

## Review

## Looking back to look forward: Reflections from networked research on energy poverty

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## SUMMARY

**Energy poverty is a far-reaching concept that intrinsically bridges numerous fields of study, ranging from engineering to anthropology and medical science to social psychology. The profound implications of energy poverty on the quality of life globally have also led to a wide range of metrics and policies aimed at measuring it and alleviating it, albeit with limited success. Using a mixed methods approach, our network has conducted research to advance knowledge and interpretations of energy poverty and boost scientific outputs' capacity to shape knowledge-based policies. In this article, we critically review this extensive research endeavor, as well as its results. We build on the conceptual, methodological, and policy dimensions of energy poverty research to set up pathways toward a new, interdisciplinary research and policy agenda on energy poverty mitigation better equipped to provide meaningful answers to the challenges posed by the current ongoing energy crisis.**

## INTRODUCTION

Recent decades have brought an increase in the attention paid to energy as an essential element of modern living standards. The UN has established energy as “essential for health, security, comfort, and nutrition.”<sup>1</sup> This has been further strengthened in the context of the pandemic when the United Nations Special Rapporteur on the Right to Adequate Housing stated that “having a functioning home—with running water, electricity, heat, and Internet—is a matter of survival and therefore a key aspect of the right to adequate housing.”<sup>1</sup> In Europe, several policy and legal documents have brought significant advancements in enshrining energy in policy and legal language at the EU and member states levels. As the documents summarized in [Appendix 1](#) show, energy is now acknowledged through formal language as playing an essential role in everyday modern life. Meanwhile, activism to promote access to (affordable, green) energy for all has gained traction through extensive social movements and networks such as the Right to Energy coalition, Fridays for Future, and others.

In this context, energy poverty—defined as a household's inability to attain a socially and materially necessitated level of domestic energy services<sup>2</sup>—already emerges as a phenomenon with profound implications on the quality of life even in “normal” times. Yet recent years have been far from normal. A series of overlapping crises - the COVID-19 pandemic, the soaring energy prices in the context of worldwide inflation, and the challenges brought by the war in Ukraine—have placed a tremendous burden on households' energy costs globally, including high-income, Western contexts, where the spectrum of energy vulnerability has significantly expanded. Data on the extent of energy poverty before 2020 are limited and fragmented across Europe due to a lack of coordinated data gathering and monitoring. Even before these crises, the Energy Poverty Observatory reported between 34 and 82 million households (depending on the indicator used for measurement).<sup>3</sup> The current context has likely increased these numbers to an extent that is yet to be determined since data for indicators relevant to diagnose the problem are mainly collected yearly and published with further delay. Furthermore, climate change provides an additional layer of complexity. The processes stemming from the need to undergo a (just) energy transition by switching from fossil fuels to green energy sources while rapidly increasing the level of energy efficiency across the built environment have further been accelerated by the war in Ukraine, with the EU now aiming to be independent of Russian oil, coal, and gas “well before 2030” by spending over 200 billion euro on

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decarbonizing energy systems. At the same time, however, some countries are exploring a temporary switch back to coal to produce electricity for energy security reasons, with an associated impact at the household level, which is yet to be fully understood. These dynamics bear implications on the extent of energy poverty both in the short and long term, as the prices of electricity will depend largely on the mix of fuels used to produce it, while the expenses for the decarbonization of heating systems will also imply costs, at macro and micro levels, which are yet to be assessed.

Complementary to energy poverty's growing empirical relevance is its theoretical one. Few concepts are as far-reaching in scope as energy poverty, which intrinsically bridges numerous fields of study, ranging from engineering to anthropology and from medical science to social psychology. Furthermore, the profound implications of energy poverty on the quality of life globally have also led to a wide range of metrics and policies aimed at measuring it and alleviating it, albeit with limited success, creating additional research material. Also, energy poverty demonstrates and often enlarges existing inequalities in society and addresses the debate of a just energy transition guaranteeing access to sustainable and clean energy services for all. At the same time, given its multidimensional nature, energy poverty has been indirectly addressed—and sometimes potentially deepened—by policies in other adjacent fields, as we will highlight multiple times throughout this article. Moreover, the complexity surrounding energy poverty fosters an ongoing lively debate among scholars themselves, which, throughout the years, has run the risk of overcomplicating the field rather than contributing to its advancements and of confining the research outputs to specific national contexts, with little room for cross-contextual learning and for efficiently communicating them to policymakers and the general public.

