European Energy Poverty
**Agenda Co-Creation and Knowledge Innovation**

# Compendium: On existing and missing links between energy poverty and other scholarly debates[1]

**Working Group 4**
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## Introduction

Energy poverty alleviation requires a rethinking of our economic and social system (Bouzarovski 2018a). Energy poverty has traditionally been studied around the income-housing-energy price triangle (Thomson 2013), but new research avenues need to be opened to deepen our knowledge of energy poverty. To understand the multi-layered nature of energy poverty and how it is embedded in the existing system, we elaborated this compendium. With this we explore how energy poverty is linked with a wide array of aspects, from taxation, over gender to urban planning, opening paths for further research and deepening of knowledge. The compendium aims to explore existing and missing links in scholarly debate to illustrate the complexity of energy poverty and how it is understood across the European Union. This compendium is an informative collection of literature about the links between energy poverty and various areas. Thereby, it establishes which areas and links need to be investigated deeper to understand the systemic nature of energy deprivation in our societies.

## Outline of the contributions

The contributions in the compendium review primarily academic literature, focusing on the European context. All contributions are based on a substantial search in catalogues and web sources using a variety of keywords in the respective field together with “energy poverty”, “fuel poverty”, “energy”, “poverty”, and “households + energy”. The contributions are structured as follows: They first state the nature of the link and summarize the key finding from the literature. Then, the main findings and discussions in the literature about the specific link are explained. Each section is mainly a description of the collected literature about the link between energy poverty and the respective thematic field. Further, it provides an analytical narrative about how this link is developed or understood. Additionally, if the literature reveals a clear link, the sections indicate how the area analysed relates to energy poverty (e.g. it is a catalyst, an indicator, a cause or a consequence of energy poverty). The areas of scholarly debate explored are grouped under four overarching categories: income, housing, energy prices, and cross-cutting issues, each of which contains several areas:

[1] We publish this work, undertaken between March 2019 and February 2019, in the midst of a huge worldwide health crisis that will alter life and living circumstances. We are aware that this crisis is likely to impact vulnerable people, among them the energy poor, in severe ways. We only start to understand how important energy is as a basis of living and of participation in society. Staying at home is only possible for those who have a home, and it is bearable only if energy can be used for cooking, heating - and communicating. We see this compendium as a living document that will profit from discussion, revision and updating.

## Contents

# 1. Energy poverty and the factors behind household incomes

## 1.1 State of the economy

**Lidija Zivcic, Lina Murauskaite**

While there is a clear link between the occurrence of energy poverty and the level of GDP, the impacts of economic cycles on energy poverty are unclear according to the available literature.
The latest study about European Energy Poverty Index (Openex network 2019) shows direct relations with the current situation in the economy, especially GDP, and energy poverty. Member States with a GDP per capita lower than the EU average are lagging behind in alleviating domestic and transport poverty. Another study (CEB 2019) shows a direct correlation of GDP per capita with energy poverty. The highest rates of energy poverty are in EU countries below mean and medium EU GDP. Also, OECD points out that the countries with the highest GDP per capita tend to have the lowest levels of energy affordability risk (Flues and van Dender 2017).
However, there is no available literature on how the state of the economy, i.e. economic or business cycles, impacts energy poverty occurrence. This is why an indirect assessment is necessary, checking on how the state of the economy impacts the three key drivers for energy poverty: income, housing and energy prices. While intuitively one could think that recessions and economic booms have a strong influence on the expansion or shrinking of the occurrence of energy poverty, the indirect assessment through the available literature shows no clear linkages.
In the field of impact of the economic cycle on income, the existing theories and empirical evidence give a mixed signal (De Beer 2012). The effects of an economic downturn on employment and incomes vary considerably, hence no clear link can be established (De Beer 2012). However, there is some level of agreement on the fact that economic cycles tend to have a stronger impact on the people at the bottom of the income distribution, e.g. less-skilled workers (De Beer 2012; Mitchell *et al.* 1985), who are at the same time more likely to be prone to energy poverty.
As for energy prices, research is focused on prices of oil and gas, establishing a strong link between the growth of energy prices and recession, yet no acceleration in economic activity in the case of prices being reduced (Brown and Yucel 2002; Ewing and Thompson 2007). From this aspect it is possible to conclude that the occurrence of energy poverty can be higher in times of recession due to higher prices of energy.
Likewise with the housing costs: although economic variables alone cannot explain all the fluctuations in real estate prices (speculation tends to be an additional factor of influence), changes in housing prices are often linked with changes in macroeconomic drivers such as interest rates, employment and economic growth (Baffoe-Bonnie 1998; Nneji *et al.* 2013; Quigley 1999). Hence here the state of economy can impact one of the key drivers of energy poverty, but in the opposite direction: during recession housing prices tend to stagnate or even reduce, therefore reducing the pressure on energy poverty.
Indirect assessment of how the state of the economy is impacting energy poverty leads to the believe that economic downturn does not mean a surge in energy poverty due to ambiguous effects on income and reducing the prices of housing, but this should be researched more thoroughly to lead to stronger conclusions. As the field is not researched enough and the indirect assessment of links between the state of economy and energy poverty gives ambiguous indications, it is difficult to propose what are the possible steps to tackle the negative impacts of economic cycles on energy poverty occurrence.

## 1.2 Labour market and employment

**Rachel Guyet, Lidija Zivcic**

Energy poverty is closely linked to the labour markets and employment field although the link is far from obvious in the literature. Research on the way employment and labor market policies impact poverty and precariousness is very rich. However, there is no direct research available about these policies and energy poverty. If we acknowledge that one of the drivers of energy poverty is related to income, it means that energy poverty is closely interrelated with labour market regulations on the access to the labour market, the working conditions, the social protection and the wages. Moreover, the weakening of labour market institutions results in increasing inequalities (Berg 2016).

Labour markets are disrupted by structural and global change (global competition, relocation of firms to countries with lower wage costs, demographic change etc.), by new technologies (ICT and digitalisation in all sectors, new technologies as illustrated by the energy sector). This situation requires workers to be more and more flexible, adaptable and mobile. People who are less educated are less likely to have or to develop the technical skills as well as the soft skills required to adapt to the new sectors and new requirements of the labour market. In such conditions, the skills gap is worsening and makes it difficult for a larger group of the population to earn their living and live decently, which includes also being able to afford the basic energy services. Decent work is also a prerequisite to attain sustainable development (ILO 2016). If (ILO 2016) shows how the promotion of decent job and work cuts across several sectors and SDGs, there is no reference to SDG 7 concerning affordable and clean energy for all.

