Romania Energy Poverty Assessment

Understanding and Addressing Energy Poverty in Romania: Exploring the Roles of Structural and Behavioral Constraints

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Acknowledgments

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ABBREVIATIONS AND ACRONYMS

ANRE	National Energy Regulatory Agency
AROP	At-Risk-Of-Poverty
B20	Bottom 20
CAPP	Clean Air Priority Program
CATI	Computer-Assisted Telephone Interview
CEE	Central and Eastern Europe
CEQ	Commitment to Equity
CT	Cash Transfer
EC	European Commission
ECA	Europe and Central Asia
ECAPOV	Europe and Central Asia Poverty Database
EPAH	Energy Poverty Advisory Hub
ESMAP	Energy Sector Management Assistance Program
EU	European Union
EU EPOV	European Union Energy Poverty Observatory
EUROSTAT	European Statistical Office
EU-SILC	European Union Statistics on Income and Living Conditions
FGD	Focus Group Discussion
GDP	Gross Domestic Product
GMI	Guaranteed Minimum Income
GRM	Grievance Redress Mechanism
GWH	Gigawatt-Hour
HBS	Household Budget Surveys
HICP	Harmonised Index of Consumer Prices
IDI	In-Depth Interview
IHSN	International Household Survey Network
IMF	International Monetary Fund
ISR	Social Reference Indicator
KGOE	Kilogram Of Oil Equivalent
KTOE	Kiloton Of Oil Equivalent
KW	Kilowatt
KWH	Kilowatt-Hour
LIHC	Low-Income High Cost
LPG	Liquid Petroleum Gas
LTRS	Long-Term Renovation Strategy
MTF	Multi-Tier Framework for Measuring Energy Access
M/2	Energy Expenditure Share below One Half of the Median
NECP	National Energy and Climate Plan
NRRP	National Recovery and Resilience Plan
PPP	Purchasing Power Parity
P10	Energy Expenditure Share above 10 Percent
SCF	Social Climate Fund
SEforALL	Sustainable Energy for All
2M	Energy Expenditure Share at least Two Times the Median
WHO	World Health Organization

Executive Summary

Why is addressing energy poverty key for economic development?

Addressing energy poverty is paramount for economic development, given its close connection to income poverty. Research indicates that lower-income households are disproportionately affected by energy price increases. Such households lack the financial means to absorb these shocks, which can lead to decreased overall welfare. This vulnerability can result in households' refraining from using energy or using less efficient and dirtier technologies and sources, particularly during winter, which poses health risks. Variations in impact exist across welfare distribution and population subgroups, with studies highlighting the heightened vulnerability of elderly populations and lower-income households to energy poverty. Energy price increases thus have the potential to exacerbate existing disparities as well as push more households into monetary poverty. Therefore, considering different population groups, a comprehensive analysis of the multidimensional aspects of poverty and vulnerability that considers different population groups is essential.

Moreover, global evidence suggests that residing in energy-deprived circumstances adversely affects overall well-being, human development, and environmental outcomes. Individuals in energy-poor households face an increased likelihood of developing respiratory and cardiac ailments due to uncomfortable temperatures and exposure to particulate matter and experience mental health challenges linked to the stress of paying for energy. Research spanning 50 developing countries reveals that a reduction in energy poverty is associated with improved health and education outcomes, with electricity access exerting a more pronounced effect than energy use. The impact of energy poverty on mental health, exacerbated during economic crises, is evidenced by studies showing a correlation with mental health issues, particularly depression. Environmental consequences, including deforestation and greenhouse gas emissions, contribute to public health concerns such as indoor air pollution and physical injuries during fuelwood collection and combustion. Furthermore, energy poverty disproportionately affects gender equity and educational prospects, particularly for women who bear the physical risks of fuel collection. Time-related effects, such as the need to gather fuel and attend to energy-related tasks, impact school attendance and contribute to increased absenteeism due to illnesses.

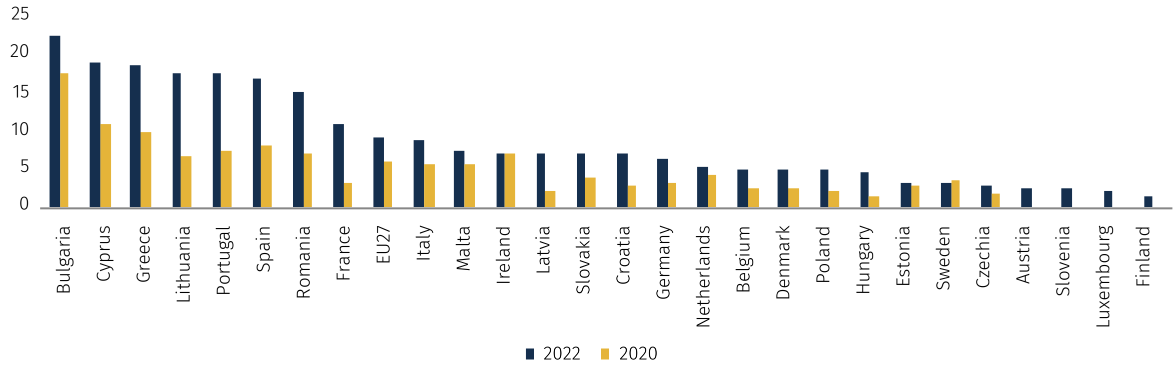
The imperative to measure and address energy poverty in Romania is underscored by the potential development benefits and the European Commission's prioritization of this issue within the European Just Transition context. As part of the Clean Energy for All Europeans legislative package, the European Commission (EC) has established the EU Energy Poverty Observatory (EPOV) to assist Member States (now the Energy Poverty Advisory Hub, EPAH), emphasizing the importance of mitigating energy poverty for improved well-being, environmental outcomes, and cost savings. In the Romanian context, addressing energy poverty is crucial, especially given the impact of the energy crisis on vulnerable consumers, necessitating prompt implementation of measures outlined in the REPower EU package within the Romanian National Recovery and Resilience Plan (NRRP). However, limited evidence exists comprehensively grasping the diverse factors influencing energy poverty in Romania, highlighting the need for robust research. This report aims to fill that gap by providing evidence on critical questions about the energy status of Romanian households.

The report focuses on four key topics, relying on existing official household surveys and new qualitative and quantitative data collected in June–July 2023, with the aim of providing an updated snapshot of energy vulnerability among Romanian households. The key topics include (1) Romania's standing on access to affordable, reliable, and sustainable energy among households; (2) structural and behavioral barriers hindering households from transitioning out of energy poverty, with a focus on sustainable heating transitions; (3) the impact of the rising energy prices on energy poverty and welfare; and (4) promising policy actions to reduce the energy burden on low-income households during Romania's transition to a more efficient and renewable energy system. By gathering quantitative and qualitative data and utilizing a mix of quantitative methods, including econometric models and microsimulation techniques along with qualitative approaches such as thematic analysis of data collected via fieldwork, the report aims to comprehensively understand energy poverty in Romania and guide effective policy interventions. The World Bank's new data collection in light of the post-Ukraine crisis provides an accurate and current assessment of the situation, which is crucial for designing efficient support programs that target the most vulnerable households in the current context.

Where do Romanian households stand regarding energy poverty and which households are more likely to be affected?

In Romania, many households reported grappling with energy poverty, with there being a pronounced need for adequate warmth, cooling, lighting, and energy for regular appliances. Given the multidimensional nature of poverty, defining and measuring it is challenging. However, underlying indicators reveal a high prevalence of energy poverty in Romania, indicating that many people face challenges accessing and affording essential energy services. Approximately 25 percent of the population experienced some form of energy poverty in 2021, with households dedicating about 8.7 percent of their expenditures to energy. High proportions of people grappling with this issue persisted, with 17.8 percent facing difficulties in paying utility bills in 2022, ranking among the EU's highest. In 2022, 15.2 percent of households struggled to maintain warmth, among the highest proportion in the EU, and even more concerning as this was a larger proportion than in 2020 (figure ES1). Cooling also emerges as an important challenge, with 31 percent of households struggling to keep their homes cool during the summer. Energy poverty disproportionately affects more vulnerable and low-income households. These disparities underscore equity concerns across the energy consumption patterns of affluent and less-privileged households.

Figure ES1 Inability to Keep Home Adequately Warm, 2022 vs. 2020 (%)



Source: Eurostat 2023. https://ec.europa.eu/eurostat/databrowser/view/ILC_MDES01__custom_6037156/bookmark/table?lang=en&bookmarkId=8f6604d8-6581-4f7b-adde-7a9e53a28caf

Two critical aspects explored in this analysis of energy poverty in Romania are connectivity and energy affordability. The investigation into connectivity reveals that in 2021, almost all households were connected to electricity, with negligible differences across various population subgroups. However, disparities emerge concerning natural gas, with rural areas showing lower coverage rates. The use of wood as a primary heating source, especially in rural regions, is highlighted, indicating the importance of considering diversified energy sources when assessing spending patterns and vulnerabilities. The section on energy affordability in this report delves into both monetary and nonmonetary measures, reflecting the need for a range of methodologies used in estimating energy expenditure shares. The income-based energy expenditure share, excluding car-related expenses, is the most robust measure for Romania. This report employs three energy poverty indicators and finds that approximately one-fourth of the Romanian population was energy poor in 2021. The overlap and distinction between monetary and energy poverty underscore the need for targeted policy interventions.

The detailed analysis further reveals that energy spending patterns and energy poverty in Romania are significantly influenced by income levels, with low-income households and other vulnerable groups experiencing higher vulnerability to energy price spikes. This report identifies specific population subgroups, such as single-elderly households, pensioners, and those receiving social aid, as more affected by energy poverty and thus necessitating tailored policy interventions. Additionally, the findings emphasize the importance of considering both monetary and nonmonetary energy affordability measures in light of issues such as leakages, housing conditions, and exposure to environmental problems. The concluding sections stress the need for targeted policies to address energy poverty efficiently and highlight the potential role of energy-efficient renovations, especially for poorer households in rural and urban areas. The overall assessment underscores the multifaceted nature of energy poverty in Romania and provides valuable insights for policy makers.

To devise effective strategies to tackle energy poverty, policy makers must acknowledge the significant heterogeneities in energy spending patterns and energy poverty rates across various population subgroups. Targeted interventions could prove to be more cost-efficient and effective than a one-size-fits-all approach because they address the unique circumstances of different demographic groups.

Notably, the overlap between those considered energy poor and those experiencing monetary poverty is only partial. This observation emphasizes the need for policy makers to adopt a distinct approach to tackling energy poverty, recognizing that it is not solely an extension of monetary poverty, so that targeting the income poor will not be enough to mitigate the issue. Targeted interventions are required that are explicitly tailored to the challenges faced by energy-vulnerable households, who may or may not be income poor.

Energy-inefficient housing emerges as a prominent issue, particularly among poorer households and those residing in rural areas. Approximately one out of four households in the bottom 20 percent of the income distribution (B20 category) reported being affected by warm air leakages (from poor insulation), indicating a need for better infrastructure and housing maintenance. Rural areas in particular face higher energy inefficiency rates than urban areas, highlighting the importance of targeted interventions to improve energy efficiency in these regions. Previous evidence suggests that social housing still needs to be developed in Romania, which could alleviate energy-related challenges for vulnerable populations.

What are the key structural and behavioral barriers that prevent households from transitioning out of energy poverty and adopting cleaner technologies and sustainable energy use?

We observe distinct correlations between technological factors and sociodemographic characteristics in understanding energy expenditure shares. The variables positively correlated with energy expenditure shares include technological aspects such as sources of energy for heating (wood pellets, natural gas, etc.) and for cooking (electricity, natural gas, etc.). Sociodemographic factors such as households' being single elderly, having unemployed members, being headed by a female, and making use of specific in-house sewage types also show positive correlations with increased energy expenditure shares. This analysis provides clear insights into the diverse drivers of energy spending.

The analysis suggests a link between energy expenditure shares and the technology employed for cooking and heating, with income levels also playing a role. However, a more in-depth investigation is required to understand this relationship fully that considers factors such as connectivity, household preferences, the energy efficiency of technologies in use, and associated costs. While income has a role, its impact is relatively minor. Certain household types, such as single elderly, those with many unemployed members, and those headed by a female, were more likely to report higher energy spending shares. Policy makers addressing energy poverty should prioritize interventions for these households. However, caution is advised in interpreting energy expenditure shares, because they may be influenced by factors like connectivity and access to resources that households do not have to pay for (like firewood collected from properties or nearby forests) , potentially biasing the results.

Understanding the factors influencing energy expenditure shares, particularly the positive correlations with technological and sociodemographic elements, has vital policy implications. This analysis calls for tailored income-support measures that can assist vulnerable households in managing their energy costs effectively. Policy makers should consider targeted interventions for households with characteristics such as being single elderly, having multiple unemployed members, or being female headed, given their higher energy expenditure shares, particularly in times of crisis and in the short term. Additionally, there is a need for support programs to enhance these households' energy efficiency, because such programs can lead to long-term savings and reduced energy-related financial burdens. Additionally, promoting energy-efficient heating and cooking technologies could contribute to household cost savings. The tailoring of policies to address these specific factors represents an opportunity to enhance energy affordability and efficiency, particularly for vulnerable demographic groups.

The higher vulnerability to energy poverty of households of the single elderly and pensioners with limited and fixed incomes also underscores the importance of targeted interventions. Prioritizing energy-efficient housing renovations and raising awareness among low-income households about environmental issues are crucial components of a comprehensive strategy.

Another factor influencing energy expenditure shares and poverty rates is the ownership of or access to resources capable of generating energy, such as wood plantations or illegal logging. Research suggests that using wood for cooking and heating is particularly significant in rural areas. Future studies should strive to estimate the potential impact of these factors on the biasing of energy expenditure shares and, consequently, energy poverty rates.

This study also investigates residential sustainable energy transitions, which hinge on both technological upgrades and attitudinal shifts, as a way to move out of energy poverty. The low level of intention to upgrade heating systems in Romania underscores the challenges in motivating behavioral change that go beyond financial constraints, emphasizing the need for inclusive, targeted policy measures and clear communication to support renewable energy adoption. Tailored financial support mechanisms that acknowledge non-financial motivations in their design and implementation are essential to ensure inclusive, sustainable energy transitions.

We analyze the barriers to and enablers of sustainable heating transitions, focusing on financial, information, and attitudinal factors. Financial concerns stem from the costs of both the initial investment and ongoing use. Financial barriers, particularly affordability concerns, emerged as the most critical among participants. The perceived difficulty in bearing the costs of upgrading heating systems is high, with 80 percent expressing that financial difficulties would be expected to sustain the costs of an upgrade. These barriers vary across regions, with South-East Romania facing the highest financial difficulty. Information barriers include limited awareness of programs supporting heating upgrades, with only 11.3 percent of those surveyed fully understanding the types of help available. Attitudinal barriers involve negative beliefs, such as the perceived inconvenience of upgrades and the importance of social influence.

Financial and knowledge constraints are significant barriers hindering many households from upgrading their energy sources. A small share of the population reported knowing of existing support programs that could offer financial assistance for such upgrades. Enhancing the dissemination of information about these programs could be crucial in incentivizing and enabling more households to make energy-efficient upgrades (mainly as these are related to sustainable heating practices), ultimately contributing to the reduction of energy poverty and negative environmental impacts.

Lack of knowledge and awareness of support programs and the complexity of participation further hinder sustainable transitions. A lack of awareness about existing subsidy programs is evident, leading to sentiments of exclusion among potential beneficiaries. Technical challenges in the online application process further hinder participation, especially by older individuals and in regions experiencing rapid fund depletion.

In July 2023, a survey revealed that approximately half of the population in Romania would consider upgrading to appliances that are more energy efficient. However, only a negligible share of respondents expressed interest in upgrading their home's heating system or insulation. Encouraging more widespread adoption of energy-efficient technologies and home improvements could significantly contribute to reducing energy poverty and enhancing overall energy sustainability in the country.

Negative beliefs about upgrades include concerns over the complexity and safety of modern heating systems. Building trust in the efficiency and sustainability of modern systems, especially electricity-based ones, is crucial. Low institutional trust in government support programs is widespread, which is attributed to a perceived lack of transparency and concerns about favoritism in fund allocation.

As of July 2023, despite nearly 7 out of 10 Romanians' perceiving upgrades as an inconvenience, a similar proportion of the population knew of the benefits of making these improvements. This indicates a potential conflict between the perceived inconvenience of upgrades and the understanding of their positive impact on energy efficiency and cost savings. Raising awareness about the advantages of upgrades and dispelling misconceptions could encourage more Romanians to consider adopting energy-efficient technologies and practices.

Despite these barriers, there are clear attitudinal enablers. Survey estimates from the 2023 World Bank rapid surveys indicate that most Romanians were aware of their energy consumption at home. This awareness can contribute to more informed decisions regarding energy usage and expenditure, potentially leading to more efficient energy management. Approximately 70 percent of respondents were aware of the benefits of upgrades, such as lower bills, convenience, increased property value, and positive environmental impacts. Trusted messengers, such as friends and family and independent technicians, play a crucial role in influencing decisions. Beliefs in the benefits of modern heating systems and community action, along with trusted messengers, are identified as vital enablers.

Our evidence points to a concerning trend where poorer households show lower awareness and concern about environmental problems. This suggests that addressing energy poverty and environmental sustainability must be approached in a way that considers economically disadvantaged households' unique circumstances and challenges. Simultaneously, certain vulnerable groups, such as households with a high number of members, report higher exposure to environmental issues, making it imperative to implement measures that support these communities' efforts to achieve energy efficiency and protect the environment in which they live.

What are the welfare implications of rising energy prices?

The global and European Union surge in energy prices following Russia's invasion of Ukraine has heightened the urgency to tackle energy poverty effectively. We simulate the

potential impacts on energy poverty and welfare of the rising energy prices. Our baseline simulations show a moderate increase in energy poverty, with some groups significantly more affected. In our baseline scenario of a 40-percent increase in energy prices, a significant impact is expected. On average, in our simulation energy poverty (P10)[1] increases by 2.3 percentage points across the population. Vulnerable groups, including households receiving support from municipalities, those receiving disability benefits, and those consisting of a single-elderly person, are disproportionately affected compared to other demographic groups. Moreover, the rise in energy poverty rates is more pronounced at the lower end of the welfare distribution, indicating that the most economically disadvantaged segments of the population bear the brunt of these price increases. Notably, the second-lowest income quintile would see a substantial increase of 10.1 percentage points in at-risk poverty rates, underscoring the severity of the impact on this specific group.

The simulation also shows that the direct effects of a 40-percent energy price increase could also lead to an overall increase in at-risk poverty rates of 2.2 percentage points. Energy-poor households are the most affected, facing higher poverty rates than non-energy-poor households. Additionally, rural areas experience more significant impacts than urban areas, highlighting the disparities in energy affordability and poverty between different regions of the country.

Analysis of the results of the simulation using the $6.85 a day (2017 PPP2) international poverty line shows that households with unemployed members are most affected, although the overall impact on poverty rates is less than in the baseline scenario. This underscores the importance of selecting appropriate poverty metrics when evaluating the effects of energy price fluctuations on vulnerable populations. Sensitivity testing with different energy price elasticity assumptions consistently shows adverse effects on energy poverty rates, emphasizing the issue's significance for policy makers and social welfare advocates. Using welfare indicators from the European Union Statistics on Income and Living Conditions (EU-SILC) data reinforces the validity of the results, which offer a comprehensive understanding of the implications of energy price changes on the well-being of diverse demographic groups.

What measures are in place and what potential mitigation measures can be devised to tackle energy poverty and protect the most vulnerable?

In Romania, addressing energy poverty is a key priority, in line with EC goals. The legal framework, notably Law 226/2021, introduces a novel definition of energy poverty, emphasizing the inability of vulnerable energy consumers to meet "minimum energy" needs. The National Strategy on Social Inclusion and Poverty Reduction focuses on thermal insulation programs and monthly assistance for heating expenses. Reintroducing regulated prices has led to implicit energy subsidies.

The National Long-Term Renovation Strategy (LTRS) recognizes energy poverty, emphasizing an improved legal framework and collaboration with local governments. Member States, including Romania, within the European Union (EU) must address energy poverty in their National Energy and Climate Plans as part of the European Green Deal. The Renovation Wave initiative and the EU's legal framework mandate action to combat energy poverty and achieve energy efficiency goals. The Social Climate Fund (SCF), which was created in June 2023, allocates funds to Romania to address energy and transport poverty from 2026 to 2032, supporting policy measures including temporary income support and investments in energy efficiency and building renovation.

The Romanian government has implemented a multifaceted approach to address energy poverty, particularly in response to the recent energy crisis. Key policy measures include untargeted energy price caps, income-support initiatives, and energy efficiency programs. The untargeted measures involve capping electricity and natural gas prices to shield consumers from steep hikes. Despite their ease of implementation, discussions persist on their fairness and effectiveness, given their fiscal impact and need for more targeting. Targeted income-support

1 Energy poverty in this case is defined as the proportion of households who spend more than 10 percent of their household income on energy.

2 The international poverty line is expressed in 2017 purchasing power parity (PPP) dollars to account for price differences across countries and to reflect changes in the cost of living over time. The World Bank uses PPPs to convert different currencies into a common unit and to derive the poverty line.

measures are implemented via Romania's social protection system, assisting vulnerable families through means-tested programs. These include heating subsidies for the cold season, which, despite being progressive, face challenges in reducing poverty due to limited benefit adequacy. The government has also introduced energy cards and vouchers for specific groups, such as pensioners and those with disabilities, to mitigate excessive heating expenditures.

In addition to income support, energy efficiency measures play a crucial role in tackling energy poverty. Programs like the National Multiannual Program for the Improvement of Energy Performance in Blocks of Flats and the Renovation Wave focus on enhancing the energy efficiency of buildings, especially in marginalized areas. These initiatives provide financial support for building renovations and prioritizing projects in urban or rural regions with populations at risk of poverty and social exclusion. The government's commitment to green projects, including energy efficiency, is evident in NRRP allocations. These comprehensive efforts aim to alleviate the impact of rising energy costs on vulnerable households and contribute to long-term solutions for energy poverty in Romania.

The Romanian government should adopt a two-pronged strategy based on overarching principles and policy simulations to mitigate energy poverty and protect vulnerable populations. The following overarching principles emerge from the analysis:

1. **Social Safety Nets and Energy Efficiency:** Creating effective social safety nets is crucial for short-term relief from energy poverty. Simultaneously, prioritizing household energy efficiency measures can enhance overall welfare in the medium term. While providing financial assistance to individuals in the immediate future is essential to help them cope with current economic challenges, it is equally important to implement strategies that will ensure sustainable benefits over a longer period.
2. **Targeted Policies for Vulnerable Groups:** Policies should be designed based on an understanding of energy expenditure patterns and affordability across income levels. Identifying vulnerable groups is essential for formulating policies prioritizing socioeconomically disadvantaged individuals and ensuring an equitable transition to sustainable energy practices.
3. **Strategic Targeting and Fiscal Viability:** Policymakers should adopt well-targeted measures that balance cost-efficiency with fiscal viability. Prioritizing recipients based on specific needs rather than a universal approach prevents the leakage of resources to non-needy individuals and thus makes possible the provision of more generous benefits to the deserving population.
4. **Adjustment of Benefit Levels:** Regularly adjusting benefit levels to match the increasing cost of living is critical. Mechanisms to index government benefits and tax credits should be implemented to maximize their impact in reducing poverty and prevent households from slipping into poverty due to erosion in the value of benefits.

The outcomes of the policy simulations provide valuable insights into effective strategies for addressing energy poverty and safeguarding vulnerable populations in Romania. Overall, our simulations show that targeted income-support approaches are effective and cost-efficient in mitigating the impact of energy price increases. Across many EU nations, price caps have been set in place to protect consumers from rising energy prices, coupled with certain forms of financial aid. However, this restriction on energy costs often benefits higher-income groups, is less effective than precisely targeted social assistance, and can strain fiscal resources significantly. By tailoring interventions to address the specific needs of different vulnerable groups, policymakers can optimize resource allocation and achieve more-substantial outcomes in alleviating energy poverty. Among the targeted approaches, focusing on single-elderly households and pensioners at risk of poverty stands out as particularly efficient and feasible, because these households are relatively easy to identify and assist. However, it is important to acknowledge other equity concerns, such as intergenerational considerations, when designing interventions. Striking a balance between targeted support for specific groups and maintaining a fair distribution of benefits across society remains a critical aspect of policy development.

The simulations explore two distinct policy scenarios, each offering a nuanced approach to tackling the challenges posed by rising energy prices.

Policy Scenario 1 – Income Support Measures Financed by External Funding

In this scenario, income support measures are proposed and financed through external funding sources, particularly from the SCF. The emphasis is on targeting vulnerable groups, with a specific focus on single-elderly households and pensioners at risk of poverty. In households with pensioners, whose income sources are primarily fixed, social program coverage rates among the energy poor lag behind the overall population. This suggests pensioners are not being adequately supported despite the efforts to address energy poverty in various groups. The simulations reveal that an approach focusing on vulnerable groups is cost-effective and efficient in mitigating the adverse impacts of rising energy prices. By directing financial assistance to these identified at-risk groups, the simulations demonstrate a substantial reduction in poverty and the poverty gap. This targeted strategy optimizes resource allocation and ensures that the most vulnerable segments of the population receive the necessary support.

Policy Scenario 2 – Income Support Measures Financed by the Phasing Out of Energy Price Caps

The second scenario involves financing income support measures by phasing out energy price caps. Despite the potential for an increase in energy prices, this policy scenario aims to use fiscal revenues gained by eliminating price caps to fund targeted assistance. The simulations highlight the critical importance of supporting single-elderly households and pensioners. By doing so, the policy proves effective in mitigating adverse effects, providing a cushion against rising energy prices, and, remarkably, reducing poverty levels beyond the pre-price-increase baseline. This underscores the resilience and effectiveness of targeted income support measures, even in the face of a more challenging economic landscape resulting from the removal of price caps.

During the winter of 2022/23, price caps were introduced as a response to the energy crisis that aimed at mitigating the impact of rising energy costs on households. If these caps were eliminated and income-support measures were financed instead, a more significant impact on poverty reduction could be achieved by targeting certain vulnerable groups. Although income-support measures are slightly more challenging to administer than price caps, they offer a cost-effective and likely more efficient approach to assisting the most vulnerable with managing higher prices. Notwithstanding that eliminating price caps implies that energy prices would increase even further, targeted measures could mitigate that adverse effect. In particular, focusing on pensioners at risk of poverty is expected to impact poverty reduction significantly. If the fiscal revenues gained from eliminating price caps were to finance cash transfers for pensioners, at-risk poverty could fall below pre-price-increase levels.

The microsimulation results emphasize the advantage of targeted cash transfer programs in mitigating poverty caused by energy price increases. Focusing on vulnerable groups, such as single-elderly households and pensioners, proves to be more efficient and impactful. These programs result in substantial reductions in poverty and the poverty gap, underscoring the importance of tailoring interventions to the unique needs of identified at-risk demographics. The findings reinforce the notion that a nuanced, group-specific approach to cash transfers is essential for achieving meaningful and sustainable poverty reduction in the context of energy price fluctuations.

Clear communication is vital to garner public support for policy interventions. The evidence in this report also draws attention to the crucial role of government support and effective communication strategies in the success of new measures. Insights from a World Bank survey underscore the significance of clear communication regarding the benefits and costs associated with policy interventions to safeguard the energy poor. As revealed by the survey, public perceptions provide valuable input for policy makers to ensure that modifications in existing protection schemes related to energy poverty garner widespread support. This highlights the need for a transparent and well-communicated approach to secure public trust and cooperation in implementing energy poverty alleviation measures.

It is critical to accompany these income support measures, which are more short-term, with some medium-term energy efficiency measures. By combining immediate financial aid with longer-term strategies for energy efficiency, we can create a more resilient and sustainable support system that addresses both current economic pressures and future energy challenges.

Policy interventions such as energy-efficiency-upgrade support programs should also be designed to support sus-

tainable energy transitions of both energy-poor/vulnerable and non-energy-poor/vulnerable households. While interventions directed at stabilizing energy prices are necessary, these must be complemented with programs that facilitate sustainable energy transitions (especially related to heating) among all relevant populations in Romania.[3] Such programs are crucial, because of the inefficient use of electricity-based heating in the coldest months to supplement inefficient and dirty traditional methods of heating using solid fuel (for example, firewood and coal). There are only a few programs in Romania that subsidize energy-efficient upgrades (such as new heating systems and insulation). Even when these programs exist, awareness of them is limited and trust in the institutions tasked with supporting sustainable energy transitions is even more limited. Programs to support these transitions holistically are needed; insights from behavioral science can inform their design and implementation to benefit energy-poor and vulnerable households the most.

Strengthening energy efficiency initiatives involves adopting a comprehensive approach that considers medium-term strategies and insights from behavioral science. First, sustainable energy transitions necessitate medium-term approaches that facilitate shifts in technologies, fuels, and usage practices. Prioritizing upgrade support programs geared toward sustainable transitions is imperative, and these should be given due consideration alongside short-term measures to ensure a holistic and enduring impact. Secondly, incorporating insights from behavioral science is critical to enhancing energy efficiency initiatives. Focusing on behavioral aspects can significantly contribute to addressing energy inefficiencies, particularly in heating systems, with a specific emphasis on low-income households. To achieve sustainable transitions, it is crucial to expand existing renovation programs, ensuring their coverage extends to energy-poor households and rural areas, thereby fostering inclusivity and effectiveness in energy efficiency improvements.

In summary, a comprehensive strategy involving targeted income support, strategic policy simulations, and a focus on sustainable energy transitions, guided by behavioral science insights, can effectively mitigate energy poverty and protect the most vulnerable populations in Romania. Future research should address knowledge gaps, particularly in understanding the dynamics of wood usage, in order to refine strategies to combat energy poverty in Romania.

Finally, given the multidimensional nature, addressing energy poverty requires a multisector approach. This involves energy, transport, infrastructure, and social sectors, as well as collaboration across various geographic levels (central and local levels). Effective measures should engage diverse stakeholders, including marginalized groups, to ensure comprehensive tracking, analysis, and the development of informed public policies.

3 Sustainable energy transitions can be understood as the shift toward cleaner and more-energy-efficient use of energy through the adoption of modern energy-intensive technologies (for example, modern heating devices) and complementary upgrades (for example, insulation).

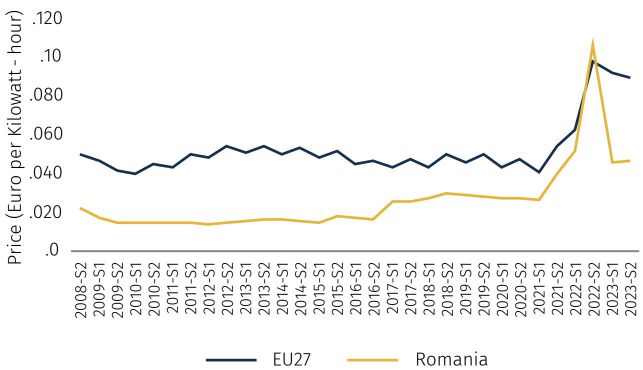
Chapter 1
Motivation

In Romania, a large share of households experience some form of energy poverty conditions, meaning they lack some of the most essential features of ordinary life: adequate warmth, cooling, lighting, and energy required to power typical appliances. Though there is no simple definition and measure of poverty, given its multidimensional nature, underlying indicators show the prevalence of energy poverty is high. When using expenditure measures, roughly 25 percent of the population in Romania experienced some form of energy poverty in the year 2021. During the same year, households in Romania allocated about 8.7 percent of their total expenditures to energy. In 2022, 15.2 percent of households struggled to maintain warmth within their homes, and 17.8 percent of households faced difficulties with unpaid utility bills, proportions that ranked among the highest in the EU. These figures were even higher among vulnerable and low-income households, indicating a meaningful distinction in energy consumption patterns between the affluent and the less privileged, which has implications for equity.

Tackling the problem of energy poverty is one of the most urgent challenges that European policy makers are facing, as the current energy crisis that emerged after Russia's invasion of Ukraine has raised significant concerns about households' vulnerability to energy prices and rising energy poverty. Figures 1 and 2 show the trajectory of natural gas and electricity prices for household consumers biannually between 2008 and 2023 in Romania and the EU-27 region. The figures clearly show a steep increase after the outbreak of the war for both electricity and gas. Because energy is a consumption good that is difficult to replace by alternative sources, especially during winter, these price increases most likely imposed significant financial stress on households. In 2023, although energy inflation was declining, the country continued to face elevated energy prices. In addition, rising energy prices and energy affordability remained an important concern for Romanians in 2023, as shown later in this report. This is important, as gaining insights into how the public perceives energy is crucial for shaping energy policies in the future.

Addressing energy poverty is critically important for economic development for various compelling reasons. First, energy poverty is closely linked to income poverty. Previous research shows that poorer households are often more affected by energy price increases because they have less disposable income and less savings as a cushion against these increases in household expenditure. Previous research on the impact of energy price increases shows that poorer households tend to be more affected (UKONS 2022; World Bank 2019). They have less disposable income and lower savings to mitigate these unexpected price shocks, and consequently, their overall welfare may decrease. Poor households might even refrain from using energy altogether, which could result in health deprivations, especially during winter months. There may be differences along the welfare distribution and across different population subgroups. For example, some studies show that elderly populations are often more affected by energy poverty (Cong et al. 2022), and others show that lower-income households bear the greatest burden of rising energy prices (UKONS 2022). Energy price increases could, therefore, have important equity effects when analyzing the problem from a multidimensional viewpoint on poverty and vulnerability. Another concern is that the additional financial constraints could push more households into monetary poverty. Based on this rationale, studying the effects of energy price increases along the welfare distribution and for different population groups is crucial.

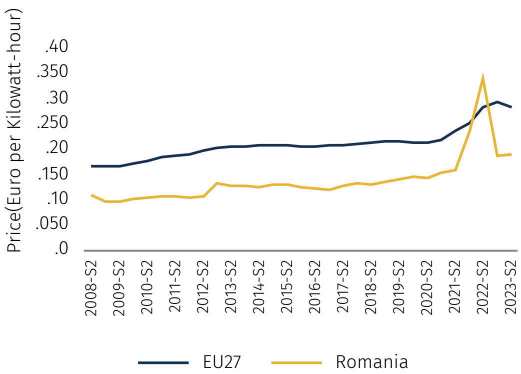
Figure 1 Natural Gas Prices for Household Consumers, Romania vs. the EU27, 2008s2–2023s2 (Half-Yearly)



Source: Eurostat 2023 https://ec.europa.eu/eurostat/databrowser/view/NRG_PC_202/default/table?lang=en.

Note: Reported Prices include all taxes and levies and are for consumption band D2 (Consumption from 20 to 199 GJ). Subsidies and allowances are included in the final price paid by the consumers, as of reference period 2023s2. For these semestrial prices, the reference periods are from January to June for semester 1 and from July to December for semester 2. More recent data are not available.

Figure 2 Electricity Prices for Household Consumers, Romania vs. the EU27, 2008s2–2023s2 (Half-Yearly)



Source: Eurostat 2023 https://ec.europa.eu/eurostat/databrowser/view/NRG_PC_204__custom_7279167/default/table?lang=en.

Note: Reported Prices include all taxes and levies and are for consumption band 2 (Consumption from 2,500 to 4,999 kWh). Subsidies and allowances are included in the final price paid by the consumers, as of reference period 2023s2. For these semestrial prices, the reference periods are from January to June for semester 1 and from July to December for semester 2. More recent data are not available.

Second, residing in circumstances of energy deprivation brings about adverse effects on overall well-being, human development, and environmental outcomes. Individuals living in energy-poor households tend to have a higher probability of developing respiratory and cardiac ailments or having existing ailments worsen due to uncomfortable temperatures and mental health caused by the stress linked to the inability to cover energy expenses (Liddell and Morris 2010). Lower energy poverty was associated with higher health and education outcomes for 50 developing countries from 1990 to 2017 (Banerjee et al. 2021), with electricity access having a more pronounced effect than energy use. Finally, further evidence for the EU before and during the 2008 economic crisis shows how energy poverty worsened and its negative impact on health increased during the economic crisis. This association was stronger and more susceptible to the effect of the economic crisis in the mental health dimension, particularly in depression (Oliveras et al. 2021). Polimeni et al. (2022) assess the impact of energy poverty on health in the EU-27 countries and found that arrears on utility bills exerts positive long run effects on current health expenditures, self-perceived health and on the capacity to keep the home adequately warm. The environmental consequences of energy poverty involve deforestation, alterations in land utilization, and the release of greenhouse gases. Furthermore, energy poverty is associated with serious public health concerns related to indoor air pollution, physical injury during fuelwood collection, and limited refrigeration and medical care in areas lacking electricity (Sovacool 2012).

Moreover, energy poverty has repercussions on gender equity and the educational prospects of individuals of all ages. The gender-related consequences mainly revolve around the physical risks of fuel collection and indoor air pollution's health effects, particularly for women who shoulder the burden of fuel and stove expenses. Additionally, there are time-related effects derived from the completion of tasks such as gathering fuel and water, cooking, and attending to the needs of unwell children. In terms of education, there are effects on school attendance due to time spent on various energy-related activities and increased absenteeism resulting from illnesses (Masud et al. 2007; Gaye 2007).

In this context, identifying and understanding the root causes and addressing energy poverty through an effective policy mix is critical in Romania, given the potential development benefits; the EC has also prioritized this task. Within the European Just Transition context, energy poverty has gained significance throughout the EU. Reducing it can lower health care costs, improve the environment, and, most importantly, enhance the well-being and comfort of vulnerable households while achieving cost savings and resource protection. As a result, the EC has prioritized the tackling of energy poverty in Europe through the Clean Energy for All Europeans legislative package and has established the EU EPOV (now EPAH) to assist Member States in addressing and mitigating energy poverty.

Until now, European member states have implemented various policy measures to tackle energy poverty and safeguard vulnerable consumers. These measures fall into five broad categories: (1) financial assistance initiatives as part of the general social support or targeted energy or heating subsidies funded indirectly through social tariffs; (2) measures to protect consumers' rights, such as disconnection protection safeguards; (3) actions to increase energy efficiency so as to reduce energy consumption; (4) measures related to providing essential information and awareness (that is, measures offering improved billing information and adhering to utility codes of conduct during consumer interactions and one-stop shops); and (5) measures to simplify and streamline the process of energy efficiency building renovations. In Romania, the investments and changes outlined in the REPowerEU package within the NRRP must prioritize addressing energy poverty, as will be explained in more detail in chapter 5. This should involve measures that can be implemented promptly to alleviate the impact of the energy crisis, particularly among the most vulnerable consumers.

Nevertheless, there is limited evidence concerning the diverse factors influencing energy poverty in Romania. The quantity and thoroughness of research pertinent to energy poverty is also affected by the challenges in the definition and measurement of the phenomenon. As discussed later in chapter 2, there is a lack of consensus on how energy poverty should be conceptualized and measured in the EU. In a comparative context, a significant portion of the evidence regarding the fundamental reasons behind energy poverty has originated from research on "fuel" poverty conducted in the United Kingdom (for example, Bridgen and Robinson, 2023). New evidence on energy poverty for the EU focused on monitoring and measurement issues, drivers, and the policy response across member states shows a renewed interest in the topic in recent years (Maxim et al. 2016; Bouzarovski 2014; Harriet et al. 2017; Ramos et al. 2022; Bouzarovski et al. 2021). With respect to Romania in particular, evidence on the incidence and drivers of energy poverty is growing (Clodnitchi and Busu 2017; Murafa et al. 2017; Sinea et al. 2018; Sinea et al. 2019; Jiglau et al. 2020; Sinea et al. 2021, Murafa, 2022; Vornicu-Chira et al. 2024). Teschner et al. (2020) examine extreme energy poverty in Roma neighborhoods in Romania, mapping norms, policies, and regulations, analyzing its main characteristics and challenges, and discussing the nexus of infrastructure, planning, and social inequality. Vornicu-Chira et al. (2024) identify energy and transport vulnerabilities in Romanian households, assess the welfare impact of the EU Emissions Trading System (ETS 2), and propose targeted measures and recommendations for national Social Climate Plans. Understanding the patterns and addressing the factors associated with energy poverty in the country is essential to guiding policies that alleviate it and to find the policy mix that (1) increases household welfare and enhances households' ability to pay their bills, thereby reducing their energy costs (through lower prices or social support); and (2) reduces their energy consumption (by improving energy efficiency or through information and awareness campaigns).

This report aims to fill this gap by producing evidence to answer the following four key questions:

- Where does Romania stand regarding access to affordable, reliable, and sustainable energy? How do the energy burdens change across Romanian households and what factors are associated with energy poverty?
- What key structural and behavioral barriers prevent households from transitioning out of energy poverty and adopting cleaner technologies and sustainable energy use?
- How has the recent rise in energy prices due to Russia's invasion of Ukraine potentially affected energy poverty and household welfare?
- What policy actions offer the most significant promise for reducing the energy burden of low-income households as Romania transitions to a more efficient and renewable energy system under the European Green Deal? What is the role of sustainable energy programs and policies and how can behavioral science inform these?

To produce this evidence, we mainly relied on official household surveys. However, given the importance of updated data in the wake of Russia's invasion of Ukraine, we collected new quantitative and qualitative data in 2023 to give an updated picture of energy affordability and willingness to move toward cleaner and sustainable heating among Romanian households. We use the 2021 Household Budget Surveys (HBS), the 2020 European Union Survey of Income and Living Conditions (EU-SILC), and new data collected by partnering with a local research firm. Notably, the official household surveys do not capture the current situation of households amid the ongoing energy crisis. Accurate and updated data on energy poverty are critical for assisting decision-makers in creating efficient support programs that focus on the most vulnerable households. Therefore, the World Bank undertook the collection of new data in June and July 2023 by means of a quantitative phone survey and a qualitative instrument designed to capture beliefs, attitudes, and behaviors related to sustainable energy use (heating in particular) among vulnerable groups. We used a mix of quantitative and qualitative methods, ranging from descriptive analysis, econometric models, microsimulation techniques (from the quantitative survey), and thematic analysis (from the qualitative fieldwork).

The report is structured as follows. Chapter 2 takes stock of where the country stands regarding energy poverty and access to affordable, reliable, and sustainable energy and potential drivers. Chapter 3 presents the structural and behavioral barriers that hinder households from moving away from energy poverty and embracing cleaner and more sustainable energy practices by investing in modern heating devices and practices. Chapter 4 evaluates the potential ex-ante impact of recent energy price increases on energy poverty and welfare. Chapter 5 presents potential mitigation measures based on identified patterns and barriers to tackling energy poverty. Finally, Chapter 6 concludes.

Chapter 2

Access to Affordable, Reliable, and Sustainable Energy among Romanian Households

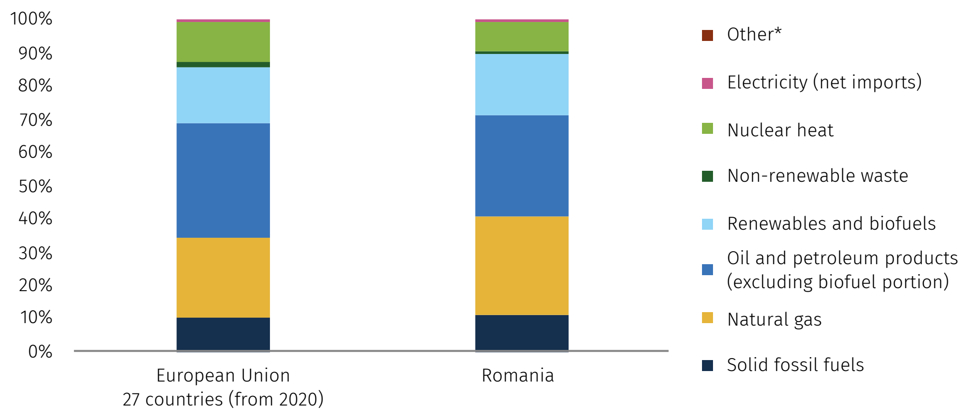
Access, affordability, and energy efficiency among households are critical aspects that significantly influence household well-being; understanding and addressing these factors is essential for designing policies aiming to ensure a sustainable and equitable energy landscape. Access to reliable and modern energy sources is fundamental for meeting basic needs and improving the quality of life for households. Energy affordability refers to the ability of households to access energy services without experiencing undue financial hardship. Rising energy prices can disproportionately affect low-income households, pushing them into energy poverty. Finally, energy efficiency measures aim to reduce energy consumption while maintaining or improving the level of service provided. Improving household energy efficiency reduces energy bills, enhances affordability, and has positive environmental implications by lowering greenhouse gas emissions. As shown in this report, addressing energy poverty involves implementing a policy mix that promote energy efficiency, subsidizing energy costs for vulnerable households, and providing targeted support to those in need.

This chapter characterizes the patterns of energy access and affordability for the Romanian households, overall and across various population segments, along with the welfare distribution. First, we briefly describe the energy sector landscape, which can affect energy prices, and then look at different dimensions of access and energy affordability among Romanian households. We then look at different measures of energy poverty—when people lack access to energy because of poor infrastructure or excessively high initial costs—and estimate the incidence rates of energy poverty from both a monetary and a nonmonetary standpoint. To understand their equity implications, we explore the different patterns of how the wealthiest and the poor and other vulnerable groups consume energy.

2.1. Energy Sector Background

Romania has one of the lowest dependency ratios in gross available energy in the EU. Figure 3 shows Romania's energy mix in 2020. The country mainly relies on natural gas, oil, and petroleum products (excluding the biofuel portion). Its dependency ratio in gross available energy, 28.2 percent, is among the lowest in the European Union (figure 4). However, the dependency ratio is exceptionally high for oil and petroleum products (excluding the biofuel portion) at 64.7 percent[4]. Russia's imports account for 17 percent of the energy mix[5]. This might stabilize energy prices, as the country might rely less on external energy sources subject to price fluctuations. A diversified energy mix with lower dependency on external energy sources could reduce energy vulnerability, because greater energy self-sufficiency can enhance the country's resilience in the face of disruptions in energy supply, thereby decreasing vulnerability to energy-related crises.

Figure 3 Energy Mix in Romania, 2020



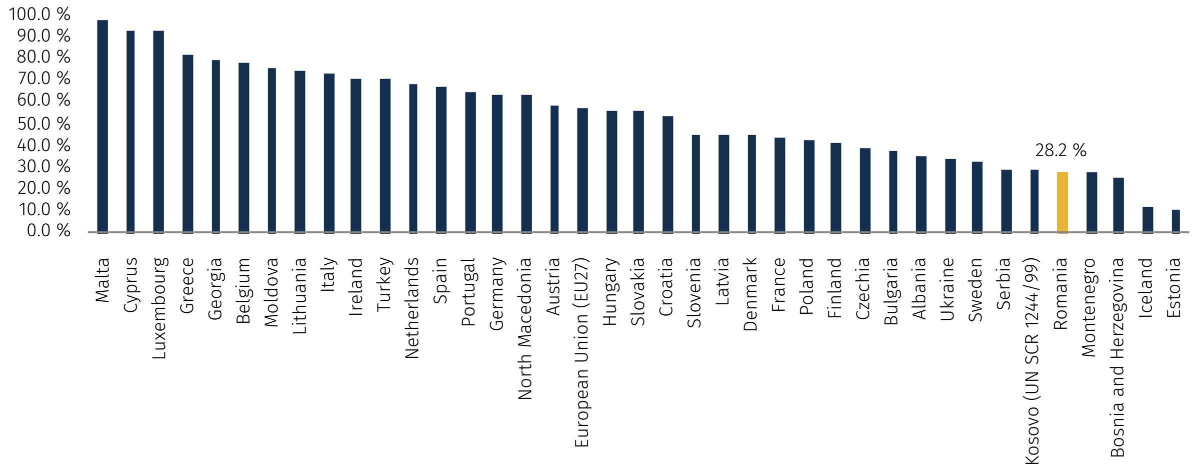
Source: Eurostat (2023).
https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Archive:EU_energy_mix_and_import_dependency#Energy_mix_and_import_dependency

Note: The figure plots the energy mix in Romania as a share of fuels in gross available energy. This shows how much the country depends on gas, oil, coal, nuclear, and renewables in its energy mix. Gross available energy means the overall supply of energy for all activities on the country's territory. This also includes energy transformation (including generating electricity from combustible fuels), support operations of the energy sector itself, transmission and distribution losses, final energy consumption (industry, transport, households, services, agriculture, and so on), and the use of fossil fuel products for nonenergy purposes (for example, in the chemical industry). It also includes fuel purchased within the country that is used elsewhere (for example, international aviation, international maritime bunkers, and, in the case of road transport, "fuel tourism").

4 Source: Eurostat (2023), https://ec.europa.eu/eurostat/databrowser/view/sdg_07_50/default/table?lang=en

5 Source: Eurostat (2023). https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Archive:EU_energy_mix_and_import_dependency

Figure 4 Energy Dependency in the European Union, 2020



Source: Eurostat (2023).
https://ec.europa.eu/eurostat/databrowser/view/sdg_07_50/default/table?lang=en
Note: The figure shows the import dependency in the EU, measured as a share of net imports in the gross available energy. It represents how much a country or region depends on imports from abroad. A negative share means the country is a net exporter (for example, oil and gas in Norway). A share of more than 100 percent means the fuel is put in stocks (for example, oil and coal in Belgium).

