

## ENERGY POVERTY ACROSS THE EU-27: A CRITICAL ASSESSMENT

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**Abstract:** *At the global and European level, the current geopolitical conjunctures bring to light various extremely dramatic realities, and the fight for resources often overrides people and their needs. In this framework, poverty and inequality, quality of life and well-being seem less important than the petty interests of the great powers. However, they are the real driving force of these interests or they should be. In this context, discussions about poverty, and especially about energy poverty, should not be missing. Energy poverty is an extremely complex concept and little understood in the fullness of its meanings. Many policymakers, members of the media and researchers associate it in one form or another with material poverty or income poverty, but its meanings are much more granular, delicate, difficult to capture and may or may not overlap with income poverty. Thus, **the objective** of the article is to critically analyze the concept of energy poverty, identify several valuable indicators for describing energy poverty and analyze them at the EU27 level for the period 2015-2024. **The methodology** reflects the comparative analysis of several energy poverty indicators, based on Eurostat statistical data. **The results** emphasize that energy poverty must be treated in a broad way, overlapping different filters or nuances, each new indicator outlining yet another problem to be solved and requiring particular solutions depending on the desired direction of analysis.*

**Keywords:** *Energy poverty, energy poverty indicators, multidimensionality, living conditions, social inequality.*

**UDC:** 620.9(4EU)

**Classification JEL:** I32, Q43, R2

### 1. Introduction

Since the 1990s, the concept of energy poverty has begun to take shape, but its definition continues to have various understandings, with approaches varying substantially between developed countries (aiming more at the financial perspective – energy income and expenditure) and developing countries (aiming at access to energy infrastructure or services). In pulse, conceptually, the degree of overlap between energy poverty and income poverty remains debatable. Thus, if income poverty is based on the concept of a poverty line – that is, a minimum of food and non-food items necessary to sustain life and standard of living, on the other hand, energy poverty does not have a defined energy poverty line – that is, a minimum amount of energy to sustain standard of living. In addition, the two forms of poverty, although both are expected to decrease as household incomes increase, nevertheless differ both in terms of regional impact and in which income deciles they begin to manifest themselves (Khandker, 2013). Thus, they can overlap (especially in urban areas), but they can also exist in the absence of the other (e.g. energy poverty can surpass it or exist without income poverty, especially in rural areas, especially in countries in Asia or Africa, where access to energy infrastructure is precarious).

In all this tangle of theoretical controversies regarding the definition, energy poverty is a reality that politicians find difficult to remove from public attention. Thus, in

2023, at the European Union (EU) level, 17.9% of the EU population lived in dwellings that were not comfortably warm during winter and 31.2% of people at risk of poverty lived in dwellings that were not comfortably warm, compared with 14.4% of those not at risk. Regarding the rural-urban discussion, cities had the highest rates of people living in dwellings that were not comfortably warm in winter, with 19.1% of people affected, and compared with 17.6% in towns and 16.3% in rural areas (Eurostat article, Living conditions in Europe - energy efficiency in households, Sept. 2024).

## **2. Literature Review**

Although since the last decades of the last century, energy poverty has captivated the concerns of the media, researchers and public policy makers, the terminology itself is difficult to fit into a unitary structure, with numerous dichotomies. One of these captures the framing of energy poverty either in the lack of access to energy services (so it rather captures the available capabilities, e.g. Sovacool 2012; Day, Walker and Simcock, 2016; Thomson, Bouzarovski and Snell 2017; Sokołowski 2019) or in the financial impossibility of bearing energy expenses (Buzar, 2007; Tirado Herrero and Ürge Vorsatz 2012; Thomson and Snell 2013).

In the study of Palma and al. (2024) there is a critical analysis of definitions and measurement of energy poverty reflected in the national policy strategies in Portugal and Spain. The results highlight that definitions can benefit from an expansion of the scope and increased representativeness of energy services and types of vulnerability. At the same time, greater efficiency in identifying energy poor households requires increased intersectionality of indicators and alternative indicators.

At the EU level, against the background of the need for the most inclusive identification of people suffering from energy poverty, numerous definitions have been developed (EC, 2020), with states also being encouraged to formulate specific definitions in order not to overlook the diversity of situations that capture the phenomenon (Strakova, 2014; Romanian Government, 2016; Republic of Austria, 2019; Government of the UK, 2024).