Moreover, national labour market regulations are increasingly characterized by deregulation, increasing precariousness of working conditions, diversity in working arrangements, job polarisation and labour market segmentation which does contribute to insecure working places (Berg 2016; Esping-Andersen and Regini 2000). This is closely intertwined with the specificities of the prevailing economic model (Hall and Soskice 2001). Such models are reflected in the dualization of the labour market embedded in the different institutional regimes, with the “first” labour market offering good and decent jobs and the “second” offering more precarious jobs and conditions, alternating periods of employment and periods of unemployment, reflecting the increasing inequalities among the society (Biegert 2017; Paugam 2009). Some authors even refer to a third segmentation of the labour market, among others promoted by the labour market policies of the state including all the “active” labour market policies supposed to help people go back to work but leaving them in the most precarious employment situation (Yoon and Chung 2016). Such deregulatory forms of employment and the loss of collective bargaining reduce the protective role of the labour markets and increase the insecurity of this third segment. This is illustrated for example by the “zero hour contract” in the UK[2] or by the “mini-job contracts” in Germany.[3]

The changing landscape of the labour market is translated into poor quality working contracts that no longer protect the workers nor guarantee a decent wage for a decent living. It is also reflected by the increase of freelancers who have poor social protection which may result in working poverty, unemployment and underemployment (Eurofound and European Commission Joint Research Centre 2019; UKCES 2014). Employment policies do not offer equal opportunities to all people in terms of jobs, working conditions and wages. Moreover, having a job today is not always enough to provide decent living conditions. Increasingly workers are considered “working poor” because their wage conditions do not allow them to live decently of their work and because the welfare state

[2] https://www.gov.uk/contract-types-and-employer-responsibilities/zero-hour-contracts

[3] https://www.bmas.de/EN/Our-Topics/Social-Security/450-euro-mini-jobs-marginal-employment.html

systems are unable to protect them (Gautié and Ponthieux 2016; McKnight *et al.* 2016). This impacts energy poverty in a way that working people cannot always afford energy services at the "socially and materially necessitated level" (Bouzarovski and Petrova 2015). Because of the multi-faceted vulnerabilities they face, working poor are more at risk of energy poverty. Another consequence of the harder conditions of the labour market is that unemployed people with no access or unregular access to job have to stay longer at home, which requires more energy. But because of their socio-economic situation, they cannot necessarily afford the basic energy services which may result in increasing mental and physical health issues (Marmot Review Team 2011).
Providing inclusive and sustainable labour market opportunities is needed to guarantee decent living conditions and participation in society (EAPN 2017; Klosse and Muysken 2016). A holistic approach to social inclusiveness needs to be considered in the elaboration of labor market and employment policy. Addressing labour market in an inclusive and protective way by providing decent protection systems, training, jobs, working conditions and salaries could represent good leverage to address energy poverty. Such a balance was addressed by the approach of the “transitional labour markets”, launched in the mid-90s when its authors suggest reforms to improve the integrative role of this institution (Grazier and Gautie 2011; Schmid 1995, 2009; Schmid and Grazier 2002).

## 1.3 Welfare

**Rachel Guyet, Lidija Zivcic**

The design of welfare state systems can impact energy poverty. The welfare system can be both a cause of aggravating energy poverty, as well as a solution to energy poverty, although the way welfare systems are designed does not target energy poverty per se.
Seeing it as a cause of energy poverty, it needs to be highlighted that in Europe, the different types of welfare states (Esping-Andersen 1990) have been subject to a series of global crises (global cost competition, economic crises, post-industrialism) and changes (changes in the working and family pattern, population ageing, increase in unemployment etc.) (Palier and Hay 2017). As a consequence, reforms have been undergone to reduce the cost of welfare provisions. Stricter eligibility rules, reduction in duration and level of coverage, privatization of pension schemes etc. have been introduced. The past and current changes resulted in increased individual responsibility, job activation and income loss for vulnerable households lowering the consumption-ability of the households (Bernard 2019; Palier and Hay 2017). There is evidence that the current design of the welfare state does not guarantee a decent income compensation able to match the need for energy nor the energy prices increases. In Germany, in 2017 the NGO Der Paritätische showed that there was a gap of 28.7%, i.e. 116€, between the level of the minimum social allowance the real energy needs and payment capacity of a welfare recipient.[4] In 2015, another NGO, Caritas, noted a similar gap between the electricity allowance which is part of the minimum social benefits and the real costs of electricity consumption and the needs for hot water. The gap was identified thanks to the data collected by the energy saving programme Stromsparcheck addressing low income households[5].
The design of the welfare system can also explain its influence on energy poverty as in the case of Hungary where the competences of social welfare were transferred to local authorities in 2015. This means that programs addressing energy poverty, such as the “social firewood programme” launched by the Hungarian government, are now depending on the resources and political will of municipalities

[4] https://www.isl-ev.de/attachments/article/1726/armutsbericht-2017_aktuell.pdf
[5] https://www.stromspar-check.de/fileadmin/user_upload/Dokumente/Hintergrund/DCV_Position_Energiearmut_2015.pdf

to implement it, thus contributing to geographical inequalities in the support provided (Bouzarovski *et al.* 2017).

It is also possible to look at the welfare system as a solution to energy poverty. Using welfare policies in the form of social benefits is the traditional way to alleviate energy poverty. But the design of these policies is a highly political issue that overlaps welfare reforms and poverty and social policies introduced by governments. Some governments like England, Ireland and France have introduced energy poverty in their political agenda. However, the way they address it is strongly shaped by their respective welfare model and reforms as shown for example by eligibility criteria, levels of spending etc. (Kerr *et al.* 2019). Healy in 2004 emphasized the key role of the welfare regimes to mitigate energy poverty. He showed that the stronger and the more equitable the social welfare support is, the lower the levels of energy poverty (Healy 2004).

