



Methodology for the identification of EU regions with higher vulnerability to severe energy poverty

EUROPEAN COMMISSION

Directorate-General for Energy

Directorate B – Just Transitions, Consumers, Efficiency and Innovation

Unit B.1 – Consumers, Local Initiatives, Just Transition

Contact: Mathilde Leyge. Email: Mathilde.LEYGE@ec.europa.eu

Published in: March 2026, Brussels

Author: Energy Poverty Advisory Hub (EPAH) managed by the European Commission Directorate General for Energy (DG ENER).

Written by: Inês Valente, João Pedro Gouveia (NOVA FCT).

Contributors: Miguel Sequeira, Pedro Palma (NOVA FCT), Flavio Ghilardi, Irene Mata Ribes, Aniol Esquerra and Marta Garcia Paris (Ecoserveis).

Reviewers: Mathilde Leyge, Chiara Massarotto (Directorate General for Energy, European Commission).

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PDF

ISBN 978-92-68-38738-2

DOI: 10.2833/8468215

MJ-01-26-029-EN-N

Executive Summary

The European Commission's initiative Energy Poverty Advisory Hub (EPAH) has established itself as the central EU initiative supporting cities, regions, and national actors in their efforts to diagnose, plan, and act against energy poverty. Among its core activities are the Technical Assistance (TA) calls, designed to support and empower local governments in taking action to address energy poverty and provide support for energy poverty diagnosis. Aligned with these activities, this report presents a methodology for identifying regions with higher vulnerability to energy poverty to specifically promote EPAH's Calls for Technical Assistance, which could be readily applied across the EU.

Two complementary approaches were implemented in this methodology. First, a top-down assessment based on Eurostat's regionally detailed statistical indicators, representing diverse dimensions of energy poverty at the NUTS 2 level. Second, a bottom-up assessment, relying on experts with national and local knowledge of energy poverty in each Member State for validating and characterising the previously identified regions and suggesting and justifying additional potential regions (*i.e.*, NUTS 2, NUTS 3). Additionally, experts could suggest specific vulnerable communities — cities, municipalities, or even neighbourhoods, along with justification for their inclusion. For this purpose, EPAH drew on its network of national Antennas, critical nodes of local and national expertise in each Member State.

The top-down assessment considered four energy poverty-related indicators for which data were available at the NUTS 2 level. These indicators were selected for their alignment with the criteria defined in the Energy Efficiency Directive (EU) 2023/1791 and for the availability of regionally disaggregated data across EU Member States. One indicator is directly aligned with the EED: the inability to keep the home adequately warm. Two indicators are partially aligned: arrears on mortgage, rent, utility bills, or hire purchase, which extends the EED's utility bill arrears indicator to cover broader financial obligations, and persons at risk of poverty or social exclusion, which builds on the EED's at-risk-of-poverty rate by incorporating an additional dimension of social exclusion. The fourth indicator used – housing cost overburden rate – is not explicitly listed in the EED but was incorporated to capture an additional dimension of financial vulnerability relevant to energy poverty. When replicating the methodology, practitioners and researchers should consider incorporating this and other relevant indicators where data are available at the subnational level.

The results of this methodology feed one of the criteria for project selection in EPAH's Technical Assistance Calls, ensuring flexibility to account for diverse drivers of energy poverty while maintaining transparency through a scoring system. Regions identified through this methodology are prioritised for 40% of the technical assistance, though all regions demonstrating severe vulnerability will also be considered to ensure comprehensive coverage without exclusion.

Beyond its application to EPAH's technical assistance, this methodology can be replicated by multilevel policymakers to develop their own national approaches, such as identifying priority regions in national energy poverty strategies, designing targeted interventions, and establishing monitoring systems across the full policy cycle — from planning through implementation and evaluation. Further details on the results of this methodology applied in the EPAH context can be found in the dedicated report (EPAH, 2026).

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List of Abbreviations

AROE	At risk of poverty or social exclusion
CDD	Cooling Degree Days
EPAH	Energy Poverty Advisory Hub
EU	European Union
HCOR	Housing Cost Overburden Rate
IHAW	Inability to keep Home Adequately Warm
JTF	Just Transition Fund
NUTS	Nomenclature of Territorial Units for Statistics
OMR	Outermost Region
TA	Technical Assistance

1. Introduction

Energy poverty, characterized as a household's lack of access to essential energy services such as heating, hot water, cooling, lighting, and electricity for appliances, is a phenomenon that requires spatial analysis for a more effective diagnosis, as some regions are disproportionately affected. For example, in 2024, 41.3 million Europeans reported being unable to keep their homes adequately warm; however, this share varied widely across regions, ranging from approximately 3% in some areas to as high as 23% in others (Eurostat, 2025a). These disparities highlight the importance of regional analyses of energy poverty to ensure a more effective and targeted allocation of technical, financial, and other forms of support.

One of the objectives of the European Commission's Initiative Energy Poverty Advisory Hub (EPAH) is to support the diagnosis of energy poverty at the national and regional levels and to provide technical assistance to regions and communities seeking to tackle energy poverty across Europe. Additionally, past work also focused on the identification of illustrative practices on energy poverty at the subnational level, namely with the [EPAH ATLAS](#) of local energy poverty action (EPAH, 2026a), handbooks focusing on the diagnosis, planning and implementation of activities ([EPAH, 2024](#)), and an analysis of regional and local indicators and metrics (EPAH, 2022), among other contributions. In this context, EPAH aims to provide a comprehensive understanding of the regional diversity regarding vulnerability to energy poverty and to identify regions with particularly high severity of energy poverty. Following this, EPAH seeks to raise awareness of energy poverty among relevant policymakers and practitioners in those regions, thereby promoting the uptake of novel energy poverty mitigation initiatives, including through EPAH's technical assistance calls. To achieve this goal, a methodology was developed to identify regions with higher vulnerability to severe energy poverty.