The total energy supply is mainly based on oil, followed by natural gas and coal; nuclear power, wind, and solar energy, as well as hydro energy, play a more significant role nowadays. In 2019, nearly 30 percent of the total energy supply was based on oil, followed by natural gas (27.9 percent) and coal (15 percent). While natural gas and coal now play a less significant role in total energy supply than 20 years ago, hydro energy, biofuels, and waste, nuclear, wind, and solar energy play a more critical role (figure 5). There was a drop of 12.3 percent in electricity production between 2018 and 2020 (figure 6).

Figure 5 Total Energy Supply by Source, 1990–2019 (TJ)

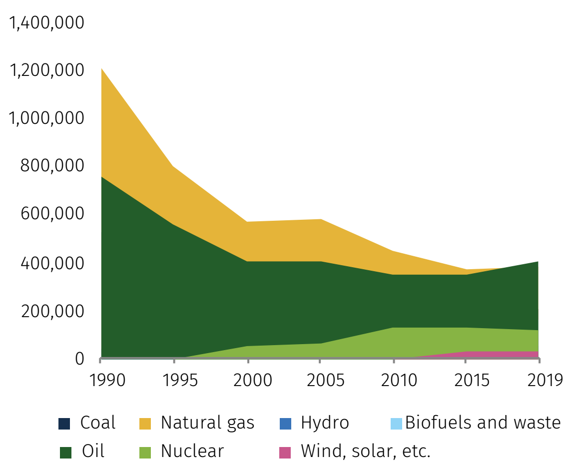
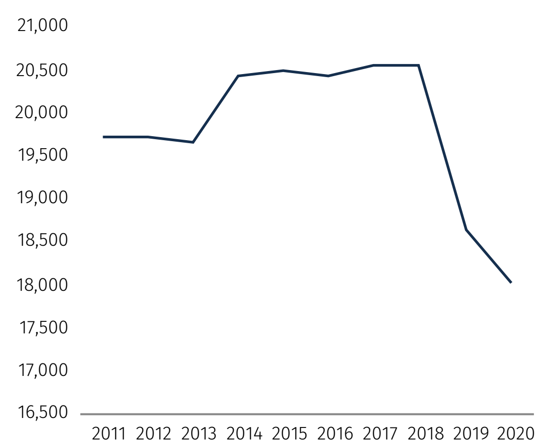


Figure 6 Electricity Production, 2011–20 (MW)



Source: IEA Data Services (https://www.iea.org/countries/romania) based on data from World Energy Balances (2022) (https://www.iea.org/data-and-statistics/data-product/world-energy-statistics-and-balances) and Eurostat (nrg_inf_epc, 2022 https://ec.europa.eu/eurostat/databrowser/view/NRG_INF_EPC/default/table?lang=en).

Households account for less than 20 percent of energy use; energy intensity in Romania has improved over time but is still above the EU average. Electricity consumption per capita dropped between 1990 and 2000, but has shown an increasing trend since then, suggesting the need for continued efforts to promote energy efficiency and sustainable energy practices. Household consumption accounted for 16.9 percent of energy use in 2020, a relatively small share compared to energy transformation, nonenergy use, industrial, transport, and services. Back in 2011, this share was equal to 15.6 percent. Energy intensity (measured as the amount of energy needed to produce a unit of GDP), commonly used as one of the major energy efficiency indicators, improved in Romania from 280 to 190 kilograms of oil equivalent (kgoe) per thousand euros from 2011 to 2020. However, in 2020 it was still significantly higher than the EU-27 average of 117 kgoe per thousand euros, suggesting there is room for improvement in energy efficiency and implementation of new technologies to reach the standard of the EU average.

Although Romania traditionally had among Europe's lower energy import dependency rate[6], it has not escaped the current energy crisis, leading to many Romanians worrying about rising energy prices. A 2022 survey conducted by Avangarde reveals that nearly 2 out of 10 Romanians were worried about the current energy crisis. One-third of those heating with gas said they would consider moving to alternative heating sources. An additional 68 percent of respondents indicated that they would reduce their overall electricity consumption. Four out of 10 respondents expected a complete gas supply cut by Russia during the winter (Fodor 2022). A more recent household survey conducted by the World Bank in June 2023 in Romania shows that 6 out of 10 Romanians expected electricity prices to increase even further during the next 12 months. These numbers demonstrate the population's awareness of their vulnerability to the current energy crisis and potential behavioral changes to cushion the impacts of rising prices.

2.2. Connectivity

Connectivity to and availability of different energy sources could significantly influence energy spending patterns. If households have limited access to energy due to limited infrastructure or high prices, they might report low energy spending shares. Nevertheless, these low shares do not reflect lower exposure to high prices, but rather another form of energy vulnerability, namely low access. Based on this line of thinking, we next analyze the connectivity of households to different energy sources. We investigate how connectivity differs along the welfare distribution and analyze average connectivity rates for different population subgroups.

The assessment of access to energy services involves considerations at both the extensive and intensive levels, encompassing the availability of energy as well as its quality and reliability. Typically, measures focusing on energy access primarily examine whether households have access to energy, representing the extensive margin. Additionally, the quality aspects of energy access and its reliability,[7] referred to as the intensive margin, contribute to the understanding of energy poverty. Bhatia and Angelou (2015) introduce a comprehensive multitier framework, particularly for electricity, incorporating parameters such as reliability (frequency of disruptions per week), legality, health and safety aspects of the energy source, peak capacity, and duration. Access-based approaches to evaluating energy poverty can also extend to the type of energy available, including considerations of access to clean energy, as highlighted by Ullah et al. (2021).

Nearly all households in Romania were connected to electricity in 2021,[8] and differences across groups are negligible. Figure 7 shows full electricity coverage for nearly all groups. While there are some minor differences across groups, these are negligible. Coverage in rural areas is slightly lower.[9] One group that reported below-average coverage rates consisted of house-

6 Source: Eurostat (2023); https://ec.europa.eu/eurostat/databrowser/view/sdg_07_50/default/table?lang=en

7 Some aspects of this are how many hours per day the household receives electricity, the number of blackouts per month, etc. This is more difficult to quantify.

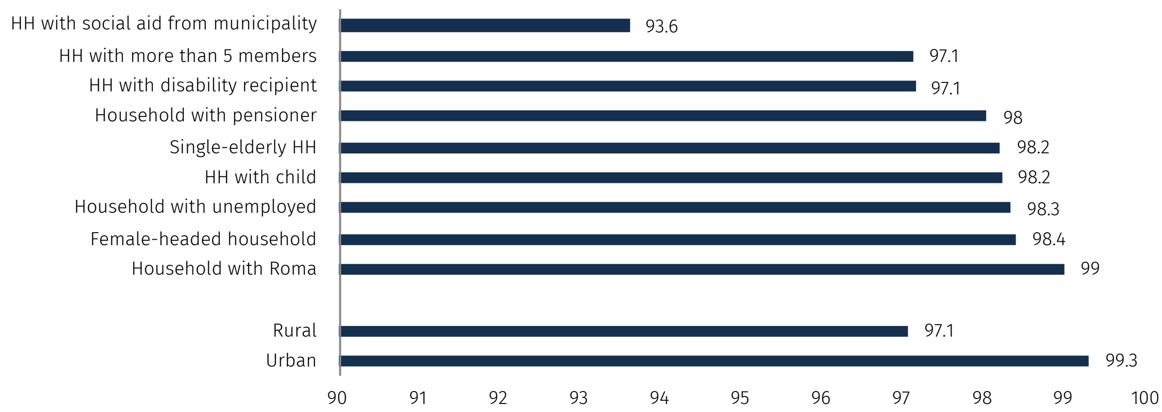
8 Because we do not observe in the household survey a connection to the grid, we proxy for electricity connectivity by identifying the share of households with a nonzero household expenditure on electricity and renewable energy, which are combined in the survey collection process. However, expenditures on renewables are expected to be negligible compared to electricity. Therefore, it is likely that this spending mostly captures electricity expenditures.

9 This is consistent with previous evidence. According to the Atlas or Urban Marginalized Areas in Romania, less than 1% of the urban dwellings are not connected to electricity. Lack of electricity connection in rural marginalized areas tends to be more prevalent. Similarly, the share of the

holds receiving social aid from municipalities. Still, more than 9 out of 10 households in this group reported nonzero electricity spending. Based on these results, we rule out lack of connectivity to electricity as a driver of our results.

A different picture emerges when looking at natural gas; however, the heterogeneity in coverage rates across groups could be driven by household preferences about energy sources rather than by a lack of access. Figure 8 shows significant differences across groups in the coverage rate of natural gas. While most households in urban areas reported using natural gas for cooking or heating, less than one-fourth of those living in rural areas did so.[10] Previous evidence also shows urban-rural differences in gas coverage.[11] A small share is also observed among households receiving social aid from the municipality, those with Roma members, and those with more than five household members. However, because we proxy connectivity to natural gas by determining the share of households using natural gas for cooking and/or heating, these differences could relate to differences in household energy preferences rather than limited access due to limited infrastructure or high prices.

Figure 7 Coverage Rates of Electricity by Groups, 2021 (%)



Source: Own estimates based on HBS (2021).

Note: We proxy for electricity connectivity by identifying the share of households with a nonzero household expenditure on electricity and renewable energy, as expenditures on electricity only cannot be identified in the 2021 HBS. This indicator measures access at the extensive margin (binary description) and does not capture the intensive margin aspects (quality and reliability). Expenditures on renewables are expected to be negligible compared to electricity. There is no formal ethnicity identifier in the HBS, but Roma is one of the categories in the nationality question.

When analyzing heating and cooking methods, it becomes evident that energy sources are relatively diversified (figures 9–10). Almost half of the households relied on central heating systems, with the majority using gas as the main fuel. However, more than one-third of households still used traditional technologies for heating (wood, coal, or oil stoves).[12]

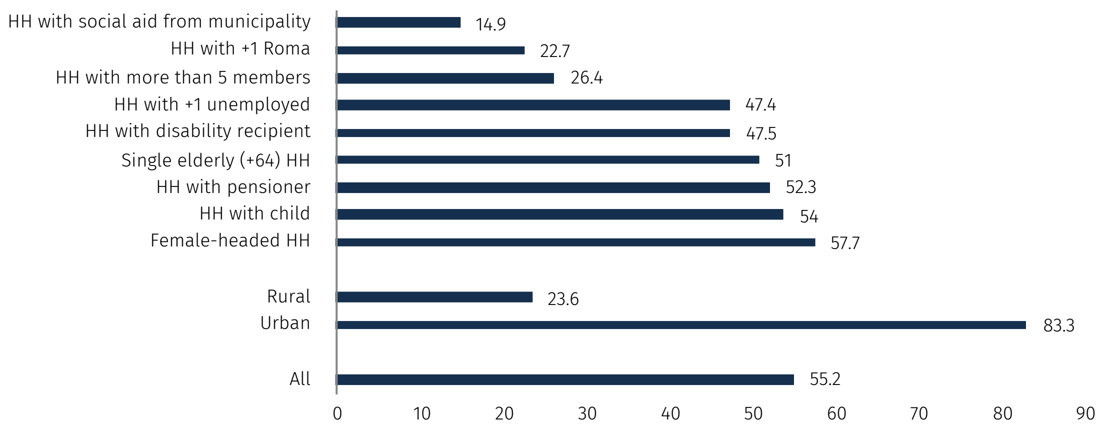
population living in dwellings not connected to electricity jumps from 0.6 percent of non-Roma in non-marginalized areas to over 10 percent of Roma people living in marginalized areas, suggesting pockets of deprivations at lower levels of disaggregation and among marginalized groups (Sandu et al., 2016).

10 This is only an estimate of differences in coverage and usage between the urban and rural populations, which does not necessarily imply that the gas network needs to be extended to reach the whole population.

11 A study from the Center for the Study of Democracy (2018) found that, in urban areas, 148 cities (68%) are connected to gas, covering 75% of the urban population. In contrast, 71% of the rural population has access to gas. Localities connected to gas are primarily concentrated in central Romania along an axis that starts in the northwest (including eastern Cluj and Alba counties, Mureș county, and most of Sibiu and Brașov counties), extends southward through Dâmbovița, Prahova, Ilfov, and Bucharest. Conversely, the regions outside the Carpathian Mountains are the least covered by the gas network.

12 The HBS does not collect information on the type of heating technology (modern vs. traditional). Information on the type of heating technology (modern vs. traditional) is important, because without it a comprehensive understanding of energy usage patterns is not possible. Knowing the

Figure 8 Coverage Rates of Natural Gas by Groups, 2021 (%)



Source: Own estimates based on HBS (2021).

Note: We proxy for connectivity to natural gas by identifying the share of households using natural gas for cooking and heating.

Figure 9 Type of Heating Methods, 2021 (%)

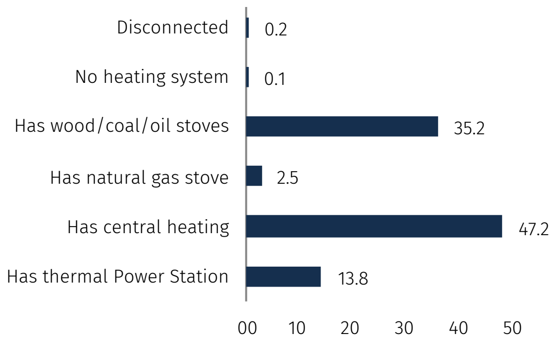
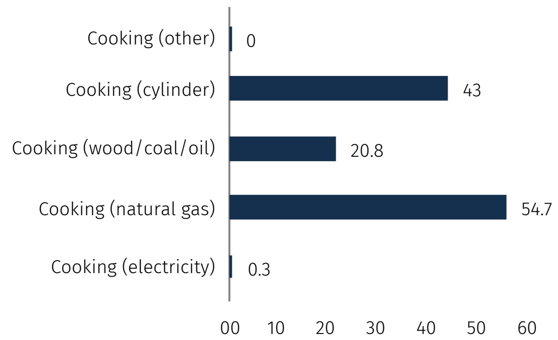


Figure 10 Type of Cooking Methods, 2021 (%)



Source: Own estimates based on HBS (2021).

Note: Central heating includes systems using various energy sources to generate heat. In the survey, these included wood, natural gas, electricity, and so on. The last category of "others" is not specified in the survey.

A significant share of rural households also relied on wood as a heating and cooking energy source. The availability of wood as a confounding factor is especially relevant when considering spending patterns on energy in rural areas. Other potential confounding factors are energy sources that are illegal or freely available, such as wood generated from illegal logging or forest plantations owned by households, which might result in underreporting. Based on this rationale, we analyze whether energy sources for heating and cooking differs between rural and urban areas. These analyses reveal that wood as a heating and cooking energy source plays a significant role, especially in rural areas (figures 11–12).

heating technology households use is crucial for assessing energy efficiency, environmental impact, and potential health implications. Therefore, we classify the available heating sources into modern and traditional heating technologies. The classification of heating technologies is based on various features, highlighting the diverse methods employed for providing warmth. Traditional technologies involve the use of wood, coal, oil, or natural gas stoves, reflecting a reliance on conventional sources for warmth, while modern heating technologies include options like thermal power stations and central heating systems using various energy sources to generate heat (wood/pellets, natural gas, electricity, and so on). Finally, we also collect this information in the 2023 World Bank survey.

Figure 11 Type of Heating Energy Source by Rural/Urban, 2021 (%)

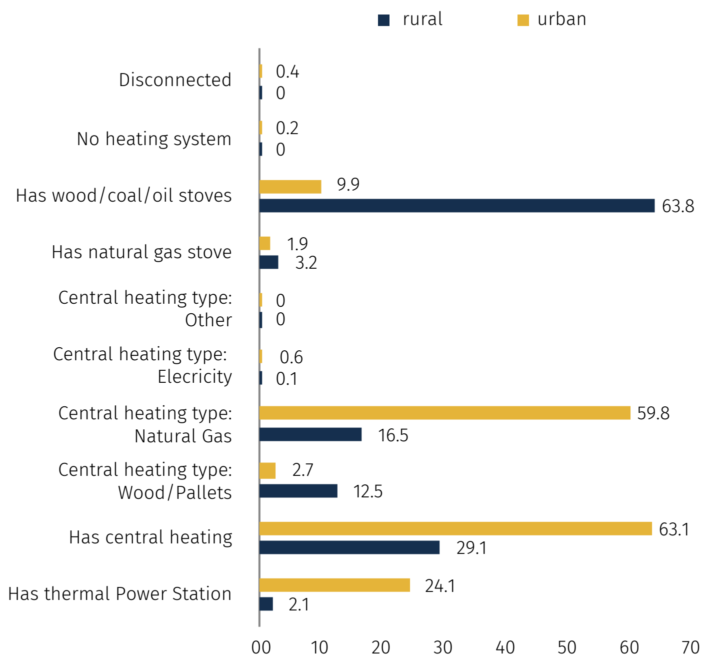
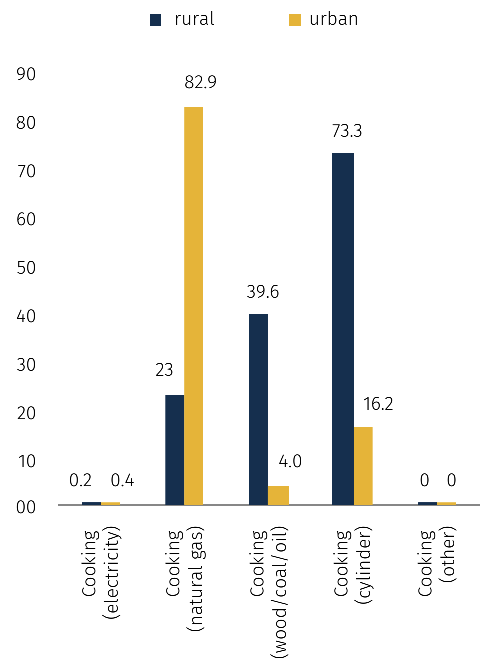


Figure 12 Type of Cooking Energy Source by Rural/Urban, 2021 (%)



Source: Own estimates based on HBS (2021).

2.3. Energy Affordability: Monetary and Nonmonetary Measures

Researchers have developed a variety of approaches to measure energy expenditure shares. Several measures of energy expenditure shares have been used in the literature (for a complete overview, see Robayo-Abril and Rude (2024). While some measures rely on nonmonetary approaches, others use income and expenditure data. However, even within the literature that uses monetary approaches, significant methodological differences exist in the empirical approaches taken for two reasons. First, different measures consider different components when estimating household energy expenditure. For example, some might include car-related energy expenditures (for example, gasoline), while others might abstract from this component because they relate it more to transport than the energy sector. Especially when analyzing households' vulnerability to fluctuations in energy prices, it is crucial to carefully consider which components to include when measuring absolute energy expenditure. Second, the literature has used several different methodologies to set households' absolute energy expenditure in relation to households' welfare. While some approaches rely on household income, others rely on household expenditure (consumption).

The diverging methodologies might result in different pictures of overall energy poverty incidence, energy expenditure patterns, and households' vulnerability to energy prices, impacting the design and monitoring of energy poverty policies. Given that energy expenditure shares might vary depending on the underlying measure used, it is crucial to base the chosen measure on empirical considerations. In addition, the comparison of different empirical approaches is recommended to better understand the sensitivity of the insights generated based on resulting energy expenditure shares to the underlying methodology. Because policy recommendations might differ depending on the estimates that are generated, reflecting on the underlying methodology is crucial.

In this report, we conduct empirical analyses to choose the most suitable monetary measure in the context of Romania. To this end, we rely on the 2021 HBS data and explore different approaches to measure energy expenditure and household welfare. More concretely speaking, we analyze how estimates differ across different methodological approaches in the case of Romania. We do so by considering different components of households' overall energy expenditure. In addition, we explore two different approaches to measuring households' welfare: income and consumption. Appendix 1 presents the detailed empirical approach and the resulting estimates.

Based on our empirical analysis, the income-based energy expenditure share that abstracts from car-related energy expenditure is the most robust measure in the case of Romania. We define energy expenditure shares as follows:

$$ES = \frac{E}{I},$$

where *ES* is the energy expenditure share for each household, *E* is the total expenditure on energy, and *I* is the household's total income (household budget). Notably, *E* does not consider energy-related household expenditure, such as expenditure on gasoline or other type of car-related fuels.

Energy poverty lacks a universally accepted metric due to the absence of a standardized definition of what should be included under an energy poverty line. In this report, we explore four different approaches to measuring energy poverty. Unlike nutritional poverty, which can be defined by a minimum daily caloric intake, there is no absolute reference point for meeting basic energy needs. Therefore, we apply four of the most commonly used measures in the EU (for a complete overview, see Robayo-Abril and Rude, 2024). The first defines households as energy poor who have an energy spending share at least twice as large as the median energy spending share in the population (2M). The second relies on absolute energy expenditure and defines households who report absolute energy expenditure below half the national median as energy poor (M/2). The third measure defines energy poverty as the share of households with an energy expenditure share above 10 percent (P10). Finally, the last approach, the Low-Income High Cost (LIHC) measure, identifies energy-poor households as those who are pushed into energy poverty due to high energy costs and low incomes. These different measures of energy poverty capture different aspects of energy poverty (see box 2.1 for details). As explained in chapter 5, we did not operationalize the official definition in the legislation due to the lack of clearly defined `minimum energy' needs and the lack of data.[13]

Box 2.1: Measuring Energy and Electricity Poverty to Design Better Social Programs

In the European context, particularly in countries where heating needs are significant, development practitioners and academics have long sought to isolate the needs of those households whose energy expenditure represents a significant burden on their budget. The literature on measuring energy poverty is ample (Hills 2012; Thomson et al. 2017; Trinomics et al. 2017; Romero et al. 2018; Castaño-Rosa et al. 2019; Sareen et al. 2020). A relatively easy way to proxy for such a burden using an expenditure-based indicator is by setting a threshold of budget share devoted to energy costs (it is customarily set at 10 percent; see World Bank 2012) and identifying energy poverty. By analogy to such measures, source-specific thresholds have also been set, thereby identifying, for example, electricity poverty as spending more than 10 percent of the household budget on electricity. This is a fixed threshold, so it is useful to track changes over time and for cross-country comparisons.

Several developments have contributed to the refining of the way such indicators are designed. One was the establishment of the EPOV,[14] now the Energy Poverty Advisory Hub, tasked with monitoring the situation in the EU. Against the absence of one commonly agreed-upon definition of energy poverty across the EU, the EPOV aims to contribute to a common understanding—but not to finally define energy poverty. It has produced a set of guidelines to define and measure energy poverty.[15] While the EC has reiterated that a standard definition cannot be developed at the European level, given the specific nature of energy poverty in different countries, this effort can benefit from some common data and definitions. For example, the EU-SILC conducted by all EU Member States includes self-reported information on households' being unable to heat their homes appropriately and carrying arrears on utility bills. Other expenditure-based indicators based on the household budget surveys are absolute (equivalized) energy expenditure below half the national median (M/2) and the share of (equivalized) energy ex-

13 Estimating "minimum energy needs" is also data intensive, because it requires detailed information on the dwelling (space heating, water heating, lights, and appliances and cooking) and its occupants.

14 https://energy-poverty.ec.europa.eu/energy-poverty-observatory_en.

15 https://energy-poverty.ec.europa.eu/system/files/2021-09/epov_methodology_guidebook_1.pdf.

penditure (compared to equivalized disposable income) above twice the national median (2M). The M/2 indicators measures abnormally low energy expenditures, capturing the concept of hidden energy poverty, whereas the 2M indicator captures abnormally high energy expenditure. Both indicators are relative per definition and are sensitive to the underlying distribution of the variables used for their calculation, so they are not ideal for tracking differences over time (where a set bar is recommended).

The EC highlights the importance of energy poverty as reflected in innovation at the country level. For example, the United Kingdom has been at the forefront of the effort to measure and tackle energy poverty since 2001, when it introduced a fuel poverty measure identifying those households who would spend more than 10 percent of their income to keep their home at 21 °C. Other evidence has reassessed that measure and suggested two new fuel poverty measures to capture the incidence and severity of the phenomena. The indicator for the incidence of energy poverty, known as Low Income, High Cost (LIHC), is defined as having energy costs higher than the median and having an income net of energy costs below the official at-risk-of-poverty (AROP) line. Finally, the measurement of the depth of energy poverty is a more complex task and the indicator for it involves measuring the gap between household energy needs and a reasonable threshold.

A different international effort that provides some new ideas on how to look at electricity affordability is provided by the Multi-tier Framework for Measuring Energy Access (MTF).[16] The framework was developed by The World Bank's Energy Sector Management Assistance Program (ESMAP) in consultation with international partners under the Sustainable Energy for All (SEforALL) initiative to improve measures for monitoring energy access under Sustainable Development Goal 7.1 (target on access to affordable, reliable, and modern energy for all). The MTF proposes operational definitions for measuring access to energy, going beyond the binary metrics (whether a household has an electricity connection and cooks with fuels like charcoal or dung). Electricity access is measured based on the combination of seven energy attributes across six access tiers with minimum requirements by tier of electricity access. It also provides basic thresholds on expenditure on electricity for different purposes. Those are identified as 5 percent for heating and 5 percent for cooking, which have been adopted by the MTF.

All these different efforts, which are ultimately aimed at measuring more accurately a particular facet of monetary and nonmonetary deprivations, suggest that there is scope for experimentation and dialogue with the Romanian government in designing new measures and programs that help address the multiple causes of energy poverty itself: low incomes, poor housing conditions, low energy efficiency, and high energy spending.

We report these values along the income distribution and for population subgroups. We approximate the welfare distribution by relying on the income measure of the household survey. We first calculate the income per capita and then analyze to which income quintile each household belongs. Based on this distribution, we generate insights on energy affordability and poverty along the welfare distribution. Moreover, we generate these estimates for subgroups of the population, which we believe could be especially vulnerable, such as households of the single elderly, with female heads, or with many household members.

We mainly rely on the 2021 HBS to analyze monetary energy affordability in Romania. The HBS collects detailed expenditure information for all consumption categories, including energy expenditure with disaggregation by energy source, and allows for indirectly approximating the amount of energy consumed. The HBS also enables disaggregation among some vulnerable groups, including but not limited to beneficiaries of the leading social assistance program and households of the single elderly, those with unemployed persons ages 55 and above, and those headed by a single parent.

We also rely on data from the EU-SILC 2020. To analyze affordability among the poor and other income groups across the distribution (that is, income quintiles), we also use the EU-SILC data, the leading survey instrument for measuring official poverty in the country. The EU-SILC also allows us to measure several nonmonetary energy affordability and poverty indicators. To combine energy expenditure and income data, we use

16 https://www.esmap.org/mtf_multi-tier_framework_for_energy_access#:~:text=The%20Multi%2DTier%20Framework%20(MTF,vs%20nonsolid%20fuels%E2%80%9D%20for%20cooking.

the HBS from 2019, because the income reference year of the EU-SILC 2020 is 2019, and match the two datasets.

Finally, the 2023 World Bank rapid survey, conducted in June–July 2023, provides an updated picture of household energy vulnerability. This household survey was purposely designed to capture energy affordability and barriers to moving to cleaner energy and heating sources. It captured information on beliefs, attitudes, and behaviors related to sustainable energy transitions. The details of this survey are presented in annex 1.

Our estimates suggest that, when using expenditure-based measures, approximately one-fourth of the Romanian population was energy poor in 2021. In 2021, Romanian households spent, on average, 8.7 percent of their overall household expenditure on energy.[17] The resulting energy poverty incidence rates using the P10 and the M/2 are similar and indicate that approximately one-fourth of the population in Romania was affected by energy poverty. The M/2 indicators measure unusually low energy expenditures, capturing the concept of hidden energy poverty, which is different from other concepts of energy poverty that typically focus on high energy costs or lack of access to energy. Therefore, it is important to capture a full picture of energy poverty. The absolute energy poverty rate was significantly smaller when using the 2M and the LIHC measures, 12.3 and 5.7 percent, respectively (figure 13).

Figure 13 Energy Expenditure Share and Energy Poverty, 2021

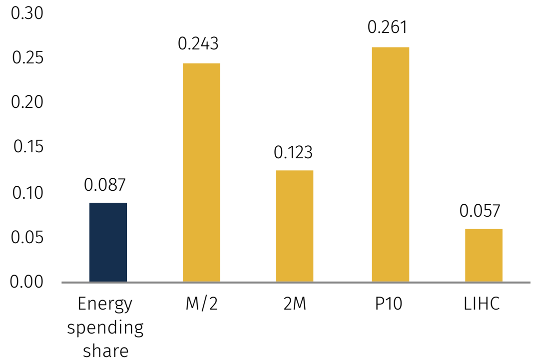
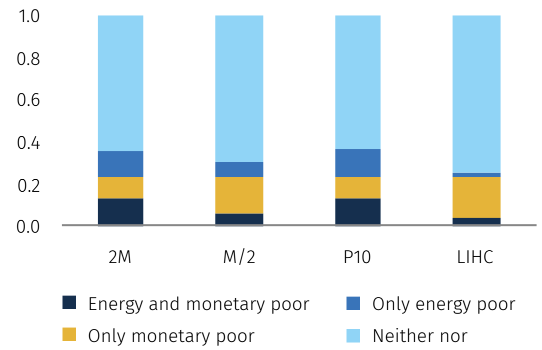


Figure 14 Monetary vs. Energy Poverty, 2021 (Shares)



Source: Own estimates based on HBS (2021).

Note: We measure energy spending as the amount of money spent on energy divided by the monthly income of each household. We abstract from car-related expenditure when calculating spending on energy. Energy expenditure includes electricity and renewables, natural gas, liquified energy sources, liquid fuels, solid fuels, and thermal energy. Collected firewood (not traded in markets) is not captured as energy expenditure and may lead to low energy expenditures. We use four different measures of energy poverty: (1) the rate of households spending more than twice the median value of energy expenditure shares (2M), (2) the rate of households spending less than half the median value of absolute energy spending (M/2), (3) the rate of households spending more than 10 percent of their income on energy (P10), and (4) the rate of households who are pushed into energy poverty due to high fuel costs and low incomes (LIHC). Monetary poverty is the AROP rate using equivalized household income and the poverty line estimated in the HBS 2021. The AROP rate estimated using the HBS is higher than the official rate estimated with the EU-SILC, standing at 23.8 percent compared to 21.2 percent, respectively.

While interrelated, energy poverty and income poverty are distinct. When energy-poverty measures are used in tandem with the measure of households at risk of poverty, often used to evaluate monetary poverty in the EU, between 4 and 13.4 percent of households in Romania were energy poor but not income poor. The proportion of energy poor among non-poor populations emphasizes the difference between money and energy poverty. We would want such a share to be small, but this is not the case in Romania. When using the 2M and P10 measures of energy poverty, only half of those at risk of poverty were also energy poor. The share is lower in the cases of the M/2 and LIHC measures (25.5 and 17.6 percent, respectively). On

17 There are many different methodological approaches to measure energy poverty. For a full overview of different measures see Robayo-Abril and Rude (2024). For the chosen methodology in this report and the applied empirical approach, see appendix 1.

the other hand, when considering all energy poverty measures except LIHC, only half of those experiencing energy poverty were also in monetary poverty. However, when examining the LIHC measure, this proportion increases to 73 percent (figure 14). These results imply that while there is some overlap between the energy and the monetary poor, a significant share of the population did not face monetary and energy poverty jointly.

This finding has important implications for designing policies to tackle energy poverty. If people who lack access to energy are mostly also poor in terms of income, then reducing income poverty is essential to reducing energy poverty. However, suppose energy poverty and income poverty are not necessarily coincident. In that case, energy policies can still play a crucial role in reducing energy poverty, because targeting schemes that target those at risk of poverty might only partially address the vulnerabilities faced by those exclusively affected by energy poverty. For example, energy policies can provide subsidies or incentives for low-income households to access energy-efficient technologies or renewable energy sources. Moreover, energy policies can focus on improving energy infrastructure in low-income areas to ensure access to reliable and affordable energy.

Although those at risk of poverty and those who are energy poor do not fully overlap, those at the lower end of the income distribution report higher shares than those at the higher end, regardless of the measure used, suggesting higher energy vulnerability among low-income groups to energy price spikes. Figure 15 reveals that households in the lowest income quintile spend, on average, 14.7 percent of their household income on energy expenditures, while those in the upper-income quintile only spend 3.4 percent of their household income on these expenditure types. The energy poverty incidence rates vary significantly by income quintile, with the lower-income population experiencing higher rates, regardless of the definition used (figure 16). These patterns suggest that energy price spikes will affect low-income households disproportionately.

Figure 15 Energy Expenditure Shares by Income Quintiles, 2021 (%)

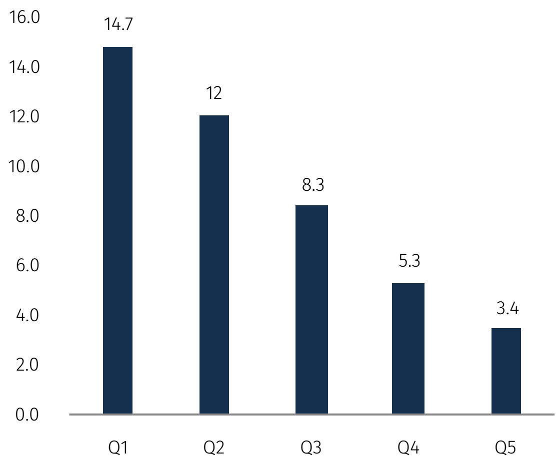
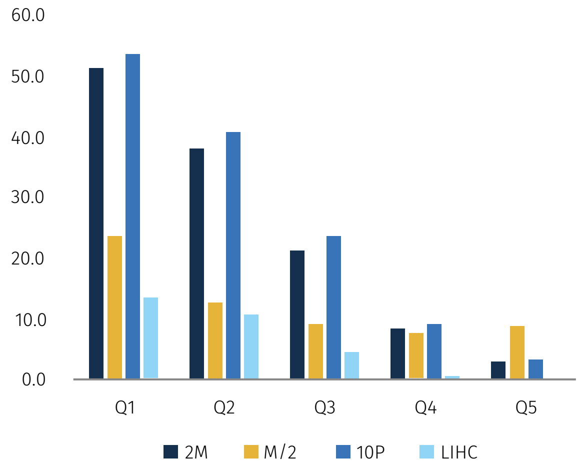


Figure 16 Energy Poverty by Income Quintiles for Three Measures of Energy Poverty, 2021 (%)



Source: Own estimates based on HBS (2021).

Note: We measure energy spending as the amount of money spent on energy divided by the monthly income of each household. We abstract from car-related expenditure when calculating spending on energy. Energy expenditure includes electricity and renewables, natural gas, liquified energy sources, liquid fuels, solid fuels, and thermal energy. Collected firewood (not traded in markets) is not captured as energy expenditure and may lead to low energy expenditures. We use four different measures of energy poverty: (1) the rate of households spending more than twice the median value of energy expenditure shares (2M), (2) the rate of households spending less than half the median value of absolute energy spending (M/2), (3) the rate of households spending more than 10 percent of their income on energy (P10), and (4) the rate of households who are pushed into energy poverty due to high fuel costs and low incomes (LIHC).

Some groups are more affected by energy poverty than others, which requires targeted and differential policy interventions. Figure 17 shows that energy spending share differs across population subgroups and that there are some important variations. The energy expenditure share ranges from 6.7 to 14.5 percent. The households who reported the highest shares were those of the single elderly, those who receive social aid from municipalities, and those with older adults or pensioners. Energy spending shares are also higher in rural than urban areas. Energy poverty patterns are similar when the 2M and P10 measures are used (figure 18). When the absolute energy poverty incidence rate (M/2) is used, Roma households and households receiving social aid from municipality reported the highest rates. This hints at the problem of hidden energy poverty, a phenomenon that occurs when households report low energy spending shares because they restrict their energy usage due to energy poverty. What these results show is that policy makers need to design efficient interventions to target those who are most affected instead of implementing universal, undifferentiated interventions.

Figure 17 Energy Expenditure Shares by Groups, 2021 (%)

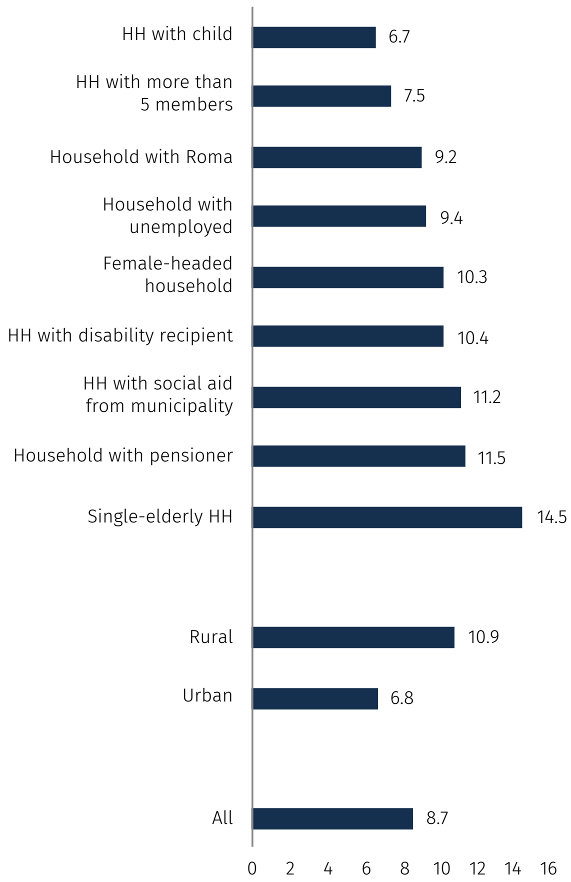
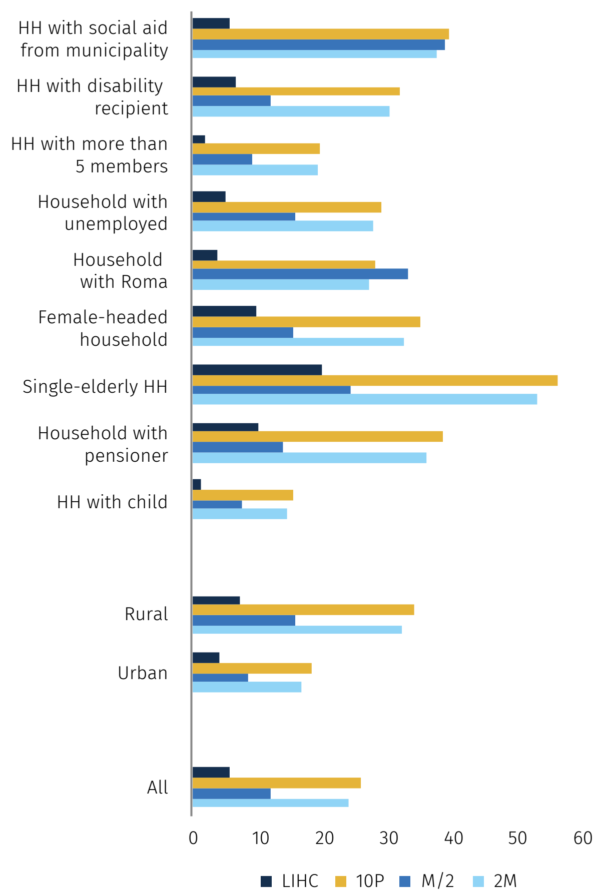


Figure 18 Energy Poverty Rates by Groups, 2021 (%)



Source: Own estimates based on HBS (2021).

Note: We measure energy spending as the amount of money spent on energy divided by the monthly income of each household. We abstract from car-related expenditure when calculating spending on energy. Energy expenditure includes electricity and renewables, natural gas, liquified energy sources, liquid fuels, solid fuels, and thermal energy. Collected firewood (not traded in markets) is not captured as energy expenditure and may lead to low energy expenditures. We use four different measures of energy poverty: (1) the rate of households spending more than twice the median value of energy expenditure shares (2M), (2) the rate of households spending less than half the median value of absolute energy spending (M/2), (3) the rate of households spending more than 10 percent of their income on energy (P10), and (4) the rate of households who are pushed into energy poverty due to high fuel costs and low incomes (LIHC).

Box 3.2: Energy and the Elderly in Romania

One main result of our analysis is that single-elderly households were much more likely to be affected by energy poverty, and related to this, they also reported, on average, higher energy expenditure shares. Previous studies find similar patterns for older adults in the case of other countries. Research in Japan, for example, finds that older adults are more likely to spend time at home during winter and summer than younger people, leading to higher energy consumption (Inoue et al. 2022). Single-elderly households are also less likely to benefit from economies of scale of energy consumption (Inoue et al. 2022). In addition, data from the United Kingdom shows that older adults are more likely to live in energy-inefficient housing and houses that are more difficult to heat (Harding 2022). At the same time, they might also have less income to cover rising energy bills. These factors make older adults, especially those living alone, more vulnerable to rising energy prices.

The higher exposure of single-elderly households to energy prices is problematic, given that they also show stronger health reactions to energy deprivation. A study from the United States, for example, showed that older adults are more likely to die from heat- or cold-related causes during the summer and winter months with extreme temperatures (LIHEAP Clearinghouse 1995).

We analyze which factors could drive the higher probability of being energy poor of single-elderly households in the case of Romania. To this end, we use data from the HBS 2021 and describe single-elderly households in terms of observable socioeconomic characteristics, compare the type of energy they used for cooking and heating, and analyze some of their housing and living conditions more broadly.

We find evidence of the mechanisms behind the higher vulnerability to energy poverty of older adults identified in previous studies in Romania. Table A.5.1. in Annex 5 shows that single-elderly households are more likely to be at risk of poverty (30 percent vs. 22 percent). Some indicators also hint at worse housing conditions in the case of single-elderly households. For example, they are less likely to have available appropriate sewage systems or hot water. Lastly, there are some systematic differences in the types of energy they rely on for heating and cooking. More-detailed information on the energy efficiency and costs of these different heating and cooking systems is required to understand further the extent to which the latter point drives the higher energy-spending shares for single-elderly people in Romania.

Overall, we conclude that single-elderly households require special attention when designing policies to decrease energy poverty. These policies should consist of income-support measures on the one hand and access to energy-efficient housing and heating and cooking methods on the other.

We do not find that energy spending patterns and energy poverty differ by gender. Commonly, energy poverty is conceptualized and assessed at the household level, potentially overlooking gender disparities in the expenses and advantages related to energy and fuel consumption. To this end, we construct some gender typologies to investigate household compositions beyond the traditional female headship typology and analyze the extent to which different forms of 'female' and 'male' households are affected by energy poverty. Figures 19 and 20 show these groups' energy spending shares and energy poverty incidence rates. The highest energy spending share (and poverty incidence rate) was reported by households with no employed adults, while the lowest was that reported by dual-earner households. These results indicate that income might be more relevant than the gender of household members in determining energy spending shares and energy poverty rates. However, the gender dimensions of energy poverty may be broader and require a more detailed analysis.[18]

18 For example, women and children may bear a disproportionate impact from energy poverty, as they tend to spend more time at home (Petrova & Simcock (2021); Clancy et al. (2007)).

Figure 19 Energy Spending Shares by Gender Groups, 2021 (%)

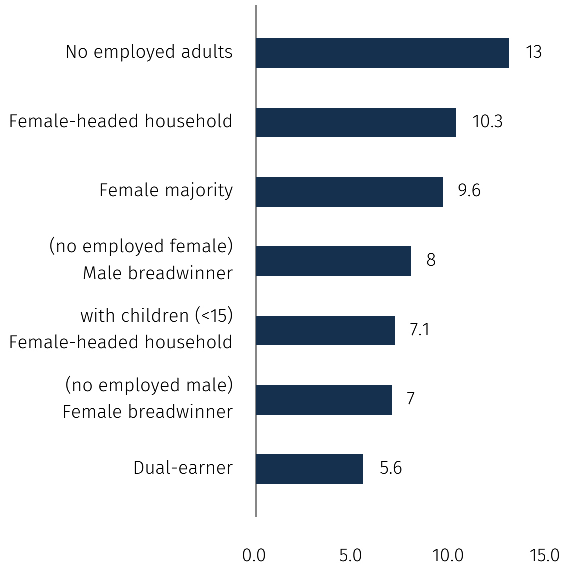
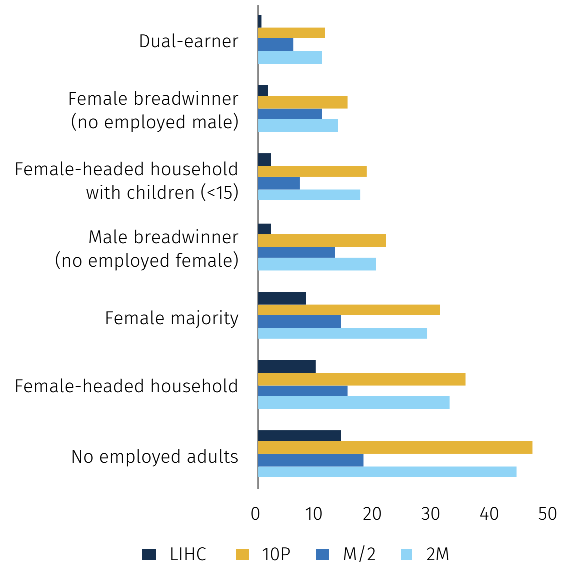


Figure 20 Energy Poverty Rates by Gender Groups, 2021 (%)



Source: Own estimates based on HBS (2021).

Note: We measure energy spending as the amount of money spent on energy divided by the monthly income of each household. We abstract from car-related expenditure when calculating spending on energy. Energy expenditure includes electricity and renewables, natural gas, liquified energy sources, liquid fuels, solid fuels, and thermal energy. Collected firewood (not traded in markets) is not captured as energy expenditure and may lead to low energy expenditures. We use four different measures of energy poverty: (1) the rate of households spending more than twice the median value of energy expenditure shares (2M), (2) the rate of households spending less than half the median value of absolute energy spending (M/2), (3) the rate of households spending more than 10 percent of their income on energy (P10), and (4) the rate of households who are pushed into energy poverty due to high fuel costs and low incomes (LIHC).

Among all energy expenditures, households spend the most on electricity[19]**.** Household energy expenditure alone, not the energy sources, is the only factor used to estimate energy poverty. However, the assessment of energy poverty and the formulation of policy directives to reduce it requires a thorough understanding of the many energy sources that are used. When analyzing the energy expenditure patterns in Romania in more detail, it quickly becomes clear that the largest share of energy spending goes to electricity, followed by solid fuels. Households spend, on average, 32.8 percent of their overall household energy expenditure (including car-related fuel) on electricity, 20.3 percent on solid fuels, and 18.0 percent on car-related fuels. Similarly, households spend, on average, 17.5 percent of their overall energy expenditure on natural gas (figure 21, panel a).

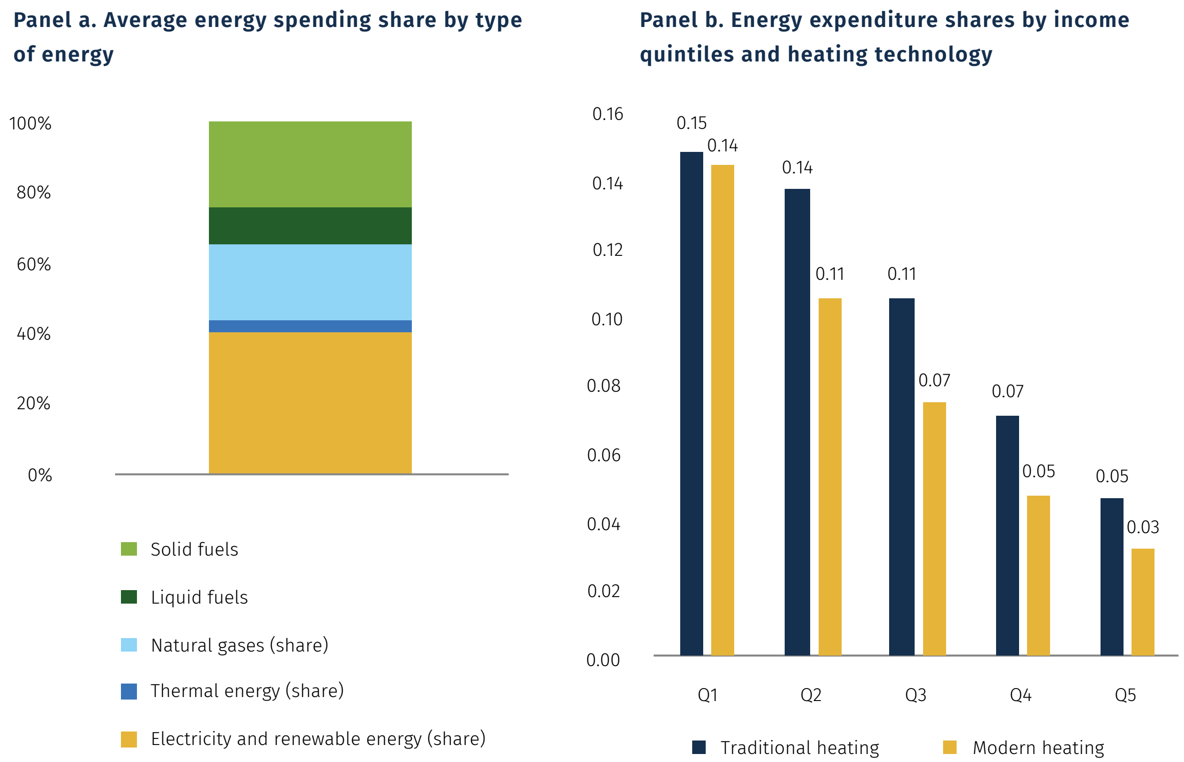
On average, energy expenditure shares are larger when traditional heating technologies are used. Overall, households who used traditional heating technologies (such as a natural gas stove or wood/coal/oil stoves) spent, on average, 12.2 percent of their household income on energy expenditures, whereas households who used modern technologies (thermal power station or central heating) spent 6.6 percent. These suggest the use of modern technologies yields cost savings, once the upfront costs of installation are recovered. Panel b of figure 21 reveals that savings are present across income quintiles, although they are lower for the lowest income quintile.[20] Even when we control

19 As mentioned earlier, the household budget survey does not separately identify expenditures on electricity and renewable energy. However, renewable energy expenditures are expected to be negligible compared to electricity, so this spending likely mostly captures electricity expenditures.