Starting in 2017, our research network, consisting initially of 68 members in 25 countries and reaching 270 members in 36 countries at its formal end, labeled ENGAGER and described in more detail later in discussion, has sought to overcome these challenges and reshape how energy poverty is researched and communicated. Based on broad multidisciplinary, collective, synergizing competencies across universities, businesses, non-governmental organizations (NGOs), and public sector bodies, we aimed to facilitate knowledge transfer and collaborations and thereby advance knowledge and practices on energy poverty through innovative research. As a Cooperation on Science and Technology (COST) Action funded by the European Union through the eponymous COST Association, the network has aimed to catalyze transformational change in knowledge and interpretations of energy poverty and to boost the capacity of scientific outputs to shape knowledge-based policies. Our premise is that the growing community of energy researchers and practitioners needs to explore the manifold ways energy poverty is interwoven with other socioeconomic dimensions and how it manifests in different contexts to open paths for further research and deepening of knowledge. This requires constant redesigning of methodological approaches which have governed research on energy poverty, encompassing new sites of inquiry applying a multi-disciplinary and holistic approach. In contrast, traditional approaches have often extrapolated specific national experiences as general issues and fallen into the trap of the quantitative-qualitative divide. Thus, a growing need has developed to open space for researchers to generate valid and reliable measurements, to properly observe the scope of energy poverty, and to identify and enable opportunities for action.

As a result of these dynamics, two main research questions have gradually developed throughout the years at the core of scientific approaches to energy poverty, guiding the work of our network.

### **How can energy poverty be understood and alleviated via multidimensional research and policy? And what conceptual and methodological complexities underpin energy poverty research?**

In this article, we aim to critically review how our collaborative work has pursued answers to these questions and, in doing so, led to an increased capacity to understand, interpret, and address energy poverty. Complementary, we will bridge our work with the current ongoing crises, which have occurred toward the formal end of our COST Action funding period, but have amplified many of the issues addressed by our network. While focusing on the contributions made by our network as arguably the largest network of energy poverty scholars and practitioners yet, we aim to integrate them into the broader scope of scientific literature and connect our work with other relevant outputs of other networks or research and policy-oriented projects.

The article develops the points above and is structured as follows: we first review the main milestones in the energy poverty literature, which we use as a stepping stone for more comprehensive theoretical and methodological approaches. We then explain the methodological framework in which our network has developed its contributions based on the research questions formulated above and on the previously reviewed literature. We then review the scientific and policy outputs of our work to show how collaborative work has stirred the field of energy poverty within the widening scope created by new climate policies and transition processes affecting the field of energy. Finally, we bridge our work to the current context of the overlapping crises and extract the premises for a new research agenda on energy poverty.