The literature on energy poverty diagnosis has evolved over the years, with a research stream focusing on energy poverty indicators. Energy poverty indicators can be classified into three groups (Thomson *et al.*, 2017): expenditure-based, where domestic energy expenditure is compared to income, consensual-based, based on consisting of self-reported experiences and assessments, and direct measurement, assessed by comparing domestic energy services consumption versus a set value. Energy poverty can be monitored based on different indicators of those groups, capturing the complex and multidimensional nature of this issue (Rademaekers *et al.*, 2016), with some authors exploring combining different indicators into multi-dimensional indices (Castaño-Rosa *et al.*, 2019; Maier & Dreoni, 2024). Sareen *et al.* (2020) propose measuring energy poverty based on historical trajectories, data flattening, contextualization identification, new representation, and policy uptake. The Energy Efficiency Directive (EU) 2023/1791 recast suggests, for countries that have not developed their own calculation method, the identification of energy-poor households (for energy saving obligation purposes) using an arithmetic average between the inability to keep the home adequately warm, the arrears on utility bills, the total population living in a dwelling with

a leaking roof, damp walls, floors or foundation, or rot in window frames or floor and the at-risk-of-poverty rate (cutoff point: 60 % of median equivalised income after social transfers) indicators.

The main objective of this report is to present the methodology developed by EPAH for identifying subnational regions with higher vulnerability to energy poverty. This approach can be readily applied across Member States and uses data available at the national and regional levels (*e.g.*, at the NUTS (Nomenclature of Territorial Units for Statistics), a system that divides countries into regions: 2 (medium-sized regions) or 3 (smaller regions)). Two rationales guided the development of this methodology. First, the method was designed to be applied by EPAH, using indicators that meaningfully capture diverse dimensions of energy poverty, in future TA calls or in other EPAH initiatives. Second, the methodology incorporates an additional layer of validation through national experts with in-depth knowledge of national and regional contexts.

Considering this methodology, a first top-down identification of priority NUTS 2 areas was conducted based on four energy-poverty-related indicators, one climate indicator, and one factor related to the presence of JTF territories. Overseas regions in some member states were not included in the analysis due to insufficient data and differences in the context of energy poverty in those regions.

Following this initial screening was then strengthened and complemented using a bottom-up qualitative method, where the national [EPAH Antennas](#) (*i.e.*, the national focal points of EPAH) in all 27 Member States validated, characterised, and supplemented the identified NUTS 2 regions based on national, regional, and local information sources, drawing on their on-the-ground knowledge and experience. While this approach complements and enriches the quantitative approach, a qualitative contribution is inevitably biased by each expert's experience, partial view, or representation of energy poverty in each country, which is a limitation of this segment of the methodology.

2. Methodology

This methodology aims to identify European regions potentially vulnerable to severe energy poverty. By combining quantitative and qualitative data in two steps, this approach enables a more robust analysis and a deeper understanding of energy poverty across multiple dimensions, which could inform the development of energy poverty plans or support the identification of regions for mitigation activities (Figure 1). Firstly, a **top-down quantitative assessment** provides a preliminary list of regions (NUTS 2) in the European Union that may be more vulnerable to severe energy poverty according to the analysis of four indicators, complemented by Just Transition territories and regions vulnerable to extreme summer weather (NUTS 3). Secondly, a **bottom-up assessment** complements the results with stakeholder input from each Member State (EPAH Antennas).

The top-down methodology emphasises the use of readily available regional-level data across all Member States, promoting harmonisation and facilitating cross-country comparisons. Furthermore, it prioritises achieving the highest possible level of territorial granularity beyond the NUTS 2 scale, supported by Antennas through the bottom-up qualitative component, thereby enabling the **identification of areas with a higher probability of severe energy poverty** at other territorial unit levels. The following sections describe in detail the methods and rationales used in each segment of the methodology.

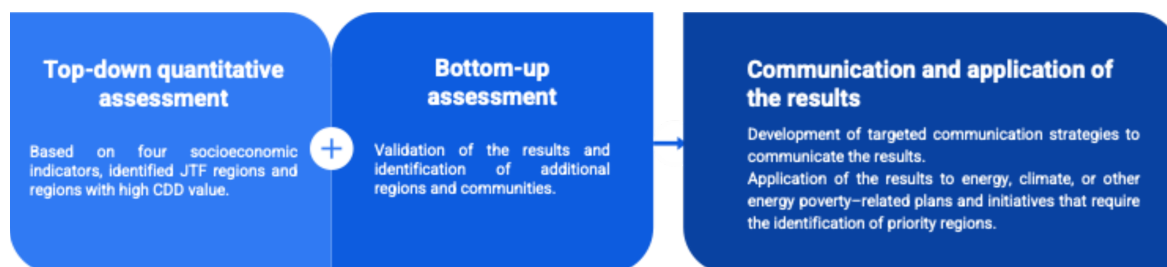


Figure 1: Overview of the EPAH methodology to identify highly vulnerable regions and communities to energy poverty.

2.1 Top-Down Quantitative Assessment

The top-down quantitative segment identifies and selects energy poverty-relevant indicators at the subnational level, providing an initial list of regions that could later be validated by national stakeholders and experts. Indicators are usually presented at the NUTS level. NUTS stands for Nomenclature of Territorial Units for Statistics and comprises three levels: NUTS 1, which describes major socio-economic regions; NUTS 2, which covers basic regions; and NUTS 3, which covers small regions (Eurostat, n.d.). In this analysis, the objective is to work at the smallest possible territorial level; based on data availability, the methodology ultimately identified NUTS 2 regions for one set of indicators and NUTS 3 regions for another.

