

Vulnerable Households in the Energy Transition



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Energy transitions are multi-dimensional and multi-actor processes involving technical systems, social networks and societal institutions and regimes (Sovacool and Geels 2016). Interactions between firms, households, policymakers and social bodies are at the core of the shift from one energy system to another. This nexus of interactions is even more important to be analysed when considering the current energy transition towards decarbonization, which is mainly policy-driven rather than social- or technology-driven. Policies, regulations and incentives have been widely used to shape energy markets and consumer energy use according to different goals, ranging between energy saving, environmental protection and energy independence. Since the European Green Deal plan, low-carbon transition has become the main goal in the EU and the related policy packages—among which the ‘Fit for 55’ legislation is the most important pillar—make use of all policy levers: regulation and standardization, investment, national reforms and international cooperation (EC 2019; Paleari 2022). Market-based policies—such as environmental taxes, tradable permit systems or targeted subsidies—represent central tools in the transition to a climate-neutral society by 2050. Indeed, they provide incentives to firms and consumers to opt for less polluting energy sources and products. Fundamentally, the EU policy package stresses that decarbonization can be reached by putting a price on a resource either with taxation or through regulation to make environmentally harmful energy sources and products more expensive. These policies should generate a long-term upward trend in fossil fuel prices and consequently they should provide the right signal to reduce the energy consumption (through higher energy efficiency) and/or to redirect

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the energy use towards those sources with the lowest carbon footprint. As argued by Pisani-Ferry (2021), the new long-term growth strategy implemented with the EU ambitious climate package has economic transition costs as any other macroeconomic policy. These costs will be unevenly distributed, creating winners and losers and should not be overlooked. Focusing on households, consumers will be better off in the long run because of the avoided costs of climate change but in the short run they will suffer significant transition costs due to sizeable relative price changes. There is a general agreement in the literature that climate policies have distributional implications that are larger among the lowest deciles of income distribution (see Fullerton and Muehlegger 2019 for a review of several studies) although the overall final impact is affected, among others, by the revenue recycling schemes adopted to address these effects (Ohlendorf et al. 2021). These social transition costs are acknowledged also by the European Commission which stresses that energy and climate transitions should be ‘just and fair’ and ‘leave no one behind’. Indeed, the Impact Assessment accompanying the European plan (EC 2020) expresses concern about the increasing risk of energy poverty for vulnerable households if not addressed by appropriate policies. Energy vulnerability may arise for reasons not necessarily related to income levels but to other characteristics (Bouzarovski and Petrova 2015): specific socio-demographic factors (age, household type), critical dependence on energy-intensive equipment due to health reasons or limited energy literacy, such as difficulty to understand complex contracts and to react to aggressive commercial practices. In general, vulnerable households are more affected by climate policies because they have constraints in their consumption baskets and they have less information to make informed choices, including about making investments in energy efficiency and energy saving.

At the time of writing, the transition costs are being exacerbated by the high volatility in energy prices—and the resulting inflation—due to the uneven emergence of different economies from the pandemic and the geopolitical situation. The EU and member state energy transition policy—which, with the ‘Fit for 55’ package, has placed great emphasis on market instruments—has been thus overlaid by an unexpected effect of great intensity, which, precisely because of the geopolitical component, increased the level of uncertainty about future trends. The pressure on consumers has therefore been considerable and sudden. Households need to be able to absorb rising costs and, at the same time, have the flexibility to innovate and change technology and, above all, habits (Ari et al. 2022).

The household sector is therefore a key player in this process: individuals must be engaged in the deep behavioural changes required in this transformation to avoid the risk of a mismatch between implemented policies and social acceptance. In this challenging framework, particular care should be devoted to the distributional impact, in particular to the ‘left behind’, since in the European Union a significant share of households is already experiencing energy vulnerability (Bouzarovski et al. 2020; Koukoufikis and Uihlein 2022). The current phase of high energy prices is showing that every household may become vulnerable to energy costs because of economic factors (low income, unemployment or poor jobs) and also of some other characteristics such as being a woman, having disabilities, having poor health, being

