински и други райони и за издаване на превозни документи за извършване на превозите, last amended 2 January 2024, (accessed 13 August 2024).

Iskreva, D., Valkova, K., Dimitrova, Z. and Delcheva, P. (2018) Situation analysis of the equal access to water and sanitation in Bulgaria, in support of the political process for acomplishing the human right of access to water and sanitation, Earth Forever.

Kitous, A. & Després, J., 2018. *Assessment of the impact of climate change on residential energy demand for heating and cooling*. EUR 29084 EN. Luxembourg: Publications Office of the European Union. ISBN 978-92-79-77861-2. doi:10.2760/96778.

Ministry of Labour and Social Policy (n.d.) Национална стратегия за намаляване на бедността и насърчаване на социалното включване 2030, available at: https://www.mlsp.government.bg/uploads/15/spitao/dokumenti/strategii/strategiya-za-namalyavane-na-bednostta-i-nasrchavane-na-sotsialnoto-vklyuchvane-2030.pdf (accessed 12 September 2024).

Ministry of Labour and Social Policy (2022) 504 лв. ще е линията на бедност в

България през 2023 г., News from September 21, 2022, available at: https://www.mlsp.government.bg/504-lv-shche-e-liniyata-na-bednost-v-blgariya-prez-2023-g (accessed 12 September 2024).

Ministry of Regional Development (2014) Strategy for Development and Management of the Water Supply and Sanitation Sector in the Republic of Bulgaria 2014 - 2023, available at: https://www.mrrb.bg/static/media/ups/articles/attachments/24e7666f6785ee40bfb094bec3ad5f45.pdf (accessed 13 August 2024).

National Statistical Institute (NSI) (2024a) Total household expenditures per year [dataset HH_2.1.3], available at: https://nsi.bg/bg/content/3239/%D0%B3%D0%BE%D0%B4%D0%B8%D1%88%D0%BD%D0%B8-%D0%B4%D0%B0%D0%BD%D0%BD%D0%B8 (accessed 13 August 2024).

National Statistical Institute (NSI) (2024b) Total household income per year [dataset HH_1.1.3], available at: https://nsi.bg/bg/content/3223/%D0%B3%D0%BE%D0%B4%D0%B8%D1%88%D0%BD%D0%B8-%D0%B4%D0%B0%D0%BD%D0%BD%D0%B8 (accessed 13 August 2024).

National Statistical Institute (NSI) (2024c) Average prices and purchased quantities of essential non-food items by households per year [dataset HH_6.2], available at: https://nsi.bg/bg/content/3271/%D0%BD%D0%B5%D1%85%D1%80%D0%B0%D0%BD%D0%B8%D1%82%D0%B5%D0%BB%D0%BD%D0%B8-%D1%81%D1%82%D0%BE%D0%BA%D0%B8 (accessed 13 August 2024).

National Statistical Institute (NSI) (2024d) Housing conditions of households in 2023, available at: Жилищни условия на домакинствата | Национален статистически институт (nsi.bg) (accessed 13 August 2024).

National Statistical Institute (NSI) (2024e) Share of the Bulgarian households equipped with items for long-term use in 2023, available at: Снабденост на домакинствата със стоки за дълготрайна употреба | Национален статистически институт (nsi.bg) (accessed 13 August 2024).

National Statistical Institute (NSI) (2024f) Indicators on poverty and social inclusion – methodological notes, available at: https://www.nsi.bg/bg/content/8257/%D0%BC%D0%B5%D1%82%D0%B0%D0%B4%D0%B0%D0%BD%D0%BD%D0%B8/%D0%B8%D0%BD%D0%B4%D0%B8%D0%BA%D0%B0%D1%82%D0%BE%D1%80%D0%B8-%D0%B7%D0%B0-%D0%B1%D0%B5%D0%B4%D0%BD%D0%BE%D1%81%D1%82-%D0%B8-%D1%81%D0%BE%D1%86%D0%B8%D0%B0%D0%BB%D0%BD%D0%BE-%D0%B2%D0%BA%D0%BB%D1%8E%D1%87%D0%B2%D0%B0%D0%BD%D0%B5 (accessed 12 September 2024).

Peneva, T. (2021) "The fourth pillar of energy poverty in Bulgaria", *Economic Thought,* 5.

Poriazova, V. (2024) Четири варианта за новата такса смет, ще стане ли по-скъпо?, Marica 04.02.2024, available at: https://www.marica.bg/biznes-zona/chetiri-varianta-za-novata-taksa-smet-shte-stane-li-po-skapo (accessed 12 September 2024).

Shopov, G. (2016) "Energy poverty and social assistance", *Economic Thought,* 6.

Shopov, G. and T. Peneva (2018) "Targeted social assistance for heating - historical experience and persepectives for development with limation of the energy poverty in Bulgaria", *Economic Thought,* 6.

Simeonov, K. (2024) National baseline assessment on underperforming renovations Bulgaria, OUR-CEE (Overcoming Underperforming Renovations in Central and Eastern Europe), available at: https://our-cee.eu/wp-content/uploads/2024/07/Baseline-assessment-Bulgaria.pdf (accessed 7 October 2024).

Terziev, V., et al. (2018) "Structure of the Social Welfare System in Bulgaria" *Knowledge - International Journal*, 23(4): 1275-1281.

## Italy

Article 43 of the Italian Constitution defines 'essential public services' as those services of major public and general interest which have to be guaranteed by the state and may be managed by public institutions and/or by private firms, under strict public regulation. Law 146/1990 makes explicit reference to the need to guarantee access to sanitation, water, energy and public transport (ESPN, 2020). Energy is the only essential service monitored for poverty level, and this is undertaken by is the OIPE.

Broadly speaking, the national statistical institute (ISTAT) identifies two types of poverty thresholds, the absolute poverty threshold and the relative poverty threshold.

Absolute poverty threshold: the minimum expenditure to acquire essential goods and services that, in the Italian context, are considered to allow for a minimally acceptable standard of living. The threshold may vary depending on different variables, such as the region in which the person lives, whether the person lives in an urban or rural area, the number of people that are part of the household, and the age of the person.

Relative poverty threshold: the value depends on the components of the family considered. For a two-member household, it is equal to the average expenditure per person in the country (i.e. per capita expenditure and is obtained by dividing total household consumption expenditure by the total number of members)[47]. The 2022 relative poverty threshold for a household of two members was EUR 1,150 per month.

Comparatively speaking, Italy is among the countries with a high share of population at risk of poverty, at 22.8% in 2023, above the EU average of 21.4% (Eurostat, 2024).

