Energy Poverty During the Energy Crisis

The energy crisis in the post-pandemic era seems to add new dimensions to energy policy in many developed countries. The spectrum of factors determining energy poverty ranges from sociological to psychological issues, far beyond economics. Ukraine- Russia war proved that even international relations could determine the number of households with difficulty accessing energy services properly. Thus, Denmark seems to be among those countries facing energy poverty because of the non-domestic economic factors but escalating global energy prices. This paper elaborates on this issue and develops policy suggestions to tackle Denmark's energy poverty.

1. Introduction

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The academic and political communities have recently become interested in energy justice and poverty. These terms indicate a global problem requiring immediate attention. According to Eurostat, approximately 8 percent of the EU population (35 million citizens) cannot heat their homes adequately. The Pandemic and Ukraine War escalated energy prices which likely worsened the problem because of the decreasing energy affordability for many EU citizens[1]. The problem is particularly severe in Central and Eastern European countries, where high energy prices, low-quality housing stock, and low incomes combine to create a significant burden for vulnerable households (Byrnes and Pickering, 2019). On a broader scale, the 2018 IEA World Energy Outlook reports that 13% of the world's population (1 billion people mainly in Africa and South Asia) has no access to electricity, and "40% of the world population lack access to clean cooking facilities worldwide, relying instead on solid biomass, coal or kerosene as their primary cooking fuel"[2]. These statistics indicate how serious the situation is. The problem is an accumulated outcome of low income and poverty conditions, energy dependency on other countries, lack of infrastructures in less developed countries, energy-inefficient homes, and failures in energy efficiency. Global warming and climate change have worsened the situation because the fossil fuel-based energy mix is the major contributor to climate change through the emission of greenhouse gases into the atmosphere and, thus, the alleviation of energy poverty is considered the increase in energy demand and more additions to the emissions (Chakravarty and Massimo, 2013). There is a dichotomy here. The lack of energy access is a problem, but the increase in emissions due to the alleviation of it is another. Therefore, the climate change mitigation and adaptation process should be managed through just transition policies to prevent the economic changes that could result in increased social inequality[3], strikes or civil unrest, and

reduced market productivity and competition. To support a just energy transition, energy poverty and justice have been the target of energy efficiency, decarbonization, and clean energy policies. Energy justice and energy poverty are two emerging problems during the transition that require attention to lessen the burden on those in need or to equally distribute the risk and burdens of climate change and energy transition. These facts put energy in general and energy poverty in particular in the center of SGD1, SDG7, and SDG 10 of the UN 2030 goals.

Jenkins et al. (2018) define energy justice as a term that "conceptualizes a world where all individuals, across all areas, have safe, affordable, and sustainable energy". On the other hand, energy poverty is generally defined as the lack of affordability or of access to basic energy services to meet one's most common needs, such as lighting, cooking, heating, and cooling (Day, Walker, and Simcock, 2016). The basis for this definition comes from the justice issue that has been discussed in energy and environment literature (see Ulucak, Sari, Erdogan, and Castanho, 2021 for a review). One of the key points in both poverty and justice issues in energy research is the *affordability* of energy (Sovacool et al., 2017). Affordability refers to the economic ability to pay for energy services, such as cooking, heating, and other basic living expenses. Therefore, affordability mainly depends on the prices of goods and services and income. The change in prices and income will affect affordability. The wars and conflicts strain the energy supply through production and distribution, which usually increase the prices, as we have been observing during the pandemic and war in Ukraine.

Disruptions to global energy supply chains and damage or the potential of damage to the energy infrastructure due to the conflict may lead to price spikes and price volatility in global and national energy markets. In turn, the price volatilities and increases can have a cascading effect on economies in general and households, in particular (Arezki et al., 2011), leading to an increase in energy poverty and a worsening of already-existing social and economic inequalities.

Since there is no "one for all" solution to energy poverty, the national government policies may have a similar goal that can be achieved by different strategies due to the differences in countries' energy systems. For instance, countries with abundant renewable resources may consider increasing the production of renewables as the solution for energy-poor households, and some others may view financial support to vulnerable households or retrofitting of homes. Therefore, it is vital that governments develop policies and implement programs aligned with the available energy sources to reduce the vulnerability of energy markets and to reduce energy poverty, nowadays driven by war. As the EU is committed to tackling energy poverty and protecting vulnerable consumers, the reduction and mitigation of energy poverty in the past have also been increasingly targeted in energy efficiency, decarbonization and clean energy policies to support a just energy transition for all. The Ukrainian

War has provided evidence of the impact of a war on the global energy market, which leads to energy poverty in almost all countries through increased energy prices. Thus, this issue has received attention even from countries with relatively less energy poverty experience in the past, including Denmark.