The link between the reforms of the electricity market and of the welfare systems in Europe has been studied by H. Haber to show the emergence of a new type of regulation, that the author calls “social regulation of a liberal type” (Haber 2018). The author explains how the liberalization of the energy market promoted by the EU directives increasingly took into consideration the protection of vulnerable consumers, thus gradually requiring member States to implement social measures to protect vulnerable consumers and to tackle energy poverty (Haber 2018). The link between welfare systems and energy poverty needs to be more researched and consolidated.

## 1.4 Capitalist mode of the economy

**Lidija Zivcic, Lina Murauskaite**

The current global economic model, capitalism, is likely one of the root causes of energy poverty. Although energy poverty and general poverty are different from each other, they often coincide. Despite frequent claims that capitalism helps to eradicate poverty, capitalism has throughout its history created more, not less, poverty (Harriss-White 2006; Ruccio 2015). It is possible to mitigate poverty through measures, such as welfare support, but it is not possible to eliminate the ways that capitalism contributes to poverty creation (Chester 2014; Harriss-White 2006; Mosse 2010). Hence we cannot look for the eradication of energy poverty within the current economic system without radical changes in the system.

Capitalism has positive effects such as progress driven by competition and economic growth. However, the major negative effect is the unequal distribution of wealth that has led to poverty (Hall 2015; Hein *et al.* 2015).

Regulatory capitalism allows energy companies to foster economic competitiveness including the benefit to society. Therefore, the development of energy regulators is a Western European approach to poverty. But energy poverty is not a priority. People living in poverty are considered as marginalized from the political process, and energy poverty is considered as an injustice (LaBelle 2017).

We need a change in economic model towards model(s) that do not stimulate poverty and inequality, but more inclusiveness (social economy, solidarity economy, degrowth…). More research is needed on how the current economic model impacts the key drivers of energy poverty and what other possible ways of economic organization would have less negative impacts on energy poverty.

# 2. Energy poverty and the factors behind housing energy efficiency

## 2.1 Housing market: gentrification, affordability, and segregation

**Katrin Grossmann, Ricardo Barbosa**

While the quality of housing is one of the core topics in the energy poverty literature as such, only very few contributions address the links between energy poverty and the housing *market* overview in (Grossmann 2019). Building renovation is recognized as a useful strategy to decrease energy use in heating and cooling and to alleviate energy poverty, but there is scarce information regarding its repercussion on urban space and residential segregation dynamics. Attention is rising from different perspectives: There is a spatially sensitive approach, highlighting the differentiated drivers of energy poverty such as the infrastructure for heating, the social status of households, tenure and building structures (Bouzarovski and Thomson 2018; Bouzarovski and Tirado Herrero 2017; Robinson *et al.* 2019). On the other hand, the tenure structures are recently acknowledged to impact the motivation to implement and effect of energy efficiency measures for buildings. Low-income households have a higher propensity to rental housing than to owner occupancy throughout Europe and private landlords are shown to have a low inclination to conduct energy retrofitting (Hope and Booth 2014). Therefore, low-income households in social housing rentals have come to the focus of retrofitting programs (e.g. Aranda et al., 2017). The evidence of the repercussions of energy retrofitting in urban space and societies may include:

1) Rising rents/decreasing affordability: Housing prices have been found to rise with rising energy efficiency. Literature from urban economy termed this the “price premium of energy efficiency” and shows the effect for different European and other contexts e.g. (Dinan and Miranowski 1989; Hyland *et al.* 2013; Steininger *et al.* 2018). Because of the “prebound-effect” (Sunikka-Blank and Galvin 2012), also called precast effect, e.g. in (Vilches *et al.* 2017), it is frequent that saving in energy cost does not materialize after a building renovation (as opposed to the rebound-effect where savings are eaten up by other uses). Being so, the burden of the investment is addressed in literature as the so-called “split-incentives” problem which might lead to disinvestment by landlords (Gillingham *et al.* 2012; Melvin 2018); in other contexts leads to cost burdens for tenants (Grossmann 2019).

2) Neighbourhood change, displacement through retrofitting/gentrification: The term “renoviction” has been coined for the unjust effects of urban renovation projects (Baeten *et al.* 2017) and is lately applied to energy building renovation as a means for speculation and thus of forced displacement of low-income residents ,which was also addressed in research as stimulating “low-carbon-gentrification” (Bouzarovski *et al.* 2018);

3) Residential segregation: First studies address the effect of building energy renovation on residential segregation on a city level. (Mangold *et al.* 2016) model potential outcomes of energy renovations in the millennium homes of Gothenburg/Sweden and show how they would increase housing prices in areas with less than average incomes, thus displacing poor people to cheaper areas. (Großmann *et al.* 2015) examine residential location decisions and find that a preference for energy efficient housing is likely to contribute to residential segregation in their case study.

In sum, the link between energy poverty and housing market mechanisms is yet to be established. This is especially important as energy retrofitting is seen as a major strategy to alleviate energy poverty. The question to what extent the retrofitting measures reach energy-poor households and

whether they really do profit from them also in the long run is a wide-open research gap. Tenure seems a crucial issue here.

## 2.2 Energy efficiency and the quality of buildings

**Ricardo Barbosa, Fernando Martín-Consuegra, Eleonora Gaydarova**

The low energy efficiency of housing is considered to be one of the major factors leading to energy poverty. Consequently, energy efficiency measures, such as the improvement of the building envelope and the replacement of heating and cooling systems for more efficient equipment, have consistently been shown as the most effective way to address energy poverty issues. The link is clearly established and first was pointed out by (Boardman 1991). In some contexts, such as Hungary and Portugal, a significant relationship between energy poor household and older, inefficient dwellings was already identified (Bouzarovski and Tirado Herrero 2017; Gouveia *et al.* 2019). However, because the level of energy consumption in residential buildings is influenced by factors related to the characteristics of the building and location, but also with user-related factors, some authors argue that only approaches that can reflect the complexity and interrelation between these elements should be considered (Papada *et al.* 2019). On the other hand, approaches that address important effects such as the precast and the rebound effect, already found in households at risk of energy poverty situations (Brøgger *et al.* 2018) are also pointed out as key. In many cases the energy consumption is already extremely limited before the housing retrofit, so the consumption does not show any decrease (precast effect) (Vilches *et al.* 2017) However, studies based on thermal comfort have recorded increases in indoor temperature achieved after energy-efficient housing renovation that does not use energy for space heating during the winter (Poortinga *et al.* 2018). Other studies indicate that a reduction in energy consumption after housing retrofit cannot be expected, since low-energy households tend to use the benefits of improved efficiency to increase their comfort levels instead of reducing the consumption (rebound effect) (Berger and Höltl 2019). Because of this context, when choosing the most adequate measures in order to deal with energy poverty, priority has to be set on implementing non-investment energy efficiency measures with the lowest payback possible, taking in consideration the actual consumption (Aranda *et al.* 2017), with some authors arguing that is should be based in a thermal comfort approach and that a cost effective methodology is not applicable in a fuel poverty context (Vilches *et al.* 2017)