### Data on essential services poverty

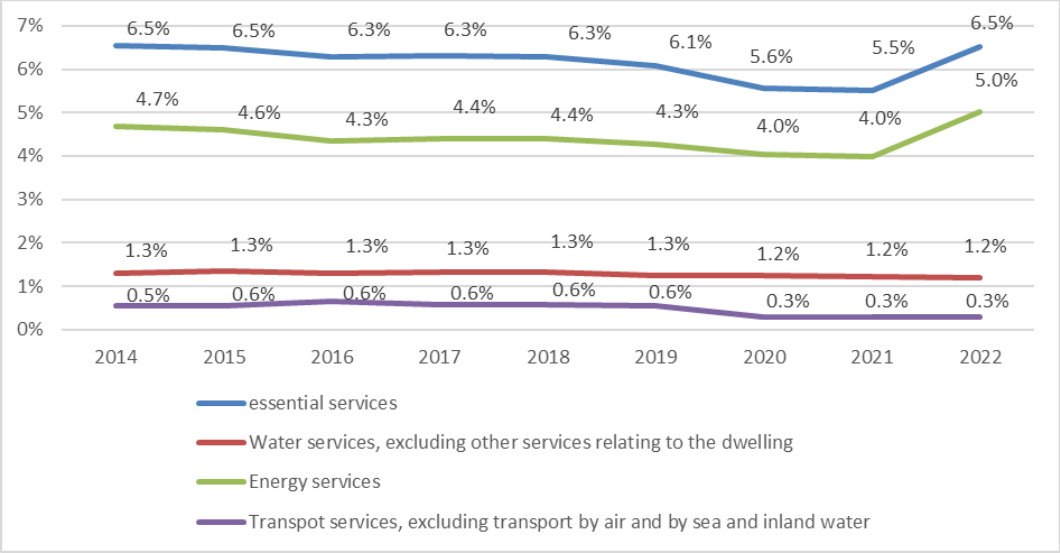
According to data on household consumption released by ISTAT, the average annual expenditure on essential services increased from EUR 1,927 in 2014 to EUR 2,346 in 2022[48]. The main drivers are increased expenditure on electricity, gas and other fuel (+31%) and water supply excluding other services (+12.2%). On the other hand, total expenditure on transport services (excluding transport by air and by sea and inland waterway) decreased (-34.4%).

The average cumulative expenditure on essential services remained stable between 2014 and 2022, at around 6.5% of average household income (see Figure 23). Both expenditure for services related to water and transport decreased over the period, from 1.3% to 1.2% and from 0.5% to 0.3% of average household income, respectively. By contrast, the share of expenses related to energy services increased from 4.7% to 5%.

[47] ISTAT (2023), ISTAT statistics on poverty – 2022, document in Italian (link)

[48] Figures based on authors' calculation of household average monthly expenditure (in current euros) indicator (link)

**Figure 23 Average household essential services expenditure as share of household income, 2014-2022**




Source: Authors' elaboration, based on HBS and EU-SILC data.

**Energy:** According to the National Energy Strategy and the 2024 NECP, energy poverty in Italy is defined as:

The difficulty of acquiring a minimum basket of energy-related goods and services or as the condition whereby access to energy services involves a diversion of resources (in terms of expenditure or income) beyond what is socially acceptable.

More concretely, according to the information provided by OIPE website, a family is said to be energy poor if:

Its energy expenditure is twice as much as the national average energy expenditure and, at the same time, the total expenditure (minus the energy expenditure) is lower than then relative poverty threshold, as identified by ISTAT, or

Its total equivalent expenditure is lower than the national median and it has zero heating expenditure[49].

As such, energy poverty cannot easily be captured by only one indicator. According to Eurostat, in 2023 and reported in **Error! Reference source not found.**, 9.5% of Italian families were not able to keep their homes adequately warm, below the EU-27 average (10.6%). Considering only those families at risk of poverty, this share increases considerably, to 21.6%, but remains lower than the EU-27 average (22.2%).

**Table 9 Share of households unable to keep home adequately warm, EU-27 average and Italy, 2014-2023**

| | | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| EU-27 | Income below 60% of median | 23.9% | 23.3% | 21.8% | 19.3% | 19% | 18.2% | 18.1% | 16.4% | 20.1% | 22.2% |
| | Total | 10.4% | 9.6% | 9% | 8.1% | 7.6% | 6.9% | 7.5% | 6.9% | 9.3% | 10.6% |
| IT | Income below 60% of | 38.3% | 35.9% | 32.4% | 29.1% | 30% | 26.3% | 17.2% | 17% | 17.6% | 21.6% |

[49] OIPE website, how to measure energy poverty (link) [Website accessed on 09/09/2024]

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | median | | | | | | | | | | |
| | Total | 18% | 17% | 16.1% | 15.2% | 14.1% | 11.1% | 8.3% | 8.1% | 8.8% | 9.5% |

Source: Eurostat inability to keep home adequately warm - EU-SILC survey (dataset: ilc_mdes01).

Similarly, the share of Italian families unable to pay their utility bills is lower than the EU-27 average (4.1% and 6.9%, respectively). The share of Italian families below the poverty threshold that have arrears on utility bills is slightly higher (9.7%) but still below the EU-27 average (16%) (see Table 10 and Table 11).

**Table 10 Harmonised Consumer Price Index (CPI), year-on-year change, annual average, 2014-2022**

| | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 |
|---|---|---|---|---|---|---|---|---|---|
| **Water supply** | 6.1% | 9.1% | 4.2% | 4.3% | 1.9% | 2.0% | 2.6% | 2.9% | 5.2% |
| **Refuse collection** | 10.8% | -2.9% | 0.9% | 0.4% | 1.0% | 0.0% | 1.1% | 1.0% | 1.3% |
| **Sewerage collection** | 6.7% | 7.9% | 4.0% | 3.5% | 0.6% | 1.0% | 4.0% | 2.2% | 4.9% |
| **Electricity, gas and other fuels** | -3.8% | -3.1% | -4.8% | 4.9% | 1.8% | -8.3% | 18.0% | 92.2% | -4.5% |
| **Passenger transport by railway** | 0.6% | -0.9% | 1.3% | -1.8% | 7.0% | 4.3% | 5.6% | -9.4% | 4.9% |
| **Passenger transport by road** | 2.4% | 0.5% | 0.2% | 0.9% | 0.9% | 0.9% | 0.7% | 1.0% | 3.0% |
| **Combined passenger transport** | 2.4% | 2.8% | 0.1% | 1.6% | 2.5% | 1.6% | 0.1% | 0.4% | 3.3% |
| **Other purchased transport services** | -0.8% | -0.2% | 0.3% | 1.3% | 1.6% | 0.7% | 1.4% | 4.4% | 4.6% |

Source: ISTAT.

**Table 11 Share of households with arrears on utility bills, EU-27 average and Italy, 2014-2023**

| | | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| EU-27 | Income below 60% of median | 23.4% | 21.9% | 19.4% | 17.4% | 16.3% | 14.9% | 15.9% | 15.9% | 15.6% | 16% |
| | Total | 10.3% | 9.4% | 8.4% | 7.3% | 6.8% | 6.2% | 6.5% | 6.4% | 6.9% | 6.9% |
| IT | Income below 60% of median | 27.6% | 28% | 18.9% | 11.2% | 10.8% | 9.9% | 15.1% | 15.8% | 10.1% | 9.7% |
| | Total | 12.2% | 12.6% | 8.9% | 4.8% | 4.5% | 4.5% | 6% | 6.5% | 5% | 4.1% |

Source: Eurostat arrears on utility bills - EU-SILC survey (dataset: ilc_mdes07).