20 We used alternative energy expenditure shares, such as expenditure-based vs. income-based, including vs. excluding car-related expenditure, and

for socioeconomic and demographic characteristics, as well as dwelling characteristics, we find significant savings using modern technologies (see table A2.1).

Figure 21 Average Energy Spending Share by Type of Energy and by Heating Technology, 2021



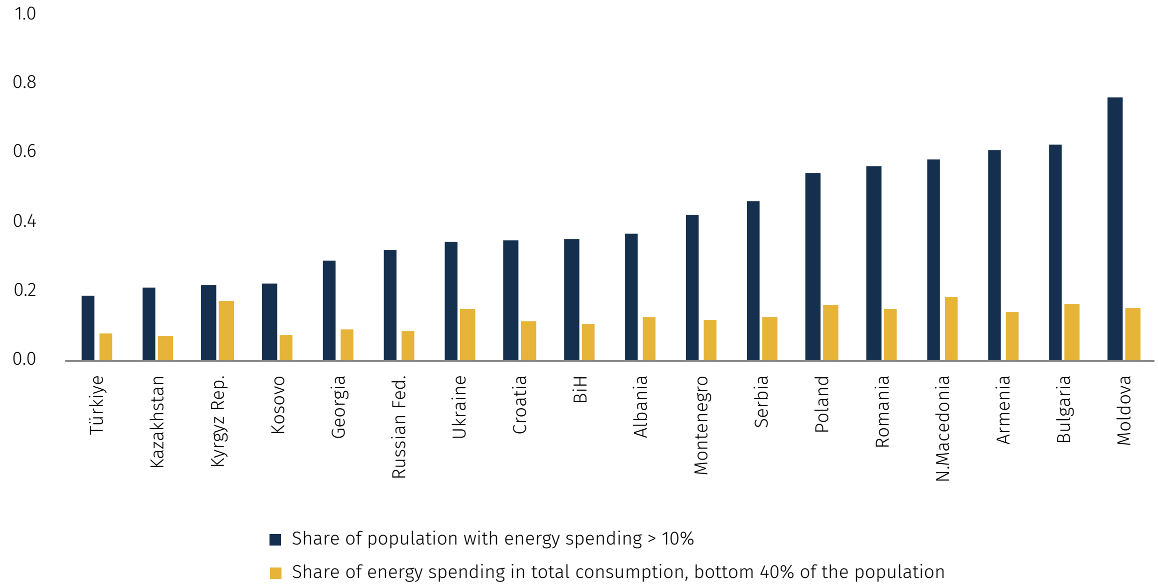
Source: Own estimates based on HBS (2021).

Note: Panel a shows the data collected by the HBS for the energy spending categories. Collected firewood (not traded in markets) is not captured as energy expenditure, and may lead to low energy expenditures. In panel b, modern heating technologies include thermal power station and central heating and traditional technologies include natural gas stoves and wood/coal/oil stoves.

Among the European and Central Asia countries, higher electricity prices (the most critical energy source for households) are generally associated with higher burdens of electricity spending in household budgets. The evidence also suggests that, when looking at changes over time for a particular country, households seem to have limited abilities to keep their electricity expenditures constant in an environment of rising electricity prices (by substituting for cheaper sources of energy), resulting in households cutting down other types of consumption such as food, health, or education (World Bank 2012). This is particularly the case among the poor. In Romania, energy shares among the poor and energy poverty rates (P10) are among the highest in the region (figure 22). Therefore, at the microlevel, it is critical to assess both the impact in terms of affordability and the distributional impact of rising energy prices on households.

expenditure vs. income quintiles, all of which yielded consistent results.

Figure 22 Energy Affordability in a Broader Context: Romania vs. Other Europe and Central Asia Countries (Shares)

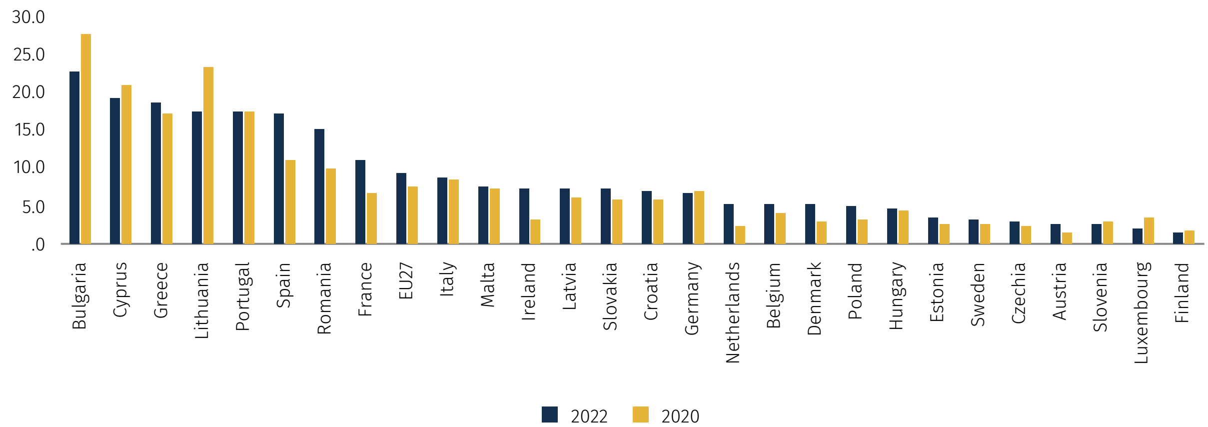


Source: World Bank (2022). Staff estimates based on the Europe and Central Asia Poverty Database (ECAPOV) standardized household budget surveys covering most of the countries in Europe and Central Asia. Energy expenditures are expressed as a share of total consumption, not income, and include all sources of energy spending. Therefore, results are not comparable to the previous measures presented in this section.

We also analyze nonmonetary measures of energy affordability and energy poverty. These measures might be less sensitive to measurement errors, such as the ones described previously, and might also capture slightly different aspects of households' vulnerability to energy poverty.

Compared to the citizens of other EU countries, in 2022 a large share of Romanians reported being unable to keep their home warm (15.2 percent). Among the poor, the incidence was almost twice (29.5 percent). Consistent with the trends in the region, these rates experienced a significant increase relative to 2020. These results are consistent with World Bank rapid survey estimates from July 2023, where 14.9 percent of the population reported that they could not afford to keep their home adequately warm during the past winter. Similarly, the proportion of households with arrears on utility bills was among the largest in the EU, reaching 17.8 percent in 2022, a trend that was increasing. Figures 23 and 24 show the respective estimates.

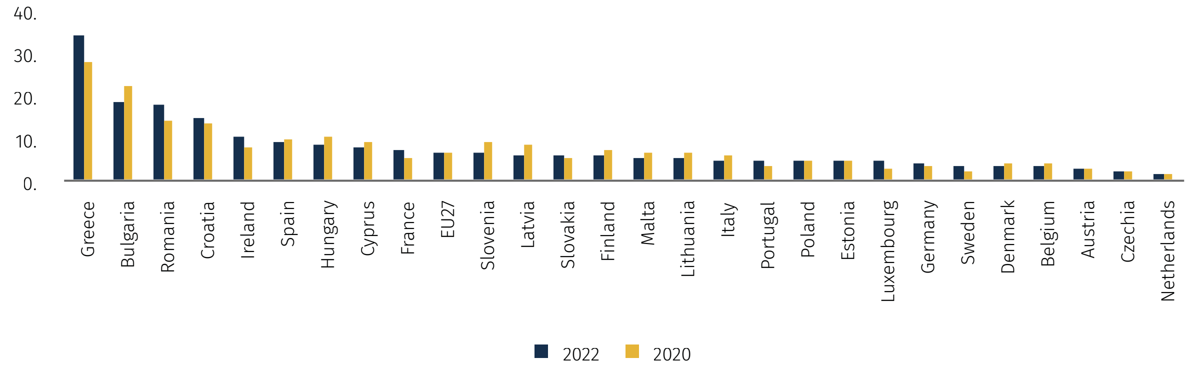
Figure 23 Inability to Keep Home Adequately Warm in the Past 12 Months, 2020 vs. 2022 (%)



Source: Own estimates based on Eurostat (2023).

Note: This consensual-based indicator is based on self-reported answers to a question in the EU-SILC about affordability (or ability) to keep home warm, regardless of whether the household needs to be kept warm.

Figure 24 Arrears on Utility Bills in the Past 12 Months, 2020 vs. 2022 (%)



Source: Own estimates based on Eurostat (2023).

Note: This consensual-based indicator is based on self-reported answers to a question in the EU-SILC survey about inability to pay utility bills (heating, electricity, gas, water, and so on) on time due to financial difficulties.

Recent survey estimates from the 2023 World Bank rapid surveys indicate that hot temperatures also pose a problem for Romanians and that their energy consumption patterns might change if energy prices continue to increase. Energy poverty in the EU has traditionally been associated with the inability of households to meet their heating needs during winter. However, understanding cooling needs is also important, particularly given that many countries in the region have experienced an increase in the frequency and intensity of heatwaves (Thomson et al. 2019). To understand this issue, we collected information on the ability of households to keep cool during summer (as in the Spanish EU-SILC), which is currently not collected in the Romania EU-SILC. Our results show that about one-third of the population indicated they could not keep their home adequately cool in the summer of 2022. This is an important finding, as most existing studies solely focus on the harmful health impacts of low indoor temperatures, even though several European regions are also susceptible to dangerously high summertime temperatures (Maxim et al. 2016).[21] Interestingly, over one-third of the population will either heat less or replace heating sources with cheaper ones or both. In addition, 60.7 percent indicated that they would limit the usage of energy appliances. These estimates confirm that households in Romania are vulnerable to rising energy prices and will likely remain so in the near future.

Households who are poorer or with either many or unemployed members are more affected by leakages. Another interesting measure to look at in the context of energy efficiency is the share of households reporting leakage by income quintiles and across groups. Figure 25 demonstrates that poorer households are, on average, more affected by leakages than wealthier households. Nearly one-fourth of households in the lowest income quintile reported leakages compared to only 3.2 percent in the highest income quintile. Similarly, we find substantial heterogeneity in leakages for households with more than one unemployed household member (27.8 percent) and those with many members (18.7 percent) (figure 26). Leakages are a more persistent problem in rural than urban areas (16.3 percent versus 5.2 percent). Based on 2023 survey estimates, 7.7 percent of interviewees experienced a leaking roof; 7.9 percent damp walls, floors, or foundations; and 4.7 percent a rotten window frame or floors.

Figure 25 Households with Leakages by Income Quintiles, 2019–20 (%)

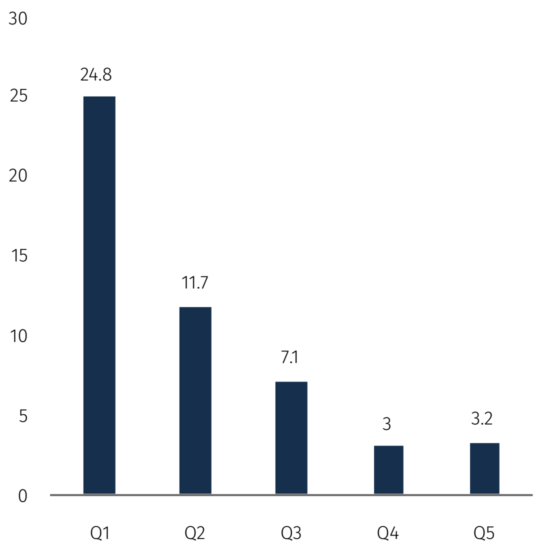
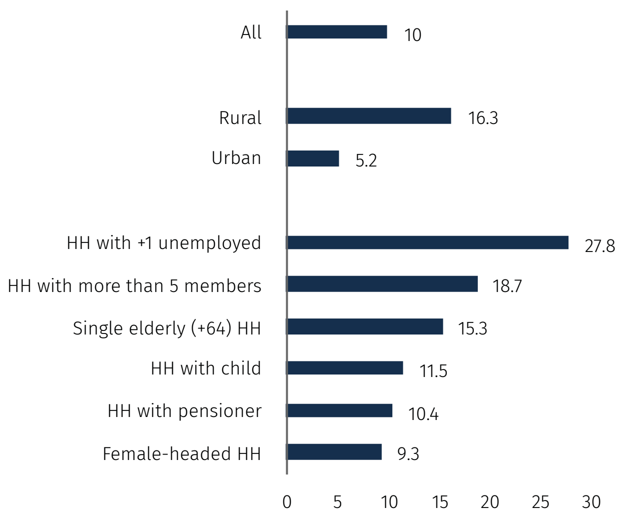


Figure 26 Households with Leakages by Groups, 2019–20 (%)



Source: Own estimates based on EU-SILC (2020).
Note: Q1 indicates the poorest income quintile and Q5 the richest. Leakages include roof, wall, floor, foundation, and windows.

These estimates show that poorer households might need renovation measures and other energy-efficient modules; rural areas might have more significant needs than urban ones. The measure above shows that poorer households were more exposed to problems related to their housing conditions. These could generate energy inefficiencies, further worsening the welfare of such households along several dimensions. Leakages can also reduce the effectiveness of other energy-efficiency measures, such as increased insulation and high-performance windows. Investing in energy-efficient renovations for the poorest could be beneficial in both the medium and long term.

21 The WHO recommends keeping indoor air temperatures between 18 and 24 °C, although in Southern and Southeastern Europe, where many households lack air conditioning, this range is frequently surpassed. People who are chronically unwell and the elderly are particularly susceptible to heat stress.

At the same time, a lower share of poorer households reported exposure to environmental problems. Not even 1 out of 10 households in the lowest income quintile indicated that they were exposed to some form of environmental problem. In comparison, 14.4 percent of households in the highest income quintile did so (figure 27). These results could hint at poorer households' needing to be made aware of these problems or not identifying them as problems due to their more-severe challenges. Nevertheless, plotting these estimates for different groups reveals that vulnerabilities might also play a role (figure 28)—households with at least one unemployed member and those with a pensioner reported the highest exposure.

Figure 27 Households with Environmental Problems by Income Quintiles, 2019–20 (%)

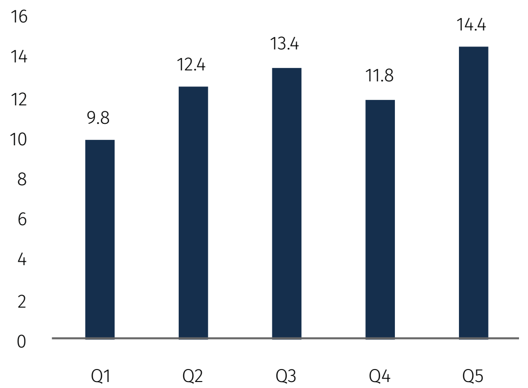
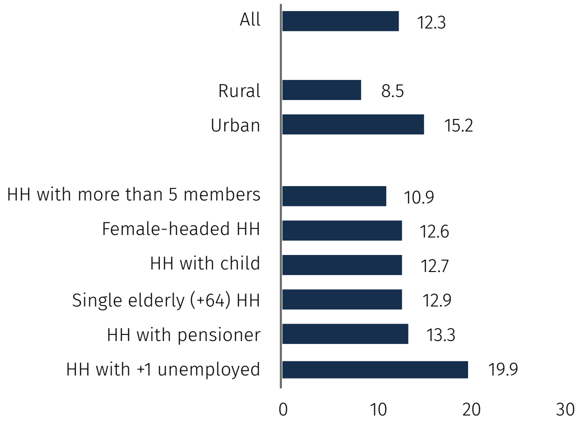


Figure 28 Households with Environmental Problems by Groups, 2019–20 (%)



Source: Own estimates based on EU-SILC (2020).
Note: Q1 indicates the poorest income quintile and Q5 the richest.

Moreover, previous evidence shows that social housing is underdeveloped in Romania. Only 1.5 percent of the housing stock is earmarked for state-subsidized housing and most of that is in private hands (Adăscăliței et al. 2020). Local governments manage the housing stock, but often lack the capacity and resources to expand this sector. There are also reports of institutional discrimination against the Roma (Adăscăliței et al. 2020). These dynamics could worsen the disparities in Romania when it comes to facing problems related to energy inefficiency.

2.4. Factors Associated with Energy Poverty

To identify potential factors associated with energy poverty, we start by analyzing potential factors correlated with high energy expenditure shares. To this end, we run an ordinary least squares regression and identify the variables significantly correlated with energy expenditure shares. We include socioeconomic and demographic characteristics, as well as dwelling characteristics (including the type of energy used for cooking and heating) to understand whether certain technologies correlate with higher energy spending shares. Table 1 reports the results.

Table 1 Regression of Energy Expenditure Shares, 2021

Variables	(1) Energy exp. share (income-based no car)	Variables	(1) Energy exp. share (income-based no car)
Household with children (<15)	-0.0105*** (0.00136)	Subsidy (wood/coal/oil)	-0.0993 (0.0874)
Household with pensioner	0.00245 (0.00164)	Subsidy (electricity)	-0.180** (0.0836)
Single-elderly	0.0390*** (0.0141)	Cooking (electricity)	0.0211** (0.00953)
Female-headed household	0.00740*** (0.00146)	Cooking (natural gas)	0.0360*** (0.00951)
Household with Roma	-0.0116*** (0.00396)	Cooking (wood/coal/oil)	0.00352* (0.00195)
Household with unemployed	0.0109*** (0.00265)	Cooking (cylinder)	0.0290*** (0.00533)
Urban	-0.00758*** (0.00174)	Cooking (other)	-0.0345 (0.0854)
Household with more than five members	-0.00963*** (0.00238)	Cold water, indoors from public supply	-0.00763 (0.00608)
Income per capita	-6.98e-07*** (2.55e-08)	Indoors, from in-house	-0.00245 (0.00621)
Social aid from municipality (recipient)	0.00813 (0.00535)	Outside the residence, but inside the building	-0.0139* (0.00833)
Disability benefit recipient	-0.00792* (0.00425)	Outdoors, fountain, pump, well	0.00317 (0.00495)
Connectivity to electricity	0.0512*** (0.00482)	Hot water: N/A	0.00668 (0.0223)
Has a thermal power station	-0.0285 (0.0200)	Hot water: Public system	-0.00448 (0.00497)
Has central heating	-0.0512** (0.0219)	Hot water: In-house system	-0.00494 (0.00384)
Central heating type: Wood/pellets	0.0354*** (0.00935)	Hot water: Disconnected	0.000694 (0.0202)
Central heating type: Natural gas	0.0296*** (0.00952)	Sewage type: In-house system	0.00405* (0.00232)
Central heating type: Other	0.185*** (0.0527)	Sewage type: None	0.00699 (0.00510)
Has a natural gas stove	-0.0174 (0.0206)	Natural gas (cooking or heating)	-0.0102 (0.00881)
Has wood/coal/oil stoves	-0.00208 (0.0200)	Constant	0.0433* (0.0223)
Disconnected	-0.0309 (0.0257)	**Observations**	**15,192**
Subsidy (thermal energy)	0.185** (0.0834)	**R-squared**	**0.163**

Source: HBS (2021).

Note: The table reports correlation coefficients from a simple regression on energy expenditure shares. Energy expenditure shares are income based, abstract from energy spending on car-related energy (such as gasoline), and range from 0 to 1.

We identify several variables that are negatively correlated with energy expenditure shares. Based on the figures in table 1, the following variables are related to a significant decrease in the energy expenditure share: households with children (<15), households with Roma, those living in urban areas, households with more than five members, income per capita, having central heating, receiving electricity subsidies, being a disability benefit recipient household, and having access to cold water outside the residence, but inside the building (the last two are only significant at the 10 percent level).

Several variables are positively correlated with energy expenditure shares. The following variables are positively correlated with the energy expenditure share: households of a single elderly person or with many unemployed; households headed by females; being connected to electricity; using wood pellets, natural gas, or other sources for heating; and using electricity, natural gas, wood/coal/oil, or cylinder for cooking. Having an in-house sewage type also correlates with increased energy expenditure shares, although this is only significant at the 10-percent level.

We conclude that energy expenditure shares are partly related to the technology used for cooking and heating; income levels and socioeconomic factors also play a role. A more detailed study is required to understand the relationship entirely, because policy conclusions would require additional information that allows controlling for connectivity, household preferences, the energy efficiency of different technologies currently in use, and the costs related to each technology (fixed and variable costs). Income plays a role, but to a lower extent, given that the effect is close to zero. In addition, a significant correlation is expected, given that the outcome variable uses income as an input.

The analysis also shows that certain household types are more likely to report higher energy spending shares: those of the single elderly, with many unemployed, and those headed by a female. Policy makers addressing energy poverty rates should prioritize these households when designing policy interventions. Still, energy expenditure shares could be biased, given that shares decrease with lower connectivity or greater access to resources for which households do not have to pay (for example, through ownership of forest plantations or illegal logging). This channel could, for example, be behind the negative coefficient observed for households with Roma.

The next chapter adopts a behaviorally informed approach to illuminate the barriers and facilitators of behavior change in sustainable energy transitions. By delving into the attitudes and behaviors that contribute to energy poverty, this approach enhances traditional diagnostic methods, offering a more nuanced understanding of policy challenges from the perspective of users or beneficiaries.

Chapter 3

A Behaviorally Informed Approach to Sustainable Energy Transitions

Energy poverty is an outcome (or condition) driven by various factors, including individual and social behaviors. As discussed in chapter 2, there are multiple factors correlated with energy poverty, including the sociodemographic composition of the household, energy-dependent technologies in use, and geographic location. These factors, however, can only be confronted per se by first addressing the determinants of behaviors that sustain energy poverty, such as the use and choice of energy-intensive technologies. An approach informed by insights from behavioral science can yield a holistic understanding of the bottlenecks and enablers of behavior change in the sustainable energy transition space. In particular, this approach can help bridge the gap between the condition of energy poverty and the attitudes and behaviors that sustain it.

A behaviorally informed approach adds value to traditional diagnostic approaches by generating a nuanced understanding of policy challenges from the user or beneficiary perspective, which is particularly relevant to residential sustainable energy transitions. Standard development policy typically targets financial resources, incentives, laws, or information provision—the conventional tools available to policy makers. By contrast, a behavioral approach draws on various disciplines in placing the focus on mindsets, decision-making frames, and the social environment. The result is a more holistic understanding of how decisions are made and actions taken in relation to behavior change in specific policy contexts.

Residential sustainable energy transitions can be understood as the uptake of behaviors and technologies that promote the clean and efficient use of energy for household purposes. Sustainable energy transitions can center around the adoption of modern appliances and technologies that limit the amount of energy consumed in the home (for example, energy-efficient appliances), conserve energy that has already been generated (for example, insulation), or change the source of energy combustion to a cleaner or more efficient source (for example, away from fossil fuels toward renewable sources or from dirtier or more inefficient to cleaner or more efficient fossil fuels, such as from coal to natural gas). For behavioral and technological change to happen at the household and individual levels, however, attitudinal change is required, which means that policies and programs should target both behaviors and attitudes.

This chapter examines select structural and behavioral determinants of transitions toward sustainable energy practices and away from energy poverty. Structural (for example, economic, legal/regulatory, and information) and behavioral (for example, psychological, social, and contextual) factors can explain the transition out of energy poverty and into sustainable energy practices. As such, it is essential to understand what correlates with sustainable energy transitions (structural and behavioral determinants) and to map decision-making processes as individuals consider engaging in more-sustainable energy practices. Effectively, the questions to be answered here are what gets in the way of transitioning out of energy poverty or vulnerability and how these bottlenecks can be addressed through sustainable energy policy and targeted programs. First, this chapter will discuss the behaviors of interest in sustainable energy use, supported by the presentation of quantitative evidence on attitudes toward energy efficiency (captured through a recent survey). The remainder of the chapter will look at sustainable heating transitions, focusing on the barriers of affordability, awareness, beliefs, and trust and their influence on willingness to transition to more sustainable heating and energy behaviors (captured through a quantitative survey and qualitative fieldwork).

3.1 Sustainable Energy Use and Attitudes toward Energy Efficiency

Sustainable energy use revolves around awareness of the amount of energy used and the willingness to reduce energy consumption. A recent high-frequency survey conducted in July 2023 shows that most Romanians knew how much energy they used at home. Only a small share indicated that they needed to be made aware of how much energy they consumed at home (6.9 percent) and 80 percent of the population were aware of peak and off-peak energy use. In addition, nearly 70 percent were concerned about the energy used in their home (figure 29). Nearly three-fourths of Romanians indicated that they limited their energy use to save energy (figure 30). Still, it must be clarified whether they did so due to energy affordability constraints or environmental concerns.

Intentions to upgrade to more-energy-efficient technologies are lower, mainly when this concerns heating systems and insulation. Half of the Romanian respondents were considering upgrading to more-energy-efficient appliances, but only a negligible share were considering upgrading their home's heating system or insulation. Based on survey estimates from 2023, half of the population considered upgrading at least one of their home appliances to more-energy-efficient appliances (figure 30). In contrast, only a negligible share of the population was considering the upgrading of their home's heating system (9.4 percent) or insulation (9.1 percent). Intentions to upgrade heating behaviors (including investing in insulation and complementarities) will be explored in greater detail in the next section of the chapter.

Figure 29 Awareness of Energy Used at Home, July 2023 (%)

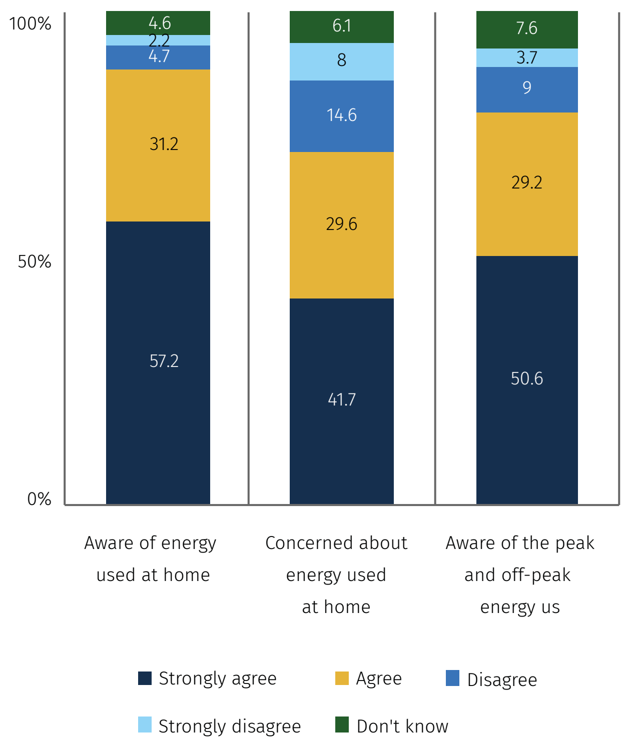
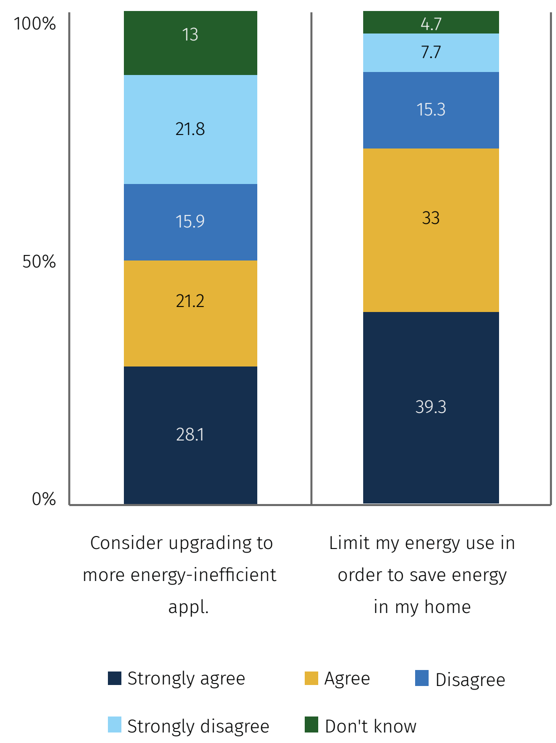


Figure 30 Consideration of Changes in Energy Use, July 2023 (%)



Source: Estimates based on World Bank rapid household survey (July 2023).

Despite high concerns over energy use at home, survey responses suggest that most Romanians were unwilling to make financial sacrifices to develop renewable energy further. When respondents were asked about their willingness to make financial sacrifices for the societal benefit of sustainable energy transitions (in terms of greater use of renewable energy), less than half were willing to make sacrifices, and less than 10 percent reported being able to afford it (figure 31).[22] Nearly 38 percent of Romanians were willing to sacrifice for renewable energy, but said they could not afford it, while 6 percent were willing and could afford to make sacrifices. Nearly 9 percent could afford the sacrifices, but were unwilling to make them, and 35 percent were neither able nor willing to sacrifice for renewable energy. Meanwhile, the survey shows limited actions are being taken in response to energy price increases (figure 32). While 62 percent of those surveyed claimed to limit the use of appliances, 40 percent or less took more-proactive measures such as heating less overall (40 percent) or substituting heating or cooking fuels (just 37 percent). Over half (55 percent) reported keeping their habits the same in response to energy prices.

22 A previous survey collected in the city of Cluj- Napoca shows similar results; while most citizens recognize the climate impact of energy consumption, they are unwilling to incur additional costs (Babeș-Bolyai University, 2021).

Figure 31 Willingness to Make Financial Sacrifices for Further Development of Renewable Energy, July 2023 (%)

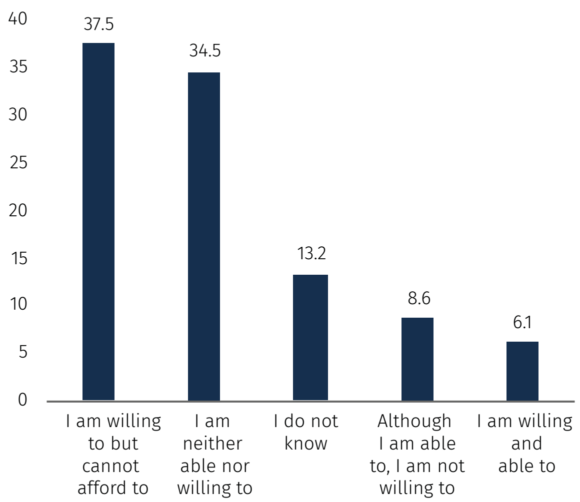
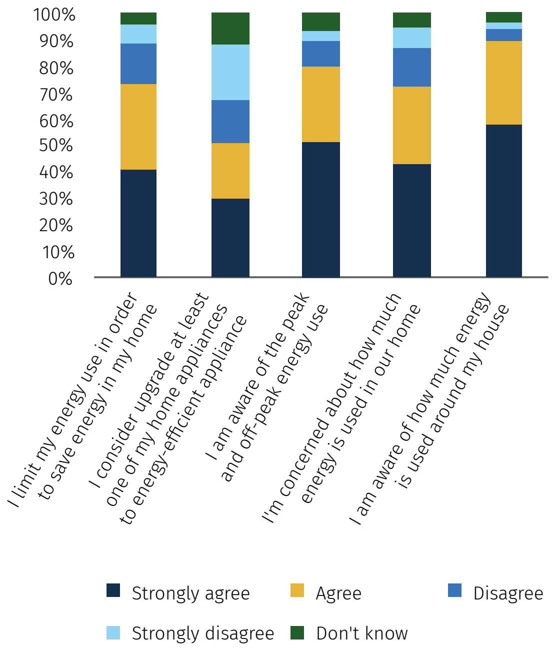


Figure 32 Responses to Energy Price Increases



Source: Estimates based on World Bank household survey (July 2023).

Findings from qualitative fieldwork conducted in June 2023 also point to possible intentions to adopt more-sustainable energy practices, though affordability was once again a primary concern. During many focus group discussions and in-depth interviews (see annex 1 for methodology and discussion guides), when covering the topic of energy efficiency and programs to support energy-efficient investments, participants highlighted the demand for solar panels for improved residential energy efficiency. When asked about their attitudes toward energy efficiency upgrades and knowledge of existing support programs to promote efficient heating practices, solar panels were mentioned with an aspirational tone in many of the discussions, particularly in electricity-based heating solutions (heat pumps for space heating and water heaters). In multiple discussions, solar panels were mentioned as a way to reduce electric bills. Still, concerns about high upfront installation costs and unreliability contribute to the use of energy-intensive appliances, such as electric heaters and other appliances, during winter months. Some discussions unearthed knowledge about energy-efficiency support programs to install solar panels (most support programs mentioned concerned solar panel installation). However, discussants said the programs had not yet reached their villages or expressed the belief that the funding would be exhausted when people became aware of the benefits. Even with the benefits, the cost of installing solar panels was perceived by many as too high.

> **To install a 3KW power [solar panels] would cost around 20,000 euros, of which 2000 is your contribution of 10 percent.** The problem is that at the moment, the cost has risen to about 23,000 euros to install a 3KW one; you have to pay around 5000 euros, which is too much. (Participant from Vrancea, Reghiu FGD)

3.2 A Focus on Sustainable Heating Transitions

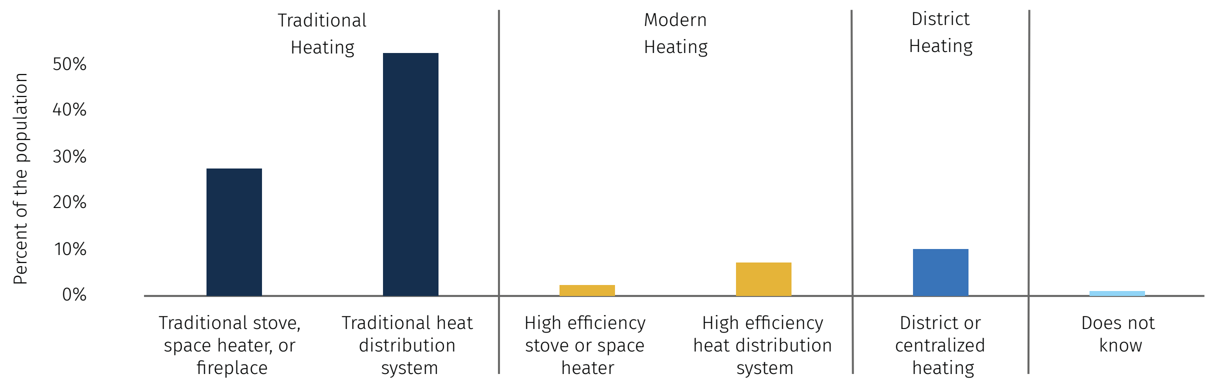
Sustainable energy transitions in Romania are very sensitive to decisions around residential heating, given the role heating plays in energy poverty and vulnerability and the impacts heating can have on climate change and local air quality. For this reason, sustainable heating transitions are an essential component of sustainable energy transitions. Sustainable heating transitions are a transition to affordable, reliable, efficient, and low-emission heating practices (World Bank 2023b). Residential heating in Romania varies according to the heating system and appliance type. However, an important share of the population needs more-efficient appliances and systems. While both heating and cooking practices are highly correlated with the share of expenditures going to energy (chapter 2), the energy intensity needed for heating is disproportionately higher and the ability to substitute energy sources is more limited. By improving heating practices and implementing energy-efficient technologies, Romania can reduce its overall energy consumption and decrease its dependence on fossil fuels.

Given the scope of energy poverty and vulnerability in Romania, it is important to map the factors that limit the initiation of the types of sustainable energy transitions that would overcome those challenges, particularly in the heating space. Understanding the structural and behavioral barriers preventing households from transitioning out of energy poverty and adopting cleaner technologies and sustainable energy use is essential, because these must be considered in order to effectively inform any policies or programs targeting the challenge. While financial barriers, in many cases, are binding constraints, the existence of support programs (albeit limited) signals that other factors influencing decisions need to be explored. This exploration can be accomplished using a mixed methods approach combining qualitative and quantitative research methodologies.

The current state of heating and intentions to upgrade technologies

Most Romanians—around 8 out of 10—are classified as using traditional heating technologies, meaning there is substantial scope for the adoption of improved and more-sustainable heating practices and behaviors. Traditional (conventional) heating is defined by heating systems that burn fuels less cleanly and efficiently than modern devices. These are old-style stoves, space heaters, fireplaces, or distribution systems (boilers and otherwise) that typically burn raw fuels (unprepped firewood, lump coal, or solid waste) or natural gas (albeit inefficiently). In Romania, just over half of survey respondents reported using traditional heat-distribution systems (those that produce heat in one home location and distribute this to other areas of the home through pipes and radiators or vents) (figure 33).[23] Twenty-eight percent of Romanians heat their homes with traditional stoves, electric space heaters, or fireplaces (without heat distribution to other home areas). Most of those with modern heating systems (9 percent) use high-efficiency heat distribution systems. Ten percent of Romanians are connected to centralized (that is, heat generated at the building level and distributed to individual units) or district (that is, heat generated at the local or municipal level and distributed to properties) heating system.

Figure 33 Heating Systems by Category

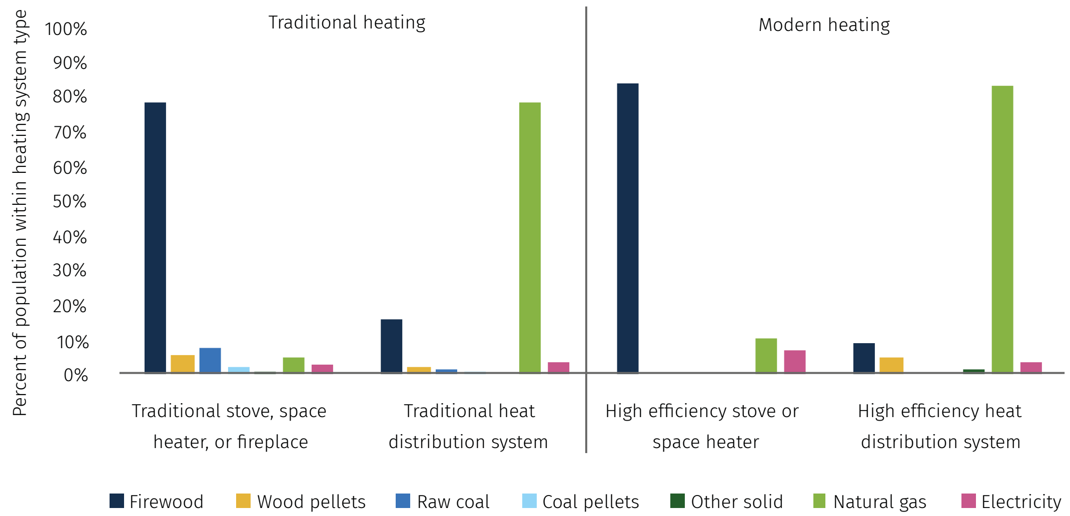


Source: Estimates based on World Bank household survey (July 2023).

23 Respondents were asked what type of heating device was primarily used to heat the home and were prompted to specify whether this was traditional or modern (as well as if it had distribution or not). As such, respondents could report the same type of device (natural gas heat distribution system) but a different class (traditional or modern).

Regarding heating fuels among Romanians with individual rather than central or district heating systems, firewood was used most commonly in traditional and modern heating systems, followed by natural gas. Nearly 80 percent of traditional and over 80 percent of modern stoves in Romania burned firewood and fewer than 10 percent used wood pellets, raw coal, coal pellets, electricity, or other fuels. Similarly, around 80 percent of Romanians used natural gas in heat distribution systems, with low shares of firewood used for traditional systems (16 percent) and modern systems (8 percent) and negligible shares of other fuels (figure 34).[24]

Figure 34 Heating Fuels by System and Type

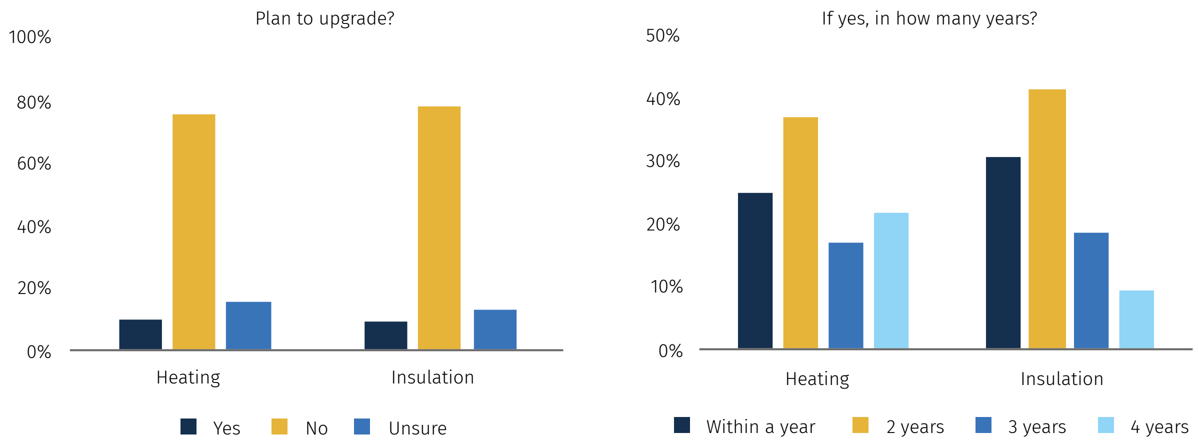


Source: Estimates based on World Bank household survey (July 2023).

Intentions to upgrade heating systems or insulation were very low in Romania, with around 1 in 10 respondents planning to do upgrades. The majority of Romanians were not planning to upgrade heating or insulation within the next years (figure 35). On average, only 9 percent of those with traditional heating systems planned to upgrade the heating appliances or systems and just 9 percent planned to upgrade their insulation. Around two-thirds of these planned to upgrade within the next two years, while the rest may need up to four. These shares are similar across different genders; in terms of age, people over 60 had a lower propensity to upgrade. Some geographical differences also exist; most notably, respondents from the South-East expressed a much lower propensity to upgrade heating or insulation.

24 According to World Bank (2023), heating that relies on coal, peat, oil and other petroleum products is classified as unsustainable, whereas natural gas is classified as a better alternative, though only a medium-term solution. Biomass (such as wood) is considered to be sustainable if the management of the resource is "certified and follow[s] a robust regulatory framework. . . . Natural gas can have a role in providing household and business heating solutions in some countries over the medium term as a transition fuel provided it is compatible with a country's goal of long-term decarbonization. For biomass to be a sustainable fuel in line with the definition cited above, the management of the underlying biomass resource must be certified and follow a robust regulatory framework." (page 1-2)

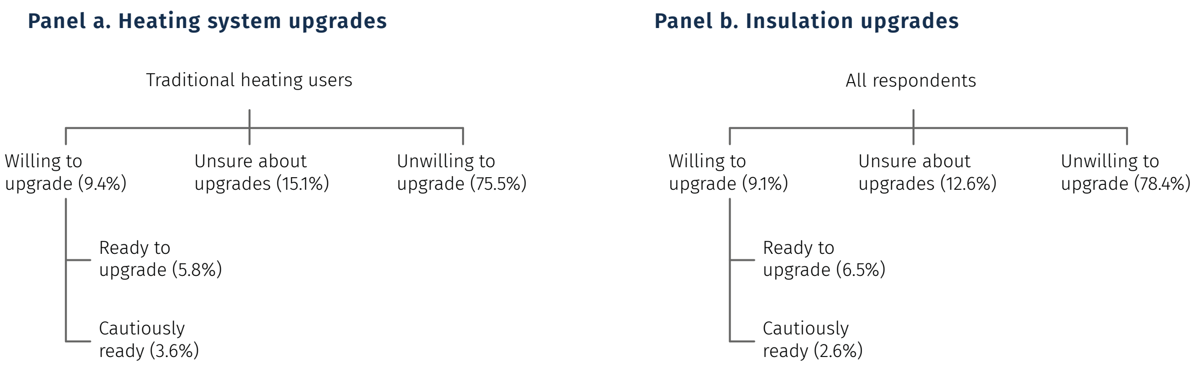
Figure 35 Romanians' Intentions regarding a Heating or Insulation Upgrade within the Next Few Years and Time Frame for Upgrade



Source: Estimates based on World Bank household survey (July 2023).

Capturing intentions to upgrade heating systems and insulation allows us to establish a typology of traditional heating users and all respondents. Panel a of figure 36 shows the proportions of the population with traditional heating systems willing, unwilling, or unsure with regard to updating. Households with modern heating systems were excluded from this calculation because they had already made the transition. As of 2023, traditional heating users were around 80 percent of the total population. The analysis shows that only 9 percent were willing to upgrade to a new heating system within the next few years. Two-thirds of this group were ready to upgrade in the following two years, while the rest would need more time. Fifteen percent needed clarification about the upgrades, while three-quarters were unwilling to upgrade. Panel b of figure 36 presents the same breakdown for all Romanians regarding insulation upgrades. Nearly 80 percent were unwilling to initiate a home insulation upgrade. Those ready to upgrade insulation were around 7 percent of the total population, while the other 3 percent were planning to upgrade between 3 to 4 years from now and 13 percent were still deciding whether they should upgrade.

Figure 36 Romanians with Traditional Heating Systems (All Households) Who Fall into a Specific Profile According to Their Intention to Upgrade Systems (Insulation)



Source: Estimates based on World Bank household survey (July 2023).

Profiling sustainable heating transitions: behavioral barriers to and enablers of sustainable heating transitions

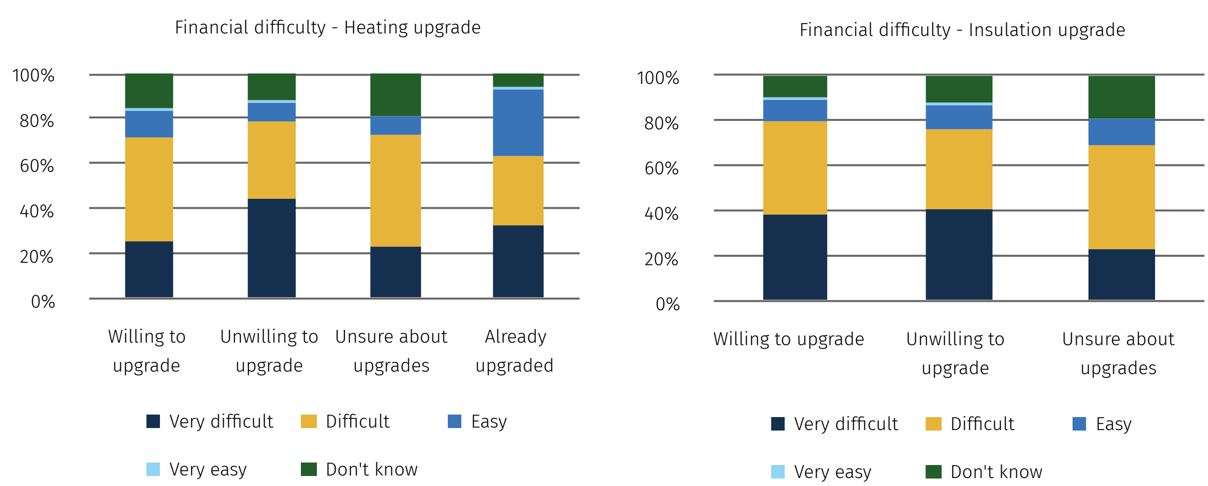
Barriers (and enablers) to sustainable heating transitions fall under financial, information, and attitudinal. Financial barriers refer to those perceived or real affordability concerns that block intentions or actions to change behaviors. Information barriers refer to knowledge and awareness gaps that limit the target population's understanding of the need to engage in sustainable heating transitions, the tools at their disposal to support this transition, and how information about technologies and programs is presented. Attitudinal (understood loosely as the beliefs, values, ideas, and perceptions) barriers and enablers refer to the cognitive and social factors that influence decision-making in the context of sustainable heating, including beliefs about the costs and benefits of upgraded heating practices, social norms about sustainable heating practices, and trust in messengers and upgrade facilitators. In this section, we link these barriers and enablers to intended changes in behavior (intentions to upgrade the heating system or insulation).

Financial barriers

According to the quantitative and qualitative data collection, financial and affordability-related barriers are by far the most critical among Romanian participants in relation to sustainable heating transitions. Respondents and participants in the survey, focus group discussions, and in-depth interviews highlighted difficulties in upgrading heating practices even if part of the upgrade cost was covered through a program. While heating appeared to be a priority for many households in the winter (related to other expenses), the perceived capability to take action on these priorities needs to be improved, particularly among economically disadvantaged households.

