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Assessment of EU regions with higher vulnerability to severe energy poverty

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Executive Summary

The European Commission Initiative Energy Poverty Advisory Hub (EPAH) has established itself as the EU's primary initiative supporting cities, regions, and national actors in diagnosing and addressing energy poverty. A key step in this work is the accurate identification of regions with higher vulnerability to severe energy poverty, which is essential for ensuring that technical assistance, targeted measures, and financing instruments reach the areas and communities that need them most. To this end, EPAH developed a novel methodology for identifying such regions across the EU, described in detail in the accompanying methodology report (EPAH, 2026). This report presents the results of the application of that methodology in 2025.

The methodology combines a top-down quantitative assessment with a bottom-up qualitative assessment. The top-down component integrates data from four energy poverty-related indicators — inability to keep home adequately warm; at-risk-of-poverty or social exclusion rate; arrears on mortgage, rent, utility bills, or hire purchase; and housing cost overburden rate — complemented by climate data (cooling degree days) and information on Just Transition Fund territories. The preliminary results were subsequently validated and enriched by contributions from national EPAH Antennas present in all 27 Member States — expert organisations providing insights into their country-specific energy poverty contexts.

The full application of the methodology presented herein resulted in the identification of 60 NUTS 2 regions through the four energy poverty indicators, 113 NUTS 3 regions within JTF territories, and 13 NUTS 3 regions above the 99th percentile for cooling degree days. The bottom-up assessment validated these results and identified an additional 54 NUTS 2 regions based on national Antennas' expertise. In total, accounting for overlaps across segments, 114 NUTS 2 regions and 55 NUTS 3 regions with potentially high vulnerability to severe energy poverty were identified across the EU.

The results reveal significant differences among Member States in terms of their potential vulnerability to severe energy poverty. These differences reflect varying national realities, differences in administrative structures — such as the number and size of NUTS regions — and the maturity of energy poverty recognition and policymaking at the national level. The contributions of the EPAH Antennas also introduced an inherently qualitative dimension to the results, shaped by each contributor's expertise and contextual knowledge, which should be considered when interpreting cross-country comparisons.

Beyond its application for EPAH's activities, this methodology can be replicated by multilevel policymakers to identify priority regions for targeted measures and financing instruments, and to establish monitoring systems across the full policy cycle — from diagnosis and planning through to implementation and evaluation.

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AROPE	At risk of poverty or social exclusion
CDD	Cooling Degree Days
EPAH	Energy Poverty Advisory Hub
EPC	Energy Performance Certificate
EU	European Union
GDR	German Democratic Republic
GMB	Guaranteed Minimum Benefit
HCOR	Housing Cost Overburden Rate
IHAW	Inability to keep Home Adequately Warm
JTF	Just Transition Fund
NUTS	Nomenclature of Territorial Units for Statistics
OECD	Organisation for Economic Co-operation and Development
OMR	Outermost Region
TA	Technical Assistance

1. Introduction

Since 2021, the European Commission Initiative's Energy Poverty Advisory Hub (EPAH) has been working to provide tools to support the diagnosis of energy poverty and the planning and implementation of activities to tackle it. Through EPAH's Technical Assistance programme, special emphasis has been placed on diagnosing energy poverty at the regional level and on empowering local actors with tools to assess energy poverty vulnerability and implement mitigation actions.

Aligned with these efforts and with the roll-out of EPAH's Technical Assistance calls, a two-step methodology was developed to identify regions with potentially higher vulnerability to severe energy poverty. This methodology established a framework for identifying NUTS 2 and NUTS 3 regions, as well as specific communities, based on the status of energy poverty across the EU, drawing on existing statistical data and expert knowledge. The methodology is described in detail in the accompanying report (EPAH, 2026); the present report focuses solely on the results of its application across the EU and its Member States.

The methodology combines an initial top-down quantitative assessment with a bottom-up qualitative validation. The top-down component assessed NUTS 2 regions using the arithmetic average of four socioeconomic indicators relevant to diagnosing energy poverty, complemented by a climate-related indicator and information on Just Transition Fund territories. The results were subsequently validated in collaboration with the national EPAH Antennas — focal points of EPAH in all 27 Member States, with in-depth knowledge of each country's energy poverty context. Drawing on their expertise, the Antennas validated and characterised the identified regions, suggested additional regions not captured by the top-down assessment, and provided examples of communities vulnerable to severe energy poverty, which will inform future EPAH work.

The analysis was conducted in the last quarter of 2025 in the context of planning EPAH's technical assistance calls. In total, the application of the methodology identified 114 NUTS 2 regions and 126 NUTS 3 regions across the EU, of which 55 NUTS 3 regions represented new findings not already covered by the identified NUTS 2 regions. Overseas territories of some Member States were excluded from the analysis due to the substantially different energy-poverty contexts they present. The multi-criteria and multi-level approach enabled the capture of diverse aspects of energy poverty vulnerability and ensured that at least one region was identified in each Member State, thereby guaranteeing comprehensive geographical coverage across the EU for the roll-out of EPAH's technical assistance calls.

2. Methodology

This section summarises the methodology applied for the identification of EU regions with high vulnerability to severe energy poverty. A detailed description of the methodology is presented in the report entitled "*Methodology for the identification of EU regions with higher vulnerability to severe energy poverty*" (EPAH, 2026).

The methodology follows a two-step approach, combining quantitative and qualitative data to identify regions with potentially higher vulnerability to energy poverty across the EU. First, a top-down assessment was conducted using regionally detailed statistical data representing diverse dimensions of energy poverty, including income, climate, housing, and energy affordability. The selected indicators are relevant to energy poverty diagnosis and are among the few regularly collected at the regional level, enabling the transition from national-scale vulnerability assessments to the identification of priority regions across all EU Member States.

This provides a robust baseline framework that can be consistently applied across the EU while remaining sensitive to local variations. Second, a bottom-up assessment was integrated by engaging national experts in each Member State — the EPAH Antennas — who are familiar with the national, regional, and local contexts and dynamics of energy poverty in their respective countries. Experts were engaged to: validate and characterise the regions previously identified through the top-down approach; suggest additional regions (NUTS 2 or NUTS 3) where justified and supported by data; and identify illustrative communities with higher vulnerability to severe energy poverty.

Top-Down Assessment

In its first step, the top-down assessment considered four indicators for which data were available at the NUTS 2 level. These indicators were:

- **Inability to keep home adequately warm** [ilc_mdes01_r]: represents the share of the population unable 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** [ilc_peps11n]: represents people at risk of poverty (defined as below 60% of median equivalised income after social transfers), or who are severely materially and socially deprived, or living in a household with very low work intensity (Eurostat, 2025b);
- **Arrears on mortgage, rent, utility bills, or hire purchase** [ilc_mdes05_r]: represents the share of the population in arrears on mortgage, rent, utility bills, or hire purchase payments (Eurostat, 2025c);
- **Housing cost overburden rate** [ilc_lvho07_r]: represents the percentage of the population living in households where total housing costs — net of housing allowances — exceed 40% of total disposable income (Eurostat, 2025d).

Data from 2023 were used, as the analysis was conducted in 2025 and not all Member States had published 2024 data at the time. The four indicators were aggregated into a single composite index by calculating their arithmetic mean, with equal weights assigned to each, yielding a ranked list of regions. The full list is presented in Annex 1 (Table A1). One adjustment applied during this aggregation was the exclusion of overseas regions of certain Member States, due to geographical and contextual considerations that make direct comparison with mainland EU regions inappropriate.

In the context of EPAH's technical assistance calls, a threshold was defined above which a region was considered potentially severely vulnerable to energy poverty. The top 60-ranked regions were selected, corresponding approximately to those above the 75th percentile. Several threshold options were tested, and this value was ultimately chosen because it achieves a balance between identifying regions with potentially higher vulnerability to severe energy poverty and ensuring comprehensive geographical coverage across the EU. Additionally, a maximum cap of five regions per country was applied to ensure balanced representation and geographic representativity across Member States. Where this cap was already reached for a given country, the next eligible regions from other Member States were selected instead (Annex 2, Table A2).

Recognising that energy poverty vulnerability extends beyond income, housing, and energy affordability — and is not limited to winter conditions — two additional indicators were integrated to broaden the analytical framework. These include NUTS 3 regions with very high cooling degree day (CDD) values, capturing vulnerability to summer energy poverty, and NUTS 3 regions included in Just Transition Fund (JTF) territories, identifying areas undergoing structural economic transitions. For JTF, all relevant NUTS 3 regions were included in the assessment. For CDD, only regions above the 99th percentile were added.

It is important to note that the results report only the NUTS 3 regions identified through the JTF and CDD criteria that were not already captured by the NUTS 2 regions selected through the four-indicator composite index or the bottom-up expert consultation. This reflects the sequential nature of the methodology: regions are progressively identified according to different criteria, starting with the four energy poverty indicators at the NUTS 2 level, followed by qualitative feedback from the bottom-up assessment also at the NUTS 2 level, and concluding with the NUTS 3 regions identified through the JTF and CDD criteria not previously captured. This approach was selected after testing several alternatives, as it was considered to offer the best balance among data availability, multidimensional criteria, and representativeness across diverse EU contexts.

Bottom-Up Assessment

Following the top-down assessment, an online survey was sent in the 3rd quarter of 2025 to each national EPAH Antenna to validate the preliminary results for their respective country, characterise

the identified regions, and provide further contextual information where relevant. Through the survey, Antennas could also suggest and justify additional NUTS 2 regions and identify illustrative communities considered vulnerable to severe energy poverty in their national context. The identified communities encompass a range of territorial units, including cities, municipalities, neighbourhoods, and other subnational units at the NUTS 2 and NUTS 3 levels, and will be the focus of upcoming EPAH work.

This report provides an overview of the NUTS 2 and NUTS 3 regions identified through the application of the described methodology. These results directly inform the roll-out of EPAH's technical assistance calls and are also relevant to other activities requiring regional-level energy poverty analysis (Annex 3, Table A3).

3. Results and Discussion

This chapter presents and discusses the overall results of the top-down and bottom-up methodology used to identify NUTS 2 and NUTS 3 regions with potentially higher vulnerability to severe energy poverty, in the scope of EPAH's calls for technical assistance. The results reflect the combined application of quantitative statistical indicators and qualitative expert knowledge, offering a multidimensional picture of energy poverty vulnerability across the EU. Country-specific results and analysis are presented in the following section and illustrated through maps, tables, and figures highlighting the identified regions.

Applying the cap of five regions per country, 60 NUTS 2 regions were identified through the arithmetic average of the four statistical indicators relevant to energy poverty diagnosis (Figure 1 and Table 1); the full list is provided in Annex 2. The five-region cap enabled the identification of a diverse set of areas across different geographies while ensuring methodological consistency and balanced representation across Member States. Countries including Belgium, Bulgaria, France, Germany, Greece, Italy, Portugal, Romania, and Spain each had five regions identified in this step. Most results are broadly aligned with known national-level vulnerability patterns — for instance, in Portugal, Spain, Bulgaria, and Greece. Several of the highest-ranked NUTS 2 regions are island territories, including Ionia Nisia (Greece), the Canary Islands (Spain), the Azores and Madeira (Portugal), and Sardinia and Sicily (Italy). Other countries had fewer regions identified, such as Austria, Croatia, and Sweden, while a third group — Finland, Czechia, Estonia, Ireland, Luxembourg, the Netherlands, Poland, and Slovenia — had no regions identified in this segment of the methodology.

The predominant use of socioeconomic indicators led, in some cases, to the identification of regions not typically associated with high energy poverty vulnerability. Notable examples include regions in Denmark and Sweden, which were identified due to relatively high values across the arrears, housing cost overburden rate, and inability to keep home adequately warm indicators. In contrast, countries more commonly associated with higher energy poverty vulnerability, such as Poland, had no regions identified in this segment, as their values for the specific selected indicators were comparatively low in 2023 — highlighting that the chosen indicators or a specific year may not fully capture all dimensions of energy poverty in every national context and its trends.

To illustrate these differences, in 2023 the housing cost overburden rate stood at 15.4% in Denmark, 10.9% in Sweden, and 5.9% in Poland, against an EU-27 average of 8.8%. The share of the population in arrears on mortgage, rent, utility bills, or hire purchase was 7.8% in Denmark, 6.7% in Sweden, and 5.4% in Poland. Furthermore, the inability to keep the home adequately warm was higher in Denmark and Sweden than in Poland in 2023, and has risen noticeably since 2022 — likely reflecting the lasting impact of the 2021–2023 energy crisis, during which electricity prices increased by approximately 186% in Denmark and 86% in Sweden between 2021 and 2022 (Eurostat, 2025f). It is also worth noting that the NUTS 2 region identified in Sweden — Sydsverige

— is located in the south of the country, an area more severely affected by the energy crisis than other parts of Sweden (Nordicenergy, 2024).

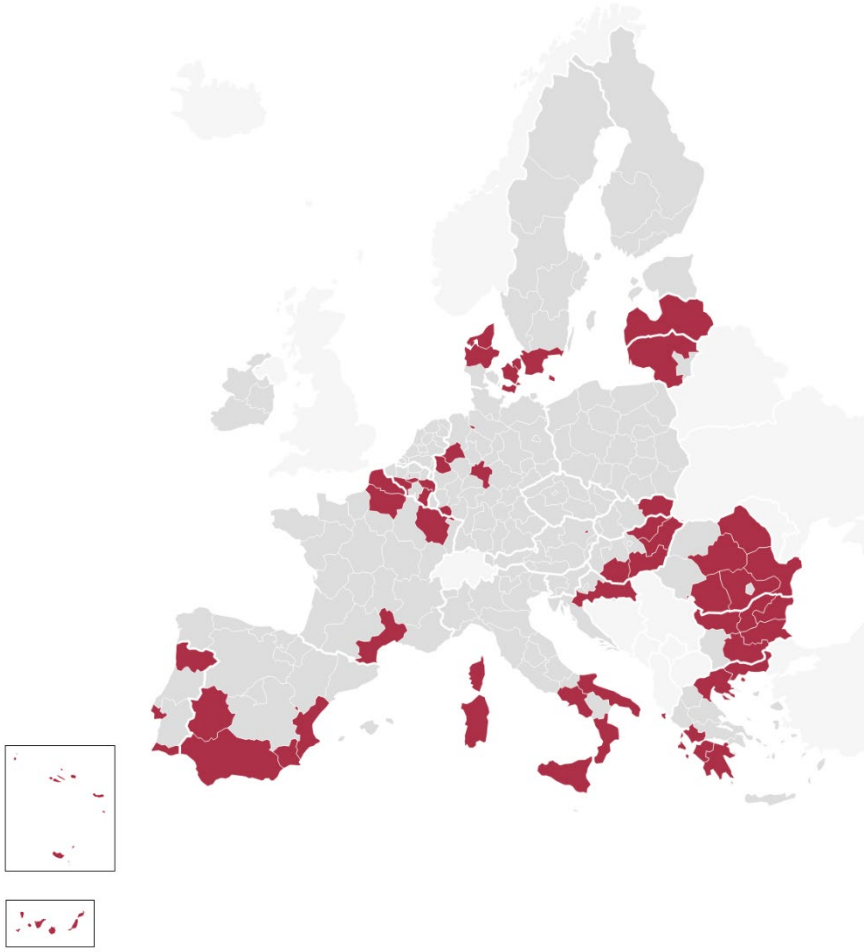

Figure 1: Top 60 NUTS 2 regions identified through the four selected indicators and considering a cap of five regions per country.

Table 1: NUTS 2 regions identified through the four selected indicators and the cap of five regions per country and their representativeness in the respective country.

Member State	Number of identified NUTS 2 regions	Population in the identified NUTS 2 regions as a share of the total population of the country (%)	Total number of NUTS 2 regions in the country
Austria	1	21.8%	9
Belgium	5	37.9%	11
Bulgaria	5	68.7%	6
Croatia	1	25.9%	4
Cyprus	1	100%	1
Czechia	0	0%	8
Denmark	4	50.1%	5
Estonia	0	0%	1
Finland	0	0%	5
France	5	20.2%	27
Germany	5	13.0%	38
Greece	5	35.7%	13
Hungary	4	47.5%	8
Ireland	0	0%	3
Italy	5	30.1%	21
Latvia	1	100.0%	1
Lithuania	1	70.3%	2
Luxembourg	0	0%	1
Malta	0	0%	1
Netherlands	0	0%	4
Poland	0	0%	17
Portugal	5	71.6%	7
Romania	5	65.9%	8
Slovakia	1	29.2%	4
Slovenia	0	0%	2
Spain	5	38.7%	19
Sweden	1	15.0%	8

Recognising that several dimensions of energy poverty were not fully captured by the four selected indicators, a complementary step was added to the top-down quantitative assessment to

incorporate regions belonging to JTF territories and those with very high CDD levels. JTF territories encompass a total of 113 NUTS 3 regions across the EU. Of these, 52 were added as potentially vulnerable to severe energy poverty, as the remaining 61 were already covered by the NUTS 2 regions identified through the four-indicator step or the bottom-up assessment. The assessment of NUTS 3 regions with CDD values above the 99th percentile identified 13 regions, of which 8 were added as new regions, while 5 were already included in the previous steps (Figure 2). An overlap was observed between JTF regions and regions with high CDD values — namely in Cyprus, Greece, Malta, and Spain — meaning that, in total, only 55 NUTS 3 regions were identified as new additions to the list.

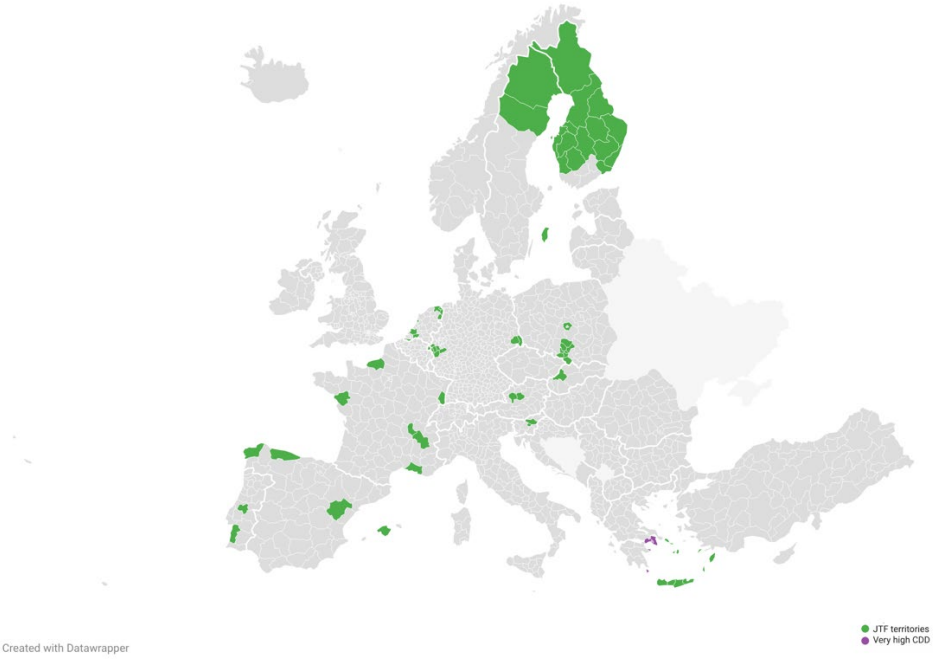

Figure 2: Regions identified through the JTF and High CDD criterion.

In the bottom-up segment of the methodology, the national EPAH Antennas made distinct yet complementary contributions to the top-down assessment. They validated all regions identified through the top-down approach and contributed to the inclusion of an additional 54 NUTS 2 regions (Figure 3). Some Antennas provided quantitative evidence drawn from country-specific energy poverty studies and national datasets, while others offered qualitative characterisations of regions based on their on-the-ground experience. In most cases, Antennas suggested additional NUTS 2 regions they consider vulnerable to severe energy poverty and that they could justify and

characterise. Antennas were also asked to identify specific illustrative communities they consider particularly at risk; the results from this step will be the subject of future EPAH work.

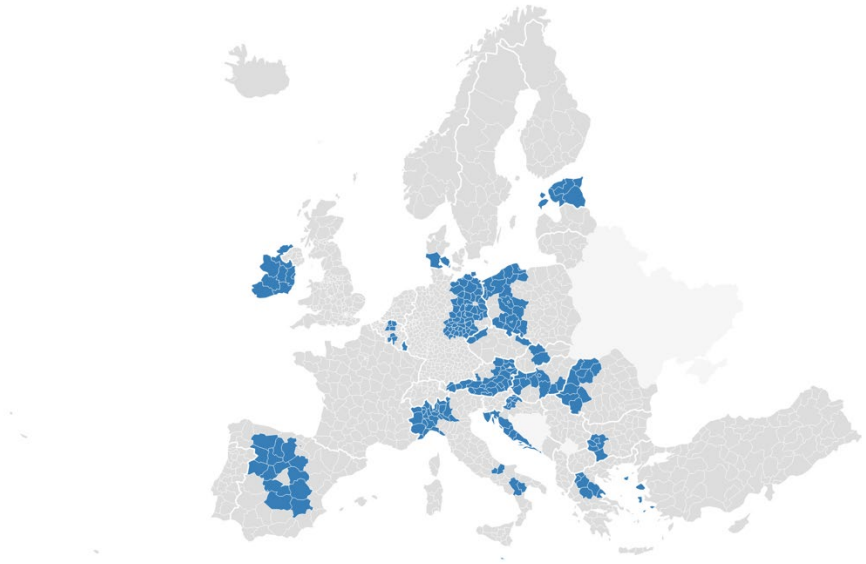

Figure 3: Regions identified by the National EPAH antennas through the Bottom-Up assessment.

A limitation of the bottom-up assessment is that Antenna contributions are inherently subjective and directly linked to the maturity of energy poverty research, policy, and action in their respective countries and their own knowledge and perceptions. Antennas from countries with more advanced research, monitoring systems, detailed data availability, active policy agendas, and experienced stakeholder networks are likely to provide more granular, evidence-based, and systematically validated input. Conversely, in countries where energy poverty remains an emerging policy issue, contributions may rely more heavily on expert judgement, partial datasets, or fragmented local knowledge. This asymmetry introduces comparability challenges across Member States. Additionally, Antennas' contributions are shaped by the geographic regions in which they operate and their institutional focus, which may introduce a degree of bias into the assessments. These are recognised limitations of this segment of the methodology that should be considered when interpreting cross-country comparisons.

A further consideration raised by several Antennas is that the NUTS 2 level may be too coarse an administrative unit to adequately characterise energy poverty vulnerability in some countries. The number of NUTS 2 regions per country is determined by population size, resulting in significant variation, ranging from a single NUTS 2 region in countries such as Cyprus and Latvia, to a large number in countries such as Germany and France, which affects both the granularity of the analysis and the comparability of results across Member States.

Figure 4 presents all regions identified through this sequential, multi-staged approach, and the full list is provided in Annex 3 (Table A3). Among the 114 NUTS 2 and 55 NUTS 3 regions identified,

every Member State has at least one region represented. The number of NUTS 2 regions identified per country ranged from 1 to 11. For NUTS 3 regions, not every Member State had new regions listed, as in some cases the identified NUTS 3 regions were already covered by previously selected NUTS 2 regions, while in some countries, as many as 14 new NUTS 3 regions were identified.

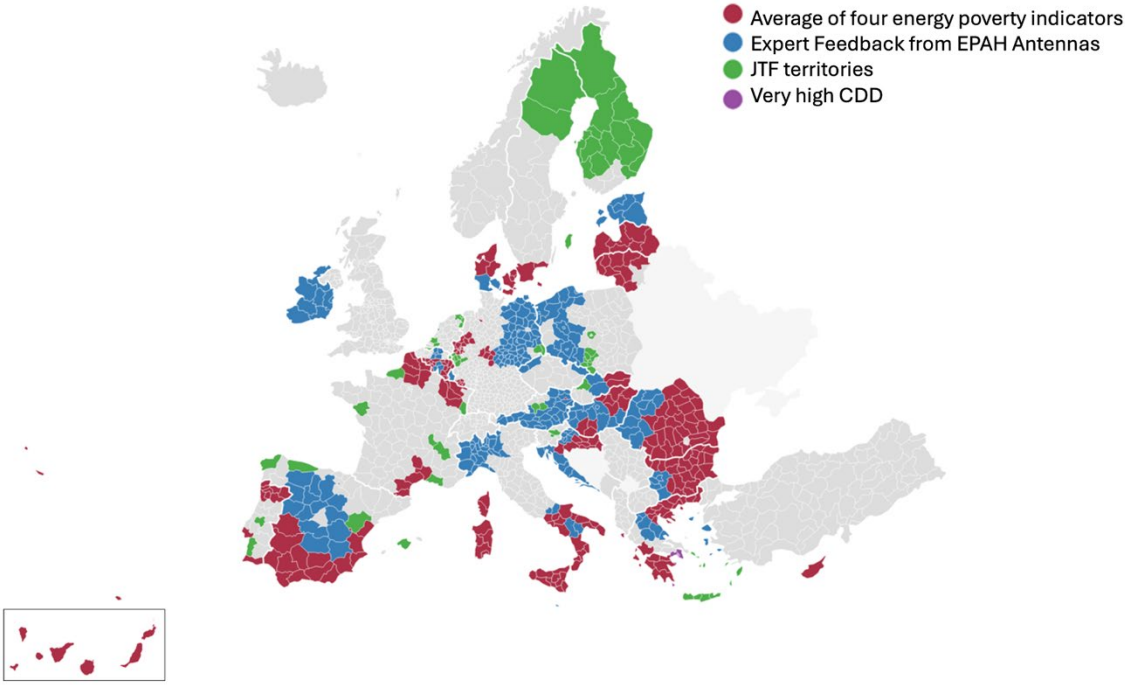

Figure 4: Map with the NUTS 2 and NUTS 3 regions identified as potentially vulnerable to severe energy poverty (covering all stages of the methodology developed by EPAH).

3.1 Austria

Austria has nine NUTS 2, with one being identified in the quantitative methodology based on the arithmetic average of four energy poverty indicators (Table 2). A total of 13 NUTS 3 regions were identified as JTF territories in Austria, none of which were previously included in the NUTS 2 region identified. No regions with very high CDD levels were identified.

***Wien* (Vienna) (AT13)** was identified by the top-down indicators quantitative methodology (Table 2). The NUTS 3 included as part of the Just Transition Plans are **Mostviertel-Eisenwurzen (AT121)**, **Niederösterreich-Süd (AT122)**, **Graz (AT221)**, **Östliche Obersteiermark (AT223)**, **West- und Südsteiermark (AT225)**, **Westliche Obersteiermark (AT226)**, **Unterkärnten (AT213)**, **Klagenfurt-Villach (AT211), Traunviertel (AT315),** and **Steyr-Kirchdorf (AT314)**, which were added to the assessment. Figure 5 and Table 3 cover the final results for Austria.

Table 2: Austria's NUTS 2 regions identified through the quantitative approach and the national value for the selected indicators (2023).

NUTS 2	IHAW	AROPE	ARREARS	HCOR	Position on ranking
Vienna (AT13)	6.9*	29.5	6.9*	6.3*	59
Austria	3.9	16.9	6.9	6.3	-

**Austria did not have values at the NUTS 2 level for these indicators on EUROSTAT, so national averages were considered.*

The national EPAH Antenna answering the survey was Klimabündnis Österreich GmbH. Factors such as housing quality, household income, energy prices, and household composition (e.g., elderly individuals, single-parent families) were identified as primary determinants of energy poverty vulnerability in Austria. Regarding statistics and sources other than those used in the top-down quantitative methodology, the KEA, E–Control, and Statistik Austria were highlighted as national organisations that provide reports on energy and housing vulnerability. As an overall limitation of the results for Austria, the national EPAH Antenna indicated that **the results do not reflect the urban–rural divide that underpins energy poverty in Austria**. The Antenna indicated two main groups of energy poverty vulnerability in Austria: **urban areas**, affected by high living costs, rental-dominated housing markets, and older, poorly insulated buildings, and **rural areas**, characterised by low incomes, outdated heating systems, and limited renovation activity. These two dimensions were not captured by the methodology, which only included one urban NUTS 2.

The identification of **Vienna** as a NUTS 2 area was validated by the national EPAH Antenna, which indicated that national data and studies on energy poverty in Austria highlight Vienna as a hotspot of vulnerability. According to the KEA Monitoring Report 2024 (KEA, 2024), Vienna's vulnerability is driven by a concentration of single-person and low-income households, a high proportion of tenants living in poorly insulated buildings, and above-average housing cost burdens. These structural conditions significantly increase the risk of energy deprivation, particularly amid rising

energy prices. According to national and regional reports, Viennese households report a higher-than-average inability to keep their homes adequately warm and arrears on energy bills (A&W blog, 2023; Statistik Austria, 2023).

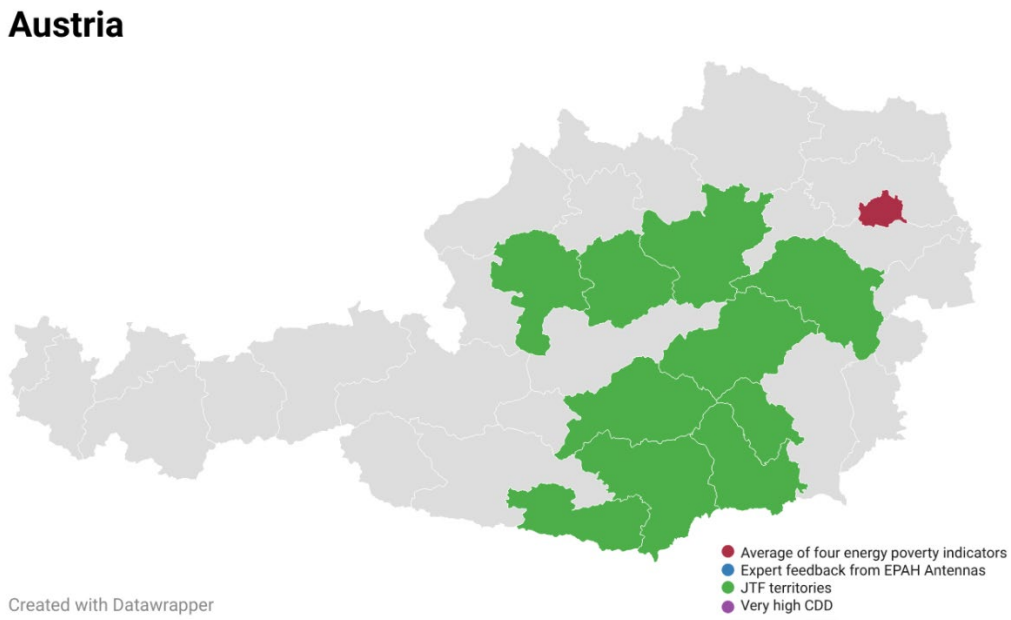

Figure 5: Regions identified in Austria with higher vulnerability to severe energy poverty.