## 2.3 Ownership and tenancy issues

**Ana Stojilovska, Katrin Grossmann, Rachel Guyet**

Despite much research on energy poverty relates to housing and deals with households in a variety of housing situations, the impact of tenancy on energy poverty remains underexplored. For decades, studies in the UK were concerned with low housing efficiency, measuring heating cost burdens and the effect on households, but the difference tenure can make, has not been addressed explicitly. Now, that the debate is extending to other geographical contexts, tenure gradually enters the debate. The research on energy poverty and the ownership of the dwelling is mostly about the tenancy status being indicative of energy poverty, but is also revealing of the challenges this tenancy status brings regarding energy use and housing. Living in rented dwelling means a higher probability of energy poverty as research shows for Spain (Aristondo and Onaindia 2018; Romero *et al.* 2018), France (Imbert *et al.* 2016) and Northern Ireland (Mohan *et al.* 2018). Research on Slovenia, however, shows that owners can be affected by energy poverty if combined with other factors, such as low

education and unemployment (Primc *et al.* 2019). Other discussions in the literature are about the choices and abilities a tenant has in regard to the use of energy and managing their energy affordability. Tenants tend to have less control over their energy supply, the type and operation of their heating system as research in Glasgow shows (Kearns *et al.* 2019). Research in the German context explains that tenants might influence their heating costs only through behavior change (März 2018). Having limited choices in regard to managing their housing clarifies why renters in low efficient dwellings are more energy vulnerable as shown in the French context (Legendre and Ricci 2015). Due to the link between energy poverty and housing ownership, a question is raised about the access to affordable housing of also private tenants as resulting from research in England (Robinson *et al.* 2018). In France and Germany there are new regulations allowing tenants to access cheaper and renewable electricity, allowing them to benefit from the energy transition, which represents a big change in the owner/tenant relationship as far as energy is concerned. On the downside, as discussed under 'housing market', the burden of the energy efficiency investment is or the so-called "split-incentives" problem between tenants and landlords (Gillingham *et al.* 2012; Melvin 2018) is relevant in this context.

## 2.4 Urban planning

**Ricardo Barbosa, Fernando Martín-Consuegra, Ana Stojilovska**

There is an implicit link between urban planning and energy poverty in the sense that there is evidence of a direct impact of urban planning on energy inefficiency in European cities. The link between building energy needs and urban characteristics is very strong. High energy needs, caused by inefficient urban form and poor construction quality, are producing energy vulnerability to the inhabitants of certain neighbourhoods (Martín-Consuegra *et al.* 2018). Densification of urban areas has been also associated with a strong likelihood of energy injustice and energy poverty in low-income households, which suggests that the physical structure of the city, such as the density design can be of relevance for energy poverty (Poruschi and Ambrey 2018). This means that greater density corresponds to a greater likelihood of experiencing energy poverty (Poruschi and Ambrey 2018). Appropriate urban planning and housing design are mentioned in health research for Milan, suggesting that they are a realistic solution for reducing cold- and heat-related mortality and morbidity on poor energy housing (Condemi and Gestro 2019).

Another important issue regarding urban planning and energy poverty is the relation between two main areas where fuel is consumed: transport and buildings. Mattoli and colleagues remark the difficulty of approaching the two concepts in an integrated way, because they actually belong to two parallel policy worlds (Mattioli *et al.* 2017). Demography, economy, land use, climate impacts and GHG emissions were assessed in a study performed for London (Dagoumas 2014). The conclusions point to the need of linking economic activity, employment, and energy demand for tackling energy poverty at a macro level.

There is also evidence that the physical structure of settlements can be of relevance. A study from Spain suggests that urban sprawling can constitute a source of energy consumption increase, because of high transportation costs added to the higher quantity of detached and semidetached housing in the external areas of the cities (Navamuel *et al.* 2018). On the other hand, the spatial distribution of the price of housing forces low-income families to move away from the city center to suburban areas, in order to limit the burden of housing costs. This situation drives into an energy vulnerability associated with mobility because they are forced to face high transportation costs (Coulombel 2018). This "two-fold energy poverty" (housing and transport) is affecting a significant part of the population in urban areas, as indicated by a study from Strasbourg (Mayer *et al.* 2014).

## 2.5 Transport poverty

**Lidija Zivcic**

Energy poverty hinders access to energy services, but it also hinders access to transport services. The alternative use of the phrase “fuel poverty”, which was long used in the British context, made this even more clear. Transport poverty is a problem that adversely affects the daily lives of millions of people across the globe, yet the problem is not adequately articulated or researched (Lucas *et al.* 2016; Mattioli *et al.* 2017). There is no universally accepted definition, but transport poverty could be explained as an overarching combination of transport affordability (inability to meet the cost of transport), mobility poverty (lack of (usually motorized) transport), accessibility poverty (difficulty of reaching certain key activities such as employment, education) (Lucas *et al.* 2016) and exposure to transport externalities (Verne Transport Research Centre 2018). Term ‘transport poverty’ is used in two essentially different ways in the literature (Mattioli *et al.* 2017): it refers to all kinds of inequalities related to transport and access or it refers to the affordability of transport costs.

Transport poverty is also linked to other issues such as well-being, housing, social exclusion (Verne Transport Research Centre 2018) and urban sprawl, which contributes to an increased usage of private cars to meet basic socio-economic needs (Openex network 2019). Mobility should be an equally important energy service as heat and light (Sovacool *et al.* 2012). The issue is that energy poor often need more energy, and pay more for it, to go efficiently or quickly where they need to go; or they simply forego ‘‘going’’ altogether (Sovacool *et al.* 2012). Transport poverty is suggested to be one of the many contributory factors to a wide range of poor living standard aspects, such as unemployment, reduced participation in education and training, reduced health services usage, as well as exclusion from a wider range of social activities and social networks (Mattioli *et al.* 2017; Sovacool *et al.* 2012). Further consequences of transport poverty are also increasing debts and the trade-off with other basic needs (domestic energy needs, food, health, leisure…) (Openex network 2019).