Perceived financial difficulties among the surveyed population with respect to heating and insulation upgrades were very high. The share of Romanians who would find it difficult financially to cover the costs of upgrading the heating system is around 80 percent, regardless of any actual plans to upgrade either the heating system or insulation. Nonetheless, those unwilling to upgrade their heating systems reported a significantly higher level of financial difficulty compared to those willing to do so, suggesting that the affordability of the new heating technologies may play an important role in deterring people from upgrades. Moreover, only 6 percent of the population indicated they were both willing and able to make financial sacrifices to advance renewable energy further. At the same time, the majority was either not willing or not able to or both (figure 37).

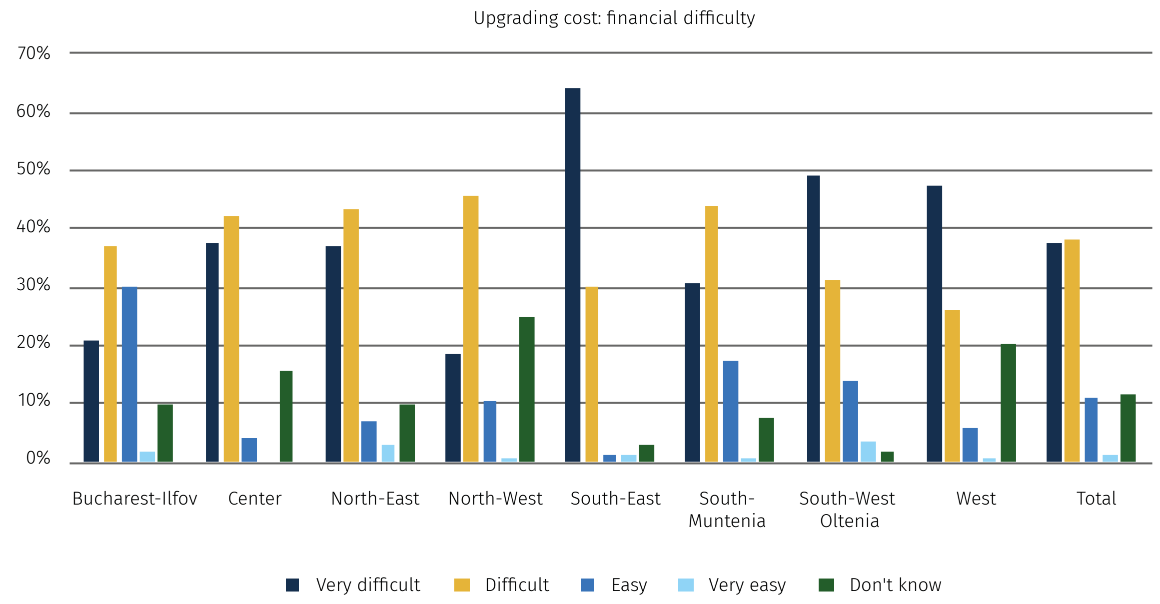
Figure 37 Perceived Financial Difficulty According to Profiles (% of Population within Upgrade Intentions Group)



Source: Estimates based on World Bank household survey (July 2023).

Perceived financial barriers vary across regions, with the highest financial difficulty reported in the country's South-East region. Exploring the perceived costs of upgrading highlights that these perceived barriers are higher in certain parts of the country. A much higher proportion of respondents in South-East Romania expressed the belief that it would be financially difficult to upgrade. Conversely, respondents in the Bucharest-Ilfov region believed they faced lower financial barriers to meeting the costs of upgrading. The responses did not suggest any gender difference with respect to perceived financial difficulty, through in terms of age people over 60 seemed to find upgrading more financially difficult than younger respondents (figure 38).

Figure 38 Perceived Difficulty in Spending More to Maintain the Same Level of Comfort with a Modern Heating System by Region



Source: Estimates based on World Bank household survey (July 2023).

Concerns over the affordability of such upgrades also came out strongly in the qualitative fieldwork. Financial concerns over upgrades can relate to the initial investment costs (fixed costs) or the use costs (variable costs). Both are relevant in regard to sustainable heating upgrades (for example, fixed costs include purchasing and installing devices and variable costs refer to the cost of fuel or maintenance). The most frequently mentioned concern related to upgrading was the installation price, in line with the financial concerns outlined above. Even those who believed it would have long-term benefits mentioned the problem of having enough financial resources to face the expenses.

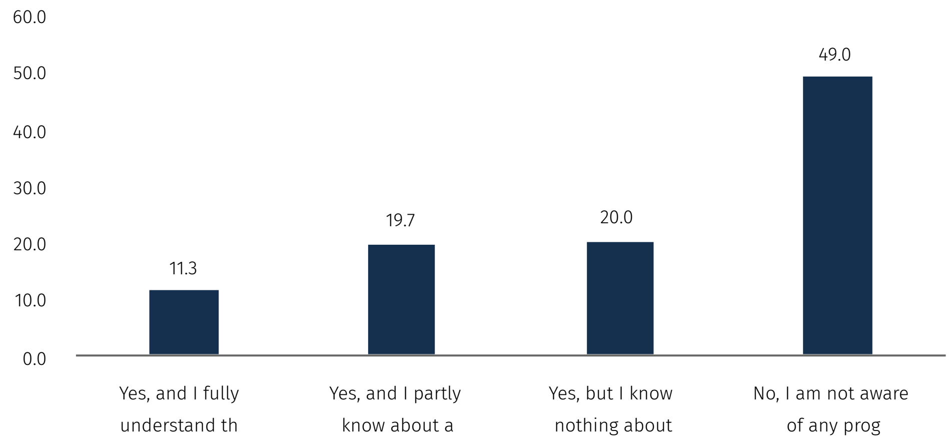
> **The investment would be too high, and I'm not sure how many years it would take to recover it, not to mention that you will require maintenance during all these years, and I don't think it's worth it.** (Participant from Vrancea Răstoaca FGD)

> **Well, when you install it, it's difficult, financially wise.** After that, yes, these costs can be greatly reduced in two to three years. . . . If you install panels and electric heating with a heat pump, costs should reduce in two to three years, after which heating comes free. (Participant from Mehedinți Drobeta Turnu Severin FGD)

Information barriers

Only a small share of the population were aware of and understood existing programs that could support them financially in upgrading to modern heating systems. The survey shows that half of the population was aware of programs/initiatives to financially support investments in modern technologies for heating their home more efficiently and keeping it warm. Still, only 11.3 percent fully understood them the details (figure 39).

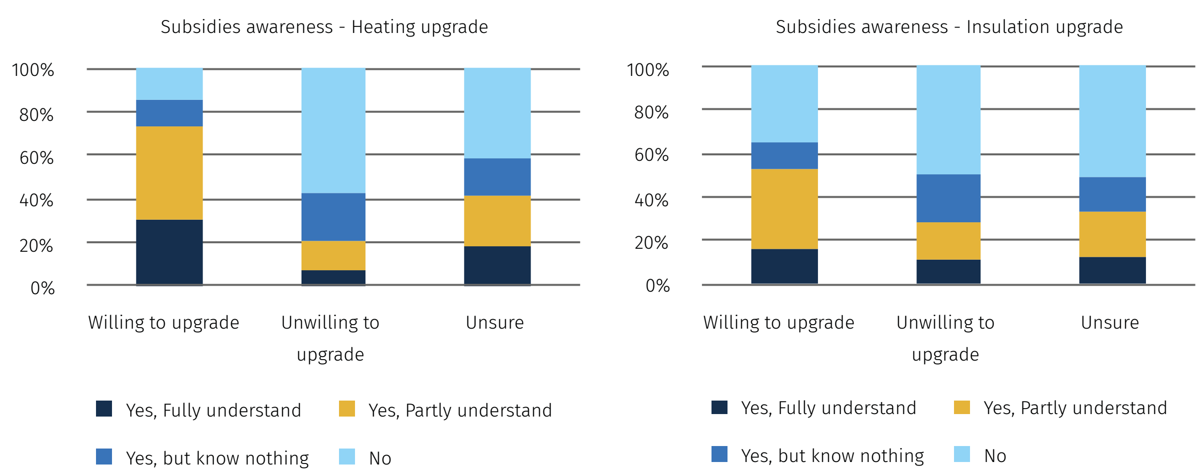
Figure 39 Awareness of Programs or Initiatives to Financially Support Investments, July 2023 (%)



Source: Estimates based on World Bank household survey (July 2023).

Knowledge of support programs varied significantly depending on intentions to upgrade. Awareness of subsidies was much higher in the willing-to-upgrade group compared to those unwilling to do so. About 80 percent of the willing-to-upgrade group knew about subsidies and programs and 25 percent believed they fully understood how the subsidies and programs worked. Two-thirds of those unwilling to upgrade had yet to learn of any program. Awareness of subsidies could also be higher in the unsure about upgrades group (figure 40).

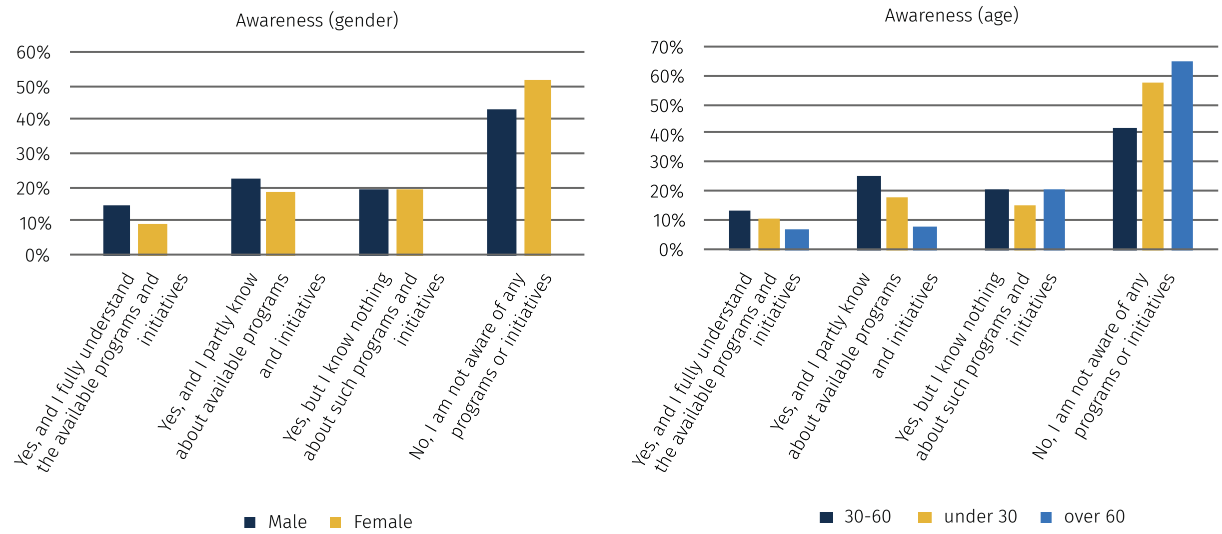
Figure 40 Awareness of Subsidies (% of Population within Upgrade Intentions Group)



Source: Estimates based on World Bank household survey (July 2023).

Awareness of support programs was sensitive to the demographic characteristics of the population. Men in Romania were slightly more informed than women about subsidies and programs—the same was true for people ages between 30 to 60 with respect to either younger or older populations (figure 41). Geographical differences were also present, with there being much higher awareness in the Bucharest-Ilfov and North-East and lower awareness in the Center, South-East, and North-West regions, where around two-thirds of the respondents were entirely unaware of subsidies.

Figure 41 Awareness of Programs and Subsidies to Support the Upgrading of Heating Systems or Insulation by Gender and Age



Source: Estimates based on World Bank household survey (July 2023).

Similar insights about the low awareness of support programs were identified in the qualitative fieldwork. The need for wider awareness of existing subsidies was evident in some of the group discussions and interviews where, in most cases, knowledge could be improved. Some interviewees attributed this need for more awareness to limited transparency and scarce advertisement of existing subsidy programs, such that only those actively seeking information would find it.

> **No, it's not transparent enough.** It's not known. It was scarcely advertised, but just for interested parties, who went read and tried to find out, but for it to become visible, for you to understand it and take the necessary steps, or for someone to come, to talk about it on a larger scale, it wasn't accessible. (Participant from Vrancea Adjud FGD)

In particular, a lack of awareness translated into a sentiment of exclusion regarding intended beneficiaries. Lack of transparency was perceived as intrinsic to the procedure used to select who gets the benefit. Some respondents believed they would not benefit even if they met all the requirements, although it needs to be clarified whether this was linked to a direct experience or personal belief.

> **But anyhow, you don't have entrance, you or I.** / Maybe . . . at a certain point we will. / Only people working at the village hall. / The one that's higher [in the hierarchy]. / I can't gain access. Maybe you do. (Participant from Vrancea Răstoaca FGD)

> **We, poor people, don't get to see or . . .** receive what they should offer there. Besides, in the back, the director, the engineer, a friend, and others come to fill their bags and leave through the back door. . . . Nothing is done. We, as Roma people, are left as no one's children. (Participant from Mehedinți Drobeta Turnu Severin FGD)

Some participants also highlighted technical problems in the application process that may deter people from applying. Challenges in the application process relate to the application's being exclusively online, which might pose some problems for older people. Also, web pages with connections timing out too early made it difficult for applicants to upload all the necessary documents.

> **It requires digital abilities that many people do not own.** . . . For example, to know how to scan documents,

to go onto the portal, to know how to update data and information, and to upload documents. And all this quickly, to get the chance. . . for someone familiar with working on a computer, it's ok. The ones who've obtained the solar panels know how to use the platform. But who doesn't have any digital skills is excluded. (Participant from Vrancea, Reghiu FGD)

There is a platform, and we go on it, and we have limited time . . . and we have to get on it, and in 3 to 5 minutes we have to send the documents . . . and there are some people who do this for many more. (Participant from Vrancea Adjud IDI)

One participant also cited subsidy funds' being depleted in a few minutes in some regions, so that people were not allowed to apply.

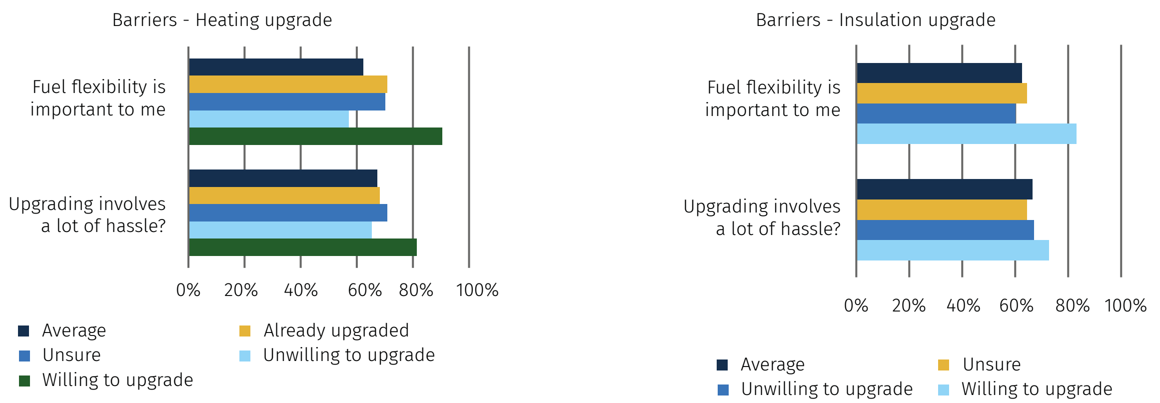
Yes, but I want to say that in some regions, the funds finished in 2 minutes. For Vrancea, it was 6 minutes. / In Adjud, mainly, there are more older people than young ones, and to put in information very quickly, for an older person, is harder work. (Participant from Vrancea Adjud FGD)

These results show that even though there was a particular awareness of existing programs, knowledge of to whom and how to apply and friction in the application process can be a barrier to obtaining the subsidies.

Attitudinal barriers

Regarding negative beliefs, fieldwork participants signaled concerns over the complexity of upgrades and the inconvenience associated with them. Concerning barriers to heating or insulation upgrades, around two-thirds of Romanians believed upgrading heating or insulation involved a great deal of inconvenience and that having flexibility in what to burn was essential. Forty-two percent of Romanians would only upgrade if their friends and neighbors did the same (figure 42).

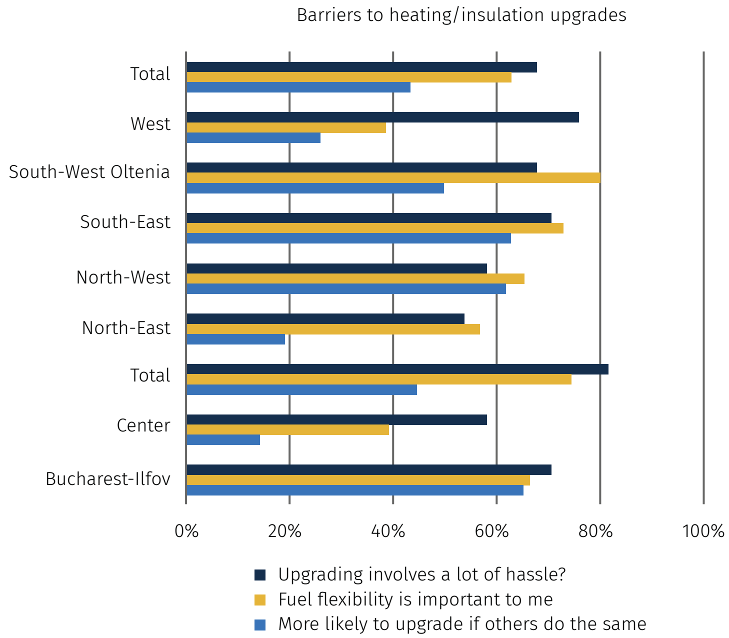
Figure 42 Perceived Barriers to Heating and Insulation Upgrades by Intentions to Upgrade



Source: Estimates based on World Bank household survey (July 2023).

Differences in beliefs did not vary meaningfully by the sociodemographic composition of the Romanian population, but important regional differences were identified through the quantitative survey. No clear gender difference was identified with respect to these barriers, while Romanians under 30 seemed to perceive them as being lower. Nonetheless, some differences in the perception of these barriers was evident across different regions. In particular, the inconvenience of upgrading was perceived more in North-East and West Romania. In contrast, fuel flexibility was perceived as more important in the South-West, South, and North-East regions. Social influence was much lower in the Center, North-West, and West regions compared to the others. North-West, South-East, and Center Romania also perceive these barriers are being lower (figure 43).

Figure 43 Barriers to Upgrading Either Heating or Insulation by Region



Source: Estimates based on World Bank household survey (July 2023).

Negative beliefs, as captured in qualitative fieldwork, revealed a need for more trust in the efficiency and sustainability of specific modern heating systems, particularly electricity-based ones. The main concerns mentioned in the focus group discussions were a lack of trust in the efficiency of modern systems (especially solar panels), safety concerns related to burning or blowing up, the lack of preparation of technicians and repair persons, the need for a network development from the administrations, and high costs of installation and service.

> **I've learned that there are some batteries which can be adapted to this type of heating system, in case electricity is cut off.** . . . There's a risk of explosion. There's a place where this happened, here in the village. (Participant from Mehedinți Ilovița IDI)

> **The thermostat could break down on the electric heater, and then what? (Participant from Mehedinți Drobeta Turnu Severin FGD)**

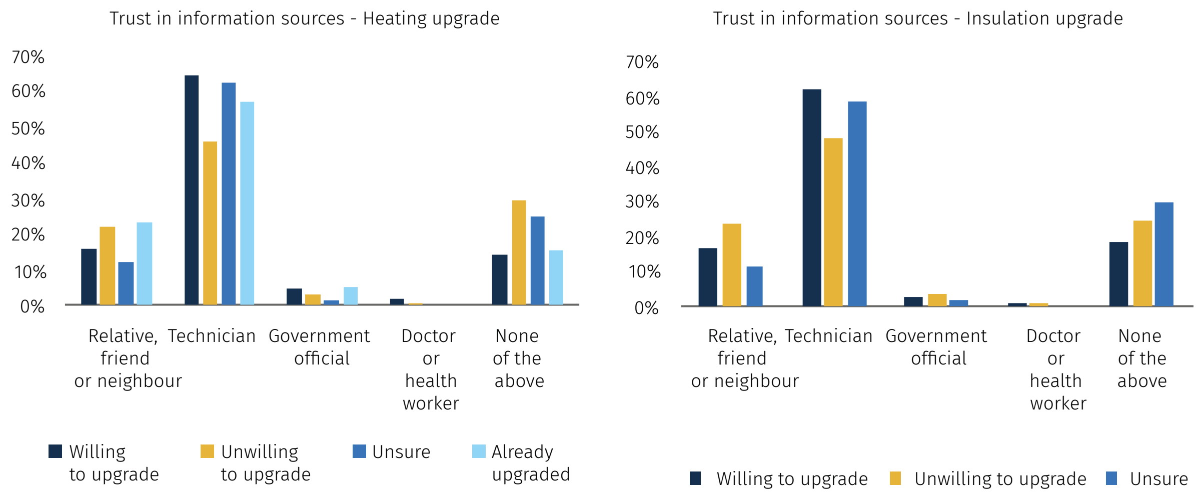
Low institutional trust in the sustainable heating transition space was consistent across all fieldwork. Supporting our survey results, trust in administration or government was limited at all levels in the hierarchy. Nevertheless, some participants said they would trust the system because they had had positive experiences in past applications. Among the reasons cited for low trust in institutions was the belief that the process of assigning subsidies needed to be more transparent, with administration officers favoring themselves or their peers over the general public.

> **They take the information and the benefit from all [such] programs.** Some people. (Participant from Mehedinți Drobeta Turnu Severin FGD)

> **I trust that we will receive part of the investment funds, and most likely, there are a few competent people who know what they're doing, but we don't trust them because we all know that some of that money will end up in hands where it shouldn't go.** . . . Often, these programs are made so someone else could profit from them and not for the normal people. (Participant from Mehedinți Izvoru Bârzii FGD)

Interpersonal and institutional trust can also serve as a barrier or enabler to sustainable heating transitions, specifically as these relate to preferred messengers and behavior change facilitators. One area where trust serves as an important barrier or enabler pertains to preferred sources of information about heating upgrades. Trusted sources of information differed in the different profiles of Romanians. Those unwilling to upgrade had a much lower propensity to trust technicians and other similar groups, but a higher propensity to trust family, friends, or neighbors. This same group of respondents also had a higher propensity to distrust information sources. Government officials and health workers were trusted by a substantially low share of respondents in all groups. Regarding trusted information sources for heating or insulation upgrades, technicians were the most trusted sources by around 50 percent of the population, followed by relatives, friends, and neighbors at around 22 percent (figure 44). Substantially lower trust was given to government officials and doctors and health workers. Concerning trust, the responses were similar across different genders and ages. At the same time, respondents from the Center, North-East, and West regions seemed less prone to trust any of the abovementioned sources of information.

Figure 44 Trusted Messenger for Information about Heating and Insulation Upgrades



Source: Estimates based on World Bank household survey (July 2023).

Low institutional trust was closely tied to experience or expectations about involvement in a government support program. Lack of trust also related to the applicant's perception of an excessive bureaucracy. Some participants stated they were asked for additional documents once they presented the necessary documentation according to the application form.

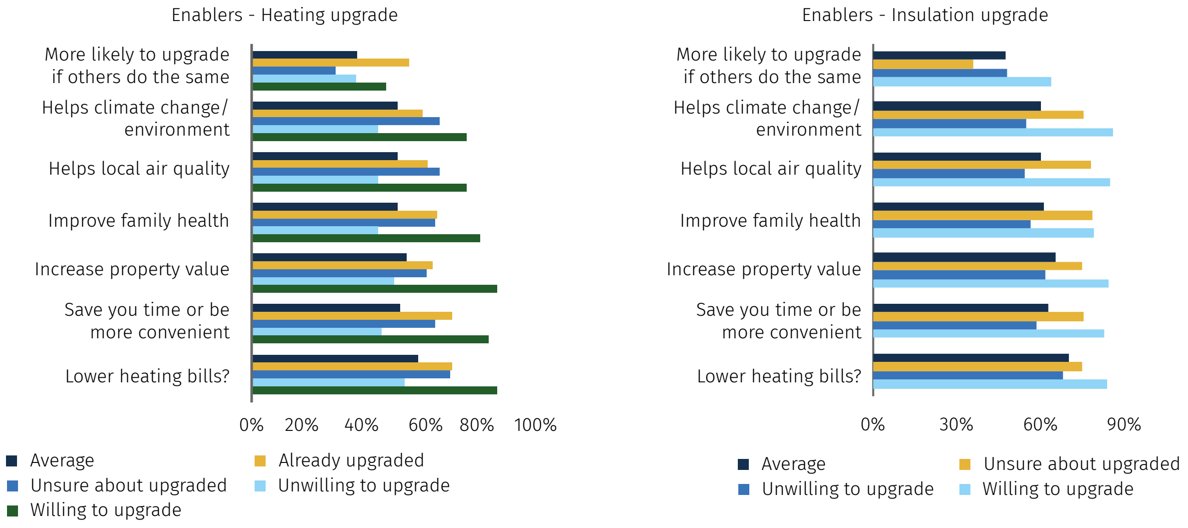
> **But if you go to the town hall and ask, "I want to ask about these European funds," they say, "This, this, this, this, this, this," they give a list of 20 files, you go and collect them and when you go back, and they say, "You're missing this, that's missing, that's missing, that's missing."** After this, you go with those, and when you go the third time, they say, "The funds are finished." (Participant from Mehedinți Izvoru Bârzii FGD)

Attitudinal enablers

Although nearly 7 out of 10 Romanians perceived upgrades as an inconvenience, a similar amount were aware of the different benefits of doing so. Sixty-six percent perceived these upgrades to be an inconvenience. Yet approximately 50 to 60 percent of the population indicated that upgrading would yield benefits, such as lower heating bills, convenience or time savings, increased property value, better family health, better air quality, and a better environment. Around 4 out of 10 Romanians indicated that they would be more likely to undertake these upgrades if surrounding communities did so as well.

The perceived benefits of sustainable heating upgrades are relatively high in Romania. Regarding the perceived benefits of upgrading heating systems, Romanians showed a slightly increased agreement over present-related benefits such as lower bill charges, convenience, and increased property value compared to climate- or health-related benefits. However, those who were unsure or unwilling to upgrade showed less agreement with regard to these benefits, indicating that the lack of perceived benefits might play a role in the decision to upgrade (figure 45). A slightly larger proportion of men than women perceived the upgrades as having benefits. In terms of age, the proportion of Romanians over 60 who believed that upgrading would yield benefits was smaller than the proportion of the younger population.

Figure 45 Perceived Enablers of Heating and Insulation Upgrades by Intentions to Upgrade



Source: Estimates based on World Bank household survey (July 2023).

Supporting the findings from the quantitative survey, positive beliefs, as captured through qualitative fieldwork, revealed some of the expected benefits from heating upgrades. During the focus group discussions, benefits such as an increase in comfort and a decrease in time spent heating the home were frequently mentioned by participants. Less frequently raised were the benefits to health and the environment.

> **But the comfort . . .** because you don't have to take out the ash, chop the wood, put wood on the fire. You just click a button and look on your phone. (Participant from Mehedinți Drobeta Turnu Severin FGD)

Evidence from qualitative fieldwork opens the opportunity to consider trusted messengers and facilitators as enablers. In most focus groups, friends and family appeared to be the most relied-upon sources of information regarding heating and insulation. That said, technicians and energy professionals were cited as reliable sources of information, particularly regarding heating systems.

> **My husband had a problem with the heating appliance and went to an authorized shop in Focșani.** . . . He asked for advice from someone in the field, just as that man said. So, he knew what he was saying about utilizing and installing heating systems. He offered good advice. (Participant from Vrancea Răstoaca IDI)

One participant also suggested that the involvement of people experienced in navigating the bureaucracy in the subsidy application process would make it easier to opt for an upgrade.

> **It would be good if the ones that know and deal with installing [such systems] would deal with the bureaucracy issues.** It would be good for them to deal with all aspects of bureaucracy so that people can access [these programs]. I mean, someone does deal from end to end with the whole thing. For both a block of flats and individual homes, some older people don't know the necessary steps to take. And if the one that installs the

> system could deal with everything, it would be perfect. (Participant from Vrancea Adjud FGD)

Finally, a generally positive attitude toward considering subsidy programs was expressed in the group discussions, mainly on the condition that the governmental contribution to the investment was relevant.

> **I would make a start towards this change.** If the state helps, meaning the government offers us . . . I don't know . . . at least 50 percent of the entire sum of the investment, I would agree to opt for such an investment. (Participant from Mehedinți Ilovița IDIs)

These findings suggest there are several enablers of the upgrading of heating systems. Beliefs in the benefits of modern heating systems accompanied by community action and trusted messengers available to guide households through upgrading and maintaining the appliances are vital to consider when persuading households to get involved in upgrading programs. People also expect the government to reciprocate their efforts by subsidizing them financially.

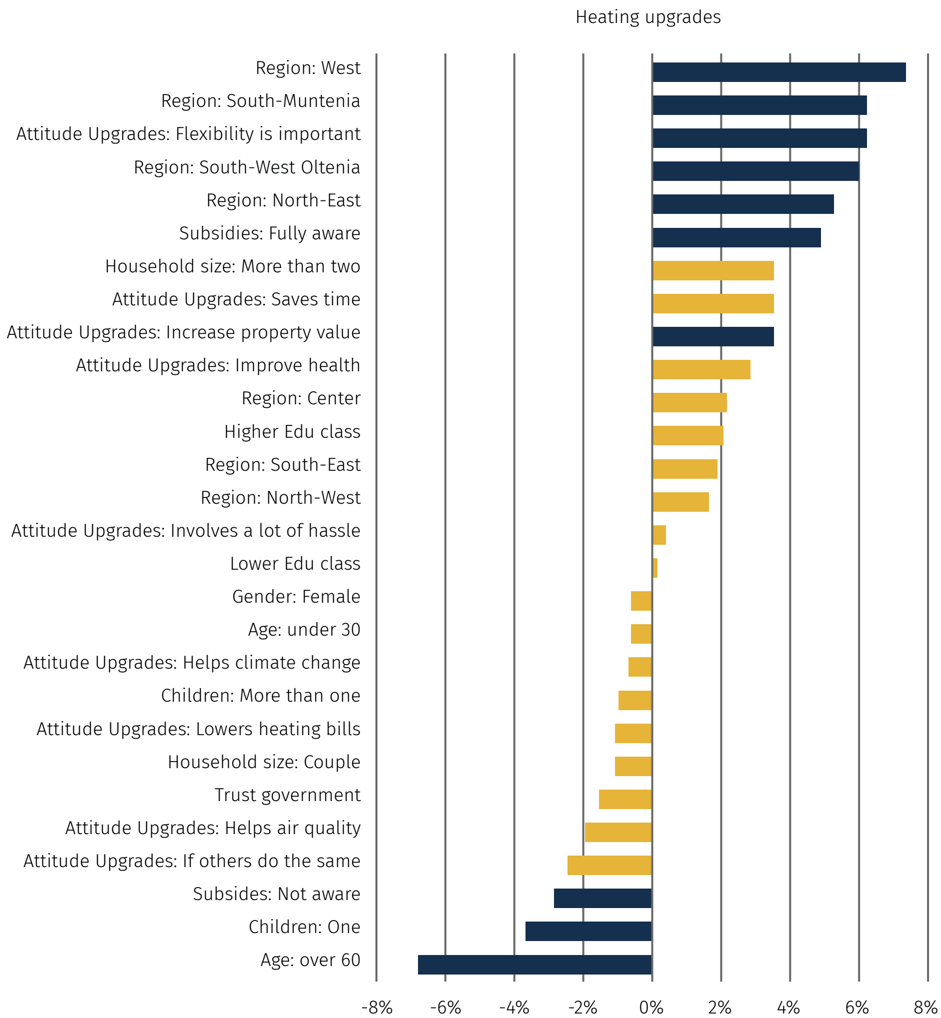
Key factors correlated with intentions to upgrade heating.

While the previous analysis signaled a variety of factors that could be influencing intentions to upgrade heating behaviors, a question remains about which factors appear to be binding in the Romanian context. To answer this question, regression analysis was used to isolate the association between respondent characteristics, the various behaviors and enablers, and the intentions to upgrade heating and insulation. For this, a robust probit model was used to estimate the influence of attitudes, awareness, trust, and sociodemographic characteristics on the propensity to upgrade heating or insulation within the next few years.

Considering Romanians and their household characteristics, many factors are associated with intentions to upgrade heating behaviors. Regional differences significantly influence upgrading intentions, with propensity being around 5–8 percentage points higher among respondents from the West, South, South-West, and North-East regions (figure 46). While household size is not associated with intentions to upgrade heating, other demographic factors are associated with lower intentions to upgrade heating: for example, households with 1 child (relative to those with 0) are nearly 4 percentage points less likely to want to upgrade, while respondents over 60 are nearly 7 percentage points less likely to upgrade relative to young adults. Meanwhile, there is no association between levels of education and intentions to upgrade heating.

Regarding other factors, many financial, information, and attitudinal barriers and enablers also display an essential association with intentions to upgrade heating behaviors. Awareness of subsidies is also significantly connected to intention to upgrade, with fully aware respondents being 5 percentage points more likely to be willing to upgrade and unaware respondents 3 percentage points less likely to do so. Attitudes play a more limited role, with higher propensity found for those believing upgrades increase property value and those who give importance to fuel flexibility.

Figure 46 Influence of Different Factors on the Propensity to Upgrade Heating System



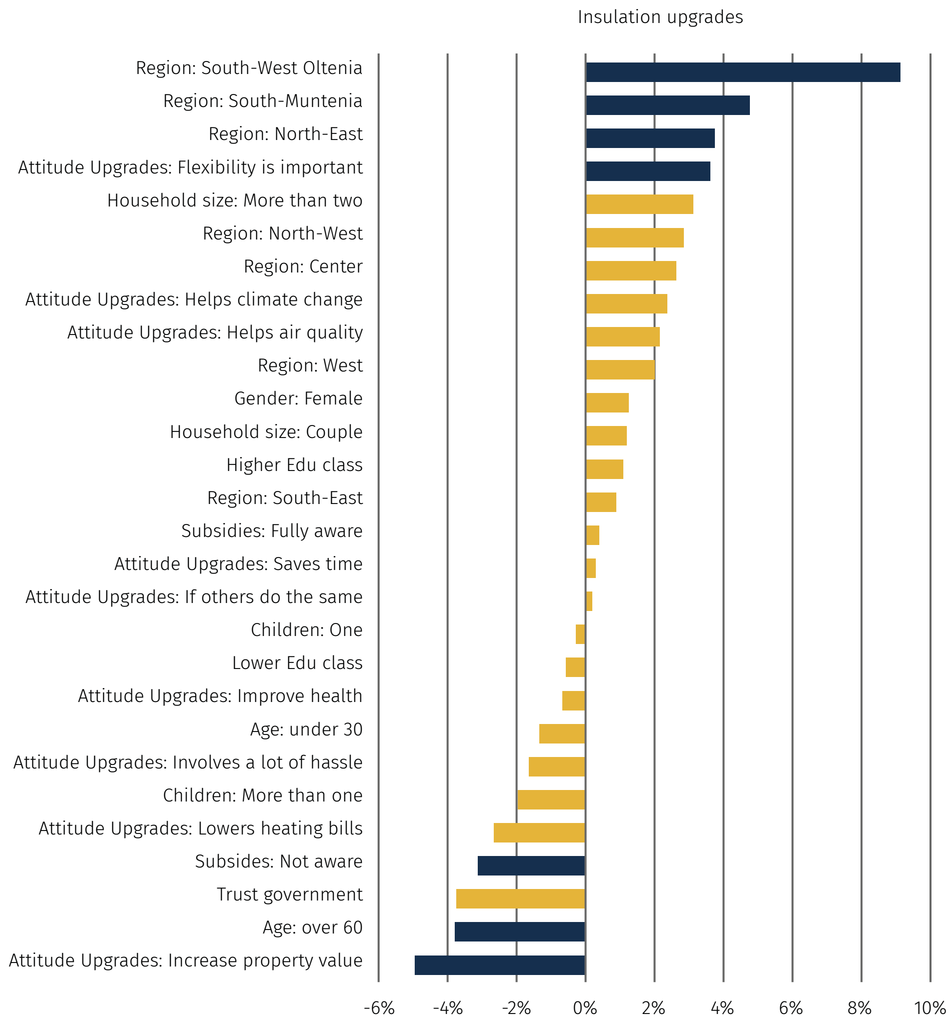
Source: Estimates based on World Bank household survey (July 2023). The x-axis plots the percentage point change in intentions to upgrade (the marginal effects from a Probit regression)

Note: A solid blue bar means the result is significant.

Similar individual and household characteristics are associated with intentions to upgrade insulation. Regional differences are also a significant determinant in the propensity to upgrade insulation. As with heating upgrade intentions, respondents from the South-West, South, and North-East regions have a higher propensity to upgrade insulation (figure 47). The only demographic factor associated with insulation upgrade intentions is the respondent's age: Romanians over 60 are nearly 4 percentage points less likely than young adults to consider insulation upgrades.

Financial, information, and attitudinal barriers and enablers are similarly limited in insulation upgrade intentions related to respondent and household characteristics. Those unaware of subsidies (relative to those who are somewhat aware) are around 3 percentage points less likely to intend to upgrade insulation. Other factors show unexpected results, which are likely driven by an already adequate level of insulation in the home: those who believe heating and insulation increase property value are less likely to upgrade. Meanwhile, those who view fuel flexibility as necessary are nearly 4 percentage points more likely to upgrade insulation.

Figure 47 Influence of Different Factors on the Propensity to Upgrade Insulation



Source: Estimates based on World Bank household survey (July 2023). The x-axis plots the percentage point change in intentions to upgrade (the marginal effects from a Probit regression)

Note: A solid blue line indicates a significant result.

Chapter 4

Simulating the Ex-Ante Impacts of Energy Price Increases on Households

Taking stock of the magnitude of energy inequities is critical for designing targeted policies to protect the most affected groups. Who bears the burden of the recent rise in energy prices, given the unequal energy spending patterns shown in chapter 2? What are the potential impacts on energy poverty, poverty, and inequality? This chapter delves into a simulation of the potential ex-ante welfare impacts of energy price increases, shedding light on the heterogeneous impacts on households due to different expenditure patterns. We employ microsimulation methodologies to examine the potential direct impacts of price spikes on energy affordability, energy poverty, and at-risk poverty rates. In addition to the direct impacts, this section further explores potential indirect consequences of energy price increases. These indirect effects manifest through the price changes of other essential goods and services, thus providing a more comprehensive understanding of the broader socioeconomic ramifications. By examining these interconnected ripple effects, this research aims to provide a comprehensive outlook on how energy price fluctuations can trigger price changes throughout the economy, particularly affecting vulnerable households along the income distribution.

4.1 Direct Impacts

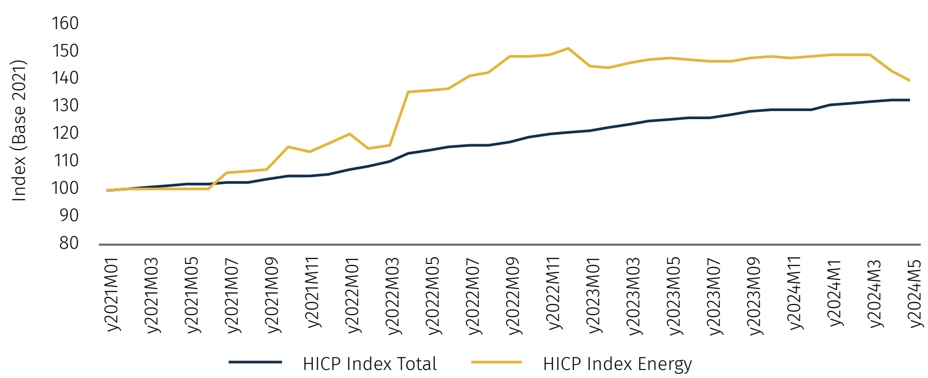
Impact on energy poverty rates

The impact of rising energy prices on the shares of household expenditures allocated to energy consumption, energy poverty, and welfare is felt through two main channels. Firstly, there is a direct effect on the share of household expenditure dedicated to energy due to the elevated costs associated with energy consumption. Second, indirect effects may occur as the price of energy affects the prices of other consumption goods, in turn affecting households' purchasing power.

The measurement of price elasticity of energy demand plays a crucial role in determining the direct impact of energy prices or policy changes on welfare; therefore, we consider multiple elasticity scenarios to explore the sensitivity of the welfare of Romanian households to increasing energy prices. The importance of price elasticity of energy and electricity demand when evaluating welfare effects is discussed amply in several studies (for example, Miller and Alberini 2016; Burke and Abayasekara 2018). The extent of this increase relies on the price elasticity of energy, which determines the household's responsiveness to changes in energy prices. In response to higher energy prices, households may opt out to reduce energy consumption, adopt energy-efficient measures, or switch to alternative energy sources unaffected by price hikes, such as illegally sourced wood or self-generated resources. Given the large variability of residential price elasticity of residential electricity demand in the literature, we consider various scenarios: a price elasticity of 0, -0.25, -0.5, -0.75, and -1. Moreover, we assume a uniform energy price elasticity for all households, irrespective of their position in the welfare distribution. To test the sensitivity of our findings, we also examine variations in energy price elasticity across income quintiles. Low-income households may have low residential price elasticity, because substantial substitutions away from energy might be challenging, particularly during winter. Furthermore, given the uncertainty of future price variations, we incorporate diverse scenarios of average residential energy price increases, encompassing a range of 10, 20, 30, 40, and 50 percent increments.

We incorporate additional scenarios by varying household income levels to consider the potential income effects. We examine a range of income decreases, namely 0, 2.5, 5, 7.5, and 10 percent. These income variations account for changes in energy expenditure shares resulting from fluctuations in income. While the income effect could potentially influence energy shares through alterations in energy consumption, we assume that this income effect is already encompassed within the price elasticity. In other words, we interpret the price elasticities as encompassing both the substitution and income effects, as per the underlying rationale.

Figure 48 Harmonized Consumer Price Index, Total and Energy (January 2021–May 2024)



Source: Eurostat (2024). Link: Harmonised index of consumer prices (HICP).

Note: The HICP gives comparable measures of inflation for EU countries and the country groups for which it is produced. The HICP for energy includes electricity, gas, and other fuels.

In our analysis, we establish a baseline scenario that we consider the most probable situation households encounter in the current context. This baseline scenario encompasses an average increase in energy prices of 40 percent, a price elasticity of -0.25, and a reduction in household income of 2.5 percent. The chosen price increase is based on the observed price data from the Harmonised Index of Consumer Prices (HICP) for energy published by Eurostat (2024), specifically from January 2021 to May 2024 (40 percent, as depicted in figure 48). It should be noted that we interpret the price increase as an absolute price change. However, in relation to the overall price increase, the relative price increase, as indicated by the harmonized energy and housing price index, is significantly smaller. Regarding household income decreases, we assume a moderate to slight reduction, given that real GDP has continued to grow since 2021 (the rates were 5.9 and 4.8 percent in 2021 and 2022, respectively).[25] Additionally, the unemployment rate remained relatively stable during this period, standing at 5.6 percent in 2021–23, according to data from the IMF.[26] Consequently, we argue that the decline in household income will likely be slight.

While we define a baseline scenario in which energy prices increase by 40 percent, we also consider some alternative price scenarios, acknowledging both historical trends and the potential for future uncertainties in the energy market. Establishing a 40 percent price increase as a foundational baseline for a hypothetical scenario in the future is reasonable, given its alignment with recent trends in the past two years. Over recent years, energy prices have fluctuated within this range, making it a plausible starting point for projections. However, it is crucial to acknowledge the energy market's inherent uncertainty, due to geopolitical events, supply-demand dynamics, and environmental policies. While aiming for a realistic baseline, we must consider the possibility that energy price inflation may not moderate and could persist at elevated levels, albeit not reaching the peaks seen in the past. Energy prices will likely remain volatile due to geopolitical uncertainty and the transition toward a low-carbon energy system, resulting in higher consumer costs (Mišík 2022; Pahle et al. 2022). Given this uncertainty, we simulate alternate energy price scenarios with increases ranging from 0 to 50 percent.

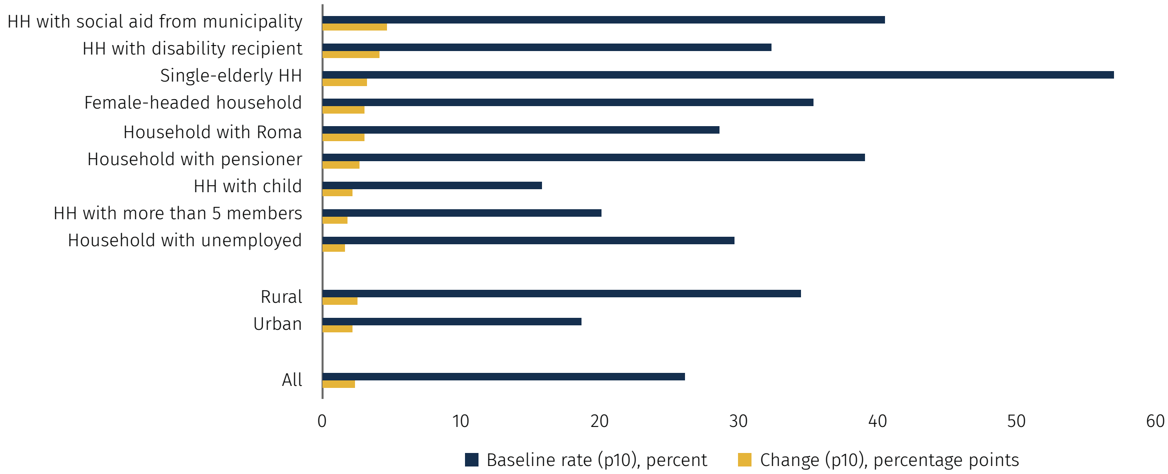
Out of the multiple energy poverty metrics discussed in section 2, we opt to use a specific measure (P10) for presenting our results in both this chapter and chapter 5. Under this measure (P10), energy poor households are those who spend more than 10 percent of their household income on energy. We choose this measure for several reasons. First, this is the only absolute measure among the expenditure-based measures, allowing comparisons against a fixed standard. Second, this measure allows for cross-country comparability. Finally, though using the official definition of energy poverty drafted in the Law 226/2021 would be ideal, it is still not clear how this measure can be operationalized.

Our simulation results indicate that within the baseline scenario with a 40 percent rise in energy prices, energy poverty (P10) may see an average increase of 2.3 percentage points; moreover, vulnerable groups (households receiving support from municipalities, those receiving disability benefits, and those of single elderly persons) are more affected than other groups. We analyze the impact of energy price increases on energy poverty rates in our baseline scenario (a price increase of 40 percent, an income change of 2.5 percent, and a price elasticity of -0.25) (see annex 4 for methodological details). Figure 49 illustrates the shift in the energy poverty rate (P10), represented by the blue line, alongside the pre-price-increase energy poverty rate shown in orange. The overall expected increase amounts to 2.3 percentage points, which would represent 174 thousand more households in energy poverty. This increase is consistent across rural and urban areas, displaying relatively minor fluctuations. Among the most impacted would be households receiving social aid and disability support. Single-elderly households would also experience a notable impact compared to other demographic groups. The graph further demonstrates that the steepest increases are observed among those grappling with energy poverty before the price hike. These findings raise concerns because they suggest a widening gap in inequality and vulnerability across various population segments due to rising energy prices.

25 IMF, Country Harmonized Indexes and Weights: Romania and the IMF.

26 IMF, Country Harmonized Indexes and Weights: Romania and the IMF.

Figure 49 Simulated Increase in Energy Poverty Rates and Pre-Price-Increase Energy Poverty Rate (P10) by Groups for 2021

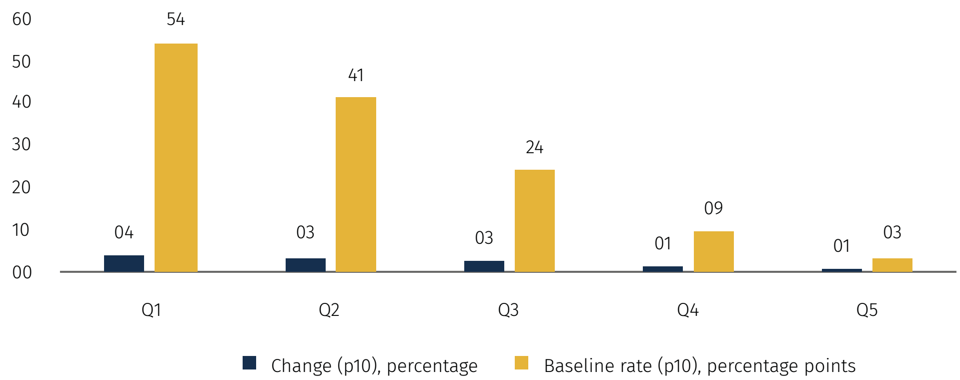


Source: Own estimates based on HBS (2021).

Note: The figure plots energy poverty rates in the pre-price-increase scenario and the change in energy poverty rate in our baseline scenario (an energy price increase of 40 percent, a change in household income of -2.5 percent, and a price elasticity of -0.25) for different groups of the population. For a detailed overview of how we construct the energy poverty rates and the microsimulation, see annex 2 and 4.