Table 3: NUTS 2 and NUTS 3 regions with potentially higher vulnerability to energy poverty in Austria, according to the respective criteria of identification.

NUTS 2 identified by the four indicators step	NUTS 2 identified by the Antenna	NUTS 3 regions with very high CDD	JTF Territories (NUTS 3)
Vienna (AT13)	None	None	Mostviertel-Eisenwurzen (AT121)
			Niederösterreich-Süd (AT122)
			Graz (AT221)
			Östliche Obersteiermark (AT223)
			West- und Südsteiermark (AT225)
			Westliche Obersteiermark (AT226)
			Unterkärnten (AT213)
			Klagenfurt-Villach (AT211)
			Traunviertel (AT315)
			Steyr-Kirchdorf (AT314)

3.2 Belgium

Among the 11 NUTS 2 in Belgium, five were identified in the top-down quantitative methodology. The three JTF territories identified in Belgium are already inserted in one of the NUTS 2 regions, so they were not listed as new regions. On the bottom-up qualitative segment of the methodology, the national EPAH Antenna suggested the inclusion of three additional NUTS 2.

The five NUTS 2 identified in the quantitative methodology were ***Région de Bruxelles-Capitale/Brussels Hoofdstedelijk Gewest* (BE10, Brussels)**, ***Prov. Hainaut* (BE32, Hainaut)**, ***Prov. Brabant wallon* (BE31, Walloon Brabant)**, ***Prov. Liège* (BE33, Liège)** and ***Prov. Luxembourg (BE)* (BE34, Luxembourg, Belgium)** (table 4). The EPAH antenna proposed the inclusion of three additional regions: ***Prov. Vlaams-Brabant* (BE24, Flemish Brabant)**, ***Prov. Antwerpen* (BE21)** and ***Prov. Namur* (BE35).** Belgium has territories included in approved territorial just transition plans, which are **Arrondissements de Tournai (BE328)**, **Mons (BE323),** and **Charleroi (BE32B)**, already included in the NUTS 2 regions identified. No summer vulnerability NUTS 3 was identified in Belgium. All identified regions for Belgium are mapped in Figure 6 and listed in Table 5.

Table 4: Belgium NUTS 2 and national average value on the selected indicators.

NUTS 2	IHAW	AROPE	ARREARS	HCOR	Position on ranking
Brussels (BE10)	10.0	37.6	4.9	15.8	26
Hainaut (BE32)	11.4	28	10.9	8	40
Walloon Brabant (BE31)	14.5	20.9	6.3	12.1	466
Liège (BE33)	10.6	22.6	6.9	9.2	54
Luxembourg, Belgium (BE34)	13.3	20.6	3.1	10	57
Belgium	5.9	18.6	4.7	7.7	-

The national EPAH Antenna for Belgium is Climate Alliance, which identified the factors of rural or remote areas, housing quality, household income, employment rates, economic activity, and household composition as the most relevant for identifying energy poverty in Belgium. Regarding other relevant indicators and metrics to estimate the number of households in energy poverty, it was addressed that in Belgium, indirect measurements are used based on households' eligibility for social incentives and other income-related indicators. The Antenna also provided as a source, a national energy poverty barometer (Meyer & Coene, 2024), which assessed energy poverty vulnerability by income levels and showed a partial overlap between energy poverty and income poverty. It was also indicated that indicators more related to household composition and level of urbanization should be considered to identify energy poverty. The EPAH Antenna validated that

the identification of these NUTS 2 was aligned with national studies, namely with the barometer on energy poverty (Meyer & Coene, 2024).

The following paragraphs describe examples of vulnerable NUTS 2 identified by the methodology.

Brussels Capital (BE10) was characterized as an urban area with low housing quality, particularly in specific communes and historical areas. The Antenna indicated that most buildings have low energy efficiency, based on an aerial thermography map, which captured the level of insulation of buildings in the city of Brussels (City of Brussels, n.d.) and that, in Brussels, 40.3% of buildings have an Energy Performance Certificate (EPC) below "E" class, way higher than the national average of 28.2% (Cralux, n.d.). The Antenna also highlighted that household income is uneven across these regions, with some communes among the lowest-income areas in Belgium (Statbel, 2024a). Regarding household composition, 14.6% of households in Brussels are single-parent households (Statbel, 2024b).

The identification of **Hainaut** was justified by its significant share of population at risk of poverty and social exclusion, and 13.2% report severe material and social privation (Statbel, 2025). A major urban centre in **Hainaut**, **Charleroi**, reflects the broader structural vulnerabilities of the province, presenting a declining population, ageing demographic structure, and high unemployment rates (Urbistat, n.d.). In terms of the built environment, the province exhibits a disproportionately older housing stock, especially in post-industrial urban areas like Charleroi. A significant portion of buildings in Charleroi were constructed before 1945, and many require extensive renovation to meet modern energy performance standards (Iweps, n.d.). Additionally, the social landscape of **Hainaut** encompasses various vulnerable household types, including unemployed individuals, single-parent families, and elderly residents on fixed incomes.

Walloon Brabant is situated in central Wallonia, presenting a unique socioeconomic profile compared to other regions in Belgium. Although it is generally perceived as more affluent, it faces pockets of vulnerability and growing concerns about energy poverty, particularly among low-income households and isolated residents. The Antenna highlighted that local stakeholders, including energy poverty advocates and municipal actors, noted that certain households in Brabant Wallon face disproportionate energy burdens due to factors such as poor housing efficiency, rising energy prices, and limited public transport infrastructure, particularly in semi-rural and peri-urban areas. The region's demographic composition includes a significant number of elderly residents living in detached housing, often in suburban or rural settings, where energy retrofitting is both more costly and more logistically complex. The Antenna indicated a lack of data related to energy efficiency or building stock, but highlighted some local news that displays the region's vulnerability. For example, one article reported that households are having to choose between heating, eating, and healthcare (Écolo Genappe, 2024) or choosing to spend the day at community centres to avoid energy expenditure at home (Province du Brabant Wallon, n.d.).

Liège, located in eastern Wallonia, is one of Belgium's regions most significantly affected by poverty, social exclusion, and structural inequalities. This region was also recently affected by floods. According to national indicators, it remains among the areas with a high risk of poverty or social exclusion, reflecting persistent socio-economic challenges that intersect with energy-related hardship (Statbel, 2025). The energy performance of buildings in the region, as in much of Wallonia, is generally low, with many dwellings constructed before modern efficiency standards were introduced (Wallonie Énergie SPW, n.d.). Poor insulation, outdated heating systems, and limited financial capacity among residents contribute to significant energy gaps between theoretical and actual thermal comfort. Furthermore, the demographic profile of Liège reveals a mix of elderly residents living in older homes, single-parent households, and migrants, many of whom are disproportionately affected by high energy costs and inefficient housing.

Prov. Luxembourg (BE), located in the southernmost part of Wallonia, presents a distinct profile within the Belgian regional landscape. While it is the least densely populated province in the country, its vast rural character and dispersed settlement patterns present unique challenges for identifying and addressing energy poverty. Despite these characteristics, there is currently a notable lack of publicly available data and targeted studies on energy poverty in the Luxembourg province. This data gap represents a significant barrier to understanding the full scope and dynamics of energy poverty in this region. Nevertheless, **Luxembourg** shares several characteristics with other rural and semi-rural parts of Wallonia, including a predominantly aging housing stock, particularly in smaller local governments and isolated villages, greater reliance on individual heating systems, such as oil-fired boilers and wood stoves, which are typically less efficient than urban district systems, limited public transport infrastructure, which increases household energy needs and reduces access to centralized support services.

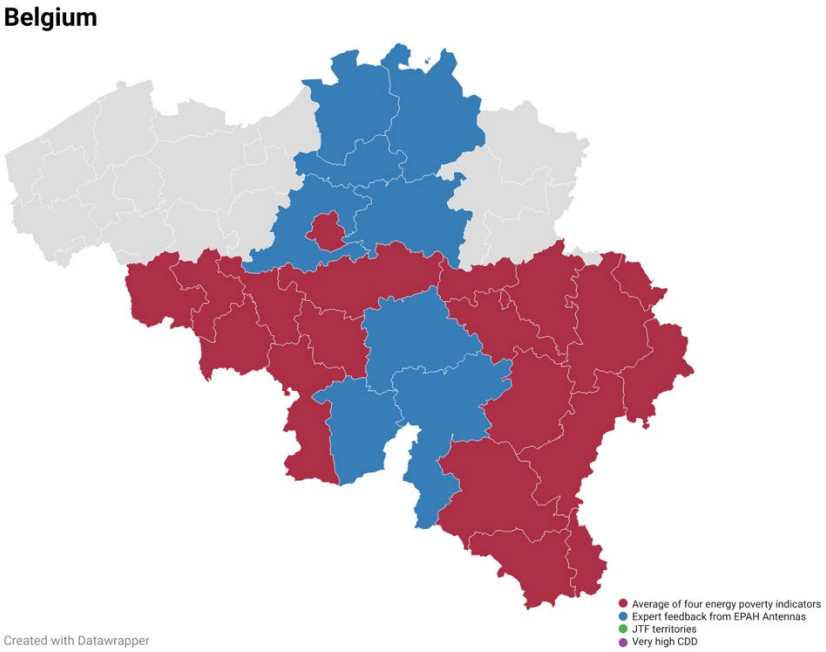

Figure 6: Regions identified in Belgium with higher vulnerability to energy poverty. The map shows the division by NUTS 3. Highlighted are the Top-Down and Bottom-up NUTS 2.

*Table 5: Results for Belgium. Regions marked with a * represent regions that are already included in a NUTS 2 identified in the first two columns.*

NUTS 2 identified by the indicators methodology	NUTS 2 identified by the Antenna	High CDD regions (Corresponding NUTS 3 code)	JTF Territories (Corresponding NUTS 3 code)
Région de Bruxelles-Capitale/Brussels Hoofdstedelijk Gewest (BE10)	Prov. Vlaams-Brabant (BE24)	None	Arrondissements de Tournai (BE328)*
Prov. Hainaut (BE32)	Prov. Antwerpen (BE21)		Mons (BE323)*
Prov. Brabant wallon (BE31)	Namur (BE35)		Charleroi (BE32B)*
Prov. Liège (BE33)			
Prov. Luxembourg (BE) (BE34)			

3.3 Bulgaria

Five of the six NUTS 2 regions in Bulgaria were identified as vulnerable by the methodology's quantitative component, and two additional JTF NUTS 3 regions were added. In the qualitative segment of the methodology, the Antenna proposed including the missing NUTS 2.

The five NUTS 2 regions identified using the top-down quantitative methodology were ***Severen tsentralen*** **(BG32, Northern Central)**, ***Severozapaden*** **(BG31, Northwestern)**, ***Yugoiztochen*** **(BG34, Southeastern)**, ***Yuzhen tsentralen*** **(BG42, Southern Central),** and ***Severoiztochen*** **(BG33, Northeastern)** (Table 6). **Southwest (BG41)** was proposed for inclusion by the EPAH national Antenna. Bulgaria also has territories included in approved territorial Just Transition Plans: **Stara Zagora (BG344), Pernik (BG414),** and **Kyustendil (BG415),** which are already identified as NUTS 2 regions. Figure 7 and Table 7 identify all the results for Bulgaria.

Table 6: Bulgaria NUTS 2 and national average value on the selected indicators.

NUTS 2	IHAW	AROPE	ARREARS	HCOR	Position on ranking
Northern Central (BG32)	22.8	38.2	25.2	16.8	6
Northwestern (BG31)	21.1	37	22.8	15.8	8
Southeastern (BG34)	21.2	32.8	20.1	11.5	12
Southern Central (BG42)	18.6	35.8	16.5	11.9	14
Northeastern (BG33)	16.2	28.6	19.7	9.4	21
Bulgaria	20.7	30	18.8	11.1	-

Housing quality, household income, employment rates, and economic activity, household composition (*e.g.,* elderly, single-parent families), and lack of political decision-making/priority/commitment were the main factors of energy poverty in Bulgaria identified by the national EPAH Antenna, Cleantech Bulgaria. The Antenna also provided additional reports and databases relevant to identifying energy poverty in the country, such as those from the Bulgarian Statistical Institute, the World Bank, and the Bulgarian Academy of Sciences. All the NUTS 2 identified in the Top-down approach were validated by the antenna.

The following sections describe examples of vulnerable regions in Bulgaria. **Northern Central** was characterised by structural economic decline, low employment rates, and limited access to modern energy infrastructure. Many households reside in informal or substandard housing, often lacking adequate heating or insulation (Peneva, 2023). Elderly and socially isolated individuals comprise a significant portion of the at-risk population (NSI+, n.d.). The regional national income

was 18,931 BGN in 2023 (national average 24,147 BGN) (NSI, n.d). **Northwestern** is a region that consistently ranks lowest across key national indicators, with extremely low household income (19,020 BGN) (NSI, n.d.) and a high unemployment rate (55.8%, the second-highest in all Bulgarian regions) (NSI+, n.d.). Housing quality is poor, with many dwellings lacking insulation or modern heating systems. This region also presents a coefficient of Gini higher than the national average, 38.5 (2023) (national average 37.2) (NSI+, n.d.). A significant share of the population, particularly elderly individuals, relies on solid fuels such as firewood and suffers from high energy expenditure relative to income (Peneva, 2023; Robayo-Abril and Rude, 2024). **Southeastern** is a region that experiences both cold winters and hot summers, increasing the need for year-round energy use. Limited modern infrastructure, combined with low incomes (19,857 BGN) (NSI, n.d.) and poor housing conditions, creates a multidimensional risk. Elderly households and isolated communities constitute a significant proportion of the vulnerable population (Peneva, 2023; Robayo-Abril and Rude, 2024). **Southern Central** is marked by an ageing housing stock and high poverty rates. Households face high energy burdens, and heating is often inefficient. Climatic conditions also pose challenges during colder months, particularly in mountainous zones. The risk of poverty in 2023 was 30.6% (NSI+, n.d.) while the region's yearly salary was below the national average (19,313 BGN) (NSI+, n.d.). Finally, **Northeastern** was characterised as a region with low economic activity and declining agricultural employment; the region also faces housing degradation and widespread use of inefficient heating. Vulnerable demographics, particularly older households and low-income families in rural areas, are disproportionately affected by exposure to extreme weather conditions, including cold winters and hot summers (Peneva, 2023). The risk of poverty in 2023 was 26.3% (NSI+, n.d.), and the region's average annual salary was 20,984 BGN (NSI, n.d.).

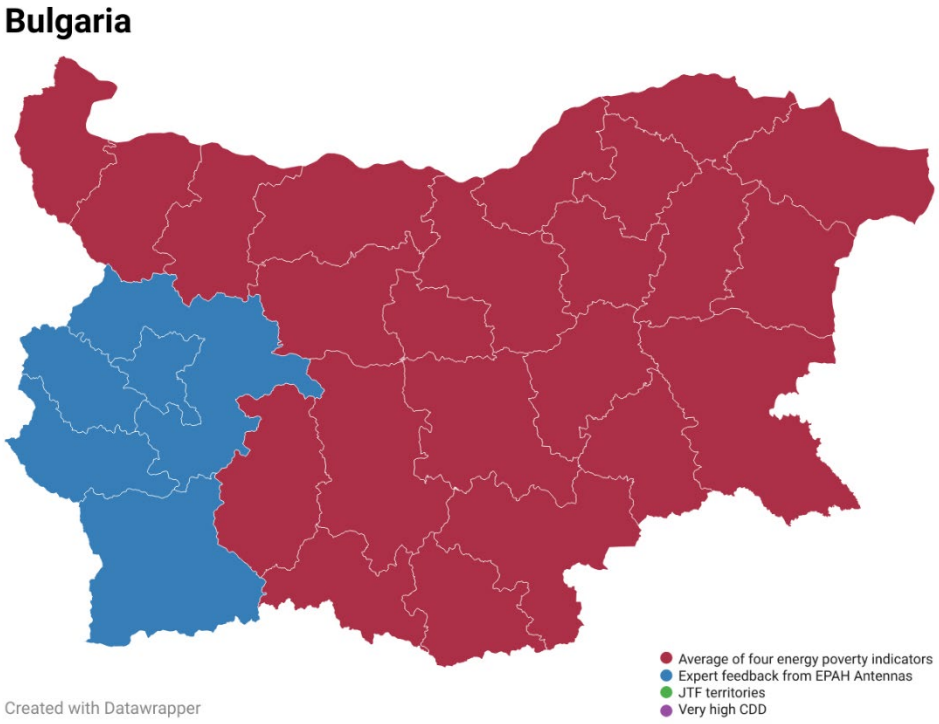

Figure 7: Regions identified in Bulgaria with higher vulnerability to energy poverty. The map shows the division by NUTS 3. Highlighted are the Top-Down and Bottom-Up NUTS 2.

*Table 7: Results for Bulgaria. Regions marked with a * represent regions that are already included in a NUTS 2 identified in the first two columns.*

NUTS 2 identified by the indicators methodology	NUTS 2 identified by the Antenna	High CDD regions (Corresponding NUTS 3 code)	JTF Territories (Corresponding NUTS 3 code)
Northern Central (BG32)	Southwest (BG41)	None	Stara Zagora (BG344)*
Northwestern(BG31)			Pernik (BG414)*
Southeastern (BG34)			Kyustendil (BG415)*
Southern Central (BG42)			
Northeastern (BG33)			

3.4 Croatia

One of the four NUTS 2 regions in Croatia was identified as vulnerable to energy poverty in the quantitative methodology, three were added by the EPAH antenna, and two NUTS 3 were identified as JTF territories. The top-down methodology identified **Panonska Hrvatska** (HR02, Pannonian Croatia) as a region vulnerable to energy poverty (Table 8). Croatia has territories included in approved territorial just transition plans: **Sisak-Moslavina** (HR028) and **Istria** (HR036), which are already identified as NUTS 2 regions. Figure 8 and Table 9 cover the final results for Croatia.

Table 8: Croatia NUTS 2 and the national average value on the selected indicators.

NUTS 2	IHAW	AROPE	ARREARS	HCOR	Position on ranking
Pannonian Croatia (HR02)	6.9	31.3	12.2	5.6	43
Croatia	6.2	20.7	12.7	4.0	-

The national EPAH Antenna in Croatia, DOOR, identified rural or remote areas, housing quality, household income, household composition (*e.g.*, elderly, single-parent families), and hard-to-reach energy users *(e.g.*, migrants, Roma communities) as key factors in identifying energy poverty. The Antenna validated the top-down results and advocated the inclusion of the whole country as vulnerable to energy poverty, justifying this with the presence of different vulnerability factors among the four NUTS 2.

The following paragraph describes a vulnerable region in Croatia. **Pannonian Croatia**, which was predominantly rural, was significantly affected by the 1990s war. Parts of the region were occupied during the conflict, and the area remains economically disadvantaged. It is known for its strong conservative values, and agriculture remains a major source of income. A notable number of microenterprises are registered at the same addresses as households, indicating a substantial overlap between domestic and business spaces. The primary sectors of activity are agriculture and services. Certain areas have a high concentration of minority populations. The local population is generally older, less educated, and holds traditional views. The region is sparsely populated overall. In Slavonski Brod, the second-largest city in the region, air quality is poor, primarily due to fossil fuel-intensive industrial activity across the border in Bosanski Brod, located in Republika Srpska, Bosnia and Herzegovina. The risk of poverty rate was 29.7% in 2024 (national average 20.3%), and the percentage of people at risk of poverty or social exclusion was 31% (national average 21.7%) (Croatian Bureau of Statistics, 2025).

Northen Croatia, is a rural regions characterized by the lowest GDP per capita and regions where the population has the lowest level of education (Eurostat, 2025). Two examples of vulnerable regions in this NUTS 2 were provided. One of the regions was **Međimurje County**. It this regions,

manufacturing represents the main economic activity of the region with 37,8% of all people in official employment working in this (highest figure in the country) (Statistics of Croatia, 2024a). A vast majority of enterprises in 2023 are small and micro enterprises (Hrvatska Gospodarska Komora, n.d.). **Međimurje** is an upper-mid-level Croatian county in terms of the subnational human development index, when compared to the national average, with the latest score of 0.856 in 2022 (Global Data Lab, n.d.). It holds the second-highest share of the rural population (62.2%) in Croatia (Institute of Ethnology and Folklore Studies, 2020). Additionally, the number of people in the county utilising the GMB has been on the rise since 2021, and in 2023 it amounted to 3896 residents of **Međimurje** (Međimurje County, n.d.). In 2021, **Međimurje** had the largest number of young people and the lowest average age (Statistics of Croatia, 2022), with the most favourable ageing index and coefficient (Statistics of Croatia, 2021a). Among people aged 15 or older, as of 2021 (Statistics of Croatia, 2021b), a below-average 16% of the population had completed some form of higher education. In 2021, the average household size was 3.1, the highest in the country (Statistics of Croatia, 2021b). In 2021, the number of household members (co-)owning the dwelling in which they live was 93.3% (Statistics of Croatia, 2021b). A comparison by county shows that occupied apartments have the largest average surface area in **Međimurje** (114 m^2) (Statistics of Croatia, 2021a). In terms of migrations between counties, **Međimurje** is relatively stable, with only a barely negative count (-3) of people displaced from this county to others and with a much larger share of emigration targeting foreign countries. However, in recent years, the county has seen an influx of foreign workers, with figures from 2023 suggesting a halt to the negative net migration rates from previous years, mostly due to foreign immigration (Statistics of Croatia, 2024b). **Međimurje** hosts the largest share of the Roma population in the country, with around 6,5% in 2021 (Statistics of Croatia, 2021a). Other regions identified was **Koprivničko-križevačka county.** Here, similarly to t Međimurje, the highest economic activity is manufacturing, with 27.8% of total county employees working in this field (Statistics of Croatia, 2024a). Besides manufacturing, it also holds significant importance in the trade, construction, and agriculture industries. Micro and small companies make up 98% of the economic structure of **Koprivničko-križevačka**. It is a below-average and mid-level county in terms of subnational HDI (0.847 in 2022) (Global Data Lab, n.d.). The percentage of the population living in rural areas is 46.2% (Institute of Ethnology and Folklore Studies, 2020). Despite having a below national average risk of poverty rate, a high risk of poverty is observed in the population aged 65 or over (34.8%) (Statistics of Croatia, 2021b). According to the most common activity status, the highest risk is faced by unemployed individuals (45.2%) (Koprivničko-križevačka County, 2025). The same source states that the age structure of the population shows that most of the population of **Koprivničko-križevačka** was in the age group of 20-64 years (58.4%), 22% of the population were people aged 65 and over, while the smallest share of residents (19.6%) was in the age group of 0-19 years. Among people aged 15 or older, in 2021, 16,6% completed higher education, which is below the national average. At the same time, women with higher education degrees are at

55,7%, which is barely below average (Statistics of Croatia, 2021b). In **Koprivničko-križevačka**, the average household size is 2.9, which is among the highest figures in the country (Statistics of Croatia, 2021b). In 2021, 92% of household members (co-) owned the dwelling in which they lived. With an average surface area of occupied apartments of 108 m^2, **Koprivničko-križevačka** is among the top counties in this housing aspect. **Koprivničko-križevačka** is losing population to other counties, with the between-counties migration rate at -165. However, like most of the country, in recent years it has seen an increase in foreign immigration, improving its total net migration rate to a positive 294 in 2023 (Statistics of Croatia, 2024b).

City of Zagreb NUTS 2 holds the capital of the country, Zagreb. In recent years, **Zagreb** has registered an increase in the risk of poverty and social exclusion, potentially leading to a higher risk of energy poverty. The number of Guaranteed Minimum Benefit (GMB) beneficiaries has increased in 2023 compared to 2022, particularly in districts such as Pešćenica, Zitnjak, Dubrava, and Sesvete. Comparing the number of people receiving housing benefit in 2023 with the number of people receiving GMB, it was found that less than 30% of GMB beneficiaries also used housing benefit. The analysis of this disparity reveals other factors, namely that the buildings in which GMB beneficiaries reside are mainly not legalised (most often in the areas of the city districts of Pešćenica and Dubrava, where the largest number of GMB beneficiaries are located). A certain number of GMB beneficiaries work illegally (their employers do not cover their health and social benefits due to various reasons), and these beneficiaries do not submit a request for the realisation of the right to housing costs due to fears that their families will lose social rights.

Adriatic Croatia is characterized by a geographically diverse coastal region with strong urban - rural contrasts. Employment is largely driven by tourism and services, with the sector exerting the highest tourism pressure in the country (Eurostat, 2025), resulting in high seasonality. One vulnerable region in this NUTS 2 is **Zadar County**. This territory encompasses islands, the coast, the rural hinterland, and the mountainous area of the Velebit mountain range. The coastal belt is densely populated and has greater economic dynamics and a concentration of human resources (especially in the City of Zadar). In contrast, the rural areas of the islands and the hinterland are sparsely populated and experiencing intense depopulation. Tourism is the primary source of income in the economy. In addition to tourism, the food processing industry, fishing, mariculture, and shipping are key economic sectors for the overall development of **Zadar County**. The largest share of **Zadar County** residents belongs to the age group over 60 years of age, and a comparison of the 2021 Census with the 2011 Census shows a decline in the number of working-age population (in 2021, the total number of working-age residents was 98 211, which represents a significant decrease compared to the 2011 Census when it was 111 652) (Statistics of Croatia, 2021). The average net salary in 2022 at the national level of the Republic of Croatia was 986.00 euros, while the average net salary in Zadar County was lower, at 909.00 euros (Statistics of Croatia, 2021). Zadra Nova – a regional agency active in the **Zadar County** area - estimates that

the number of citizens at risk of poverty and social exclusion, by age group, amounts to 4,211 children and young people aged 0 to 24. It is estimated that between the ages of 20 and 64, 1,676 people in **Zadar County** face severe material deprivation, 830 people are socially excluded and beneficiaries of the guaranteed minimum benefit, 3,241 people face the risk of food deprivation, and 72 people face the risk of homelessness. As for the age group 65 and older, it is estimated that around 5,000 residents are at risk of social exclusion and poverty, predominantly those living alone or in rural and secluded areas (rural hinterland, the mountainous areas, and islands).

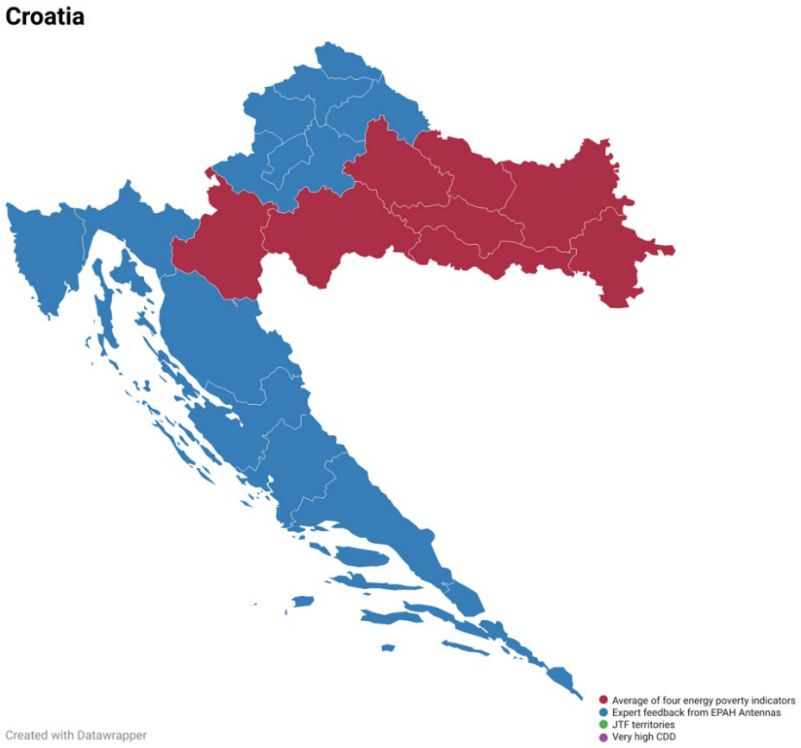

Figure 8: Regions identified in Croatia with higher vulnerability to energy poverty. The map shows the division by NUTS 3. Highlighted are the Top-Down and Bottom-Up NUTS 2.

*Table 9: Results for Croatia. Regions marked with a * represent regions that are already included in a NUTS 2 identified in the first two columns.*

NUTS 2 identified by the indicators methodology	NUTS 2 identified by the Antenna	High CDD regions (Corresponding NUTS 3 code)	JTF Territories (Corresponding NUTS 3 code)
Pannonian Croatia (HR02)	City of Zagreb (HR05)	None	Sisak-Moslavina (HR028)*
	Northern Croatia (HR06)		Istria (HR036)*
	Adriatic (HR03)		

3.5 Cyprus

Given Cyprus's size and population, the country is divided into a single NUTS 2 and NUTS 3 region, which was identified as a vulnerable area across the three segments of the top-down quantitative methodology.