According to "energy poverty is a situation in which households are unable to access essential energy services" (EC, 2020), and according to the European Parliament Council of The European Union (EPCEU, 2023) energy poverty means "means a household's lack of access to essential energy services, where such services provide basic levels and decent standards of living and health, including adequate heating, hot water, cooling, lighting, and energy to power appliances, in the relevant national context, existing national social policy and other relevant national policies, caused by a combination of factors, including at least non-affordability, insufficient disposable income, high energy expenditure and poor EE of homes".

In general, energy poverty has many facets, being rather analyzed as a multidimensional concept, capable of capturing both quantitative and qualitative aspects (Nussbaumer et al. 2011, Alkire and Foster 2011, Price, Brazier and Wang 2012; Gouveia, Palma and Simoes, 2019; Sokołowski et al., 2020).

## **3. Methodology**

The paper analyzes a series of energy poverty indicators, starting from the definition. The analysis is carried out over the period 2015-2023 (with the year 2024 being included where there are scattered data), the data source being Eurostat. Regarding the data, where there is data for 2024, it should be viewed with caution, especially at the level

of country groups, because there is no data for all the countries analyzed. The analysis is comparative between the Member States of the European Union.

In order to highlight distinct continental areas of the European Union, a systematized grouping was developed into three groups of countries: Nordic and Eastern Countries (NEC) - Denmark, Finland, Sweden, Latvia, Lithuania, Estonia, Ireland, Netherlands, Belgium; Southern and Western Countries (SVC): France, Portugal, Spain, Italy, Greece, Cyprus, Malta, Croatia and Slovenia; Central Countries (CC): Luxembourg, Germany, Poland, Czech Republic, Austria, Slovakia, Hungary, Romania and Bulgaria.

Depending on these groupings, although the number of energy poverty indicators can be considerable (over 30), a series of 4 energy poverty indicators, from several grouping spheres, are tracked in this analysis, such as: Cooling and heating degree days by country - annual data (Heating degree days); Inability to keep home adequately warm (Percentage); Severe material and social deprivation rate by age and sex (Percentage); Arrears on utility bills (Percentage).

#### **4. Results and Discussion**

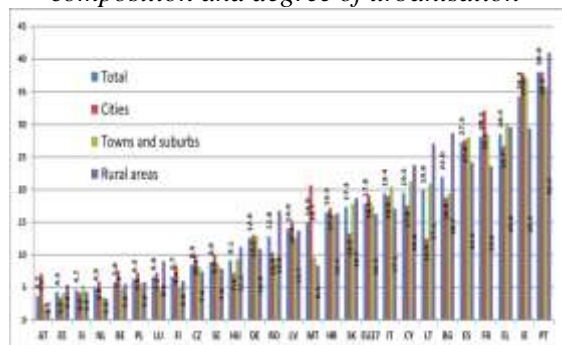
The European Union defines energy poverty as the situation in which a home is forced to reduce its energy consumption to the level where it can have a negative impact on the health and well-being of its inhabitants (European Commission). Among the main causes are low incomes, a high proportion of household expenses for energy, but also poor energy performance of buildings and appliances.

The COVID-19 epidemiological crisis paradoxically seems to worsen energy poverty. Thus, from 2021 to 2023, the indicator describing the inability to keep the house adequately warm worsened, increasing by 3.7 pp.