## EXISTING LITERATURE ON ENERGY POVERTY AS A STEPPING STONE FOR NEW THEORETICAL AND METHODOLOGICAL DEVELOPMENTS

Starting with Boardman's<sup>4</sup> work, the literature on energy poverty has developed along three intertwined dimensions: conceptual, methodological, and policy. At the conceptual level, overcoming the initial "fuel poverty" versus "energy poverty" debate made way for more sophistication in the attempt to develop a language aimed at capturing, as accurately as possible, the fuzzy landscape around the relation between the quality of life in households and energy. "Vulnerability" rose as a keyword, and attaching "energy" to it created yet another concept with a troublesome relation to energy poverty; despite attempts to clarify each concept and dissociate them, to this day, the two are often used interchangeably, especially in policy-making. Bouzarovski<sup>5</sup> views energy vulnerability as a fluid state, as a variable context, "as a set of circumstances that underpin the risk of falling into fuel and energy poverty." Along the same lines, Boardman<sup>6</sup> argues that vulnerability is also the result of socio-cultural disadvantages, with poor access to information, a lack of the proper critical tools to process information, inexistent institutional support or lack of access to it, or an abundance of regulations that deter or prevent people in need from accessing support all playing a crucial role in generating a context of vulnerability. These theoretical nuances around the concept of energy vulnerability have opened a valuable path toward connecting energy issues to other concepts, such as justice or inequality.<sup>7</sup> Other scholars emphasize vulnerability as a social construct, in the sense that a person, a household, or an entity may become, may be perceived, or may perceive itself as vulnerable in certain spatial and temporal conditions,<sup>8,9</sup> but, nevertheless, with deep implications on the overall quality of life and subjective wellbeing.<sup>10</sup>

The richness in theoretical approaches to energy poverty and energy vulnerability is mirrored by the attempts to establish proper measurements. Since Boardman<sup>4</sup> introduced the "10%" indicator (at least 10% of a household's income spent on energy), various other single indicators sought to combine the key variables of income and energy expenditures. Perhaps the most notable are the Low Income High Cost (LIHC) indicator<sup>11–13</sup> and expenditure-based indicators revolving around the median expenditure for energy at a household level (M): 2M for overspending, M/2 for underspending.<sup>14</sup> Since then, the literature has flourished regarding composite, complex indicators and measurements. The numerous indicators integrate different approaches to the problem, and much work is devoted to innovation and refinement. However, this is a challenging endeavor, as energy poverty is highly multidimensional and unevenly distributed across geographical spaces,<sup>2</sup> and data is often hard to access or non-existent. Such context-dependent phenomena have always raised methodological challenges, as common composite indicators tend to disable nuanced evaluations. Take, for instance, the specificities of winter domestic energy poverty, deeply affecting Central and Eastern European countries, and summer domestic energy poverty, affecting mainly Southern, Mediterranean countries. Not minding the particular roots of these phenomena for the purpose of a single indicator would prevent the elaboration of better targeted policies, as highlighted by Sunikka-Blank and Galvin,<sup>15</sup> who reinforce the importance of intersectionality approaches for analyzing energy poverty, or by Robinson et al.<sup>16</sup> In their systematic review of existing indicators, Siksnylyte-Butkiene et al.<sup>17</sup> identify no less than 41 composite indicators, which make use of various single indicators. In contrast, a previous report identified, based on different criteria, no less than 178 indicators for measuring energy poverty.<sup>18</sup> This is telling for the level of attention given to developing methodologies and measurements to assess energy poverty in the last thirty years, as is the rich literature developed in the attempt to employ and test their validity, robustness, and replicability across contexts.<sup>19–21</sup> Furthermore, as with other indicators developed in social science, some indicators generate degrees of inclusion in a category. Others result in a categorical, binary outcome—energy-poor or not energy-poor. The former are more flexible and allow for the necessary contextual nuances, but their results have intrinsic relativity. The latter provides more absolute results, which are often sought by policymakers.

Definitions of energy poverty are a closely related concern. Just as efforts invested in developing and assessing the wide variety of indicators are not purely methodologically oriented, but rather bear direct empirical implications for how policies are formulated and toward whom they are targeted, so are definitions crucial for the science-policy interface. The EU, national, and local governments have placed a growing emphasis on working definitions of energy poverty and energy vulnerability,<sup>22</sup> and, consequently, on implementation and measurement. But too much complexity does not go well with the need to draft effective and targeted policies,<sup>23</sup> therefore much of the pressure on identifying the most appropriate or, simply put, “the best” indicator comes from the policy direction as well. While part of the literature on policies targeting energy poverty focuses on accessibility issues from a developmental perspective,<sup>24–28</sup> most of it focuses on policies on their rationale and effectiveness in Europe. Some studies aim at explaining how national policies are EU-driven,<sup>5,29–34</sup> while others focus on case studies at the national or local level in various European countries.<sup>20,35–40</sup>