This article will explore energy poverty in Denmark and recommend policies to reduce it if it is conflict driven. Of course, the factors that determine energy poverty in Denmark are not limited to the Ukrainian war only, as discussed in the following sections, energy poverty was not an urgent problem in Denmark before the war. The war has revealed that the potential energy poverty problem alongside the age and insulation of buildings, for instance, has existed, which was only uncovered during the war due to the increased energy prices. So far, poverty-related deprivation has been addressed through social policy, not energy policy[4].

The rest of the article is organized as follows. Section 2 briefly explains the measurement methods in the literature, section three provides evidence on the energy poverty in Denmark by using survey-based secondary energy poverty data, and finally, section four provides the concluding remarks.

2. Measurement of energy poverty

Though there are increasing concerns about energy poverty, there is still a lack of any unified definition of energy poverty. For instance, while Lewis (1982) defined energy poverty using a single indicator measure as a household's inability to afford adequate warmth, Boardman (1991) suggested that a household would be in energy poverty if it needs to spend more than 10% of its total income to meet its necessary energy consumption, where the threshold of 10% is about twice the sample median ratio of energy expenditure to income ratio in Britain (Xie et al., 2022). The threshold of 10% has been widely used since then until Boardman (2010) pointed out that, using twice the median as the threshold would be more consistent and more informative than fixing the threshold at 10% of the household's income, as economic and social conditions had changed (Xie et al., 2022). Besides, energy poverty was also defined in terms of access to energy services in previous studies (see, e.g., Davis, 1998; Alam et al., 1991), and Foster et al. (2000) define energy poverty in terms of both availability and affordability of modern energy that meets a household's basic needs. Considering the different energy sources for different purposes, Nussbaumer et al. (2012) used the Multidimensional Energy Poverty Index (MEPI), where they focus specifically on the deprivation of access to modern energy services, including modern "cooking fuel, electricity, home appliances, entertainment, educational equipment, and communication tools"; Simcock et al. (2016) defined energy poverty as the inability of households to obtain adequate energy for critical services like home heating, appliance use, and transportation.

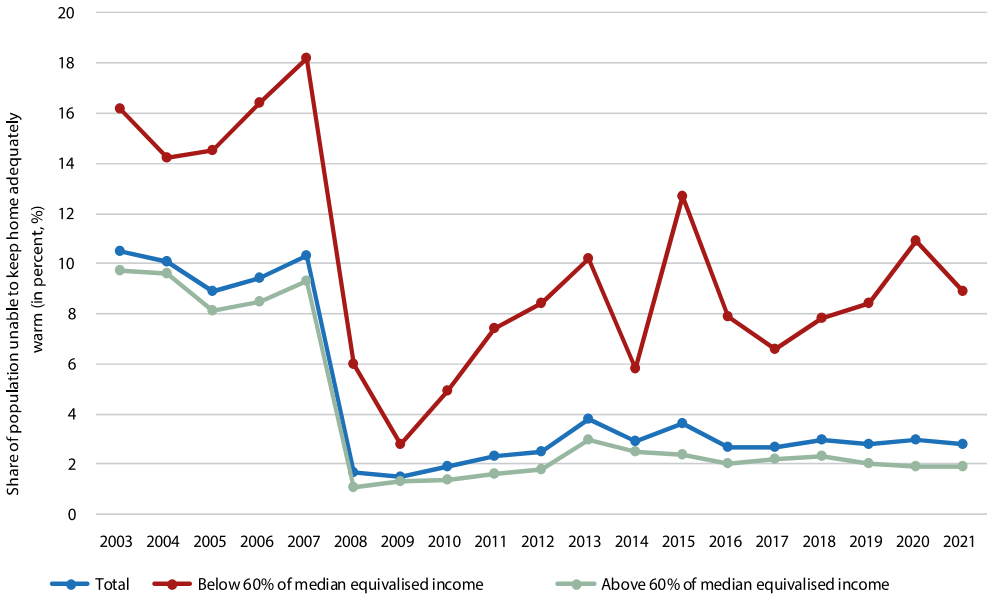
The preferred measure for energy poverty would depend on the study context and data availability. In recent years, there are more and more studies that employ subjective measures of energy poverty to capture the ”feeling” of material deprivation felt by households who are unable to keep their homes warm during the cold season (see, e.g., Thomson et al., 2017; Churchill et al., 2020). This article uses a similar measure for energy poverty – ”the share of the population who are unable to keep home adequately warm” – to monitor the development of poverty and social inclusion in the EU by the European Union Statistics on Income and Living Conditions (EU-SILC). The data collection is based on a survey, which means that the indicator values are self-reported and thus reflective of the ”subjective feeling” of households.