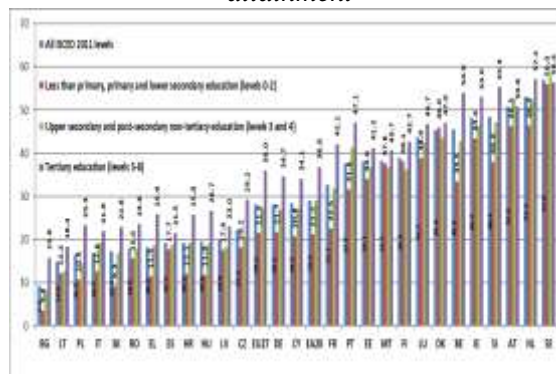
Thus, we can observe in 2023 that beyond the EU27 average, although there are also a few countries from the east and north of the continent (such as Bulgaria, Lithuania and Ireland), the countries of the western and southern flank of the European Union are the most affected, especially countries such as Italy, Cyprus, Spain, France, Greece and Portugal. If we look at the degree of urbanization, perhaps paradoxically, large cities seem to be the most affected by the inability of citizens to heat their homes sufficiently, in 15 out of 27 countries (Austria, Netherlands, Belgium, Poland, Finland, Czech Republic, Sweden, Germany, Latvia, Malta, Croatia, Italy, Spain, France and Ireland), while the opposite situation (i.e. the share of people affected by this type of energy poverty is higher in rural areas than in urban areas) is recorded in Estonia, Slovenia, Luxembourg, Hungary, Romania, Slovakia, Cyprus, Lithuania, Greece and Portugal.

If we look at the degree of satisfaction by level of satisfaction and education, we can see that if we group the indicator by the general level of education, countries such as Denmark, Belgium, Ireland, Slovenia, Austria, the Netherlands and Sweden are in the top of satisfaction with the energy situation of their households, and the seven countries least satisfied with the energy situation by level of education are Bulgaria, Lithuania, Poland, Italy, Slovakia, Romania and Greece. A relatively similar situation we can obtain if we group by the highest level of education, with the Nordic countries of the EU monopolizing this ranking. Thus, we can conclude that the level of education in general can lead to greater satisfaction with life, to better social conditions on the background of higher incomes as a result of the studies held and therefore greater satisfaction with living and housing conditions.

*Persons living in a dwelling not comfortably  
warm during winter by sex, household  
composition and degree of urbanisation*



*Satisfaction with the dwelling by level of  
satisfaction, sex, age and educational  
attainment*



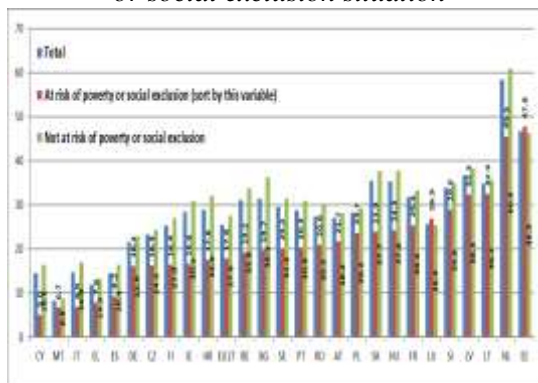
**Figure 1. Winter housing comfort and satisfaction by education level (2023)**

*Source: Eurostat, author processing and systematization*

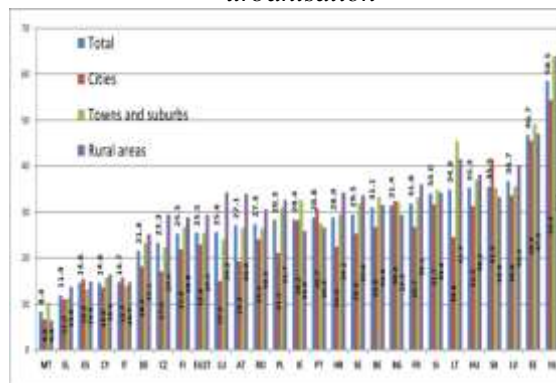
However, in 2023, there are also improvements in the risk of energy poverty. Thus, when we analyze the improvement in the risk of energy poverty, taking into account the entire population and those not at risk of poverty, the countries that have recorded the most improvements are Slovenia, Lithuania, Hungary, Slovakia, Latvia, Estonia and the Netherlands. If, analyzing the improvement in energy efficiency in the last five years, grouped in ascending order by risk of poverty, the countries that have recorded the smallest improvements are Cyprus, Malta, Italy, Greece, Spain, Germany and the Czech Republic, and the countries that have recorded the most substantial improvements are France, Luxembourg, Slovenia, Latvia, Lithuania, the Netherlands and Estonia, although they are still in the top 7 regarding the risk of poverty or social exclusion.