Energy prices increased most over the period 2014-2023, with an average annual increase of 10.3% (see Table 10). However, most of the increase is linked to the energy price surge in

2022, when the price of energy increased more than 92% on a year-to-year basis. Nevertheless, Italy remains one of the Member States with energy prices above the EU-27 average. Indeed, electricity prices jumped from 0.21 EUR/kWh to 0.33 EUR/kWh in Italy over the period 2017-2023, while the EU-27 average increased only by 0.07 EUR/kWh, from 0.21 to 0.28 EUR/kWh over the same period. For gas prices, the difference between Italy and EU27 average is less prominent: gas prices for Italy and the EU-27 average increased from 0.07 and 0.06 EUR/kWh to 0.13 and 0.11 EUR/kWh, respectively (see Figure 24).

**Figure 24 Average price for energy, Italy and EU-27 average, prices in EUR per kWh**


Source: Eurostat, energy statistics – natural gas and electricity prices (datasets: nrg_pc_202 and nrg_pc_204).

However, the expenditure varies considerably when looking at families at risk of poverty and the average household. HBS data for 2022 show that families at risk of poverty spend less than EUR 56 per month on electricity, compared to EUR 70.50 national average. Their expenditure on heating is larger, with families at risk of poverty spending around 70% of the national average (EUR 407, compared to EUR 587). The difference in energy expenditure between at risk of poverty households and average households is the largest across all essential services.

**Transport:** According to the latest available EU-level data, Italy is among those countries with the lowest share of population unable to afford public transport. In 2014, 0.6% of the Italian population could not afford regular use of public transport, compared to 2.4% at EU-27 level[50]. This figure increases to 2.1% when looking at people at risk of poverty.

Expenditure on transport varied considerably over the 2014-2023 period, in part due to COVID-19 restrictions. Expenditure for transport by railway had an average annual increase of 1.3%, road transport spending increased by 1.2%, combined passenger transport by 1.6%, and other purchased transport services by 1.5% (see Table 10). The share of families unable to afford transport during certain periods of the year decreased steadily, from 9.7% in 2014 to 2.7% in 2023[51]. At national level, the HBS 2022 results show that, on average, Italian families spend almost EUR 30 per month on transport-related services, while families at risk of poverty spend EUR 27.5. These figures vary considerably across macro regions (see Table 12).

**WSS:** No data are available on the share of the population connected to essential water supply. In 2020, 88.7% of the population was connected to wastewater services (ISTAT, 2023). Italy is consistently below the EU-27 average for share of population that have neither a bath nor a shower nor an indoor flushing toilet in their house, 0.5% in Italy, compared to 1.5% at EU level. When focusing on families at risk of poverty, these figures rise to 0.8% for Italy and 5.1% for

[50] Eurostat, Persons who cannot afford a regular use of public transport by age, sex and income group EU-SILC survey, ad-hoc module (dataset: ilc_mdes13a)

[51] Istat, based on EU-SILC survey (http://dati.istat.it/Index.aspx?lang=en&SubSessionId=112133a5-bb29-4d39-b49f-89456e32abd3)

the EU-27 average[52].

Expenditure on WSS has increased steadily since 2014. Overall, water services have increased by an average of 4.3% on an annual basis, while sanitation services increased by an average of 3.9. The average household expenditure on WSS is around EUR 35 per month, falling to EUR 29 for households at risk of poverty (see Table 12).

[52] Eurostat, Total population having neither a bath, nor a shower, nor indoor flushing toilet in their household - EU-SILC survey (dataset: ilc_mdho05)

**Table 12 Average monthly expenditure across different services per macro regions, all households and at risk of poverty households, EUR, 2022**

| Macro region | Filter | Electricity | Heating | Total energy | water | Waste water | total water services | waste | transport | Total essential services |
|---|---|---|---|---|---|---|---|---|---|---|
| North-west | all | 65.40 € | 110.32 € | 170.22 € | 18.96 € | 11.28 € | 30.38 € | 17.30 € | 37.72 € | 200.55 € |
| | poor | 50.61 € | 62.81 € | 108.32 € | 15.46 € | | | 14.50 € | 30.58 € | 130.08 € |
| North-east | all | 74.36 € | 111.81 € | 176.81 € | 18.60 € | 13.19 € | 34.54 € | 16.89 € | 24.25 € | 210.58 € |
| | poor | 52.65 € | 71.47 € | 115.87 € | 15.89 € | 7.42 € | 26.49 € | 14.93 € | 28.07 € | 143.24 € |
| Centre | all | 67.59 € | 86.61 € | 150.72 € | 24.51 € | 13.43 € | 36.82 € | 22.76 € | 28.05 € | 192.70 € |
| | poor | 50.62 € | 53.78 € | 100.12 € | 20.36 € | 10.12 € | 31.50 € | 19.30 € | 26.75 € | 129.31 € |
| South | all | 70.03 € | 79.99 € | 146.03 € | 20.31 € | 19.48 € | 40.47 € | 24.19 € | 31.05 € | 186.28 € |
| | poor | 58.21 € | 47.45 € | 97.51 € | 17.03 € | 13.75 € | 31.25 € | 21.39 € | 20.36 € | 124.27 € |
| Islands | all | 83.74 € | 52.34 € | 130.92 € | 22.47 € | 16.38 € | 37.52 € | 25.16 € | 21.61 € | 172.37 € |
| | poor | 68.75 € | 35.10 € | 95.53 € | 21.59 € | | | 21.15 € | 2.92 € | 126.94 € |
| Italy | all | 70.51 € | 92.71 € | 157.86 € | 20.88 € | 13.60 € | 35.26 € | 20.67 € | 29.87 € | 194.90 € |
| | poor | 55.45 € | 54.90 € | 103.31 € | 17.69 € | 9.28 € | 29.28 € | 18.05 € | 27.54 € | 130.10 € |

Source: Authors' elaboration, based on 2022 HBS publicly available microdata, ISTAT.

## Policy context

The main instrument applied in Italy to support households at risk of poverty are in-kind benefits (Hassan et al., 2023). Only those families that have an ISEE below a certain threshold can apply for these in-kind benefits. To define the ISEE, families have to submit a substitute declaration. In 2023, there were around 10.8 million such declarations, for a total of 10.5 million families. The average value of the ISEE was EUR 15,327.81 (see Table 13).