Nevertheless, the comparative nature of the policy-oriented body of literature allows for meaningful evaluations of energy poverty policies’ effectiveness and exchange of good practices. For instance, work by Dobbins et al.<sup>31</sup> or Pye et al.<sup>41</sup> displays the vast array of income-based support schemes across Europe, involving financial transfers, social tariffs, or disconnection bans for those considered to be energy poor or energy vulnerable primarily on financial grounds, but also showing how definitions embedded in the legislations matter in determining who is addressed. Longitudinal studies<sup>42–44</sup> have illustrated the dynamics of energy poverty indicators and the policies addressing them. In contrast, the successive European “energy packages” (such as Renovation Wave, European Green Deal, Fit for 55) have increasingly established the alleviation of energy poverty as a European priority while also acknowledging the need to understand the specificities of each geopolitical context.<sup>45</sup>

Significantly, intertwined bodies of literature have been developing around the link between transversal societal dimensions and energy poverty. Through the lens of feminism and gender studies, the disproportionate impact of energy poverty on women compared to men has gained much attention from scholars and politicians.<sup>46–52</sup> Calls to action emerged to design policies that address the gendered impact of energy poverty using an intersectional approach that includes e.g. age, ethnicity, family composition. Ethnicity has also been identified as an issue affecting the occurrence of energy poverty in specific communities,<sup>53–55</sup> <https://www.fuelpovertyresearch.net/> with increasing evidence showing energy insecurity being disproportionately exacerbated by the COVID-19 pandemic in the case of ethnic minorities.<sup>56</sup> Also, while connections are made between energy poverty and income (or other forms of economic) poverty, investigating the specific shape that energy poverty takes in pockets of extreme energy poverty in low and middle-income countries has also gained increased attention.<sup>57,58</sup> The various drivers of energy poverty, touching on some of these transversal issues which acted as the foundation of research carried out throughout ENGAGER and gateways toward new avenues aimed at expanding the field, are synthesized by Dubois<sup>59</sup> in Table 1.

The references mentioned in this section exemplify the rich body of literature that the ENGAGER network has engaged with, contributed to, and built upon. As with any scientific endeavor, existing literature has been a stepping stone for our subsequent collective work, and many of these referenced authors have become members or collaborators of our network. In our work as a network, we have aimed to acknowledge and make use of the conceptual and methodological richness reflected above. However, the rationale for our work has been driven by the need to push further the interpretations of energy poverty for all three directions—conceptual, methodological, and political—and to overcome certain dead ends stemming mainly from an excessive focus on national contexts and a lack of dialogue among the disciplines aiming to contribute to the energy poverty literature and to science-driven policy-making.

## METHODOLOGICAL FRAMEWORK

The wide theoretical and empirical variation around energy poverty combined with the increase of political attention to mitigate energy poverty has led to the establishment of numerous EU-funded research programs. In Europe, multiple Horizon calls for applications are targeting energy issues in the newly created debates, an Energy Poverty Observatory (EPOV) has been set up and further developed into an Energy Poverty Advisory Hub (EPAH) within DG Energy, and COST Actions are increasingly used to set up networks of energy researchers and practitioners aimed both at scientific developments and policy contributions.