If we also take into account the degree of urbanization, the improvement was recorded more in cities than in villages in the countries like Malta, Spain, Italy, Ireland, Poland, Bulgaria and Slovakia and vice versa in the countries like Greece, Cyprus, Germany, Czech Republic, Finland, Luxembourg, Austria, Romania, Poland, Croatia, Sweden, Belgium, France, Slovenia, Lithuania, Hungary, Latvia, Estonia and the Netherlands.

*Persons living in dwellings whose energy  
efficiency had been improved in the last 5  
years by sex, current age and risk of poverty  
or social exclusion situation*



*Persons living in dwellings whose energy  
efficiency had been improved in the last 5 years  
by current household composition and degree of  
urbanisation*



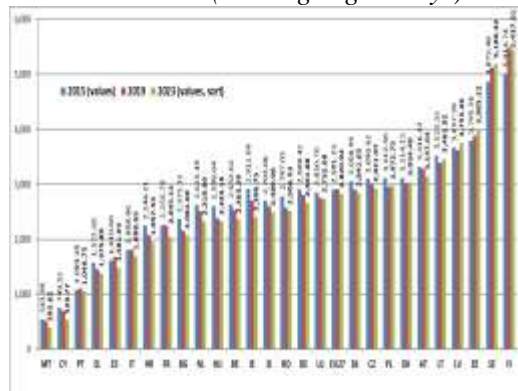
**Figure 2. Energy-efficient dwellings by poverty risk, household type, and urbanization**

*Source: Eurostat, author processing and systematization*



Although "The need to cool a given building in the EU in 2022 was almost four times higher compared with 1979." and "In the EU, the needs for heating a given building in 2022 were approximately two-tenths lower than in 1979." (Eurostat, 2023). Nevertheless, the Heating degree days (HDD) indicator can be significant to the correct interpretation of energy consumption for buildings and therefore for describing the general framework for framing the problem of energy poverty.

*Cooling and heating degree days by country  
- annual data (Heating degree days)*



*Cooling and heating degree days by country groups  
- annual data (Heating degree days) on 2015-2023*



**Figure 3. Heating degree days by year and country group (2015–2023)**

*Source: Eurostat, author processing and systematization*

Analyzing the indicator Heating degree days (HDD), we note that during the analysis period (2015-2023) most states recorded a reduction in the number of days requiring heating, with the exception of the countries Lithuania, Latvia, Estonia, Sweden and Finland. At the same time, if we follow the trend during the period 2015-2023 of the various EU regions studied, we note that the years 2016, 2017 and 2021 recorded increases in the indicator for all geographical areas, mainly for the group of countries in the north and east of the continent (NEC), but also for the continental countries (CC). At the same time, a substantial reduction was recorded in 2020 for all groups of countries analyzed. Thus, although we can see that the COVID 19 pandemic brought some disruptions to the indicator (2020-2022), nevertheless the trend regarding the need for heating at the European level decreases from year to year.

If we analyze the indicator regarding the inability to keep the house warm, we can see that although many countries are recording improvements, comparing the year 2023 with 2015 we notice that almost half of the EU27 countries (13 countries) have not recorded positive developments. These countries are: Czech Republic, Denmark, Germany, Estonia, Spain, France, Luxembourg, Netherlands, Austria, Slovakia, Finland and Sweden.

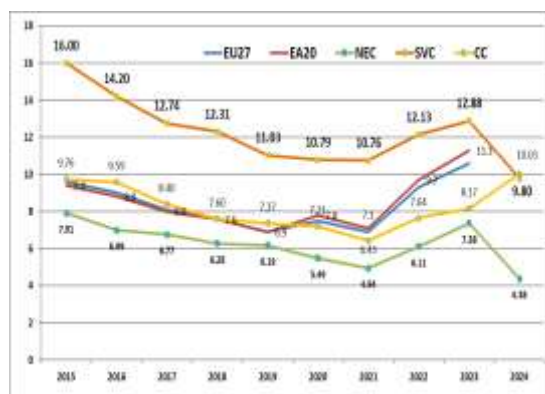
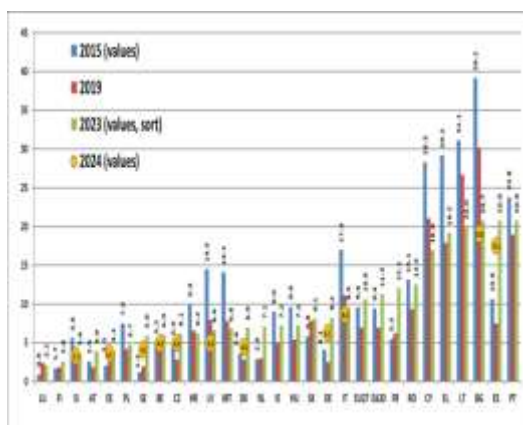
If we follow the increasing indicator, grouped by the value in 2023, we notice that in the negative top, with increasing values, are the countries: Romania, Cyprus, Greece, Lithuania, Bulgaria, Spain and Portugal. Paradoxically, the Nordic countries, although some have recorded increases in the indicator in 2023 compared to 2015, their values are still reduced, in the top of the countries with the fewest households affected by energy poverty according to this indicator are Luxembourg, Finland, Slovenia, Austria, Estonia, Poland and Sweden.