**Table 13 DSU, applicant households, and average ISEE per macro regions, 2016-2023**

| Year | Zone | North-west | North-east | Centre | South | Islands | Italy |
|---|---|---|---|---|---|---|---|
| 2016 | No of DSU | 1,256,265 | 856,783 | 1,178,202 | 1,674,214 | 904,915 | 5,870,379 |
| | Households | 1,150,321 | 788,632 | 1,082,416 | 1,508,762 | 824,005 | 5,354,136 |
| | Average ISEE (EUR) | 13,055.14 | 12,526.60 | 14,264.89 | 9,397.51 | 9,300.38 | 11,598.86 |
| 2017 | No of DSU | 1,240,334 | 892,049 | 1,197,160 | 1,750,441 | 920,021 | 6,000,005 |
| | Households | 1,150,416 | 832,522 | 1,112,735 | 1,602,394 | 844,919 | 5,542,986 |
| | Average ISEE (EUR) | 13,673.04 | 13,348.17 | 14,440.70 | 9,834.58 | 9,391.35 | 12,001.54 |
| 2018 | No of DSU | 1,351,375 | 924,865 | 1,240,327 | 1,857,714 | 1,008,471 | 6,382,752 |
| | Households | 1,264,082 | 869,936 | 1,161,051 | 1,708,334 | 934,133 | 5,937,536 |
| | Average ISEE (EUR) | 13,683.98 | 13,601.07 | 14,350.13 | 9,567.84 | 9,152.30 | 11,887.40 |
| 2019 | No of DSU | 1,576,738 | 1,069,396 | 1,500,451 | 2,270,918 | 1,200,511 | 7,618,014 |
| | Households | 1,476,341 | 1,007,816 | 1,403,568 | 2,103,008 | 1,120,537 | 7,111,270 |
| | Average ISEE (EUR) | 13,279.23 | 13,832.69 | 13,901.52 | 9,607.44 | 9,286.74 | 11,755.76 |
| 2020 | No of DSU | 1,873,873 | 1,227,162 | 1,654,706 | 2,618,234 | 1,269,164 | 8,643,139 |
| | Households | 1,783,892 | 1,171,939 | 1,569,916 | 2,471,225 | 1,206,588 | 8,203,560 |
| | Average ISEE (EUR) | 14,830.19 | 15,681.86 | 14,705.51 | 10,361.17 | 9,827.36 | 12,838.84 |
| 2021 | No of DSU | 1,943,498 | 1,340,532 | 1,736,579 | 2,588,883 | 1,322,063 | 8,931,555 |
| | Households | 1,863,131 | 1,288,593 | 1,658,528 | 2,467,567 | 1,267,554 | 8,545,373 |
| | Average ISEE (EUR) | 14,871.05 | 15,998.77 | 14,482.58 | 10,205.93 | 9,924.57 | 12,880.37 |
| 2022 | No of DSU | 2,366,558 | 1,711,837 | 2,056,886 | 3,081,577 | 1,545,388 | 10,762,246 |
| | Households | 2,277,452 | 1,652,225 | 1,974,205 | 2,952,431 | 1,485,373 | 10,341,686 |
| | Average ISEE (EUR) | 16,442.78 | 17,806.66 | 15,951.38 | 11,935.55 | 11,319.85 | 14,539.62 |
| 2023 | No of DSU | 2,413,932 | 1,685,711 | 2,043,158 | 3,096,629 | 1,572,021 | 10,811,451 |
| | Households | 2,334,074 | 1,636,902 | 1,973,001 | 2,985,527 | 1,519,916 | 10,449,420 |

| Year | Zone | North-west | North-east | Centre | South | Islands | Italy |
|---|---|---|---|---|---|---|---|
| | Average ISEE (EUR) | 17,098.59 | 18,365.65 | 16,839.10 | 12,834.96 | 12,297.46 | 15,327.81 |

Source: National Institute for Social Security (INPS) data on DSU.

**Energy:** The energy market in Italy is an open market. However, since 1999, the 'greater protection service' has been in place to support vulnerable consumers[53]. The protected market was in place until January 2024 (gas) and July 2024 (electricity) for those consumers not considered vulnerable, while vulnerable consumers will continue to stay in the protected market.

This in-kind benefit lasts for 12 months and can be applied directly to eligible households[54]. The benefit takes the form of reduced bills for the entire household.

**Transport:** Transport is the only essential service for which the benefit is not based on in-kind benefits. Expenditure on transport may benefit from a transport-related bonus. Up until 2023, people with an ISEE lower than EUR 20,000 could request access to a bonus of EUR 60 to purchase seasonal tickets (local, regional, interregional transport services).

**WSS:** Vulnerable households can request an in-kind benefit for assistance, with eligibility based on the ISEE. In this case, the discount is based on the reduction of the consumption of water to 50 litres/habitant/day. In other words, the authority provides up to 50 litres/habitant/day of free water to vulnerable households. The water bonus is covered through the equalisation charge UI-3 paid by those not eligible for the bonus.

**Information and data sources for Italy:**


Eurostat, Arrears on utility bills, Online data code: ilc_mdes07, DOI: 10.2908/ilc_mdes07, available at: https://ec.europa.eu/eurostat/databrowser/view/ilc_mdes07/default/table

Eurostat, Electricity prices for household consumers - bi-annual data (from 2007 onwards), Online data code: nrg_pc_204, DOI: 10.2908/nrg_pc_204, available at: https://ec.europa.eu/eurostat/databrowser/view/nrg_pc_204/default/line?lang=en

Eurostat, Gas prices for household consumers - bi-annual data (from 2007 onwards) Online data code: nrg_pc_202, DOI:10.2908/nrg_pc_202, available at: https://ec.europa.eu/eurostat/databrowser/view/nrg_pc_202/default/table?lang=en

Eurostat inability to keep home adequately warm, Online data code: ilc_mdes01, DOI: 10.2908/ilc_mdes01
https://ec.europa.eu/eurostat/databrowser/view/ilc_mdes01/default/table?lang=en

Eurostat, Persons at risk of poverty or social exclusion by age and sex, Online data code:ilc_peps01n, DOI:10.2908/ilc_peps01n, available at: https://ec.europa.eu/eurostat/databrowser/view/ILC_PEPS01N__custom_12849864/default/table?lang=en (accessed 09 October 2024).

Eurostat, Total population having neither a bath, nor a shower, nor indoor flushing toilet in their household, Online data code: ilc_mdho05, DOI:10.2908/ilc_mdho05, available at: https://ec.europa.eu/eurostat/databrowser/view/ILC_MDHO05/default/table?lang=en

Hassan, E., Neumann, T., Siöland, L., Akbaba, B., Gasperini, M., Finello, F., Cinova, D., & Eichler, T. (2023). Access to essential services: Evidence from EU Member States – final synthesis report. European Commission, Directorate-General for Employment, Social Affairs and Inclusion. Available at: https://op.europa.eu/en/publication-detail/-/publication/10.2767/44461.

ISTAT (2023). Annuario Statistico Italiano 2023. https://www.istat.it/produzione-editoriale/annuario-statistico-italiano-2023/

ISTAT (2024) Indagine sulle spese delle famiglie, 2022
https://www.istat.it/microdati/indagine-sulle-spese-delle-famiglie-2/


[53] Decreto Legislativo 16 marzo 1999, n. 79 https://www.normattiva.it/uri-res/N2Ls?urn:nir:stato:decreto.legislativo:1999-03-16;79~art4

[54] https://www.arera.it/atti-e-provvedimenti/dettaglio/21/063-21

National Institute for Social Security (INPS), Statistics on Single Substitute Declarations and average Equivalent Economic Situation Indicator (ISEE) https://servizi2.inps.it/servizi/osservatoristatistici/76/o/482

Ministero dell'Ambiente e della Sicurezza Energetica, (2017). Strategia Energetica Nazionale. https://www.mase.gov.it/comunicati/strategia-energetica-nazionale-2017

Ministero dell'Ambiente e della Sicurezza Energetica, (2024). Piano nazionale integrato per l'energia e il clima. https://www.mase.gov.it/sites/default/files/PNIEC_2024_revfin_01072024.pdf