Considering these restrictions, Cyprus was identified in the quantitative methodology in terms of socio-economic indicators (Table 10), in the JTF territories NUTS 3, and in high CDD regions (Figure 9, Table 11).

Table 10: Croatia NUTS 2 and the national average value on the selected indicators.

NUTS 2	IHAW	AROPE	ARREARS	HCOR	Position on ranking
Cyprus	17.1	17.4	13.9	2.6	51

The Cyprus Energy Agency, the national EPAH Antenna, identified factors related to housing quality, energy prices, and hard-to-reach energy users as relevant vulnerability factors in the country and validated the identification of Cyprus as a country vulnerable to energy poverty. However, due to the country's size, Cyprus would benefit from a more detailed regional analysis and criteria for identifying vulnerable regions. Considering this, the Antenna provided two criteria for further identifying regions in Cyprus. One of them was regions where the percentage of special tariff beneficiaries exceeded 10% of the population. This tariff is a socially targeted electricity pricing scheme for vulnerable consumers, as provided by the Electricity Authority of Cyprus (EAC, 2025). These criteria are revised annually, and therefore, the results may vary from year to year.

Other criteria for identifying areas vulnerable to energy poverty include regions with established refugee settlements. The settlements built between 1974 and the mid-1980s, following the island's partition to accommodate internally displaced people, have since been generally neglected. Many houses and building blocks have not only poor energy performance but also structural issues. Due to this reason, the government has launched a plan to refurbish 43 of the 358 high-rise buildings. The 315 remaining areas, together with the row houses, are characterised by a high concentration of low-quality buildings and low-income households. Therefore, these settlements are considered a crucial category of areas affected by energy poverty.

Figure 9: Regions identified in Cyprus with higher vulnerability to energy poverty. The map shows the division at the NUTS 3 level (Cyprus has only one NUTS 3). Highlighted is the Top-Down NUTS 2.

*Table 11: Results for Cyprus. Regions marked with a * represent regions that are already included in a NUTS 2 identified in the first two columns.*

NUTS 2 identified by the indicators methodology	NUTS 2 identified by the Antenna	High CDD regions (Corresponding NUTS 3 code)	JTF Territories (Corresponding NUTS 3 code)
Cyprus (CY00)	None	Cyprus (CY000)	Cyprus (CY000)*

3.6 Czechia

Czechia has eight NUTS 2. None was identified in the top-down quantitative assessment, and three NUTS 3 were identified, as part of the JTF territories. In the Bottom-up assessment, two NUTS 2 were identified by the Antenna.

The NUTS 3 identified as part of the JTF were **Moravian-Silesian Region (CZ080, *Moravskoslezský kraj*)**, the **Ústí nad Labem Region (CZ042, *Ústecký kraj*),** and the **Karlovy Vary Region (CZ041, *Karlovarský kraj*)**. Two NUTS 2 were identified by the Antenna: ***Severozápad* (CZ04, Northwest Region)** and ***Moravskoslezsko* (CZ08, Moravia-Silesian Region)**. Figure 10 and Table 12 describe the results for Czechia.

SEVEn is the national EPAH Antenna, which identified housing quality, heating sources, household income, energy prices, and household composition (e.g., elderly, single-parent families) as relevant factors to identify energy poverty in Czechia. The following paragraphs describe examples of vulnerable regions in Czechia.

Northwest Region NUTS 2 is located in the northern part of Czechia and encompasses the **Ústí** and **Karlovy Vary regions**, NUTS 3, identified as JTF territories. This NUTS 2 region has historically been shaped by heavy industry and mining. The region has undergone significant economic transformation, but despite these changes, it continues to face deep-rooted structural problems. The decline of traditional industries, coupled with insufficient investment in infrastructure and education, has contributed to persistent socio-economic disparities compared to other parts of the country. The region is characterised by a lower standard of living, limited job opportunities and demographic decline due to population out-migration (Mahdalova and Skop, 2024). According to available statistics, the **Ústí** region is the most affected in the country in terms of households' ability to pay energy costs on time, with 16% of residents experiencing difficulties in this region, compared to 13% in the **Karlovy Vary region** (Klusáček and Kalenda, 2024). Overall, the **Northwest Region** has the highest share of households in arrears on energy payments. Both regions have some of the lowest income levels in the country. In the first quarter of 2025, the average wage was 39,642 CZK in the **Karlovy Vary** region and 42,944 CZK in the **Ústí nad Labem** region (Czech Statistical Office, 2025). The **Northwest** region has the highest unemployment rate in the entire Czechia – a total of 4.1% (men: 3.7%, women: 4.6%) (Czech Statistical Office, 2023). Approximately one in ten households in the **Ústí nad Labem** and **Karlovy Vary** regions depend on housing benefits. The entire region includes areas with a high index of social exclusion. There is a large number of socially excluded localities, especially in cities like Most, Chomutov, Jáchymov, or Ústí. The combination of low energy literacy, limited access to advisory services, and reluctance to utilise subsidy programs perpetuates the cyclical maintenance of energy poverty.

The **Moravia-Silesian Region** has historically served as the industrial heartland of the country with a strong concentration of coal mining, steel production, and heavy engineering. Following the collapse of the centrally planned industry, the region experienced a sharp economic downturn accompanied by job losses, population decline, and social fragmentation. The loss of jobs has continued in tandem with the decline in coal mining and the transition to renewable energy sources. Despite gradual restructuring and investment in innovation and new technologies, many local governments continue to face the long-term consequences of deindustrialisation. The combination of outdated infrastructure, ageing housing stock, and socio-economic disparities makes the **Moravia-Silesian** region particularly prone to energy poverty and related vulnerabilities. From the perspective of energy poverty, it is the second most affected region in Czechia. According to MPSV data, up to 90,000 households are at risk of energy poverty in this region, which represents approximately 15% of the population, making it the second most affected region in the country (Klusáček & Kalenda, 2024). In 2023, the **Moravia-Silesian** region also recorded the highest number of applications for extraordinary immediate assistance due to the inability to pay energy bills. Similar to the **Northwest region**, wages in this area have long been below the national average. In the first quarter of 2025, the average wage was 41,653 CZK compared to the national average of 46,924 CZK. The unemployment rate in 2023 was 3.9%, making the Moravia-Silesian region the area with the second-highest unemployment rate in the country (Czech Statistical Office, 2025). In the cities of Karviná, Ostrava, and Havířov, approximately every sixth household relies on housing benefits, which is the highest proportion in Czechia. The region also has a high share of outdated housing stock — old panel apartment buildings and family houses without insulation, often heated by coal or wood. Especially seniors, disabled people, and those living alone find themselves in situations where they lack resources for basic modernisation or consumption regulation. Although the region supports boiler replacement and community energy initiatives, energy literacy remains low, and access to subsidy instruments is still limited.

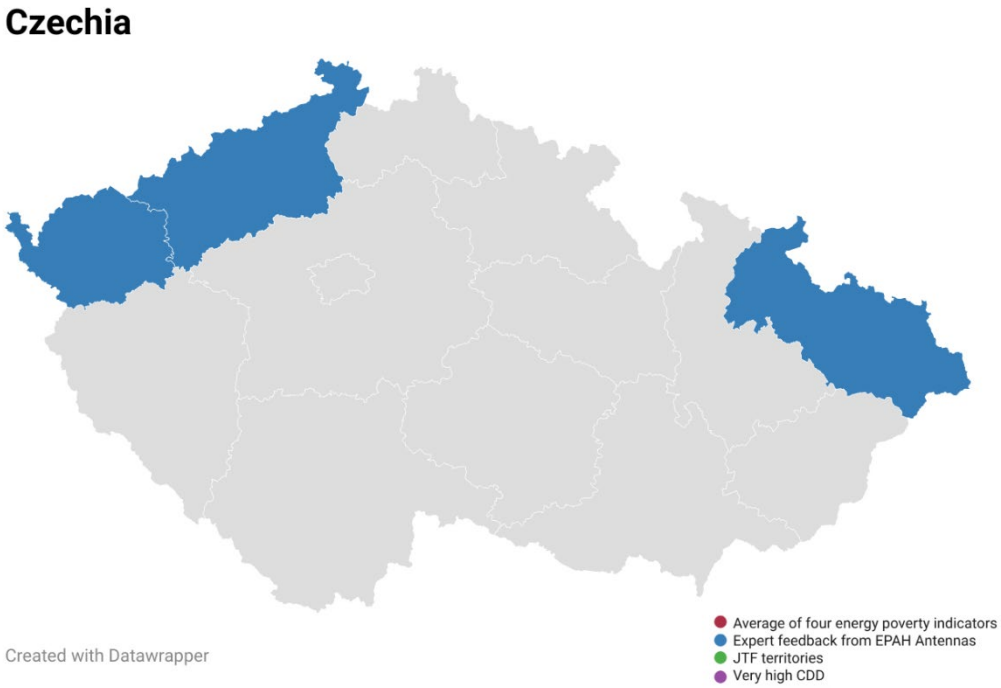

Figure 10: Regions identified in Czechia with higher vulnerability to energy poverty. The map shows the division by NUTS 3. Highlighted is the Bottom-Up NUTS 2.

*Table 12: Results for Czechia. Regions marked with a * represent regions that are already included in a NUTS 2 identified in the first two columns.*

NUTS 2 identified by the indicators methodology	NUTS 2 identified by the Antenna	High CDD regions (Corresponding NUTS 3 code)	JTF Territories (Corresponding NUTS 3 code)
None	Northwest Region (CZ04)	None	Moravian-Silesian Region (CZ080)*
	Moravia-Silesian Region (CZ08)		Ústí nad Labem Region (CZ042)*
			Karlovy Vary Region (CZ041)*

3.7 Denmark

Four of the five NUTS 2 regions in Denmark were identified as vulnerable to severe energy poverty, ranking among the lowest in the 60 identified. Denmark also has two additional NUTS 3 regions identified in the JTF: one is already included in one of the listed NUTS 2 regions, and the other is depicted as a new region. The national EPAH Antenna identified one additional NUTS 2.

The top-down results for Denmark identified four NUTS 2 regions: **Hovedstaden (DK01)**, **Nordjylland (DK05)**, **Midtjylland (DK04)**, and **Sjælland (DK02)** (Table 13). Denmark has territories included in approved territorial just transition plans, which are **Nordjylland (DK050)** and **Sydjylland (DK032)**. The EPAH antenna indicated the inclusion of **Southern Denmark (DK03)** as a vulnerable NUTS 2 region. The final results are listed in Table 14 and Figure 11.

Table 13: Denmark NUTS 2 and the national average value on the selected indicators.

NUTS 2	IHAW	AROPE	ARREARS	HCOR	Position on ranking
Hovedstaden (DK01)	7.9	8.4	13.5	19.8	50
Nordjylland (DK05)	7.9	8.4	12.48	12.9	52
Midtjylland (DK04)	6.2	6.8	11.7	15.1	58
Sjælland (DK02)	7.5	9.3	11.55	12.7	60
Denmark	6.9	17.9	7.8	15.4	-

The Antenna identified rural or remote areas, housing quality, household income, energy prices, and energy access as relevant energy poverty factors in Denmark and identified Denmark, the BBR Register, the Danish Energy Agency, Municipal Climate and Energy Plans (DK2020), and the Building Energy Label Database as relevant data sources for energy poverty-related indicators. The Energy Consulting Network - the Danish Antenna, validated the identified NUTS 2 regions, confirming that they aligned with the results of Danish and Nordic energy poverty analyses.

Although **Hovedstaden (DK01)** is Denmark's wealthiest region overall, it includes significant internal disparities—most notably in Bornholm and in low-income urban districts in Copenhagen. Bornholm, as a remote island within the region, faces unique structural challenges: lower average incomes, geographic isolation, and a high share of older, inefficient building envelopes contribute to elevated energy costs and vulnerability. In Copenhagen, social housing residents often live in post-war buildings with outdated heating systems and limited renovation, while also facing high

rent burdens that restrict their ability to improve energy efficiency. Despite high average incomes, the Capital Region, including Copenhagen and Bornholm, displays pockets of energy poverty that are often masked by regional statistics. In Bornholm, the at-risk-of-poverty rate is around 17% (Statistics Denmark, 2023), reflecting a structurally weaker local economy with many low-income and elderly residents. High energy prices and limited access to modern heating systems contribute to a growing risk of energy deprivation on the island. In Copenhagen's social housing sector, 25–30% of units are rated among the lowest energy performance categories (E to G) on the EPC scale (SparEnergi, 2024), indicating poor energy efficiency and high heating demand. Many of these buildings are post-war high-rises with outdated insulation and ventilation systems. In large urban blocks, households often lack individual control over heating (Fagbladet Boligen, 2025), leaving residents unable to manage their energy use, a key factor in both affordability and comfort. In disadvantaged neighbourhoods like Mjølnerparken and Tingbjerg, high rent burdens leave little room for co-financing of renovations or improved indoor climate measures. While the Capital Region boasts one of the highest income levels in Denmark, the uneven distribution of wealth and housing quality means that energy poverty is concentrated in specific groups and areas. These internal disparities — between owner-occupiers and renters, social housing and private stock, city centre and periphery — justify its classification as a region vulnerable to energy poverty.

Nordjylland (DK05) was another NUTS 2 region identified as vulnerable to energy poverty, and, according to the Antenna, this classification is consistent with national studies that recognise it as Denmark's most energy-poor region. It has the lowest average disposable income, a high share of rural households relying on costly oil or biomass heating, and a high prevalence of housing with poor energy efficiency. Elderly populations and single-person households have been identified as a prevalent population in this region. The Antenna noted that these characteristics apply to the entire NUTS 2 region, with the exception of Aalborg, an affluent urban centre compared to the surrounding rural areas. It has a stronger economy, higher average incomes, and better access to energy-efficient housing and district heating. However, disparities still exist—certain neighbourhoods in Aalborg, particularly those with older social housing or lower-income residents, may still experience energy poverty. **Nordjylland** faces ongoing challenges with energy poverty, particularly in rural areas. This is due to low incomes, old and inefficient heating systems, and the prevalence of many older homes. People in the region have approximately 172,000 DKK in disposable income per year— significantly less than the national average of 202,000 DKK (Statistics Denmark, 2023). That makes it harder for them to afford energy-efficient renovations or switch to more effective heating systems. Approximately 15–20% of rural homes still rely on oil or biomass for heating (Energistyrelsen, n.d.), and 35–40% of homes have poor insulation, with low energy performance ratings (SparEnergi, 2024). Many elderly people and those living alone are particularly at risk, as they often reside in homes that are too large and difficult to heat. In many areas, low property values make it more challenging to secure loans for home improvements. To address this, the Antenna noted that **Nordjylland** needs a stronger local

support system, which can include independent energy advice tailored to rural households, financial assistance that matches local property values and income levels, and simple, step-by-step renovation options that are easy to understand and implement. Solutions must also be accessible to older residents, individuals with limited digital skills, and those residing in remote areas.

Midtjylland (DK04) was characterised as a region facing both rural and urban energy poverty, driven by outdated heating systems, low property values, and demographic vulnerability. In rural local governments, such as Morsø, Skive, and Lemvig, 20–25% of households still rely on fossil fuels, particularly oil and gas (Energistyrelsen, n.d.). These homes are often located in scattered areas without access to district heating, and adoption of heat pumps remains limited. Rising fuel costs further burden these households. Property values are low (e.g., 1.2–1.4 million DKK in Morsø, compared to 2.7 million DKK nationally (Boliga, 2025)), which limits access to renovation loans. Over 30% of homes are rated D–G on the energy label scale, with poor insulation and high heating needs (SparEnergi, 2024). In urban areas like Aarhus, many low-income residents live in post-war social housing with outdated building envelopes. While connected to district heating, poor energy performance persists. Demographic risks include elderly residents in rural homes that are costly to heat, and low-income or unemployed groups facing poor housing and limited resources.

Sjælland (DK02), particularly Lolland and Guldborgsund, were identified by the Antenna as exhibiting high levels of energy poverty. These areas face multiple structural challenges, including poor energy efficiency, outdated heating systems, and low-income levels, especially in rural and suburban communities. Beyond economic factors, geographic isolation plays a role. Regions such as Lolland and Guldborgsund have limited access to affordable energy alternatives, making households more dependent on costly heating sources. Additionally, demographic trends show a high proportion of elderly residents and single-person households, both of which are more exposed to energy poverty due to fixed incomes and higher per-capita energy costs. Recent studies and media reports have highlighted the growing impact of energy poverty in these local governments, particularly in relation to rising energy prices and the slow pace of energy-efficient renovations. Local governments have initiated programs to improve inefficient building envelopes and heating systems, but financial constraints and logistical challenges continue to hinder widespread improvements. A significant factor is the lack of district heating: 25–30% of homes in southern **Sjælland** are not connected and rely on costly oil, electric, or wood heating (Energistyrelsen, n.d.). These homes are often older detached houses with poor insulation and little energy renovation. Generally, Sjælland's rural areas face greater energy poverty challenges than urban centres, with older, inefficient homes and limited access to renovation support. Many modest-income homeowners, especially in commuter towns, struggle to afford upgrades. local governments often lack the resources to assist residents or manage funding schemes. Digital barriers and low awareness hinder access to support, particularly among older rural residents. Lastly, **Southern Denmark (DK03)** was also identified as vulnerable to energy poverty. The EPAH national antenna

indicated that multiple Danish datasets and studies suggest that it should be reconsidered, particularly given the conditions in rural and island local governments.

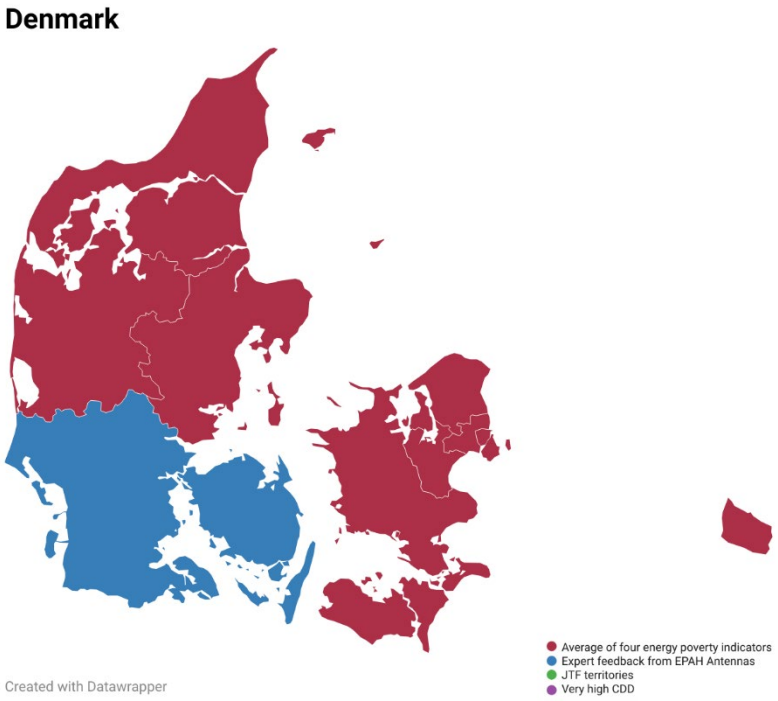

Figure 11: Regions identified in Denmark with higher vulnerability to energy poverty. The map shows the division by NUTS 3. Highlighted are the Top-Down and Bottom-Up NUTS 2.

*Table 14: Results for Denmark. Regions marked with a * represent regions that are already included in a NUTS 2 identified in the first two columns.*

NUTS 2 identified by the indicators methodology	NUTS 2 identified by the Antenna	High CDD regions (Corresponding NUTS 3 code)	JTF Territories (Corresponding NUTS 3 code)
Hovedstaden (DK01)	Southern Denmark (DK03)	None	Nordjylland (DK050)*
Nordjylland (DK05)			Sydjylland (DK032)*
Midtjylland (DK04)			
Sjælland (DK02)			

3.8 Estonia

Estonia has one NUTS 2 region and five NUTS 3 regions. The NUTS 2 was not listed as severe by the top-down quantitative assessment. One NUTS 3 was identified as part of the JTF territories, and two by the Antenna in the qualitative assessment.

The JFT NUTS 3 identified in Estonia is **Ida-Virumaa** (EE007). The EPAH antenna suggested including two NUTS 3 regions: ***Kirde-Eesti*** (EE007, Northeast Estonia) and ***Lõuna-Eesti*** (EE008, South Estonia). The final results are listed in Figure 12 and Table 15.

Factors such as climate conditions (*e.g.*, extreme cold), rural or remote areas, housing quality, household income, and energy prices were identified by the EPAH Antenna and the Estonian Green Movement as the most relevant in the country. Low absolute energy expenditure was indicated as an appropriate indicator in the country's context. The national EPAH Antenna noted that the absence of NUTS 2 identification in the top-down assessment reflects an administrative barrier, not a lack of energy poverty vulnerability in the country. The following paragraphs describe examples of vulnerable regions, highlighting the factors that contribute to their vulnerability.

Northeast Estonia (*Kirde-Eesti*) stands out as the most severely affected by energy poverty, according to the December 2024 report by the Estonian Ministry of Finance (Kährik *et al.*, 2024). The region's economy has historically been dominated by the oil shale industry, which has been in decline, leading to economic contraction and elevated unemployment. The region faces significant social and economic inequalities, with Ida-Viru County being the only officially designated JTF Territory in Estonia. The housing stock is predominantly Soviet-era apartment blocks and older single-family homes, many of which suffer from poor insulation and outdated heating systems. A substantial share of residents relies on district heating, but affordability remains a challenge due to rising energy costs and low average incomes. The region also has a higher proportion of vulnerable groups, including low-income households, elderly populations, and ethnic minorities. Energy consumption patterns reveal a heavy reliance on fossil fuels and inefficient technologies, contributing to high energy expenditure burdens. Social challenges, including language barriers, combined with limited access to renovation financing and social support, increase the risk of energy poverty. The lack of comprehensive local data on energy use and housing conditions complicates targeted interventions.

South Estonia *(Lõuna-Eesti)*, also identified as a region with a higher percentage of energy-poor households in the Ministry of Finance report (Kährik *et al.*, 2024), is a predominantly rural area where the economy relies mainly on agriculture, forestry, and small-scale manufacturing, with limited industrial development. The region has a dispersed population, comprising many small villages and towns, which poses challenges to infrastructure development and energy service delivery. The housing stock is primarily composed of older, detached houses, many of which lack proper insulation and rely on outdated heating systems. A significant share of households uses wood-burning stoves or electric heating, both of which tend to be inefficient and costly in terms

of energy consumption. Many residents rely on solid fuels (such as wood and peat) and electric heating, with limited access to natural gas or district heating networks. Low average incomes and an ageing population contribute to economic vulnerability, making it difficult for households to invest in energy-efficient renovations or modern heating technologies. These factors, when combined, lead to increased energy expenditure burdens and a higher risk of energy poverty. Moreover, the region faces challenges due to insufficient local data, which limits visibility into energy poverty hotspots and the design of targeted interventions.

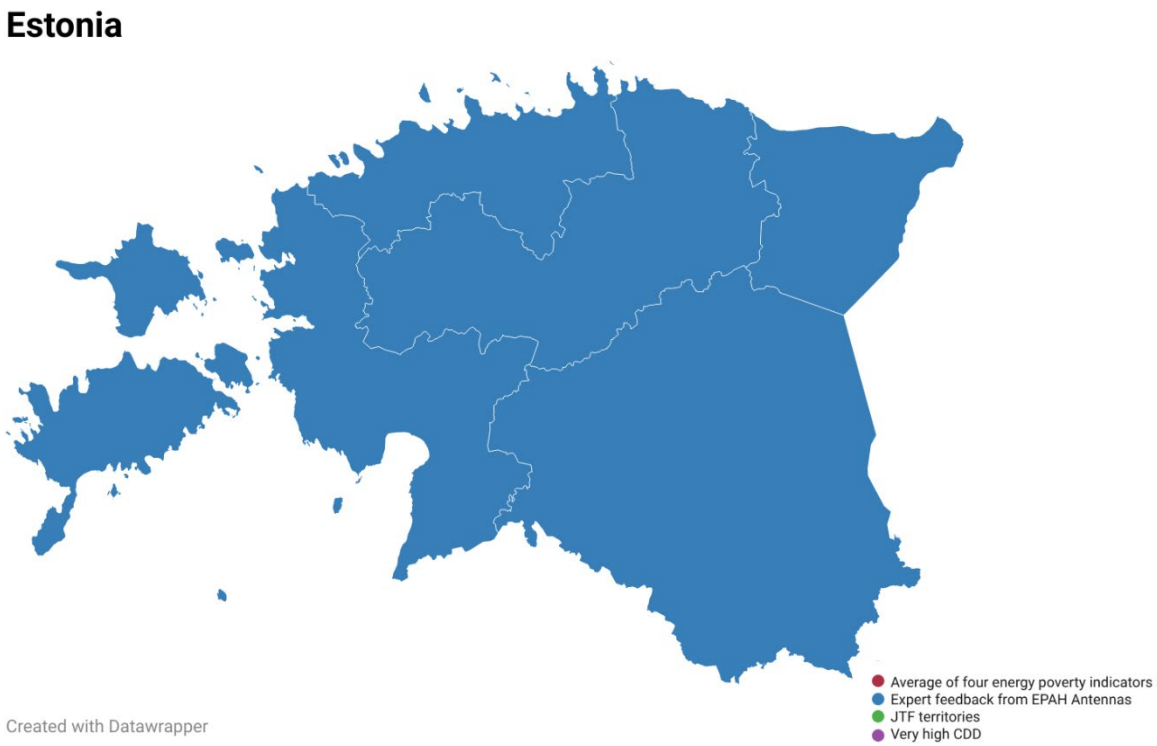

Figure 12: Regions identified in Estonia with higher vulnerability to energy poverty. The map shows the division by NUTS 3. Highlighted are the Top-Down NUTS 2.

*Table 15: Results for Estonia. Regions marked with a * represent regions that are already included in a NUTS 2 identified in the first two columns.*

NUTS 2 identified by the indicators methodology	NUTS 2 identified by the Antenna	High CDD regions (Corresponding NUTS 3 code)	JTF Territories (Corresponding NUTS 3 code)
None	Estonia (EE00)	None	Ida-Virumaa (EE007)*

3.9 Finland

None of the five NUTS 2 in Finland were identified as priority areas for energy poverty, and 14 NUTS 3 regions are identified as JTF territories. The national EPAH Antenna identified two NUTS 2.

The Finnish approved territorial just transition plans are **Lappi (FI1D7), Pohjois-Pohjanmaa (FI1D9), Kainuu (FI1D8), Keski-Pohjanmaa (FI1D5), Pohjois-Savo (FI1DB), Pohjois-Karjala (FI1DC), Etelä-Savo (FI1DA), Etelä-Karjala (FI1C5), Kymenlaakso (FI1C7), Keski-Suomi (FI198), Etelä-Pohjanmaa, Parkano, Kihniö**, **and Virrat (FI199), Pohjanmaa (FI19A), Satakunta (FI196)** and **Punkalaidun(FI19B).** The national EPAH Antenna at Tampere University suggested including **Western Finland (FL19)**, **Åland (FI20),** and **Eastern Finland (FI1D)** as vulnerable regions to energy poverty. The final results are listed in Table 16 and Figure 13.

The national EPAH antenna identified rural or remote areas, housing quality, heating sources, household income, and energy prices as the main factors for diagnosing energy poverty in Finland. The national antenna also identified that there are no comprehensive regional studies on energy poverty in Finland, which makes it challenging to identify priority NUTS 2 areas. The following sections provide examples of vulnerable regions in Finland.

Western Finland is considered a more densely populated area, with certain regions presenting socioeconomic vulnerability. Satakunta, South and Central Ostrobothnia are actively suffering from negative migration patterns; for instance, Satakunta has an elderly population rate higher than the national average, and the workforce is steadily leaving the area. Furthermore, Satakunta also has the oldest building stock in the whole country. Similar patterns can be observed in South and Central Ostrobothnia, where the majority of the population resides in rural areas, in contrast to the national average. These contextual characteristics may make the phenomenon of energy poverty relevant in Western Finland. Regarding heating energy sources, the use of oil heaters is a significant factor contributing to energy poverty in **Western Finland**. While this form of heating is part of the energy mix nationwide, it is more prevalent in coastal regions such as Uusimaa, Satakunta, Varsinais-Suomi, Ostrobothnia, and South and North Ostrobothnia (Statistics Finland, 2023). In 2025, the ELY-centre (Centre for Economic Development, Transport and the Environment) provided financial assistance to households to replace oil boilers used for heating (Ministry of the Environment, 2025). However, it is important to note that the lack of data on heating system typologies and energy consumption in Finnish households means that statistics need to be carefully considered. Peat usage remains a notable component of the energy mix in certain regions, particularly in Satakunta, North, Central, and South Ostrobothnia (Sitra, 2020). As a fossil fuel, peat was expected to be phased out of the energy system. However, the surge in energy prices and the geopolitical tensions resulting from the Ukraine–Russia war have prolonged its use, leaving its future uncertain. Phasing out peat and oil from the energy mix may lead to new instances of energy poverty and exacerbate existing ones, as energy-poor households will face even greater

challenges under current conditions. This will depend on the regionally related contextual characteristics and contractual conditions from energy suppliers in the area. Further investment in renewable energy solutions might help reduce certain negative impacts of the peat and oil phasing-out while ensuring energy supply for the most vulnerable groups (Sitra, 2020).

Åland, located in the Baltic Sea between Sweden and Finland, is a demilitarised autonomous island region that operates its own energy and environmental strategy independently. Most of the housing has been built after the 70s and is composed of self-owned detached houses. Plans to increase self-sufficiency and lower emissions have been on the region's agenda since the early 2000s, but little initiative has been forthcoming (Minister of Industry, Environment and Energy, 2017, Statistics Finland, 2021). Energy poverty vulnerability is notable in **Åland**, as indicated by factors such as the prevalence of self-owned detached houses with inefficient energy systems. Fossil fuels are primarily used in district heating, residential oil boilers, road and ferry traffic (Government of Åland, 2023a). Interestingly, **Åland's** strategy for improving the livelihoods of the elderly population includes prioritising households with oil boilers to prevent energy poverty (Government of Åland, 2023b). Despite measures taken for households with oil boilers in 2021 and 2023, oil-based heating remains prevalent in Åland. Statistics Finland estimates that approximately 3 000 houses in Åland still use oil for heating in 2024 (Statistics Finland, 2024). Severe energy-poor households can be identified when paired with those living in poorly energy-efficient old houses in rural areas.