single-parent, with low education or belonging to a minority group. Energy poverty is a complex phenomenon that needs to be addressed within the energy transition agenda, not only to avoid exacerbating the problem, but mainly to implement a win–win strategy achieving a solution while following a decarbonization path. Unfortunately, an effective knowledge of the real vulnerabilities on which to base policies is still lacking, especially in a world where innovation is widening the gap between different types of consumers. As the recent period of high volatility in energy prices is exacerbated by the impact of European policies—as shown by the record price of ETS allowances—the change in relative prices is driving behavioural changes in favour of energy efficiency and towards less carbon-intensive energy sources across the economy and the household sector. However, the speed of reaction may not be homogeneous: vulnerable households lack the knowledge, the financial resources, the time and the information to seize the opportunities of a shift in the energy system (Eurofound 2021). Moreover, vulnerable households suffer the most from carbon pricing not only because they have a higher share of energy costs in their total expenditure but also because they are estimated to experience a larger fall in income as they tend to work in sectors more sensitive to changes in demand (Ari et al. 2022; Faiella et al. 2022; Kanzig 2022). Therefore, the vulnerable households segment needs to be supported with appropriate policies to access the benefits of the transition and to limit the inequality in energy use and energy expenses. These needs are even more important if we consider the projection of a fast ageing society in almost all EU member countries. Indeed, ageing may worsen all of these vulnerabilities, including the increasing demand for energy services from those who spend progressively more time at home. Although this higher residential energy consumption of the elderly may be compensated by lower consumption of energy for transport services and production activities, some empirical studies show that a change in generational preferences should also be considered as younger cohorts will get older with practices and lifestyles that are different from the current elderly cohorts (Bardazzi and Paziienza 2020; Han et al. 2022). Therefore, future patterns of energy consumption and emissions will be affected not only by changes in population size but also by the fact that younger generations will substitute older cohorts in the population.

For the aforementioned reasons, the study of energy poverty and household energy demand is of utmost importance, not only with a focus on the present but also in view of the future societal transformations and the planned energy and environmental policy of the European Union.

This volume is a collection of essays dealing with the nexus between energy transition and energy poverty in some countries of the European Union, considering the effects on the household sector of energy transition and related policies. The book is divided into three sections, corresponding to the premises, the identification of the problem and the policies to address it. In the first section, the European energy context and the long-term scenario are discussed in more detail, with particular reference to the impact of ageing, one of the most influential elements in the long term. The second section looks at the multi-faceted issue of energy poverty, including a gender perspective, transport poverty and the health consequences of lack of access to adequate energy services. The last section discusses the impact of

some policies on energy transition—mainly carbon price—and on energy poverty. As for the geographical analysis, we consider five countries, most with a connection with the Mediterranean area (France, Greece, Italy and Spain) and Germany, where the debate on energy transition started long ago, but where major reforms are still needed. Several chapters are dedicated to Italy, where the project on energy poverty—the HOPPER Jean Monnet Chair—that inspired this collection of essays originated.

Drawing connections and scenarios in the energy field is a really difficult task in this time of great turbulence. However, the work of Lutz and Becker does an excellent job of clarifying the underlying relationships and thus signalling the significance of the projections being made. As an overall assessment of the macroeconomic impact of the energy transition scenarios, Lutz and Becker's contribution uses a multisectoral model to consider the new framework of increasing energy prices to estimate the effects on the economy in general and on the household sector in particular, taking Germany as a case study. The results quantify the expected negative macroeconomic effects on GDP and the labour market, induced by the sharp increase in energy prices. The findings also show the key importance of the consumption structure and income position in evaluating how the price shock propagates in private households. The regressive effects of the shock may be lightened by effective public policies and the authors support the idea of a per capita bonus, firstly because the savings incentive of high prices must be maintained and secondly because low-income consumers are relatively more relieved. However, Lutz and Becker stress that an accelerated policy of fossil fuel independence and decarbonization remains the only effective long-term policy to address climate change, exposure to international price volatility and, ultimately, budget protection.

In the second chapter, Bardazzi and Paziienza analyse how another important transition, the demographic change in the structure of the population, interacts with future trends in household consumption behaviour. After providing an overview of population trends at the EU level—both in terms of size and composition—the authors emphasize that the age effect is not linear and depends not only on the life cycle but also on energy cultures and the relative wealth position of different contingent age groups. By estimating price and income elasticities by age group, Bardazzi and Paziienza find a lower responsiveness in the residential energy consumption of the elderly compared to the younger population. The authors interpret this result in terms of the relatively better income and wealth position and the persistent energy-saving behaviour of the oldest part of the Italian population, which will, however, come under greater pressure in the future due to changes in the welfare system and the progressive effects of the energy transition policies.

The second section of the volume collects several contributions exploring some determinants and consequences of energy poverty and overlapping vulnerabilities that play a part in shaping this phenomenon. Charlier and Legendre investigate the relationship between energy poverty and health using an original survey on French households designed specifically for this empirical study. By using econometric models, Charlier and Legendre investigate the two-sided relationship between energy poverty and health clarifying that falling into energy poverty significantly degrades

objective and subjective health scores, such as those used by WHO both at physical and mental health levels. These findings highlight the positive spill-over effects that can be expected from effectively tackling energy poverty, both in terms of individual well-being and potential savings for public budgets. The authors therefore call for a holistic approach to these policies, considering the environmental, social and health aspects of tackling energy poverty as inextricably linked.