Consistent with energy expenditure patterns, the rise in energy poverty rates is notably pronounced among households with lower income levels. Our analysis delves into the variations in the impact of energy price hikes across the welfare distribution. Consistent with existing data on diverse population segments, vulnerable households bear a heavier burden. The escalation in energy poverty rates is more pronounced among the lower-income quintiles, contributing to an uptick in inequality within the realm of energy poverty (figure 50).

Figure 50 Simulated Increase in Energy Poverty Rates and Pre-Price-Increase Energy Poverty Rate (P10) by Income Quintiles, 2021

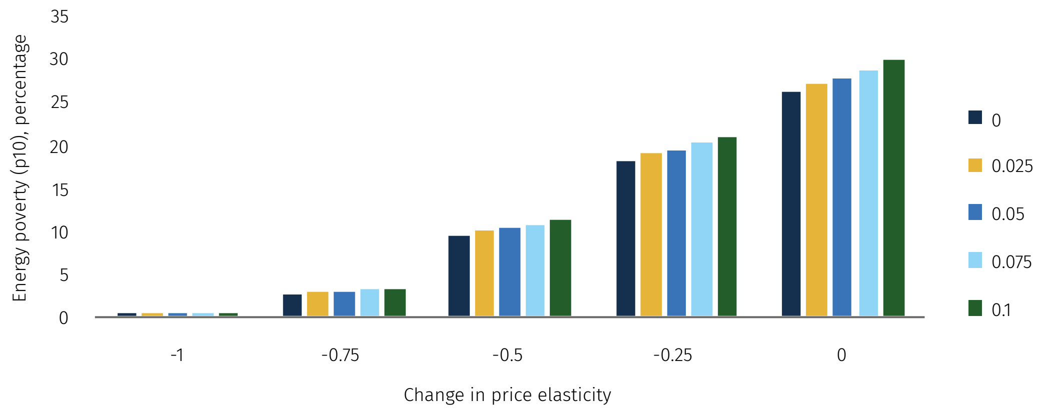


Source: Own estimates based on HBS (2021).

Note: The figure plots energy poverty rates in the pre-price-increase scenario and the change in energy poverty rate in our baseline scenario (an energy price increase of 40 percent, a change in household income of -2.5 percent, and a price elasticity of -0.25) by income quintiles. Income quintiles are based on per capita household income; Q1 is the poorest and Q5 is the richest. For a detailed overview of how we construct the energy poverty rates and the microsimulation, see annexes 2 and 4.

Nonetheless, an important caveat warrants consideration. The estimates are notably sensitive to the assumed price elasticity, albeit to a lesser extent to the assumed change in household income. Before examining the impact of energy price hikes on energy poverty rates, we thoroughly analyze these estimates' sensitivity to the parameters outlined in annex 6. Figure 51 clearly illustrates this sensitivity, particularly regarding the price elasticity. In an extreme scenario with a price elasticity of -1, households theoretically cease energy consumption entirely—an improbable outcome—reducing energy poverty to zero. Conversely, in the opposite extreme, where households cannot adjust their energy consumption (price elasticity is zero), energy poverty rates surge significantly, ranging between 25 and 30 percent, contingent on the assumed parallel change in household income. Conversely, when keeping the price elasticity fixed and altering the assumed change in household income, the estimates showcase a comparatively lesser degree of variation. This implies that our estimates are less susceptible to shifts in assumptions concerning income changes. The notable sensitivity to price elasticities highlights a critical limitation of this study—namely, the lack of reliable estimates on price elasticities for Romania.

Figure 51 Sensitivity of Energy Poverty Rates (P10) to Income and Price Elasticity Parameters



Source: Own estimates based on HBS (2021).
Note: The figure plots energy poverty rates (P10 measures) when underlying assumptions (income change and price elasticity parameters) are varying. For a detailed overview of how we construct the energy poverty rates, see annex 2. The colors present different changes in household income.

Impact on welfare measures

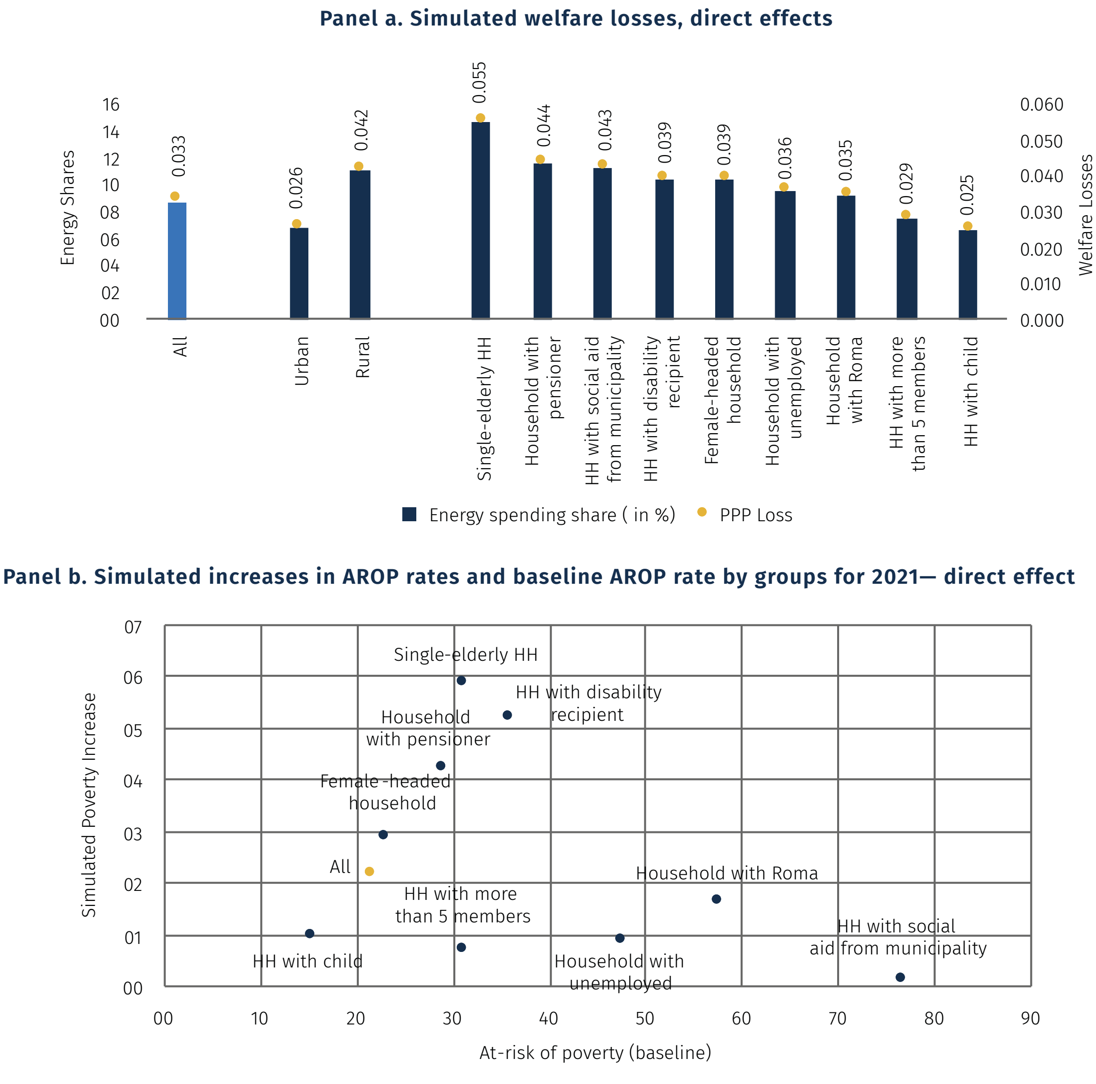
Our analysis extends beyond the assessment of energy expenditure and energy poverty rates. We delve into the broader welfare implications of energy price increases, considering an evaluation of income and at-risk-of-poverty changes. We approximate the changes in welfare using consumer surplus variation, following the methodology proposed by Freund and Wallich (1997) (see annex 4 for details).

In our baseline scenario, a 40 percent increase in energy prices can lead to significant welfare losses, pushing some households into income poverty. Given the larger budget shares spent on energy by people in rural areas, the single elderly, pensioners, and social aid and disability recipients, welfare losses are expected to increase for these groups (figure 52, panel a). The size of the losses can inform the adequacy of the income support measures to put in place, so that the losses are somewhat mitigated. Policy makers addressing energy poverty rates should prioritize these households when designing policy interventions.

These welfare losses are enough for some groups to experience substantial poverty increases and can lead to an overall rise of 2.2 percentage points in AROP rates in the short term. Energy-vulnerable households experience the most significant increase, particularly those in rural areas, which are more impacted than urban areas, those of the single elderly, and those with pensioners. The AROP rate exhibits a more substantial increase in rural than urban areas (3.2 versus 1.4 percentage points). Additionally, households already grappling with energy poverty, excluding those receiving social aid from municipalities likely due to their already elevated AROP rates, observe the most substantial surge in energy poverty rates. This includes single-elderly households, households with pensioners, and recipients of disability benefits, all witnessing at-risk-of-poverty rate increases exceeding 4 percentage points (figure 52, panel b).

Examining the impact across income quintiles highlights that the second income quintile primarily drives the surge in AROP rates. Figure 53 shows the pre-price AROP rate and the subsequent increase in AROP rates. The data underscore that the increase in AROP rates is driven mainly by households situated at the lower spectrum of the welfare distribution, especially those within the second income quintile. For these households, the AROP rate nearly doubles. Conversely, the upper-income quintiles experience minimal impact in terms of the risk of poverty. These findings underscore significant equity implications, demonstrating the interconnectedness of monetary and energy poverty. However, there is only a marginal increase in the Gini coefficient, amounting to less than 1 percentage point.

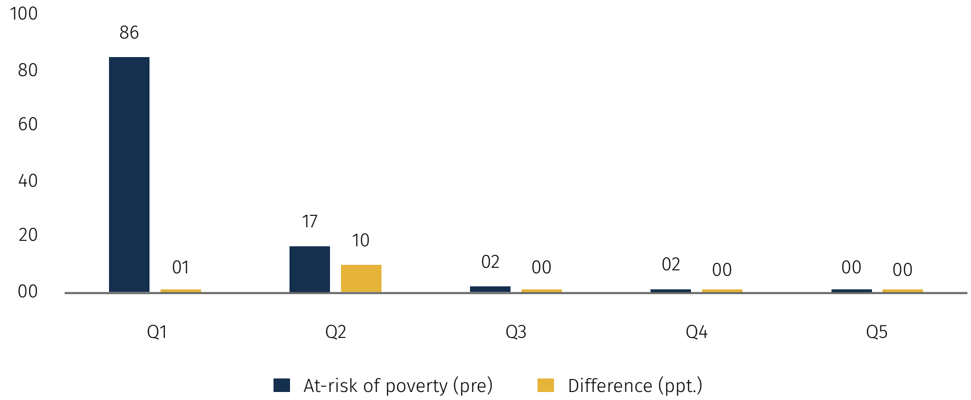
Figure 52 Simulated Welfare Losses and Poverty Impacts



Source: Own estimates based on HBS (2021).

Note: The bottom figure plots the AROP rates in the pre-price scenario for 2021 and the simulated change in the AROP rate in our baseline scenario (an energy price increase of 40 percent and a price elasticity of -0.25) for different population groups. For a detailed overview of the microsimulation, see annex 4. AROP rates are based on equivalized household income.

Figure 53 Increase in AROP Rates and Pre-Price-Increase AROP Rate by Income Quintiles for 2021—Direct Effect



Source: Own estimates based on HBS (2021).

Note: The figure plots the AROP rates in the pre-price scenario for 2021 and the change in the AROP rate in our baseline scenario (an energy price increase of 40 percent and a price elasticity of -0.25) by income quintiles. For a detailed overview of the microsimulation, see annex 4. AROP rates are based on equivalized household income. Income quintiles are based on per capita household income.

4.2 Indirect Impacts

Indirect effects can also contribute to changes in energy expenditure shares, energy, and income poverty. Increased energy prices can have ripple effects on income, such as during periods of economic downturns or inflation, resulting in reduced income for individuals. Moreover, businesses may struggle to cope with higher costs due to increased energy prices, potentially leading to closures and subsequent job losses, further affecting individuals' income. This reduction in income can subsequently impact the numerator of energy spending shares. Additionally, companies may pass on the increased costs resulting from higher energy prices to consumers through hikes in the prices of their products, thereby contributing to inflation. The extent to which higher energy prices translate into price increases for nonenergy goods depends on the energy intensity of each specific nonenergy good (Guan et al. 2023). These price increases in nonenergy goods, in turn, can influence households' energy consumption patterns, as they now face higher prices across various goods, including essential items like food, resulting in a reduced budget allocation for energy (Battistini et al. 2022). The specific response of households to these changes depends on factors such as price elasticity, income elasticity, and cross-price elasticity. For instance, research conducted by Kirikkaleli and Darbaz (2021) has established a causal relationship between energy and food prices, highlighting the interconnectedness of these variables.

In most research studies, estimating the indirect effects resulting from energy price increases relies on input-output tables; however, in Romania, the availability of updated information is limited. For instance, a recent study conducted by Guan et al. (2023) employed multiregional input-output tables and expenditure data from 201 expenditure groups and 116 countries to estimate the direct and indirect consequences of the energy crisis triggered by Russia's invasion of Ukraine. Their findings revealed significant variations in energy cost burdens among households, and they projected that the global impact of the crisis could push anywhere from 78 million to 141 million people into extreme poverty. While it would be valuable to expand our analysis to encompass indirect effects and incorporate input-output analysis, it is not feasible in the Romania context due to the unavailability of updated input-output tables, as the latest input-output matrix for Romania is for 2020.

Our previous analysis focused solely on the direct effects of energy price increases. Despite evidence from previous studies suggesting their significance, we did not consider the potential indirect effects. Freund and Wallich (1997) acknowledges in their research that their formula only captures the direct effects and overlooks the indirect effects of energy price increases. Consequently, our analysis, which relies on the formula proposed by Freund and Wallich (1997), only accounts for a portion of the total effects associated with energy price increases. This simplification represents a significant limitation, because prior research indicates that the indirect effects of energy price increases in the EU are likely to be substantial. For instance, a study by Saunders (2023) reveals that the inflation rates for energy-intensive nonenergy goods and services surpassed those of less energy-intensive nonenergy goods and services. Furthermore, Ari et al. (2022) estimate that indirect effects contribute to approximately 30 percent of the overall impact of rising energy prices on household budgets. However, it is worth noting that there is currently no consensus within the existing literature regarding the precise measurement of indirect effects and their magnitude is challenging to quantify accurately (Riksbank 2022).

Furthermore, existing studies indicate that the influence of indirect effects varies across different segments of the welfare distribution, which emphasizes the importance of incorporating these effects into the analysis. In a manner consistent with the observations on energy expenditure shares, expenditure patterns for nonenergy goods may also differ across income groups and household types (Guan et al. 2023). For instance, a study conducted by Battistini et al. (2023) highlights the severe impact of energy price shocks on nonenergy companies, particularly those operating in energy-intensive sectors such as intermediate goods and transport services. These shocks have repercussions on labor income and employment. Notably, labor income often constitutes a more significant portion of the total income for households at the lower end of the welfare distribution. Additionally, as energy price increases can lead to higher food prices, the poor are particularly vulnerable, because they allocate a significant proportion of their income toward food expenses (Mahler et al. 2022; Menyhért 2022). Consistent with this evidence, recent research by Guan et al. (2023) demonstrates that the impact of rising energy prices tends to be regressive. Furthermore, these authors' findings indicate that the distributional effects in low- and high-income countries primarily stem from the indirect effects of energy prices. In contrast, in middle-income countries, the effects are predominantly driven by direct effects.

Another study suggests that the indirect effects of energy price increases stemming from Russia's invasion of Ukraine could be pretty sizable. The most recent input-output tables for Romania date back to 2020.[27] To gain a rough estimate of the potential magnitude, we refer to estimations from another study conducted by Prasad et al.(2023), indicating that the indirect effects are likely to be approximately double the direct effects, especially when considering the $6.85 a day (2017 PPP) poverty line. It is essential for future research to update these estimations by utilizing more-recent input-output tables.

4.3 Robustness Checks

Using a matched dataset and welfare measures from the EU-SILC

Our comparative analysis using HBS and matched EU-SILC data shows the impact of energy price increases on AROP rates (2.2 versus 1.5 percentage points); differences in AROP rates are evident between the two approaches, yet the overall impact of rising prices remains consistent in magnitude. We conduct a comparative analysis of our simulations using the HBS dataset alongside simulations carried out on a matched dataset incorporating EU-SILC and HBS data. Welfare metrics and AROP rates are typically derived from the EU-SILC dataset. Subsequently, we investigate whether there are variations in results when relying on welfare estimates from the EU-SILC. Given that the EU-SILC dataset does not encompass expenditure data, we perform statistical matching techniques to integrate information from both household surveys (HBS and EU-SILC). The approach's specifics are outlined by Rude and Robayo-Abril (forthcoming b). Crucially, the overall estimates of the total impact of price increases on AROP rates exhibit similarity (2.2 versus 1.5 percentage points). Disparities in AROP rates across different groups emerge between the two approaches, although the impact's magnitude remains consistent (figure 54). Upon analyzing results by income quintiles, the primary finding remains robust: the effect is most pronounced for the second-lowest income quintile. However, within the matched dataset, the impact displays a slightly broader distribution across income quintiles, with the lowest and third-lowest income quintiles experiencing more-substantial effects (figure 55) compared to the microsimulations solely based on HBS data (figures 52–53).

27 http://statistici.insse.ro:8077/tempo-online/#/pages/tables/insse-table.

Figure 54 Increase in AROP Rates and Pre-Price-Increase AROP Rate by Groups for 2021—Direct Effect

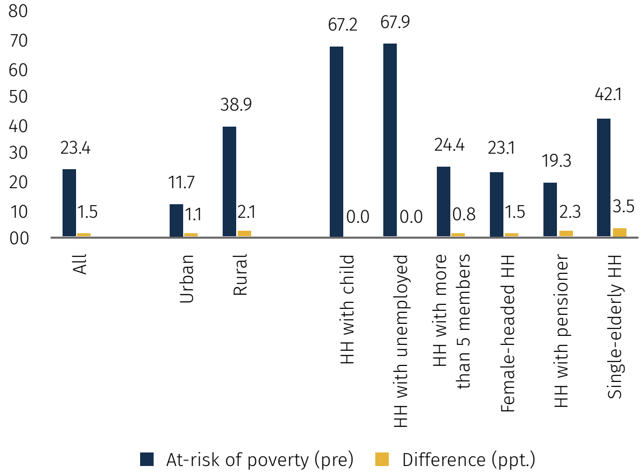
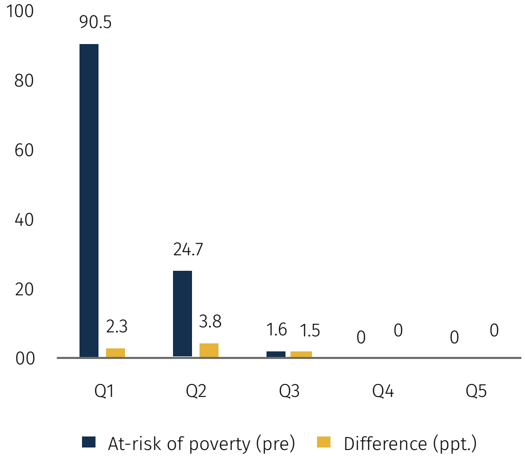


Figure 55 Increase in AROP Rates and Pre-Price-Increase AROP Rate by Income Quintiles for 2021—Direct Effect



Source: Own estimates based on a matched HBS (2019) and EU-SILC (2020) dataset.

Note: The figures plot the AROP rates in the pre-price-increase scenario for 2021 and the change in the AROP rate in our baseline scenario (an energy price increase of 40 percent and a price elasticity of -0.25) by groups (left graph) and by income quintiles (right graph). For a detailed overview of the microsimulation, see annex 4. AROP rates are based on equivalized household income. Income quintiles are based on per capita household income.

Using an alternative poverty threshold

The overall poverty effects are comparatively modest when employing a comparatively lower poverty line (the $6.85 a day 2017 PPP international poverty line). The outcomes also vary across demographic groups, highlighting the heightened impact on households with unemployed members. Shifting our focus, we compare our findings on AROP rates with those under a significantly lower threshold ($6.85 (a day 2017 PPP international poverty line). In this scenario, the overall impact diminishes (0.6 versus 1.5 percentage points), with a shift in the most affected group. While single-elderly households were primarily affected using AROP rates, households with unemployed members experienced the most substantial increase using the $6.85 a day (2017 PPP) poverty line (figure 56). Rural areas see a more significant impact in both cases than urban areas. The equity implications persist when employing the $6.85 a day (2017 PPP) poverty line, but the disparities are more pronounced. The rise in poverty rates is driven entirely by the lowest income quintile (figure 57).

Figure 56 Increases in International Poverty Rates ($6.85 a Day) and Pre-Price-Increase International Poverty Rate by Groups for 2021—Direct Effect

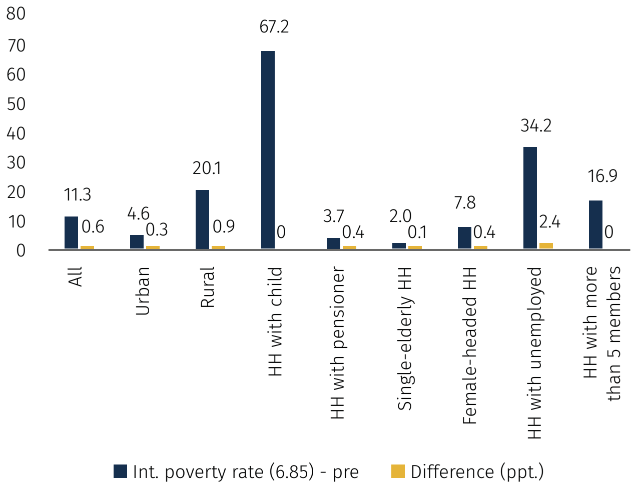
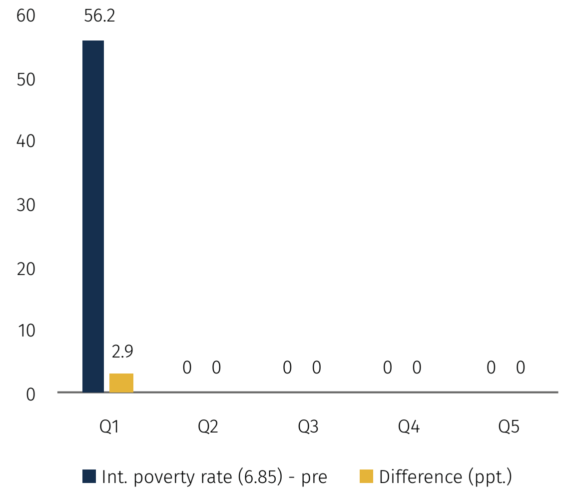


Figure 57 Increases in Pre-Price-Increase International Poverty Rates ($6.85 a Day) by Income Quintiles for 2021—Direct Effect



Source: Own estimates based on a matched HBS (2019) and EU-SILC (2020) dataset.

Note: The figures plot the AROP rates in the pre-price scenario for 2021 and the change in international poverty rates at the $6.85 (2017 PPP) line in our baseline scenario (an energy price increase of 40 percent and a price elasticity of -0.25) by groups (left graph) and by income quintiles (right graph). For a detailed overview of the microsimulation, see annexes 4 and 6. International poverty rates are based on per capita household income. Income quintiles are based on per capita household income.

Varying price elasticities across the income distribution

Existing research indicates that the price elasticity of energy varies across different segments of the population and household categories, which points up the importance of disaggregating behavioral response patterns. For instance, Schulte and Heindl (2017) provide evidence that the price elasticities of energy consumption significantly differ among income quintiles. Their findings reveal that low-income households are less responsive to changes in energy prices than high-income households. Schulte and Heindl's study indicates that households in the top 25 percent of income levels are three times more price-elastic than those in the lowest 2–5 percent. Moreover, their research highlights variations in price elasticities of energy consumption across different types of households.

The observed patterns of energy price elasticities have notable implications for welfare, mainly due to the regressive nature of energy price increases. When energy prices rise, the welfare losses experienced by individuals and households will be more significant for those at the lower end of the welfare distribution. This is because high-income households tend to exhibit more-significant responses to changes in energy prices than low-income households. Consequently, low-income households face a more significant burden and are more adversely affected by energy price increases, which has significant implications for energy affordability across the welfare distribution. This regressive impact underscores the equity concerns associated with rising energy prices, highlighting the greater need for support and assistance among lower-income households compared to their higher-income counterparts.

In line with existing scholarly work, we investigate the robustness of our primary findings by accounting for varying price elasticities across the welfare distribution. Specifically, we utilize the estimates of energy price elasticities provided by Schulte and Heindl (2017) as a benchmark. We assume an energy price elasticity of -0.2 for the lowest income quintile and decrease the elasticity by 0.1 for each subsequent quintile. Conversely, we assign an energy price elasticity of -0.6 to the highest income quintile. These adjusted elasticities are used in our analysis while maintaining the baseline scenario of a 40 percent increase in energy prices.

Our findings closely align with the results obtained from our baseline scenario for both the AROP and international poverty rates. The impact on the Gini coefficient is slightly more pronounced but remains close to zero. Specifically, the overall effect on the AROP rate resulting from a 40 percent increase in energy prices is very similar at 2.05 percentage points (compared to 2.08) when using the matched EU-SILC-HBS dataset. Moreover, the impact on each income quintile closely corresponds to previous observations, which can be attributed to the shape of the welfare distribution, with the upper two income quintiles remaining unaffected by the AROP threshold.

4.4 Limitations and Caveats

Previous research indicates that the effects of increasing energy prices extend beyond the direct impact on household income. Households may respond to price shocks by adjusting their spending patterns, such as reducing expenditures or deferring payments. A study conducted by Battistini et al. (2022) reveals that the distributional consequences of rising energy prices on households are more extensive than those discussed in our current report. The study highlights a substantial reduction in spending, particularly among lower-income households, consistent with liquidity constraints of low-income households, which forces them to cut back on spending when prices rise. This uneven effect on savings could potentially have adverse long-term implications for household wealth. However, we do not account for these impacts in our study due to our dataset's lack of savings data.

Existing research highlights the variation of income elasticities across the welfare distribution, similar to the variation observed in price elasticities. Studies by Wadud et al. (2009) and Schulte and Heindl (2017) provide estimates of income elasticities of energy consumption ranging from 0.2 to 0.6. In line with their findings on price elasticities, Schulte and Heindl (2017) demonstrate substantial differences in income elasticities across income groups. Specifically, they report income elasticities of around 0.2 to 0.3 for the lowest-income group, while the upper-income group exhibits elasticities of around 0.5. However, this level of granularity is not accounted for in the current report. It would be valuable for future research to investigate how the results might vary by incorporating different income elasticities across the welfare distribution.

Some additional limitations of and considerations concerning our methodology need to be acknowledged. Firstly, it is essential to note that we do not have reliable estimates of energy price elasticities for Romania, which is a significant limitation. Secondly, we encountered challenges in obtaining up-to-date input-output tables specific to Romania. Consequently, we employ a more constrained approach to estimate indirect effects. Our analysis focuses exclusively on households and we do not account for energy consumption by other entities, such as public or private institutions.

Chapter 5

Effectively Tackling Energy Poverty and Mitigating the Adverse Welfare Impacts of Rising Energy Prices

In this chapter, a comprehensive examination is conducted to assess the existing legal and policy framework in Romania for addressing the multifaceted issue of energy poverty. This chapter first evaluates the current legal and policy framework in Romania addressing energy poverty. Second, it reviews current government measures specifically designed to shield households from the impact of rising energy prices and examines their potential effectiveness. Third, it identifies and simulates policy packages that can potentially play a pivotal role in the ongoing efforts to combat and alleviate energy poverty, leveraging the diagnostic evidence and insights gleaned from the preceding chapters. The analysis primarily focuses on two key policy categories: income support initiatives aimed at immediate relief for vulnerable populations' energy needs and energy efficiency initiatives geared toward long-term sustainability and prudent energy usage. Finally, we explore the importance of potential behavioral interventions, aiming to tackle the behavioral barriers uncovered in chapter 3. This approach offers a distinctive perspective on combating energy poverty through sustainable energy transitions by considering key elements of human behavior. The present chapter aims to inform and guide future policy-making initiatives for a more effective and targeted approach to addressing energy poverty by providing a nuanced understanding of the legal landscape, current government measures, and their outcomes.

5.1 Legal and Policy Framework

In Romania, "energy poverty" has often been aligned with the concept of a "vulnerable consumer," as stipulated in various normative acts. The enactment of Law 226/2021[28] in September 2021 introduced a novel definition of energy poverty: the inability of a vulnerable energy consumer[29] to cover their minimum energy needs.[30] Despite this being an official definition, how it is operationalized for monitoring and evaluation purposes and how the measurement of minimum energy needs is assessed is not defined in the legislation.[31]

Tackling energy poverty has been a strategic priority for the Romanian government, as outlined in various government strategies, and it aligns with the priorities set by the EC.

The Romanian National Strategy on Social Inclusion and Poverty Reduction for 2022–2027,[32] along with its associated Action Plan, as of April 2022, aims to address energy poverty through two main approaches. First, it seeks to establish public programs targeting thermal insulation in communities affected by energy poverty (aiming to address energy poverty through increased energy efficiency) that offer subsidies for rehabilitation projects. Second, the strategy involves providing monthly assistance to cover part of the expenses associated with home heating during the cold season. Prior to the initiation of the strategy, a social tariff for electricity was in effect (from 2006 to 2018); it was removed as part of the market liberalization process. However, the government returned to regulated prices in April 2022 and established price caps to respond to the recent sharp rise in energy prices, leading again to the introduction of implicit energy subsidies.

The LTRS[33] recognizes energy poverty in single-family homes and apartment units. This strategy explores energy poverty in buildings and proposes solutions that focus on energy efficiency and heating assistance interventions. The LTRS emphasizes the necessity for an improved national legal framework to address energy poverty and stresses the importance of robust government programs, accessing EU funds, and exploring other financial schemes on the private market. Additionally, the LTRS underscores the crucial role of local governments in securing grants and integrating energy poverty considerations into their local renovation programs.

Furthermore, EU Member States are required to assess and mitigate energy poverty within their National Energy and Climate Plans (NECPs) as part of the European Green Deal. The 2021–2030 Integrated National Energy and Climate Plan offers details about the share of households experiencing energy poverty using consensual measures (arrears on utility bills and inability to keep home warm) and establishes a nationwide goal to alleviate energy poverty and protect vulnerable customers. However, it does not specify clear metrics and time frames for monitoring and evaluating the impacts of policies on energy poverty. When a significant portion of households faces energy poverty, Member States should include distinct national goals and policies in their plans to address and mitigate it. Tackling energy poverty is one of the key focus areas of the Renovation Wave,[34] an initiative to boost

28 https://legislatie.just.ro/Public/DetaliiDocumentAfis/246430.

29 A "vulnerable energy consumer" refers to an individual or family requiring social protection measures and additional services due to health, age, insufficient income, or isolation from energy sources to meet at least their minimum energy needs.

30 "Minimum energy needs" encompass the essential energy consumption for lighting, optimal home cooling and heating, cooking, hot water preparation, using plugged-in communication devices, and powering medical devices vital for life support or improving health. The minimum consumption limit is established by order of the Minister of Labor and Social Protection, based on the data made available by the National Energy Regulatory Authority, as well as by the National Institute of Statistics.

31 There is no universally accepted basket of basic energy services. To clearly distinguish the energy poor from those who are not using this definition, one must define a basket of basic energy services and the minimum amount of each service needed (an energy poverty line). Unlike the food poverty line, which can be defined in terms of a minimum daily caloric intake, there is no absolute reference for what fulfills a minimum level of basic energy needs. For a measurable metric of energy poverty, this energy poverty line needs to be estimated. This involves several steps to determine the minimum income needed for an individual or household to meet basic energy needs.

32 https://www.mmuncii.ro/j33/index.php/ro/minister-2019/strategii-politici-programe/6562-sn-incluziune-sociala-2022-2027.

33 https://energy.ec.europa.eu/system/files/2021-04/ro_2020_ltrs_en_version_0.pdf.

34 See more details here: https://energy.ec.europa.eu/topics/energy-efficiency/energy-efficient-buildings/renovation-wave_en.

energy efficiency of public and private buildings, as outlined in the European Green Deal.

The EU legal and institutional framework recognizes energy poverty as a critical and growing problem among EU Member States. The Recast Electricity Directive and Directive 2009/73/EC mandates[35] that Member States create national action plans, employ other suitable frameworks to address energy poverty, take appropriate measures to combat energy poverty, protect vulnerable customers, and quantify the number of affected households. The Energy Efficiency Directive,[36] which sets rules and obligations for achieving the EU's ambitious energy efficiency targets, also requires the addressing of energy poverty within energy efficiency obligations with a focus on protecting vulnerable households. The revised Energy Performance of Buildings Directive,[37] aiming to reach the building and renovation goals set out in the European Green Deal, compels the inclusion of national measures to alleviate energy poverty within long-term renovation strategies. National strategies among EU Member States for long-term renovation and related initiatives toward achieving 2030 and 2050 energy efficiency goals should prioritize the protection of energy-poor households.

Furthermore, the revised Energy Efficiency Directive and the Energy Performance of Buildings Directive encourage the development of one-stop shops for home energy renovation in all EU Member States. These one-stop shops, highlighted in the directives (with the Energy Efficiency Directive adopted in September 2023 and the Energy Performance of Buildings Directive pending adoption), are crucial for implementing the 'energy efficiency first principle' in the fragmented residential sector. EU Member States are expected to support the establishment of these one-stop shops and stimulate both demand and supply through favorable legislation, regulatory frameworks, and other support mechanisms. The concept of one-stop shops aims to provide consumers with a single point of contact for information and advice on energy retrofits, making the process simple and straightforward. This includes pre-renovation audits, renovation design, tailored financial plans, process coordination, access to affordable financing, and energy consumption monitoring. However, existing one-stop shops lack standardized services, energy savings thresholds, technical criteria, and renovation quality specifications. Due to homeowners' low prioritization of energy efficiency and reluctance to pay for advice, most one-stop shops require public sector support. In Romania, these initiatives haven been integrated into the recovery and resilience plan, particularly under the REPowerEU chapter, which focuses on accelerating the deployment of renewable energy and energy efficiency renovations.

Finally, the EC established the SCF in 2021, the first EU Fund designed specifically to offer financial assistance to vulnerable households, transport users, and microenterprises during the energy transition. The SCF regulation, which was approved in May 2023 and became effective in June 2023, is expected to mitigate the social impacts of implementing the new emission trading system for building and road transport by explicitly targeting vulnerable households, microenterprises, and transport users in the EU who are affected by energy and transport poverty during the 2026–32 period. Member States must submit their Social Climate plans by June 2025. The projected SCF allocation for Romania is estimated to be around 9.25 percent of the total EU funds, amounting to approximately 6 billion euros. This makes Romania the sixth-largest recipient of SCF funds. These funds can finance temporary income-support measures and investments in energy efficiency and the renovation of buildings, clean heating, and cooling. Up to 37.5% of this allocation can be used for temporary direct income support to assist vulnerable households.

5.2 Recent Policies and Interventions

In response to the recent energy crisis, the Romanian government has primarily focused on a combination of energy price caps and income-support measures to protect households; some energy efficiency programs are also in place. Direct financial support measures included untargeted price caps and targeted income-support measures, which include a heating subsidy for the cold season, a supplementary heating subsidy, and energy cards. The existing heating subsidy, reformed in 2021, continues to provide financial support to compensate for the heating costs of vulnerable customers. Energy efficiency measures include a renovation program (already approved),

35 https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:211:0094:0136:en:PDF.

36 https://energy.ec.europa.eu/topics/energy-efficiency/energy-efficiency-targets-directive-and-rules/energy-efficiency-directive_en.

37 https://energy.ec.europa.eu/topics/energy-efficiency/energy-efficient-buildings/energy-performance-buildings-directive_en.

with the ambitious goals of enhancing the energy efficiency of buildings[38] and investing in energy-efficient housing, especially among poorer households, which could have beneficial welfare effects. In addition, Romania's NRRPs have allocations for green projects, including energy efficiency.[39]

Untargeted measures—energy price caps

As in numerous other EU Member States, in Romania efforts have been made to significantly cap energy prices to shield consumers and businesses from steep price hikes. In 2021, Romania completed the process of fully liberalizing its energy market. However, the government reintroduced regulated prices to curb any additional increases in energy bills at the end of February 2022. Romania established a one-year ceiling on electricity and natural gas prices for households and firms to be rolled out from August to December 2022. Customers for gas and electricity were provided a reduced price that fell below the market rate set by companies and a governance ordinance was put in place to address the price differential between the market price and the customer price. Utilities purchased at the prevailing market price and sold at a restricted rate, with the government providing compensation to cover the difference.[40] The electricity and natural gas prices ceiling was extended until August 2023. However, price caps for vulnerable customers have been extended until 2025.[41] These retail price caps were a valuable tool in protecting households and enterprises from spikes in energy costs, especially those who allocate a significant portion of their budget to energy expenses. The appeal of price caps for governments lies in their ease of implementation, providing a clear and easily monitored framework for energy pricing.

Despite the advantages of the price caps discussed above, discussions persist regarding the fairness and effectiveness of this measure (Hardy et al. 2019; Philibert et al. 2009; Guo et al. 2019), primarily due to their sizable fiscal impact and lack of targeting. Moreover, international evidence shows lower fossil fuel prices can incentivize fossil fuel consumption. Suranovic (2013) argues that fossil fuel addiction, similar to cigarette addiction, may result in a prolonged period of expressing a desire to switch to clean energy without significant action, as the opportunity cost of switching to cleaner alternatives also rises. Taghvaee et al. (2022) show that price policies are ineffective in reducing fossil fuel consumption, while energy efficiency improvements are much more effective.

Evidence presented in this report shows that the welfare impacts of rising prices in Romania have been sizable despite the energy price caps; moreover, the associated fiscal cost is also high. As shown in chapter 4, the risk of poverty increases is expected to be sizable despite the price caps, which is explained by the untargeted nature of this policy measure. Moreover, they are fiscally costly, given the untargeted nature of the policy and leakage to high-income groups. Estimating the fiscal cost of untargeted price caps in Romania is challenging, but several studies provide some estimates. Bruegel estimates show the fiscal costs of the initial price cap and subsequent extension amounted to approximately 2.9 and 1.6 billion euros, respectively, for a total of 4.5 billion euros, representing a large share of the policy response (Sgaravatti et al. 2021). Estimates from the IMF indicate gas and electricity explicit consumption consumer subsidies of 1.1 US$ billion. Implicit consumer subsidies for gas and electricity are estimated at 0.6 US$ billion.[42] Alternative estimates from Autoritatea Nationala de Reglementare in Domeniul Energie (ANRE) indicate the annual fiscal cost of price caps to be

38 The program aims to promote the use of heat pumps as a means of significantly reducing energy demands for heating and transitioning to electrification.

39 For more details, see https://commission.europa.eu/business-economy-euro/economic-recovery/recovery-and-resilience-facility/country-pages/romanias-recovery-and-resilience-plan_en.

40 The government introduced a social tariff of 0.68 leu/kilowatt-hour (kWh) (approximately 0.14 euros/kWh) with VAT included for households with monthly consumption of up to 100 kWh, covering approximately 4 million households. Another 4 million households with monthly electricity consumption between 100 and 300 kWh benefited from a tariff of 0.80 leu/kWh (0.16 euros/kWh), including VAT.

41 The cap of 0.14 euros/kWh for vulnerable customers, including those with a max monthly consumption of 100 kWh, households using medical equipment, families with at least three children, and single-parent households, will continue until March 2025. Additionally, the cap of 0.16 euros/kWh will continue until March 2025 for domestic customers with monthly consumption between 100 and 255 kWh.

42 Explicit subsidies reflect supply costs' being greater than the retail prices, whereas implicit subsidies reflect the efficient price's being greater than the retail price, exclusive of any explicit subsidy, with the efficient price being the monetary supply cost plus all externalities. Costs of externalities include estimates of associated air pollution, greenhouse gas emissions, and road congestion.

close to 6.6 billion lei (1.4 billion euros).[43] Estimates from the Ministry of Labor suggest that, in 2022, implicit energy subsidies in Romania amounted to 1.177 billion RON for natural gas and 2.73 billion RON for electricity[44]. In February 2024, the Romanian government announced that the cap on energy prices would remain unchanged until March 2025.

Targeted income-support measures

Understanding the key features of a country's social protection system is essential before delving into the discussion of income-support measures to address energy poverty. The social protection system, the foundational framework within which these measures operate, influences their design, effectiveness, and overall impact. By describing the key features of the social protection system, we gain insight into the mechanisms and structures that underpin the delivery of support to vulnerable populations. This contextual understanding is crucial for evaluating the appropriateness and success of income-support measures to ensure they align with the broader social welfare framework and effectively address the nuanced challenges posed by energy poverty.

Key features of the social protection system

Romania's social benefits system is characterized by a combination of categorical and means-tested initiatives designed to support poor and vulnerable families. These programs can be broadly categorized into four key areas: (1) family support programs, which focus on promoting the well-being of families; (2) means-tested programs tailored to low-income households, ensuring targeted assistance to those in need; (3) specialized programs to assist to individuals with disabilities; and (4) additional programs, such as social pensions, aimed at providing comprehensive support to diverse segments of the population. This comprehensive approach underscores Romania's commitment to addressing the varied needs of its citizens through a social benefits framework.

In 2021, Romania's social protection spending, at 13.3 percent of GDP, was below the EU-27 average and some CEE countries, with "old age" pensions and family allowances dominating the allocation. Social protection spending as a share of GDP was significantly below the EU-27 average and some other CEE countries from 2012 to 2021 (figure 58, panel a). In Romania in 2021, social protection expenditure totaled 157.8 billion lei, representing 13.3 percent of the GDP and comprising 33.4 percent of the overall expenditure. The most substantial category within this framework, "old age" (9.7 percent of GDP), primarily encompassed pension disbursements. Following closely was "family and children" (1.5 percent of GDP), the second-largest category. Expenditure for "sickness and disability" (1.2 percent of GDP), the third-largest group, primarily involved social payments in cash or kind linked to social insurance schemes. Expenditure attributed to "social exclusion not elsewhere classified," which constituted 0.5 percent of GDP in 2021, encompassed benefits for socially excluded individuals, such as those with low income, refugees, or facing substance abuse. Other programs, including "survivors" (0.1 percent of GDP) and "unemployment" (0.1 percent of GDP), notably feature pension payments to survivors and contribute significantly to overall expenditure. The "housing" category, which involves social protection payments to households for housing costs and the operation of social housing schemes, accounts for a negligible share of GDP (figure 58, panel b).

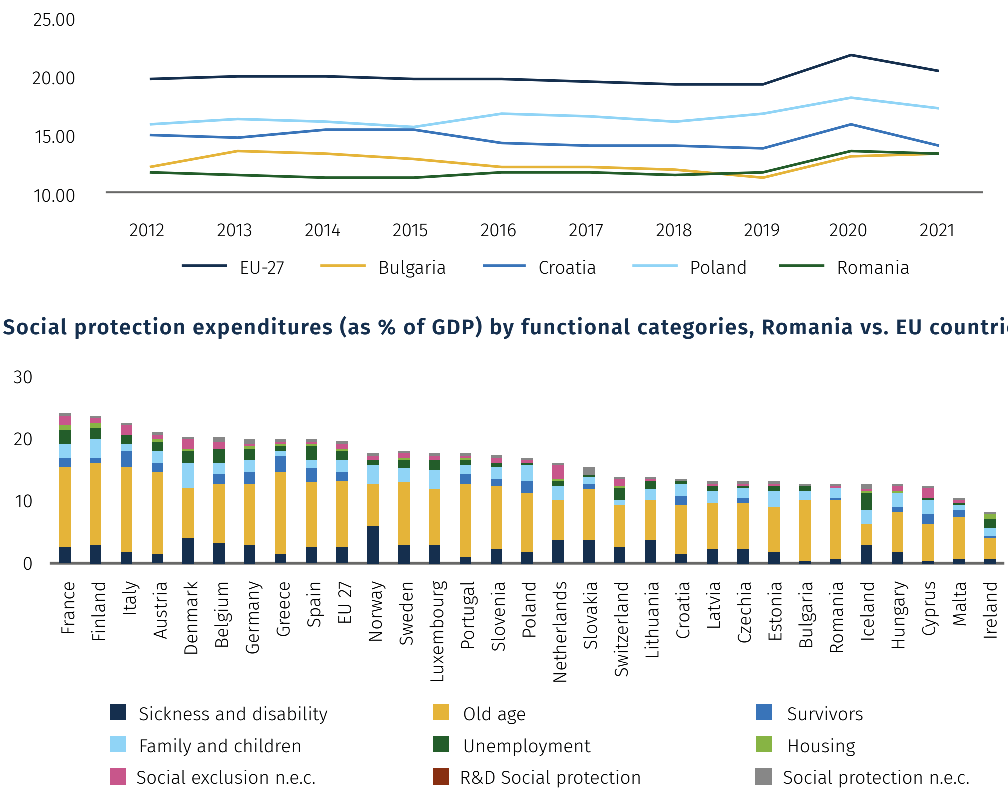
43 Source: https://anre.ro/suma-totala-verificata-de-anre-si-transmisa-spre-decontare-a-depasit-205-miliarde-ron/

44 Source: Ministry of Labour and Social Solidarity, https://mmuncii.ro/j33/index.php/ro/transparenta/statistici/buletin-statistic

Figure 58 Social Protection Spending, Romania vs. EU-27 and Selected CEE Countries

Panel a. Evolution of social protection expenditures (as % of GDP), Romania vs. comparator countries, 2012–21

Panel b. Social protection expenditures (as % of GDP) by functional categories, Romania vs. EU countries, 2021



Source: Eurostat (2023). Indicator: TESSI120

Note: Social protection spending in Romania was primarily driven by "old age" pensions and family and children programs.

Romania's social benefits system, especially its means-tested programs, faces substantial challenges in protecting the poor and vulnerable; moreover, there are inequalities in family policies and pensions and as a result social transfers have a limited role in reducing poverty. The existing means-tested programs, such as the Guaranteed Minimum Income, Family Support Benefit, and heating benefit, provide limited coverage and offer relatively low generosity. Furthermore, despite the introduction of the Social Reference Indicator in 2008, the value of social benefits has not been consistently adjusted to inflation (World Bank 2023a).[45] Fragmentation within means-tested benefits hinders their effectiveness in reducing poverty and enhancing program administration efficiency.[46] A recent analysis of how to improve the social protection system in Romania from 2020 revealed several shortfalls, such as a bias toward middle-income families with respect to family policies—at least prior to the pandemic (Adăscăliței et al. 2020).

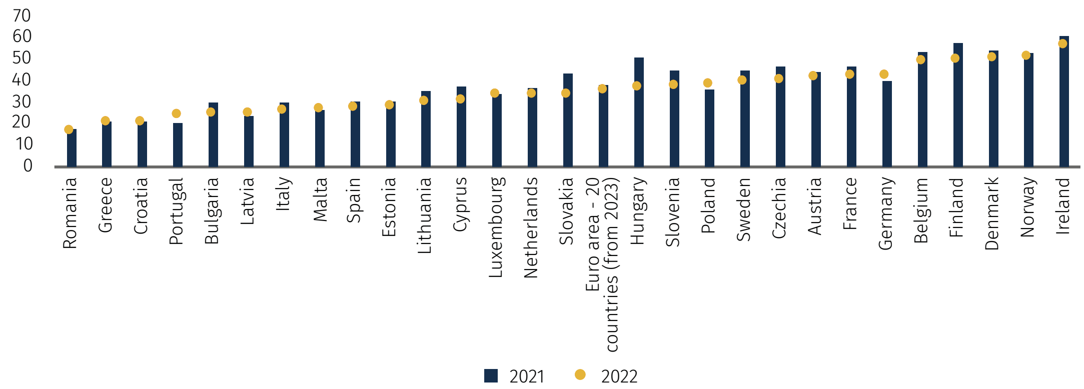
In line with this assessment, Romania has the EU's third-highest AROP rate for children. In 2021, 3 out of 10 children below 18 years old were affected. Moreover, the pension system is marked by significant inequalities. In 2020, the highest income quintile of pensions was more than four times

45 Various benefits have been ad-hoc indexed based on separate laws, resulting in discrepancies. For example, while the value of universal child allowances tripled in the last decade, the guaranteed minimum income barely changed. The social reference indicator (ISR) remains fixed at 500 lei/month, irrespective of inflation, which reached around 42 percent between 2008 and 2021, while benefit values linked to the index remained stagnant.