Costs and affordability in the transport, housing and domestic energy sector are usually addressed by different policy sectors and research literatures, yet they should be tackled in conjunction (Mattioli 2015). The transport poverty challenge demands a fundamental change in the design of housing and land use policies to avoid the trade-off between affordable housing and car dependency. Alleviating transport energy poverty requires making mobility an affordable option for all. Public transport, car-sharing, biking lines and other options of modal shift should be available, accessible and affordable for all. Moreover, Europe’s policies related to private cars should focus on electric vehicles that can be recharged using solar panels installed on the roofs of positive energy buildings (Openex network 2019).

# 3. Energy poverty and the factors behind energy prices

## 3.1 Infrastructure

**Ana Stojilovska, Anna Mengolini**

The siting of infrastructure contributes to the understanding of the spatial distribution of energy poverty. Available infrastructure and its geographical location are factors for recognizing vulnerable homes (Castaño-Rosa *et al.* 2019). Infrastructure is unevenly distributed and these infrastructure inequalities create the spatial differences in energy poverty (Bouzarovski and Simcock 2017). The literature accounts for the urban-rural differences in availability of infrastructure with rural areas being more affected by energy poverty due to the lack of adequate infrastructure (Thomson and Snell 2013). For example, in England, the lack of gas infrastructure in rural areas forces households to use the more expensive oil (Robinson *et al.* 2019), while in peri-urban areas in Greece to use fuelwood (Petrova and Prodromidou 2019). One can argue that the poverty of infrastructure is a relevant predictor of energy poverty in the European context. Furthermore, there is a socio-economic and political dimension of energy poverty in the post-communist context. Post-communist energy poverty is related to the infrastructure legacies from the centrally planned economy (Bouzarovski and Tirado Herrero 2017), thus is embedded in the socio-spatial path-dependencies (Bouzarovski *et al.* 2016). The lack of gas infrastructure in Central Eastern Europe adds to the energy deprivation due to the limitations to using more affordable energy in addition to the inefficient dwellings and affordability issues (Bouzarovski 2018b). One relevant discussion for energy poverty alleviation and climate change mitigation is the social heat infrastructure. As both climate change and energy poverty have an infrastructure dimension, the involvement of local authorities ensures that the viability of heat network development is assessed based on a wider set of drivers and responsibilities than financial profit (Foxon *et al.* 2015). The same research also argues that it is particularly difficult to assess heat demand for households in energy poverty who may use less heat than they require for a healthy living standard (Foxon *et al.* 2015).

## 3.2 Taxation

**Lidija Zivcic, Lina Murauskaite**

Taxation is a factor contributing to energy poverty. Key changes in energy taxation systems are needed as some aspects of it are set up in an unfair manner, especially bearing in mind the much-needed energy transition. For example, tax rates vary considerably between households and industry, as important tax reductions or exemptions are applied by Member States for the industry in the EU (European Commission 2019). The current taxation framework also provides incentives to fossil fuels use in the form of tax benefits that have been persistent over the last decade in the EU and amounted to around €40 billion in 2016, while the external costs associated with the generation and consumption of the fuel are often not fully reflected in taxes (European Commission 2019).
However, the move towards environmental taxation is particularly felt by final consumers, especially by the households affected by energy poverty (Bouzarovski 2014a). Modest and vulnerable households are sometimes compensated for high energy taxes. Dominant policy measures for energy poor households are social tariffs, concessions, rebates, and prepayment meters

supplemented by allowances, also improvements to housing energy efficiency. These measures are reactive and short term (except energy efficiency) (Chester 2014). However, measures for energy poor households that are focused on price support or price relief are less efficient than the measures for welfare support, hence it is better to secure transfers to low-income households than trying to keep energy prices low or subsidized (Bouzarovski 2014a). Taxes on diesel, petrol and natural gas are generally less harmful to the poor households than the tax burden on electricity bills (Bouzarovski and Petrova 2015). Simulation results show that a reform that increases taxes on heating fuels and electricity can reduce energy affordability risk if parts of the additional revenues are transferred back to households using an income-tested cash transfer (Flues and van Dender 2017). Direct cash transfers are also suggested as a non-distortionary instrument for easing the burden of high prices for those endangered by energy poverty by Frondel et al. (2015).

## 3.3 Corporate power and vested interests

**Lidija Zivcic, Lina Murauskaite**

The corporate power of the energy sector and the impacts of their vested interests on energy and taxation/price policies along with choice of energy sources and infrastructure could be one of the factors contributing to energy poverty.

The restructuring of energy sector that happened through the liberalization process has contributed to rising prices of energy, which further increased energy poverty occurrence (Bouzarovski *et al.* 2012; Chester and Morris 2011). According to consumer rights organisations, the energy liberalization process, supported by the international financial institutions and policy-makers, decreased the affordability of energy (Bouzarovski *et al.* 2012). They also believe that energy policy makers protected more the corporate interests of energy companies than household consumers (Bouzarovski *et al.* 2012). Although research of role that energy companies play in the policy- and regulation-making processes is scarce, some glimpses behind the curtains of policy-making reveal that energy companies have a major role to play in affecting decision-making processes and restraining democracy in energy decision-making arena (Tkalec 2016; OpenSecrets 2019; Corporate Europe Observatory 2019). As a result, the consumers, especially vulnerable consumers are often powerless against the energy giants. Research shows that there are cases when energy supply arrangements structurally discriminate against low-income consumers (O'Sullivan *et al.* 2011).

Decentralized energy production from renewable sources of energy, as well as distributed-energy technologies such as micro-grids, can deliver energy to all citizens (Nathwani 2018). Distributed energy can empower the powerless, as well as reduce the power of the current energy giants, while decentralized energy systems give people the ability to negotiate directly with energy suppliers (Nathwani 2018). The power of current energy giants could be reduced by allocating state funding for the increase of energy efficiency of housing stock for energy poor households.