## Sweden

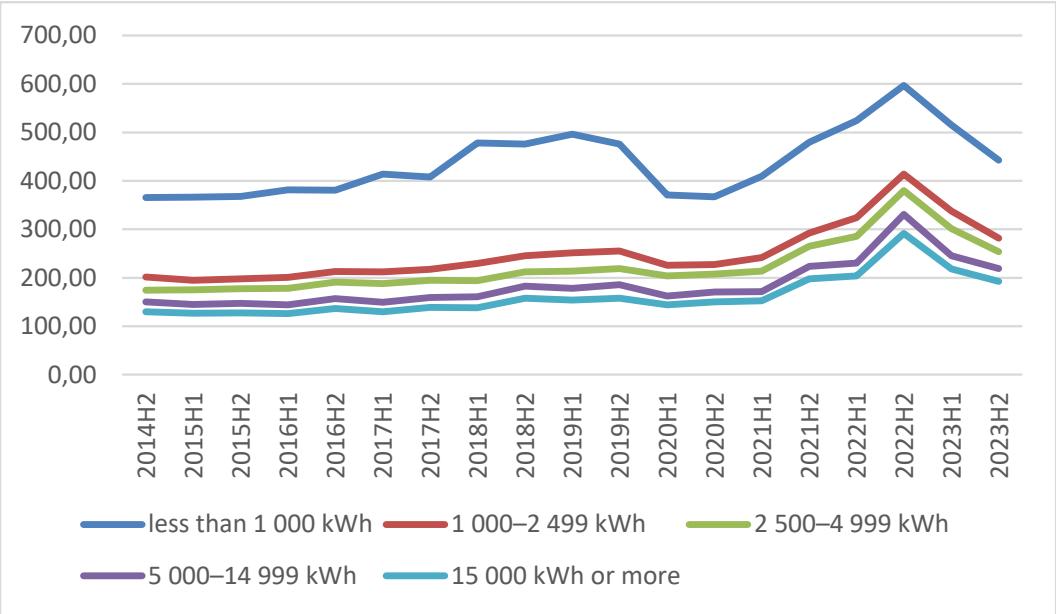
Historically, Sweden has been one of the richest countries in the EU. Compared to Bulgaria and Italy, Sweden is consistently one of the Member States with lower shares of population at risk of poverty compared to the EU average. In 2023, 18.4% of Swedish population was at risk of poverty and social exclusion, compared to the EU average of 21.4% (Eurostat, 2023). Sweden does not have a national definition for essential services, either as a whole or individually (DG EMPL, 2023b).

### Data on essential services poverty

The latest available edition of the HBS in Sweden is 2021. According to the Swedish Statistics Agency (SCB) (2021), households allocate a significant proportion of their budget to essential items such as food, housing and transport. On average, all households spent 12.6% of their total expenditure on food, 21.9% on housing, water, electricity, gas and other fuels and 14.9% on transport. Due to data limitations, it is not possible to present the evolution of that expenditure over time. The SCB does not provide historical data that allow for a direct comparison of expenditure patterns. The only data available prior to 2021 is from 2006-2009, which is aggregated in a way that makes it non-comparable to the 2021 figures. The data do not separate specific expenditure, such as water or energy costs, which are instead grouped under broader housing-related categories.

**Energy**: Over the past two decades, incomes in Sweden have increased steadily, more than doubling from SEK 169 700 (EUR 19 732) in 1999 to SEK 348 600 (EUR 33 200) in 2022 (SCB, 2024). However, from 2014 onwards, the contrast between income growth and electricity prices is striking. From 2014 to 2022, average income in Sweden rose by approximately 30%. In contrast, electricity prices for households saw a dramatic increase of over 80% during the same period. This disproportionate rise in electricity costs relative to income suggests that energy affordability is an increasing concern for many Swedish households.

**Figure 25 Evolution of electricity prices for households, CSEK/kWh[55], 2014-2022**




Source: Swedish Statistical Office (2024).

This concern is reflected in the growing number of households struggling to keep their homes adequately warm, particularly in recent years. While the EU average for households unable to afford adequate heating has generally decreased since 2014, Sweden's situation has worsened. The percentage of households facing this challenge increased sharply, from 1.1% in 2014 to 5.9% in 2023, with the most substantial rises occurring in the last two years (see Table 15**Error! Reference source not found.**). This surge is alarming, given Sweden's harsh winter climate, where adequate heating is essential for health and safety. In addition, the proportion of people with arrears on utility bills also increased, from 2.2% in 2017 and 2018 to 3.3% in 2023 (see Table 14). These trends highlight growing energy poverty in Sweden, where more households are unable to afford their energy needs, despite overall income growth.

**Transport**: Transport poverty in Sweden can be examined through households' access to public transportation, as captured by data from the SCB. Between 2014 and 2022, a consistent majority of all residences in Sweden were located in close proximity to public transport stops, with 78.6% of all residences within 400 metres of a stop in 2022. This percentage was higher for newly constructed housing, with 85.0% of new residences built within that range in 2022. This trend of prioritising proximity to public transport in new developments is also evident within larger distance ranges, with 98.0% of new residences in 2022 being within 2000 metres of a transport stop. The data indicate that the national infrastructure and urban planning strategies have successfully maintained or improved access to public transport over the years. This commitment helps to mitigate the risk of transport poverty by reducing reliance on private vehicles and ensuring that public transport remains a viable option for a large segment of the population (SCB, 2024).

However, according to 2023 data from the SCB, only 67% of respondents rate the ease of using public transport for everyday travel, such as commuting to work or school, as good or very good. The remaining 33.1% rate it as poor or very poor, indicating that while public

[55] CSEK represents cent SEK, referring to hundredths of a Swedish Krona (1 SEK = 100 CSEK). According to the exchange rate from October 2024, 11 301 SEK = 1 EUR. See https://www.ecb.europa.eu/stats/policy_and_exchange_rates/euro_reference_exchange_rates/html/eurofxref-graph-sek.en.html. EUR values for years before 2024 have been calculated using historical exchange rates.

transport is generally accessible, a significant portion of the population faces challenges.

**WSS:** Since 2012, Sweden has seen a notable increase in the number of people connected to essential water and wastewater services. In 2012, about 82.9% of the population (roughly 8.2 million people) were connected to the public water network. By 2022, this figure had risen to approximately 93.1% (9.3 million people). This represents an increase of around 1.1 million people gaining access to public water services over the decade.

Similarly, the percentage of the population connected to the public wastewater network also rose: in 2012, around 8.1 million people were connected, roughly 82.3% of the population. By 2022, this number had increased to about 9.2 million people, 92.5% of the population, reflecting an increase of approximately 1.1 million individuals gaining access to public wastewater services. This growth in connectivity underscores Sweden's ongoing efforts to improve access to essential services (for an overview of population connected to public water and wastewater network since 1960 see Table 16). According to Eurostat's EU-SILC survey, there is no segment of the population in Sweden with neither a bath nor a shower nor an indoor flushing toilet in their house (EU-SILC, 2024).

## Policy context

Due to the structure of the Swedish welfare system, there are limited targeted measures to support access to specific services. Essential services are generally considered part of the basic standard of living and are provided through financial assistance to low-income households (DG EMPL, 2023b) Costs for energy, water, and sanitation are usually included in the rent for Swedish homes, meaning there are no separate support payments for these expenses. Transport, specifically work-related travel, is covered under the social assistance benefit for consumption items (DG EMPL, 2023b).