46 These benefits differ regarding assistance units, equivalence scales, documentation requirements, income exemptions, asset filters, recertification periods, coresponsibilities, linkage to social services, and incentives for transitioning from benefits to employment or income-generating activities. Each program maintains separate beneficiary records and payment systems, leading to inefficiency and administrative redundancy.

higher than the lowest income quintile and there is dualization in the pension system (Adăscăliței et al. 2020). In September 2020, the guaranteed minimum pension was below the poverty line for a single person (Adăscăliței et al. 2020), which is one of the reasons why Romania reports one of the highest AROP rates for older adults in the EU. In addition, social protection for persons with disabilities is fragmented (Adăscăliței et al. 2020). Consequently, the overall impact of social transfers on poverty reduction in Romania ranks the lowest among EU Member Sates (figure 59). An updated comprehensive fiscal incidence analysis provides a more detailed assessment of how the overall tax-transfer system can reduce poverty and inequality and which households bear the burden or receive the greatest benefits along the income distribution (Robayo-Abril et al forthcoming).

Figure 59 The Role of Social Transfers in Poverty Reduction, Romania vs. EU Member States, 2021–22 (%)



Source: Eurostat (2023); indicator: TESPM050.

Note: The figure presents reductions in the AROP rate due to social transfers (calculated comparing AROP rates before social transfers with those after transfers; pensions are not considered as social transfers in these calculations). The indicator is based on the EU-SILC. Data reflects the 2021 and 2022 survey years.

Heating subsidies

For the protection of energy-vulnerable customers, the home heating aid subsidy is a means-tested cash support targeted to low-income families during the cold season (November to March). The benefit entitlement is subject to income and asset testing and the benefit amount is differentiated according to the type of heating source. For heating provided by a centralized system, the benefit amount is calculated as a proportion of the heating energy bill. The proportions decrease with income brackets and increase for single persons. The lump sum benefit amount for heat provided by the burning of natural gas, wood, coal, and oil fuel is a lump sum that also decreases with income (table 2, panel a). The benefit is given monthly during the cold season, between November 1st and March 31st next year.

Table 2 Home Heating Aid Parameters

Panel a. Income thresholds and benefit amounts, 2018–21

Per capita monthly net (lei)	Percentage compensation in centralized systems (% reference value)		Reference value	
	Family	Single person	Natural gas (lei)	Wood, coal, and oil fuel (lei)
Up to 155	90	100	262	54
155.1–210	80	90	190	48
210.1–260	70	80	150	44
260.1–310	60	70	120	39
310.1–355	50	60	90	34
355.1–425	40	50	70	30
425.1–480	30	40	45	26
480.1–540	20	30	35	20
540.1–615	10	20	20	16
615.1–786	5	15	-	-
786.1–1082	0	10	-	-

Source: Ministry of Labour and Social Protection of Romania, Law no. 92/2012.

Panel b. Income thresholds and benefit amounts, 2022–23

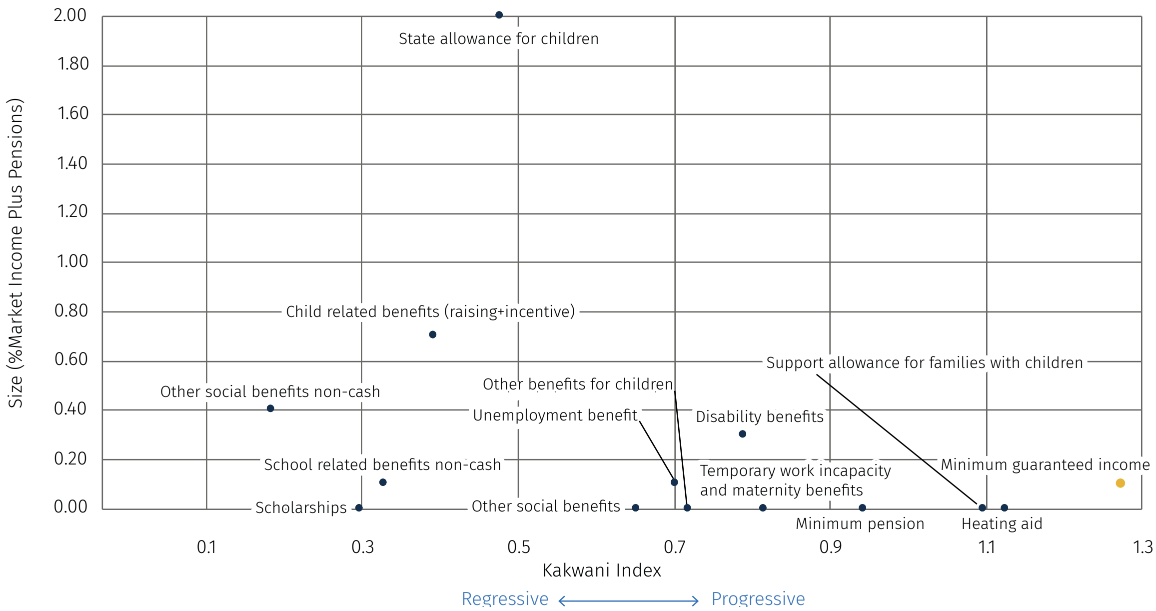
Per capita monthly net (lei)	Percentage compensation in centralized systems (% reference value)		Reference values		
	Family	Single person	Natural gas (lei)	Wood, coal and oil fuel (lei)	Electricity (lei)
Up to 200	100	100	250	320	500
200.1–320	90	90	225	288	450
320.1–440	80	80	200	256	400
440.1–560	70	70	175	224	350
560.1–680	60	60	150	192	300
680.1–920	50	50	125	160	250
920.1–1040	40	40	100	128	200
1040.1–1160	30	30	75	96	150
1160.1–1280	20	20	50	64	100
1280.1–1386	10	n/a	25	32	50
1280.1–2053	n/a	10	25	32	50

Source: Ministry of Labour and Social Protection of Romania, Law no. 226 of September 16, 2021.

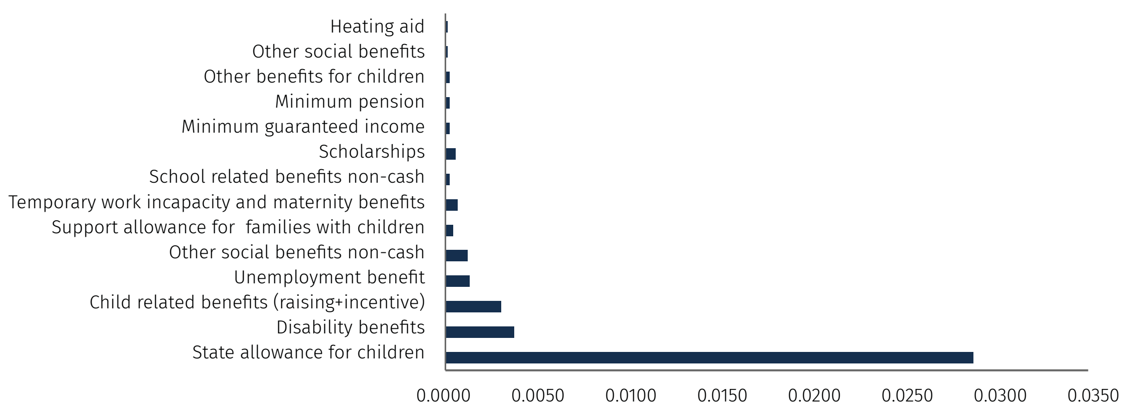
Current fiscal incidence analysis shows that the heating aid is quite progressive, but the poverty and inequality impacts were small due to the limited benefit adequacy. Fiscal incidence analysis using 2021 data (Robayo-Abril et al. forthcoming)[47] shows that the home heating aid is quite progressive compared to other social transfers, as shown by a larger Kakwani index, but the poverty and inequality impacts are small, primarily due to its small size (figure 60). Additionally, this scheme did not have any energy consumption threshold criterion and was aimed to provide support for heating but for no other energy expenses. Our analysis in chapter 2 suggests that while heating costs are an important component of household energy expenditures, the other components represent a significantly larger share.

Figure 60 Social Transfer Programs: Size, Progressivity, and Contributions to Poverty Reduction

Panel a. Size (% market income plus pensions) and progressivity (Kakwani index)



Panel b. Marginal contributions to poverty reduction



Source: Robayo-Abril et al. forthcoming. Latest Commitment to Equity Approach (CEQ) based on 2021 HBS. This figure does not capture the heating subsidy reform introduced in 2021.

47 A comprehensive distributive analysis of the fiscal system that allows for the observation of the changes in poverty and inequality of each fiscal intervention would require the implementation of approaches such as the Commitment to Equity Approach (CEQ) (Lustig 2018). The forthcoming CEQ for Romania is based on 2021 data before the surge in energy prices.

In 2021, changes were implemented in the heating subsidy system to improve its progressivity, increase its impact on poverty, and introduce a heating supplement to assist during the offseason. These changes, implemented under Law 267 (Vulnerable Consumer Law), encompass various measures related to the heating subsidy and a new energy supplement. Notably, the amendments involve raising the income cap for benefit eligibility of the heating aid, thereby increasing the number of beneficiaries (table 2, panel b). Furthermore, there is an elaboration on the definition of a vulnerable customer.[48] Additionally, an income-tested supplementary heating subsidy was also introduced to provide help for the whole year, including during the cold season. This is an important step, considering that this report shows cooling has emerged as an important challenge. Starting from the 2021–22 cold season, the energy supplement serves as an additional benefit for the same recipients. This monthly top-up is provided throughout the entire year, not just during the cold season. The amount of the supplement varies based on the type of energy utilized for heating: it is 10 lei for thermal energy and natural gas, 20 lei for fossil fuels, and 30 lei for electricity. However, if electricity is the sole source of energy used in the household, the supplement increases to 70 lei. The upcoming CEQ analysis is expected to shed light on the effectiveness of this reform.

Energy cards or vouchers

In addition to existing heating subsidies and energy price caps, in 2023 the government introduced a temporary "energy cards" program targeting pensioners, those with disabilities, and beneficiaries of the Guaranteed Minimum Income (GMI) program and family allowances. The primary objective of the energy cards was to assist low-income and vulnerable families facing excessive heating expenditures. The funds could be utilized for a range of energy-related services and products, encompassing electricity, centralized thermal energy, gas, wood, and even pellets. The vouchers carried a monetary value of 1,400 lei benefit (approximately 280 euros), were distributed in two installments, and were usable through December 2023. The eligibility criteria encompassed individuals with pensions below 2,000 lei per month, those with disabilities and incomes below 2,000 lei per month, and families benefiting from the GMI and family support allowances. The application process for eligibility involves multistage verification, including checks by the National Pension House and the National Agency for Pensions and Social Inspections to identify eligible pensioners and individuals with disabilities based on specific income thresholds. Further scrutiny is performed using the Agenția Națională de Administrare Fiscală platform to confirm the total household income remains below 2,000 lei and to ascertain whether multiple individuals reside in the same dwelling. If the per capita income is under 2,000 lei per month, households qualify to receive the energy card.[49] The continuity of this program beyond 2023 remains uncertain.

While there is no available analysis or data to assess the effectiveness of the energy cards, these vouchers are directed toward groups identified as particularly susceptible to energy poverty. This includes pensioners, households receiving GMI, and households with members with disabilities. The aim is to support these specific groups, acknowledging their heightened susceptibility to energy-related challenges.

Energy efficiency measures

Several energy efficiency measures have been adopted in Romania to tackle energy poverty. The National Multiannual Program for the Improvement of Energy Performance in Blocks of Flats is an ongoing rehabilitation program established in 2009 targeting multilevel blocks of flats constructed before 2005, including public social buildings, focusing on the building envelope (exterior walls, foundations, roof, windows, and doors) and

48 A vulnerable energy consumer is a single person/family who, for reasons of health, age, insufficient income, or isolation from energy sources, requires social protection measures and additional services to ensure that at least the minimum energy needs are met. "Energy needs," however, is not defined in the legislation.

49 For more details, see Emergency ordinance no. 166 of December 8, 2022 https://legislatie.just.ro/Public/DetaliiDocument/262296.

heating system. Prior to 2019, the grant rate was 80 percent from the state and local budgets, with flat owner associations covering 20 percent. Since 2019, the state has been covering 60 percent, with the balance coming from flat owner associations or local budgets. Priority is given to flat owner associations and those exempted from payment include individuals with disabilities, low-income single persons or retirees, and war veterans with surviving spouses. In 2018, recorded energy savings of implemented energy efficiency measures were 4.3 GWh (375 ktoe), compared to 573 GWh (49 ktoe) energy efficiency measures in the residential buildings included in the National Program from 2011 to 2017.[50] The budget for 2022–24 is 22.5 million euros from local funds.

Under the Renovation Wave (Component 5) of the NRRP, there is a grant scheme for energy efficiency and resilience in multifamily residential buildings. The projects seek to cover 100 percent of the investment costs for moderately renovating multifamily blocks of flats in rural and urban regions, particularly in marginalized urban or rural areas, as defined in the national mapping or declared in the Integrated Local Development Strategies. The targeted buildings are those constructed before 2000, with the maximum eligible project value of 200 euros/m2 for moderate renovation work (deployed area), excluding VAT. This initiative focuses on areas with a population at risk of poverty and social exclusion, allowing local authorities to execute renovation projects through their Local Development or Integrated Urban Development Strategies. The total budget for this endeavor is 219 million euros, and as of 2022, 29 submitted projects totaling approximately 100 million euros had been registered.

Another call for projects for thermal rehabilitation of blocks of flats under the Regional Operational Program (2014–20) is specifically designed to fund investments to enhance energy efficiency in both public and residential buildings and public lighting. In 2018, a total of 279 multifamily residential buildings, comprising 19,596 flats, underwent thermal rehabilitation through this initiative, leading to a cumulative energy savings of approximately 149 GWh.

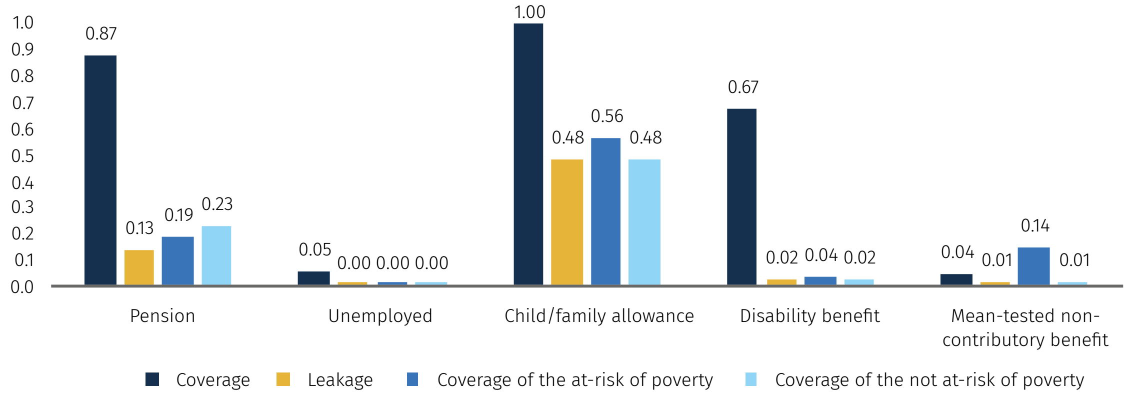
Do current social protection measures cover the groups who are at a higher risk of experiencing energy poverty?

As highlighted in chapter 2, energy poverty is more prevalent among individuals in lower-income brackets, those residing in rural areas, single-elderly households, pensioners, and recipients of municipal social aid. Consequently, it is crucial to examine the coverage of these demographic groups by social protection programs.

A significant portion of these groups had access to various social protection programs in 2019–20, although a notable proportion still lacked access to some initiatives. We assess the coverage and leakage rates of selected social protection programs in Romania, including pensions, unemployment benefits, child and family allowances, and disability benefits, for 2019–20. Figure 61 illustrates that almost 90 percent of elderly Romanians had access to pensions, and all families with children received some form of family or child allowances. Approximately 70 percent of families with members with disabilities reported access to disability benefits. However, only a negligible proportion of the unemployed received unemployment benefits. Additionally, only 5 percent of the population at risk of poverty received means-tested noncontributory benefits. Interestingly, over half of all households at risk of poverty, regardless of whether they were in the targeted group or not, received child and family allowances—a slightly larger proportion than of those not at risk of poverty. Conversely, concerning pensions, coverage rates were higher for those not at risk of poverty compared to their poor counterparts. Regarding benefit adequacy, per capita pensions demonstrated the highest average, followed by disability and unemployment benefits.

50 Raport de monitorizare a implementarii Planului National de Actiune în domeniul Eficientei Energetice (PNAEE), ANRE 2019: https://www.anre.ro/ro/eficienta-energetica/rapoarte/rapoarte-de-monitorizare-aimplementarii-planului-national-de-actiune-in-domeniul-eficientei-energetice-pnaee

Figure 61 Social Protection Benefits in Romania—Coverage and Leakage Rates, 2019–20



Source: Own estimates based on EU-SILC (2020).

Note: Social transfers were directly identified in the survey data. Coverage refers to the proportion of the intended target groups covered, while leakage pertains to the proportion of the nontargeted group covered. We cannot fully replicate the target population behind these social protection measures. Consequently, shares of the coverage and leakage rates might also reflect measurement errors. Family and children-related allowances are at the household level and we divide them by the number of household members. All other variables are collected at the individual level. We exclude all observations with zero values. For a detailed description of how we construct the variables, see appendix 1.

To assess the coverage of energy-poor individuals by existing social protection programs, we employ statistical matching techniques to integrate data from the EU-SILC and the HBS. A nuanced understanding of Romania's social protection schemes is crucial for evaluating the effectiveness of these mitigation measures. While the HBS provides limited insight, the EU-SILC contains necessary information—but it lacks expenditure data, making identification of the energy poor challenging. To address this, we utilize statistical matching techniques, as extensively detailed by Rude and Robayo-Abril (forthcoming b), to merge and harmonize these datasets. Due to data constraints, the analysis is based on 2019 data, as our 2020 EU-SILC data captures income information from 2019. Therefore, we use HBS data from 2019 during the matching process.

The coverage rates of social programs among the energy-poor target population are comparable or higher than the total population, except for pensions and disability benefits, where they lag significantly behind the average; the lower coverage rates for pensions among the energy poor are concerning, especially given that pensioners are significantly impacted by energy poverty and subsequent energy price increases. We now investigate the energy poor's access to conventional social protection schemes and how it contrasts with the broader population (figure 62). Approximately one-third of the energy-poor have access to pensions and 4 out of 10 energy-poor households receive child or family allowances. However, energy-poor individuals do not benefit from unemployment benefits, and only a negligible fraction receive disability benefits and benefits from means-tested noncontributory programs. When narrowing down the energy-poor population to a specific target demographic, 72 percent of the energy poor who live with elderly persons who are covered by pensions (versus 87 percent of the overall population). Similarly, only 34 percent of the population who reside with a person with disabilities and are energy poor receive benefits, compared to 67 percent of all individuals who reside with someone with a disability. Coverage rates for unemployment benefits surpass the general average, with 18 percent of energy-poor individuals who are unemployed accessing these benefits, compared to only 5 percent across all unemployed individuals. Similarly, the coverage rates for households with children accessing child or family allowances (universal) remain similar to the total average. Figure 63 underscores that the average benefit amounts received by beneficiaries are noteworthy.

Figure 62 Share of Energy Poor (P10) Accessing Social Benefits by Type, 2019–20

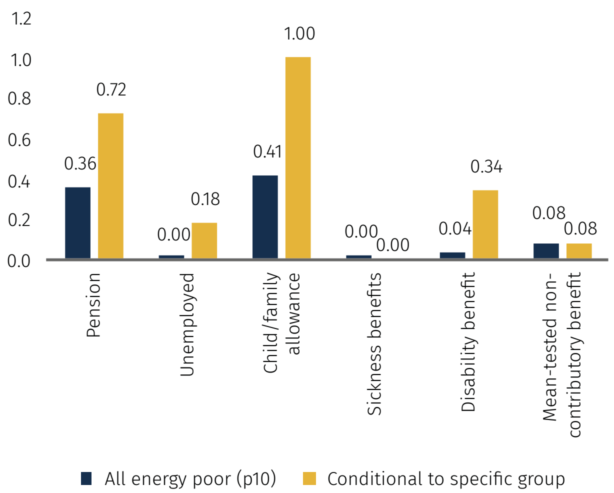
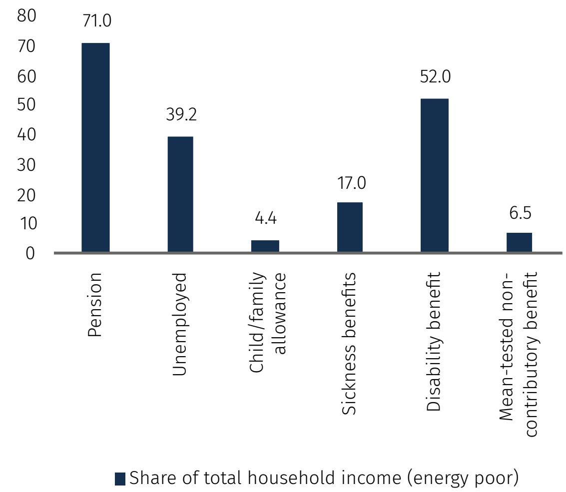


Figure 63 Benefits Paid to the Energy Poor via the Traditional Social System as Proportion of Total Household Income, 2019–20



Source: Own estimates based on matched 2019 HBS and 2020 EU-SILC dataset. For a detailed description of the statistical matching approach, see Rude and Robayo-Abril (forthcoming b).

Note: The left graph shows the coverage rate of all energy poor—independent of whether they are targeted or not—in terms of several social benefits in Romania. The right graph shows the per capita annual social benefit paid to energy-poor households, independent of whether they form part of the target group or not. Family and children-related allowances are at the household level, and we divide them by the number of household members. All other variables are collected at the individual level. We exclude all observations with zero values. For a detailed description of how we construct the variables, see appendix 1.

5.3 How Do We Design Effective Mitigation Measures to Protect the Most Vulnerable Energy Poor?

Overarching principles

Effective social safety nets are vital in shielding individuals from energy poverty, especially in the short term; simultaneously, household energy-efficiency measures can significantly enhance overall welfare, particularly in the medium term. Effective policy solutions must focus on supporting enhancements in housing and heating appliance efficiency through subsidized investments. Additionally, aiding households struggling to meet energy bill payments for heating is crucial. Energy efficiency initiatives can yield positive outcomes across various domains, including lowering energy costs, enhancing indoor comfort and air quality, boosting property value, creating employment opportunities, and diminishing reliance on fossil fuels.

Examining energy expenditure patterns and affordability across various income levels and identifying vulnerable groups, as presented in the previous chapters, is essential for formulating effective policies that prioritize the socioeconomically disadvantaged during the shift toward environmentally sustainable practices. The transition toward greener and more-efficient energy sources stands as an important pillar of the European Green Deal (European Commission 2023). However, a significant challenge lies in the fact that financially constrained households, particularly those in lower-income brackets, encounter obstacles in transitioning to renewable and cleaner energy sources (González-Eguino 2015). This economic barrier has substantial implications, leading to heightened energy costs and potential negative health outcomes (Sagar 2005). Addressing the challenges faced by the more-vulnerable groups is crucial to ensuring an equitable and inclusive transition toward sustainable energy for all.

In the current inflationary environment and the constrained fiscal space, two aspects are critically important when designing effective policy packages: well-targeted measures that are cost-efficient and have sufficient adequacy, to the extent possible, so that the welfare losses of the rising energy prices are offset.

First, while augmenting the incomes of vulnerable segments can enhance overall societal well-being, policies to support vulnerable populations necessitate careful balancing with fiscal viability within resource constraints. Focusing on recipients based on their specific needs, rather than adopting a universal approach, enables the allocation of limited resources to those who require it the most, thus mitigating the 'leakage' of the poverty budget to non-needy individuals. This approach enables the more generous provision of benefits to a smaller yet deserving group and for the program to operate within a more constrained budget. In essence, strategic targeting enhances the effective allocation of resources (Coady et al. 2004; Skoufias and Coady 2007).

Therefore, countries should give precedence to protecting the susceptible population through targeted assistance while maintaining strict fiscal control to combat inflation. Across many EU nations, efforts to protect consumers, both individuals and businesses, from escalating food and energy costs have primarily involved implementing price limits coupled with certain forms of financial aid. However, these general restrictions on energy costs and the provision of indirect utility subsidies can also benefit higher-income groups, being less effective than precisely targeted social assistance, and can strain fiscal resources significantly.

Second, it is crucial to thoroughly assess the adjustment of benefit levels to match the increasing cost of living—an often-overlooked aspect in policy formulation. Implementing mechanisms to index government benefits and tax credits intended to alleviate financial strain is vital for maximizing their impact on reducing poverty. Unfortunately, the value of numerous government benefits and tax credits designed to assist struggling families can easily erode due to the lack of proportional adjustment for inflation. This erosion in their efficacy increases the risk of households' slipping into poverty.

Adhering to these principles, we explore potential strategies with a dual focus: (1) safeguarding the most vulnerable groups identified in our analysis, specifically poor households receiving means-tested and noncontributory cash transfers, as well as single-elderly and pensioner households; and (2) enhancing the size or generosity of benefits. Considering the pinpointed inefficiencies in AROP rates and energy-poverty patterns and recognizing the demonstrated effects on subgroups, prioritizing poorer households and the elderly emerges as a promising approach for short-term income mitigation strategies. These initiatives are not only practical in terms of implementation, but can also capitalize on existing infrastructure within social protection measures designed for these identifiable population segments.

Policy simulations

In our simulations, we assess the potential mitigating impact of income-support initiatives on vulnerable populations facing rising energy prices within a constrained fiscal space. This policy approach aims to offer temporary, targeted support to those affected by energy and income poverty, utilizing existing well-targeted programs to minimize administrative costs associated with instituting new benefits. This strategy is built on the understanding that current social transfers are adequately targeted but constrained in their level of assistance or generosity. For each policy scenario, we consider an annual government expenditure of 1.4 billion euros, equivalent to the yearly fiscal budget allocated for electricity and natural gas price caps.[51] We divide the total government expenditure across the beneficiaries of each potential program to estimate the size of the annual transfer per beneficiary. Then, we re-estimate welfare indicators (poverty headcount, poverty gap, and inequality). This entails disbursing cash transfers to the identified households and re-estimating the poverty rate using simulated per adult equivalent household income, which already includes the cash transfers.

We simulate two policy scenarios with alternative financing options.

51 Estimates based on data on yearly spending from April 2022 to April 2023 on electricity and gas from ANRE: https://anrero/suma-totala-verificata-de-anre-si-transmisa-spre-decontare-a-depasit-205-miliarde-ron/.

Policy Scenario 1: Income support measures, financed with external funding

This policy scenario entails implementing income-support measures for households, with funding sourced from additional channels, such as the SCF. Importantly, the existing structures for electricity and gas prices remain unchanged. Under this scenario, price caps are retained and income-support measures are financed through the SCF, constituting 23 percent of the total SCF allocation. The fiscal envelope is assumed to be 1.4 billion euros. The income-support initiatives comprise a supplementary cash benefit integrated into means-tested and noncontributory programs. Additionally, a top-up is introduced to target pensioners and single-elderly households identified as highly vulnerable groups in our prior analysis.

In this scenario, we evaluate eight distinct policy measures aimed at addressing the heightened vulnerability of various vulnerable groups, including single-elderly households, pensioners, and AROP households receiving benefits through means-tested noncontributory programs. We chose these target groups based on their susceptibility to energy poverty and existing targeting mechanisms in Romania. Given the crucial need to shield the poorest and most vulnerable segments of the population from the repercussions of rising energy prices, it is important to determine the most suitable measures and ascertain when interventions would be deemed sufficient, as highlighted by Guan et al. (2023). To identify the most effective and cost-efficient short-term strategies for mitigating the impact of energy price increases, we employ microsimulations to assess the poverty-level effects of cash transfers. Our focus is on interventions targeting the following groups:

1. Entire population (for illustrative purposes)
2. Single-elderly
3. Single-elderly at risk of poverty
4. Pensioners
5. Pensioners at risk of poverty
6. Recipients of means-tested noncontributory programs
7. Bundle 1: Pensioners at risk of poverty and recipients of means-tested noncontributory programs
8. Bundle 2: Pensioners at risk of poverty and single-elderly at risk of poverty

The abovementioned groups have been chosen due to their susceptibility to energy poverty, their ease of identification, and the existence of social protection measures in Romania that already target them. Policy makers can, therefore, leverage the existing infrastructure to implement cash transfer programs for these groups without significant additional implementation and administrative costs.

An effective strategy to counter the upsurge in poverty resulting from rising energy costs involves extending financial assistance to pensioners at risk of poverty and single-elderly households, two demographics at heightened risk. By implementing cash transfer programs for these groups, one can alleviate the decline in their income, thereby mitigating the adverse effects. This approach holds significant merit, considering that single-elderly households can be readily identified and are among the most adversely impacted by the energy price increases, and a top-up transfer to pensioners at risk of poverty is easy to implement. By tailoring support to these vulnerable demographics, we can ensure a targeted and efficient response to the challenges posed by rising energy prices and their subsequent impact on poverty levels.

Our findings indicate that more-targeted approaches are more cost-efficient in mitigating the impact of price increases. According to the microsimulation results, adopting a universal approach where all Romanian households receive a cash transfer would not sufficiently counteract the escalating poverty effect (policy measure 1, table 3). This insight is particularly relevant, given that various European governments have implemented general measures, such as price caps, energy bill discounts, subsidies, or tax reductions, to address rising energy prices across the population (Ari et al. 2022).

Alternatively, adopting more-targeted approaches, specifically focusing on single-elderly households or pensioners at risk of poverty, proves to be more cost-effective. Income-support programs directed at these groups provide a greater reduction in poverty and the poverty gap compared to pre-price-increase levels within the same fiscal budget (policy measures 2, 3, and 5, table 3). In these cases, the cash transfer amounts to a substantial percentage, ranging between 23 and 53 percent of their total household income. Introducing a top-up transfer for recipients of means-tested noncontributory programs alone (policy measure 6, table 3) would reduce poverty less than other measures targeting single-elderly households or pensioners at risk. It is essential to consider other dimensions of equity, and emergency measures should be implemented through inclusive consultations and active engagement with specific communities and the Romanian population as a whole.

Lastly, programs bundling pensioners at risk of poverty with cash-transfer recipients' households (policy measure 7) or pensioners at risk of poverty with single-elderly households at risk of poverty (policy measure 8) would also effectively reduce poverty and the poverty gap below the pre-price-increase level.

Table 3 Simulation of Short-Term Measures Mitigating the Direct Effects of Rising Energy Prices under Current Program Structure

Policy measure	Targeted population	Simulated Poverty headcount (%)	Simulated Poverty gap (%)	Simulated Gini Index	Simulated Poverty reduction (percentage points)	Simulated Reduction of poverty gap (percentage points)	Simulated Monthly Cash transfer Size (Euros)	Simulated Beneficiaries	Simulated Adequacy (% Income)
1	All	24.4	9.2	33.9	0.48	0.38	72	19,348,563	5.9
2	Single-Elderly	22.2	8.8	33.0	2.68	0.77	1,136	1,232,223	22.4
3	Single-Elderly AROP	22.2	8.7	32.8	2.68	0.82	2,696	519,197	53.0
4	Pensioner	24.0	9.1	33.4	0.93	0.46	332	4,211,665	6.2
5	Pensioner AROP	21.2	8.4	32.8	3.74	1.12	1,665	841,003	30.0
6	CT recipients	23.6	8.7	33.2	1.31	0.82	1,800	777,846	31.8
7	Bundle 1: Pool beneficiaries Pensioner at-risk and CT recipients	22.0	8.2	32.9	2.90	1.38	890	1,573,329	15.5
8	Bundle 2: Pool beneficiaries Pensioner at-risk and Single-elderly at-risk	20.8	8.3	32.7	4.11	1.27	1,478	947,173	28.7

Source: Own estimates based on the matched HBS and EU-SILC dataset.
Note: This table shows eight potential short-term measures to mitigate energy price increases with a total fiscal budget of 1.4 billion euros for each measure, assuming that all other things stay equal. The pre-price-increase poverty level is 24.9 percent.

Policy Scenario 2: Income support measures financed by phase-out of energy price caps

This policy scenario involves income-support measures for households, financed with the resulting fiscal revenues generated by the full elimination of the implicit residential price caps of natural gas and electricity. As price caps for electricity and natural gas are eliminated, in this scenario energy prices increase even further. We assume that energy prices without subsidies would increase an additional 20 percent, bringing the total increase to 60 percent based on IMF data[52] (refer to annex 7 for additional price-increase scenarios). As in previous scenarios, we maintain a total annual expenditure of 1.4 billion euros for each policy measure.

Although the elimination of the price caps implies an estimated increase in energy prices, which may have adverse distributional consequences, these can be mitigated through the targeted measures. The same income support measures

52 Based on the "IMF Fossil Fuel Subsidies Data: 2023 Update": www.imf.org/en/Topics/climate-change/energy-subsidies.

used in policy scenario 1 are assumed. The additional 20 percent increase in energy prices due to the elimination of price caps would increase poverty from 24.9 percent (in baseline scenario—policy scenario 1) to 25.8 percent in policy scenario 2 (figure 64). Moreover, inequality would increase from 33.8 percent with price caps to 34.1 percent without price caps. Income- support measures that target single-elderly and pensioners are expected to provide an effective cushion against the rising energy prices, because more than half of the targeted populations are both energy poor (P10) and income poor (figure 65).

Figure 64 Short-Term Effects on Welfare by Policy Scenario

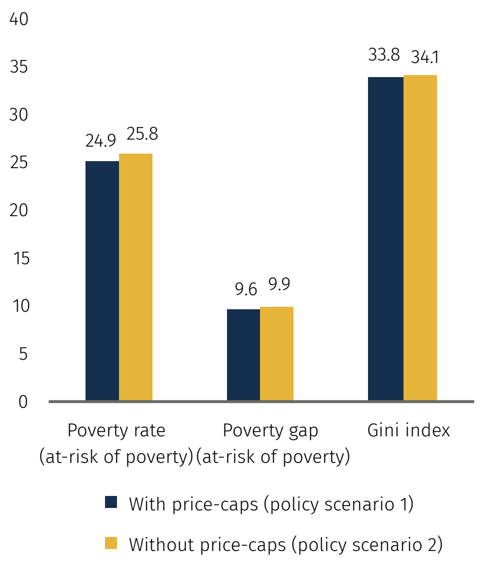
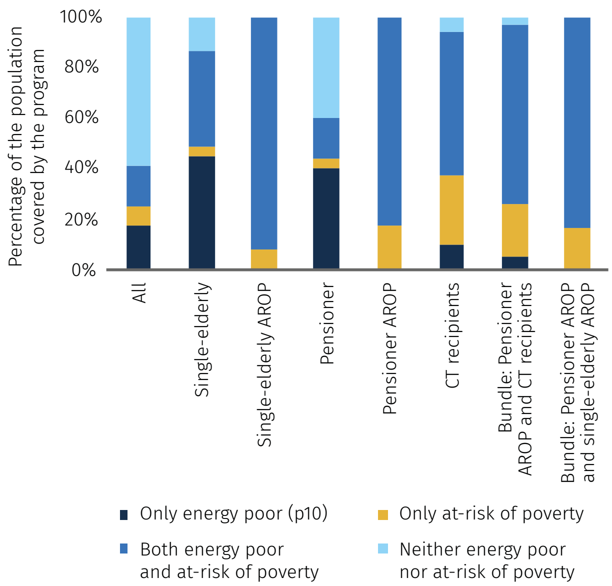


Figure 65 Coverage of Potential Mitigation Measures by Poverty Groups



Source: Own estimates based on the matched 2019 HBS and 20202 EU-SILC dataset.
Note: CT recipients refer only to those receiving benefits through means-tested and noncontributory programs.

In this scenario, where residential price caps are entirely eliminated and the resulting fiscal revenues are allocated to income-support measures, targeted approaches become even more important for mitigating adverse effects. Our simulations show that these temporary income-support measures, while slightly more challenging to administer compared to the price caps, offer a cost-effective and likely more efficient approach to assisting the most vulnerable with managing higher energy prices. Notably, providing a cash transfer of 1,665 euros per year to pensioners at risk (measure 5, table 4) not only mitigates the increase in poverty, it in fact reduces poverty levels much further than in the baseline scenario. A similar effect is achieved by providing a 1,478 euros cash transfer to pensioners at risk of poverty and single elderly at risk of poverty (bundle 2, table 4).

Table 4 Simulation of Short-Term Measures Mitigating the Direct Effects of Rising Energy Prices by EliminatinPrice Caps for Electricity and Natural Gas

Policy measure	Targeted population	Simulated Poverty headcount (%)	Simulated Poverty gap (%)	Simulated Gini Index	Simulated Poverty reduction (percentage points)	Simulated Reduction of poverty gap (percentage points)	Simulated Monthly Cash transfer Size (Euros)	Simulated Beneficiaries	Simulated Adequacy (% Income)
1	All	25.1	9.5	34.1	0.69	0.39	72	19,348,563	4.7
2	Single-Elderly	23.1	9.1	33.2	2.67	0.84	1,136	1,232,223	22.7
3	Single-Elderly AROP	23.1	9.1	33.0	2.68	0.88	2,696	519,197	53.6
4	Pensioner	24.9	9.4	33.6	0.86	0.49	332	4,211,665	6.2
5	Pensioner AROP	22.1	8.7	33.0	3.70	1.20	1,665	841,003	30.3
6	CT recipients	24.5	9.1	33.4	1.23	0.85	1,800	777,846	32.2
7	Bundle 1: Pool beneficiaries Pensioner AROP and CT recipients	23.2	8.5	33.1	2.55	1.44	890	1,573,329	15.6
8	Bundle 2: Pool beneficiaries Pensioner AROP and Single-elderly AROP	21.7	8.6	32.9	4.07	1.36	1,478	947,173	29.1

Source: Own estimates based on the matched 2019 HBS and 2020 EU-SILC dataset.

Note: This table shows eight potential short-term measures to cushion energy price increases with a total fiscal budget of 1.4 billion euros for each measure, assuming that all other things stay equal. The pre-price-increase poverty level is 25.8 percent. Currencies are in euros. Cash-transfer (CT) recipients refer only to those receiving benefits through means-tested and noncontributory programs. Adequacy measures the share of the CT with respect to the total household income.

It is important to acknowledge that our microsimulations of mitigation measures are based on several assumptions and are subject to some limitations. This microsimulation exercise that is subject to some limitations. First, we assume that all other relevant parameters, such as prices, remain constant throughout the analysis. We also assume that there are no behavioral changes among the population as a result of the cash transfers' being implemented. Second, we assume perfect take-up of the programs among the targeted beneficiaries, meaning that all eligible individuals and households receive the cash transfers. Lastly, we operate under the assumption that there is no take-up of the program by population groups who are not specifically targeted. Furthermore, we must highlight the limited feasibility of replicating the social protection system in Romania using EU-SILC data from 2020. The available information in the EU-SILC dataset is often aggregated, which hampers the comprehensive reconstruction of the respective social protection programs. Additionally, crucial information necessary for a thorough analysis of these programs is frequently absent from the EU-SILC 2020 dataset. This observation aligns with the findings of previous research conducted by Militaru et al. (2022), who also emphasize the limited scope for simulating tax and social benefits in Romania.

A crucial aspect to contemplate when considering the implementation of new measures is the level of government support likely to be garnered when modifying existing protection schemes related to energy poverty. As per recent estimates from a rapid survey conducted by the World Bank in July 2023, over half of the population perceived the price caps implemented in response to the energy crisis the previous summer as inadequate. Only a minimal fraction of the population, specifically 4.3 percent, expressed the opinion that the response was too generous. These figures underscore the significance of a clear communication strategy and transparent dissemination of information regarding the benefits and costs associated with policy interventions aimed at safeguarding the energy poor within the country.

Regarding the modality, cash and in-kind transfers have different advantages that make each suitable for specific contexts. A careful analysis of the delivery systems for energy compensatory transfers is important for Romania. Cash transfers typically have lower administrative costs and give recipients greater freedom over their consumption, providing flexibility in expenditures and alleviating credit constraints. If properly indexed, they can help mitigate the impact of overall increases in prices that may result due to higher energy prices. In-kind transfers ensure that aid is used for its intended purpose and can help mitigate the impact of energy inflation when the real value of cash transfers diminishes (when not properly indexed). Some countries have opted for cash and others for in-kind electricity subsidies to protect energy poor households. France, for instance, has established a system of vouchers in place to help households pay their energy bills or to cover energy renovations. Evidence of different modalities of cash transfers in the context of energy subsidy reform shows a wide range of policy responses. Ukraine initially increased the scope and generosity of its financial assistance programs. Subsequently, it changed the way benefits were distributed, shifting from providing budgetary transfers to utility companies to directly compensating households. The Dominican Republic's experience offers valuable insights into coordinating and integrating compensatory cash transfers with existing programs, particularly conditional cash transfers like those in the Programa Solidaridad. Brazil, Malaysia, Morocco, and Tunisia have implemented similar approaches with different levels of coverage. These delivery systems manage the entire process, from identifying beneficiaries to onboarding and making payments (Mukherjee et al, 2023).

It is critical to accompany these income support measures, which are more short-term, with some medium-term energy efficiency measures. Income support measures are designed to offer quick relief and address urgent needs, such as paying bills and maintaining daily living standards. However, these are temporary solutions. To achieve lasting improvements, it is necessary to also invest in energy efficiency measures that will have a medium-term impact, as these measures can strengthen the resilience of households against future energy price shocks.

Strengthening energy-efficiency initiatives with insights from behavioral science

Households in Romania face energy inefficiencies (especially in the heating space) that could be addressed effectively with more and better upgrade-support programs that focus on sustainable transitions. As highlighted above, most of the policy focus in Romania is on short-term price or income-support measures. Sustainable energy transitions require more medium-term approaches that support shifts in technologies (for example, heating technology and structural and insulation investments in homes as well as energy efficient appliances), fuels, and use practices, especially for energy-poor households who might not be income poor. Existing renovation programs target mostly urban areas and multifamily buildings, meaning that a large concentration of energy-poor households in rural areas and residing in single-family homes does not benefit from these programs. Medium-term energy-efficiency solutions are aligned with the EC's SCF, which aims to support vulnerable households through an improvement in the environmental and energy-efficiency performance of buildings, including the replacement of fossil-fuel heating installations with renewable ones.[53]

As discussed in chapter 3, only a small share of the population makes use of energy-efficient heating systems, and only half of this group can control the temperature at home, which leaves substantial room for improvement in supporting of sustainable heating transitions. Based on survey estimates from 2023, only 1 out of 10 Romanians indicated that they used a high-efficiency stove or heating system (figure 66) and only 2 out of 10 Romanians could be classified as using modern heating devices. Critically, half of Romanians rely on traditional/conventional heating systems. Another sign of improvements needed in energy efficiency in Romania is the fact that only half of

53 See https://www.consilium.europa.eu/en/infographics/fit-for-55-social-climate-fund/ and https://www.europarl.europa.eu/RegData/etudes/ATAG/2023/753971/EPRS_ATA(2023)753971_EN.pdf

households could control the temperature in their home (figure 67). Among the 80 percent of Romanians living in households with traditional heating technologies, only 10 percent would be willing to upgrade their heating system and 8 percent would be willing to install or upgrade insulation in their home (and fewer than one-third of these people would do so within one year).

Figure 66 Main Heating Source, 2023 (%)

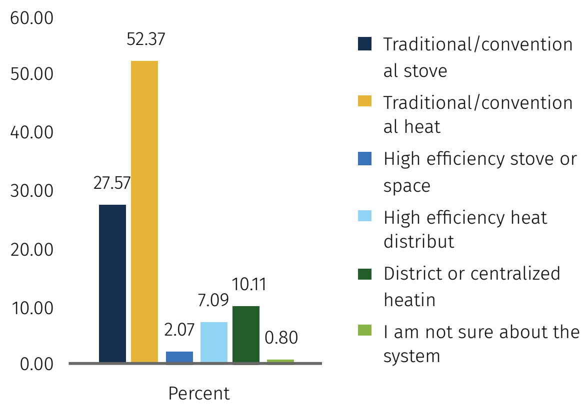
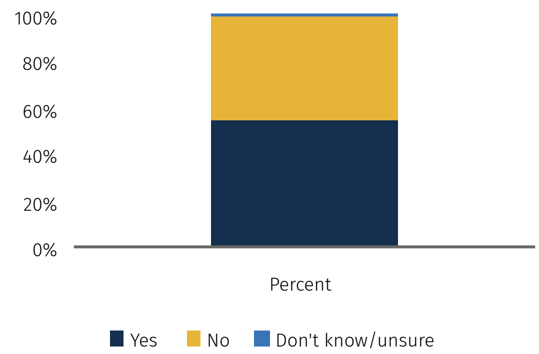


Figure 67 Share of Population Able to Control Temperature in Home, 2023 (%)



Source: Estimates based on World Bank household survey, July 2023.

Energy efficiency initiatives should expand upon the existing grant scheme for energy efficiency and resilience in multifamily residential buildings by focusing on energy efficient investments in both multiapartment buildings and single-family homes. Such initiatives should support investments in both structural improvements (building envelope) among the households with the lowest incomes as well as heating and cooling systems, fuels (especially heat source), insulation, and A+, A++, and A+++ rated appliances.[54] These initiatives should focus not only on the upgrading of appliances but on the diversification of energy sources, such as renewables rollout. Successful subsidy programs have been designed in similar contexts, providing benefits that reflect the demands of different income groups. For example, the Clean Air Priority Program (CAPP) in Poland (a program that has received financial and technical assistance from the World Bank) is a national subsidy scheme that supports property renovations and heat source replacements (including thermal retrofitting) in single-family homes in an effort to reduce energy consumption and reduce air pollution[55]. In Romania, the ElectricUp program Initiated by the Romanian Ministry of Economy, Energy and Business Environment offers support to micro, small and medium-sized enterprises for the installation of photovoltaic panels and energy storage systems. Similar programs should be developed with a focus on energy-poor and rural areas with a high density of vulnerable communities.

Subsidy programs in Romania should learn from successful examples elsewhere in Europe, including by considering the distributional implications of support levels and willingness to accept certain subsidy amounts. Three out of four Romanians would find switching to a cleaner, more energy-efficient fuel or power source to be financially difficult, and less than half of respondents agreed that they had enough saved up to cover large unexpected expenses. With this in mind, it is likely that most households will need part of the upfront costs of these upgrades covered, though how much will depend upon a variety of factors. Similar to the income measures discussed above, subsidy levels should vary by level of income, with income- and energy-poor households receiving the largest subsidy amount and non-income-poor and non-energy-poor households the lowest. New fieldwork could be conducted to understand the willingness to

54 For details on the EU Energy ratings, see https://commission.europa.eu/energy-climate-change-environment/standards-tools-and-labels/products-labelling-rules-and-requirements/energy-label-and-ecodesign/about_en.

55 https://commission.europa.eu/projects/update-clean-air-priority-programme_en.

accept certain subsidy levels by income and socioeconomic and sociodemographic groups. A study conducted by the World Bank in four Western Balkan countries[56] found that willingness to accept hypothetical subsidy amounts to support sustainable heating upgrades was significantly correlated with income and education: for example, wealthier and more-educated respondents were significantly more likely than poorer and less-educated respondents to accept a subsidy of 30 percent of the total cost (30 percent subsidy was the baseline level, which increased in 10 percentage-point increments to a maximum of 70 percent).

Financial support alone, however, will not guarantee that these sustainable transitions happen through support programs; such programs must consider other factors that influence decisions to invest in energy efficiency upgrades. While the financial barriers (in particular, real or perceived affordability concerns that influence intentions to change behaviors) are important, these are complemented by information barriers and barriers related to beliefs, attitudes, ideas, and perceptions that encompass the cognitive, psychological, and social factors that influence decision-making.[57] The survey of Romanians identified low awareness around support programs (nearly half of Romanians were unaware of support programs) and beliefs and attitudes regarding energy efficiency upgrades that serve to dissuade people from making investments and participating in public support programs (including sentiments of exclusion, as captured in the qualitative fieldwork). Intentions to upgrade appeared to be most highly correlated with awareness of subsidy programs and fuel flexibility (for both heating technology and insulation upgrades) and expected increases in property value from heating technology upgrades. Addressing these factors represents low hanging fruit with regard to motivating sustainable heating transitions and any support program should consider these.

Finally, targeted allocation of EU grant funds specifically for renovating the housing stock of energy-poor individuals is important. If EU (nonreimbursable) funds are extensively used for renovating and investing in households of non-energy-poor individuals, it may deplete the funds available to energy-poor households in the future. This could result in a limited pool of resources for energy-poor households, hindering their ability to receive grants for renovations. This, together with the existing barriers faced by energy-poor individuals in accessing current renovation programs may further diminish their future capacity to renovate their homes and transition out of energy poverty. To address this, better-targeted allocation of EU funds in these programs combined with the mobilization of private financing for non-energy-poor households is recommended.

Behaviorally informed solutions to support sustainable energy and heating transitions

Subsidy programs supporting energy efficiency—and in particular, sustainable heating upgrades—should address the barriers and enablers uncovered in the diagnostic activity in those programs' design and implementation. While most beliefs and attitudes about energy efficiency and sustainable heating appear to suggest that a favorable environment exists to some extent—for example, the share of the respondnts who saw the benefits of upgrades in terms of climate change and environmental impact (including local air quality), health, and convenience was greater than 50 percent—there is still substantial room for improvement. Subsidy programs need to raise awareness about the programs as well as the benefits of these investments while dispelling the perception of barriers such as inconvenience factors involved in the process (purchase, installation, correct use initially and over the long term) of adopting a new technology into the home.