A comprehensive review of available data showed that only four relevant indicators are available at the NUTS 2 level. These include three expenditure-based indicators and one consensual-based indicator, which are commonly used in the diagnosis of energy poverty due to their close relationship with household income, perceived thermal comfort, and buildings' energy performance:

- **Inability to keep home adequately warm** [code ilc_mdcs01_r]: represents the share of the population not able to keep their home adequately warm, based on the question “Can your household afford to keep its home adequately warm?” (Eurostat, 2025a);
- **Persons at risk of poverty or social exclusion** [code ilc_peps11n]: represents the share of the population that is at risk of poverty or social exclusion (60 % of median equivalised income after social transfers) (Eurostat, 2025b);
- **Arrears (mortgage or rent, utility bills, or hire purchase)** [code ilc_mdcs05_r]: represents the share of the population that has arrears in housing-related expenses (mortgage or rent, utilities, or hire purchase) (Eurostat, 2025c);
- **Housing cost overburden rate** [code ilc_lvho07_r]: represents the percentage of the population living in a household where the total housing costs (net of housing allowances) represent more than 40% of the total disposable income (Eurostat, 2025d).

These four indicators were selected as the baseline for the top-down assessment, not only because of their relevance and data availability, but also because they are partially aligned with the Energy Efficiency Directive (EU) 2023/1791 recast, which recommends similar indicators for identifying energy-poor households¹.

One indicator is directly aligned with the EED: the inability to keep the home adequately warm (EED indicator a). Two indicators are partially aligned: arrears on mortgage, rent, utility bills, or hire purchase, which extends the EED's utility bill arrears indicator (b) to cover broader financial obligations, and persons at risk of poverty or social exclusion, which builds on the EED's at-risk-of-poverty rate (d) by incorporating an additional dimension of social exclusion. The fourth indicator — housing cost overburden rate — is not explicitly listed in the EED but was incorporated to capture an additional dimension of financial vulnerability relevant to energy poverty. It should also be noted that the EED indicator on population living in dwellings with structural deficiencies (leaking roofs, damp walls, or rot) was not included due to a lack of data availability at the NUTS 2 regional level.

¹(a) Inability to keep home adequately warm [ilc_mdcs01]

(b) Arrears on utility bills [ilc_mdcs07];

(c) Population living in a dwelling with a leaking roof, damp walls, floors or foundation, or rot in window frames or floor [ilc_mdho01]

(d) At-risk-of-poverty rate [ilc_li02]

In this analysis, data from 2023 were used, as it was the most recent year at the time of the analysis with available data across most Member States.

As recommended by the EED recast, the vulnerability analysis based on these indicators was subject to an aggregation process. Still, before aggregating all the indicators, the dataset was thoroughly analysed, and the following aspects were identified and adjusted:

- **Lack of data for a region/country in one or more indicators:** France's regions lack housing costs and overburden data, so the national value was considered. The Netherlands does not have NUTS 2 level data for the indicators “Inability to keep home adequately warm”, “Arrears (mortgage or rent, utility bills, or hire purchase)”, and “Housing cost overburden rate”. However, data were available at the NUTS 1 level (Noord-Nederland, Oost-Nederland, West-Nederland, and Zuid-Nederland), so this subdivision was used. Austria had data only at the NUTS 2 level for the “Persons at risk of poverty or social exclusion” indicator; for the remaining indicators, the national value was used.

- **Lack of data for an indicator for the year under analysis:** Slovakia does not have data on “At risk of poverty or social exclusion by NUTS region” for 2023 in Eurostat. Considering this, data from 2022 were used.

- **Countries without NUTS 2 division:** Estonia, Cyprus, Latvia, Luxembourg, and Malta do not have NUTS 2 division; therefore, they were treated as a single region in the analysis, and national-level values were used.

- **Overseas regions:** Member States, such as Spain, France, and Portugal, have regions overseas. Those are located in the *Départements d'Outre-Mer* (*Guadeloupe, Martinique, Guyane, La Réunion, and Mayotte*) in France, in the Spanish territories of *Ciudad de Ceuta, Ciudad de Melilla, and Canarias*, and in the Islands of Azores and Madeira in Portugal. They are considered Outermost regions (OMRs) under Article 349 of the Treaty on the Functioning of the EU, meaning that they are fully part of the EU, they follow EU policies and law (with some tailored exceptions), and they are part of the NUTS classification (NUTS 2 or 3 levels). The Azores and Madeira are located off the coast of Europe; therefore, they were considered in the assessment. Canarias, although it is located off the coast of Africa, shares a similar island context. For the cases of *Guadeloupe, Martinique, Guyane, La Réunion, Mayotte, Ciudad de Ceuta, and Ciudad de Melilla*, it is necessary to acknowledge that energy poverty may have different drivers and dimensions from those considered in the EU context. In the scope of EPAH's analysis, these regions were not included in the presentation of the results; nevertheless, assessing energy poverty in these territories may be highly relevant for future research.

Following these adjustments, data were available for **233 NUTS 2 European regions** across the four selected indicators. These indicators were aggregated into **a single composite index** (equation 1) by averaging them and assigning equal weights to all, yielding a ranked list of regions.

Equation 1: Energy poverty regional vulnerability calculation formula.

$$\text{Regional Vulnerability (\%)} = \frac{IHAWi + AROPEi + ARREARSi + HCORi}{4}$$

IHAWi - Inability to keep home adequately warm value for 2023 of region *i* (%)

AROPEi - Persons at risk of poverty or social exclusion value for 2023 for region *i* (%)

ARREARSi - Arrears (mortgage or rent, utility bills, or hire purchase) value for 2023 for region *i* (%)

HCORi - Housing cost overburden rate value for 2023 for region *i* (%)

Several approaches can be used to process the data and obtain results, depending on the objective and context of the methodology's application. A key methodological decision involves defining the threshold above which energy poverty vulnerability is considered severe. The choice of threshold is not prescriptive and should be guided by the specific purpose of the analysis, data availability, and the national or regional context in which the methodology is being applied. It is also important to recognise that energy poverty severity may have different meanings across countries, reflecting distinct housing, climatic, income, and social protection conditions.

