

Discovering the energy poverty profile: 9 most distinctive groups in 11 countries of Central and Eastern Europe

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Energy poverty and security issues are acute in Europe as never before. The series of crises, first pandemic, then energy, and finally war threaten the most vulnerable in all countries.

This study attempts to unveil the faces of the energy poor to shape conscious policies concerning these households. We focus on the profile of energy-poor households in 11 CEE countries, such as Bulgaria, Croatia, Czechia, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, and Slovenia.

We are driven by several concerns. First, the energy poor should not be treated as a homogenous group. Households differ in terms of demographic characteristics, condition of a dwelling, and tenure status. We recognize it is a combination of factors that make them unique and vulnerable. Second, the policy action is the most effective when targeted on the support of a particular social group with well-known characteristics. The costs of eliminating energy poverty will vary depending on the size, composition prototype, etc. It is crucial to ensure the just distribution of welfare, which is not possible if policymakers are unaware of whom to help. Third, we believe the energy poor in the CEE countries must have some common traits. This is because energy poverty in these countries is mostly hidden; low-income households tend to save on energy costs, and use cheap solid fuels to heat and cook.

The study pursues several goals. The first goal is to estimate energy poverty in the CEE countries based on the methodology put forth by Karpinska and Śmiech (2020). The second goal is to draw a portrait of energy-poor households in CEE and discover keen features relevant to each group. The third goal is to reveal the similarities and differences in profile distribution across the examined countries and suggest policy solutions.

Our source data is the EU Survey on Income and Living Conditions collected in 2020. Specifically, we use cross-sectional household data files. The sample size depends on the country and is minimum for Lithuania (5,032 observations) and maximum for Poland (14,621 observations). The final table contains 18,331 records, which represent energy-poor households from 11 CEE countries. Our analysis is based on the partitioning around medoids algorithm, which allows the clustering of similar objects by minimizing the average dissimilarities in the group. The quality of classification is verified with Dunn metrics (Dunn, 1974). To measure the distance between objects we rely on the Gower method suitable for categorical and continuous variables. The computations are performed in R using a cluster library (Maechler, 2019).

Since energy poverty is measured at a household level we focus on the respective characteristics of a household and a dwelling. The EU-SILC dataset contains a rich choice of variables, yet the set differs from country to country. In total, we use eight variables, which are available for all countries. Housing costs and equivalised disposable income are used to calculate energy poverty; dwelling type, tenure status, household type and size, number of rooms, and availability of a flushing toilet, bath, or shower in a dwelling are used to build the energy poverty profile.

From the results that we have, it can be inferred that there are 9 distinctive groups of energy poor common to all analyzed countries. Among the vulnerability factors, we could mention low income, spacious dwellings, single-family houses, and dependent children. We consider the distribution of profiles across countries and analyze the share of each profile in a country mix. Six profiles describe the situation of single-person households. This type of household dominates in all countries profiles ranging between 56% (Slovenia) and 83% (Latvia). Three profiles depict households with dependent children, i.e. on average about 30% of profiles. Some groups consist of households living in small apartments or houses, while others possess too large properties. We note that on average roughly half of all energy-poor profiles occupy spacious dwellings, mostly single-family houses. The share of detached houses in profiles varies from 34% in Latvia to 85% in Croatia. Tenants are under-represented. We reveal only two profiles of tenants, which have the largest share of 42% in Czechia and the smallest share of 5.5% in Romania. The average silhouette width is 0.41, which indicates a good quality of classification. The highest classification score receives a group of medium-sized households with dependent children renting apartments.

We bring up for discussion several policy problems in this regard. The first type of issue is linked to a building stock, which is ill-adjusted to the size and needs of energy-poor households. Large floor areas are difficult to heat, especially when the burden falls on a one-person budget. Ownership of single-family houses is a challenge due to the absence of shared walls and floors providing additional energy savings. In case single-family houses are situated in low-density areas, households might not be able to connect to district heating for example. Policy-makers should reconsider and rearrange the housing stock and settlements in the country. The second type of issue is related to the income situation of energy-poor households in the first place. The major effort of policy-makers should be put into social support of these households.

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