3. Patterns of energy poverty in Denmark

The discussion on energy poverty in Denmark was very rare in the past, though the energy crisis of 2022 has triggered people's attention to the ability to access energy services properly. As mentioned above, this study uses ”the share of population who are unable to keep home adequately warm” from EU-SILC to measure energy poverty subjectively.

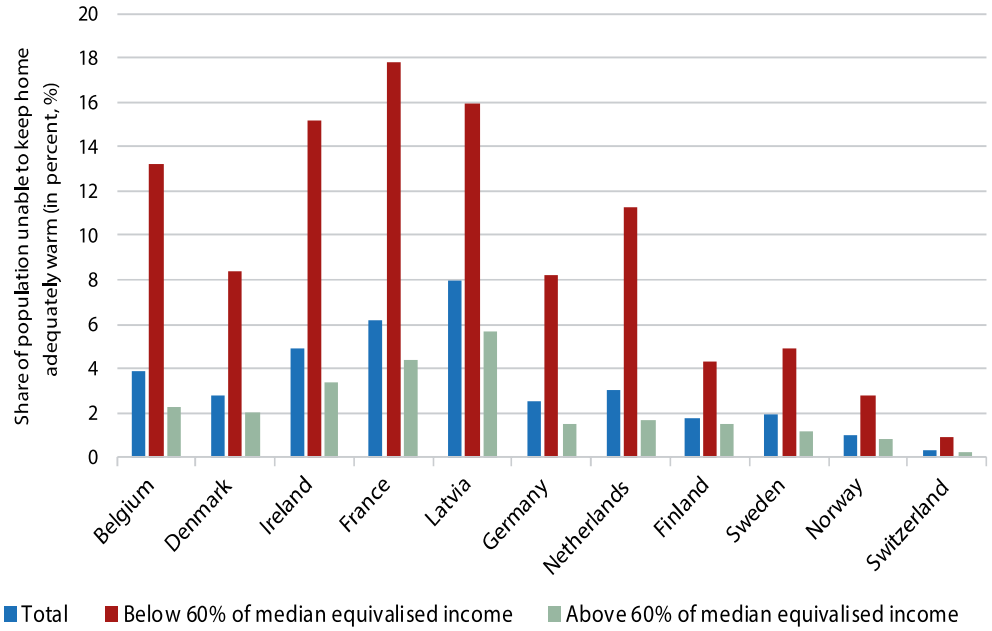
Figure 1 shows how the share of the population unable to keep their home adequately warm changed over time in Denmark. The percentage of the population that are unable to keep their home adequately warm has decreased dramatically from 10.5% in 2003 to 2.8% in 2021, which implies that energy poverty in Denmark has been decreased overall. The dramatic decrease in 2008 might be due to the thermal efficiency improvement programs, which helped replace oil-based heating systems with alternatives and focus on improved thermal insulation, and the new policies for promoting renewable energy. In recent years, the share of the population that cannot keep their home adequately warm has been stable at around 3%. However, there is a big difference between the (relatively) rich and poor population. For those who are relatively poor (with income below 60% median in the total population), around 16.2% of them could not keep their home adequately warm in 2003, which is still as high as 10.9% in 2020 and 8.9% in 2021. In contrast, for those who are relatively wealthy (with income above the 60% median of the total population), the share of the people who are unable to keep their homes adequately warm has decreased much more sharply from 9.7% in 2003 to only 1.9% in 2021. Therefore, during the past decade, energy poverty reduction for the relatively rich households in Denmark has been much more dramatic than that for the relatively poor households, which implies that more attention should be paid to the poor in terms of reducing energy poverty.

Fig. 1. The share of population unable to keep home adequately warm in Denmark.



If we compare the case of Denmark with other European countries, as shown in Figure 2, which is the data for the year 2019 (before the pandemic), Denmark has a relatively better performance in energy poverty, with having a lower share of the population unable to keep home adequately warm than countries such as Belgium, Ireland, France, or Netherland. This is likely due to the larger share of district heating in Denmark (64%), which helps keep the home warm at an affordable price. However, compared with other Nordic countries (Finland, Sweden, and Norway), Denmark still has room to improve its energy poverty performance.