Subsidy program design and implementation should consider the beneficiary journey to support the various decisions and actions that take place at the various stages of program engagement. The decision to invest in energy efficient technologies and behaviors is a dynamic one, especially when the decision is dependent upon external support and influence. As was identified in the context of the CAPP in Poland,[58] beneficiaries must embark on a journey in participating and benefiting from support programs. There is a decision stage (during which they recognize the need or desire to upgrade, inform themselves about upgrades and support programs, and ultimately decide to

56 "Behavioral Diagnostic of Sustainable Heating Transitions in the Western Balkans: Evidence from Bosnia & Herzegovina, Kosovo, North Macedonia, and Serbia" (World Bank 2022). Internal report.

57 For a discussion of how these factors were incorporated into the CAPP in Poland, see https://blogs.worldbank.org/climatechange/clean-air-and-heating-choices-how-change-homeowners-behavior-poland.

58 https://blogs.worldbank.org/climatechange/clean-air-and-heating-choices-how-change-homeowners-behavior-poland.

move forward), an application stage (during which either subsidy or loan applications or both are initiated, forms are completed, and financing is secured), and an installation stage (during which beneficiaries wait for approval, commence a project, and learn how to operate new technology, which includes the sustained use of the technology). Each of these stages must be completed before a household benefits from upgrades (or does so in the long term), and understanding the different pressure points in each will help optimize program design and implementation.

Subsidy programs should have embedded solutions that target identified bottlenecks at each stage of the beneficiary journey and be evaluated where possible to understand those bottlenecks' impacts on attitudes and behaviors. The design and implementation of subsidy programs must be centered around solutions to alleviate identified bottlenecks in the process of behavioral change. Where possible, these solutions should include robust evaluation methodologies (for example, experimental design) to identify the causal impact of specific strategies on household attitudes and behaviors. Such an approach will identify both the most effective strategies to improve take-up and for whom these strategies are most relevant (for example, urban vs. rural households or older vs. younger audiences). An evidence-based approach also helps programs be responsive to changes in attitudes over time and improve features of program design and implementation as programs are scaled up. Below is a list of potential actions that should be considered to facilitate sustainable-energy transitions (particularly related to heating) by means of energy-efficiency subsidy programs.

1. *Initiate holistic engagement strategies to elevate the importance and urgency of sustainable energy transitions.* Holistic engagement strategies in the context of subsidy programs serve to promote positive beliefs and attitudes around sustainable transitions and thus target behaviors. Engagement can take the form of mass communication campaigns that raise awareness about the costs of traditional energy-use practices (for example, heating practices) and the benefits of modern ones (for example, the consequences of heating practices on indoor and local air quality) and dispel perceptions of the inconvenience of sustainable upgrades. An important aspect of engagement strategies is to manage the amount of information being communicated to the population. Planning the timing of the campaigns and avoiding saturation and cognitive overload of the citizens is key for wide take-up of the message.
2. *Use nontraditional messengers to raise awareness of and motivate participation in subsidy programs.* Low institutional trust can complicate engagement strategies highlighting the importance of energy efficient investments as well as participation in public programs. As discussed in chapter 4, the level of trust in information from government officials about sustainable heating upgrades was substantially lower than the level of trust in information from technicians and social networks, and a high share of those surveyed did not even trust the main messenger in this type of investment. Engagement strategies should enlist trusted nontraditional messengers (for example, independent technicians, installers, and builders) to inform potential beneficiaries and change the narrative around sustainable energy use. Testing a variety of messengers of information about energy efficiency and subsidy programs will help identify those who are the most effective for particular audiences.
3. *Harness social influence in investment decisions.* While social influence seems to be less of an enabler in the Romanian context (less than 40 percent of Romanians stated they would be more willing to upgrade if others did the same), those with intentions to upgrade (willing to upgrade or had already upgraded) were significantly more likely to undertake upgrades when social influence was present. As such, any programs seeking to motivate investments in energy efficient technologies should consider the importance of communicating about rising trends in energy use modernization as well as harness established role models to promote sustainable energy behaviors. Role models can be used as messengers or early adopters can be recognized socially to change the narrative around energy efficient investments. Especially when there is a lack of role models or success stories, which can lead to the perception of participation as being risky, elevating the positive experience of early adopters and early beneficiaries can have a meaningful impact of participation.
4. *Improve the framing of the costs and benefits of investment.* Engagement with potential beneficiaries throughout the decision-making journey should focus on improving the framing of the financial costs and ben-

efits of energy efficient investment to address financial and affordability concerns. Perceptions of long payback periods (uncovered in the qualitative fieldwork) can be addressed by providing concrete information on upfront costs, variable costs (in terms of maintenance and fuel), and energy savings scenarios based on the combination with insulation and other energy-saving practices (for example, solar panels and investment in A-rated appliances). Communications should underscore the rise in energy prices in the country and region and how energy efficiency can mitigate this trend, as well as encourage potential beneficiaries to be more future oriented in their approach to energy efficiency in general and heating in particular.

5. *Remove pressure points in the application process itself.* Qualitative fieldwork uncovered challenges faced by households in terms of the process of applying to programs offering support for energy efficiency upgrades. Application processes should be simplified where possible and offered in both online and in-person or paper formats for less-digitally-connected groups to reduce expected friction. Engagement should also promote inclusion by increasing transparency in the selection of beneficiaries as well as the eligibility criteria to confront the sentiments of exclusion highlighted in the focus group discussions.

6. *Consider the "sustained use" phase of the journey from the outset, especially with regard to communicating the costs and benefits of upgrading.* Installation alone does not guarantee that the new behaviors will continue in the long run, particularly if there are unexpected costs or maintenance responsibilities with new technologies (per the expression in the survey responses of potential beneficiaries' concerns about the reliability and upkeep of modern heating systems and solar panels). Communication as to the costs and benefits of upgrades (highlighted above) should highlight warranties or guarantees available with the new technology if these are available, because these can serve to increase trust in sustainable and clean energy technologies.

Chapter 6
Conclusions and Policy Implications

In Romania, a significant portion of households grapple with energy poverty, lacking essential features for daily life, such as adequate warmth, cooling, lighting and energy. Around 25 percent of the population experienced energy poverty in 2021, due to having to allocate 8.7 percent of their expenses to energy. The urgency to address this crisis is heightened in light of the energy crisis in the wake of Russia's invasion of Ukraine, which is causing notable financial stress for households and impacting well-being negatively overall.

The pressing issue of energy poverty is a critical concern for European policy makers, especially amid the current energy crisis. Steep increases in natural gas and electricity prices are further exacerbating the financial strain on households. This crisis is particularly acute, given its linkage to income poverty and its adverse effects on health, education, and the environment. Prioritizing energy poverty in policy agendas can enhance well-being, environmental sustainability, and economic resilience.

Examining energy spending patterns reveals that connectivity and energy source availability significantly impact household expenses. Limited access to energy due to infrastructure or high costs can lead to seemingly low energy spending shares, highlighting another form of energy vulnerability—low access. Analyzing household connectivity to different energy sources, we find nearly universal access to electricity or renewable energy in 2021, so that lack of connectivity can be dismissed as a driving factor. However, variations emerge concerning natural gas coverage, influenced by household preferences rather than accessibility. Additionally, wood proves a vital heating and cooking source, particularly in rural areas, shedding light on the nuanced energy dynamics and confounding factors affecting spending patterns.

Our estimates indicate that approximately a quarter of Romania's population faced energy poverty in 2021, spending an average of 8.7 percent of their household budget on energy. The overlap of energy and monetary poverty reveals that 7–15 percent of households were energy poor but not income poor, emphasizing the distinction between the two forms of poverty. This has significant policy implications, because it highlights the need for targeted energy policies such as subsidies for energy-efficient technologies, especially for low-income households. Moreover, enhancing energy infrastructure in low-income areas is crucial to ensure reliable and affordable energy access. The data underscore the vulnerability of low-income groups to energy price hikes, underscoring the need to mitigate the disproportionate impact on their household budgets.

We found that energy expenditure shares are influenced by the technologies used for heating and cooking and income levels; single-elderly households are particularly vulnerable. However, a more comprehensive study that considers factors such as connectivity, preferences, technology efficiency, and associated costs is needed to grasp this relationship fully. Certain household types, such as those of the single elderly, of pensioners, and those with unemployed members or a female head, tend to have higher energy spending shares. Policy makers should prioritize these households when it comes to energy poverty interventions.

The impact of rising energy prices is particularly pronounced for households already exposed to energy poverty. As energy prices increase, so does these vulnerable groups' risk of falling into poverty. This situation has significant welfare and equity implications, as it can exacerbate inequalities between different socioeconomic groups and further marginalize the most vulnerable. Mitigating the effects of rising energy prices in both the short and long terms is crucial to ensure that energy poverty is manageable for those struggling to make ends meet. Effective policy measures that address price increases can help protect the well-being of energy-poor households and promote the more equitable distribution of resources.

Addressing energy poverty requires a thorough understanding of its diverse drivers, which encompass household sociodemographics, energy technologies, and geographical location. We found that energy expenditure shares are influenced by the technologies used for heating and cooking and income levels; single-elderly households are particularly vulnerable. However, a more comprehensive study that considers factors such as connectivity, preferences, technology efficiency, and associated costs is needed to grasp this relationship fully. The focus must extend to the non-financial determinants of behaviors that sustain energy poverty, specifically the choice and use of energy-intensive technologies. Non-financial determinants include attitudinal and belief systems, social norms, intention to action gaps and cognitive biases that act as barriers to choosing and using energy efficient options. Integrating insights from behavioral science into the sustainable energy transition framework provides a holistic perspective on the barriers to and facilitators of behavior change, bridging the gap between energy poverty conditions and the attitudes and behaviors perpetuating them. This approach offers the nuanced insights crucial for policy development.

Drawing from the comprehensive empirical analysis presented in this report, we have identified a range of valuable policy insights. Building upon these findings, we propose a set of thoughtful policy recommendations aimed at effectively addressing and mitigating energy poverty within Romanian households. These recommendations are designed to offer pragmatic solutions and guide policy makers in formulating strategies prioritizing the welfare and well-being of vulnerable households grappling with energy poverty.

The behavioral approach adds value to traditional diagnostics by providing a user-centric understanding of policy challenges in residential sustainable energy transitions. Standard development policies typically target financial resources, incentives, laws, or information provision, while a behavioral approach explores mindsets, decision-making frames, and social environments. This holistic understanding sheds light on decision-making processes, crucial for effecting behavior change in specific policy contexts. Residential sustainable energy transitions involve upgrading behaviors and technologies for clean and efficient energy use. Thus there is a pronounced need for policies and programs addresing both behaviors and attitudes.

First, special attention should be directed toward single-elderly households, because they face increased vulnerability to rising energy costs and energy poverty. Given this demographic group's higher rates of energy poverty and larger shares of energy expenditure, policy makers must focus on them when formulating measures to tackle energy poverty effectively. Previous studies have shown that single-elderly households are more susceptible to health risks related to extreme temperatures, making implementing policies that address their specific needs and circumstances imperative. In Romania, single-elderly households also report inadequate housing conditions and are at a higher risk of poverty. Additionally, differences in the technologies they use for cooking and heating further contribute to their vulnerability. By recognizing and prioritizing single-elderly households' challenges, policy makers can implement targeted solutions, such as financial assistance programs or tailored energy-saving initiatives, to alleviate their energy-related hardships.

Second, the report's findings also highlight a worrisome aspect concerning pensioners. While coverage rates of social programs among energy-poor target populations are similar or even higher compared to the coverage of the total population, they lag when it comes to pensions. This is alarming because pensioners are particularly susceptible to monetary and energy poverty. The impact of price increases can be particularly harsh for this group, leading to higher AROP rates. To tackle energy poverty effectively, it is essential to consider targeted strategies focusing on pensioners, especially those in single-person households and at risk of poverty. By implementing measures that specifically cater to their needs, policy makers can create more-effective and efficient solutions to address energy poverty among this vulnerable segment of society. Finally, an easy way to mitigate the rising energy costs faced by pensioners would be the implementation of a top-up transfer.

Third, it is evident that energy-inefficient housing disproportionately affects low-income households. To alleviate this burden, we recommend prioritizing renovation programs that target energy-efficient housing to benefit the poor. Such initiatives align with the goals of the European Green Deal and can significantly improve the living conditions of vulnerable communities by reducing energy leakages and the associated expenses.

Addressing energy poverty requires a multifaceted approach that considers the unique challenges of different socioeconomic groups. One key aspect to bear in mind is that poorer households might need to be made more aware of environmental problems. Therefore, implementing interventions that involve the education of these households about pollution, grime, and other environmental issues could be beneficial. Such education would not only raise environmental consciousness; it also has the potential to spark energy-efficient behavioral patterns. By empowering these households with knowledge, they can become active participants in sustainable practices, contributing to the broader effort to combat energy poverty and promote environmental stewardship.

Even in a context of limited fiscal resources, efficient targeting of policy interventions aimed at mitigating price increases through income-support measures can significantly impact poverty reduction. Policy makers can enhance the effectiveness of their efforts to reduce energy poverty by tailoring interventions to meet the needs of different vulnerable groups, thereby optimizing the allocation of resources and achieving more-significant outcomes. Among the targeted strategies, focusing on single-elderly households or pensioners at risk of poverty emerges as notably practical and feasible, given their relatively straightforward identification and vulnerability to energy poverty. However, policy makers must carefully balance cost efficiency with equity considerations, such as intergenerational concerns and fiscal sustainability. While cost savings are essential, it is equally crucial to ensure that vulnerable populations are adequately supported and that the long-term implications of policy measures are sustainable and equitable.

Clear communication is vital to garnering support for new policy interventions targeting energy-poor households. Providing the Romanian population with a transparent understanding of the benefits and costs of such interventions is essential to secure public backing. When people comprehend the potential positive impacts on their lives and the broader society, they are more likely to embrace and actively participate in these initiatives. Effective communication strategies can foster a sense of collective responsibility and engagement, encouraging a unified effort to combat energy poverty and promote a more sustainable future for all.

Finally, multisector approaches are essential for measuring and addressing energy poverty due to its complex and multidimensional nature. Tackling energy poverty requires the involvement of various sectors, including energy, transport, infrastructure, and social sectors such as social protection, health, and education. It also necessitates interconnected strategies at multiple geographic levels, from EU-wide policies and comparisons to local-level monitoring. Tackling energy poverty requires a mix of public policies, including energy, social, and housing policies. Consequently, a wide range of stakeholders must be involved in measuring, defining, and monitoring energy poverty. Implementing energy poverty measures should be a collaborative effort among different ministries, academic institutions, and local communities.

Some knowledge gaps are worth emphasizing for future studies, particularly on the usage of wood and its influence on energy expenditure and energy poverty measures. This study could provide valuable insights into the complex interplay between energy usage, energy prices, and energy accessibility and their relationship to illegal logging and climate change. By understanding these dynamics, policy makers can devise more-targeted and practical strategies to combat energy poverty and promote sustainable energy practices.

The policy recommendations outlined in this report provide a foundation for addressing energy poverty and promoting sustainable energy practices. By conducting further research on wood usage, prioritizing energy-efficient housing renovations for low-income households, and targeting support for single-elderly households, policy makers can make significant strides toward creating a more equitable and energy-conscious society. In addition, by educating poorer households about environmental issues, addressing the impact of rising energy prices on vulnerable populations, targeting pensioners with specific policy measures, and effectively communicating the benefits of interventions, Romania can take significant strides in alleviating energy poverty. These measures are vital to achieving long-term energy security, improving the well-being of energy-poor households, and mitigating the adverse effects of energy poverty on vulnerable communities, ultimately contributing to a more sustainable and equitable society.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Annex 1
Data

Household Budget Survey

For this study, we rely on the Household Budget Surveys (HBS). The household budget survey is a national survey measuring households' expenditure on goods and services. The survey also provides information on income and some demographic and socioeconomic characteristics. EU Member States implement these surveys independently, which has resulted in limited comparability across countries in the European Union. The survey is conducted based on a gentlemen's agreement, with frequency, timing, content, or structure varying by country. We use scientific use files, which consist of variables about the household as well as about the household members. We use information published on the 2016 HBS by the International Household Survey Network (IHSN) to label the data.[1]

The HBS follows concepts that differ from traditional household surveys. The unit of analysis is the household, which in this case is a social unit living in the same dwelling and sharing expenditure with each other. Moreover, the surveys follow the concept of the so-called household's reference person, who is the person most representative of the respective household. Additionally, in the case of Romania, households are asked to maintain detailed diaries on expenditure for a reference period of one month.[2] The income period is also gathered for the reference month.

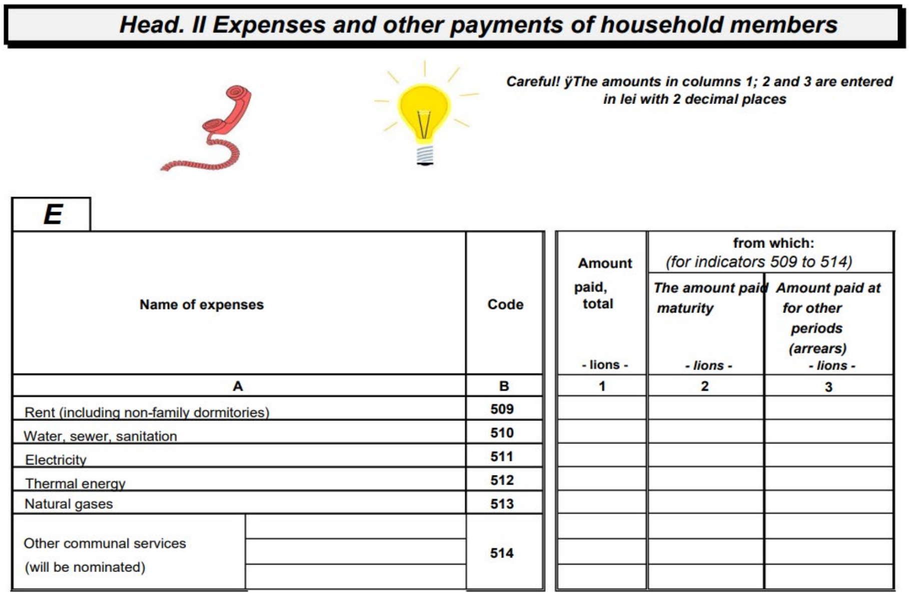
Importantly, variables from the EU-SILC and the HBS are only partly comparable. The lack of comparability mainly lies in the different purposes of the surveys. The EU-SILC is the main source for income and poverty measurement in the EU, while the HBS focuses on expenditure. Consequently, income categories in the HBS might be less complete and refer to different reference periods. In particular, income, which is subject to seasonality, might not be captured well in the HBS.

We rely on information gathered under the housing category of the survey to measure expenditure for energy. The housing category includes information on water, electricity, gas, and other fuels. Below, we depict the part of the questionnaire that gathers information on these indicators.

1 https://catalog.ihsn.org/catalog/7357/data-dictionary/F109?file_name=sve

2 https://ec.europa.eu/eurostat/documents/54431/1966394/HBS_EU_QualityReport_2015.pdf/72d7e310-c415-7806-93cc-e3bc7a49b596.

Figure A.1.1 Household Budget Survey Questionnaire for Romania



Head. II Expenses and other payments of household members

Careful! ÿThe amounts in columns 1; 2 and 3 are entered in lei with 2 decimal places

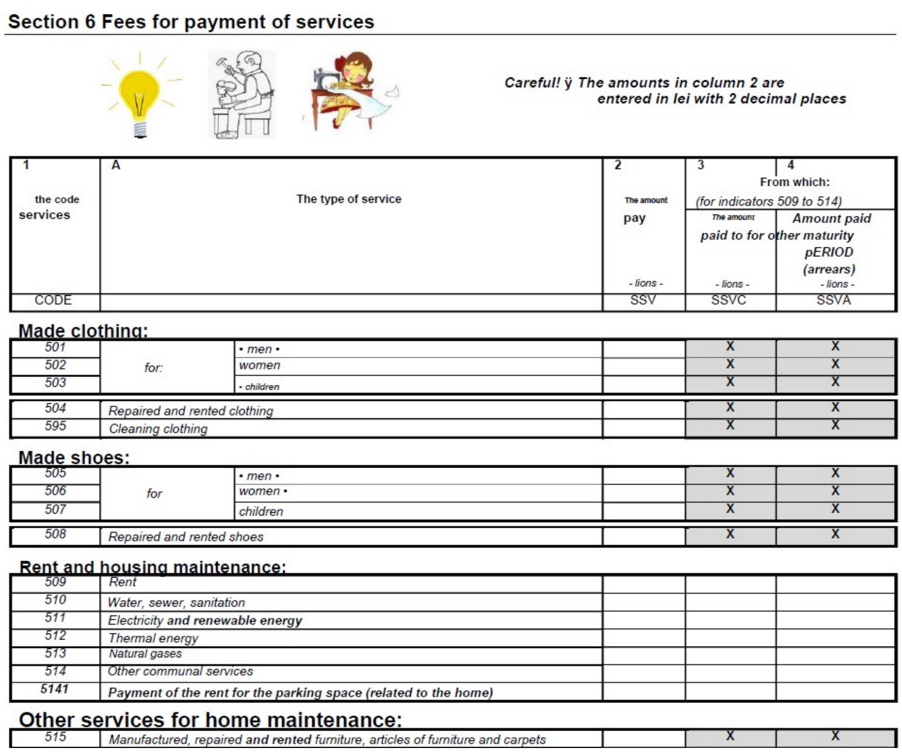
E

Name of expenses		Code	Amount paid, total - lions -	from which: (for indicators 509 to 514) The amount paid maturity - lions -	Amount paid at for other periods (arrears) - lions -
A		B	1	2	3
Rent (including non-family dormitories)		509			
Water, sewer, sanitation		510			
Electricity		511			
Thermal energy		512			
Natural gases		513			
Other communal services (will be nominated)		514			

Source: 2022 HBS Questionnaire for Romania.

Information on the payment of services forms part of Section 6 of the questionnaire within the category of "rent and housing maintenance." The HBS collects data on several types of energy expenditures:

Figure A.1.2 Household Budget Survey Questionnaire for Romania



Section 6 Fees for payment of services

Careful! ÿ The amounts in column 2 are entered in lei with 2 decimal places

1 the code services	A The type of service		2 The amount pay - lions -	3 From which: (for indicators 509 to 514) The amount paid to for maturity - lions -	4 Amount paid other pERIOD (arrears) - lions -
CODE			SSV	SSVC	SSVA
Made clothing:					
501	for:	• men •		X	X
502		women		X	X
503		• children		X	X
504	Repaired and rented clothing			X	X
595	Cleaning clothing			X	X
Made shoes:					
505	for	• men •		X	X
506		women •		X	X
507		children		X	X
508	Repaired and rented shoes			X	X
Rent and housing maintenance:					
509	Rent				
510	Water, sewer, sanitation				
511	Electricity and renewable energy				
512	Thermal energy				
513	Natural gases				
514	Other communal services				
5141	Payment of the rent for the parking space (related to the home)				
Other services for home maintenance:					
515	Manufactured, repaired and rented furniture, articles of furniture and carpets			X	X

Source: 2021 HBS Questionnaire for Romania.

European Union Statistics on Income and Living Conditions (EU-SILC)

We rely on data gathered as part of the EU-SILC survey, which collects information on income and living conditions of the full population (above the age of 16) of all Member States in the EU. The information gathered can be divided into four broad areas: information, income, social exclusion, and housing. The survey collects information at the individual level, such as each individual's demographic information, education, labor information, health, and income. The survey is conducted annually and was launched in 2004 in 13 Member States and was extended to all Member States from 2005 onward (GESIS 2022). The data are collected by national statistical institutes, and has a cross-sectional and a longitudinal component. Some countries combine administrative and register data. There are two different registers: a household register and a personal register.

Importantly, the data on income refer to the year preceding the date of the survey. The survey's income measure follows international standards. The income reference year is a 12-month period, which, depending on the country, might be a fixed 12-month period (such as the previous calendar or tax year) or a moving 12-month period (such as the 12 months preceding the interview).[3]

The EU-SILC also contains detailed information on social protection benefits in Romania. The following social protection schemes form part of the EU-SILC:

- Employers social insurance contribution
- Optional employer social insurance contributions
- Contributions to individual private pension plans
- Unemployment benefits (noncontributory and non-means-tested)
- Pension from individual private plans (gross)
- Unemployment benefits (gross)
- Old-age benefits (gross)
- Survivor benefits (gross)
- Sickness benefits (gross)
- Disability benefits (gross)
- Education-related allowances (gross)
- Unemployment benefits (contributory and means-tested)
- Unemployment benefits (contributory and non-means-tested)
- Unemployment benefits (noncontributory and means-tested)
- Unemployment benefits (noncontributory and non-means-tested)
- Old-age benefits (contributory and means-tested)
- Old-age benefits (contributory and non-means-tested)
- Old-age benefits (noncontributory and means-tested)
- Old-age benefits (noncontributory and non-means-tested)
- Survivor benefits (contributory and means-tested)
- Survivor benefits (contributory and non-means-tested)
- Survivor benefits (noncontributory and means-tested)
- Survivor benefits (noncontributory and non-means-tested)
- Sickness benefits (contributory and means-tested)
- Sickness benefits (contributory and non-means-tested)
- Sickness benefits (noncontributory and means-tested)
- Sickness benefits (noncontributory and non-means-tested)
- Disability benefits (contributory and means-tested)
- Disability benefits (contributory and non-means-tested)
- Disability benefits (noncontributory and means-tested)
- Disability benefits (noncontributory and non-means-tested)
- Education-related allowances (contributory and means-tested)
- Education-related allowances (contributory and non-means-tested)
- Education-related allowances (noncontributory and means-tested)
- Education-related allowances (noncontributory and non-means-tested)

3 https://ec.europa.eu/eurostat/documents/203647/203704/DOC65.pdf/434b2180-33b3-0d8c-ed1e-2da912d6a685?t=1655461990699.

World Bank Rapid Household Surveys

The World Bank developed a high-frequency monitoring system to monitor the impact of COVID-19 on people's well-being in four EU countries (Romania, Bulgaria, Poland, and Croatia) in collaboration with survey firms in the region. Nine survey rounds were designed and implemented in Romania between 2020 and 2022. In 2023, the World Bank conducted another survey round to assess the impact of Russia's invasion of Ukraine and supply chain disruptions on households' energy affordability and vulnerability. This quantitative household survey was conducted in June and July 2023 using high-frequency computer assisted telephone interviews (CATI) and covered 1,500 households, aiming to monitor the effects of the crisis on energy affordability and vulnerability. The questionnaire was designed to be comparable with the other rapid surveys conducted in the region to allow for cross-country comparisons. The sample used is representative at the national, urban, and rural levels and the survey weights were based on the 2021 Population Census.

Qualitative Data Collection

Qualitative data collection taking the form of focus group discussions (FGDs) and select in-depth interviews (IDIs) with focus group discussion participants was conducted in July 2023 and included homeowners living in both single-family homes and multiapartment buildings. A total of 64 individuals participated in the qualitative fieldwork (7 focus group discussions were conducted in total, 1 with a Roma community) across 7 locations in the counties of Mehedinți (the historical region of Oltenia) and Vrancea (the historical region of Moldova).

The objective of the qualitative fieldwork was to complement the quantitative survey by exploring themes surrounding sustainable energy transitions more deeply as well as capturing the views of harder-to-reach populations. The approach, as a result, was to focus qualitative fieldwork mainly in rural areas and on those with lower socioeconomic status (lower levels of income and higher social marginalization). A separate FGD was carried out with Roma communities in one of the selected municipalities in light of the increased marginalization of this group.

FGDs comprised 10–15 participants per discussion and aimed to balance gender (male/female) and age (under 45, 45, and older) dimensions of participants. Participants in the FGDs were selected primarily based their use of traditional heating technologies (for example, inefficient coal or wood boilers or stoves) or being connected to district heating in poorly insulated buildings. The FGDs and IDIs centered around five key themes: attitudes toward sustainable heating practices (and knowledge of energy efficiency measures), the current status of heating and energy efficiency in the home, knowledge of subsidy and support programs to improve sustainable heating practices and energy efficiency, preferred channels of information about government support programs, and intentions to upgrade heating technologies or practices.

Qualitative discussion guide

GROUP DISCUSSIONS GUIDE – HOMEOWNERS IN ROMANIA

Qualitative fieldwork

Focus group discussions

A. Introduction and warmup

10 min

- Hello and welcome . . . My name is [name of facilitator], and today I will spend some time with you. Today I want to talk to you about how you heat your homes and use different energy sources more generally, how much money you spend on heating/electricity, how satisfied you are with the warmth of your home and what you plan to do about it in the future.
- We are here to hear your attitudes, so I invite you to openly and honestly exchange thoughts and ideas, respecting different views. There are no right or wrong answers; everything you have to tell us is equally important to us, I would ask you to speak one by one so that we can listen to each other and possibly comment or add something . . .
- The information obtained in this way is anonymous and confidential. I will ask you to allow me to record our conversation, because that is the only way for me to remember everything we talk about, which is very important to me. We will use the recording exclusively internally, for our analysis and drawing conclusions.

- Please fill in the questionnaire with general questions before we start the conversation, to save time for the discussion (5 minutes, we will help if anyone needs it).

B. Basic information on participants and their heating practices

Gender [Potentially to be provided directly by surveying company]

1. Male
2. Female
3. Other/prefer not to say

Home location [Potentially to be provided directly by surveying company]

1. Urban area
2. Rural area

Age

1. Under 25 years
2. From 25 to 35 years
3. From 36 to 45 years
4. from 46 to 55 years
5. from 56 to 60 years
6. above 60 years

Education

1. Completed primary school
2. Completed secondary school
3. Completed college
4. Completed university degree

Are you?

1. Employed in a public company
2. Employed in a private company—small, medium or large
3. Self-employed
4. Unemployed
5. Retired with disability
6. Retired due to age

Do you live in . . . ?

1. Separate house
2. Flat or apartment
3. Other

Is it just your family or more families living in your house/apartment?

1. Just my family
2. More families

Are you the sole owner of the house/apartment or co-owner?

1. I am the sole owner of the house/apartment
2. I am a co-owner of the house/apartment
3. I am not the owner of the house/apartment

What is the field area of the house/apartment where you live? It is ______ m2
What are the main construction materials used for building your house/apartment?

1. Brick and block
2. Concrete
3. Wood
4. Prefabricated materials
5. Plywood
6. Other. What?__________________________________

When was the house/apartment built? Enter the year or age of the house/apartment _______?

When (if at all) to your knowledge was your home last renovated (e.g., major improvements to structure of home like walls, roofs, etc.)? Enter the number of years since last renovation_______?

How many rooms does the house/apartment have? Enter number of rooms______?

Do you heat your home with . . . ?

1. Room stove
2. Centralized boiler in your home (heat from an individually controlled boiler connected to radiators throughout home)
3. Centralized boiler in your building (heat from a building controlled boiler connected to radiators in every unit of the building)
4. Electric heaters (oil radiators, heaters, etc.)
5. District heating (city/public heating system)
6. Some other way. What?________________________

What type of fuel do you *primarily* use to heat your home? (mark all that apply)

1. Wood
2. Coal
3. Pellet
4. Electricity
5. Natural or LPG gas
6. Oil and oil derivatives
7. Other solid fuels (e.g., trash, mixed paper, old tires, etc.)
8. District heating (city/public heating)

Do you ever burn anything else to supplement this fuel (for example, paper, waste, clothing, etc.)?

1. Yes
2. No

Who in your families take care of heating during the winter? Is it just you, other family members, both? Or homeowner? (prompt: who turns on heating, adds fuel and extinguishes)

1. You personally
2. Your spouse
3. Both of you decide together
4. Other relatives in the household
5. Common agreement

What about decisions regarding investing / buying heating items?

1. You personally
2. Your spouse
3. Both of you decide together
4. Other relatives in the household
5. Common agreement

How much money do you spend on heating per year? (Open answer)

How much of this is maintenance of the heating appliance and how much is the fuel? (Open answer)

How much money do you think you would spend if you insulated your house or apartment or changed the carpentry? (Open answer)

Can you control the heat generated by this stove or boiler automatically or just manually by adding more fuel?

1. It can be controlled automatically (e.g., with a thermostat)
2. It can be controlled only manually (e.g., by adding or removing fuel)

Where in the house is the boiler or stove located?

1. In one room
2. In the hallway
3. In the boiler room
4. In the garage
5. In the kitchen
6. Somewhere else. Where? ________________________

Are you heating the entire home or just some parts?

1. I heat entire home
2. I heat most parts of the home
3. I heat only some parts of the home

Do you own any other heating appliances for your house/apartment?

1. Yes
2. No

Do you have access at home to gas for heating?

1. Yes
2. No

C. DISCUSSION

Current winter-time heating practice?

How many of you changed the heating technology that was already in place in your house (when you moved in or once you began to make decisions about heating)? What did you install instead? Why?

What are the main aspects or measures you take into account regarding heating and insulation in your home. [*Note for facilitator*: ask their opinions in relation to costs, quality, technology and comfort if not mentioned]

What are your main concerns with respect to access to different fuel types/heating materials?

Based on the info you've offered, you heat your home with. . . . (In case this is different from gas or electricity) Where do you get this (wood/coal, other) from? What would you use if this source would become unavailable?

What specifically would you improve regarding the carpentry in your home if you'd have the chance?

What would you consider to be a favorable temperature in the house, and why? What are the thinking and priorities influencing how you decide to set the temperature in your house, if you can?

If you were to compare different priorities in your home (e.g. food, appliances, health and education of householders, vehicles, etc.), how does heating your home in winter and cooling it on summer compare to others?

Attitudes about modern heating systems, energy efficiency, and air quality

We would like to hear from you what you think about modern heating systems and energy efficiency in terms of maintaining the heat of your home (by energy efficiency we mean practices that focus on using less energy and preserving the value of energy used).

Thinking about what you know about modern heating systems (for example, the introduction of heat pumps, gas boilers or eco-design boilers or stoves and insulation), what are your opinions and concerns regarding these technologies? Are they worth the investment?

How would you say a modern heating technology would influence the time spent on heating up your house? And how would it affect you financially?

For those of you who have improved some aspect of heating your home (e.g. with modern boilers or stoves, or insulation), what changes have you noticed?

To your knowledge, how many people in your community have upgraded some aspects of their heating technology to more modern processes? Do you perceive a trend in your community towards this type of improvements, and why?

Based on what you know, what changes did you notice in the homes or lives of these people in your community?

Upgrade decision

During the next 12 months, what do you plan on doing regarding the heating and/or insulation in your house / apartment, If nothing/anything—what are the main reasons for this?

[If the answer is yes]: To which heat source or fuel type would you like to upgrade if you had the chance to do so?

What kind of thermal modernization are you thinking about?

What motivated you to think about these changes? Were these local smog problems, climate change? To improve thermal comfort in your home? Easier and cleaner operation of a modern heating source compared to a traditional solid fuel boiler? Recommendations from friends and family who did it (what types of recommendations)? Want to modernize your home? Increasing the value of the house? Reducing heating costs?

From whom do you get your information or ask for advice when you need to make a decision about the heating system of your home (Remind with examples if the answers are minimal: friends, family, contractors, local authorities?)?

What other sources of information have you investigated?

What would motivate you to move forward with the heating upgrade next year? What factors would make you hesitate about it (e.g., cost of heating appliance? Cost of fuel and maintenance?)?

If you're not thinking about upgrading your heating technology or insulating your building, why not?

If given the chance to partially finance a heating or insulation upgrade through a government program, would you be willing to accept such a program? Why, why not?

Knowledge and interactions with support programs

Are you aware of programs that support upgrading of heat systems to clean, energy efficient ones (modern boilers, stoves, and heat pumps) or retrofitting of homes with insulation to improve heat retention?

(If familiar with these initiatives) How did you hear about them? Was it through family/friends/neighbors? Installers, contractors or retailers? Chimney sweeps? Government officials? Did you see any communications on TV, in a newspaper/billboard/leaflet/website or hear about the initiatives on the radio? When did you hear about this? Has the communication of these initiatives changed in the past year?

(If not familiar with these initiatives) Where would you like to hear about them/ Through which communication channels would you like to be informed?

Have you looked into the details of these initiatives? Are you aware of how much financial support you could receive? Did you look into the application process? Are you considering applying to these initiatives? What are the main reasons for or against it? What are the main aspects of the application process that could be improved? How?

How much would you say you trust the government agencies responsible for providing this type of support? For example, the Ministry of Work and Social Solidarity, the county council/local authorities?

Are you aware of any loans from commercial banks that can be used to help you finance investments in your home's heating technologies? Could you offer a few examples? Would you trust commercial banks enough to take out a loan for this purpose? Would you be able to afford such loans from commercial banks?

In-depth interviews

Current winter-time heating practice?

What are the main reasons for which you chose to heat your home the way you currently do?

Did that way of heating come with the place or did you opt for it?

What are the main aspects you consider when deciding to heat your home? (prompt with quality of heating, cost of heating appliances, cost of fuel and maintenance, air pollution in your city, potential health implications for you and your family, etc.)

What do you usually use to heat your home during the winter?

Do you use anything else besides that? (prompt for burning paper, rubber, garbage, clothes, etc.)

If you were to compare different priorities in your home (e.g. food, appliances, health and education of householders, vehicles, etc.), where is the heating of your home positioned compared to the others?

Attitudes about modern heating systems, energy efficiency, and air quality

I would like to hear from you what you think about modern heating systems and energy efficiency in terms of maintaining the heat of your home (by energy efficiency we mean practices that focus on using less energy and preserving the value of energy used)

Thinking about what you know about modern heating systems (for example, the introduction of heat pumps, gas boilers or eco-design boilers or stoves and insulation), what are your opinions and concerns regarding these technologies? Are they worth the investment?How would you say a modern heating technology would influence the time spent on heating up your house? And how would it affect you financially? What effects would it have on the health of the household in your opinion?

In case you've made any upgrades regarding the heating in your home, what changes have you noticed?

To your knowledge, how many people in your community have upgraded some aspects of their heating technology to more modern processes? Do you perceive a trend in your community towards this type of improvements, and why?

Based on what you know, what changes did you notice in the homes or lives of these people in your community?

Upgrade decision

During the next 12 months, what do you plan on doing regarding the heating and/or insulation in your house / apartment, If nothing/anything—what are the main reasons for this? [If the answer is yes]: To which heat source or fuel type would you like to upgrade if you had the chance to do so? What kind of thermal modernization are you thinking about?

What motivated you to think about these changes? Were these local smog problems, climate change? To improve thermal comfort in your home? Easier and cleaner operation of a modern heating source compared to a traditional solid fuel boiler? Recommendations from friends and family who did it (what types of recommendations)? Want to modernize your home? Increasing the value of the house? Reducing heating costs?

From whom do you get your information or ask for advice when you need to make a decision about the heating system of your home (Remind with examples if the answers are minimal: friends, family, contractors, local authorities?)?

What other sources of information have you investigated?

What would motivate you to move forward with the heating upgrade next year? What factors would make you hesitate about it (e.g., cost of heating appliance? Cost of fuel and maintenance?)?

If you're not thinking about upgrading your heating technology or insulating your building, why not?

If given the chance to partially finance a heating or insulation upgrade through a government program, would you be willing to accept such a program? Why/why not?

Knowledge and interactions with support programs

Are you aware of programs that support upgrading of heat systems to clean, energy efficient ones (modern boilers, stoves, and heat pumps) or retrofitting of homes with insulation to improve heat retention?

(If familiar with these initiatives) How did you hear about them? Was it through family/friends/neighbors? Installers, contractors or retailers? Chimney sweeps? Government officials? Did you see any communications on TV, in a newspaper/billboard/leaflet/website or hear about the initiatives on the radio?

(If not familiar with these initiatives) Where would you like to hear about them/ Through which communication channels would you like to be informed?

Have you looked into the details of these initiatives? Are you aware of how much financial support you could receive? Did you look into the application process? Are you considering applying to these initiatives? Why or why not? If not, is there some aspect of the application process that could be improved? How?

How much would you say you trust the government agencies responsible for providing this type of support? For example, the Ministry of Work and Social Solidarity, the county council/local authorities?

Are you aware of any loans from commercial banks that can be used to help you finance investments in your home's heating technologies? Could you offer a few examples? Would you trust commercial banks enough to take out a loan for this purpose? Would you be able to afford such loans from commercial banks?

Annex 2

The Method for Measuring Energy Expenditure and Energy Poverty in Romania Matters

Main Findings

Here we examine diverse methodologies for assessing energy expenditure shares and energy poverty in Romania, utilizing data from the 2021 HBS. Notably, substantial variations are observed in both energy expenditure shares and energy poverty rates based on the chosen methodology. These discrepancies are attributed to considerations in the numerator (the method of measuring household energy expenditure) and the denominator (the method of measuring household welfare). The inclusion of car-related energy expenditures in the numerator yields results that are somewhat less straightforward. The choice of expressing energy expenditure shares as a ratio over household expenditure or household income impacts the outcomes, with patterns along the welfare distribution differing between the two approaches. We conclude that results are generally more coherent when expressing energy expenditure shares as a proportion of household income rather than consumption. Moreover, energy poverty rates exhibit significant variation depending on the methodology employed, with greater alignment observed when using an income-based method. Consequently, in our analysis we opt to measure energy spending shares and energy poverty using income-based measures while excluding car-related energy spending due to increased stability and intuitive.

Different Approaches to Measuring Energy Expenditure and Welfare

Analyses conducted on people's vulnerability to energy prices often rely on estimating households' energy spending shares. These shares can be informative, because larger shares might indicate that households are more vulnerable to rising energy prices. Researchers and policy makers typically rely on these estimates to better understand their population's need for mitigation measures or social protection mechanisms.

Researchers have developed a variety of approaches to measure energy expenditure shares. To date, researchers have used various measures of energy expenditure shares (for a full overview, see Robayo-Abril and Rude, 2024). While some measures rely on nonmonetary approaches, others use income and expenditure data. However, even within the literature that uses monetary approaches, significant methodological differences exist in the empirical approaches taken, based on two factors. First, different measures consider different components when estimating household energy expenditure. For example, some might include car-related energy expenditures (for example, gasoline). In contrast, others might abstract from this component, because they relate it more to transport than the energy sector. Especially when analyzing households' vulnerability to fluctuations in energy prices, it is crucial to carefully consider which components to include when measuring absolute energy expenditure. Second, the literature to date has used several different methodologies to set households' absolute energy expenditure in relation to households' income. While some approaches rely on household income, others rely on household expenditure (consumption).

These diverging methodologies might result in diverging pictures of energy expenditure patterns and households' vulnerability to energy prices, which in turn might impact policy recommendations. Given that energy expenditure shares might vary depending on the underlying measure used, it is crucial to base the chosen measure on empirical considerations. In addition, to better understand the sensitivity of the insights generated based on resulting energy expenditure shares to the underlying methodology, it is recommended to compare different empirical approaches. Given that policy recommendations might differ depending on the resulting estimates, it is crucial to critically reflect on the underlying methodology used.

In the following, we conduct empirical analyses to choose the best suitable monetary measure in the context of Romania. To this end, we rely on data from the 2021 HBS and explore different approaches to measure energy expenditure as well as household welfare. More concretely, we analyze how estimates differ across different methodological approaches in the case of Romania. We do so by considering different components of households' overall energy expenditure. In addition, we explore two different approaches to measure households' welfare: income and consumption.

As we are ultimately interested in the poorest households' vulnerability to energy prices, we investigate different expenditure patterns and measures by income and consumption quintiles. We are ultimately interested in the vulnerability of poor households to rising energy prices. These households might be more in need of support or mitigation mechanisms when energy prices rise. Therefore, in the analysis we investigate different measures of energy expenditure shares and energy poverty by consumption and income quintiles. Both consumption and income are approaches used to approximate households' welfare.

Moreover, we explore three different approaches to measure energy poverty. While there are many ways to quantify energy poverty, we apply three of the most used measures (for a full overview see Robayo-Abril and Rude, 2024). The first one defines all households as energy poor those who have an energy spending share at least twice as large as the median energy spending share in the population. The second one relies on the absolute energy expenditure and defines all households who report absolute energy expenditure below half the national median as energy poor. The last measure defines energy poverty as the share of households with an energy expenditure share above 10 percent.

We show that critically reflecting on the underlying methodology used to estimate energy expenditure shares and energy poverty is crucial, given that results differ. We demonstrate that energy expenditure shares and energy poverty rates differ significantly by the underlying methodology used. These differences are driven both by the numerator (the method of measuring household energy expenditure) and the denominator (the method of measuring household welfare). Expressing energy expenditure shares as a ratio over household expenditure or household income affects the results, and patterns along the welfare distribution also differ between both approaches. Results are overall more intuitive when expressing energy expenditure shares as a share of household income (not consumption). Lastly, energy poverty rates vary largely, depending on the underlying method.

Based on our empirical analysis, we choose the income-based measure and abstract from car-related energy expenditure. We show that estimates along the welfare distribution are more intuitive when using income-based measures. In addition, energy poverty rates fluctuate less when abstracting from car-related energy expenditure. Based on these results, we conclude that the income-based measure that does not consider car-related energy expenditure is the most appropriate measure for energy expenditure shares and energy poverty in Romania.

The Method of Measuring Households' Energy Expenditure Matters

There are several possibilities to approach households' energy expenditure (consumption). Eurostat, for example, considers the following components when analyzing households' en-

ergy consumption: space and water heating, space cooling, cooking, lighting and electrical appliances, and other end-uses, which mainly refer to energy usage outside the dwelling.**[1] Bacon et al. (2010) note that measurements vary by country because they depend on the information collected in household budget surveys. Household budget surveys, on the other hand, are often not standardized nor harmonized, and how they collect information on energy expenditure might vary significantly. Bacon et al. (2010) divide energy expenditure into the following categories: kerosene, liquified petroleum gas, gasoline, diesel, electricity, natural gas, coal, firewood, and other forms of biomass. They also mention the importance of analyzing expenditure on motorized passenger transport, given that oil price is a critical component of its cost structure.

We start by screening the codebook of the Romanian HBS and search for all energy-relevant expenditures. We identify six expenditure categories relevant to the energy sector. These are car-related energy expenditures (such as gasoline), solid fuels, liquid fuels, natural gas, thermal energy, and electricity and renewables.

To better understand the importance of car-related energy expenditure, we investigate the share of households who own a car by income quintile. Figure A.2.1 shows that only a small share of households in the lowest income quintile own a car. At the same time, car-related fuels play, on average, a significant role in the overall energy expenditure of the Romanian population (figure A.2.2). On average, nearly 30 percent of all energy expenditure by Romanian households is due to car-related energy consumption. Still, given the evidence on car ownership, it is not surprising that these patterns of results do not hold across income quintiles. Figure A.2.3 plots the different energy components by income quintiles. The graph reveals that those households in the lowest income quintile only spend 9.8 percent of their household income on car-related energy expenditure, whereas this makes up more than 35 percent of total household energy expenditure in the upper-income quintile.

Figure A.2.1 Shares of Households with a Car by Income Quintile, 2020

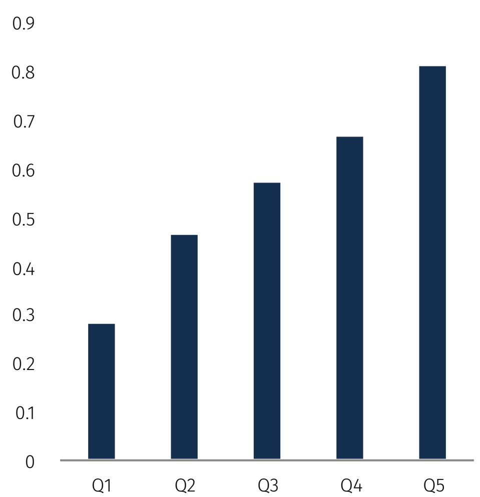
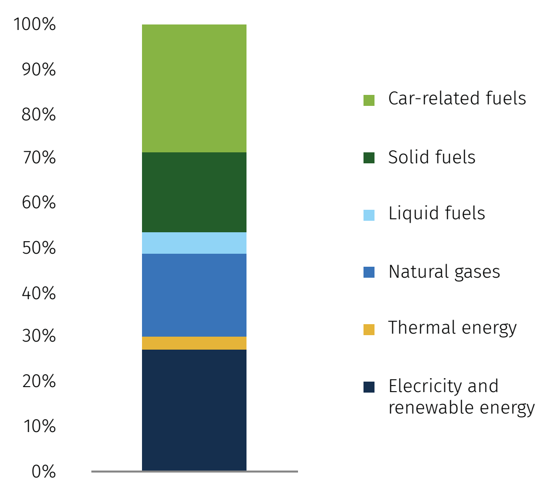


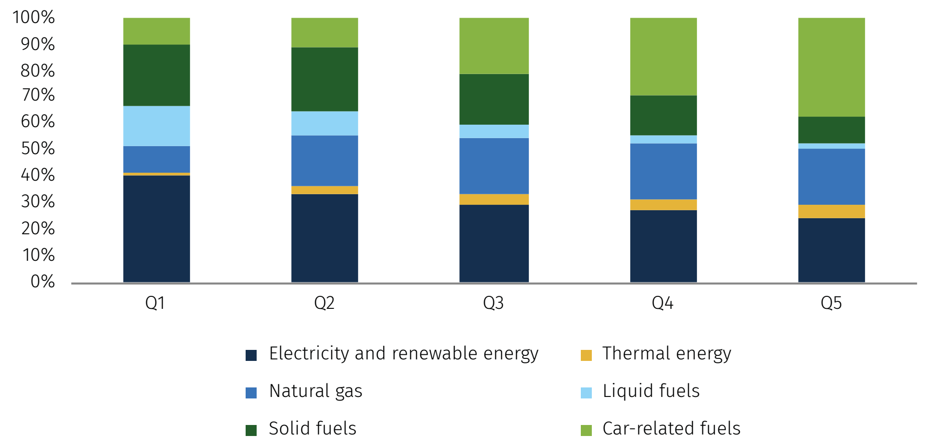
Figure A.2.2 Energy Expenditure by Energy Source, 2021



Source: Figure A.2.1—2020 EU-SILC; Figure A.2.2—2021 HBS.
Note: Q1 indicates the poorest income quintile and Q5 the richest.