As an illustration of how these methodological decisions can be operationalised in practice, in the context of EPAH's Technical Assistance calls, it was considered appropriate to introduce a cap on the maximum number of regions selected per country to ensure representativity among Member States, in alignment with EPAH's efforts to study and address energy poverty in different European contexts. Thus, the 60 regions potentially most affected by energy poverty were identified, while limiting the selection to a maximum of 5 per country. Nevertheless, alternative approaches could also be considered at this stage, as the number of regions and the cap per country were introduced solely to reflect a subjective level of energy poverty severity and to ensure representativity among Member States.

Given limitations in data availability and the multidimensionality of energy poverty, which the four selected indicators do not comprehensively capture, two additional perspectives were added to complement the regional analysis.

To capture the dimension of summer vulnerability not reflected in the "inability to keep home adequately warm" indicator, an analysis of **Cooling Degree Days** (CDD) (Figure 2) at the NUTS 3 level was performed (Eurostat, 2025e). The increasing frequency of extreme heat events and the rise in CDD in recent years have increased vulnerability to summer energy poverty across Europe (Cornelis, 2025), justifying the inclusion of this indicator to capture this dimension at the regional level. The CDD indicator was also selected for its timely availability, direct relevance to cooling needs, and granularity at the NUTS 3 level, thereby enhancing the analysis's detail and accuracy. Similar to the approach used for the other four indicators, a threshold can be applied to define

regions with high vulnerability to extreme heat conditions. In the context of EPAH's regional energy poverty assessment, NUTS 3 regions with CDD above the 99th percentile in the EU were added, seeking to ensure a balance between the application of this criterion and the representativity of different EU contexts. However, alternative approaches could also be considered at this stage, according to the specific goal of the methodology's application. Logically, overlaps may occur between NUTS 3 regions identified through the CCD indicator and the NUTS 2 regions previously identified through the selected four indicators. In this case, only the NUTS 3 regions that were not part of the previously identified NUTS 2 regions were added to the group of EU regions with potentially higher vulnerability to energy poverty.

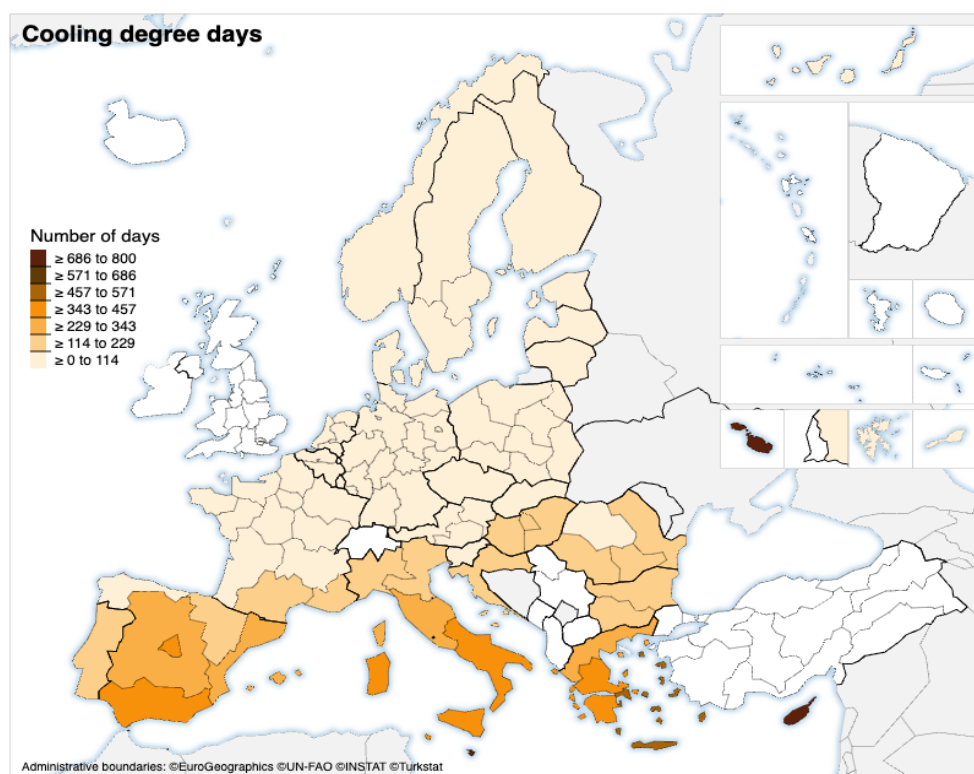


Figure 2: Cooling Degree Days Map. Retrieved from EPAH (2025c).

Finally, the last criterion considered was the **territories designated for the Just Transition Fund (JTF)** (Figure 3). The JTF supports the regions most affected by the shift toward climate neutrality, aiming to mitigate the risk of growing regional inequalities. For instance, in some of these regions, the labour force is heavily dependent on coal extraction, an industry set to decline significantly. These shifts in the employment landscape may exacerbate the vulnerability of these regions, as most already have lower regional gross domestic product per capita than the national average (Alves Dias *et al.*, 2018). Additionally, elderly people, minorities, and workers with disabilities or other physical or mental health conditions can also be disproportionately affected

by this transition (EC, 2021), and they are also pointed out as vulnerable groups to energy poverty (Middlemiss, 2022), placing them on a dual vulnerability. Considering this, one of the factors for the identification of JTF territories should be if the transition to climate neutrality have an impact on energy poverty (EC, 2021) and, according to Regulation (EU) 2021/1056 establishing the Just Transition Fund, energy efficiency investments, projects, and activities funded by the JTF are expected to contribute to reducing energy poverty in these specific regions. Therefore, considering the relation between energy poverty and JTF, these territories were retrieved from the official JTF platform² and added to the analysis. A similar approach applied to the CDD is also used for the JTF territories: if a JTF NUTS 3 region is already included in an identified NUTS 2, it is not reported as a new region. Otherwise, it was now listed as an additional result.