## 3.4 Air pollution

**Ana Stojilovska**

The research linking energy poverty to air pollution focuses on indoor energy pollution causing health impacts due to biomass use. The use of fuelwood in European energy poverty context and its contribution to indoor air pollution has been explored in Hungary (Bouzarovski *et al.* 2016). In the

European context the outdoor air pollution and its relation to energy poverty is also relevant. In Greece the fireplace is used as a supplementary heating to the main inefficient heating because it is cheap and its intensive use causes smog in urban areas (Papada and Kaliampakos 2016). There is limited academic research on this link in the European context with one paper on Poland stating that smog alerts of activists showed narratives acknowledging the importance of energy poverty (Frankowski 2020). In a non-European developing country context, however, the link between indoor air pollution and energy poverty is well studied and has a gender and health dimension (Gray *et al.* 2019; Sadath and Acharya 2017; Sovacool and Dworkin 2012). Emerging research studying the link between energy poverty and air pollution in Eastern Europe and Southeast Europe comes from the international development and non-governmental sectors. Fuelwood burned in inefficient wood stoves is indicative of energy poverty in North Macedonia and causes air pollution (IEA 2008; World_Bank_Group 2014). The widespread reliance on fuelwood for heating reflects the household inability to afford modern heating sources, such as gas, district heating or electricity; but also shows the unavailability of gas access in the country (World_Bank_Group 2014). The increase in energy prices led to an increase in the use of fuelwood in North Macedonia (IEA 2008). A project report acknowledges that the link between energy poverty and poor air quality is not recognized in the EU (InventAir 2018). The issue in Eastern Europe is that existing programs aimed at reducing energy poverty allow vulnerable households to buy humid wood and low-quality coal (InventAir 2018).

# 4. Energy poverty and other cross-cutting issues

## 4.1 Climate change

**Ricardo Barbosa, Naama Teschner**

There is an intrinsic linkage between climate change and energy poverty. A considerable discussion is centered along what can be designated by energy-poverty-climate nexus (Jones and Warner 2016), where the two factors are interlinked and should be dealt with in order to promote development and poverty alleviation. At this scale, it is argued that efforts to deal with climate change and energy poverty should be complementary. Several studies identify trade-offs and synergies which should be considered in policy formulation, in particular concerning climate change mitigation (Schaffrin and Reibling 2015; Ürge-Vorsatz and Tirado Herrero 2012).
Increasing energy efficiency in buildings as a part of a climate change mitigation strategy would potentiate the reduction of energy poverty problems (Ürge-Vorsatz and Tirado Herrero 2012), although it is suggested that complete eradication of energy poverty would probably be inevitably linked to higher energy consumption (Schaffrin and Reibling 2015), because of the extra energy needed to have sufficient energy services at home (even if the need to improve energy efficiency is recognized in order to obtain energy services at a reduced price) (Bouzarovski 2014a). In this sense, there is also the danger of increasing energy poverty situations, by acting aggressively towards climate change, especially when externalities of carbon emissions are considered and not offset by savings potentiated by energy efficiency (Ürge-Vorsatz and Tirado Herrero 2012). This position regarding environmental taxation can increase energy prices for consumers, which, combined with the context of decreasing incomes, would increase the risk of energy poverty in households (Bouzarovski 2014b). In addition, some evidences that indicate that climate change can dramatically decrease energy demand regarding heating and increase cooling needs (Barbosa *et al.* 2015; Sanders and Phillipson 2003), suggesting that energy poverty situations can increase in an extreme climate context, similarly to what happens in a urban heat island context (Tsilini *et al.* 2015), which would also call for policy integration with climate adaptation. In this context, several authors advocate measures that are arguably win-win solutions regarding climate change adaptation and energy poverty, such as the promotion of energy performance through retrofit of the built environment (Barbosa *et al.* 2015; Filippín *et al.* 2018).

## 4.2 Gender

**Marielle Feenstra, Ricardo Barbosa, Ana Stojilovska, Raúl Castaño-Rosa**

The relation between gender and household energy has been relatively well explored in the context of developing countries (Clancy 2003; Clancy and Skutsch 2003). The so called “gender-energy-poverty nexus” (Clancy and Skutsch 2003) highlights the challenges regarding access to resources, decision making and control, in particular of rural women. Within households in the Global South, a gendered division of labor allocates women the responsibility for energy provision. Although women have that responsibility, they also frequently see their access to decision making restricted within the household, which hinders their influence on processes and resource allocation and makes them more vulnerable in their access to energy sources (Clancy 2003). The gendered dimension of energy poverty is acknowledged as a global concern through the SDG’s (SDG 7 and SDG 5) combined with a strong gender mainstreaming target in the SEforAll programme of the UN. Although this

relationship have been identified in the scientific debate only more recently, some studies argue about its unexplored potential and the need to consider gender equality through energy and housing policies (Sunikka-Blank *et al.* 2019). Interestingly, there is a growing body of evidence that the energy poverty vulnerability of women is also present in the Global North. The first publication on gender and energy access in the EU is published in 2017 commissioned by the FEMM Committee of the EU Parliament (Clancy *et al.* 2017). (Clancy *et al.* 2017) It identifies the main link to be the economic situation of single-mother households who do not have enough monetary resources to live with their child; women have lower wages than men; women have associated child-care tasks that make them more vulnerable in terms of lower net income and less hours to work; and women live longer than men, so many one-person households are women living alone on a small pension. Another report in the UK indicates that there is a gender impact on housing policy since 2010, with women having a higher percentage of claiming of housing benefits and living in social renting, as well as in homeless conditions (Tunstall 2018). (Clancy and Feenstra 2019) argue that persistent gender inequality exists in the energy sector in the EU. For example, men and women experience energy poverty in distinctive ways due to differences in income, housing conditions or depending family members. As an illustration, in the city of Madrid, female headed households are more affected by the high energy prices; 32% of female headed households were considered in energy poverty, while 23% were households in general (Clancy and Feenstra 2019). In England overcoming difficulties and helping others to overcome it; exclusion from a productive economy; vulnerability to negative mental health impacts; lack of social protection throughout the life course; and unpaid caring are the dimensions identified as potential factors for increasing the likelihood of women falling in energy poverty (Robinson 2019). The literature refers to gendered coping strategies, for example that women control energy costs which constitutes an emotional labor for them (Petrova and Simcock 2019). Overall, a focused literature review shows that gender and women are of marginal interest in energy and development scholarship (Listo 2018). As (Clancy *et al.* 2017) identified that many energy poverty indicators have a strong gender dimension, there is a call for gender disaggregated data on energy poverty.