Fig. 2. The share of population unable to keep home adequately warm in selected European countries in 2019



But how has the energy crisis in 2022 affected the energy poverty or the number of people unable to keep their homes adequately warm in Denmark? Though the data for 2022 is not available for Denmark yet, there are four countries for which the data has already been available (from EU-SILC): Belgium, Latvia, Netherlands, and Finland. It can be seen from Figure 3 that the percentage of the population who are unable to keep their home adequately warm increased in all four countries in 2022. While household incomes are less likely to be directly affected by the energy crisis, this could be an indication that the sharply increased energy prices during the energy crisis have made the energy poverty situation worse, as can be seen from Figures 4 and 5 that electricity and natural gas prices in these countries have increased dramatically during the energy crisis. Since the energy prices in Denmark have also increased significantly during the energy crisis (as shown in Figures 4 and 5), we expect that the energy poverty in Denmark has also been worsened as in other countries, i.e., there would have been a larger share of the population who are unable to keep their home adequately warm due to the energy crisis by the war. However, several measures, including government subsidies, have been introduced in Denmark to support low-income households to compensate for the increasing prices. This can help relieve the already difficult situation for those households.

Fig. 3. The share of population unable to keep home adequately warm in four countries (2020-2022)

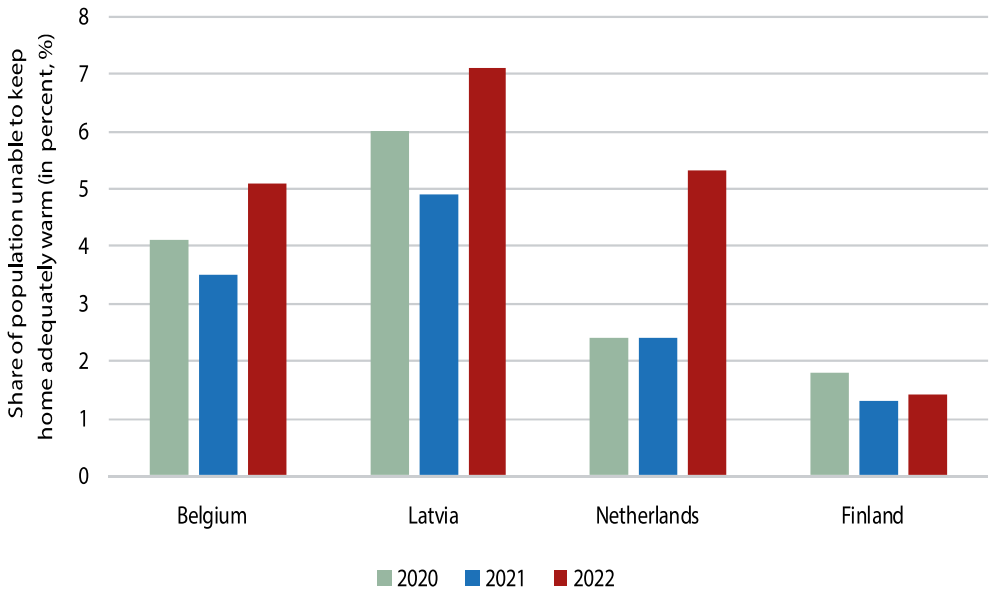


Fig. 4. Electricity prices for household consumers 2020-2022 (euro/Kwh; taxes included)