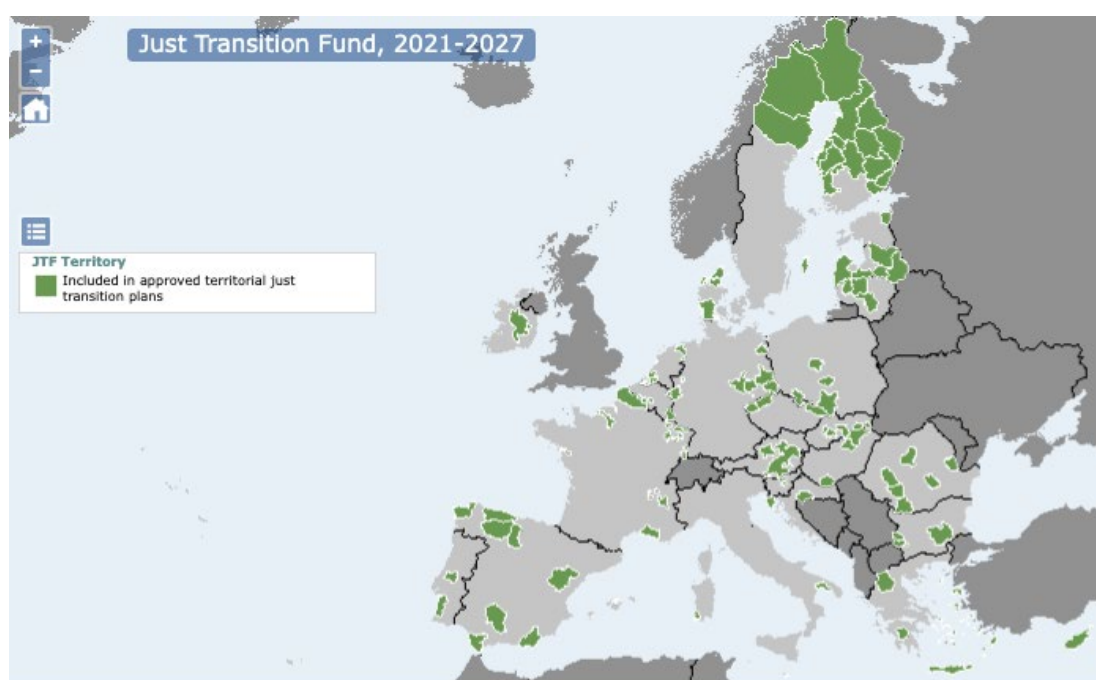


Figure 3: Just Transition Fund Territories Map. Retrieved from the JTF Platform¹.

To summarise, the final output of the application of this top-down methodology is a list of EU regions with potentially higher vulnerability to energy poverty. Considering data limitations and the need to include multiple dimensions of energy poverty, the list was compiled based on the arithmetic average of four energy poverty-related indicators assessed at the NUTS 2 level and on two additional criteria – regions with very high CDD values and regions belonging to JTF territories – assessed at the NUTS 3 level.

² https://ec.europa.eu/regional_policy/funding/just-transition-fund/just-transition-platform_en

2.2 Bottom-Up Qualitative Assessment

One important step of this methodology is the validation of the results by national experts. Going beyond indicator-based approaches, bottom-up validation seeks to provide quantitative and qualitative data that justifies why specific regions are classified as potentially severely affected by energy poverty. This step allows a validation process and an in-depth characterization of the listed NUTS 2 and 3 regions using additional data sources, local or regional analyses, empirical experience, and other contextual evidence to uncover the underlying drivers and causes of energy poverty vulnerability. Furthermore, national experts could identify regions vulnerable to energy poverty that may have been missed through a top-down approach.

In the context of EPAH's work, a survey was sent in the 3rd quarter of 2025 to each national EPAH Antenna to validate previously obtained results, characterise the regions, and, when relevant, provide further information for their specific country. The full version of the survey is depicted in Annex 1. EPAH Antennas consist of organizations that are experts on the respective national context of energy poverty and that are actively involved in energy poverty initiatives in their country. Therefore, they provide national knowledge that extends beyond the top-down indicators of the quantitative approach, enabling a tailored and detailed assessment of regions with higher vulnerability to severe energy poverty. In essence, input from the Antennas, which serve as critical nodes of local and national expertise, significantly enriches the preliminary list of regions derived from available EU-wide datasets and completes the methodology. The list of Antennas is updated on the EPAH website ([EPAH, 2026b](#)). Aligned with EPAH's efforts to promote local action on energy poverty, the Antennas also identified and characterised specific communities they consider vulnerable to severe energy poverty.

Considering the two logical outcomes of the top-down assessment – *i.e.*, either a country has regions identified as vulnerable to severe energy poverty, or it does not have any such regions, depending on the thresholds used – two corresponding approaches were used. For countries with listed NUTS 2 regions, the list was shared with the respective national EPAH Antenna for validation of the regions' vulnerability in their national context and for further characterisation supporting the top-down assessment. For countries where no NUTS 2 regions were identified, the Antennas were asked whether this accurately reflected the national situation.

Regardless of whether any regions had been identified, all Antennas were also asked to suggest and characterise additional NUTS 2 regions they considered to be severely vulnerable to energy poverty in their country.