Eastern Finland, which includes Southern Karelia, Northern Karelia, Southern Savo, Northern Savo, Kainuu, and Kymenlaakso areas, can be considered a priority region mainly because its population is widely dispersed and experiencing negative migration trends, including population decline, ageing demographics, and sluggish economic growth (Government of Finland, 2025). The war in Ukraine has also affected this area greatly, as trade with Russia has been chiefly halted (Ministry of Economic Affairs and Employment). In 2024, the Confederation of Finnish Industries proposed a plan to enhance the economy and energy security through targeted financial schemes for various green initiatives (Elinkeinoelämän keskusliitto, 2024). The building stock in this area consists predominantly of detached and paired houses that were built in the 1970s and 1980s. These regions are also usually excluded from benefits for home renovation (Promoted by the Finnish Centre for State-Subsidised Housing Construction) (VARKE, 2024). The declining population and weak economic conditions further depress housing prices, making both renovation investments and property sales financially unfeasible (Ministry of the Environment, 2015). The primary energy source of all these regions is wood. Although renewable electricity is produced in the region, fossil fuels remain heavily used, particularly in transportation. Peat remains a significant component of the region's energy mix. Oil heating is also still in use in this area, though to a lesser extent compared to the West of Finland. Energy efficiency measures could play a key role in addressing energy poverty. An important factor to note, and one that justifies the use of

wood-based heating systems in most households, is that electricity network standing charges are higher (up to five times higher) in **Eastern Finland** than in **Western Finland**.

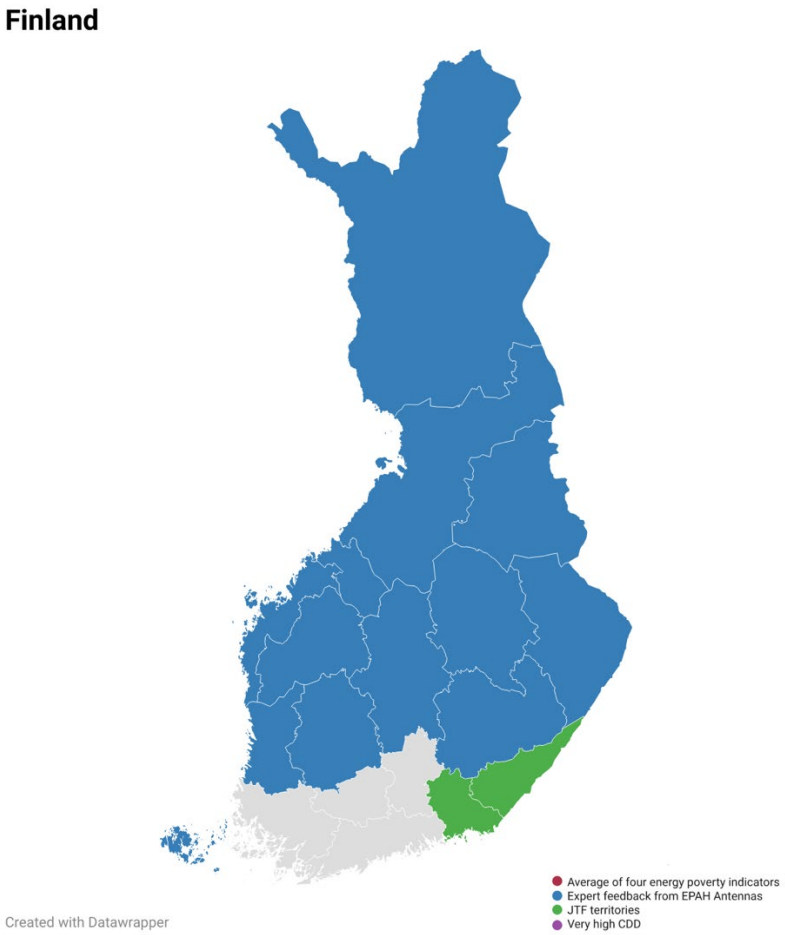

Figure 13: Regions identified in Finland with higher vulnerability to energy poverty. The map shows the division by NUTS 3. Highlighted are the Bottom-Up NUTS 2 and the JTF NUTS 3.

*Table 16: Results for Finland. Regions marked with a * represent regions that are already included in a NUTS 2 identified in the first two columns.*

NUTS 2 identified by the indicators methodology	NUTS 2 identified by the Antenna	High CDD regions (Corresponding NUTS 3 code)	JTF Territories (Corresponding NUTS 3 code)
None	Eastern Finland (FI1D)	None	Lappi (FI1D7)*
	Åland (FI20)		Pohjois-Pohjanmaa (FI1D9)*

	Western Finland (FL19)		Kainuu (FI1D8)*
			Keski-Pohjanmaa (FI1D5)*
			Pohjois-Savo (FI1DB)*
			Pohjois-Karjala (FI1DC)*
			Etelä-Savo (FI1DA)*
			Etelä-Karjala (FI1C5)
			Kymenlaakso (FI1C7)
			Keski-Suomi (FI198)*
			Etelä-Pohjanmaa (Parkano, Kihniö and Virrat) (FI199)*
			Pohjanmaa (FI19A)*
			Satakunta (FI196)*
			Punkalaidun (FI19B)*

3.10 France

France has 27 NUTS 2 regions, five of which rank among the most affected by energy poverty. 10 NUTS 3 parts of the JTF territories were also identified by the Top-down assessment. In the bottom-up assessment.

The Five NUTS 2 regions identified by the top-down quantitative methodology in France were **Nord-Pas-de-Calais (FRE1)**, **Languedoc-Roussillon (FRJ1)**, **Lorraine (FRF3)**, **Corse (FRM0)**, and **Picardie (FRE2)** (Table 17). France has OMR, which were identified as severe but removed, due to the restriction listed in the methodology section. France has territories included in approved territorial just transition plans, which are **Nord-Pas-de-Calais (FRE11, FRE12)**, **Moselle (FRF33)**, **Meurthe-et-Moselle (FRF31)**, already included in the NUTS 2 regions identified, and **Haut-Rhin (FRF12)**, **Loire-Atlantique (FRG01)**, **Vallées de la Seine et de la Bresle (FRD22)**, **Rhone-Isere (FRK26, FRK24)** and **Bouches-du-Rhone (FRL04)**, which were added to the assessment. Figure 14 and Table 18 cover the final results for France.

Table 17: France NUTS 2 and national average value on the selected indicators.

NUTS 2	IHAW	AROPE	ARREARS	HCOR	Position on ranking
Nord-Pas de Calais (FRE1)	15.1	26.6	12.8	6.5*	35
Languedoc-Roussillon (FRJ1)	13.1	23.3	10.9	6.5*	36
Lorraine (FRF3)	13.5	22.2	11.1	6.5*	47
Corse (FRM0)	12.4	23.3	10.3	6.5*	48
Picardie (FRE2)	13.3	21.0	11.2	6.5*	49
France	12.1	20.4	10.0	6.5	-

**Due to the absence of data on EUROSTAT for NUTS 2, national values were considered.*

Rural or remote areas, housing quality, household income, household composition, and hard-to-reach energy users were identified as the primary factors contributing to energy poverty in France by the national EPAH Antenna, SERAFIN. The following sections present examples of regions identified as particularly vulnerable.

Nord-Pas-de-Calais is characterised by low household incomes and poor residential energy efficiency, with approximately 22.9% of households facing a high energy cost burden. The average household income is €27,602, of which approximately 11% is spent on energy and transport (Siterre, n.d.). **Languedoc-Roussillon**, a predominantly rural region, also records low household incomes, with the lowest at €25,330. Households allocate between 4.3% and 8.3% of their income

to energy and transport, while 7.7% to 21% spend more than 10% of their income on energy (Siterre, n.d.). **Lorraine**, another rural area, faces similar challenges, including low income and poor residential energy efficiency. 23.7% to 28.5% of households spend over 10% of their income on energy, with 10.3% to 11.3% directed to energy and transport (Siterre, n.d.). **Corse**, as a Mediterranean island, is characterized by low incomes, with households dedicating 15.7% to 16.1% of income to housing and mobility (Siterre, n.d.). Finally, **Picardie**, a rural region with low incomes and inefficient dwellings, shows household incomes ranging from € 29,526 to € 33,315, with 18% to 25.6% of households spending more than 10% of their income on energy (Siterre, n.d.).

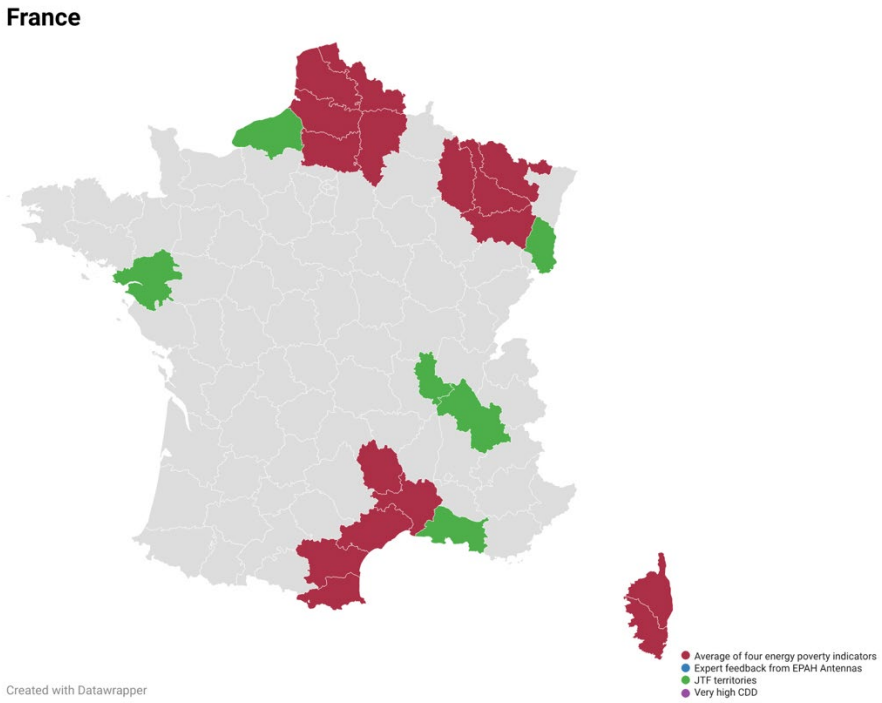

Figure 14: Regions identified in France with higher vulnerability to energy poverty. The map shows the division by NUTS 3. Highlighted are the Top-Down NUTS 2 and the JTF NUTS 3.

*Table 18: Results for France. Regions marked with a * represent regions that are already included in a NUTS 2 identified in the first two columns.*

NUTS 2 identified by the indicators methodology	NUTS 2 identified by the Antenna	High CDD regions (Corresponding NUTS 3 code)	JTF Territories (Corresponding NUTS 3 code)
Nord-Pas de Calais (FRE1)	None	None	Nord-Pas-de-Calais (FRE11, FRE12)*
Languedoc-Roussillon (FRJ1)			Moselle (FRF33)*

Lorraine (FRF3)			Haut-Rhin (FRF12)
Corse (FRM0)			Loire-Atlantique (FRG01)
Picardie (FRE2)			Vallées de la Seine et de la Bresle (FRD22)
			Rhone-Isere (FRK26, FRK24)
			Bouches-du-Rhone (FRL04)
			Meurthe-et-Moselle (FRF31)*

3.11 Germany

Germany is the country with the highest number of NUTS 2 (38), and five were identified as severe by the top-down methodology. The country has 39 NUTS 3 identified as JTF territories. In the bottom-up assessment, the Antenna proposed the inclusion of 6 NUTS 2.

The NUTS 2 regions identified by the Top-Down assessment in Germany were **Bremen (DE50)**, **Kassel (DE73)**, **Düsseldorf (DEA1)**, **Saarland (DEC0)**, and **Münster (DEA3)** (Table 19). Germany has several territories included in approved territorial just transition plans, which are **Uckermark (DE40I), Oberspreewald-Lausitz (DE40B), Oder-Spree (DE40C), Frankfurt (Oder), Kreisfreie Stadt (DE403), Bautzen (DED24), Gorlitz (DED2D), Leipzig (DED51), Burgenlandkreis (DEE08), Saalekreis (DEE0B), Anhalt-Bitterfeld (DEE05), Mansfeld-Südharz (DEE0A), Halle (Saale) (DEE02), Dessau-Roßlau (DEE01), Chemnitz (DED41), Städteregion Aachen (DEA2D), Düren (DEA26), Rhein Erft Kreis (DEA27), Euskirchen (DEA28), Heinsberg (DEA29), Oberbergischer Kreis (DEA2A), Rheinisch Bergischer Kreis (DEA2B), Rhein Sieg Kreis (DEA2C), Wesel (DEA1F), Aachen, Kreisfreie Stadt (DEA21), Bonn, Kreisfreie Stadt (DEA23), Köln, Kreisfreie Stadt (DEA23), Bottrop, Kreisfreie Stadt (DEA31)** and **Recklinghausen (DEA36).** The national Antenna indicated that additional NUTS 2 regions, such as **Brandenburg (DE40)**, **Mecklenburg-Vorpommern (DED80)**, **Chemnitz (DED4)**, **Sachsen-Anhalt (DEE0)**, **Leipzig (DED5)**, and **Thüringen (DEG0),** are vulnerable to energy poverty. The final list of regions is pointed out in Table 20 and Figure 15.

Table 19: Germany NUTS 2 and national average value on the selected indicators.

NUTS 2	IHAW	AROPE	ARREARS	HCOR	Position on ranking
Bremen (DE50)	12.7	32.3	11.9	14.3	24
Kassel (DE73)	11.9	24.1	14.5	14.4	27
Düsseldorf (DEA1)	10.9	26.2	11.1	14.7	29
Saarland (DEC0)	14.4	20.8	11.4	13.6	37
Münster (DEA3)	8.4	27.9	9.7	13.8	38
Germany	8.2	21.3	8.3	13.0	-

The EPAH National Antenna Climate Alliance validated the inclusion of the NUTS 2 results, indicating that Bremen and Düsseldorf are indeed at risk of energy poverty. At the same time, Kassel presented a partial alignment, as it is not always highlighted in national indices, but indicators at the regional and local level support its characterisation as an energy-poor region. The sections below outline selected cases of vulnerable regions, according to the description provided by the EPAH antenna.

Bremen was characterised as an example of chronic, structural energy poverty, rooted in decades of industrial (shipbuilding and steel) decline. The region is characterised by a consistently high risk of poverty or social exclusion rate (34.9% in 2024, national average 21.1%) and a high dependence on social welfare (the percentage of population benefitting from unemployment benefit was the highest in Germany, 17.3% (INKAR)), making residents highly sensitive to energy price shocks. Energy poverty is prevalent in working-class districts such as Tenever, Gröpelingen, and Vahr, where energy-inefficient buildings, low incomes, and high utility cost burdens intersect. The issue is visible and deeply embedded in local socio-economic structures.

Düsseldorf was characterised as a region with "hidden energy poverty" vulnerability, where energy poverty exists beneath the surface of an affluent city, making it harder to detect in national statistics unless disaggregated. Though the city is economically strong, specific districts house vulnerable migrant and low-income communities who face high housing and energy cost burdens but remain underrepresented in statistics. Energy poverty here is related to factors related to energy underconsumption and strongly tied to urban affordability, characterised by a very high housing cost overburden rate (Destatistics, 2025), income inequality, and migrant populations concentrated in poorly insulated housing. **Kassel** shows signs of emerging or transitional energy poverty, particularly in neighbourhoods such as Nord-Holland, Bettenhausen, Rothenditmold, and Wesertor. Vulnerability arises from increasing utility debt, old building stock, and insufficient renovation, combined with modest incomes and rising energy prices. **Saarland** has undergone decades of economic transformation following the decline of coal mining and steel industries. These shifts have led to relatively high unemployment and low average household income, particularly in former mining towns (*e.g.,* Völklingen, Neunkirchen). A significant share of the housing stock is pre-1970 and in need of renovation, with many single-family homes relying on oil heating. Elderly homeowners in rural areas often face energy inefficiency burdens and lack the capacity for renovations. Energy poverty here is often “hidden”, especially among pensioners and low-income homeowners.

The **Münster** region (which includes Münster city and rural districts like Warendorf, Coesfeld, and Borken) is one of the more affluent areas in North Rhine-Westphalia. Low unemployment and higher-than-average income levels generally reduce the overall risk of energy poverty. Within the city of Münster, high rent and cost of living can create “hidden” energy poverty, particularly among students, migrants, and pensioners in older buildings. In rural districts, some elderly residents in

single-family homes may face barriers to renovation and under-consumption due to cost concerns. There are no substantial concentrations of welfare dependency or housing cost overburden compared to other regions.

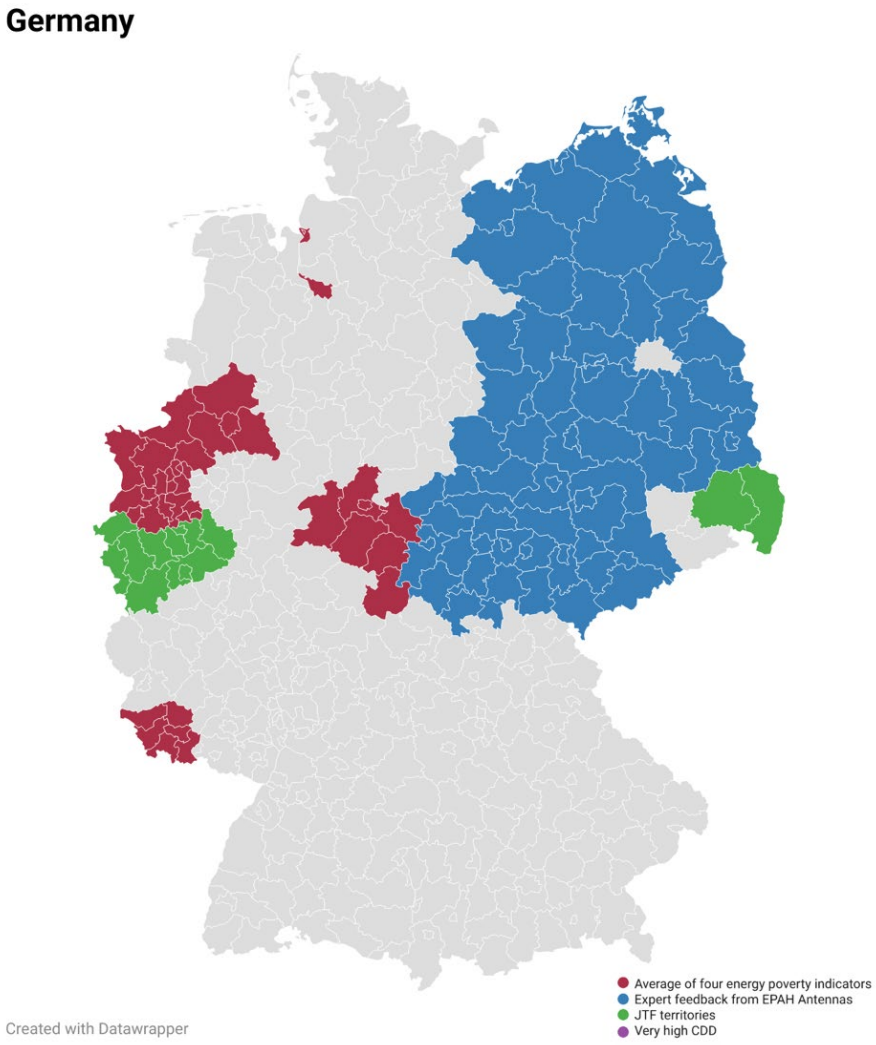

Figure 15: Regions identified in Germany with higher vulnerability to energy poverty. The map shows the division by NUTS 3. Highlighted are the Top-Down and Bottom-Up NUTS 2 and JTF NUTS 3.

*Table 20: Results for Germany. Regions marked with a * represent regions that are already included in a NUTS 2 identified in the first two columns.*

NUTS 2 identified by the indicators methodology	NUTS 2 identified by the Antenna	High CDD regions (Corresponding NUTS 3 code)	JTF Territories (Corresponding NUTS 3 code)

Bremen (DE50)	Brandenburg (DE40)	None	Uckermark (DE40I)*
Kassel (DE73)	Mecklenburg-Vorpommern (DED8)		Oberspreewald-Lausitz (DE40B)*
Düsseldorf (DEA1)	Chemnitz (DED4)		Oder-Spree (DE40C)*
Saarland (DEC0)	Sachsen-Anhalt (DEE0)		Frankfurt (Oder), Kreisfreie Stadt (DE403)*
Münster (DEA3)	Leipzig (DED5)		Bautzen (DED24)
	Thüringen (DEG0)		Gorlitz (DED2D)
			Leipzig (DED51)*
			Burgenlandkreis (DEE08)*
			Saalekreis (DEE0B)*
			Anhalt-Bitterfeld (DEE05)*
			Mansfeld-Südharz (DEE0A)*
			Halle (Saale) (DEE02)*
			Dessau-Roßlau (DEE01)*
			Chemnitz (DED41)*
			Städteregion Aachen (DEA2D)
			Düren (DEA26)
			Rhein Erft Kreis (DEA27)
			Euskirchen (DEA28)
			Heinsberg (DEA29)
			Oberbergischer Kreis (DEA2A)
			Rheinisch Bergischer Kreis (DEA2B)
			Rhein Sieg Kreis (DEA2C)
			Wesel (DEA1F)*
			Aachen, Kreisfreie Stadt (DEA21)
			Bonn, Kreisfreie Stadt (DEA23)
			Köln, Kreisfreie Stadt (DEA23)
			Bottrop, Kreisfreie Stadt (DEA31)*
			Recklinghausen (DEA36)

3.12 Greece

Greece was one of the countries with the highest vulnerability. Five NUTS 2 (out of 13) were identified as severe in the Top-down assessment, ranking among the top 5 of the 60 identified regions. 17 NUTS 3 are included in the JTF territories, and 10 NUTS 3 in Greece were among the regions with the highest CDD. Three additional NUTS 2 were identified in the bottom-up assessment.

The five NUTS 2 were identified in Greece as vulnerable to energy poverty: **Dytiki Elláda (EL63, Western Greece)**, ***Peloponnisos* (EL65, Peloponnese)**, ***Anatoliki Makedonia, Thraki* (EL51, Eastern Macedonia and Thrace)**, ***Ionia Nisia* (EL62, Ionian Islands),** and ***Kentriki Makedonia* (EL52, Central Macedonia)** (Table 21)**.** Three additional NUTS 2 regions were suggested to be included by the Antenna**: North Aegean (EL41), Western Macedonia (EL53),** and **Thessaly (EL61)**. Greece has territories included in approved territorial just transition plans, which are **Megalopoli (EL651), Western Macedonia (EL531, EL532, EL533), North Aegean (EL411, EL412, EL413), South Aegean Islands (EL411, EL412, EL413, EL421, EL422),** and **Crete (EL431, EL432, EL433, EL434).**

It also has high CDD regions, such as **Corfu (EL622), Lesbos, Lemnos (EL411) Kalymnos, Karpathos, Kos, Rhodes (EL421), Piraeus Islands (EL307), Western Athens (EL302), Southern Athens (EL304), Central Athens (EL303), Eastern Attica (EL305), Western Attica (EL306), and Northern Athens (EL301).** All identified regions are listed in Table 22 and Figure 16.

Table 21: Greece NUTS 2 and national average value on the selected indicators.

NUTS 2	IHAW	AROPE	ARREARS	HCOR	Position on ranking
Western Greece (EL63)	30.3	35.2	53.3	29.1	1
Peloponnese (EL65)	21.5	35.7	54.6	35.9	2
Eastern Macedonia and Thrace (EL51)	12.6	31.9	61.8	32.7	3
Ionian Islands (EL62)	17.2	27.7	63.3	23.1	4
Central Macedonia (EL52)	19.9	29.6	45.7	34.8	5
Greece	19.2	26.1	47.3	28.5	-

Climate conditions, household income, employment rates, economic activity, household composition, and hard-to-reach energy users were the main factors identified by the national EPAH Antenna, INZEB, as most relevant to the identification of energy poverty.

The national EPAH Antenna indicated that this classification aligns with national data, with some regions also being identified as severely vulnerable according to national statistics, while others are not. The Antenna also indicated the use of two indicators in Greece to measure energy poverty vulnerability: Index I-II and Index I-IIeq (Greek Energy Poverty Observatory, n.d_a). The first, Index I-II, identifies households as energy poor if they simultaneously meet two conditions: their annual energy expenditure is less than 80% of what is needed to cover minimum required consumption, and their yearly net income is below 60% of the national median income, in line with the definition of relative poverty. To refine this analysis, Index I-IIeq was introduced, which adjusts household income based on the number of household members using the OECD equivalence scale. This index applies the same energy expenditure threshold but also considers equivalized income, providing a more nuanced picture of energy poverty that accounts for household size and composition. The subsequent sections describe examples of vulnerable regions in Greece.

Western Greece is among the regions with the lowest GDP and experiences persistently high unemployment. The housing stock is largely outdated, with many dwellings lacking insulation, double glazing, or efficient heating systems. As a result, households often rely on open wood fireplaces or outdated oil boilers, which increase energy consumption and costs, particularly when heating oil is used. In 2021, the region had 19% the I-II indicator and 22% of the I-IIeq (Greek Energy Poverty Observatory, n.d. b).

The **Peloponnese** is characterised by low average incomes, particularly among elderly and agricultural households in inland and mountainous areas. The housing stock is generally old and poorly insulated, especially in villages and historic towns. In addition, the region experiences intense summer heat, most notably in the eastern and southern parts, which, combined with high electricity costs for air conditioning, places many households at risk of summer energy poverty. Values for the indicators across the regions were 13.5% for I-II and 13.5% for I-IIeq (Greek Energy Poverty Observatory, n.d. b). **Eastern Macedonia**, a region with values of 11% on I-II and 10% on I-IIeq indicators (2021) (Greek Energy Poverty Observatory, n.d._b), has one of the lowest per capita incomes in Greece and faces high unemployment levels, particularly in rural communities. The region is also characterised by long, cold winters, which, when combined with poorly insulated buildings, lead to high heating costs.

In the **Ionian Islands**, the region faces challenges with energy supply, as it relies mainly on diesel generators and experiences significant seasonal fluctuations. The economy heavily relies on tourism, leaving many households with insufficient income outside the tourist season. Summers are long, hot, and humid, increasing reliance on air conditioning and making households particularly vulnerable to high electricity costs, especially in older and less efficient buildings. In 2021, 8% of

households were identified as energy poor under Indicator I-II and 10% under Indicator I-IIeq (Greek Energy Poverty Observatory, n.d. b). In **Central Macedonia** many areas experience cold and prolonged winters, particularly at higher altitudes, resulting in high heating needs from November to March and spikes in energy consumption and costs, especially in older and poorly insulated homes. In Thessaloniki and other urban areas, energy poverty is also prevalent in densely populated, low-income neighbourhoods. In 2021, 14% of households were considered as energy poor under the I-II indicator and 15% I- IIeq (Greek Energy Poverty Observatory, n.d. b).

Western Macedonia (EL53) has been highly affected by the phasing out of lignite power plants, with significant repercussions for the local economy and employment. In 2023, the region recorded the highest unemployment rate in Greece (16.7%, compared with a national average of 11.1%) and the third-lowest labour force participation rate (68.5%, compared with 71.4%). Between 2015 and 2023, net job creation was minimal, averaging just 0.6 thousand jobs per year. The region also shows potential for convergence with national averages in social inclusion and access to services. Per capita household income remains below the national average, while a larger share of the population faces the risk of poverty and social exclusion. Furthermore, the impact of social transfers (excluding pensions) on poverty reduction is relatively limited (Foundation for Economic & Industrial Research, 2024). 21.8% of households are classified as energy poor according to the I–II indicator (Greek Energy Poverty Observatory, n.d. b).

Figure 16: Regions identified in Greece with higher vulnerability to energy poverty. The map shows the division by NUTS 3. Highlighted are the Top-Down and Bottom-Up NUTS 2, JTF NUTS 3 and NUTS 3 with high CDD values.

*Table 22: Results for Greece. Regions marked with a * represent regions that are already included in a NUTS 2 identified in the first two columns.*

NUTS 2 identified by the indicators methodology	NUTS 2 identified by the Antenna	High CDD regions (Corresponding NUTS 3 code)	JTF Territories (Corresponding NUTS 3 code)
Western Greece (EL63)	North Aegean (EL41)	Corfu (EL622)*	Megalopoli (EL651)*
Peloponnese (EL65)	Western Macedonia (EL53)	Lesbos, Lemnos (EL411)*	Western Macedonia (EL531, EL532, EL533)*
Eastern Macedonia and Thrace (EL51)	Thessaly (EL61)	Kalymnos, Karpathos, Kos, Rhodes (EL421)	North and South Aegean Islands (EL411*, EL412,* EL413*, EL421, EL422)
Ionian Islands (EL62)		Piraeus, Islands (EL307)	Crete (EL422, EL431, EL432, EL433, EL434)
Central Macedonia (EL52)		Western Athens (EL302)	

		Southern Athens (EL304)	
		Central Athens (EL303)	
		Eastern Attica (EL305)	
		Western Attica (EL306)	
		Northern Athens (EL301)	

3.13 Hungary

Four NUTS 2 out of the eight were identified as vulnerable regions in the top-down assessment based on the selected indicators; four in the bottom-up assessment; three NUTS 3 as part of the JTF territories; and no high-CDD region.