## 4.3 Justice

**Ana Stojilovska, Anaïs Varo**

Energy poverty is considered a key energy injustice. Energy justice is broadly defined as providing everyone with safe, affordable and sustainable energy (Heffron and McCauley 2014) which means energy poverty does not exist in an energy just system. There are several representations of energy poverty as energy injustice: it is lack of access to electricity and technology and dependence on traditional solid fuels (Sovacool and Dworkin 2015), unequal share of the burdens of the energy system, such as the pricing (Heffron and McCauley 2014), lack of individual choice (Jenkins *et al.* 2016), and political representation of different social groups (LaBelle 2017). (Sovacool and Dworkin 2015) have constructed an energy justice decision-making tool which lists several principles, one of which is affordability defined as the Boardman's definition on energy poverty being more than 10% of income paid to energy services. This list has been upgraded to include insights of how energy justice is related to socio-economic, political and environmental justice (Sovacool *et al.* 2017). The literature also points out that energy poverty is not a matter of arrears in energy bills, but a question of personal well-being and justice (Sovacool 2015). Energy poverty is considered a socio-political injustice, not only an injustice of uneven distribution as the example of disabled people and low income families being considered passive recipients of interventions (Gillard *et al.* 2017). The key conceptual article combining energy justice and energy poverty discusses that energy poverty is an

important injustice due to the unequal access to energy services, different rights and needs of vulnerable consumers and access to information and inclusion in decisions (Walker and Day 2012). The unequal access to energy services, which includes income, energy prices and energy efficiency is a distributive injustice, the lack of recognition of different needs and cultural respect is a recognition injustice, while the lack of participation, access to information and to legal rights is a procedural injustice (Walker and Day 2012). Some research focuses on double effects of decarbonization, that might alleviate the existing vulnerability to energy poverty, but can push people into new forms of poverty, exclusion and injustices (Sovacool *et al.* 2019). In this same spirit, other literature has broadened the concept on energy justice (and its connection to energy justice). As an example, authors like (Baker 2017) or (McCauley and Heffron 2018) have linked the current literature on energy justice with other ideas such as climate and environmental justice, or just transitions, building bridges among the different academic definitions. Another attempt to build these connections is the contribution of (Healy *et al.* 2019) proposing the novel idea of "embodied energy justice" to reframe it considering hidden and distant injustices.

## 4.4 Social, spatial and regional inequalities

**Ana Stojilovska, Katrin Grossmann, Ana Horta**

Energy poverty research has long been rather narrowly focussed on income inequalities. This certainly has to do with the history of energy poverty literature and debate that put great emphasis on measurement and lobbying for action, especially in the UK and Ireland. While many studies had implicitly dealt with a variety of inequality dimensions, inequality has hardly been addressed conceptually.

Spatial inequality is the most relevant inequality in the context of energy poverty. Spatial inequality is seen in differences in prevalence of energy poverty between countries (Dubois and Meier 2016), regions within a country and urban-rural areas (Aristondo and Onaindia 2018). In some EU countries a large share of the population is affected by energy poverty, while in others it is about certain groups (Dubois and Meier 2016). The literature on geographies of energy poverty in Europe identifies UK and Ireland, Central Eastern Europe and the Mediterranean region as suffering more from energy poverty (Bouzarovski 2014b). (Bouzarovski 2018b) argues that there is an infrastructural divide whereas Central Eastern Europe suffers from energy poverty also due to the lack of gas infrastructure preventing access to affordable energy. The research on energy poverty in Spain for 2004-2015 shows that rural areas are more affected than urban areas and that Southern and Northern regions have higher level of energy poverty (Aristondo and Onaindia 2018), but (Scarpellini *et al.* 2019) for Spain claims that energy poverty in rural areas is less acute. In the UK energy poverty is more persistent in the urban context, while the rural energy poor are more vulnerable to changes in energy price (Roberts *et al.* 2015). Spatial inequalities in energy vulnerability mean that certain localities are being disadvantaged in satisfying energy services and this is considered an energy injustice (Bouzarovski and Simcock 2017).

Another claims that both homogeneous (national-level) and heterogeneous (neighborhood-specific) determinants of energy poverty must be researched (Mashhoodi *et al.* 2019). For example, in the Netherlands that national-level policies should offer safety net to energy vulnerable groups, while neighborhood-level funds should support particular social group in the neighborhood at risk of energy poverty (Mashhoodi *et al.* 2019). A research on energy poverty in Italy proposes a multi-scale approach, coupling the household-scale to the country-scale to conclude that energy poverty in this context is mainly related to the geographical dimension, rather than being related to the socio-demographic dimension (Besagni and Borgarello 2019).

A few links have been made to bridge work on energy poverty with up to date perspectives on social inequalities. One such link that recently received wider attention, is the link to socio-economic and gender inequality. Research about England, France and Ireland shows that income poverty and socio-economic inequality affect household's ability to access basic goods and services needing energy (Kerr *et al.* 2019). Gender inequality shapes vulnerability to energy poverty with other forms of social difference, and research-wise the challenge lies in that energy poverty is measured at the household level leading to difficulty about gender outcomes related to energy vulnerability (Robinson 2019). Further, (Großmann and Kahlheber 2017) suggest to employ the intersectionality approach to inequalities, highlighting how different characteristics of a household intersect so that energy poverty emerges or deepens. Using protocols from energy consultations of the consumer protection agencies, they argue that discriminatory systems in societies (housing markets, energy infrastructures and markets etc.) lead to deeper energy deprivation along the intersections of gender, household composition, income, ethnicity, age etc.

The literature also emphasizes the effects of the energy transition and its tools in reinforcing existing inequalities. Retrofitting is not a panacea for energy poverty and energy efficiency policies need to be careful in order not to reinforce structural or social inequalities as shown for the UK context (Gillard *et al.* 2017), Poland (Bouzarovski *et al.* 2018) or Germany (Grossmann 2019). A paper exploring the relationship between energy transitions and existing socio-economic and regional inequalities from energy poverty point of view concludes that the energy transitions in the EU has deepened the existing regional inequalities (Bouzarovski and Tirado Herrero 2015). There is a correlation between the Gini index of income inequality after tax and welfare transfers, and the percentage of households who cannot heat their homes adequately for all 29 EU countries for the period 2009-2017 (Galvin 2019).