Finally, a NUTS-level regional analysis may be too aggregated to pinpoint specific communities vulnerable to energy poverty — particularly in countries with smaller populations or large NUTS regions. To address this, EPAH Antennas were also asked to identify illustrative local communities they consider particularly at risk of severe energy poverty, enabling a more granular, targeted assessment. These communities could include municipalities, cities, or neighbourhoods, with a

detailed justification (based on projects, local studies, and national and local data sources) for their inclusion.

Although the identified communities were not included in the final list of vulnerable EU regions — as the methodology prioritises statistically comparable NUTS-level units for which consistent EU-wide data is available, and community selection was based on qualitative expert judgement rather than a standardised framework, this information remains valuable for further research and for additional analysis for deployment of targeted energy poverty action at regional and local scales. Care should also be taken in how this information is communicated to avoid the risk of stigmatizing specific communities identified as vulnerable.

3. Application of the Methodology

Beyond its applicability to EPAH's Technical Assistance calls, the methodology for identifying regions with potentially higher vulnerability to energy poverty can be useful for several other purposes. Building on the previous chapters, this section illustrates a few possible applications of the methodology and outlines a set of recommendations to strengthen existing processes for identifying regions with high vulnerability to energy poverty at the subnational level.

3.1 Policy and Intervention Design Support

The methodology can serve multiple objectives for informing multi-scalar energy poverty policies. It can be applied as a diagnostic tool for identifying regions with higher vulnerability to energy poverty, considering both the EU and national contexts, and as a decision-support instrument for informing policymakers and practitioners to tackle energy poverty at the subnational level. One of the advantages of the proposed methodology is that it can be easily replicated across EU Member States and consistently applied throughout each national territory. All indicators used are publicly available on Eurostat, on the [EPAH energy poverty indicators dashboard](#), and other official sources (such as the JTF platform) and are updated regularly, allowing easy application and update of this methodology across member states.

In the context of a national strategy to combat energy poverty, the methodology can be a valuable tool for identifying priority regions and designing targeted measures for areas with higher vulnerability. The recognition of high-vulnerability regions enables policymakers to develop differentiated approaches that respond to the specific needs and characteristics of different territories within their countries, ensuring that these receive the resources and attention necessary to address their challenges. The methodology can also guide the establishment of financing schemes for energy efficiency, building renovation, and renewable energy that prioritise households in the identified regions, directing limited public resources toward areas where they can have the greatest impact. Furthermore, it can inform decisions regarding the on-the-ground deployment of energy poverty actions — such as defining the number and locations of One-Stop Shops, developing Renewable Energy Communities, or targeting energy advice services — ensuring that technical assistance and energy sharing are strategically located to serve populations most in need.

The methodology can also feed into the background analysis and context sections of planning instruments such as the Covenant of Mayors' Sustainable Energy and Climate Action Plans, providing a data-driven foundation for comparing regions under study with the national context. This benchmarking function helps policymakers assess the relative positions of regions and identify areas that deviate significantly from national averages, whether positively or negatively, supporting more informed and spatially sensitive policy design.

3.2 Monitoring and Evaluation

Beyond supporting policy and intervention design, this methodology can also function as a policy evaluation tool once implemented within national or regional policy frameworks. By establishing a regional-scale monitoring system, it enables tracking of the impact of policies, measures, and financing schemes on energy poverty mitigation over time. The same indicators used to identify vulnerable regions can serve as a baseline against which progress is measured, enabling evidence-based adjustments to policy approaches and ensuring that resources continue to be directed where they are most needed.

This dual function of diagnosis and monitoring creates a feedback loop that supports continuous policy improvement and adaptation. As energy poverty dynamics evolve — driven by changes in energy prices, housing conditions, income levels, or climate — the methodology can be periodically updated to reflect new realities and emerging vulnerabilities. Whenever available, the core indicators should be complemented by additional subnational-level metrics related to energy poverty, enriching the analysis and providing a more comprehensive and nuanced picture of vulnerability patterns over time.

3.3 Stakeholder Engagement and Validation

Applying this methodology effectively requires more than a quantitative assessment; it demands meaningful engagement with the actors who possess on-the-ground knowledge of energy poverty realities. EPAH's experience demonstrates that stakeholder engagement is not a peripheral step but an integral component of the methodology itself, ensuring that statistical results are contextualised, validated, and translated into actionable insights. The validation step proved essential to ensuring that the quantitative methodology captured the nuanced realities of energy poverty across diverse national and regional contexts.

When applying or adapting this methodology, EPAH recommends validating results through consultation with stakeholders with expertise across the sectors relevant to energy poverty diagnosis and mitigation, including representatives from the energy, housing, health, and social sectors, among others. The multisectoral nature of energy poverty necessitates comprehensive stakeholder engagement, as vulnerability factors span multiple policy areas and require integrated perspectives for effective identification and response.

When applying this methodology at the subnational level, local stakeholders should be accorded particular importance in the validation process, as they provide greater granularity to the analysis and understand local variations that may not be captured by aggregated statistical indicators. Local actors possess intimate knowledge of community-specific challenges, cultural factors affecting energy use, housing stock characteristics, and the effectiveness of existing support mechanisms. Their involvement not only improves the accuracy of vulnerability assessments but also enhances the legitimacy and acceptance of resulting policies among affected populations.

3.4 Implementation Considerations

The successful application of this methodology requires careful consideration of several key factors. First, while the top-down assessment provides a robust baseline for identifying energy poverty vulnerability at the subnational level, it should be viewed as a starting point rather than a comprehensive solution. Data are not available at the regional level across the EU for several essential energy poverty indicators and other contextual indicators, as shown in the EPAH Indicators Dashboard (EPAH, 2026b). A sustained, concerted effort should be made to collect data effectively, thereby improving the diagnosis and monitoring of energy poverty across multiple scales. Furthermore, the selection of indicators may be tailored to reflect particular national and regional contexts while striving for methodological consistency that enables comparison and learning across scales.