The top-down quantitative methodology identified ***Észak-Magyarország* (Northern Hungary, HU31)**, ***Dél-Dunántúl* (Southern Transdanubia, HU23)**, ***Észak-Alföld* (Northern Great Plain, HU32)** and ***Dél-Alföld* (Southern Great Plain, HU33)** (Table 23). The national EPAH antenna also indicated that four NUTS 2 regions are vulnerable: **Budapest (HU11)**, **Pest (HU12)**, **Central Transdanubia (HU21),** and **Western Transdanubia (Nyugat-Dunántúl, HU22)**.

Hungary has territories included in approved territorial just transition plans, which are **Baranya (HU231), Heves (HU312), and Borsod-Abaúj-Zemplén (HU311),** already included in the NUTS 2 regions identified. The results for Hungary are in Table 24 and Figure 17.

Table 23: Hungary NUTS 2 and national average value on the selected indicators.

NUTS 2	IHAW	AROPE	ARREARS	HCOR	Position on ranking
Northern Hungary (HU31)	19.2	31.8	22.2	9.9	13
Southern Transdanubia (HU23)	8.2	27.5	16.7	9.1	24
Northern Great Plain (HU32)	6.9	26.2	13.4	10.2	42
Southern Great Plain (HU33)	8.8	22.1	8.2	12.0	55
Hungary	7.2	19.7	10.8	8.7	-

The national EPAH Antenna indicated that the NUTS 2 identified by the top-down assessment correspond to the most disadvantaged regions in the country, which justifies its identification as vulnerable to energy poverty. The following paragraphs describe examples of vulnerable regions, highlighting the factors that contribute to their vulnerability.

Northern Hungary ranks fourth in the country in terms of area (13,429 km^2) and population (1.2 million). It comprises a total of 610 settlements, of which 40 are towns (6.5%). Only half of the

population lives in towns. The settlement structure is characterized by small villages. The region is characterized by a high proportion of small villages; 29% of settlements have fewer than 500 inhabitants, and the population living in these small villages (3.6%) significantly exceeds the national average (2.8%). In economic terms, this region was the most affected by the political transition. The region's economy was primarily defined by heavy industry and mining, but after the economic transition, these industries declined, and industrial production decreased. Only a few major chemical companies remained. According to data from the Hungarian Central Statistical Office, the unemployment rate is highest here. According to Eurostat data, Northern Hungary is among the 30 poorest regions. Compared with other regions, properties in Northern Hungary (and the Northern Great Plain) exhibit higher energy demand due to poor-quality buildings, while owners have limited financial resources for construction or renovation. In rural areas, and particularly in settlements with fewer than 5,000 inhabitants, poor-quality, energy-inefficient family homes are common.

With a population of 858,675, **South Transdanubia** accounted for approximately 8.9% of Hungary's population in 2023. The price-adjusted gross domestic product (PPS) per capita in South Transdanubia was 33.9% of the EU27 average, which was well below the national average of 49.2%.

In the second quarter of 2025, the unemployment rate stood at 6.6%, the second-highest among Hungary's regions. The proportion of long-term unemployed within the 15–64 age group was 39.5% in 2024, one of the highest regional rates in the country. Alongside Northern Hungary and the Northern Great Plain, it is among the poorest regions of Hungary. The region has been aging since 1990 and has gradually lost its industrial potential, resulting in the emigration of a significant part of the population. Those who live here are older and less qualified than the national average. The transport infrastructure also requires development. In rural areas in general, and in settlements with fewer than 5,000 inhabitants in particular, poor-quality, energy-inefficient family homes are typical.

The **Northern Great Plain** is located in the eastern part of Hungary, covering an area of 17,729 km^2, making it the country's second most populous region with 1.4 million inhabitants. In terms of population density, it is classified among the more sparsely populated regions (78.43 inhabitants/km^2). Its economy is determined by agriculture, with 21.7% of the country's agricultural land located here. It has long been one of the country's most underdeveloped regions, with one of the weakest population retention rates. According to the Hungarian Central Statistical Office (KSH), the unemployment rate for both men and women in the region is higher than the national average. The region is also of significant importance for tourism. Compared to other regions, properties in the Northern Great Plain (as well as in Northern Hungary) have higher energy demands due to poor-quality building characteristics, and property owners have limited financial resources for construction or renovation. In rural areas in general, and in settlements with fewer than 5,000 inhabitants in particular, poor-quality, energy-inefficient family homes are typical.

The Southern Great Plain is located in the southeastern and southern parts of Hungary, and it is the country's largest region by area. Much of its territory consists of plains rich in natural and landscape values, most of which are suitable for agricultural use. Agriculture is dominated by large-scale cereal production and generally exhibits low efficiency, although the region also hosts processing industry. It is Hungary's third densely populated region, with 1,183,765 inhabitants (in the second half of 2025) representing approximately 12.5% of the national population. The region is characterized by significant outmigration, and the proportion of young people is steadily declining. In 2024, the percentage of long-term unemployed within the 15–64 age group was 39.2%, one of the highest regional rates in the country. The settlement structure is primarily composed of market towns surrounded by farmsteads and very large villages. Hungary's most extensive farmstead system is located in this region. The infrastructure is highly fragmented and requires significant development to meet regional needs. In rural areas in general, and in settlements with fewer than 5,000 inhabitants in particular, poor-quality, energy-inefficient family homes are typical.

Central Transdanubia (HU21) accounted for approximately 11% of Hungary's population in 2024. In 2023, the price-adjusted gross domestic product (PPS) per capita in Central Transdanubia was 45.8% of the EU27 average, which was below the national average of 49.2%. It is the third most developed region in the country, with significant tourism potential (*e.g.*, Lake Balaton) and outstanding natural and scenic features. Viticulture is also important in the region. It has a balanced settlement structure and is one of the most urbanized regions in the country. In rural areas in general, and in settlements with fewer than 5,000 inhabitants in particular, poor-quality, energy-inefficient family homes are typical.

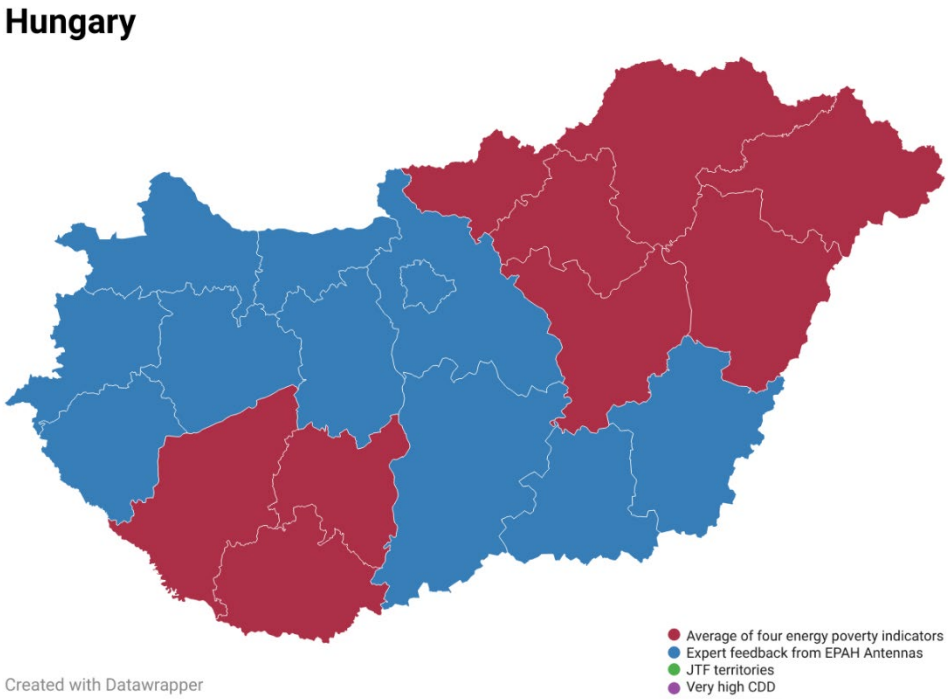

Figure 17: Regions identified in Hungary with higher vulnerability to energy poverty. The map shows the division by NUTS 3. Highlighted are the Top-Down and Bottom-up NUTS 2.

*Table 24: Results for Hungary. Regions marked with a * represent regions that are already included in a NUTS 2 identified in the first two columns.*

NUTS 2 identified by the indicators methodology	NUTS 2 identified by the Antenna	High CDD regions (Corresponding NUTS 3 code)	JTF Territories (Corresponding NUTS 3 code)
Northern Hungary (HU31)	Budapest (HU11)	None	Heves, Borsod-Abaúj-Zemplén (HU312, HU311)*
Southern Transdanubia (HU23)	Pest (HU12)		Baranya County (HU231)*
Northern Great Plain (HU32)	Central Transdanubia (Közép-Dunántúl HU21)		
Southern Great Plain (HU33)	Western Transdanubia (Nyugat-Dunántúl HU22)		

3.14 Ireland

Ireland has three NUTS 2. The results of the Top-down assessment resulted in the inclusion of one NUTS 3 (a JTF Territory) and none NUTS 2. On the bottom-up assessment, five NUTS 2 were included.

The NUTS 3 in Ireland approved territorial just transition plans is **Midlands (IE063).** The antenna suggested the inclusion of **West (IE042, NUTS 2 IE04), South-East (IE051, NUTS 2 IE05), Border (IE041, NUTS 2 IE04), Dublin (IE061, NUTS 2 IE06),** and **Midlands (IE061, NUTS 2 IE06).** Table 25 and Figure 18 cover the results for Ireland.

The national EPAH Antenna, South East Energy Agency, emphasised that the absence of formally identified vulnerable regions in Ireland does not mean energy poverty is absent. To address this, five NUTS 3 regions were highlighted as particularly vulnerable due to a combination of socioeconomic, housing, and infrastructural factors. The following paragraphs present examples of regions identified as particularly vulnerable in Ireland.

In the **Midlands** (Offaly, Laois, Longford, and Westmeath), several factors contribute to high risk of energy poverty. The region has some of the country's highest deprivation rates (CSO, 2024) and a housing stock that is predominantly old and poorly insulated (SEAI, n.d.). Historically reliant on peat for heating, residents now face higher energy costs as solid fuels are phased out. Limited access to the natural gas grid and rural isolation further increase dependence on expensive alternatives such as oil and electricity. The closure of the peat industry has also led to persistent unemployment, making the Midlands a central focus of the Just Transition Fund.

The **Border Region** (Donegal, Monaghan, Cavan, Leitrim, Louth, and Sligo) faces its own set of challenges. Its northwestern location brings frequent wind and rain, driving up heating needs. Many households remain off the gas grid and depend on oil and coal for heating (SEAI, n.d.). The area also has a relatively older population, which, according to ESRI (2022), increases vulnerability due to fixed incomes and greater health-related needs.

In the **South-East** (Wexford, Waterford, Kilkenny, and Carlow), poor housing quality and damp coastal conditions often lead to mould and indoor air quality issues. This environmental vulnerability is compounded by a low-wage economy that relies heavily on seasonal employment, leaving many households financially unstable.

The **West of Ireland** (Galway, Mayo, Roscommon, and Clare) is characterized by rural dispersion, which increases both transport and heating costs (Pobal, n.d.). Seasonal fluctuations in income linked to the tourism sector reduce financial resilience. At the same time, continued reliance on solid fuels such as peat and coal exposes households to volatile and high energy expenses (SEAI, n.d.).

Finally, **Dublin's Inner City** presents a different profile of vulnerability. Much of the housing stock consists of poor-quality private rental flats, as documented by Dublin City Council inspections. Energy arrears are a growing issue, with 8% of households behind on their bills (CSO, 2024). A high proportion of single-parent households is present in this region, which, according to ESRI (2022), is particularly vulnerable to rising energy costs, further underscoring the acute social dimension of energy poverty in the capital.

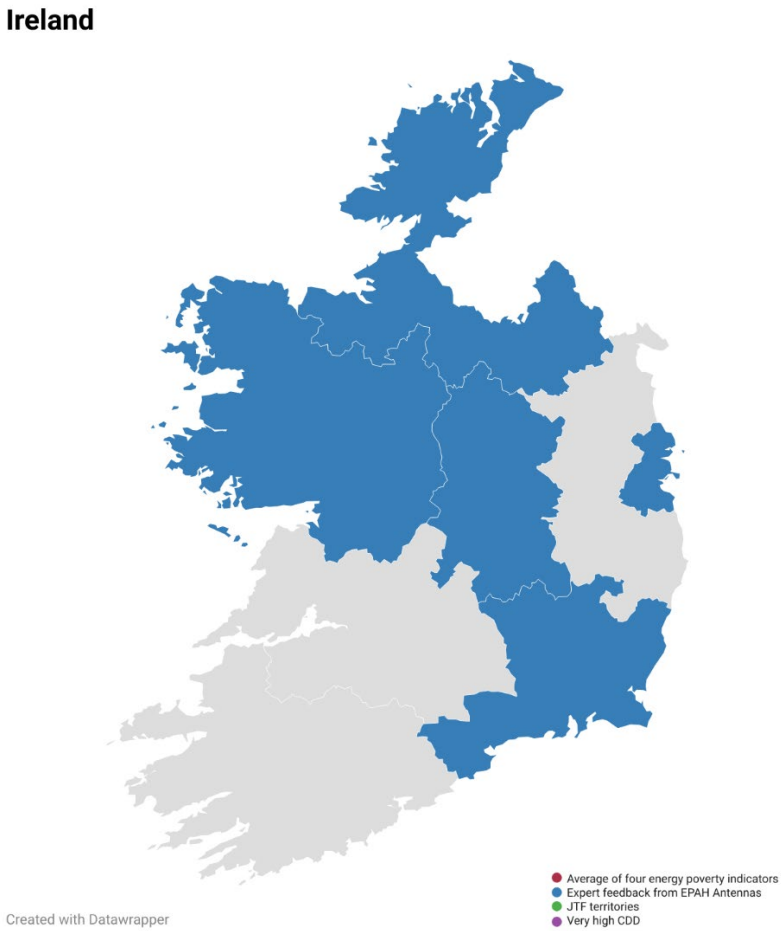

Figure 18: Regions identified in Ireland with higher vulnerability to energy poverty. The map shows the division by NUTS 3. Highlighted are the Bottom-Up NUTS 2.

*Table 25: Results for Ireland. Regions marked with a * represent regions that are already included in a NUTS 2 identified in the first two columns.*

NUTS 2 identified by the indicators methodology	NUTS 2 identified by the Antenna	High CDD regions (Corresponding NUTS 3 code)	JTF Territories (Corresponding NUTS 3 code)
None	West (IE042, NUTS 2 IE04)	None	Midlands (IE063)*
	South-East (IE051, NUTS 2 IE05)		
	Border (IE041, NUTS 2 IE04)		
	Dublin (IE061, NUTS 2 IE06)		
	Midlands (IE061, NUTS 2 IE06)		

3.15 Italy

The results for Italy on the top-down assessment, five NUTS 2 were identified (out of 21 NUTS 2), two JTF NUTS 3, and one NUTS 3 with high CDD. Six NUTS 2 were identified on the bottom-up assessment.

The quantitative methodology identified five NUTS 2 in Italy: **Calabria (ITF6), Campania (ITF3)**, **Sicily (ITG1)**, **Puglia (ITF4),** and **Sardinia (ITG2)** (Table 26). The EPAH Antenna suggested including **Piemonte (ITC1)**, **Valle d'Aoste (ITC2)**, **Liguria (ITC3)**, **Lombardia (ITC4)**, **Basilicata (ITF5),** and **Molise (ITF2)** as vulnerable NUTS 2 regions. Italy has territories included in approved territorial just transition plans, which are **Taranto (ITF43)** and **Sulcis-Iglesiente (ITG2C)**. It also has a high CDD region, **Lecce (ITF45).** All are already included in the identified NUTS 2 regions. The results for Italy are summarised in Figure 19 and Table 27.

Table 26: Italy NUTS 2 and the national average value on the selected indicators.

NUTS 2	IHAW	AROPE	ARREARS	HCOR	Position on ranking
Calabria (ITF6)	21.8	48.6	10.9	6.4	10
Campania (ITF3)	16.9	44.4	7.4	8.5	17
Sicilia (ITG1)	16.2	41.4	7.0	5.1	25
Puglia (ITF4)	19.1	32.2	7.8	4.8	28
Sardegna (ITG2)	14.5	32.9	10.5	4.2	32
Italy	9.5	22.8	5.0	5.7	-

The national EPAH Antenna, AISFOR, validated the identification of those NUTS. The following sections provide a characterization of examples of vulnerable regions in Italy.

Calabria consistently records the highest energy poverty levels in Italy, reaching 19.1% in 2023, up from 16.7% in 2021 (OIPE, 2023a; OIPE, 2023b). This region is marked by widespread rural dispersion, low-income levels (ISTAT, 2024), and significant housing inefficiency. The housing stock is typically old and poorly insulated, contributing to high energy needs. High unemployment and limited access to modern infrastructure exacerbate vulnerability. Climate conditions, particularly frequent and intense summer heatwaves, increase cooling demands in households that often lack efficient cooling systems. These factors combine to lead to both winter and summer energy poverty, requiring year-round solutions. **Calabria** also suffers from significant demographic

decline in rural areas, further limiting local economic and infrastructural resilience. **Puglia** has experienced a sharp rise in energy poverty, with a 5.5 percentage point increase noted in 2021 and a rate of 17.4% in 2023 (OIPE, 2023a, 2023b). Like **Calabria**, **Puglia** is affected by rural isolation, low incomes, and an ageing building stock. Frequent summer heatwaves add pressure on households without adequate cooling infrastructure, intensifying summer energy poverty. A high proportion of households experiencing energy poverty are renters, which makes energy-efficiency upgrades difficult due to the "split incentive" problem. This structural issue hinders renovation efforts and perpetuates inefficient housing. **Sicily** reported an incidence of energy poverty of 14.2% in 2023. Its challenges include low-income levels, a high proportion of older, energy-inefficient homes, and exposure to increasingly frequent heatwaves. Geographic isolation within an island region complicates access to infrastructure and increases vulnerability to energy supply. A large proportion of households rent their homes, often in substandard conditions, further amplifying energy vulnerability. The combination of socio-economic disadvantage and climatic stressors reinforces both heating and cooling poverty. **Campania** has experienced a decrease in the recorded rate of energy poverty, from 11.3% in 2021 to 9.6% in 2023 (OIPE, 2023a, 2023b), but it remains among the most affected regions. Urban poverty is a defining feature, with high population density, economic marginalisation, and infrastructural decay in many local governments. The energy poverty here is influenced more by economic and social vulnerabilities than climatic extremes. However, summer heat and inadequate housing conditions contribute to discomfort and increased energy use, particularly in multi-family buildings with limited access to renovation. Lastly, **Sardinia** reported an energy poverty rate of 12.5% in 2023 (OIPE, 2023a; OIPE, 2023b). Being an island, it faces unique challenges, including limited energy infrastructure, high energy transport costs, and difficulties accessing national incentive schemes. A combination of low incomes, geographic dispersion, and poor housing efficiency creates widespread vulnerability. Seasonal climatic extremes, including both winter cold in inland areas and summer heat along the coast, amplify energy demand. High rates of economic and physical vulnerability (e.g., elderly populations) further compound the issue.

Figure 19: Regions identified in Italy with higher vulnerability to energy poverty. The map shows the division by NUTS 3. Highlighted are the Top-Down and Bottom-Up NUTS 2.

*Table 27: Results for Italy. Regions marked with a * represent regions that are already included in a NUTS 2 identified in the first two columns.*

NUTS 2 identified by the indicators methodology	NUTS 2 identified by the Antenna	High CDD regions (Corresponding NUTS 3 code)	JTF Territories (Corresponding NUTS 3 code)
Calabria (ITF6)	Piemonte (ITC1)	Lecce (ITF45)*	Taranto (ITF43)*
Campania (ITF3)	Valle d'Aoste (ITC2)		Sulcis-Iglesiente (ITG2C)*
Sicilia (ITG1)	Liguria (ITC3)		
Puglia (ITF4)	Lombardia (ITC4)		
Sardegna (ITG2)	Basilicata (ITF5)		
	Molise (ITF2)		

3.16 Latvia

The results for Latvia include one NUTS 2 (the only one in the country) and four JTF NUTS 2 in the Top-down assessment.

The territories in Latvia included in approved territorial just transition plans are **Letgale (LV005), Vidzeme (LV008), Zemgale (LV009)**, and **Kurzeme (LV003).** Table 29 and Figure 20 show the identified regions for Latvia.

Table 28: Latvia NUTS 2 and the national average value on the selected indicators.

NUTS 2	IHAW	AROPE	ARREARS	HCOR	Position on ranking
Latvia	6.6	25.6	8.0	7.2	56

The national Antenna confirmed the classification of the country as a region vulnerable to energy poverty, highlighting several vulnerability factors. These include low incomes, volatile energy prices with significant peaks for heating and electricity, very low energy efficiency, and a slow pace of housing renovation. The Antenna further emphasised that these vulnerabilities became particularly evident during the 2022–2023 energy crisis. Without state and local government support mechanisms, households would have spent more than 15% of their total income on energy, placing the majority of the population at risk of energy poverty.

The following paragraph provides examples of vulnerable regions in Latvia, with statistics sourced from the national statistics authority (Latvijas oficiālā statistika, n.d.). In the **Riga statistical region**, housing, energy, and transport together account for 27.1% of household expenditure. In **Vidzeme**, the share of the population at risk of poverty was 29.8% in 2023 compared with the national average of 21.6%. Here, housing, energy, and transport account for 26.6% of expenditure, 7.8% of households have arrears on utility bills, and the housing overburden rate is 9.3%. In **Kurzeme**, 26.6% of the population was at risk of poverty in 2023. Housing, energy, and transport account for 32% of expenditure, and 3.7% of households reported arrears on utility bills, while disposable income exceeds the national average. In **Latgale**, the poverty risk was 22.2% in 2023. Housing, energy, and transport represent 28.7% of expenditure, 7.8% of households are in arrears on utility bills, and disposable income is above the national average. Finally, in **Zemgale**, housing, energy, and transport account for 31.3% of expenditure, and 5% of households are in arrears on utility bills.

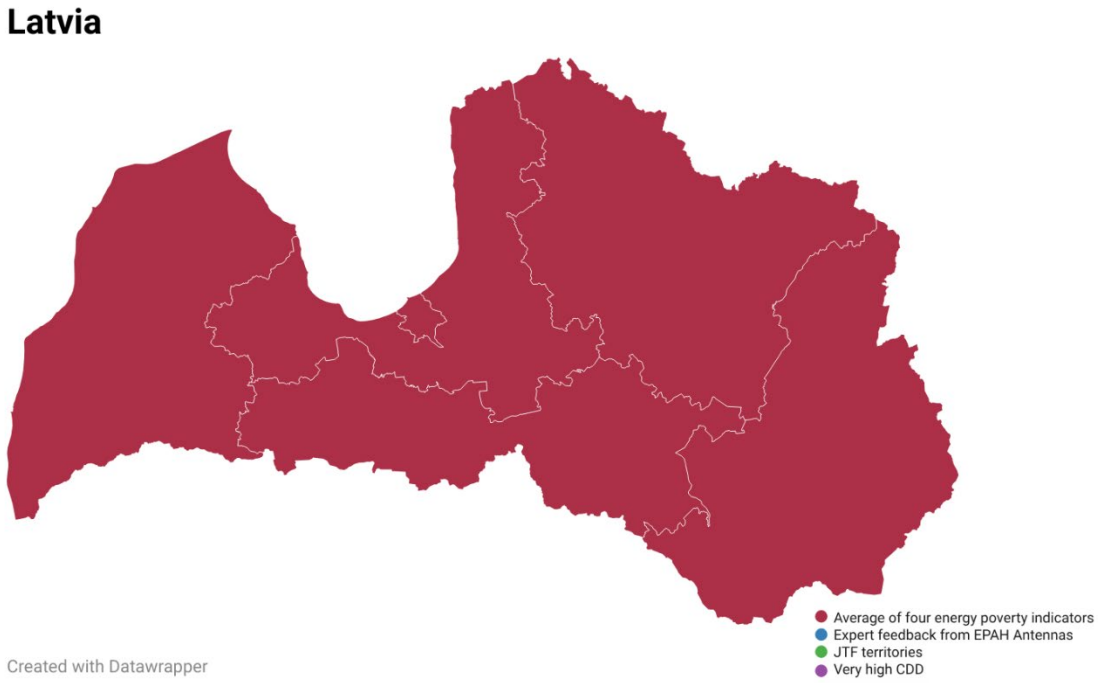

Figure 20: Regions identified in Latvia with higher vulnerability to energy poverty. The map shows the division by NUTS 3. Highlighted are the Top-Down NUTS 2.

*Table 29: Results for Latvia. Regions marked with a * represent regions that are already included in a NUTS 2 identified in the first two columns.*

NUTS 2 identified by the indicators methodology	NUTS 2 identified by the Antenna	High CDD regions (Corresponding NUTS 3 code)	JTF Territories (Corresponding NUTS 3 code)
Latvia (LV00)	None	None	Letgale (LV005)*
			Vidzeme (LV008)*
			Zemgale (LV009)*
			Kurzeme (LV003)*

3.17 Lithuania

One of the two NUTS 2 regions in Lithuania was identified as severe in the Top-down assessment, as well as three JTF NUTS 3 regions.

***Vidurio ir vakarų Lietuvos regionas* (LT02)** was identified by the Top-down assessment as vulnerable to severe energy poverty (Table 30). Lithuania also has territories included in approved territorial just transition plans, which are **Telsiai (LT028)**, **Siauliai (LT026),** and **Kaunas (LT022)**, already included in the NUTS 2 region identified. Table 31 and Figure 21 list the results for Lithuania.

*Table 30: Lithuania NUTS 2 and national average value on the selected indicators. Regions marked with a * represent regions that are already included in a NUTS 2 identified in the first two columns.*

NUTS 2	IHAW	AROPE	ARREARS	HCOR	Position on ranking
Vidurio ir vakarų Lietuvos regionas (LT02)	21.7	27.0	7.8	5.6	33
Lithuania	20.0	24.3	7.1	5.2	-

The national EPAH Antenna, *Ziedine Ekonomika*, identified the factors of rural or remote areas, housing quality, household income, energy prices, and household composition as relevant factors for diagnosing energy poverty in Lithuania. The classification of ***Vidurio ir vakarų Lietuvos regionas*** as a vulnerable region was validated by the Antenna, due to its high risk of poverty rate and the high percentage of the population reporting inability to keep their home adequately warm. It was also mentioned by the EPAH antenna that the identification is aligned with national statistics on energy poverty.

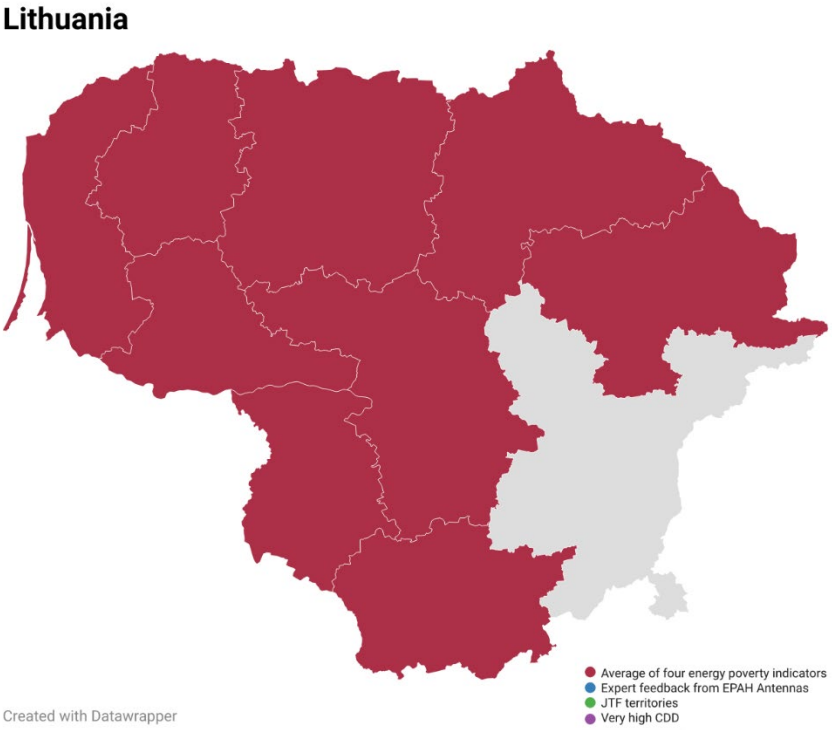

Figure 21: Regions identified in Lithuania with higher vulnerability to energy poverty. The map shows the division by NUTS 3. Highlighted are Top-Down NUTS 2.

*Table 31: Results for Lithuania. Regions marked with a * represent regions that are already included in a NUTS 2 identified in the first two columns.*

NUTS 2 identified by the indicators methodology	NUTS 2 identified by the Antenna	High CDD regions (Corresponding NUTS 3 code)	JTF Territories (Corresponding NUTS 3 code)
Vidurio ir vakarų Lietuvos regionas (LT02)	None	None	Telsiai (LT028)*
			Siauliai (LT026)*
			Kaunas (LT022)*

3.18 Luxembourg

Luxembourg has only one NUTS 2 and NUTS 3 region. That region was identified as a JTF territory on the top-down assessment. Table 32 and Figure 22 cover the results for the country.

The national EPAH Antenna, CELL, indicated that the non-identification of NUTS 2 in Luxembourg aligns with the country's reality, as it is one of the European countries with the lowest values in energy poverty-related indicators. However, inequalities are rising, with the population at risk of poverty rising. Some regions of the country exhibit vulnerability, particularly in the north and south. In the more rural northern areas, outside the main urban centres, salaries tend to be lower due to a more limited job market and a less diversified economy. A similar situation is found in local governments located in the former mining basin in the south and southwest. According to Statec (2021), communes such as **Vianden, Wiltz, Reisdorf**, **Troisvierges**, and **Echternach** in the north record the highest unemployment rates and lowest average salaries in the country. Comparable trends are also observed in **southern communes**, including **Esch-sur-Alzette, Rumelange, and Differdange**.