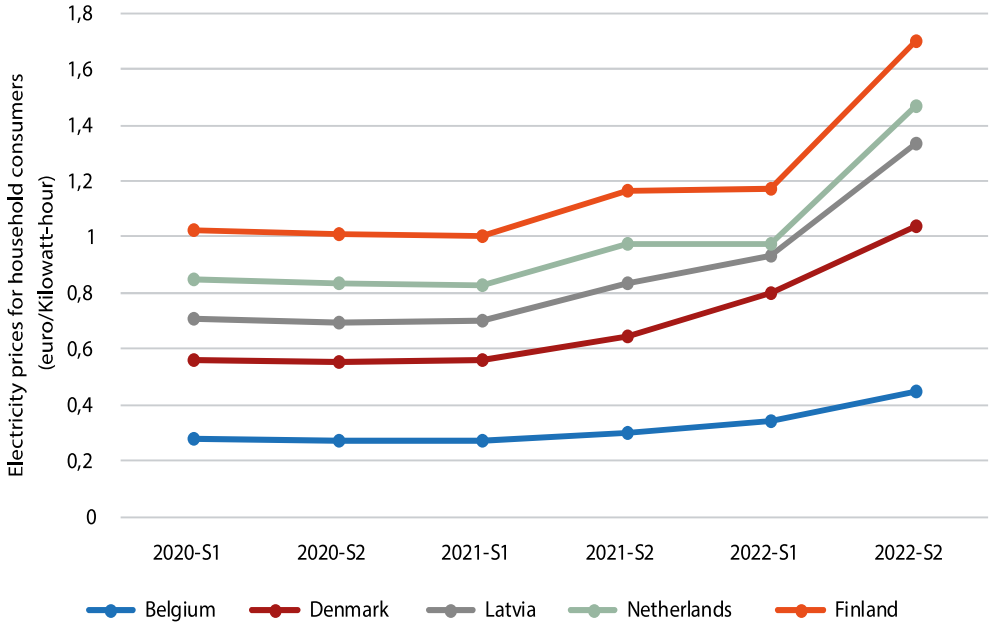
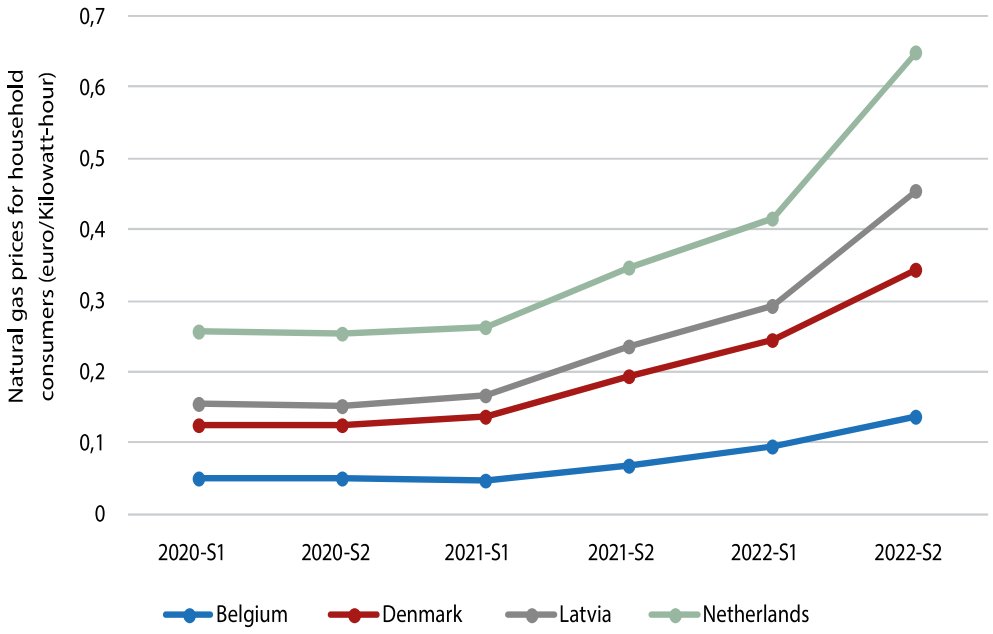


Fig. 5. Natural gas prices for household consumers 2020-2022 (euro/Kwh; taxes included)



4. Policy Suggestions and Conclusion:

The energy crisis has revealed that the alleviation of energy poverty is beyond the energy efficiency, housing retrofitting and energy bill supports in Denmark. Denmark has already implemented very efficient policies to reduce or prevent energy poverty, such as ”National Building Funds” for building insulation that started in 1975, ”Energy subsidy” measure for building insulation

and heating system that started in 2009, ”Better Housing” for Energy audits started in 2014, ”Heating allowance for pensioners” for energy bill support, ”Electricity price comparison website” for information purpose, ”Simplified electricity bill,” and ”Financial help from municipalities.” These are successful measures that aim to improve energy efficiency in buildings and ease the burden of the energy bills.

On the other hand, the energy crisis is related to the affordability of energy in homes, industry, and transportation. As a developed country with one of the highest income levels in the world, the affordability factor was not on the political agenda in Denmark. The war proved that it should be. Because Denmark is influenced by energy prices determined in global markets, focusing on promoting domestic sustainable energy sources and energy efficiency in all areas can help to mitigate the impact of energy poverty and build a more resilient energy system. Additionally, the efficient and dynamic monitoring of energy consumption and income, and implementing preventive measures, accordingly, can decrease the cascading effect of high prices on vulnerable households and disadvantaged people. Finally, more improvement in energy communities, such as district heating, can be also an alleviating measure for energy poverty.

Noter

1. https://energy.ec.europa.eu/topics/markets-and-consumers/energy-consumer-rights/energy-poverty-eu_en
2. https://www.habitat.org/emea/about/what-we-do/residential-energy-efficiency-households/energy-poverty
3. Inequalities ”in terms of gender, race/ethnicity, class, and other significant social markers due to the unequal access to and use of resources across many domains, such as health, education, and occupations”.
4. https://www.altinget.dk/forsyning/ministersvar/el-hvordan-hjaelper-man-energifattige-med-at-energirenovere-deres-boliger

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