Second, when multiple data sources beyond the most commonly used energy poverty-related indicators are available, their integration significantly enhances the methodology's analytical power and effectiveness. Countries with access to additional data on housing conditions, energy consumption patterns, building energy efficiency, health outcomes, or other relevant variables may incorporate these into their own assessments to develop a more nuanced understanding of regional and local vulnerability patterns.

Third, a validation process can reveal blind spots in the data and highlight emerging issues not yet reflected in statistics, while simultaneously building stakeholder buy-in for subsequent interventions. Establishing validation mechanisms with national and local experts during regional prioritisation is therefore not merely a technical exercise but a critical step in ensuring that quantitative analysis aligns with qualitative knowledge and lived experience — directly linking to the stakeholder engagement approach outlined in Section 3.3.

Finally, the methodology should be applied strategically across the full policy cycle, from diagnosis through planning and implementation, as presented in the EPAH methodological handbooks (EPAH, 2024), to assist municipalities and other stakeholders in developing local actions to tackle energy poverty. This requires a commitment to ongoing monitoring and a willingness to adapt the methodology based on implementation experience and emerging evidence, ensuring it remains relevant and effective as energy poverty dynamics evolve — and closing the loop between the diagnostic and monitoring functions described in Section 3.2.

4. Conclusions

This report presents a comprehensive methodology for identifying EU regions with higher vulnerability to energy poverty. While the specific aim of the methodology is to inform the implementation of EPAH's Technical Assistance calls, it provides a replicable and adaptable approach for the prospective development of multi-scalar energy poverty policy and interventions.

The methodology combines a top-down quantitative assessment of energy poverty-related indicators with bottom-up validation by national EPAH Antennas. The top-down approach assessed NUTS 2 regions based on the arithmetic average of four indicators partially aligned with the Energy Efficiency Directive criteria: i) inability to keep home adequately warm, ii) persons at risk of poverty or social exclusion, iii) arrears on mortgage, rent, utility bills, or hire purchase, and iv) housing cost overburden rate. These were supplemented by analyses of NUTS 3 regions with cooling degree days above the 99th percentile, and of territories included in the Just Transition Fund, to capture vulnerability to summer energy poverty and areas undergoing structural economic transitions, respectively. The bottom-up qualitative assessment, conducted through the EPAH Antennas' expertise, proved essential for contextualising results and identifying additional vulnerable regions not captured by the quantitative analysis alone.

This methodology was developed to inform the criteria for EPAH Technical Assistance Calls for 40% of selected projects, ensuring flexibility to account for diverse drivers of energy poverty while maintaining transparency. All regions demonstrating severe vulnerability will also be considered in the technical assistance call to ensure comprehensive coverage without exclusion.

Beyond its application to EPAH's technical assistance work, the methodology offers a versatile and rigorous framework that can be adapted to support energy poverty diagnosis, policy design, monitoring, and stakeholder engagement across diverse national and regional contexts. Whether used to identify priority regions, establish monitoring systems, guide resource allocation, or inform planning instruments, its reliance on publicly available and regularly updated data ensures accessibility to a wide range of actors, from national policymakers to local authorities and civil society organisations. When replicating this approach, additional relevant subnational data sources and indicators should be incorporated, along with validation by cross-sectoral national experts to capture local realities effectively.

Ultimately, the value of this methodology lies not only in its analytical robustness but in its capacity to connect data-driven insights with meaningful action. In the report EPAH (2026), we present the results of the methodology's application, detailing the regions identified in each segment and highlighting lessons learned from its implementation, contributing to a more just and effective response to energy poverty across Europe.

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ANNEX 1: EPAH National Antenna's survey

Survey to contribute to EPAH methodology for identifying European regions with higher vulnerability to severe energy poverty

Fields marked with * are mandatory.

Disclaimer

The European Commission is not responsible for the content of questionnaires created using the EUSurvey service - it remains the sole responsibility of the form creator and manager. The use of EUSurvey service does not imply a recommendation or endorsement, by the European Commission, of the views expressed within them.

Dear EPAH antenna,

This survey is the first stage in collecting information from you as an antenna in a Member State.

EPAH is developing a methodology for identifying European regions with higher vulnerability to severe energy poverty. The methodology combines quantitative and qualitative data to identify these areas in Europe and increase their participation in EPAH Technical Assistance Calls.

As an EPAH antenna, you will contribute in three different manners:

1. **Characterizing the regions (NUTS 2 regions (Nomenclature of territorial units for statistics - basic regions) in your country identified through a basic top-down quantitative approach.**
2. **Proposing other potential regions (NUTS 2) with higher vulnerability to severe energy poverty.** Propose additional or alternative regions that may have been missed by EPAH's methodology based on your national expertise.
3. **Identifying areas/neighbourhoods/cities in your country with higher vulnerability to severe energy poverty.** Identify a set of community-level examples of energy poverty in the country (striving for various energy poverty factors and avoiding going only to extreme "economic" poverty cases).

Identification of the respondent

* Name and Surname:

* Contact mail:

* Organization:

Level of knowledge/experience in energy poverty: scale 1 (low) to 5 (high).

Move the slider or accept the initial position.



A horizontal slider control with a track from 1 to 5. A blue circle is positioned at the value 1. Above the slider, a small black box contains the number 1. The track has arrows at both ends and the numbers 1 and 5 are marked below it.

* Say in a few sentences what is your organization's level of knowledge and experience on energy poverty topics in your country (e.g. mention projects, research, campaigns, etc).

* What do you consider a situation of "severe energy poverty"?

* Have you received a list of regions identified as with higher vulnerability of severe energy poverty according to the quantitative EPAH methodology?