Figure 22: Regions identified in Luxembourg with higher vulnerability to energy poverty. The map shows the division at the NUTS 3 level (Luxembourg has only one NUTS 3). Highlighted is the Bottom-Up NUTS 2.

*Table 32: Results for Luxembourg. Regions marked with a * represent regions that are already included in a NUTS 2 identified in the first two columns.*

NUTS 2 identified by the indicators methodology	NUTS 2 identified by the Antenna	High CDD regions (Corresponding NUTS 3 code)	JTF Territories (Corresponding NUTS 3 code)
None	Luxembourg (LU00)	None	Luxembourg (LU000)*

3.19 Malta

Malta has one NUTS 1 and NUTS 2 level, representing the country as a whole (MT0 and MT00). At the NUTS 3 level, Malta is divided into two islands: the main island of Malta (MT001) and the Gozo and Comino district (MT002). Malta's NUTS 2 was identified as vulnerable in the indicators based on the Top-Down Assessment, and the NUTS 3 as part of the JTF and the high CDD regions. Table 33 and Figure 23 cover the results for the country.

For the national EPAH Antenna, MIEMA, there is limited published data that explicitly maps energy poverty by district and locality in Malta. In Malta, energy poverty is often closely linked to general poverty, with issues such as affording electricity, maintaining adequate thermal comfort, paying utility bills on time, and living in housing with poor energy efficiency, draughts, and humidity. Poverty, coupled with poor housing conditions in older buildings, increases the risk of energy poverty; therefore, areas with higher rates of low income and older building stock can be considered at the highest risk.

Malta provides energy subsidies through a general Energy Benefit, aimed at low-income households, which offers a percentage of electricity costs and rebates on water and gas bills. There are specific eligibility requirements, such as income thresholds and household size. The benefit covers an amount to offset thirty (30%) of the consumption of electricity up to a maximum assistance of seventy-five euros (€75) per year per person in the household (Camilleri, 2025).

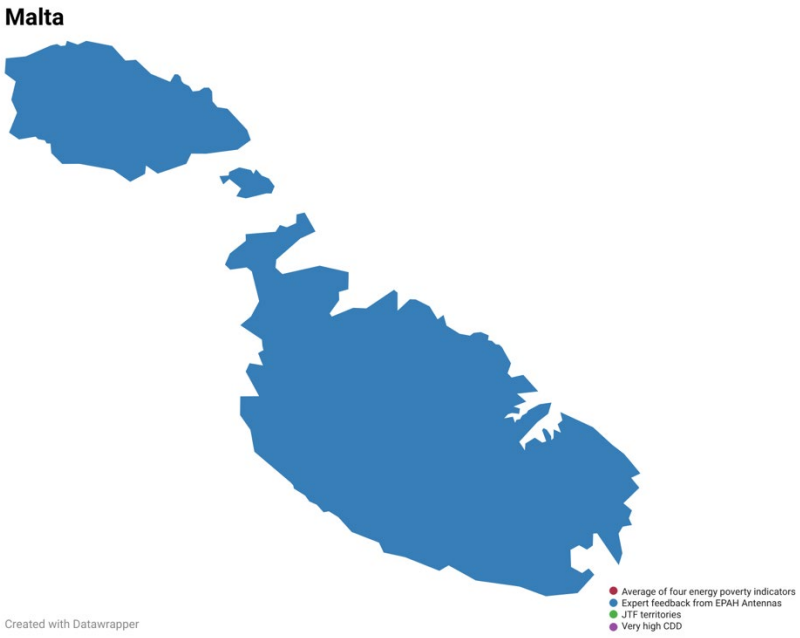

Figure 23: Regions identified in Malta with higher vulnerability to energy poverty. The map shows the division by NUTS 3. (Malta only has one NUTS 3). Highlighted is the Bottom-Up NUTS 2.

*Table 33: Results for Malta. Regions marked with a * represent regions that are already included in a NUTS 2 identified in the first two columns.*

NUTS 2 identified by the indicators methodology	NUTS 2 identified by the Antenna	High CDD regions (Corresponding NUTS 3 code)	JTF Territories (Corresponding NUTS 3 code)
None	Malta (MT00)	Malta (MT001)*	Malta (MT001)*
		Gozo, Comino (MT002)*	Gozo, Comino (MT002)*

3.20 Netherlands

The results for the Netherlands in the Top-Down assessment included only the inclusion of nine JTF NUTS 3, as no NUTS 2 were identified on the indicators-based assessment. The contribution from the National EPAH antenna led to the inclusion of five NUTS 2.

The Netherlands has territories included in approved territorial just transition plans, which are **Groningen (NL111), Delfzijl and surroundings (NL112), Rest of Groningen (NL113), Emmen (NL132), IJmond (NL323), Groot-Rijnmond (NL33C), West-Noord-Brabant (NL411), Zeeuws-Vlaanderen (NL341), and Zuid-Limburg (NL423).** The EPAH antenna proposed the inclusion of **Friesland (NL12), Overijssel (NL21), Zuid-Holland (NL33), Limburg (NL42),** and **Groningen (NL11)** as vulnerable NUTS 2. The final results are listed in Table 34 and Figure 24.

The national EPAH antenna, WISE Netherlands, indicated that the non-identification of NUTS 2 in the top-down assessment aligns with the country's reality, as it is considered a relatively wealthy nation. However, it was also noted that there has been an increase in energy poverty vulnerability in the country, with factors such as remote areas, housing quality, household income, energy prices, and a lack of political decision-making being the most relevant to identify energy poverty. The sections below outline examples of vulnerable regions.

Groningen (NL11), especially the northern part of the country, is a region where the population experiences high energy bills or their home has low energy efficiency, which puts them at risk of energy poverty. These regions have the highest values in the country in some indicators on energy poverty: 7.6% of the population experiences low income and a high energy bill (national average 6.1%), and 4.1% of the population has low income and a low energy-efficient home (national average 2.9%) (TNO, n.d.). 42.3% of the source of income of the population is welfare and social benefits (TNO, n.d.).

Limburg (NL42) has also been identified as a potentially vulnerable region to energy poverty, particularly in the southern areas. This vulnerability is partly linked to the closure of mines in the region. Several cities in southern **Limburg**, such as Heerlen, Sittard, and Vaals, are generally known for higher levels of poverty and display characteristics typical of rural energy poverty, such as low population density, an ageing population, and low incomes and pensions. The region scores high on several energy poverty indicators. For example, 7.1% of the population faces both low income and high energy bills, while 3.8% have low income and live in energy-inefficient homes (TNO, n.d.). Additionally, 47.3% of dwellings in the region were built between 1950 and 1970 (TNO, n.d.).

Zuid-Holland (NL33) has also been identified as a region with high vulnerability to energy poverty, particularly in the city of Rotterdam. In this NUTS 2, 6.8% of the population faces both low income and high energy bills, while 3.1% have low income and live in energy-inefficient homes. The majority of households consist of single-person households (64.7%), and 34% of the

population relies primarily on welfare and social benefits as their main source of income (TNO, n.d.). Additionally, 69.5% of the population lives in social housing (TNO, n.d.).

In **Overijssel (NL21),** particularly in the larger cities of Enschede and Almelo, vulnerability is also present. 6.5% of the population faces both low income and high energy bills, while 3.2% have low income and live in energy-inefficient homes (TNO, n.d.).

Lastly, in **Friesland (NL12)**, 7% of the population faces both low income and high energy bills, and 3.5% have low income and live in energy-inefficient homes (TNO, n.d.).

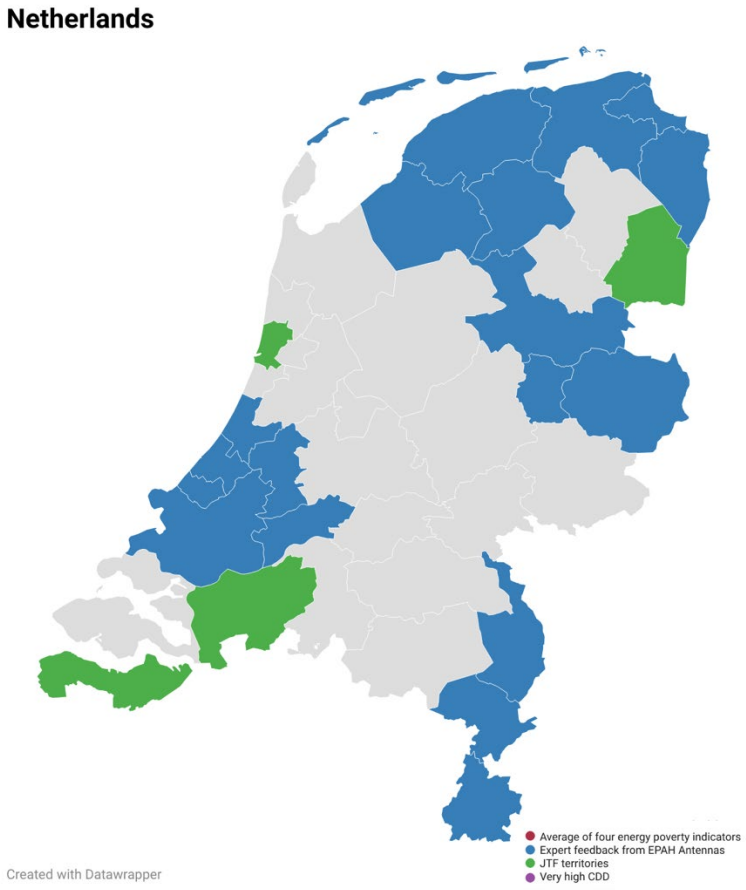

Figure 24: Regions identified in the Netherlands with higher vulnerability to energy poverty. The map shows the division at the NUTS 3 level. Highlighted are the Bottom-Up NUTS 2 and the JTF NUTS 3.

*Table 34: Results for the Netherlands. Regions marked with a * represent regions that are already included in a NUTS 2 identified in the first two columns.*

NUTS 2 identified by the indicators methodology	NUTS 2 identified by the Antenna	High CDD regions (Corresponding NUTS 3 code)	JTF Territories (Corresponding NUTS 3 code)
None	Friesland (NL12)	None	Groningen (NL111)*
	Overijssel (NL21)		Delfzijl and surroundings (NL112)*
	Zuid Holland (NL33)		Rest of Groningen (NL113)*
	Limburg (NL42)		Emmen (NL132)
	Groningen (NL11)		IJmond (NL323)
			Groot-Rijnmond (NL33C)*
			West-Noord-Brabant (NL411)
			Zeeuws-Vlaanderen (NL341)
			Zuid-Limburg (NL423)*

3.21 Poland

In Poland, among the country's 17 NUTS 2, none was identified by the Top-Down assessment, and four NUTS 2 were included as part of the JTF territories. In the bottom-up assessment, five NUTS 2 were identified by the Antenna as vulnerable to severe energy poverty.

Poland has several territories included in approved territorial just transition plans, which are **Walbrzych (PL517), Eastern Wielkopolska (PL41), Silesia (PL22)**, and **Łódź (PL712)**, which were added to the assessment. The NUTS 2 identified by the Antenna were **Pomeranian Voivodeship (PL42)**, **Lower Silesian Voivodeship (PL51)**, **Greater Poland Voivodeship (PL41)**, **Pomeranian Voivodeship (PL63)** and **Opole Voivodeship (PL52).** Figure 25 and Table 35 cover the results for Poland.

The national EPAH Antenna, The Association of Municipalities Polish Network “Energie Cités”, emphasised that the non-identification of NUTS 2 in Poland misses to reflect the country's situation, as, according to national data, a significant share of Polish households experience energy poverty. Energy poverty levels differ across Polish regions (NUTS 2), with some areas, particularly in the north and west, showing higher rates than others, including many in the east. Indicators such as LIHC (Low-Income High Costs), 2M, and bills consistently point to the presence of energy poverty nationwide. The following paragraphs provide examples of vulnerable regions in Poland.

Opolskie **(Opole Voivodeship, PL52)** has shown some of the most unfavourable energy poverty indicators in Poland in recent years. In 2021, the poverty rate measured using the LIHC method reached its highest level in the voivodeship, rising from 13.0% in 2018 to 20.0% (Statistics Poland, 2023). The "2M" indicator was also unfavourable, standing at 23.3%. By 2022, the situation further deteriorated, with the LIHC indicator increasing to 21.8% and the 2M indicator to 25.7% (Statistics Poland, 2024). In 2024, the region was struck by a natural disaster: a severe flood caused by the Genoa Low. Cities such as Głuchołazy, Prudnik, and Lewin Brzeski were heavily affected, as were numerous villages along overflowing rivers. The flood caused significant damage to flood protection infrastructure, roads, railways, and agricultural land. In total, 33,902 people were affected, 192 residential buildings and 167 public utility buildings were flooded, and the estimated losses to local government infrastructure in the voivodeship reached 509 million PLN (Polish Water Management Authority, 2025).

Pomeranian Voivodeship (PL63, **Pomeranian Voivodeship)** has also presented levels of energy poverty in recent years. In 2021, the poverty rate, as measured by the LIHC method, increased from 10.2% in 2018 to 13.6% (Statistics Poland, 2023). The "2M" indicator reached its highest and most unfavourable value in the Pomeranian Voivodeship that same year, at 24.8%. By 2022, the LIHC indicator for **Pomeranian Voivodeship** decreased to 11.7%, while the "2M" indicator worsened, rising to 25.6% (Statistics Poland, 2024).

***Wielkopolskie* (Greater Poland Voivodeship, PL41)** also recorded unfavourable energy poverty values in recent years. In 2021, the LIHC indicator increased from 10.5% in 2018 to 13.6%, highlighting a worsening situation. In the same year, the 2M indicator stood at 24.5% (Statistics Poland, 2023). By 2022, the overall picture deteriorated further. While the LIHC indicator remained at a similar level (13.5%), the 2M indicator rose significantly to 27.81%, indicating a growing share of households facing a disproportionate energy expenditure burden (Statistics Poland, 2024).

***Dolnośląskie* (Lower Silesian Voivodeship, PL51)** has also shown unfavourable trends in energy poverty in recent years. In 2021, the region recorded one of the highest values for the Bills indicator in Poland (1.3%), alongside LIHC and 2M indicators of 11.1% and 20.34%, respectively (Statistics Poland, 2023). By 2022, these values worsened, with the LIHC indicator rising to 13% and the 2M indicator to 21.7% (Statistics Poland, 2024). In 2024, the voivodeship was the most severely flood-affected region in Poland. The disaster caused extensive damage to flood protection infrastructure, roads, railways, and agricultural land. Cities such as Kłodzko, Lądek-Zdrój, Stronie Śląskie, and Bystrzyca Kłodzka were particularly impacted. In total, 177,294 people were affected, 9,744 residential buildings, and 513 public utility buildings were flooded. The losses to local government infrastructure in the voivodeship are estimated at 5.7 billion PLN, while business-related damages amounted to 84.6 million PLN (Polish Water Management Authority, 2025).

Lastly, energy poverty vulnerability is also observed in ***Zachodniopomorskie* (West Pomeranian Voivodeship, PL42).** In 2021, the LIHC method showed concerning values, with the 2M indicator reaching 19.2% and the Bills indicator, the highest in Poland that year, standing at 1.5% (Statistics Poland, 2023). By 2022, the situation had evolved unevenly. The 2M indicator worsened to 21.9%, suggesting a growing share of households facing disproportionate energy costs. At the same time, the Bills indicator improved slightly to 1.3%. The LIHC indicator in 2022 was measured at 7.8% (Statistics Poland, 2024).

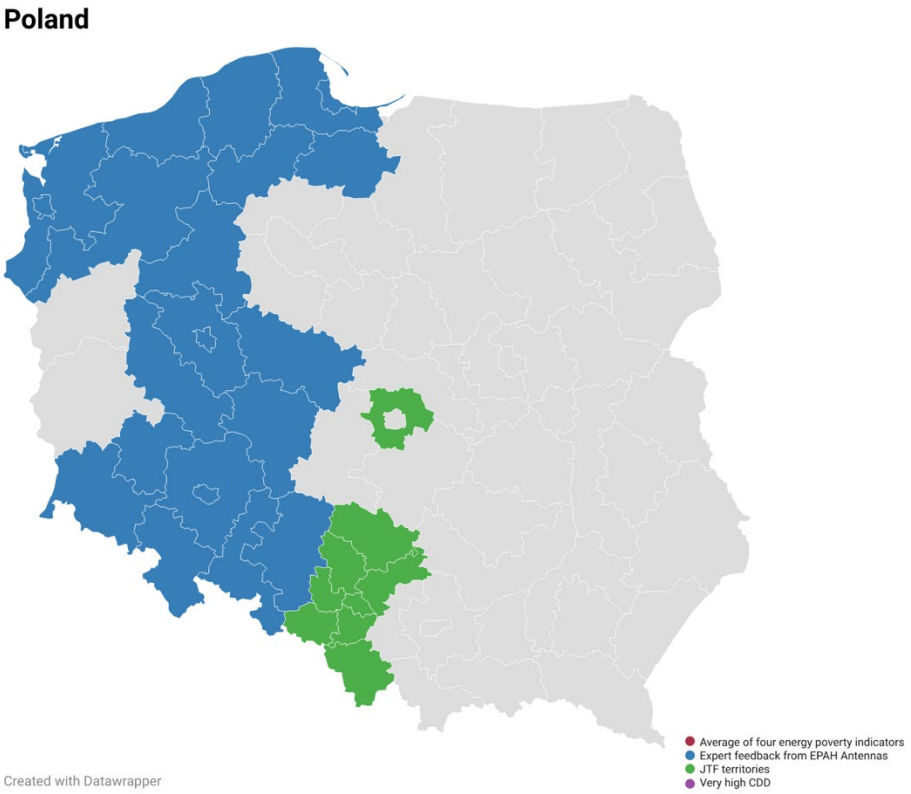

Figure 25: Regions identified in Poland with higher vulnerability to energy poverty. The map shows the division at the NUTS 3 level. Highlighted are the Bottom-Up NUTS 2 and the JTF NUTS 3.

*Table 35: Results for Poland. Regions marked with a * represent regions that are already included in a NUTS 2 identified in the first two columns.*

NUTS 2 identified by the indicators methodology	NUTS 2 identified by the Antenna	High CDD regions (Corresponding NUTS 3 code)	JTF Territories (Corresponding NUTS 3 code)
None	Pomeranian Voivodeship (PL42)	None	Walbrzych (PL517)*
	Lower Silesian Voivodeship (PL51)		Eastern Wielkopolska (PL41)*
	Greater Poland Voivodeship (PL41)		Silesia (PL22)
	Pomeranian Voivodeship (PL63)		Łódź (PL712)
	Opole Voivodeship (PL52)		

3.22. Portugal

The results for Portugal included five NUTS 2 in the Top-Down assessment and three JTF NUTS 3. The Five NUTS 2 were identified by the top-down EPAH quantitative methodology: ***Região Autónoma dos Açores* (PT20), *Região Autónoma da Madeira* (PT30), *Norte* (PT11), *Algarve* (PT15), *Área Metropolitana de Lisboa* (PT17)** (Table 36). Portugal also has territories included in approved territorial just transition plans, which are **Matosinhos (PT11A)**, already included in the NUTS 2 regions identified, and **Médio Tejo (PT1D2)**, and **Alentejo Litoral (PT1C1)**, which were added to the assessment. Table 37 and Figure 26 cover the results for Portugal.

Table 36: Portugal NUTS 2 and national average value on the selected indicators.

NUTS 2	IHAW	AROPE	ARREARS	HCOR	Position on ranking
Região Autónoma dos Açores (PT20)	34.3	31.4	5.7	2.8	20
Região Autónoma da Madeira (PT30)	23.3	28.1	7.2	3.8	31
Norte (PT11)	26.3	22.0	4.5	4.7	41
Algarve (PT15)	15.4	22.6	8.0	7.9	45
Área Metropolitana de Lisboa (PT17)	18.9	18.3	5.8	6.4	53
Portugal	20.8	20.1	5.2	4.9	-

The national EPAH Antenna, FCT-NOVA University of Lisbon, validated the classification of the NUTS 2 and provided further characterisation for these NUTS 2, which are described in the following sections as examples of vulnerable regions.

In the ***Região Autónoma dos Açores***, a group of islands, the economy is mainly based on livestock farming, fishing, and tourism. High economic and social inequalities are observed between islands. The region has the country's highest Gini index for income inequality (over 33%). Summer and winter climates in this region are mild, and energy consumption for space heating and cooling is one of the lowest in the country. Most people use independent electrical heaters (67.4%) and fireplaces (over 30%), which are low-energy-efficient options. This results in high energy gaps between actual consumption and theoretical consumption for thermal comfort (based on Palma *et al.*, 2019) and higher energy poverty vulnerability indexes (based on Gouveia *et al.*, 2019). Significant reliance on bottled LPG (44%) for domestic energy consumption. Several economically deprived and problematic neighbourhoods (the region with the highest criminality in the country in 2023).

Região Autónoma da Madeira is another group of islands in Portugal. Tourism is a considerable economic driver, while agriculture also plays a relevant role. Housing and renting price inflation is a significant challenge, reducing access to affordable homes. Although average income is not necessarily low, the Gini index for income inequality is above the national mean (32-33% in 2024). Summer and winter climates are mild, and energy consumption for space heating and cooling in this region is among the lowest in the country, as most people use independent electric heaters (82.4%) and fireplaces (over 15%), which are low-efficiency options. About 64% of dwellings have a C or lower EPC class. This results in large energy gaps between actual and theoretical consumption for thermal comfort (based on Palma *et al.*, 2019) and higher energy poverty vulnerability indices (based on Gouveia *et al.*, 2019). For other uses, the consumption of bottled LPG (28.4%) is the second most significant energy source, after electricity, with a high reliance on non-pipeline fossil fuels.

The ***Norte*** region was also identified as vulnerable to energy poverty. Its economy is based on extractive and transformative industries, as well as construction. It accounts for a significant share of the country's exports, primarily in textiles and footwear. This region has one of the coldest climates, high energy demands for space heating, and low energy consumption for space cooling in residential buildings, resulting in significant energy gaps in several locations for both seasons. Some subregions have low incomes, higher percentages of elderly population, and lower education levels. The country has a high unemployment rate (7.6% in the 1st trimester of 2024). It is the second region with the highest number of social housing dwellings in the country. Several municipalities occupy leading positions (Top 100) in winter and summer EPVI index (based on Gouveia *et al.*, 2019)

The ***Algarve*** is a region located in the south of Portugal. Tourism, agriculture, and fishing are the main economic sectors. Dependence on tourism is a liability, as it makes the region susceptible to economic crises, and it is a financial sector that creates precarious and seasonal jobs. This precarity was exposed during the COVID-19 crisis, during which, between January 2020 and 2021, national unemployment rose by 32.4%; in the same period, unemployment in the Algarve increased by 61.3% (IEFP, 2021). Tourism increases the cost of living for residents, which leads to greater difficulty in affording basic goods and making ends meet. One of the regions with the lowest income per capita. There are considerable fluctuations in employment, as the summer-based economy leads to higher unemployment during the low season. Presents a Gini index around the average of the country, between 31% and 32%, which is well above the EU average. About 54% of occupied dwellings were built before 1990 (the first energy regulation), and about 67% of dwellings have a C or lower EPC rating. Lower percentage of home ownership nationally (higher vulnerability). Higher percentage of younger population (higher vulnerability). The warmer climate leads to higher cooling energy demands in buildings. Low energy consumption for cooling and ownership of cooling equipment (such as air conditioning units) result in high cooling energy gaps,

for greater levels of energy poverty vulnerability in the summer season (based on Gouveia *et al.*, 2019).

Lastly, ***Área Metropolitana de Lisboa*** is the main metropolitan area of Portugal**.** The economy is based on finance, tourism, commerce, the creative industry, and ICT. The most prosperous region of Portugal, but with significant disparities across its territory, with deprivation and tension in the peripheries. Significant housing affordability issues are driving people away from the city. Proliferation of hotels, local accommodation, and private real estate investment. The highest percentage of social housing (over 9000 buildings and 52 thousand dwellings in 2015). The highest percentage of dwellings in older buildings (built before 1990, when the first energy regulation was implemented) is 74%, and these dwellings have an energy certificate rating of C or lower. Lower energy gaps due to higher actual consumption for space heating and cooling (higher ownership of more efficient equipment) (based on Palma *et al.*, 2019). A higher percentage of the younger population and a lower percentage of home ownership. Several socially and economically deprived neighbourhoods have high crime rates. The region presents some neighbourhoods with a high immigrant population and vulnerable ethnic minorities with a high percentage of overcrowded dwellings.

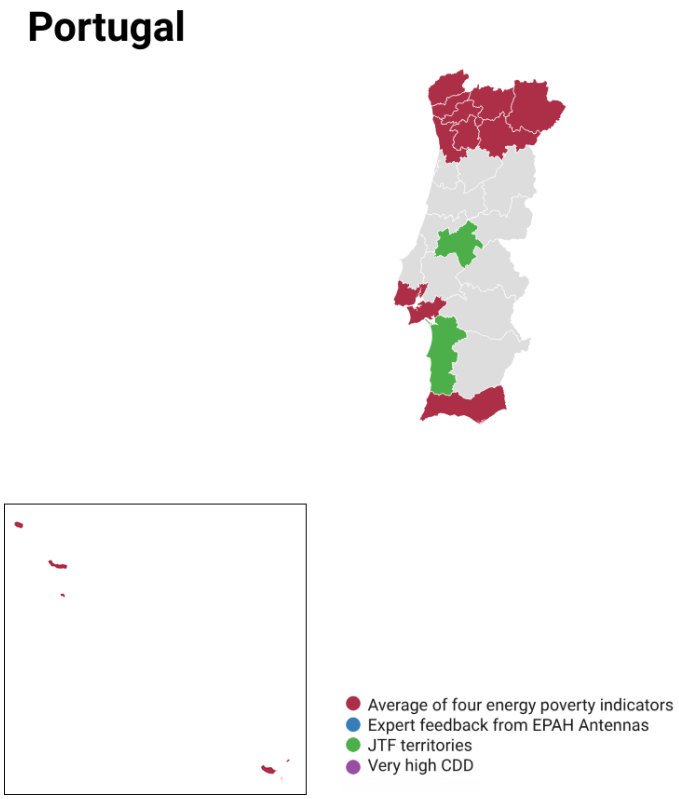

Figure 26: Regions identified in Portugal with higher vulnerability to energy poverty. The map shows the division by NUTS 3. Highlighted are the Top-Down and Bottom-Up NUTS 2 and JTF NUTS 3.

*Table 37: Results for Portugal. Regions marked with a * represent regions that are already included in a NUTS 2 identified in the first two columns.*

NUTS 2 identified by the indicators methodology	NUTS 2 identified by the Antenna	High CDD regions (Corresponding NUTS 3 code)	JTF Territories (Corresponding NUTS 3 code)
Região Autónoma dos Açores (PT20)	None	None	Médio Tejo (PT1D2)
Região Autónoma da Madeira (PT30)			Matosinhos (PT11A)
Norte (PT11)			Alentejo Litoral (PT1C1)
Algarve (PT15)			
Área Metropolitana de Lisboa (PT17)			

3.23 Romania

The results for Romania consider five NUTS 2 (out of eight) and six NUTS 2 on the top-down assessment. The NUTS 2 identified in Romania in this segment were among the most vulnerable, all ranking above the thirty most vulnerable regions to severe energy poverty. In the top-down assessment, two additional NUTS 2.

The top-down segment identified five regions in Romania: ***Sud-Est*** **(South-East, RO22),** ***Sud-Vest Oltenia*** **(SouthWest Oltenia, RO41),** ***Centru*** **(Centre, RO12),** ***Nord-Est*** **(North-East, RO21),** ***Sud-Muntenia*** **(South Muntenia, RO31)** (Table 38). Romania has territories included in approved territorial just transition plans, which are **Galați (RO224), Gorj (RO412), Dolj (RO411), Mureș (RO125), Prahova (RO316), and Hunedoara (RO423)**. The EPAH antenna indicated the inclusion of **the North-West (RO11)** and **West (RO42) Regions** as vulnerable NUTS 2. The results for Romania are listed in Table 39 and Figure 27.

Table 38: Romania NUTS 2 and national average value on the selected indicators.

NUTS 2	IHAW	AROPE	ARREARS	HCOR	Position on ranking
Sud-Est (RO22)	14.8	45.3	26.3	13.2	7
Sud-Vest Oltenia (RO41)	15.1	40.5	16.3	9.7	15
Centru (RO12)	17.9	31.9	15.1	11.3	18
Nord-Est (RO21)	8.4	38.7	16.4	9.1	23
Sud-Muntenia (RO31)	11.8	32.9	10.3	7.5	30
Romania	12.5	32	14.4	9.1	-

The national EPAH Antenna, REPER21, validated the included regions in the top-down assessment as vulnerable. The following sections describe examples of vulnerable regions, highlighting the factors that contribute to their vulnerability.