Then, the spatial dimension of a specific type of energy poverty, related to the use of fuels for private transport, is investigated by Mattioli, Dugato and Philips. The authors focus on Italy, an interesting case study due to the combination of one of the highest motorization rate in EU and high fuel prices. They define a composite indicator of vulnerability, considering the role of high exposure (high car use), high sensitivity (low income) and low adaptive capacity (high car dependence). As a general finding, the long-standing economic divide between Italian regions also reflects in a higher vulnerability in the South of Italy, largely driven by economic deprivation. However, areas of great concern are also in the Centre of the country and within the centre/periphery divide. This finding should also be considered in the context of electrification of the energy system and of the vehicle fleet in particular, which can widen the gap between Italy—characterized by a very low transport-related electrification rate—and other EU countries in terms of vulnerability to fuel price increases, by reducing other countries' exposure more rapidly than Italy's.

Finally, in the last chapter in this section, Toro, Fernández-Vázquez and Serrano examine the link between gender and energy poverty through a longitudinal analysis of Spanish households. The authors show that the gender gap in energy poverty is mainly due to women's greater exposure to energy-related activities. The results show that female householders spend a significantly higher proportion of their income on residential energy than their male counterparts, regardless of the income level, although these differences decrease as the expenditure quintile increases. The opposite is true for transport fuels for male breadwinners. As there are few substitutes for household energy, while there are substitutes for transport fuels in public transport, female breadwinners are relatively more affected. This gender inequality in energy consumption is exacerbated in the case of the most disadvantaged households, where women should limit their expenditure on energy products, especially those related to private transport.

The third section of the book deals with the distributional impacts of decarbonization policies and the possible role of compensatory measures for vulnerable households. Specifically, Dobbins and Fahl use an energy system optimization model to estimate the distributional impacts of the carbon tax in Germany so as to consider how to compensate lower-income households. Redistribution mechanisms per person and per household are considered. The authors stress that by linking redistribution to energy efficiency investments in buildings, low-income households would be more able to absorb the long-term impact of energy and carbon price increases. Social acceptance of CO₂ pricing and redistribution schemes can better be guaranteed when resources are channelled into investments that will reduce carbon emissions in the future.

In the chapter by Faiella and Lavecchia, demand elasticities for different energy sources are estimated and then used to calculate the distributional effects of a carbon tax on households in Italy. The authors use these estimates to assess the impact of different levels of carbon taxation on energy demand and the revenue that can be raised from these different tax levels. In all cases, the price increase induced by the carbon tax is regressive: poorer households' expenditure increases more, while their energy consumption decreases more. To increase the political acceptability of carbon pricing policies, the authors suggest compensating vulnerable households, for example, through lump-sum transfers or by financing low-carbon energy solutions.

Martini provides a different glimpse on the energy poverty phenomenon and analyses the different distributional effects of specific policies designed to mitigate energy poverty in European countries. In particular, she focuses on the Ecobonus instrument, which has been introduced in Italy since 2016 with the aim of incentivizing investments in energy efficiency, especially by low-income households. The author stresses that, in addition to the allocation of resources, it would be necessary to strengthen training, information, dissemination and awareness-raising activities in order to facilitate access to this incentive for energy-poor households.

Finally, Fragkos and colleagues examine the impact of the just transition on Greece using a general equilibrium model that disaggregates income by class and source. The authors quantify the distributional impact of Greece's ambitious emission reduction targets and find that the country's transition to climate neutrality is regressive, but only modestly increases income inequality. They suggest using carbon revenues to finance a lump-sum transfer to support household income. According to the authors, this compensatory measure has the potential to boost employment and reduce income inequality in Greece.

The challenges posed by the EU's decarbonization ambitions, coupled with the particularly volatile period for prices, and energy prices in particular, put a particular strain on the situation of the most vulnerable, which certainly includes the elderly and low-income households. After describing the general context, a number of contributions in this volume stress that vulnerability is a complex phenomenon and that energy poverty in particular has many facets and interrelationships, at least with mobility, health status and gender well-being gap. These vulnerabilities certainly need to be addressed by public policies, and it has been shown that there are many ways in different countries to turn the burden of carbon pricing policies into an opportunity, especially if the funds, in addition to alleviating the current situation, act as an incentive for investments that help decarbonise and make the energy consumption of vulnerable households more efficient and therefore less expensive.

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