## 4.5 Human rights

**Ana Stojilovska, Marlies Hesselman, Anaïs Varo**

The topic of human rights in relation to energy poverty remains under-researched in the European context, but as a moral right and legal right see (Brugger 2016; Christman and Russell 2016; Hesselman *et al.* 2019; Löfquist 2019; Merkouris 2017; Solis 2016; Sovacool and Dworkin 2015). Energy poverty has been considered immoral when it prevents people from realizing their needs and functions: fair access to energy services is a universal right. Importantly, protection of human rights must be considered both in the production and use of energy (Sovacool and Dworkin 2015). International human rights treaties, including the European Convention on Human Rights and the European Social Charter, may be infringed by States' failure to respect, protect and fulfil household's needs for essential energy services, or to address individuals' (extreme) conditions of poverty, including energy poverty (Christman and Russell 2016; Hesselman 2020; Hesselman *et al.* 2019; Merkouris 2017). In such cases, the right to energy most often exist as a 'derived' human right, a right grounded in other existing rights, such as the right to adequate housing, the right to life, or the right to health (Bradbrook and Gardam 2006; Hesselman 2020; Hesselman *et al.* 2019; Löfquist 2019; Tully 2007). The concept of the 'right to energy' has been used by civil society organizations as an overarching solution to eradicating energy poverty in Europe. They demand prohibition of disconnections, special tariffs for low income households, and energy efficiency for low-income households with no extra costs for them, but also often clean energy (EPSU and EAPN 2017; Hesselman *et al.* 2019). Some emphasize the possible danger of using 'rights talk', as it may allow private companies to co-opt human rights as commodity (Walker 2015). The right to energy, however, means that energy is more than just another commodity: the state and other actors

involved in energy provisioning have obligations that go beyond market relations (Walker 2015). There is a tension between the socioeconomic rights, including the right to energy, and climate and sustainability-related rights (Shue 2018). Finding alternatives to fossil fuels in the energy transition can be human rights evolution (Shue 2018), and claims to 'rights to clean energy' are increasingly made and investigated, e.g. see (Hesselman *et al.* 2019; Tully 2008).

## 4.6 Minorities and migrants

**Ana Stojilovska**

Ethnic minorities, especially Roma and households with migrant background tend to be more vulnerable to energy poverty. Ethnic minorities are one of the vulnerable groups in England which have experienced increase of energy poverty rates (Fahmy *et al.* 2011), and have been disproportionally affected more by austerity measures, one reason is that they live in rented accommodation more often (Robinson *et al.* 2019). In the UK, black and minority ethnic groups in difficult financial situation were among the vulnerable groups analyzed concerning barriers to switching energy tariffs; the conclusions was that low income households are not interested in switching as it is not a priority in their already complex lives (Lorenc *et al.* 2013). In regard to migrant background, immigrants in Austria are considered to be at high risk of income poverty (Brunner *et al.* 2012). A research on energy poverty in Vienna shows that households with migrant background can be energy poor with low income living in inefficient cold dwellings with electric heating, and also can be non-energy poor at risk of falling into energy poverty (Brunner *et al.* 2012). Roma are a vulnerable and socio-economically disadvantaged ethnic group in many European countries. Roma minority is facing structural discrimination and inequality in Hungary and Czech Republic seen in their difficult economic situation and ghettoization (Bouzarovski and Tirado Herrero 2017). Further research about Roma in energy poverty in Hungary exposes their coping strategies, such as their reliance on illegal electricity connections, use of garbage for heating, and facing the dilemma to heat or to satisfy other basic needs (Sergio Tirado Herrero and Diana Urge-Vorsatz n.d.). In similar fashion, the Roma population in Hungary have been defined as a vulnerable group in extreme version of energy poverty in rural areas which tend to replace gas with fuelwood to deal with their affordability challenges (Sergio Tirado Herrero 2013). The lack of education and poverty in one generation of a rural Roma family is transferred to the next, condemning their children to live in poverty just by being born in that community (Nagy Melinda *et al.* n.d.). Latest research about extreme energy poverty of Roma in Romania and Bedouins in Israel show that the vulnerabilities these minorities experiences are seen in various forms of informality, such as informal housing, lack of identification documents of Roma, and that extreme energy poverty is not only a matter of poverty or lack of access to energy, but it is related to their social marginalization and segregation as well (Teschner *et al.* 2020).

## 4.7 Social exclusion

**Ana Stojilovska, Raúl Castaño-Rosa**

Current literature on exclusion and energy poverty is particularly scarce. Exclusion is mostly debated in relation to income poverty as low income households reduce their energy consumption leading to social exclusion (Gillard *et al.* 2017). Energy poverty has physical and mental impacts; for example energy bill arrears can cause depression, anxiety and social exclusion (Fabbri 2015). A research on

energy poverty in the UK context shows how limited financial resources and limited ability to act on their own, makes people more dependent on social relations and consequently more isolated (Middlemiss *et al.* 2019). 'Marie had to cut on using their phone resulting in less contact with her family when looking for access to adequate energy services' (Middlemiss *et al.* 2019). Similarly, in another research in the UK context 'Barbara felt embarrassed to invite friend at home because of financial situation, leading her to be socially isolated' (Longhurst and Hargreaves 2019). Similarly, low income households avoid visitors at home to reduce their energy consumption, showing social exclusion has an indirect consequence of energy poverty (Maxim *et al.* 2016). The LGBT+ community in the UK tends to live in social rented housing located in deprived neighborhoods showing the link between the LGBT+ community and social exclusions in terms of residential location (Matthews and Poyner 2019). Identifying vulnerable groups to energy poverty is a relevant aspect of identifying exclusion. The concept of vulnerable consumer comes up in several definitions in EU member states, out of which the most common vulnerability is defined based on receipt of social welfare, and in fewer cases on health, disability, income or age (Insight_E 2015). In terms of policy action, the European Parliament calls on the Commission and the Member States to address poverty and social inclusion and to adopt a strategy considering economic, education, employment, energy transport and social policies (Official Journal of the European Union 2018).

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