The **South Muntenia** Region is the second-largest region at the national level in terms of population (over 3.2 million inhabitants). A significant percentage of the population lives in small towns, communes, and villages, characterised by modest development. The rural area covers over 70% of its territory and represents 57.2% of its population. According to the 2021-2027 Integrated Strategy for Territorial Development of the Region (South Muntenia Government, 2024),

the income of the population is below the national average and approximately 17% of the severe poverty population is situated in the Region (region with the highest value), with a rate of severe material deprivation of 23% in 2018 (South Muntenia Government, 2024; Romania national statistics, 2024). There is also a high share of the Roma population affected by poverty (4.5% of the total population of the region). The southern part of the region (represented by the counties of Călărași, Giurgiu, Ialomița, and Teleorman) is a traditionally underdeveloped area, representing the second poverty pole in Romania after the **North-East** region. It is also one of the most vulnerable areas to climate change, particularly in terms of heatwaves and tropical nights, which have triggered, among other processes, desertification. One of the main weaknesses in this region's urban areas is the large number of unrehabilitated buildings constructed with energy-inefficient materials, which are also exposed to seismic risks (South Muntenia Government, 2024). This challenge is reinforced by the region's high vulnerability to the impacts of climate change. In non-urban areas, the situation is marked by limited access to public utilities. The most critical issues concern heating systems, connections to the gas network, and sewerage infrastructure. Only 27.7% of communes are connected to the natural gas supply, and centralised heating is available in just 0.57% of communes, with the remainder relying primarily on wood for heating. According to the 2024 ORSE energy poverty report (ORSE, 2024), energy costs account for 38.8% of total household income in the region, the second-highest level in the country. This unusually high share is driven by elevated energy consumption, mainly resulting from inefficient housing conditions. The report identifies this region as the most severely affected by energy poverty nationwide.

South-East Region is the fourth largest region of Romania. Since 2012, the overall population has experienced a steady decline, with the sharpest decreases occurring in urban areas, where about half of the population resides (South-East Regional Development Agency, n.d.). According to the 2024 ORSE (ORSE, 2024), households in the South-East Region spend an average of 35.7% of their income on energy, the third-highest share in the country. Broader social indicators confirm the region's vulnerability. The region had the highest share of population living in material and social deprivation, the highest share at risk of poverty and social exclusion, and the third-highest poverty rate overall (Romania national statistics, 2024). Despite these severe socio-economic challenges, which are also reflected in the energy sector, none of the regional development strategies reviewed, including the Regional Development Plan, place emphasis on tackling energy poverty.

The South-West Region had a rural population share of 50.2% in 2021 (ADR SV Oltenia, n.d.). The region is characterised by significant disparities in access to social services, employment, healthcare, education, and living conditions between rural and urban areas. The main drivers of poverty include inactivity, low levels of education, intergenerational transmission of poverty, and limited interregional mobility. Poverty and social exclusion levels in rural areas are about twice as high as in cities (ADR SV Oltenia, n.d.). In 2023, the **South-West region** recorded the second-highest poverty rate in the country (31.3%), immediately after the North-East (31.4%). It also

ranked second in the share of people at risk of poverty and social exclusion (40.5%) and third in the share of the population experiencing material and social deprivation (35%) (Romanian National Statistics, 2024). Housing and energy infrastructure further reflect these vulnerabilities. At the last census in 2011, 96.19% of rural dwellings and 75.7% of urban dwellings had not benefited from any thermal rehabilitation (ADR SV Oltenia, n.d.). The regional gas network accounted for only 6.36% of the national length in 2020 (43,563 km), placing **South-West** last among Romanian regions. District heating provision to households accounted for 8.2 percent of the national total, 33.6 percent lower than in 2015 (p. 263). Most of the rural population continues to rely primarily on biomass for heating. From a climate perspective, the southern part of the region is among the most exposed areas in Romania to rising temperatures. 2024 registered exclusively positive deviations in average air temperature compared to the 1991–2020 reference period, with extremes exceeding an increase of 2.5°C in some areas of **South-West** (Antonescu *et al.,* 2025)**.** Finally, structural conditions contribute to a high energy cost burden for households. Households in the South-West Region allocate on average 35.7% of their income to energy expenses (ORSE, 2024), placing the region among the three most affected nationally.

North-East Region is the most populated region of Romania, accounting for 16.4% of the national population (North-East Regional Development Agency, 2021). More than 58% of its inhabitants live in rural areas, where poverty is highly concentrated. Many rural settlements rely on subsistence or semi-subsistence agriculture, often considered a disguised form of unemployment. According to the Development Plan (North-East Regional Development Agency, 2021), nearly three-quarters of those at risk of poverty or social exclusion in the region live in rural areas, and one-quarter are young people aged 15–24. Statistical data confirm this vulnerability. In 2023, the region recorded the highest poverty rate in the country (31.4%) and the third-highest share of people at risk of poverty and social exclusion (38.7%) (Romanian National Statistics, 2024). Access to energy infrastructure is also limited. Only 33 local governments and cities are connected to the natural gas distribution system, leaving most communes and villages without access (North-East Regional Development Agency, 2021). The disconnection of the population from the centralised thermal energy system has increased, and it is particularly critical in counties such as Vaslui and Botoșani, where dwellings with central heating represent only 23.4% and 26.1% of all homes with centralised or individual heating, placing them among the five counties with the lowest rates nationally. This poses significant risks given the region's severe winter climate. Moreover, the region recorded exclusively positive deviations in average temperatures compared to the 1991–2020 baseline, with extreme anomalies above +2.5°C in the northern parts of the region (Meteo Romania, 2025). Rehabilitation has progressed unevenly, with only 23% of dwellings being rehabilitated, with the lowest shares in Botoșani, Neamț, and Vaslui counties (17%) (North-East Regional Development Agency, 2021). These structural, social, and infrastructural challenges result in high levels of energy poverty. According to the 2024 ORSE report (ORSE, 2024), the North-East records disproportionately high rates of extreme energy

poverty (30.8%), driven by underdeveloped communities and lower-than-average household incomes compared to national values.

The last identified region was the **Centre region** NUTS 2. 57% of the region's population lives in urban areas, making it one of the most urbanized regions of Romania (ADR Centru, 2023). In terms of energy infrastructure, 60% of localities in the region are connected to the natural gas distribution network, which is double the national average (ADRU Centru, 2023). Mureș County has the highest share (80%), attributable to its role as a major producer of methane, and is also among the counties included in the Just JTF. Despite this relatively favourable infrastructure, poverty remains a significant challenge. **The Centre Region** ranked fourth nationally in terms of poverty rate in 2023 (24%), fifth in material and social deprivation (29.4%), and fifth in the share of people at risk of poverty and social exclusion (31.9%) (Romania National Statistics, 2024). Rural households often rely on biomass for heating, and their housing stock is predominantly old and energy-inefficient, thereby increasing the risk of energy poverty. Energy poverty indicators confirm this vulnerability. The ORSE 2024 report shows high values across all four measures, particularly for the 10% indicator—share of households for which energy costs are too high in the household budget (34.6%, the third highest nationally)—and the 2M indicator, capturing households with above-average energy consumption (22.5%, the fifth highest nationally) (ORSE, 2024). Climate change further amplifies these risks. A regional study on climate change impacts (ADR Centru, 2018) highlights significant warming trends. At Sibiu station, average annual temperatures from 2001 to 2014 were up to 0.9°C higher than during 1901–2000, whereas at Tîrgu Mureș the increase reached 1°C by 2014. During cold seasons, however, temperatures remain considerably lower, resulting in greater variability between hot and cold extremes (Antonescu *et al.*, 2025). These fluctuations directly affect energy consumption and disproportionately burden the most vulnerable households.

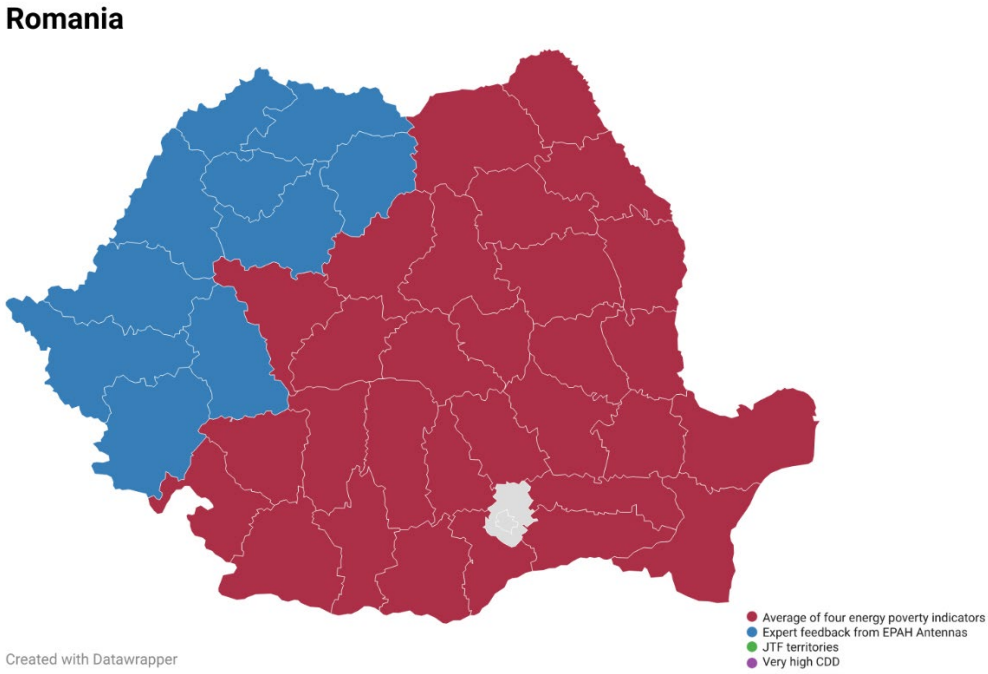

Figure 27: Regions identified in Romania with higher vulnerability to energy poverty. The map shows the division at the NUTS 3 level. Highlighted are the Top-Down and Bottom-Up NUTS 2.

*Table 39: Results for Romania. Regions marked with a * represent regions that are already included in a NUTS 2 identified in the first two columns.*

NUTS 2 identified by the indicators methodology	NUTS 2 identified by the Antenna	High CDD regions (Corresponding NUTS 3 code)	JTF Territories (Corresponding NUTS 3 code)
South-East (RO22)	North-West (RO11)	None	Galați (RO224)*
Sud-Vest Oltenia (RO41)	West Region (RO42)		Gorj (RO412)*
Centru (RO12)			Dolj (RO411)*
Nord-Est (RO21)			Mureș (RO125)*
Sud-Muntenia (RO31)			Prahova (RO316)*
			Hunedoara (RO423)*

3.24 Slovenia

Slovenia has two NUTS 2 regions, none of which were identified as vulnerable in the Top-down assessment. This segment identified two JTF NUTS 3. The results for Slovenia are listed in Table 40 and Figure 28. The JTF territories in Slovenia are **Savinjsko-Saleska (SI034)** and **Zasavska (SI035)**. The NUTS 2 included in the Bottom-up segment was Eastern Slovenia (SI03).

The national EPAH Antenna, FOCUS, indicated that factors such as housing quality, household income, household composition, hard-to-reach energy users, and tenancy are relevant for identifying vulnerable regions in the country. The national Antenna highlighted that the NUTS 2 level was too high to identify energy-poverty regions. In line with this, no NUTS 2 was directly identified by them. In line with this, no NUTS 2 were identified by them. However, as all five communities fell under the same NUTS 2 – **Eastern Slovenia (SI03),** this region was considered as a result. These regions share the highest percentage of energy-poor households and are at risk of social and material deprivation, above the national average (SIStat, n.d.a; n.d.b). This region is characterized by its rurality and a much lower population density (Government of Slovenia, 2023) and a higher percentage of population at risk of poverty (Eurostat, 2025b) than the other NUTS 2. The identification of this NUTS 2 region as potentially vulnerable to energy poverty is also supported by other socioeconomic indicators. This region is considered one of the least economically developed, characterized by a large presence of agriculture, accounting for more than 70% of Slovenia's agricultural holdings and most of its agricultural land (Kołodziejski, 2018). Regional GDP growth and contributions from statistical regions in this region are significantly smaller than from regions located in the other NUTS 2 (SIStat, 2023). This region is also characterized by the presence of manufacturing and heavy industry, which is supported by the presence of the two JTF territories present in this region.

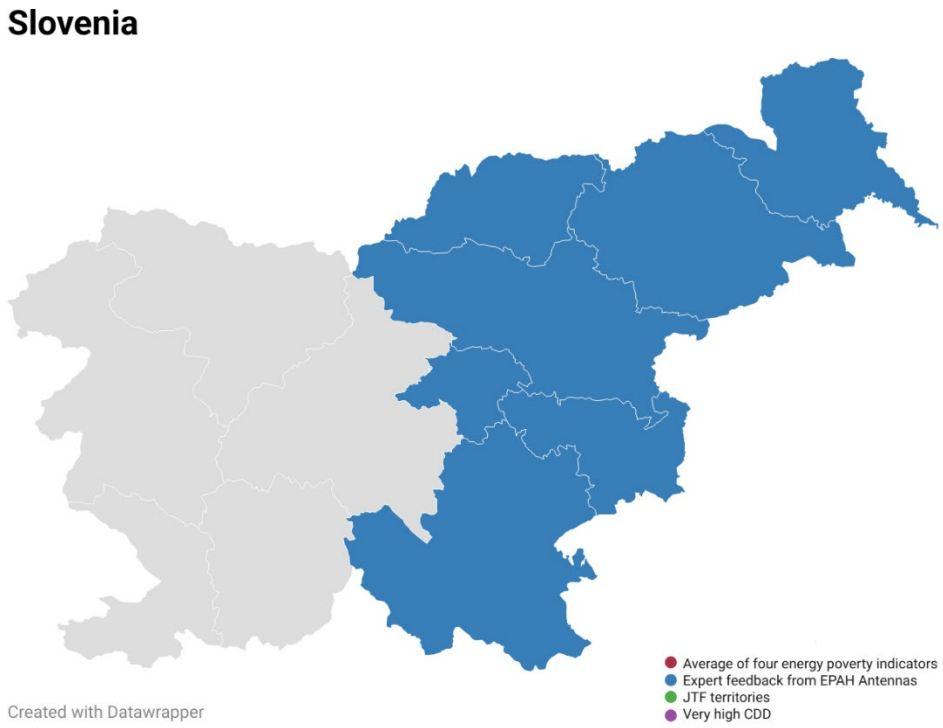

Figure 28: Regions identified in Slovenia with higher vulnerability to energy poverty. The map shows the division by NUTS 3. Highlighted is the Bottom-Up NUTS 2.

*Table 40: Results for Slovenia. Regions marked with a * represent regions that are already included in a NUTS 2 identified in the first two columns.*

NUTS 2 identified by the indicators methodology	NUTS 2 identified by the Antenna	High CDD regions (Corresponding NUTS 3 code)	JTF Territories (Corresponding NUTS 3 code)
None	Eastern Slovenia (Sl03)	None	Savinjsko-Saleska (SI034)*
			Zasavska (SI035)*

3.25 Slovakia

Slovakia has four NUTS 2 regions, one of which is identified as vulnerable in the Top-Down assessment, and three JTF NUTS 3 regions. The Bottom-up assessment resulted in the identification of one NUTS 2.

The NUTS 2 identified by the Top-down assessment was ***Východné Slovensko*** **(Eastern Slovakia, SK04)** (Table 41). Slovakia has territories included in approved territorial just transition plans, which are **Košice (SK042)**, already included in the NUTS 2 regions identified, and **Trenčín (SK022)** and **Banská Bystrica (SK032)**. The EPAH antenna indicated the inclusion of **Stredné Slovensko** (SK03) as a vulnerable NUTS 2 region. All the results are listed in Table 42 and Figure 29.

Table 41: Slovakia NUTS 2 and national average value on the selected indicators.

NUTS 2	IHAW	AROPE	ARREARS	HCOR	Position on ranking
Východné Slovensko (SK04)	13.7	23.1	15.5	6.3	39
Slovakia	8.1	13.7	8.8	5.9	-

The national EPAH Antenna, Climate Needs You, validated the inclusion of this NUTS 2 and justified its vulnerability. They also identified housing quality, household income, employment rates, economic activity, household composition, and the lack of political decision-making and commitment as relevant to identifying vulnerability in Slovakia. The following paragraphs provide examples of vulnerable regions in Slovenia.

Regions in **Eastern Slovakia** have the highest risk of poverty and social exclusion rates in the country (Statistical Office of the Slovak Republic, 2024a). This region is also characterised by the lowest GDP per capita, lowest disposable income, severe material deprivation, and the highest unemployment rate, including youth unemployment, in the country (National Bank of Slovakia, 2025). In some areas of this region, a significant share of the population expresses an inability to keep their homes adequately warm (for example, Košice region 11.7% and in Prešov region 15.7% (Statistical Office of the Slovak Republic, 2024b) and express difficulty paying energy bills (Slovakia Climate Initiative, n.d.). Indeed, households in this region allocate the highest proportion of their expenditure to electricity, gas, and fuels (Michálek, 2023).

Stredné Slovensko **(Central Slovakia, SK03)** regions with low household incomes, such as *Rimavská Sobota, Krupina, and Poltár*. The retirement pensions are among the lowest, *e.g.* in Rimavská Sobota, Čadca, Námestovo. In Central Slovakia, due to **low income,** a large proportion of houses built before 1980 have not undergone renovation (SOBD, 2021). In the Banská Bystrica region, 16.7% of households face arrears on housing costs (national average 8.8% (Statistical

Office of the Slovak Republic, 2024b)). Similarly, 12.5% of households face an inability to keep the home adequately warm. Another indicator why Central Slovakia should be identified is the air pollution - Central Slovakia has one of the highest levels of air pollution in Slovakia (SAV, 2023).

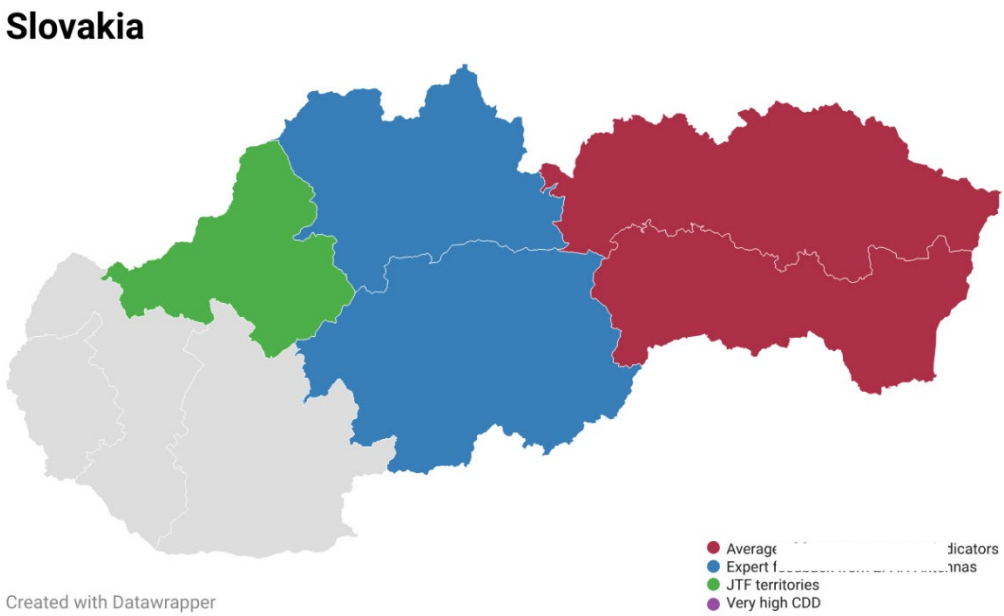

Figure 29: Regions identified in Slovakia with higher vulnerability to energy poverty. The map shows the division by NUTS 3. Highlighted are the Top-Down and Bottom-Up NUTS 2 and JTF NUTS 3.

*Table 42: Results for Slovakia. Regions marked with a * represent regions that are already included in a NUTS 2 identified in the first two columns.*

NUTS 2 identified by the indicators methodology	NUTS 2 identified by the Antenna	High CDD regions (Corresponding NUTS 3 code)	JTF Territories (Corresponding NUTS 3 code)
Východné Slovensko (SK04)	Stredné Slovensko (SK03)	None	Košice (SK042)*
			Banská Bystrica (SK032)*
			Trenčín (SK022)

3.26 Spain

Spain has 19 NUTS 2 regions, and five of them have been identified in the Top-Down assessment and 2 in the Bottom-up assessment. The NUTS 2 identified in the top-down assessment were among the regions with higher vulnerability to severe energy poverty, ranking at the top of the list. Eight JTF NUTS 3 were also identified.

Five NUTS 2 regions were identified as vulnerable to energy poverty in Spain on the Top-down assessment: ***Canarias* (ES70)**, ***Andalucía* (ES61)**, ***Región de Murcia* (ES62)**, ***Extremadura* (ES43)** and ***Comunitat Valenciana* (ES52)** (Table 43). Spain also had two OMR rankings among the most vulnerable regions, which were removed for EPAH purpose, due to the restriction mentioned in the methodology chapter. Spain has territories included in approved territorial just transition plans, which are **Córdoba (ES613)**, **Cádiz (ES612)**, **Almería (ES611)**, **León (ES413)**, and **Palencia (ES414)**, and **Alcúdia (ES532)**, **Asturias (ES120)**, **Teruel (ES242)** and **A Coruña (ES111)**, which were added to the assessment. The Bottom-up assessment identified **Castilla-La Mancha (ES42)** and **Castilla y León (ES41)** as vulnerable NUTS 2. Table 44 and Figure 30 cover the results for Spain.

Table 43: Spain NUTS 2 and national average value on the selected indicators.

NUTS 2	IHAW	AROPE	ARREARS	HCOR	Position on ranking
Canarias (ES70)	27.6	33.8	20.7	8.6	9
Andalucía (ES61)	24.2	37.5	15.7	8.7	11
Región de Murcia (ES62)	26.3	30.5	16.8	6	16
Extremadura (ES43)	25.1	32.8	13.5	4.7	19
Comunitat Valenciana (ES52)	22.8	29.6	12.5	8.8	22
Spain	20.7	26.5	13.6	8.2	-

The national EPAH Antenna, Ecoserveis, identified the factors of climate conditions, housing quality, household income, employment rates and economic activity and energy access as relevant factors for the identification of energy poverty in Spain. The national EPAH Antenna mentioned, as a relevant database and indicators for Spain, that the National Strategy against Energy Poverty 2019–2024 evaluates energy poverty using indicators such as disproportionate expenditure (2M), adapted disproportionate expenditure (2M'), hidden energy poverty (HEP), adapted hidden energy poverty (HEP'), inadequate indoor temperature in winter, and delayed payment of housing bills. Two additional indicators developed by the Chair of Energy and Poverty at Comillas Pontifical

University were also mentioned. These are the Minimum Income Standard (MIS), which defines the minimum income needed for a decent life and identifies households forced to cut other basic needs due to high energy costs, and Hidden Energy Poverty (HEP), which detects households under-consuming energy because of poverty rather than other reasons. Their methodology combines expenditure thresholds with an income filter, ensuring that higher-income households are excluded. The following sections provide examples of vulnerable regions in Spain.

In the **Canary Islands**, hidden energy poverty affected 31.42% of households in 2021, marking the third-highest rate in Spain (MITECO, 2022). The region's geographical isolation contributes to elevated energy costs, as it relies heavily on imported fuels and faces additional challenges in energy distribution and pricing. Although tourism plays a central role in the local economy, many residents are employed in low-paid, unstable service jobs, which limits their financial stability. A significant proportion of households, particularly in rural and inland areas, have low incomes, making them more vulnerable to energy poverty. Additionally, much of the housing stock is older and poorly insulated, resulting in high cooling costs during the summer and inefficient heating during the winter months. Secondly, in **Andalucía**, a significant portion of household income is spent on energy, with the region recording the highest energy expenditure relative to income in Spain in 2021—reaching 24.49% (Junta de Extremadura, 2021). That same year, 18% of the population reported inadequate heating during the winter, highlighting widespread thermal discomfort. The region also struggles with persistently high unemployment rates, which compound the challenges of energy affordability. Many residents live in older, poorly insulated buildings, resulting in inefficient heating and cooling systems and higher energy costs. Additionally, extreme summer temperatures and frequent heatwaves further drive up cooling expenses, exacerbating the region's vulnerability to energy poverty. **Murcia** was another identified region, where a considerable share of household income is devoted to energy expenses, with 23.34% of income allocated to energy in 2021 (MITECO, 2022). That year, 21.4% of the population reported inadequate heating during the winter, underscoring widespread thermal discomfort (MITECO, 2022). Economic disparities are pronounced in the region, especially in agricultural areas where low-income households and seasonal employment contribute to financial instability. Much of the housing stock is older and poorly insulated, resulting in higher heating and cooling costs. Additionally, high summer temperatures drive significant energy consumption, as air conditioning becomes essential for maintaining comfortable indoor conditions. In **Extremadura**, a large share of household income is spent on energy, with energy expenditure accounting for 23.27% of income in 2021 (Junta de Extremadura, 2021). The region also has one of the lowest average income levels in Spain, which further increases vulnerability to energy poverty. A significant portion of the housing stock consists of older buildings with poor insulation and inefficient heating and cooling systems, leading to higher energy costs. Additionally, **Extremadura** endures extremely high summer temperatures, which drive up the demand for cooling and further strain household budgets. Lastly, **u**rban areas in the **Valencian Community**, particularly cities like Valencia and

Alicante, face high rental prices, with rent-to-income ratios placing significant pressure on households. The regional economy is heavily reliant on tourism, which contributes to job instability due to the seasonal nature of employment in the sector. Many residential buildings, particularly older apartments, lack adequate insulation and effective energy efficiency measures, resulting in higher heating and cooling expenses for residents.

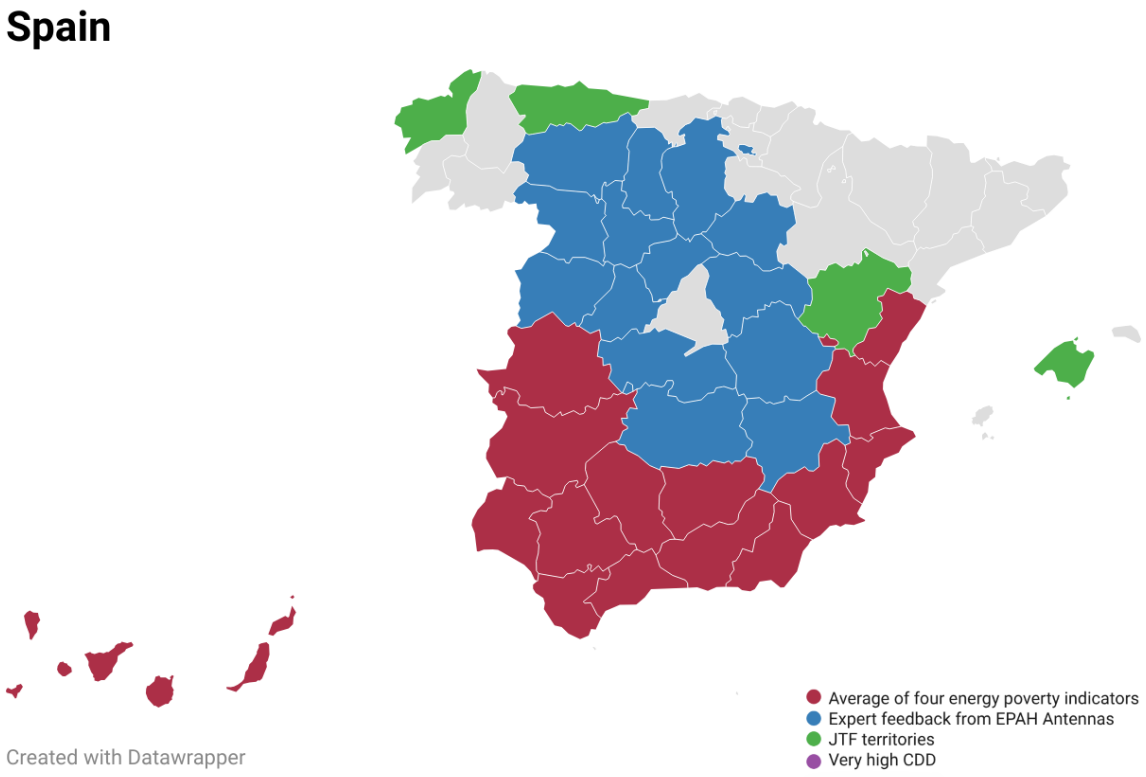

Figure 30: Regions identified in Spain with higher vulnerability to energy poverty. The map shows the division by NUTS 3. Highlighted are the Top-Down and Bottom-Up NUTS 2 and JTF NUTS 3.

*Table 44: Results for Spain. Regions marked with a * represent regions that are already included in a NUTS 2 identified in the first two columns.*

NUTS 2 identified by the indicators methodology	NUTS 2 identified by the Antenna	High CDD regions (Corresponding NUTS 3 code)	JTF Territories (Corresponding NUTS 3 code)
Canarias (ES70)	Castilla-La Mancha (ES42)	Córdoba (ES613)*	León (ES413)*
Andalucía (ES61)	Castilla y León (ES41)	Cádiz (ES612)*	Palencia (ES414)*
Región de Murcia (ES62)		Almería (ES611)*	Alcúdia (ES532)
Extremadura (ES43)			Asturias (ES120)
Comunitat Valenciana (ES52)			Teruel (ES242)

			A Coruña (ES111)
			Córdoba (ES613)*
			Cádiz (ES612)*
			Almería (ES611)

3.27 Sweden

One NUTS 2 (of a total of 8 in the country) was identified as a vulnerable region in Sweden. No high-CDD region was identified in the country, and two NUTS 2 regions were identified as part of the JTF Territories.

The NUTS 2 identified by the top-down assessment was **Sydsverige** (SE22) (Table 45). Sweden has territories included in approved territorial just transition plans, which are **Norrbotten (SE332)**, **Västerbotten (SE331),** and **Gotland (SE094).** The results for Sweden are summarised in Table 46 and Figure 31.

Table 45: Sweden NUTS 2 and national average value on the selected indicators.

NUTS 2	IHAW	AROPE	ARREARS	HCOR	Position on ranking
Sydsverige (SE22)	8.6	22.8	9	13.6	44
Sweden	5.9	18.4	6.7	10.9	-

The National EPAH Antenna, Stockholm Environment Institute, validated the identification of **Sydsverige** as a vulnerable region for energy poverty action, which is described in the following paragraphs as an example of a vulnerable region.