If we analyze the period 2015-2024 as a trend, we notice that all groups of countries registered a decreasing trend in the period 2015-2021, and after 2021 an increasing trend was registered until 2023. This once again highlights the negative impact of the COVID-19 pandemic with all the additional effects, including job losses and

decreased quality of life that led to the worsening of this indicator of housing comfort. The southern flank countries, although paradoxically should be less affected than the northern countries, are nevertheless in the top group of disadvantaged countries, which indicates an increased need for the authorities to remedy the problems related to energy poverty.

*Inability to keep home adequately warm  
(Percentage) on countries*

*Inability to keep home adequately warm  
(Percentage) on country groups - annual data on  
2015-2024*



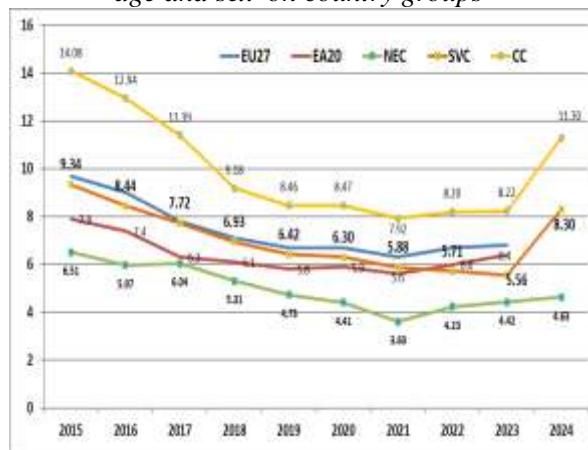
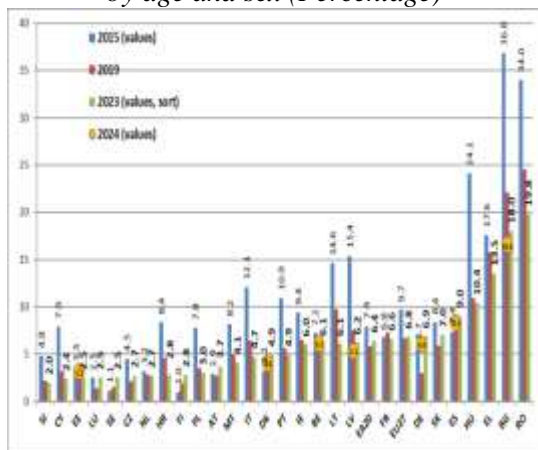
**Figure 4. Inability to keep home warm by country and year (2015–2024)**

*Source: Eurostat, author processing and systematization*

Although it does not describe energy poverty per se but rather socioeconomic and housing conditions, severe material deprivation indicates the general framework in which energy poverty can occur.