**Energy:** Costs for household energy usage are generally covered by the social assistance benefit and housing allowance (DG EMPL, 2023b). During the energy crisis in 2022 and 2023, the Swedish government implemented several measures to protect households from the impact of rising energy prices. One key initiative was a temporary progressive compensation scheme introduced in January 2022. This scheme provided financial relief to households with high electricity consumption, offering up to SEK 2,000 per month for three months (Nordic Energy Research, 2024). Additionally, a subsidy scheme targeted households in southern Sweden, where energy prices were particularly high. Compensation was provided based on electricity consumption, with higher rates for those in the hardest-hit regions (Nordic Energy Research, 2024). The government also introduced subsidies to encourage energy efficiency improvements, covering 50% of the costs for installing insulation and heat pumps in residential properties. This aimed to reduce energy bills and promote long-term sustainability (Nordic Energy Research, 2024).

To further support vulnerable families, the government temporarily increased the housing allowance for families with children, providing an additional allowance capped at 134 400 CSEK (EUR 128) per month from July to December 2022 (Nordic Energy Research, 2024). However, these measures faced criticism for not always effectively targeting those most in need. The broad approach of the electricity support scheme, which compensated based on consumption, sometimes resulted in supports going to households not severely impacted by the crisis (Nordic Energy Research, 2024).

**Transport:** Public transport in Sweden operates under the Public Transport Act[56] (Riksdagen, 2010) which assigns responsibility for managing public transportation to regional or municipal authorities. As a result, public transport strategies can differ across various parts of the country. National measures are in place to support work commutes, including a tax deduction for those whose travel time would increase by at least two hours per day if they used public transport

[56] Lag (2010:1065) om kollektivtrafik.

instead of a private vehicle. Additionally, young people and pensioners are eligible for a reduced public transport rate (DG EMPL, 2023b).

**WSS:** The Swedish Law on Public Water Services mandates that municipalities must provide water and sanitation services to areas classified as 'larger contexts'[57]. This typically excludes isolated homes in sparsely populated areas, which are responsible for their own water and sewage. Once an area reaches a sufficient number, usually around 20-30 households, the municipality is obliged to supply these services, and all households must connect and pay for access[58]. If infrastructure costs are significantly higher due to geographical factors, an additional tax may be imposed.

For low-income households, WSS costs are generally covered by social assistance benefits (DG EMPL, 2023b). The 2020 government inquiry on drinking water concluded that no legislative changes were needed to meet the DWD, as issues of access are largely due to a lack of permanent housing, which should be addressed by the Social Services Act (DG EMPL, 2023b).

**Table 14 Share of households with arrears on utility bills, EU-27 average and Sweden, 2014-2023**

| | | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| EU-27 | Income below 60% of median | 23.4% | 21.9% | 19.4% | 17.4% | 16.3% | 14.9% | 15.9% | 15.9% | 15.6% | 16% |
| | Total | 10.3% | 9.4% | 8.4% | 7.3% | 6.8% | 6.2% | 6.5% | 6.4% | 6.9% | 6.9% |
| Swe-den | Income below 60% of median | 9.5% | 8.5% | 6.3% | 6.4% | 5.6% | .7,4% | 7.3% | 8.7% | 8.7% | 7.0% |
| | Total | 3.6% | 3.2% | 2.6% | 2.2% | 2.2% | 2.3% | 2.4% | 2.2% | 3.6% | 3.3% |

Source : Eurostat arrears on utility bills - EU-SILC survey (dataset: ilc_mdes07).

**Table 15 Share of households unable to keep home adequately warm, EU-27 average and Sweden, 2014-2023**

| | | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| EU-27 | Income below 60% of median | 23.9% | 23.3% | 21.8% | 19.3% | 19% | 18.2% | 18.1% | 16.4% | 20.1% | 22.2% |
| | Total | 10.4% | 9.6% | 9% | 8.1% | 7.6% | 6.9% | 7.5% | 6.9% | 9.3% | 10.6% |
| Swe-den | Income below 60% of median | 2.9% | 2.5% | 4.6% | 5.3% | 4.6% | 4.9% | 6.9% | 3.3% | 5.5% | 8.4% |
| | Total | 1.1% | 1.2% | 2.6% | 2.1% | 2.3% | 1.9% | 2.7% | 1.7% | 3.3% | 5.9% |

Source: Eurostat inability to keep home adequately warm - EU-SILC survey (dataset: ilc_mdes01).

[57] Lag (2006:412) om allmänna vattentjänster, 6 §.

[58] Government proposition (2005/06:78), 'Allmänna vattentjänster', p. 29.

**Table 16 Population connected to public network, by year, water and wastewater, Sweden, 1960-2022**

| | Water | | | Wastewater | | |
|---|---|---|---|---|---|---|
| | Connected to public network | Not connected to public network | Total population | Connected to public network | Not connected to public network | Total population |
| 1960 | 3704000 | 3793967 | 7497967 | 3654000 | 3843967 | 7497967 |
| 1965 | 5417900 | 2354606 | 7772506 | 5564000 | 2208506 | 7772506 |
| 1970 | 6124273 | 1956956 | 8081229 | 6115642 | 1965587 | 8081229 |
| 1975 | 6925000 | 1283442 | 8208442 | 7102000 | 1106442 | 8208442 |
| 1980 | 7080600 | 1237337 | 8317937 | 7070000 | 1247937 | 8317937 |
| 1985 | 7209000 | 1149139 | 8358139 | 7185000 | 1173139 | 8358139 |
| 1990 | 7413000 | 1177630 | 8590630 | 7362000 | 1228630 | 8590630 |
| 1993 | 7541000 | 1204109 | 8745109 | 7496000 | 1249109 | 8745109 |
| 2000 | 7599934 | 1282858 | 8882792 | 7557384 | 1325408 | 8882792 |
| 2005 | 7789669 | 1258083 | 9047752 | 7735811 | 1311941 | 9047752 |
| 2010 | 8177122 | 1238448 | 9415570 | 8117245 | 1298325 | 9415570 |
| 2014 | 8550812 | 1196543 | 9747355 | 8488319 | 1259036 | 9747355 |
| 2015 | 8648272 | 1202745 | 9851017 | 8585359 | 1265658 | 9851017 |
| 2016 | 8784075 | 1211078 | 9995153 | 8720871 | 1274282 | 9995153 |
| 2017 | 8920726 | 1199516 | 10120242 | 8857045 | 1263197 | 10120242 |
| 2018 | 9024963 | 1205222 | 10230185 | 8961167 | 1269018 | 10230185 |
| 2019 | 9120416 | 1207173 | 10327589 | 9057135 | 1270454 | 10327589 |
| 2020 | 9191728 | 1187567 | 10379295 | 9126333 | 1252962 | 10379295 |
| 2021 | 9252967 | 1199359 | 10452326 | 9187732 | 1264594 | 10452326 |
| 2022 | 9319378 | 1202178 | 10521556 | 9254391 | 1267165 | 10521556 |

Source: Swedish Statistical Office (2024). Internal reference code: 000000YE.

### Information and data sources for Sweden:


Avfall Sverige (2022). Avfall under kommunens ansvar. Available at: https://www.avfallsverige.se/fakta-statistik/kommunalt-ansvar/avfall-under-kommunens-ansvar/ (Accessed 30 August 2024).

Avfall Sverige (2022). Taxor och avgifter. Available at: https://www.avfallsverige.se/fakta-statistik/kommunalt-ansvar/ekonomi-och-styrmedel/taxor-och-avgifter/ (Accessed 30 August 2024).