- ☒ Yes
☐ No

1. TOP - DOWN QUANTITATIVE PART

* 1. Please check the regions identified in your country. Do national data/studies/energy poverty index align with the regions identified by the EPAH methodology? Why/why not?

* 2. What other specific national/regional databases do you have access to in your country allowing to identify other areas at risk of severe energy poverty? (explain as detailed as possible and list and link to existing databases)

* 3. Is there any indicator that was not used but could better describe your national energy poverty situation? Please explain in detail. Is there data for that indicator available in your context at regional level?

* 4. Which factors do you consider most relevant for identifying energy poverty in your country? Please select the five most important ones:

Maximum 5 selection(s)

- ☐ Climate conditions (e.g., extreme cold or heat)
- ☐ Rural or remote areas
- ☐ Housing quality
- ☐ Heating sources
- ☐ Geographic isolation (e.g., islands)
- ☐ Household income
- ☐ Energy prices
- ☐ Employment rates and economic activity
- ☐ Household composition (e.g., elderly, single-parent families)
- ☐ Energy access (e.g., to electricity or natural gas grid)
- ☐ Lack of political decision-making/priority/commitment
- ☐ Hard to reach energy users (e.g., migrants, Roma communities)
- ☒ Other

* Please, if you selected other, specify:

5. Based on the factors above and others that you consider relevant, please provide information on the most relevant energy poverty-related factors you identify in the severe energy poverty regions identified by EPAH. Add a full description including different indicators allowing a multidimensional assessment of the energy poverty context in each region.

(Please, indicate the name of the region first)

* Region 1:

* Region 2:

* Region 3:

* Region 4:

* Region 5:

2. BOTTOM - UP QUALITATIVE PART

* 6. What NUTS 2 regions from your country could be identified as severe and weren't? Why? On what data/information/indicators do you base your answer on?

Region 1:

Region 2:

Region 3:

* 7. Would you consider the [JTF Transition](#) territories in your country, regions with higher vulnerability to severe energy poverty?

- ☐ Yes
☐ No

* 8. Could you identify regions in your country with severe climatic conditions (e.g. heat waves, cold spells, flooding area/ red zone) with higher vulnerability to severe energy poverty?

- ☐ Yes
☐ No

* Justify:

* 9. Please identify examples of other areas in your country that, according to your expertise and information, can be considered at severe energy poverty?

Identify 5 specific local communities/neighborhoods/areas severely affected by energy poverty (and provide justification)? On what data/information/indicators is your answer based? If possible, please provide GPS coordinates or local contacts

Area/Community/City 1:

Area/Community/City 2:

Area/Community/City 3:

Area/Community/City 4:

Area/Community/City 5:

10. The objective of this methodology is to have a list of regions where EPAH will reinforce communication to promote EPAH technical assistances.

* 10.1 On the NUTS 2 regions identified in your country, how would you specifically promote EPAH?

* 10.2 On the proposed areas/communities/neighborhoods , how would you specifically promote EPAH?

* Have you received a list of regions identified as with higher vulnerability of severe energy poverty according to the quantitative EPAH methodology?

- ☐ Yes
☒ No

1. TOP DOWN QUANTITATIVE PART

* 1. Based on the available indicators and chosen EPAH methodology, no NUTS 2 regions in your country were identified under the top 60 regions with higher vulnerability to severe energy poverty. To what extent does this reflect the reality in your country? Please provide an explanation.

* 2. Is there any indicator that was not used but could capture your national Energy Poverty situation? Is there data for that indicator available in your context at regional level?

* 3. Which factors do you consider most relevant for identifying energy poverty in your country? Please select the five most important ones:

Maximum 5 selection(s)

- ☐ Climate conditions (e.g., extreme cold or heat)
- ☐ Rural or remote areas
- ☐ Housing quality
- ☐ Heating sources
- ☐ Geographic isolation (e.g., islands)
- ☐ Household income
- ☐ Energy prices
- ☐ Employment rates and economic activity
- ☐ Household composition (e.g., elderly, single-parent families)
- ☐ Energy access (e.g., to electricity or natural gas grid)
- ☐ Lack of political decision-making/priority/commitment
- ☐ Hard to reach energy users (e.g., migrants, Roma communities)
- ☐ Other

2. BOTTOM UP QUALITATIVE PART

4. What NUTS 2 regions from your country could be identified as severe and weren't? Why? On what data/information/indicators do you base your answer on?

Please identify at least 5 regions that could be identified as severe and describe they multidimensional energy poverty context

* Region 1 (name and justification):

* Region 2 (name and justification):

* Region 3 (name and justification):

* Region 4 (name and justification):

* Region 5 (name and justification):

* 5. Would you consider the JTF Transition regions in your country, areas of severe energy poverty?

- ☐ Yes
☐ No

* 6. Could you identify regions in your country with severe climatic conditions (e.g. heat waves, cold spells, flooding area/ red zone) that could be at potential risk of severe energy poverty?

- ☐ Yes
☐ No

* Justify:

* 7. Please identify examples of other areas in your country that, according to your expertise and information, can be considered at severe energy poverty?

Identify 5 specific local communities/neighborhoods/areas severely affected by energy poverty (and provide justification)? On what data/information/indicators is your answer based? If possible, please provide GPS coordinates or local contacts

Area/Community/City 1:

Area/Community/City 2:

Area/Community/City 3:

Area/Community/City 4:

Area/Community/City 5:

8. The objective of this methodology is to have a list of regions where EPAH will reinforce communication to promote EPAH technical assistances.

* 8.1 On the NUTS 2 regions identified in your country, how would you specifically promote EPAH?

* 8.2 On the proposed areas/communities/neighborhoods , how would you specifically promote EPAH?

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Publications Office
of the European Union

PDF ISBN 978-92-68-38738-2