*Severe material and social deprivation rate  
by age and sex (Percentage)*

*Severe material and social deprivation rate by  
age and sex on country groups*



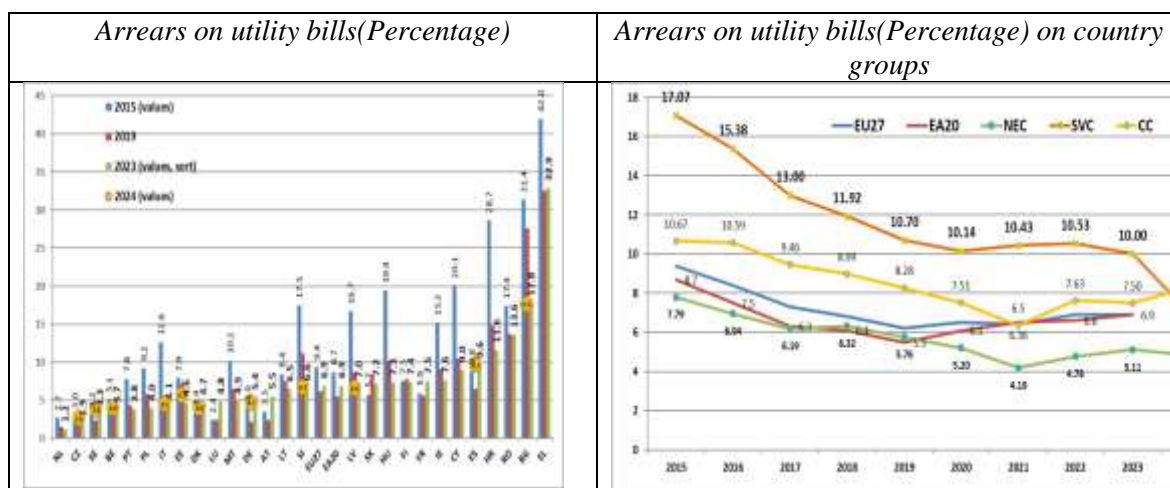
**Figure 5. Severe material and social deprivation by age, sex, and country (2015–2024)**

*Source: Eurostat, author processing and systematization*

Thus, at the level of EU27 countries, grouped after 2023, the top seven most materially deprived countries are Germany, Slovakia, Spain, Hungary, Greece, Bulgaria and Romania, although Hungary, Greece, Bulgaria and Romania recorded dramatic reductions in the indicator between 2015 and 2024. If we look at the indicator by country groups at EU27 level, we see that for all country groups the trend is of improvement between 2015 and 2021 and of progressive deterioration between 2022 and 2024. From the

perspective of this indicator, in the top of country groups, the continental, central countries seem to be in the worst shape, followed by the south-western countries.

The previous indicator correlates very well with a classic indicator of energy poverty such as arrears on utility bills. Thus, for this indicator, the top countries with the highest arrears are Ireland, Cyprus, Spain, Croatia, Romania, Bulgaria and Greece, while the countries least affected by energy poverty reflected in the delay in paying utility bills are, in ascending order, the Netherlands, the Czech Republic, Sweden, Belgium, Portugal, Poland and Italy.



**Figure 6. Arrears on utility bills by country and group (2015–2024)**

Source: Eurostat, author processing and systematization

If we look at the trend over the analysis period, we generally observe a downward trend across all country groups until 2021, with a slight increase for continental and Nordic countries, not only due to the difficult recovery from the COVID-19 pandemic, but especially, starting in 2022, due to the outbreak of the Russian occupation war in Ukraine. This armed conflict has caused all product groups to have higher prices, but especially those for food and energy products and fuels, which has led to more disadvantaged social categories in regions close to the conflict experiencing problems paying utility bills.

## 5. Conclusions

Energy poverty, although a construct derived from the classical concept of poverty, has overlapping valences, but also many that diverge from classical poverty, especially material poverty. Energy poverty can very well exist even in situations where material poverty does not exist, in areas where the infrastructure (e.g. isolated, hard-to-reach areas, rural areas, etc.) represents the critical point of access to energy.

In this sense, although the subject seems relatively less important compared to other forms of poverty, through its impact on life, health, work, education, equity and well-being, energy poverty must be addressed more often and more deeply in specialized studies. Thus, the article aims to discern for the period 2015-2024 which are the most important problems are regarding the subject, by taking into account several specific indicators of energy poverty. The results highlight that at the EU27 level, the countries that appear to be substantially affected by energy poverty are not the northern and eastern countries, but rather the southwestern (Mediterranean) flank of the EU27 and, subsidiary, the central flank of EU27 member countries.

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(Data extracted in September 2024).