1 https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Energy_consumption_in_households#:~:text=Energy%20consumption%20in%20households%20by%20type%20of%20end%2Duse,-In%20the%20EU&text=Main%20cooking%20devices%20require%206.1,final%20energy%20consumed%20by%20households.

Figure A.2.3 Households' Energy Expenditure by its Components across Income Quintiles



Source: Own estimates based on the 2021 HBS.

Note: Q1 indicates the poorest income quintile and Q5 the richest.

We next calculate energy expenditure shares as a ratio of household expenditure. To analyze energy expenditure shares, we next divide the absolute energy expenditure, using all components depicted in figure A.2.1, by each household's total expenditure, also denoted as the consumption aggregate. We then plot the resulting energy expenditure share by income and consumption quintiles. This analysis allows us to get a better understanding of energy spending patterns along the income distribution. Given that the poorest mostly report lower consumption aggregates and that energy is often considered a nonsubstitutable good, meaning that households have to use heating, electricity, and cooking devices, we expect to find higher energy spending shares in the lowest income quintiles.

We find counterintuitive results, with expenditure shares being largest in the second-lowest income quintile; car-related energy expenditures explain these counterintuitive results. Contrary from our hypothesis, the poorest do not spend the highest share of their household expenditure on energy (figure A.2.4). These results are largely driven by spending patterns on car-related energy expenditure (figure A.2.5). On average, households in the upper income quintiles spend a larger share of their overall household expenditure on this energy component than do those in the lowest income quintile. These results, which seem counterintuitive at first, hold when using consumption quintiles—our alternative welfare measure—instead of income quintiles (figures A.2.6–A.2.7). Bearing in mind the evidence on car ownership revealed in figure A.2.1 explains these results.

Figure A.2.4 Energy Expenditure Shares (Expenditure-Based) by Income Quintiles, 2021

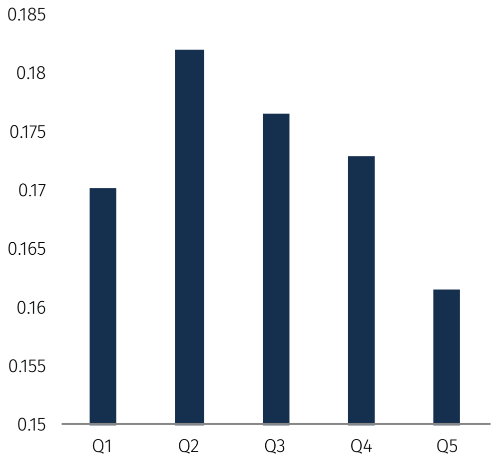
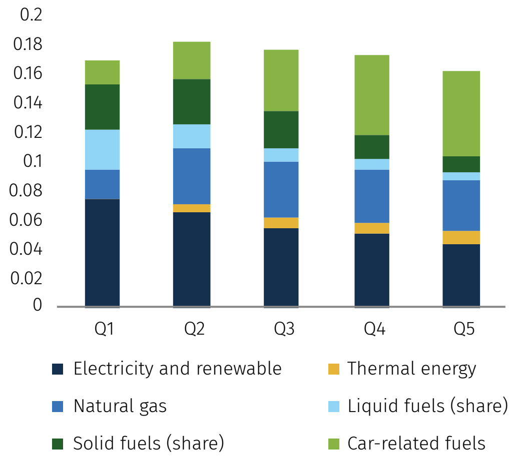


Figure A.2.5 Energy Expenditure Shares (Expenditure-Based) by Income Quintiles and Components, 2021



Source: Figure A.2.1—Own estimates based on 2020 EU-SILC; Figure A.2.2—Own estimates based on 2021 HBS.
Note: Q1 indicates the poorest income quintile and Q5 the richest.

Figure A.2.6 Energy Expenditure Shares (Expenditure-Based) by Consumption Quintiles, 2021

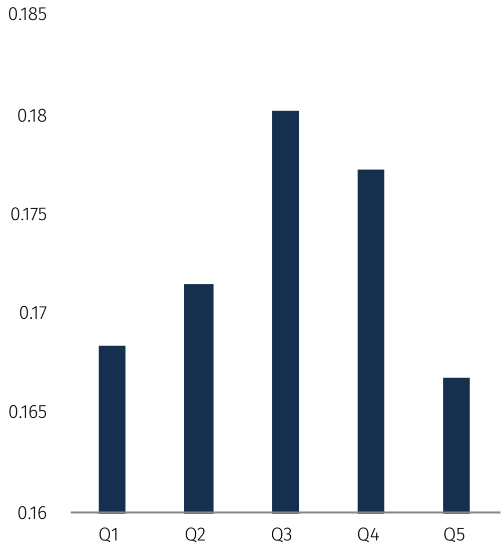
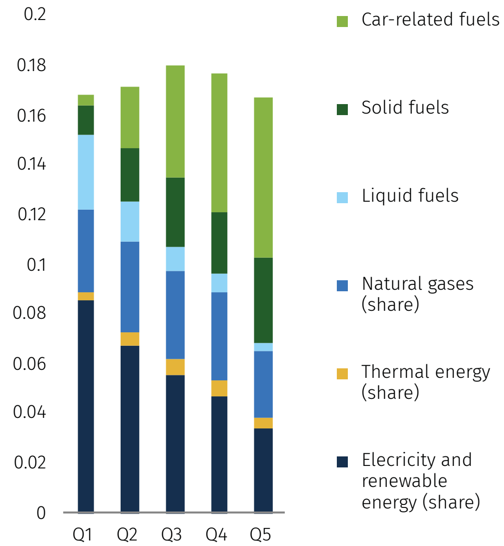


Figure A.2.7 Energy Expenditure Shares (Expenditure-Based) by Consumption Quintiles and Components, 2021



Source: Own estimates based on 2021 HBS.
Note: Energy expenditure shares include car-related expenditure and are in relation to overall household expenditure (consumption). Results are weighted by the respective survey weights. Q1 indicates the poorest income quintile and Q5 the richest.

Given that measurements of energy poverty depend directly on energy expenditure shares, it is no surprise that energy poverty patterns across welfare quintiles are also counterintuitive. Figures A.2.8 and A.2.9 plot energy poverty rates across consumption and income quintiles by applying the three different approaches to measure energy poverty outlined above. The two relative measures reveal that energy poverty rates do not vary much across income (or consumption) quintiles, which is related to the patterns in energy expenditure shares observed previously. When using the absolute measure of energy poverty, the results are more intuitive. The figures reveal that the share of households who spend less than half the median value of absolute energy expenditure decreases by income (consumption) quintile. These estimates indicate that richer households have more disposable income and can therefore spend more on energy.

Figure A.2.8 Energy Poverty by Income Quintile, 2021

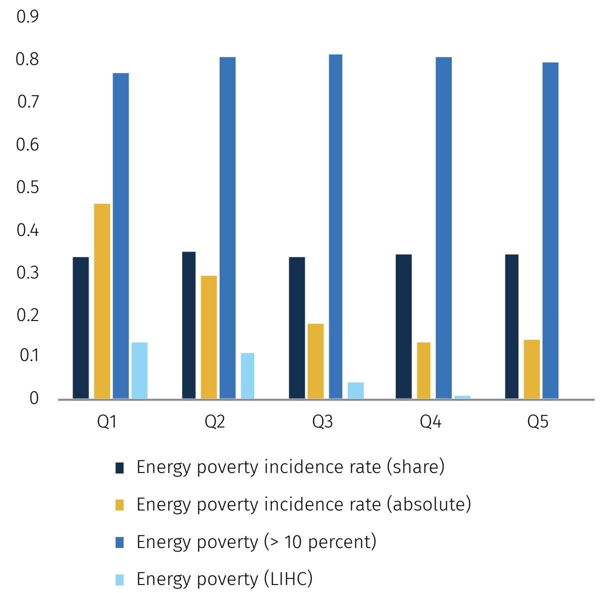
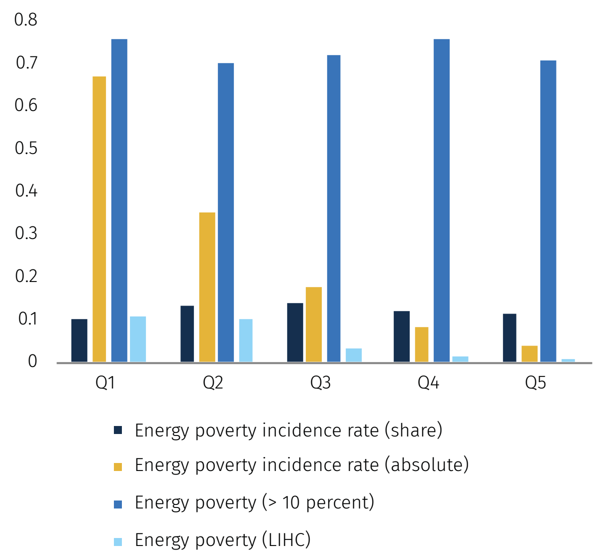


Figure A.2.9 Energy Poverty by Consumption Quintile, 2021



Source: Own estimates based on 2021 HBS. Q1 indicates the poorest quintile and Q5 the richest

We next explore energy expenditure shares across income quintiles when abstracting from car-related energy spending based on two reasons. First, car-related expenditure seems less significant for households at the lower end of the welfare distribution. Given that this is the group in which we are primarily interested, these expenditures might be less relevant for our analysis. At the same time, they might create a distorted picture, given that high-income households are more severely affected by rising gasoline prices because of the energy crisis, and we would be neglecting this part in our analysis of distributional impacts. Second, abstracting from car-related energy spending makes sense when thinking about the political distribution of responsibilities. Car-related spending patterns might fall under the responsibility of political actors in the transport sector and not the energy sector.

Energy expenditure shares along the welfare distribution are slightly more intuitive when abstracting from car-related energy expenditures. Figures A.2.10 and A.2.11 plot energy expenditure shares when not including car-related energy expenditure by income and consumption quintiles. The graphs show that estimates of energy expenditure shares are slightly more intuitive. Particularly when plotting the average expenditure share by consumption quintiles, the results are more aligned with findings in the literature of higher expenditure shares in the case of poorer households. Nevertheless, in the case of income quintiles, the second-lowest income quintile reports, on average, higher energy expenditure shares than the lowest income quintile (figure A.2.10).

Figure A.2.10 Average Energy Expenditure Shares by Income Quintiles, 2021

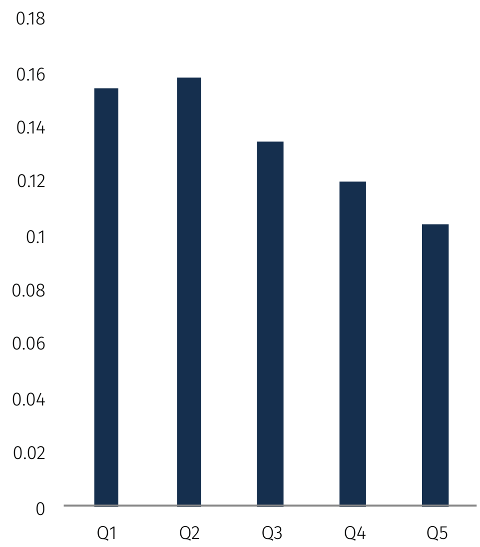
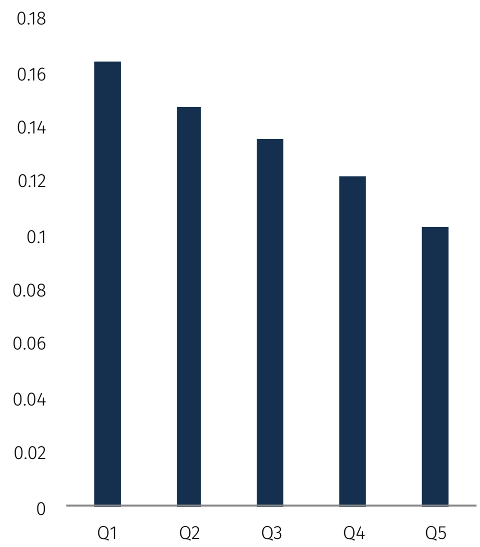


Figure A.2.11 Average Energy Expenditure Shares by Consumption Quintiles, 2021



Source: Own estimates based on 2021 HBS.
Note: Q1 indicates the poorest income quintile and Q5 the richest

Results Using Income-Based Measures

We next explore an alternative measure of energy expenditure shares that relies on income-based measures of energy expenditure shares. Where we previously defined energy expenditure shares as the ratio of energy expenditure over total household expenditure, we now define it as the ratio of household income. Household income is another way of approximating a household's wealth. Using this measure, therefore, also makes sense, especially for European settings where inequality and poverty measures often rely on income.

Using this alternative measure results in more-intuitive results, with poorer households spending larger shares on energy. Figures A.2.12 and A.2.13 reveal that energy spending patterns are significantly different than when using the expenditure-based measure. In contrast to our results using expenditure-based energy spending shares, there is a clear pattern across income and consumption quintiles, with lower quintiles spending higher shares of their overall income on energy. These findings are more in line with findings from the literature. The figures also reveal that spending patterns are less dispersed when using consumption instead of income quintiles to approximate the welfare distribution.

Figure A.2.12 Energy Spending Shares (Income-Based) by Income Quintiles, 2021

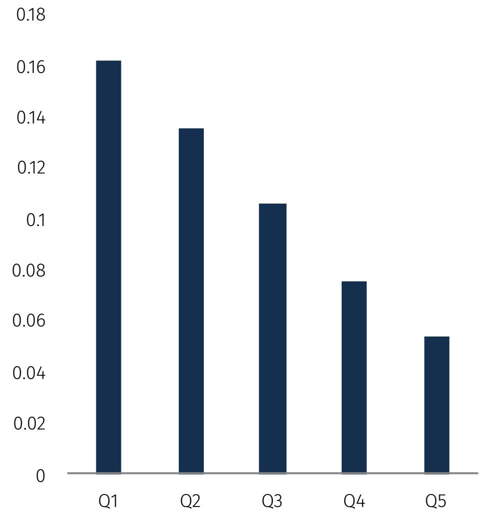
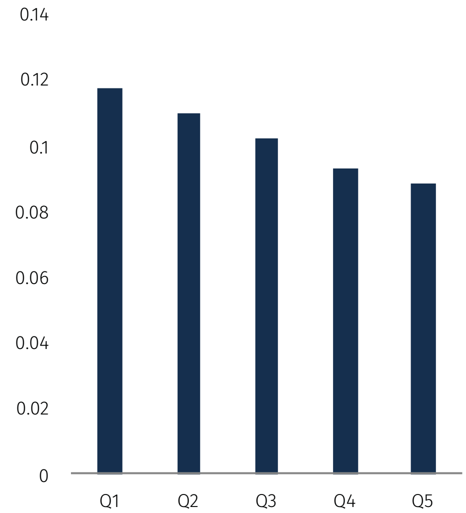


Figure A.2.13 Energy Spending Shares (Income-Based) by Consumption Quintiles, 2021



Source: Own estimates based on 2021 HBS.

Note: Energy expenditure shares include car-related expenditure and are in relation to overall household income. Results are weighted by the respective survey weights. Q1 indicates the poorest income quintile and Q5 the richest.

Similar to previous observations, the share of car-related energy expenditure is higher in the upper welfare quintiles. Figures A.2.14 and A.2.15 reveal that the higher income quintiles spend a larger share of their household income on car-related energy expenditure. The highest income (or consumption) quintile spends on average 35 percent of overall energy expenditure. The lowest income (or consumption) quintile, on the other hand, spends approximately 2 percent on this energy component. These patterns of results are in line with previous evidence from the expenditure-based measure.

Figure A.2.14 Energy Spending Shares (Income-Based) by Income Quintiles and Components, 2021

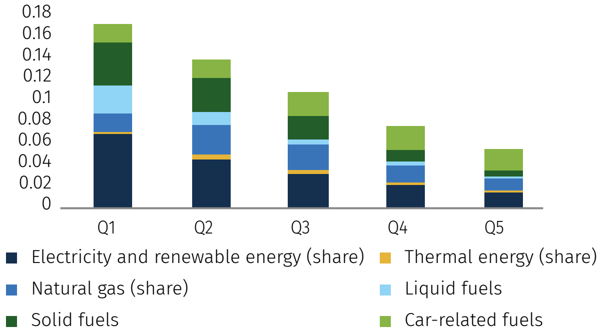
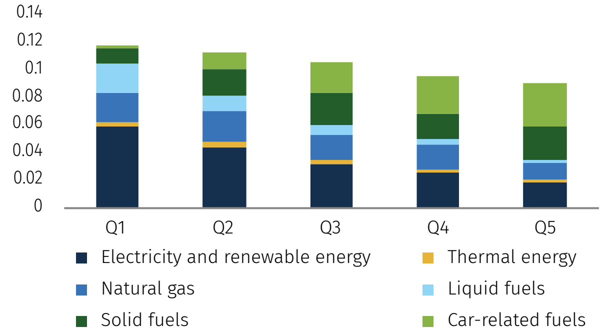


Figure A.2.15 Energy Spending Shares (Income-Based) by Consumption Quintiles and Components, 2021



Source: Own estimates based on 2021 HBS.

Note: Q1 indicates the poorest income quintile and Q5 the richest.

Energy poverty patterns across quintiles are more intuitive in case of the income-based measure, with poorer households being more affected by energy poverty than richer households. Figures A.2.16 and A.2.17 plot the average energy poverty rate by income (and consumption) quintiles, using the three measures of energy poverty explored previously. The figures demonstrate that in the case of the income-based measure, energy poverty rates are larger in the lower income (consumption) quintiles than in the upper income (consumption) quintiles. These patterns of results mostly hold for all three measures of energy poverty.

Figure A.2.16 Energy Poverty Rates (Income-Based) by Measurement and Income Quintile, 2021

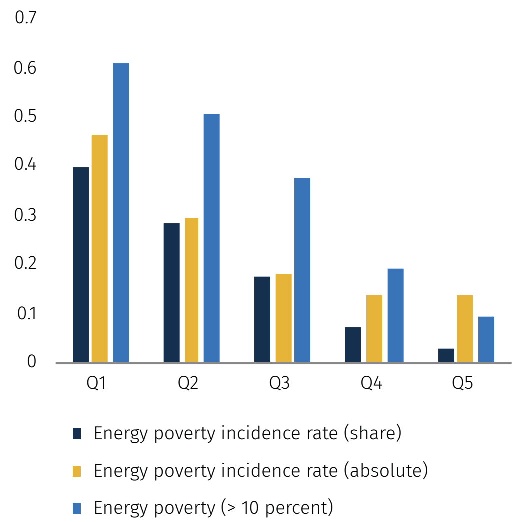
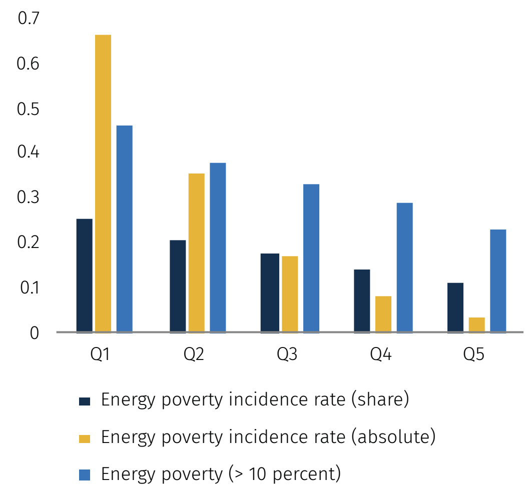


Figure A.2.17 Energy Poverty Rates (Income-Based) by Measurement and Consumption Quintile, 2021



Source: Own estimates based on 2021 HBS.
Note: Q1 indicates the poorest income quintile and Q5 the richest.

In line with the analysis that uses expenditure-based measures, we next abstract from car-related energy expenditures. Figures A.2.18 and A.2.19 show that the overall pattern of results remains close to the one observed when including car-related energy expenditures. Households at the lower end of the welfare distribution spend higher shares of their overall household income on energy than those at the higher end of the distribution.

Figure A.2.18 Energy Spending Shares (Income-Based, No Car) by Income Quintiles, 2021

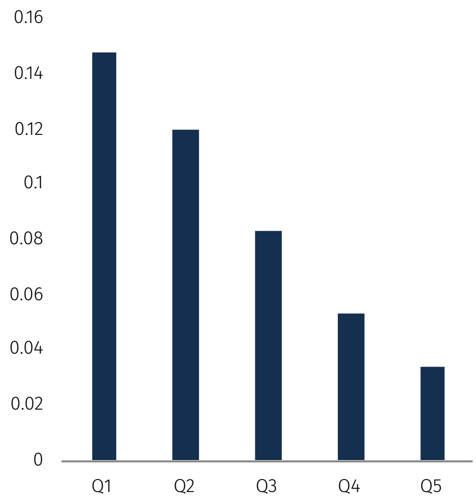
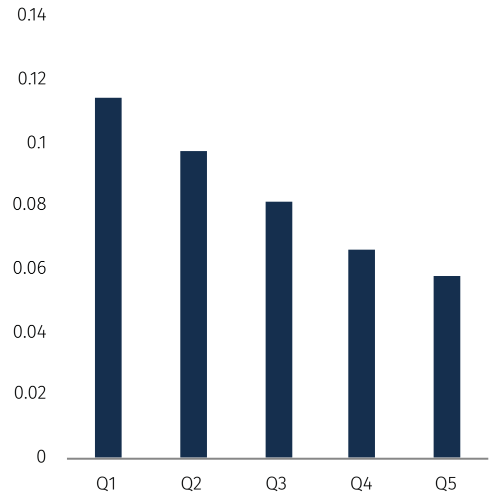


Figure A.2.19 Energy Spending Shares (Consumption-Based, No Car) by Consumption Quintiles, 2021



Source: Own estimates based on 2021 HBS.

Note: We abstract from car-related energy expenditures in these cases. Q1 indicates the poorest income quintile and Q5 the richest.

Table A.2.1 Regression of Energy Expenditure Shares among Households with Heating Systems, 2021

VARIABLES	(1) Energy exp. share (income-based, no car)	VARIABLES	(1) Energy exp. share (income-based, no car)
Household with children (<15)	-0.0104*** (0.00137)	Disability benefit recipient	-0.00870** (0.00425)
Household with pensioner	0.00282* (0.00164)	Connectivity to electricity	0.0506*** (0.00485)
Single-elderly household	0.0420*** (0.0142)	Modern heating	-0.0144*** (0.00209)
Female-headed household	0.00743*** (0.00146)	Subsidy (thermal energy)	0.0869*** (0.0263)
Household with Roma	-0.0107*** (0.00402)	Subsidy (natural gas)	0.0955 (0.0872)
Household with unemployed	0.0107*** (0.00265)	Subsidy (elecricity)	-0.0797*** (0.0269)
Urban	-0.00886*** (0.00173)	Cooking (electricity)	0.0233** (0.00957)
Household with more than 5 members	-0.0102*** (0.00239)	Cooking (natural gas)	0.0384*** (0.00942)
Income per capita	-6.95e-07*** (2.55e-08)	Cooking (wood/coal/oil)	0.00453** (0.00193)
Social aid from municipality (recipient)	0.00176 (0.00537)	Cooking (cylinder)	0.0286*** (0.00532)

VARIABLES	(1) Energy exp. share (income-based, no car)	VARIABLES	(1) Energy exp. share (income-based, no car)
Cooking (other)	-0.0349 (0.0851)	Hot water—no hot water	-0.00565 (0.0320)
Cold water, indoors from public supply	-0.00771 (0.00606)	Sewage type—public system	-0.00720 (0.00509)
Indoors, from in-house	-0.00246 (0.00620)	Sewage type—in-house system	-0.00241 (0.00474)
Outside residence, but inside building	-0.0128 (0.00831)	Natural gas (cooking or heating)	-0.0162** (0.00818)
Outdoors, fountain,pump, well	0.00357 (0.00494)	Constant	0.0540 (0.0332)
Hot water—public system	-0.0157 (0.0318)	**Observations**	**15,016**
Hot water—in-house system	-0.0110 (0.0318)	**R-squared**	**0.163**

Source: Own estimates based on HBS 2021.

Note: The table reports correlation coefficients from a simple regression on energy expenditure shares. Energy expenditure shares are income based; abstract from energy spending on car-related energy, such as gasoline; and range from 0 to 1.

Different Approaches to Measuring Energy Poverty

We next compare different measures of energy poverty to each other and find that rates vary significantly. Figure A.2.20 plots the average energy expenditure share and the related energy poverty rates when using expenditure-based measures, whereas figure A.2.21 plots these estimates using income-based measures. We find that the incidence rate of energy poverty in Romania is highly sensitive to the underlying measure. First, the incidence rates fluctuate significantly depending on the underlying measure of energy poverty. Second, the rate also varies depending on the approach used to measure welfare (income or expenditure).

Estimates of energy poverty fluctuate less when using income-based measures. The energy poverty incidence rate fluctuates less when using income-based measures, namely between 19.0 and 35.4 percent across the different energy poverty measures. In contrast, the rate varies more significantly in the case of expenditure-based measures. These results could mean that the income-based measure is more robust across the different methodological approaches toward energy poverty. Rates are even more aligned when abstracting from car-related energy expenditure (figure A.2.22).

Figure A.2.20 Average Energy Expenditure Shares and Energy Poverty Rates Using Expenditure-Based Measures, 2021

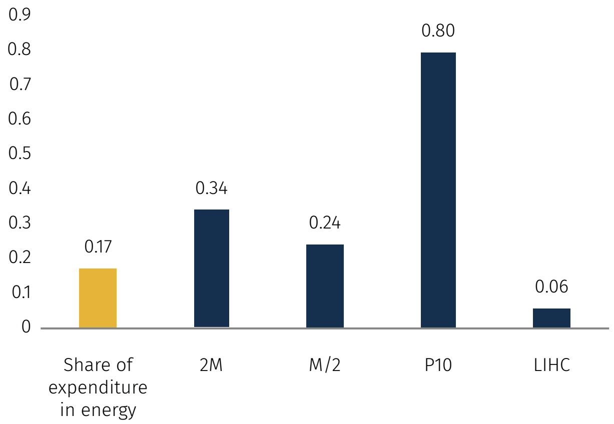
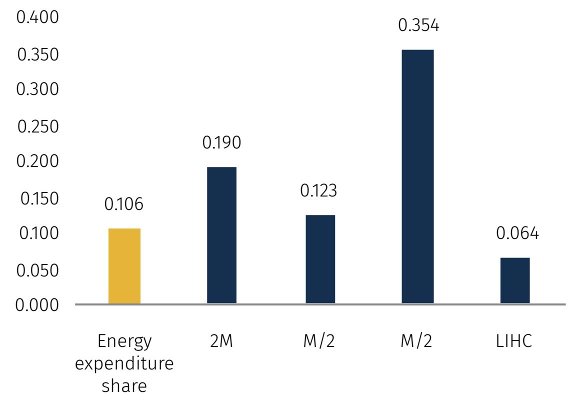


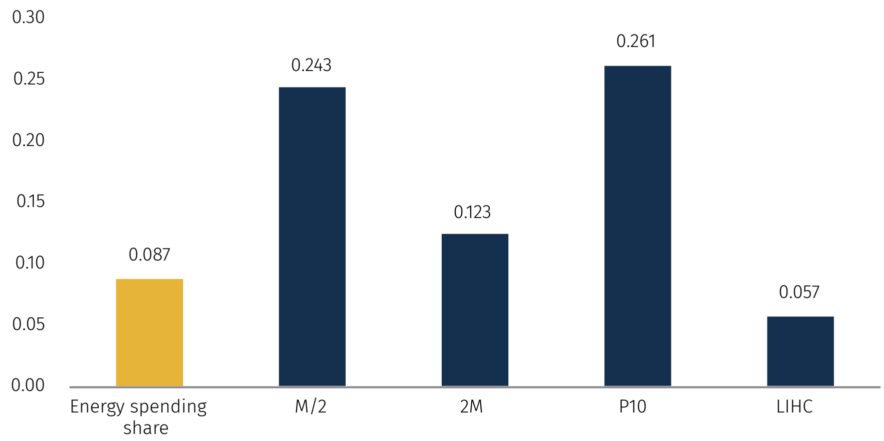
Figure A.2.21 Average Energy Expenditure Shares and Energy Poverty Rates Using Income-Based Measures, 2021



Source: Own estimates based on 2021 HBS.

Note: These measures also consider car-related expenditure. We use four different measures of energy poverty: (1) the rate of households spending more than twice the median value of energy expenditure shares (2M), (2) the rate of households spending less than half the median value of absolute energy spending (M/2), (3) the rate of households spending more than 10 percent of their income on energy (P10), and (4) the rate of households who are pushed into energy poverty due to high fuel costs and low incomes (LIHC).

Figure A.2.22 Average Energy Expenditure Shares and Energy Poverty Rates Using Income-Based Measures and No Car-Related Energy Expenditures, 2021



Source: Own estimates based on 2021 HBS.

Note: These measures do not consider car-related expenditure. We use four different measures of energy poverty: (1) the rate of households spending more than twice the median value of energy expenditure shares (2M), (2) the rate of households spending less than half the median value of absolute energy spending (M/2), (3) the rate of households spending more than 10 percent of their income on energy (P10), and (4) the rate of households who are pushed into energy poverty due to high fuel costs and low incomes (LIHC).

Energy expenditure shares also vary depending on the methodology used. When using expenditure-based measures, the average energy expenditure share is 17.3 percent (figure A.2.20). This share is lower when using income-based measures, namely 10.8 percent (figure A.2.21). When using income-based measures and abstracting from car-related energy expenditure, the resulting average expenditure share is 8.7 percent (figure A.2.22). Consequently, the estimate of Romania's average energy expenditure share fluctuates with the methodology used.

Our estimates align with previous estimates from other countries, especially when using income-based measures. Previous research finds that energy expenditure shares fluctuate between 4.1 and 12.0 percent (Bacon et al. 2010). While our income-based measure is within this range, the expenditure-based measure results in an average share above this range. In addition, Bacon et al. (2010) find that the spending share on transport is between 0.2 and 3.2 percent, which again aligns with our estimates.

Discussion and Conclusion

We explore several approaches to measure energy expenditure in Romania. The literature to date uses a variety of different methodological approaches to measure energy spending patterns of households. We explore two of these approaches, relying on monetary measures of energy expenditure shares. We vary both the numerator and the denominator of energy expenditure shares. In the former, we analyze measures with and without energy expenditure on car-related energy, such as gasoline. In the latter, we investigate the impact of using income or expenditure as a welfare measure.

The analysis reveals that the underlying methodology affects the results and findings are more intuitive when using income-based measures. On average, energy expenditure shares for Romanian households are lower when using income-based measures. In addition, estimates along the welfare distribution seem more intuitive when using income-based measures of energy expenditure shares than expenditure-based measures. While households at the lower end of the welfare distribution spend higher shares of their overall welfare on energy in the case of the income-based measure, the same is not true when using the expenditure-based measure. Estimates of energy poverty also fluctuate less across methodologies when using income-based measures. Based on these results, we conclude that income-based measures of energy expenditure shares are more suitable in the case of Romania.

We also provide evidence showing that including car-related energy spendings results in less-intuitive and robust estimates. We find that results are slightly more intuitive when abstracting from car-related energy spending by households. Moreover, energy poverty rates are more stable across methodologies when using this approach. Consequently, we abstract from this energy spending component in our final analysis.

Annex 3
Construction of Underlying Indicators

Monetary Measures

To estimate the household income, we rely on information from the income roster of the HBS (SVE) (S7). The section contains a variable (r44) that denotes total income, which we use for the analysis at hand.

To estimate household spending on energy, we rely on data from the service expenditure roster (S6) and the information on household spending on nondurable goods (S5). We summarize data on the expenditure on “electricity and renewable energy” (r511), “thermal energy” (r512), and “natural gas” (r513). We do not include information on “Water, sewer, sanitation” (r510), given that we cannot distinguish between spending on hot and cold water. We then summarize the resulting value by household and month. We also add information gathered on spending on nondurable goods (S5). Here we distinguish between liquid fuels (liquefied gas, oil, and liquid fuel for the radiator [r340 to 342]) and solid fuels (firewood and coal [r343 and r344]). Adding all these components together results in the overall household spending on energy.

Our approach to measuring energy spending has several limitations. First of all, it does not reflect discounted bills. Given that we only observe the amount ultimately paid by the household, we do not capture potential ex-ante subsidies by the government. Moreover, our measure does not account for energy acquired by the household from proper resources (for example, households owning forest plantations and using wood generated from these plantations for heating). Similar reasoning might apply to renewable energy sources, such as solar panels. In addition, in the case of wood, households might be reluctant to report wood bought on the black market or illegally.

Nonmonetary Measures

For the nonmonetary energy affordability measures, we rely on the living condition roster included in the HBS (S10a). This part of the questionnaire is only filled out by the main household in a dwelling and its representative household member. We use the information in this part of the questionnaire to gather information on the type of lighting and heating used in Romania. We also generate information on the type of energy used for cooking as well as the connection of the household to the sanitation system. Lastly, we analyze the question of subsidies to cover expenses with public utilities (thermal energy, natural gas, wood, coal, petroleum fuels, electricity, and so on).

Consumption Aggregate

For this report, we construct the ECAPOV consumption aggregate. We follow the World Bank’s definition of the consumption aggregate.[1] The consumption aggregate is the nominal household consumption expenditure divided by the household size, the temporal consumer price index (CPI), and the spatial consumer price index (CPI):

$$Living\ Standard\ Indicator = \frac{nominal\ household\ consumption\ expenditure}{household\ size\ x\ temporal\ CPI\ x\ spatial\ CPI}$$

1 For training material on how to follow the World Bank’s definition of the consumption aggregate, see this presentation: https://thedocs.worldbank.org/en/doc/20f02031de132cc3d76b91b5ed8737d0-0050012017/related/lecture-2-1.pdf.

Importantly, the definition of the consumption aggregate does not entail adding up all expenditures during the reference period, but relies on the selective consideration of all expenditures that best proxy the use (consumption) of resources. Following this definition, we only consider those expenditures that mirror the "typical" consumption during the reference year (in our case 2021). More specifically, we implement the following definition of the consumption aggregate: nominal consumption aggregate = monetary expenditures on food and nonfood nondurable goods and services consumed + value of in-kind consumption + value of use (not purchase) of durables + value of use of owner-occupied housing. We abstract from expenditure for time and leisure as well as public goods.

For some indicators, we account for household size and composition. The consumption aggregate measures individual welfare, not household welfare, although expenditure data are typically collected at the household level. To compare individuals' welfare across households, it is crucial to adjust for household size and composition. Notably, there are certain expenditures in a household that are public goods. This means that consumption by one household member does not necessarily reduce the amount available for consumption by another household member. Examples are housing, heating, and transportation, all goods that are subject to economies of scale within a given household. In theory, it is possible to account for economies of scale by taking the following approach:

$$xi = \frac{xh}{n^a} \quad with\ a \in [0,\ 1]$$

where xi is the individual welfare aggregate, xh the expenditure level per household, n the number of household members, and a is a factor that scales the number of household members. If a = 1, there is no adjustment for economies of scale. If a = 0 all goods in the household are public goods. In the case of a = 0.5 a household of four members, for example, would need twice as much as a household of one person. The decision to account for economies of scale depends on the share of household expenditure directed to public goods, such as heating, housing, or transportation.

Alternatively, one can account for household consumption through the concept of adult equivalents. This concept is based on the idea that certain household members consume less than others. One example is a child, who might eat less than an adult. Moreover, it is often assumed that women consume less than men. The common practice is to assign women a value of 0.8 and children below 15 years old a value of 0.5. The equivalent scale would then look as follows:

$$n_{AE} = (n_{males15+} \times 1) + (n_{females15+} \times 0.8) + (n_{kids(0-14)} \times 0.5)$$

Following this approach, rescaled household consumption is calculated as follows:

$$\tilde{x}_i = \frac{x_h}{n_{AE}}$$

For the purpose of this report, we abstract from the adjustment for purchasing power, given that we do not consider comparisons over time or space.

Annex 4

Methodology: Measuring Direct and Indirect Welfare Impacts of Energy Inflation

Impacts on Energy Poverty

We apply income-based measures to calculate energy spending shares and energy poverty. We divide the total energy expenditure by total household income as follows:

$$\mathrm{ES} = \frac{E}{I} = \frac{P^{*}Q}{I}$$

where *Q is the average quantity of energy consumed by a household, P is the average price for each unit of energy, and I is the total household income. Importantly, we do not observe P or Q in the household budget survey, but only the total energy expenditure E reported by each household. This limits the granularity of our analysis, because we cannot observe heterogeneity in energy prices faced by households.*

To calculate the impact of energy price increases on energy poverty, we first calculate how energy prices impact energy expenditure shares. We embark from equation 1 and assume that the energy share after an energy price increase is

$$\mathrm{ES'} = \frac{P^{'}{*}Q'}{I'} = \frac{\frac{P^{'}}{P}{*}P{*}\,Q{*}(1-e)}{I{*}(1-i)} = \frac{E{*}(1-e){*}\,\frac{P^{'}}{P}}{I{*}(1-i)}$$

The formula indicates that all three variables that comprise the energy spending share in the post scenario are subject to change. As we do not observe *P'* or *Q'*, we need to express the formula in relation to *E*, the energy expenditure reported by the household. To do so, we relate *P'* to the old price *P*, and *Q'* to the old quantity of energy consumed, *Q*. According to Freund and Wallich (1995), *Q'* = *Q* *(1-*e*). Lastly, we also do not observe the new income *I'* and need to express it as a share of *I*. We declare that income *I'* equals the old income *I* minus the share of income lost due to inflation or economic downturns, expressed as *i*. To calculate energy poverty rates under the scenario of price increases, we use the new energy spending share *ES'* and relate it to the 10-percent threshold used in the 10-percent measure of energy poverty (P10).

The equation above indicates that all three variables involved in the energy spending share within the post scenario are subject to change. Because we lack direct observations of the new price *P'* and new quantity of energy consumed *Q'*, it becomes necessary to express the equation in terms of the reported energy expenditure *I* by households. To accomplish this, we establish a relationship between the new price *P'* and the initial price *P*, as well as between the new quantity of energy consumed *Q'* and the original quantity *Q*. According to Freund and Wallich (1995), the new quantity of energy consumed *Q'* is calculated as Q multiplied by 1-*e*, where e represents the price elasticity. Furthermore, the new income *I'* is not directly observed, and thus, we express it as a proportion of the initial income *I*, adjusting for the portion of income lost due to inflation or economic downturns, denoted as *i*.

We then estimate the new energy poverty rate. To compute energy poverty rates in the context of price increases, we

utilize the new energy spending share *ES'* and relate it to the threshold of 10 percent employed in the P10 measure.[1]

Impacts on Income Poverty

To assess the household welfare impacts, we investigate the effects of price hikes on the AROP rates. Building upon the work of Freund and Wallich (1995), we consider that energy price increases result in alterations in consumer surplus as a proportion of expenditure or income. The specific relationship can be expressed as follows:

$$PPP = ES * t\,[1 + e * \frac{t}{2}]$$

In this context, the energy expenditure share *ES* represents the proportion of household income allocated to energy expenses, as explained earlier. To assess the impact of energy price increases on welfare, we introduce the variable t, which denotes the percentage change in energy prices, and e, which represents the energy price elasticity. By applying these values, we can estimate the adjusted household income by subtracting the energy-related portion *PPP* from the original income. This revised income serves as the basis for evaluating the AROP rates. The rate change reflects the welfare effect resulting from the price increases. Furthermore, we also examine variations in the Gini coefficient, which provides insights into changes in income inequality.

The *PPP* loss in our baseline scenario is as follows:

$$PPP = ES * 0.4\,[1 - 0.25 * \frac{0.4}{2}]$$

We simulate the impact of energy price increases on monetary welfare measures relying on data from the HBS. To this end, we rely on the welfare measures from the HBS, because information on household income is relatively reliable, and the resulting AROP rate, standing at 21.4 percent, is close to the official one reported by the EU-SILC. Table A.6.1 in Annex 6 presents the full results for all scenarios. Depending on the scenario, a positive price increase results in an increase of the AROP rate over the one reported in 2021 of -0.17 (when households fully substitute away from energy prices, a highly unlikely scenario) to 3.0 percentage points (assuming a price increase of 50 percent and a price elasticity of 0).

1 We do not analyze the effect on the M/2 and 2M measures of energy poverty, because these are relative measures and barely change over time. These patterns of results are by construction, because the M/2 and 2M measures are relative to the distribution. So, if the entire distribution moves into a certain direction—as is the case here—then the relative measures of energy poverty might not change significantly. The P10 measure of energy poverty might be more appropriate for tracking changes in energy poverty over time, although it is subject to serious empirical limitations as well (see the overview of Robayo-Abril and Rude [2024]) for more information.

Annex 5

Descriptive Statistics of Single-Elderly Households

Table A.5.1 Descriptive Statistics of Single-Elderly Households Compared to All Other Households, 2021

	(1) Single-elderly households		(2) All other households	
	Mean	S.D.	Mean	S.D.
Energy spending share (income-based, no car)	0.15	0.13	0.08	0.09
Household with children (<15)	0.00	0.00	0.30	0.46
Household with pensioner	0.99	0.12	0.36	0.48
Single-elderly household	1.00	0.00	0.00	0.00
Female-headed household	0.73	0.44	0.23	0.42
Household with Roma	0.01	0.07	0.03	0.16
Household with unemployed members	0.04	0.20	0.06	0.24
Urban	0.51	0.50	0.53	0.50
Household with more than 5 members	0.00	0.00	0.06	0.25
Income per capita	24569.34	25312.09	31928.47	26369.42
Social aid from municipality (recipient)	0.00	0.05	0.02	0.13
Disability benefit recipient	0.00	0.04	0.03	0.18
At-risk-of-poverty	0.30	0.46	0.22	0.41
Connectivity to electricity	0.98	0.14	0.98	0.13
Has thermal power station	0.14	0.34	0.14	0.34
Has central heating	0.36	0.48	0.49	0.50
Central heating type: wood/pellets	0.02	0.14	0.08	0.27
Central heating type: natural gas	0.33	0.47	0.40	0.49
Central heating type: electricity	0.00	0.04	0.00	0.06
Central heating type: Other	0.00	0.01	0.00	0.01

	(1)		(2)	
	Single-elderly households		All other households	
	Mean	S.D.	Mean	S.D.
Has natural gas stove	0.05	0.21	0.02	0.14
Has wood/coal/oil stoves	0.45	0.50	0.34	0.47
No heating system	0.00	0.04	0.00	0.03
Disconnected	0.00	0.05	0.00	0.04
Subsidy (thermal energy)	0.01	0.10	0.01	0.11
Subsidy (natural gas)	0.00	0.03	0.00	0.01
Subsidy (wood/coal/oil)	0.00	0.02	0.00	0.02
Subsidy (electricity)	0.01	0.09	0.01	0.10
Subsidy (other)	0.00	0.00	0.00	0.00
None	0.99	0.10	0.99	0.11
Cooking (electricity)	0.00	0.02	0.00	0.06
Cooking (natural gas)	0.51	0.50	0.55	0.50
Cooking (wood/coal/oil)	0.23	0.42	0.20	0.40
Cooking (cylinder)	0.47	0.50	0.42	0.49
Cooking (other)	0.00	0.02	0.00	0.01
Cold water, indoors from public supply	0.70	0.46	0.74	0.44
Indoors, from in-house	0.09	0.29	0.12	0.33
Outside residence, but inside building	0.02	0.13	0.01	0.10
Outdoors, fountain, pump, well	0.20	0.40	0.13	0.33
River	0.00	0.00	0.00	0.00
Other	0.00	0.00	0.00	0.00
Hot water—N/A	0.00	0.04	0.01	0.11
Hot water—public system	0.17	0.38	0.16	0.37
Hot water—in-house system	0.55	0.50	0.68	0.47
Hot water—no hot water	0.27	0.45	0.15	0.35
Hot water—disconnected	0.00	0.04	0.00	0.04
Sewage type—N/A	0.00	0.04	0.01	0.11
Sewage type—public system	0.57	0.49	0.62	0.49
Sewage type—in-house system	0.20	0.40	0.25	0.43
Sewage type—none	0.22	0.42	0.12	0.32
Electric lighting	1.00	0.05	0.99	0.11
Natural gas (cooking or heating)	0.51	0.50	0.56	0.50
Observations	7,672		22,854	

Source: Own estimates based on the 2021 HBS.

Annex 6

Simulated Poverty and Inequality Rates across Various Scenarios

Table A.6.1 Simulated Estimates of AROP Rates under a Full Set of Scenarios

Scenario	Energy price increase	Elasticity	PPP loss (% of HH income)	At-risk of poverty (%)	At-risk of poverty (equ.) (%)	Gini
1	0	0	0.00	29.90	21.42	0.364536
2	0	-0.25	0.00	29.90	21.25	0.364536
3	0	-0.5	0.00	29.90	21.25	0.364536
4	0	-0.75	0.00	29.90	21.25	0.364536
5	0	-1	0.00	29.90	21.25	0.364536
6	0.1	0	0.01	30.10	21.81	0.366431
7	0.1	-0.25	0.01	30.10	21.80	0.366406
8	0.1	-0.5	0.01	30.10	21.79	0.366382
9	0.1	-0.75	0.01	30.09	21.79	0.366358
10	0.1	-1	0.01	30.09	21.77	0.366334
11	0.2	0	0.02	29.90	21.25	0.368396
12	0.2	-0.25	0.02	30.27	22.40	0.368296
13	0.2	-0.5	0.02	30.28	22.38	0.368196
14	0.2	-0.75	0.02	30.26	22.35	0.368097
15	0.2	-1	0.02	30.26	22.31	0.367997
16	0.3	0	0.03	30.52	23.07	0.370436
17	0.3	-0.25	0.03	30.49	22.98	0.370203
18	0.3	-0.5	0.02	30.47	22.93	0.369971
19	0.3	-0.75	0.02	30.45	22.89	0.369739

Scenario	Energy price increase	Elasticity	PPP loss (% of HH income)	At-risk of poverty (%)	At-risk of poverty (equ.) (%)	Gini
20	0.3	-1	0.02	30.42	22.81	0.369509
21	0.4	0	0.03	29.90	21.25	0.372552
22	0.4	-0.25	0.03	30.62	23.63	0.372123
23	0.4	-0.5	0.03	30.58	23.51	0.371696
24	0.4	-0.75	0.03	30.56	23.37	0.371273
25	0.4	-1	0.03	30.55	23.22	0.370853
26	0.5	0	0.04	30.81	24.37	0.374747
27	0.5	-0.25	0.04	30.76	24.15	0.374052
28	0.5	-0.5	0.04	30.70	23.99	0.373366
29	0.5	-0.75	0.04	30.63	23.81	0.372687
30	0.5	-1	0.03	30.61	23.61	0.372016

Source: Own estimates based on the 2021 HBS.

Annex 7

Simulation of Potential Short-Term Measures Mitigating Direct Effects of Rising Energy Prices by Eliminating Price Caps for Electricity and Natural Gas (70% Increase in Total)

Table A.7.1 Simulation of Potential Short-Term Measures Mitigating Direct Effects of Rising Energy Prices by Eliminating Price Caps for Electricity and Natural Gas (70% Increase in Total)

Policy measure	Targeted population	Poverty Headcount	Poverty gap	Gini	Poverty reduction	Reduction poverty gap	Cash transfer	Beneficiaries	Adequacy
1	All	26.7	10.1	34.6	0.62	0.41	72	19,348,459	4.5
2	Single-elderly	24.6	9.6	33.6	2.70	0.95	1,136	1,232,223	23.0
3	Single-elderly at-risk of poverty	24.6	9.5	33.5	2.68	0.98	2,696	519,197	54.4
4	Pensioner	26.3	10.0	34.1	0.98	0.54	332	4,211,665	6.3
5	Pensioner at-risk of poverty	23.7	9.2	33.5	3.60	1.33	1,665	841,003	30.7
6	CT recipients	25.9	9.6	33.9	1.39	0.88	1,848	757,757	33.4
7	Bundle 2: Pool beneficiaries Pensioner at-risk and CT recipients	25.1	9.0	33.6	2.20	1.52	890	1,573,329	15.8
8	Bundle 3: Pool beneficiaries Pensioner at-risk and single-elderly at-risk	23.3	9.0	33.4	3.94	1.51	1,478	947,173	29.5

Source: Own estimates based on the matched 2019 HBS and 2020 EU-SILC dataset.

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