**Table 1. Energy poverty drivers and context factors**

Low incomes	Poor energy efficiency of homes and equipment	High energy prices and poor energy supply conditions
<b>Individual drivers</b>	<b>Individual drivers</b>	<b>Individual drivers</b>
Material deprivation	Financial capacity to invest	Ability and financial capacity to choose sources of heating used for energy
Age, gender	Heating equipment (age and quality)	
Household composition	<b>Both individual and contextual</b>	<b>Both individual and contextual</b>
Employments status, vulnerable employment	Age and type of buildings (for example panel buildings)	Interdependencies between energy consumers, in cities and in buildings (use of district heating)
Level of education	Energy management inside buildings (case of district heating)	<b>Context factors</b>
Health status	Individual/collective housing	Existence and availability of various and affordable energy sources
Ethnicity	Home ownership	Access to networks supplying affordable energy sources
<b>Both individual and contextual</b>	Urban/peri-urban/rural	Quality of energy supply infrastructures
Feeling poor	General quality and condition of building (renovated or not)	Right to opt out of certain types of energy supply (for example district heating)
Past and expected income evolutions	Exposure to cold or warm temperatures in different locations	Protections of vulnerable energy customers
Trust in institutions	Trust in renovation policies and programs	Energy price regulation
Dependency on remittances	Trust in neighbors (for the renovation of co-owned buildings)	Subsidised household energy prices
Importance of the shadow economy	<b>Context factors</b>	Energy sector reforms (competition) and quality of regulation
Population dynamics (emigration, aging)	Ease to renovate buildings	Share of households vs. business or industry electricity customers in the country
<b>Context factors</b>	Regulations of building quality	Regulations of the use of coal or waste to limit air pollution
Income inequalities (between income groups, inequalities related to age, gender, education level)	Regulations of heating equipment	Evolution of local energy markets (for example wood) in terms of price and availability
Social policy	Past and present refurbishment policies	Energy security and independence considerations of the country
Economic crises	Population dynamics (local and national) including emigration influencing desirability of renovations locally	
Regions in economic decline	Local climate	
Post-war country		
Quality of institutions		

Source: Synthesis by Dubois<sup>59</sup> in Jigla et al.<sup>60</sup>

In its almost five years of functioning (November 2017-May 2022), our network—officially labeled “Energy Poverty Action: Agenda Co-Creation and Knowledge Innovation (ENGAGER)”—sought to find answers to the research questions driving research on energy poverty by building on its multidisciplinary nature. We developed our contributions by building on a diverse conceptual framework, partly relying on the existing energy poverty literature summarized above, but also by integrating theoretical approaches specific to relevant adjacent fields. Similarly, we relied on a variety of methodological approaches broadly associated with comparative research, which combine methods of data collection and data analysis located within the scope of qualitative or quantitative methodology, but also tools such as critical reviews of the literature, visual mapping techniques, stakeholder analysis, or expert panels. The contributions resulting from these dynamics, to be synthesized further in this article, speak of the added value of research networks built on inclusiveness and interdisciplinarity, with the specific aim to comparatively cover Europe as a broad geopolitical space to capture both the deeply rooted contextual specificities of energy poverty but also its commonalities across this landscape.

The ENGAGER network has effectively functioned as an extended expert panel, with at least two representatives each from over forty countries across Europe (and beyond, such as Israel, South Africa, or Australia), selected and further involved in the network’s research activities and scientific exchanges based on their expertise on energy poverty or associated fields such as human geography, political science, sociology, economics, environmental science, architecture, engineering, or legal studies. In terms of geographical scope, our work has focused on Europe, with its specificities in terms of drivers and symptoms of energy poverty, which dissociate it from the shape energy poverty takes in the global South. However, awareness has been maintained throughout the action with respect to the global importance and implications of proper access to energy also in the light of international commitments to the Sustainable Development Goals and in the light of the right to the energy debate. Nevertheless, even if we consider Europe as a

single geographical space, it offers a significant degree of variation from one country to another, from one geographical region to another, as well as significant variation within each country. Moreover, the existence of the European Union as a supra-national driver of policy agendas and policy-making—of which not all European countries are members—generates an additional layer of complexity and relevance to the study of energy poverty.

The scientific outputs of ENGAGER include two books, more than thirty-six scientific articles, as well as sixteen associated policy articles and training materials for scientists and policy makers. In this article, we conducted a critical, integrative review<sup>61–63</sup> of these outputs by synthesizing them in a way that demonstrated how our work has both boosted the transversal dimensions in the existing literature and catalyzed new avenues for research in energy poverty.