Council for the Promotion of Municipal Analyses (RKA) (n.d.). Data retrieved from KOLADA.SE, based on data from Avfall Sverige. Available at: https://kolada.se/verktyg/fri-sokning/?kpis=97254,97258,97259&years=30200,30199,30198&municipals=146551&rows=municipal,kpi&visualization=bar-chart (Accessed 30 August 2024).

EU-SILC (2024) Share of total population not having indoor flushing toilet for the sole use of their household. Online data code: tessi294. DOI: 10.2908/tessi294. Last updated: 1 October 2024. Available at: [URL, if available] (Accessed 18 August 2024).

Eurostat (2024). Arrears on utility bills - EU-SILC survey. Available at: https://ec.europa.eu/eurostat/databrowser/view/ilc_mdes07__custom_12714940/default/table

?lang=en (Accessed 14 August 2024).

Eurostat (2024). Population unable to keep home adequately warm by poverty status. Available at: https://ec.europa.eu/eurostat/databrowser/view/sdg_07_60/default/table?lang=en (Accessed 30 August 2024).

Eurostat (2024) People at risk of poverty or social exclusion by age and sex - EU-SILC survey. Available at: https://ec.europa.eu/eurostat/databrowser/view/ilc_peps01n__custom_11655562/bookmark/table?lang=en&bookmarkId=1fe5fbf6-51a6-4b4b-a0d5-b9e715618a34 (Accessed 14 August 2024).

Government proposition (2005/06:78), 'Allmänna vattentjänster'. Available at: https://www.riksdagen.se/sv/dokument-lagar/dokument/proposition/allmanna-vattentjanster_GT0378 (Accessed 30 August 2024).

Hassan, E., Neumann, T., Siöland, L., Akbaba, B., Gasperini, M., Finello, F., Cinova, D., & Eichler, T. (2023). Access to essential services: Evidence from EU Member States – final synthesis report. European Commission, Directorate-General for Employment, Social Affairs and Inclusion. Available at: https://op.europa.eu/en/publication-detail/-/publication/10.2767/44461.

Lag (2006:412) om allmänna vattentjänster, 6 §. Available at: https://www.riksdagen.se/sv/dokument-lagar/dokument/svensk-forfattningssamling/lag-2006412-om-allmanna-vattentjanster_sfs-2006-412 (Accessed 30 August 2024).

Lag (2010:1065) om kollektivtrafik. Available at: https://www.riksdagen.se/sv/dokument-lagar/dokument/svensk-forfattningssamling/lag-20101065-om-kollektivtrafik_sfs-2010-1065 (Accessed 30 August 2024).

Nordic Energy Research (2024) *Policy measures to reduce energy poverty*. Available at: https://pub.norden.org/nordicenergyresearch2024-02/6-policy-measures-to-reduce-energy-poverty.html

Riksdagen (2010) Law (2010:1065) on Public Transport. Available at: https://www.riksdagen.se/sv/dokument-och-lagar/dokument/svensk-forfattningssamling/lag-20101065-om-kollektivtrafik_sfs-2010-1065/ (accessed 18 August 2024)

Swedish Statistical Office (2024). Citizens' views on climate and environmental work by municipality, citizens' background, table contents and year. Available at: https://www.statistikdatabasen.scb.se/pxweb/sv/ssd/START__ME__ME0003__ME0003J/MedborgKlimatMiljo/ (Accessed 30 August 2024).

Swedish Statistical Office (2024). Data on usual resident population connected to public water and wastewater services. Available at: https://www.statistikdatabasen.scb.se/pxweb/en/ssd/START__MI__MI0902__MI0902C/MI0902T05/ (Accessed 30 August 2024).

Swedish Statistical Office (2024). Dwellings close to public transport, share by region, distance from stop, dwelling stock and year. Available at: https://www.statistikdatabasen.scb.se/pxweb/en/ssd/START__MI__MI1303/BostKollnaraN/ (Accessed 30 August 2024).

Swedish Statistical Office (2024). Electricity prices for households by consumer category. Half-year 2014H2 - 2023H2. Available at: https://www.statistikdatabasen.scb.se/pxweb/en/ssd/START__EN__EN0301__EN0301A/SSDHalvarElHus/ (Accessed 30 August 2024).

Statistics Sweden (2021). Household Budget Survey. Available at: https://www.statistikdatabasen.scb.se/pxweb/en/ssd/START__HE__HE0201/ (Accessed 30

August 2024).

Swedish Statistical Office (2024). Möjligheterna att på ett enkelt sätt använda kollektivtrafiken för dina vardagliga resor. Statistikdatabasen. Available at: https://www.statistikdatabasen.scb.se/pxweb/sv/ssd/START__ME__ME0003__ME0003E/MedborgResor/

Swedish Statistical Office (2024) Total earned income, mean income for persons registered in the national population register during the whole year by sex, age, income bracket and year. Statistical database. Latest update: 23 January 2024.

# Annex 5: Regression Analysis

The data source for this analysis is the 2020 Household Budget Survey for Bulgaria and Italy.

The dependent variable of this model is a binary indicating if a household is essential services poor, defined as such if the household spends 23% or more of total expenditures on essential services. The dataset for Bulgarian is comprised of 2,952 households, of which, 10.3% are essential services poor. The dataset for Italy contains 25,668 households, of which 1.16% are essential services poor.

The calculation of the proportion of expenditure spent on essential services follows that of Eurostat and is based on European Classification of Individual Consumption according to Purpose (ECOICOP), excluding financial and internet services. Water and sanitation expenditure is the total of expenditures on water supply (EUR_HE0441), refuse collection (EUR_HE0442), and sewage collection (EUR_HE0443). Energy expenditure is electricity, gas, and other fuels (EUR_HE045). Transportation expenditure is transport services (EUR_HE073) minus air (EUR_HE0733) and sea and inland waterway (EUR_HE0734) transport. Th

A probit regression was selected to identify characteristics of households that would increase the probability of being essential services poor. It is important to note that significance does not equate to causality, a more sophisticated model with greater data requirements would be needed to do so. For example, in the Italian regression results, if the sex of the person of reference is female there is a higher probability that the household will be essential services poor. This does not mean that because the reference person is female the household is essential services poor, instead it likely indicates that women have a high probability of being essential services poor because of factors linked to their sex, including lower wages than men. Note that the results of the probit model presented in Table 17 are the marginal effects of the probit model, selected for ease of interpretation.

The variables selected for inclusion in the models varied slightly by country. To understand the role of income in essential services poverty, in Bulgaria total income of the household was included, while in Italy the imputed rental price was used as a proxy for income, since it was not reported to Eurostat by the Italian Statistical Office. For ease of interpretation, the natural log of both variables was taken allowing the coefficient to be read as the increased/decreased probability of being essential services poor given a 1% change in the income or rental value.

The regressions than included characteristics of the household's person of reference. This concept is defined as the person in the household who is supposed to be "representative" of the household and is thus used to classify the household and define its sampling weight[59]. The characteristics selected included sex (1 if female, 0 if male), marital status (1 if married, 0 if otherwise), education (1 if tertiary education achieved, 0 if otherwise), their age (by categories 15-29, 30-44, 45-59, and 60 and above), and whether they are retired (1 if retired, 0 if otherwise). The final variables reflect the composition and location of the household. Specifically, the number of persons in the household that are of working age (16 to 64) and are economically active. This is complimented by the number of persons in the household that are not economically active, this can be because of age, those younger than 16 or older than 64, or those of working age that are not working. Finally, a binary location variable is included which indicates if the household is residing in the NUTS (Nomenclature d'unités territoriales statistiques) 1 region of the country that includes the capital. In Bulgaria this is the southeast and southwest region and in Italy the central region.