The most relevant energy poverty-related factors in **Sydsverige** (Figure 34) are energy prices, heating sources, and lack of political commitment. This region experiences a lack of transmission capacity from the electric grid system, which is divided into four bidding areas for electricity (**Sydsverige** belongs to bidding area 4). Despite being a densely populated region, local energy production is insufficient, and bidding area 4 has thus had the most severe electricity price peaks. This issue is, at its core, a political one, where political action could help even out electricity prices across Sweden. Heating sources are also relevant here, as a relatively high share of households rely on gas heating. Moreover, inefficient electric heating systems are particularly costly here, as electricity prices fluctuate and peak, although such systems remain a problem across Sweden.

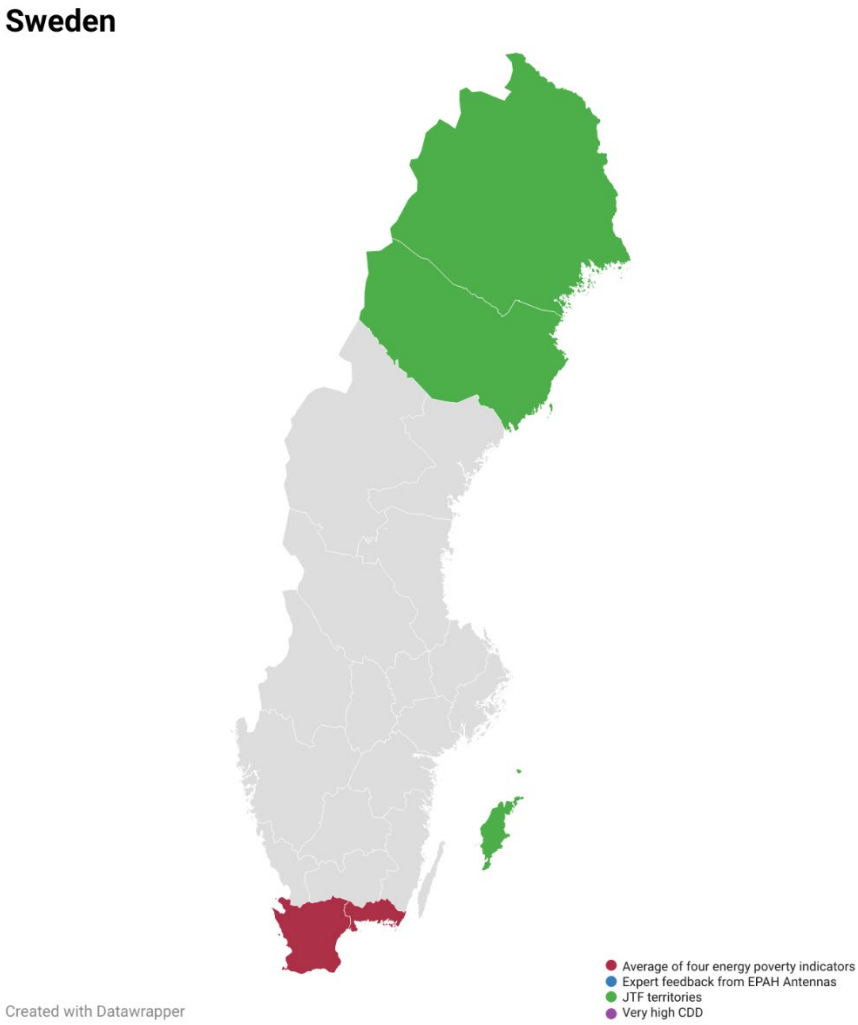

Figure 31: Regions identified in Sweden with higher vulnerability to energy poverty. The map shows the division at the NUTS 3 level. Highlighted are the Top-Down NUTS 2 and JTF NUTS 3.

*Table 46: Results for Sweden. Regions marked with a * represent regions that are already included in a NUTS 2 identified in the first two columns.*

NUTS 2 identified by the indicators methodology	NUTS 2 identified by the Antenna	High CDD regions (Corresponding NUTS 3 code)	JTF Territories (Corresponding NUTS 3 code)
Sydsverige (SE22)	None	None	Norrbotten (SE332)*
			Västerbotten (SE331)*
			Gotland (SE094)*

4. Conclusions

This report presents the results of applying a methodology designed to identify EU regions and communities with potentially higher vulnerability to energy poverty, specifically developed to support the targeting of EPAH's calls for technical assistance to the most affected regions. The methodology combines two complementary approaches to address the multidimensionality of energy poverty: a top-down quantitative assessment of four energy poverty indicators available at the NUTS 2 level, supplemented by two additional criteria at the NUTS 3 level — JTF territories and regions with very high CDD values — and a bottom-up validation by national EPAH Antennas, whose expertise proved essential for contextualising the results and identifying additional vulnerable regions, albeit with some disparity in the depth of contributions across countries.

The application of the methodology, based on 2023 data and the results of an online expert survey, led to the identification of 114 NUTS 2 regions and 55 additional NUTS 3 regions potentially highly vulnerable to severe energy poverty. The top-down assessment yielded 60 NUTS 2 regions, while the CDD and JTF criteria added 13 and 113 NUTS 3 regions, respectively. Given the considerable overlap between identified NUTS 2 and NUTS 3 regions, only the 55 NUTS 3 regions not already covered by the selected NUTS 2 regions were added to the final list. The bottom-up assessment validated the top-down results and identified an additional 54 NUTS 2 regions considered by the EPAH Antennas as vulnerable to severe energy poverty.

The results across all steps of the methodology showed significant variation among Member States, reflecting the diverse national contexts within the EU, differences in administrative structures; with some countries having only one NUTS 2 or NUTS 3 region while others have many, and varying levels of maturity in energy poverty research, policy, and action, which in turn affects the availability of subnational data and the depth of informaiton and knowledge.

It is also important to acknowledge that the results are shaped by the availability and nature of the indicators selected, which may capture some dimensions of energy poverty more effectively than others, depending on the national context. This was evident, for instance, in the identification of regions in countries not typically associated with high energy poverty vulnerability, as well as in the absence of regions from countries where energy poverty is recognised as a significant challenge but where the selected indicators show comparatively low values. These findings reinforce the value of the bottom-up validation step in contextualising and complementing the quantitative results with grounded expert knowledge of local realities.

Beyond the EU-wide analysis, this report provides a detailed assessment for each Member State, characterising selected NUTS 2 and NUTS 3 regions identified as potentially more vulnerable to severe energy poverty through both steps of the methodology. This exercise is part of EPAH's broader, ongoing efforts to enhance understanding of the multiple dimensions of energy poverty at diverse scales across the EU, and to address this phenomenon through capacity-building and

technical support for national, regional, and local actors. In addition to informing the rollout of EPAH's calls for technical assistance, this methodology has several wider potential applications, including the design of multi-scalar, targeted policies and measures to reduce energy poverty in regions with higher vulnerability.

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Annexes

ANNEX 1: List of NUTS 2 regions ranked according to the arithmetic average of four indicators relevant for energy poverty diagnosis

Table A 1: Top 60 NUTS 2 regions with potentially higher vulnerability to severe energy poverty according to the arithmetic average of the four selected indicators.

NUTS 1	NUTS 2	Region Vulnerability Score (%)
Greece	Dytiki Elláda	37.0
Greece	Peloponnisos	35.9
Greece	Anatoliki Makedonia, Thraki	34.8
Greece	Ionia Nisia	32.8
Greece	Kentriki Makedonia	32.5
Greece	Voreio Aigaio	31.5
Greece	Dytiki Makedonia	31.5
Greece	Attiki	29.2
Spain	Ciudad de Ceuta	28.4
France	Guyane	27.8
Greece	Sterea Elláda	26.8
Greece	Thessalia	26.8
Bulgaria	Severen tsentralen	25.8
Greece	Notio Aigaio	25.4
Greece	Kriti	25.3
Romania	Sud-Est	24.9
Bulgaria	Severozapaden	24.2
Greece	Ipeiros	23.1
Spain	Canarias	22.7
Italy	Calabria	21.9
Spain	Andalucía	21.5
Bulgaria	Yugoiztochen	21.4
Hungary	Észak-Magyarország	20.8
Bulgaria	Yuzhen tsentralen	20.7
Romania	Sud-Vest Oltenia	20.4
Spain	Ciudad de Melilla	20.3
Spain	Región de Murcia	19.9
France	La Réunion	19.5
Italy	Campania	19.3

Romania	Centru	19.1
Spain	Extremadura	19.0
Portugal	Região Autónoma dos Açores	18.6
Bulgaria	Severoiztochen	18.5
Spain	Comunitat Valenciana	18.4
Spain	Castilla-La Mancha	18.2
Romania	Nord-Est	18.2
Germany	Bremen	17.8
France	Guadeloupe	17.7
Italy	Sicilia	17.4
Spain	Illes Balears	17.4
Belgium	Région de Bruxelles-Capitale/Brussels Hoofdstedelijk Gewest	17.1
Bulgaria	Yugozapaden	16.7
Germany	Kassel	16.2
Spain	Cataluña	16.2
Italy	Puglia	16.0
Germany	Düsseldorf	15.7
France	Martinique	15.7
Romania	Sud-Muntenia	15.6
Portugal	Região Autónoma da Madeira	15.6
Italy	Sardegna	15.5
Lithuania	Vidurio ir vakarų Lietuvos regionas	15.5
Spain	Comunidad de Madrid	15.5
Hungary	Dél-Dunántúl	15.4
France	Nord-Pas de Calais	15.3
Spain	Galicia	15.3
Germany	Saarland	15.1
Germany	Münster	15.0
Germany	Arnsberg	14.9
Germany	Köln	14.8
Slovakia	Východné Slovensko	14.7
Germany	Hannover	14.6
Belgium	Prov. Hainaut	14.6
Germany	Gießen	14.4
Portugal	Norte	14.4
Spain	Principado de Asturias	14.4
Germany	Rheinhessen-Pfalz	14.2
Hungary	Észak-Alföld	14.2

Germany	Thüringen	14.1
Romania	Vest	14.1
Croatia	Panonska Hrvatska	14.0
Germany	Weser-Ems	13.8
Germany	Hamburg	13.7
Germany	Detmold	13.7
Denmark	Hovedstaden	13.5
Sweden	Sydsverige	13.5
Portugal	Algarve	13.5
Spain	Aragón	13.5
Belgium	Prov. Brabant wallon	13.5
France	Languedoc-Roussillon	13.5
Spain	Cantabria	13.4
Germany	Darmstadt	13.4
Germany	Koblenz	13.4
France	Lorraine	13.3
Spain	Castilla y León	13.3
France	Corse	13.1
Spain	La Rioja	13.1
Germany	Braunschweig	13.1
France	Picardie	13.0
France	Limousin	13.0
Germany	Lüneburg	12.9
Germany	Mecklenburg-Vorpommern	12.9
Germany	Schleswig-Holstein	12.8
Italy	Abruzzo	12.7
France	Champagne-Ardenne	12.7
Spain	Comunidad Foral de Navarra	12.7
Cyprus	Cyprus	12.6
France	Provence-Alpes-Côte d'Azur	12.5
Italy	Lazio	12.5
Denmark	Nordjylland	12.5
Germany	Mittelfranken	12.5
Germany	Berlin	12.5
Portugal	Área Metropolitana de Lisboa (NUTS 2021)	12.4
Belgium	Prov. Liège	12.3
Germany	Sachsen-Anhalt	12.3
France	Midi-Pyrénées	12.3

Romania	Nord-Vest	12.2
Germany	Karlsruhe	12.2
Hungary	Dél-Alföld	12.0
Latvia	Latvia	11.9
Belgium	Prov. Luxembourg (BE)	11.8
France	Aquitaine	11.7
Romania	Bucureşti-Ilfov	11.7
Denmark	Midtjylland	11.7
Austria	Wien	11.6
Denmark	Sjælland	11.6
France	Ile de France	11.6
Germany	Tübingen	11.5
Germany	Freiburg	11.5
France	Bourgogne	11.4
Germany	Brandenburg	11.4
France	Haute-Normandie	11.4
Germany	Leipzig	11.3
France	Rhône-Alpes	11.3
Ireland	Eastern and Midland	11.3
France	Poitou-Charentes	11.2
Croatia	Sjeverna Hrvatska	11.2
France	Alsace	11.2
Germany	Stuttgart	11.0
Belgium	Prov. Namur	11.0
Lithuania	Sostinės regionas	11.0
Sweden	Norra Mellansverige	11.0
Croatia	Jadranska Hrvatska	10.9
Luxembourg	Luxembourg	10.9
Sweden	Östra Mellansverige	10.9
France	Pays de la Loire	10.8
Spain	País Vasco	10.8
France	Basse-Normandie	10.7
France	Franche-Comté	10.6
Poland	Kujawsko-pomorskie	10.6
Portugal	Centro (PT) (NUTS 2021)	10.6
France	Auvergne	10.5
Poland	Pomorskie	10.5

Estonia	Estonia	10.4
Italy	Molise	10.4
France	Centre — Val de Loire	10.4
Denmark	Syddanmark	10.3
Germany	Oberfranken	10.3
France	Bretagne	10.2
Czechia	Severozápad	10.2
Germany	Chemnitz	10.1
Sweden	Stockholm	10.1
Poland	Podlaskie	9.9
Poland	Świętokrzyskie	9.8
Czechia	Moravskoslezsko	9.8
Ireland	Southern	9.8
Italy	Basilicata	9.8
Germany	Niederbayern	9.8
Hungary	Pest	9.7
Sweden	Västsverige	9.7
Slovakia	Stredné Slovensko	9.7
Netherlands	West-Nederland (utrecht, noord-holland, zuid-holland, zeeland)	9.7
Italy	Liguria	9.7
Germany	Oberbayern	9.6
Malta	Malta	9.6
Poland	Warmińsko-mazurskie	9.5
Sweden	Småland med öarna	9.5
Portugal	Alentejo (NUTS 2021)	9.4
Ireland	Northern and Western	9.4
Italy	Piemonte	9.3
Czechia	Praha	9.2
Poland	Zachodniopomorskie	9.0
Germany	Unterfranken	9.0
Austria	Vorarlberg	8.9
Poland	Lubelskie	8.9
Finland	Helsinki-Uusimaa	8.8
Germany	Schwaben	8.8
Poland	Łódzkie	8.7
Germany	Dresden	8.7
Germany	Trier	8.6

Sweden	Mellersta Norrland	8.6
Finland	Etelä-Suomi	8.6
Austria	Kärnten	8.5
Finland	Länsi-Suomi	8.4
Finland	Åland	8.4
Hungary	Budapest	8.4
Poland	Lubuskie	8.4
Slovenia	Vzhodna Slovenija	8.3
Netherlands	Noord-Nederland (groningen, firesland, drenthe)	8.2
Poland	Dolnośląskie	8.1
Austria	Steiermark	8.0
Poland	Opolskie	8.0
Germany	Oberpfalz	7.9
Austria	Oberösterreich	7.9
Austria	Tirol	7.8
Poland	Mazowiecki regionalny	7.7
Poland	Wielkopolskie	7.6
Netherlands	Zuid-Nederland (noord-brabant, limburg)	7.5
Austria	Niederösterreich	7.5
Finland	Pohjois- ja Itä-Suomi	7.4
Netherlands	Oost-Nederland (overrijssel, gelderland, flevoland)	7.4
Slovakia	Západné Slovensko	7.4
Austria	Burgenland	7.3
Austria	Salzburg	7.2
Czechia	Střední Morava	7.2
Poland	Śląskie	7.1
Hungary	Közép-Dunántúl	7.1
Sweden	Övre Norrland	7.1
Poland	Podkarpackie	6.8
Hungary	Nyugat-Dunántúl	6.8
Czechia	Jihovýchod	6.7
Belgium	Prov. Antwerpen	6.6
Croatia	Grad Zagreb	6.6
Italy	Marche	6.6
Poland	Małopolskie	6.5
Czechia	Střední Čechy	6.5

Italy	Lombardia	6.5
Italy	Veneto	6.5
Czechia	Severovýchod	6.5
Poland	Warszawski stołeczny	6.4
Italy	Toscana	6.4
Italy	Valle d'Aosta/Vallée d'Aoste	5.9
Italy	Provincia Autonoma di Trento	5.9
Italy	Friuli-Venezia Giulia	5.8
Slovenia	Zahodna Slovenija	5.8
Slovakia	Bratislavský kraj	5.6
Belgium	Prov. Vlaams-Brabant	5.5
Belgium	Prov. West-Vlaanderen	5.5
Belgium	Prov. Oost-Vlaanderen	5.5
Czechia	Jihozápad	5.5
Italy	Umbria	5.3
Belgium	Prov. Limburg (BE)	5.1
Italy	Emilia-Romagna	4.0
Italy	Provincia Autonoma di Bolzano/Bozen	3.3

ANNEX 2: List of identified NUTS 2 regions through the arithmetic average of four indicators relevant for energy poverty diagnosis, and considering the cap of five regions per country

Table A2: Top 60 list of NUTS 2 regions with potentially higher vulnerability to severe energy poverty according to the arithmetic average of the four selected indicators and considering a cap of five regions per country.

Country	Region
Greece	Dytiki Elláda
Greece	Peloponnisos
Greece	Anatoliki Makedonia, Thraki
Greece	Ionia Nisia
Greece	Kentriki Makedonia
Bulgaria	Severen tsentralen
Romania	Sud-Est
Bulgaria	Severozapaden
Spain	Canarias
Italy	Calabria
Spain	Andalucía
Bulgaria	Yugoiztochen
Hungary	Észak-Magyarország
Bulgaria	Yuzhen tsentralen
Romania	Sud-Vest Oltenia
Spain	Región de Murcia
Italy	Campania
Romania	Centru
Spain	Extremadura
Portugal	Região Autónoma dos Açores
Bulgaria	Severoiztochen
Spain	Comunitat Valenciana
Romania	Nord-Est
Germany	Bremen
Italy	Sicilia
Belgium	Région de Bruxelles-Capitale/Brussels Hoofdstedelijk Gewest
Germany	Kassel
Italy	Puglia
Germany	Düsseldorf
Romania	Sud-Muntenia

Portugal	Região Autónoma da Madeira
Italy	Sardegna
Lithuania	Vidurio ir vakarų Lietuvos regionas
Hungary	Dél-Dunántúl
France	Nord-Pas de Calais
France	Languedoc-Roussillon
Germany	Saarland
Germany	Münster
Slovakia	Východné Slovensko
Belgium	Prov. Hainaut
Portugal	Norte
Hungary	Észak-Alföld
Croatia	Panonska Hrvatska
Sweden	Sydsverige
Portugal	Algarve
Belgium	Prov. Brabant wallon
France	Lorraine
France	Corse
France	Picardie
Denmark	Hovedstaden
Cyprus	Cyprus
Denmark	Nordjylland
Portugal	Área Metropolitana de Lisboa (NUTS 2021)
Belgium	Prov. Liège
Hungary	Dél-Alföld
Latvia	Latvia
Belgium	Prov. Luxembourg (BE)
Denmark	Midtjylland
Austria	Wien
Denmark	Sjælland

ANNEX 3: Final list of identified NUTS 2 and NUTS 3 regions considering the full application of the multi-step methodology

Table A3: Final list of regions identified as being potentially more vulnerable to severe energy poverty, considering the full application of the multi-step methodology

Country	NUTS 2 identified by the average of 4 energy poverty indicators	NUTS 2 identified by the Antenna	JTF Territories (NUTS 3)	Very high CDD regions (NUTS 3)
Austria			Graz (AT221)	
			Östliche Obersteiermark (AT223)	
			West- und Südsteiermark (AT225)	
			Westliche Obersteiermark (AT226)	
			Mostviertel-Eisenwurzen (AT121)	
			Niederösterreich-Süd (AT122)	
			Unterkärnten (AT213)	
			Klagenfurt-Villach (AT211)	
			Traunviertel (AT315)	
	Wein (AT13)		Steyr-Kirchdorf (AT314)	
Belgium	Région de Bruxelles-Capitale/Brussels Hoofdstedelijk Gewest (BE10)			
	Prov. Hainaut (BE32)			
	Prov. Brabant wallon (BE31)	Prov. Vlaams-Brabant (BE24)		
	Prov. Liège (BE33)	Prov. Antwerpen (BE21)		
	Prov. Luxembourg (BE) (BE34)	Namur (BE35)	Arrondissements de Tournai, Mons et Charleroi	

			(BE328, BE323, BE32B)	
Bulgaria	Severen tsentralen (BG32)			
	Severozapaden (BG31)			
	Yugoiztochen (BG34)			
	Yuzhen tsentralen (BG42)		Stara Zagora (BG344)	
	Severoiztochen (BG33)	Southwest (BG41)	Pernik, Kyustendil (BG414, BG415)	
Croatia		City of Zagreb (HR05)		
		Northern Croatia (HR06)	Sisak-Moslavina (HR028)	
	Panonska Hrvatska (HR02)	Adriatic (HR03)	Istria (HR036)	
Cyprus				
Cyprus	Cyprus (CY00)		Cyprus (CY000)	Cyprus (CY000)
Czechia		Moravia-Silesian (CZ08)	Moravian-Silesian Region (CZ080)	
		North-west (CZ04)	Ústí nad Labem Region, Karlovy Vary Region (CZ042, CZ041)	
Denmark	Hovedstaden (DK01)			
	Nordjylland (DK05)			
	Midtjylland (DK04)		Nordjylland (DK050)	
	Sjælland (DK02)	Southern Denmark (DK03)	Sydjylland (DK032)	
Estonia		Estonia (EE00)	Ida-Virumaa (EE007)	
Finland			Lappi (FI1D7)	
			Pohjois-Pohjanmaa (FI1D9)	
			Kainuu (FI1D8)	
			Keski-Pohjanmaa (FI1D5)	
			Pohjois-Savo (FI1DB)	

			Pohjois-Karjala (FI1DC)	
			Etelä-Savo (FI1DA)	
			Etelä-Karjala (FI1C5)	
			Kymenlaakso (FI1C7)	
			Keski-Suomi (FI198)	
			Etelä-Pohjanmaa (Parkano, Kihniö and Virrat) (FI199)	
		Eastern Finland (FI1D)	Pohjanmaa (FI19A)	
		Åland (FI20)	Satakunta (FI196)	
		Western Finland (FL19)	Punkalaidun (FI19B)	
France			Nord-Pas-de-Calais (FRE11, FRE12)	
			Moselle, Meurthe-et-Moselle (FRF33, FRF31)	
	Nord-Pas de CalaisN(FRE1)		Haut-Rhin (FRF12)	
	Languedoc-Roussillon (FRJ1)		Loire-Atlantique (FRG01)	
	Lorraine (FRF3)		Vallées de la Seine et de la Bresle (FRD22)	
	Corse (FRM0)		Rhone-Isere (FRK26, FRK24)	
	Picardie (FRE2)		Bouches-du-Rhone (FRL04)	
Germany			Nordliches Ruhrgebiet (DEA31, DEA36)	
			Mitteldeutschers Revier Sachsen (DED51, DED52), Nordsachsen (DED53)	
			Uckermark (DE40I), Lausitz Brandenburg	

			(DE40B, DE40C, DE403)	
			Mitteldeutsches Revier-Sachsen-Anhalt (DEE08, DEE0B, DEE05, DEE0A, DEE02, DEE01)	
			Chemnitz (DED41)	
			Bautzen (DED24) [Lausitz Sachsen]	
			Gorlitz (DED2D) [Lausitz Sachsen]	
			Städteregion Aachen (DEA2D) [Rheinisches Revier]	
			Düren (DEA26) [Rheinisches Revier]	
			Rhein-Erft-Kreis (DEA27) [Rheinisches Revier]	
			Euskirchen (DEA28) [Rheinisches Revier]	
			Heinsberg (DEA29) [Rheinisches Revier]	
			Oberbergischer Kreis (DEA2A) [Rheinisches Revier]	
		Thüringen (DEG0)	Rheinisch-Bergischer Kreis (DEA2B) [Rheinisches Revier]	
	Bremen (DE50)	Chemnitz (DED4)	Rhein-Sieg-Kreis (DEA2C) [Rheinisches Revier]	
	Kassel (DE73)	Mecklenburg - Vorpommern (DED80)	Wesel (DEA1F) [Rheinisches Revier]	

	Düsseldorf (DEA1)	Leipzig Region (DED5)	Aachen, Kreisfreie Stadt (DEA21) [Rheinisches Revier]	
	Saarland (DEC0)	Sachsen-Anhalt (DEE0)	Bonn, Kreisfreie Stadt (DEA23) [Rheinisches Revier]	
	Münster (DEA3)	Brandenburg (DE40)	Köln, Kreisfreie Stadt (DEA23) [Rheinisches Revier]	
Greece				Corfu (EL622)
			Megalopoli (EL651)	Lesbos, Lemnos (EL411)
			Grevena, Kozani, Kastoria, Florina (EL531, EL532, EL533)	Kalymnos, Karpathos, Kos, Rhodes (EL421)
			Lesbos, Lemnos, Ikaria, Samos,Chios (EL411, EL412, EL413)	Piraeus, Islands (EL307)
			Kalymnos, Karpath os, Kos, Rhodes (EL421)	Western Athens (EL302)
	Western Greece (EL63)		Andros, Thira, Kea-Kythnos, Milos, Mykonos, Naxos, Paros, Syros, Tinos (EL422)	Southern Athens (EL304)
	Peloponnese (EL65)		Heraklion (EL431)	Central Athens (EL303)
	Eastern Macedonia and Thrace (EL51)	Western Macedonia (EL53)	Lasithi (EL432)	Eastern Attica (EL305)
	Ionian islands (EL62)	Central Greece (EL64)	Rethymno (EL433)	Western Attica (EL306)
	Central Macedonia (EL52)	North Aegean (EL41)	Chania (EL434)	Northern Athens (EL301)
Hungary	Siuthern Great Plain (HU33)	Western Transdanubi a (HU22)		

	Nothern Great Plain (HU32).	Central Transdanbubia (HU21)		
	Southern Transdanubia (HU23)	Pest (HU12)	Baranya (HU231)	
	Észak-Magyarország (HU31)	Budapest (HU11)	Heves, Borsod-Abaúj-Zemplén (HU312, HU311)	
Ireland		Dublin (IE061, NUTS 2 IE06)		
		West (IE042, NUTS 2 IE04)		
		Sout-East (IE051, NUTS 2 IE05)		
		Border (IE041, NUTS 2 IE04)		
		Midlands (IE061, NUTS 2 IE06)	Midlands (IE063)	
Italy		Liguria (ITC3)		
	Calabria (ITF6)	Lombardia (ITC4)		
	Campania (ITF3)	Valle d'Aosta (ITC2)		
	Sicilia (ITG1)	Piemonte (ITC1)		
	Puglia (ITF4)	Basilicata (ITF5)	Taranto (ITF43)	
	Sardegna (ITG2)	Molise (ITF2)	Sulcis-Iglesiente (ITG2C)	Lecce (ITF45)
Latvia	Latvia (LV00)		Letgale, Vidzeme, Zemgale, Kurzeme (LV005, LV008, LV009, LV003)	
Lithuania	Vidurio ir vakarų Lietuvos regionas (LT02)		Telsiai, Siauliai, Kaunas (LT028, LT026 ,LT022)	

Luxembourg		Luxemburg (LU00)	Luxemburg (LU000)	
Malta		Malta (MT00)	Malta (MT001)	Malta (MT001), Gozo and Comino (MT002)
Netherlands			Groningen (NL111)	
			Delfzijl and surroundings (NL112)	
			Rest of Groningen (NL113)	
			Emmen (NL132)	
		Friesland (NL12)	Ijmond (NL323)	
		Overijssel (NL21)	Groot-Rijnmond (NL33C)	
		Zuid Holland (NL33)	West-Noord-Brabant (NL411)	
		Limburg (NL42)	Zeeuws-Vlaanderen (NL341)	
		Groningen (NL11)	Zuid-Limburg (NL423)	
Poland		Pomeranian Voivodeship (PL42)		
		Lower Silesian Voivodeship (PL51)	Eastern Wielkopolska (PL41)	
		Greater Poland Voivodeship (PL41)	Silesia (PL22)	
		Pomeranian Voivodeship (PL63)	Łódź (PL712)	
		Opole Voivodeship (PL52)	Walbrzych (PL517)	
Portugal	Região Autónoma dos Açores (PT20)			
	Região Autónoma da Madeira (PT30)			
	Norte (PT11)		Matosinhos (PT11A)	
	Algarve (PT15)		Médio Tejo (PT1D2)	

	Área Metropolitana de Lisboa (PT17)		Alentejo Litoral (PT1C1)	
Romania	Sud-Vest Oltenia (RO41)		Galați (RO224)	
	Sud-Est (RO22)		Gorj, Dolj (RO412, RO411)	
	Centru (RO12)		Mureș (RO125)	
	Nord-Est (RO21)	North-West (RO11)	Prahova (RO316)	
	Sud-Muntenia (RO31)	West Region (RO42)	Hunedoara (RO423)	
Slovakia			Košice (SK042)	
			Banská Bystrica (SK032)	
	Východné Slovensko (SK04)	Central Slovakia (Stredné Slovensko, SK03)	Trenčín (SK022)	
Slovenia			Savinjsko-Saleska (SI034)	
		Eastern Slovenia (SL1)	Zasavska (SI035)	
Spain			Córdoba, Cádiz, Almería (ES613, ES612, ES611)	
	Canarias (ES70)		León, Palencia (ES413, ES414)	
	Andalucía (ES61)		Alcúdia (ES532)	
	Región de Murcia (ES62)		Asturias (ES120)	
	Extremadura (ES43)	Castilla-La Mancha (ES42)	Teruel (ES242)	
	Comunitat Valenciana (ES52)	Castilla y León (ES41)	A Coruña (ES111)	
Sweden			Norrbotten (SE332)	
			Västerbotten (SE331)	
	Sydsverige (SE22)		Gotland (SE023)	

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