[59] Eurostat. 2023. Household Budget Survey 2020 Scientific-use files User Manual. Available at : https://ec.europa.eu/eurostat/documents/203647/7610424/HBS_2020_User+manual_22+countries.pdf/e7e13803-03d6-292d-07bd-432b48a358b3?t=1692628728272

**Table 17 Marginal Effects of Probit Model - Probability of Being Essential Services Poor in Bulgaria & Italy in 2020**

| VARIABLES | Bulgaria | Italy |
|---|---|---|
| Net income (natural log) | -0.102*** | |
| | (0.014) | |
| Imputed rent (natural log) | | -0.008*** |
| | | (0.001) |
| Person of reference is female | 0.005 | 0.005*** |
| | (0.012) | (0.002) |
| Person of reference is married | 0.017 | 0.002 |
| | (0.013) | (0.003) |
| Person of reference has tertiary education | -0.065*** | 0.001 |
| | (0.016) | (0.003) |
| Age categories of person of reference 30 to_44 | 0.008 | 0.002 |
| | (0.030) | (0.001) |
| Age categories of person of reference 45 to 59 | 0.074** | 0.009*** |
| | (0.031) | (0.002) |
| Age categories of person of reference 60_and older | 0.070** | 0.013*** |
| | (0.031) | (0.002) |
| Person of reference is retired | 0.018 | -0.001 |
| | (0.019) | (0.002) |
| Number of persons aged 16-64 in household who are at work | 0.013 | -0.006*** |
| | (0.011) | (0.002) |
| Number of persons in household who are NOT at work | 0.022*** | -0.002 |
| | (0.005) | (0.001) |
| NUTS1 Region including the capital | -0.008 | -0.007*** |
| | (0.011) | (0.002) |
| | | |
| Observations | 2,952 | 22,196 |
| F-test | 16.26 | 10.30 |
| Prob > F | 0 | 0 |

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

### In Bulgaria:

Net income: A 1% increase in net income decreases the probability of being essential services poor by 10.2%.

Tertiary education: The obtainment of such a degree decreases the probability of being essential services poor by 6.5%.

Age: Households with a person of reference 45 years or older have a 7% greater probability of being essential services poor than a person of reference between 15 and 29 years of age.

Economic activity: Having one more person in a household who is not economically active,

including persons under the age of 15 or over the age of 65, as well as unemployed persons of working age, increase the probability of essential services poverty by 2.2%.

**In Italy:**

Imputed rental value: A 1% increase in the imputed rental value of a dwelling decreases the probability of being essential services poor by 0.8%.

Economic activity: The presence of another person of working age who is economically active results in a 0.6% decrease in the probability of being essential services poor.

Location: Living in Lazio, the Italian region containing the capital Rome, decreases the probability of being essential services poor by 0.7%.

Female: A female person of reference increases the probability of the household being essential services poor by 0.5 %.

Age: Households with a person of reference 45 years and older have between a 0.9 % and 1.3 % greater probability of being essential services poor.

# Annex 6: Description of Megatrends

**Climate change:** Human activities, particularly the emission of greenhouse gases from fossil fuel burning, agriculture, and deforestation, are driving global warming and altering climate patterns. These changes are unprecedented over millennia and are expected to persist, posing severe threats to natural ecosystems, biodiversity, economic growth, food security, and human health. The impacts, including more frequent and intense extreme weather events, sea-level rise, and shifts in agricultural productivity, are expected to increase, particularly affecting disadvantaged populations. While mitigation and adaptation efforts can reduce risks, the potential for pervasive and irreversible damage remains high (JRC, 2023; EEA, 2015).

**Environmental degradation**: Since the industrial revolution, environmental pollution has become a global problem affecting air, water, soil and ecosystems, with direct impacts on human health and well-being. Driven by rapid population growth, industrialisation, increased consumption and mobility, pollution is primarily caused by the burning of fossil fuels, agricultural practices involving synthetic fertilisers and pesticides, and the widespread use of chemicals. This has led to significant emissions of pollutants such as nitrogen oxides, ammonia and ozone precursors, contributing to air and water pollution, soil contamination and ecosystem degradation. The continuing increase in pollution, particularly in rapidly developing regions, poses a continuing threat to biodiversity, food security and the environment on a global scale (EEA, 2015).

**Aggravating resource scarcity:** The Aggravating Resource Scarcity megatrend highlights the increasing global demand for water, food, energy, land, and minerals, which is outpacing the Earth's capacity to provide these resources sustainably (JRC, 2023).

**Changing geo-political landscape (i.e. security paradigm, expanding influence of East and South, etc.):** The "Changing Geo-Political Landscape" megatrend describes the ongoing shift in global power dynamics, marked by the rising influence of emerging economies in the East and South, particularly China and India, alongside increasing geopolitical fragmentation. This shift is accompanied by new and evolving security challenges, such as hybrid warfare, the race for technological and space dominance, and the need for strategic autonomy. Together, these factors are reshaping international relations and the global balance of power.

**Continuing urbanisation:** The continuing urbanization megatrend highlights the ongoing global shift of populations from rural to urban areas, with the number of city dwellers projected to reach 5 billion by 2050 (JRC, 2023). While urbanization drives economic productivity and development, it also poses challenges such as environmental strain, public health issues, and growing inequalities, necessitating sustainable urban planning and management (JRC, 2023).

**Widening inequalities:** This megatrend highlights the persistent and expanding gaps in education, labour markets, health, gender equality, and wealth distribution worldwide, despite some areas of improvement. Although the number of people in extreme poverty has decreased, the divide between the richest and poorest segments of society continues to grow (JRC, 2023).

**Growing consumption:** This megatrend highlights the rapid expansion of the global middle class, projected to reach nearly 5 billion people by 2030, bringing with it increased purchasing power and demand. This surge in consumerism, particularly in emerging economies, is reshaping global production systems and intensifying the strain on resources such as food, water, and energy.

**Demographic changes – i.e. – ageing population:** This megatrend highlights the complex and evolving dynamics of global demographics. By 2050, the world's population is projected to reach 9.7 billion, with rapid growth primarily in Sub-Saharan Africa, while many developed countries face stagnating or declining populations and an ageing demographic. Concurrently, migration has become an increasingly significant and complex global phenomenon, driven by

economic opportunities, conflict, and environmental factors. These demographic shifts will have strong implications for labour markets, social systems, and geopolitical stability.

**Accelerating Technological Change Megatrend**: The rapid acceleration of technological innovation, especially in information, communication, nanotechnology, and biotechnology, is creating unprecedented opportunities. These advancements can help reduce environmental impact, decrease reliance on non-renewable resources, and foster green growth and improved lifestyles. However, the risks associated with these technologies must be carefully managed through the application of the precautionary principle and robust regulatory frameworks. By updating its institutions and policies, Europe can better manage these risks while promoting innovation and the adoption of new technologies (EEA, 2015).