While the main focus of the article refers to ENGAGER outputs, we are aware that significant research has also taken place outside the network. We make bridging references to such work where relevant.

### CATALYZING NEW RESEARCH AVENUES IN THE FIELD OF ENERGY POVERTY

We now move on to synthesizing the new conceptual and methodological insights derived from our collaborative work, summarized in [Annexes 2](#) and [3](#). The results of our research have been aimed at building on the conceptual, methodological, and policy contributions existing in the literature and outlined in the previous section. We organize this section along four dimensions that have guided our work and which integrate elements of each of the three thematic areas illustrated above: the societal underpinnings of energy poverty, the increased attention given to people-oriented and rights-based approaches, the expansion of the conceptual and empirical scope of energy poverty, and the broadening of methodological approaches aimed at measuring and capturing the phenomenon.

#### Societal underpinnings – trust, values, power relations

Unsurprisingly, given how contexts shape both drivers and symptoms of energy poverty, the literature aims at making sense of the geographical variation around energy poverty, with numerous streams of research focusing on elements such as the “geographical energy poverty divide” among EU countries,<sup>64</sup> the “East-West divide,”<sup>65</sup> the “North-South divide,”<sup>66</sup> or the “global North-South divide.”<sup>67</sup> However, we aimed to go beyond these traditional geographical lines of separation by exploring the variation existing within previously considered homogeneous geopolitical spaces. Jiglau et al.<sup>60</sup> provide an in-depth view into the particularities of energy poverty across Central and Eastern European (CEE) countries. Explanations for the greater prevalence of energy poverty in post-socialist states had already pointed to post-1989 rapid increases in energy prices and low incomes and to historically poor quality and energy efficiency of housing stock and relevant infrastructures.<sup>68</sup> Nevertheless, a more detailed approach shows that the region is by no means a unitary space in terms of the roots of energy poverty and of how it is approached, depending to a large extent on who governs at a certain moment but also on the cultural background shaping how politics and policies are done. Across post-communist Europe, energy poverty is attached to different policy agendas, sometimes occurring in connection to climate issues (such as Poland), sometimes considered a purely social issue (Romania), while other times it is instrumentalized as part of broader populist narratives (Hungary). While seemingly minor when regarded from the outside, differences in political cultures across CEE countries, previously associated with the speed and the success of political and economic transitions,<sup>69</sup> have also been increasingly associated with energy poverty as an underlying dimension explaining variations from one region to another. Thus, we showed how, beyond incomes, energy efficiency, and prices, energy poverty is driven by contextual factors which are partly related to structural aspects such as the local availability of energy sources or structural specificities of countries. Furthermore, the work of Jiglau et al.<sup>60</sup> shows how energy poverty is framed as a policy issue in national policy debates.

Beyond the variations in structural conditions and policy framings and building on the political layer and on the increasing cross-national datasets exploring values and attitudes, such as the World Values Survey and European Values study, some topics, such as *trust*, have emerged as essential for bridging the grassroots and the institutional levels. Trust is a fundamental ingredient needed for creating sustainable social networks and strengthening communities and stimulating collaboration between citizens and institutional—both public and private—actors active across the energy and adjacent fields. Following a qualitative study across ten European countries, Grossmann et al.<sup>70</sup> show how a lack of trust in institutions can lock people in energy poverty. In contrast, existing trust acts as a catalyst for alleviating energy poverty and preventing



households from being affected if they accept poverty mitigation aid. Overall, there is a tendency to distrust institutions and governments, while trust exists more within social networks, NGOs, or individual officers in institutions. Similarly, Simcock et al.<sup>71</sup> use evidence from Poland to explain how “institutional misrecognition” reproduces patterns of energy poverty by embedding non-recognition of its drivers and symptoms, as well as disrespect into dominant discourses and policies. Moreover, in their research on the coping strategies of energy-vulnerable households in four European countries, Stojilovska et al.’s<sup>72</sup> premise is that “energy vulnerability is still a topic of strong stigmatization in many European countries [and] the problem often remains hidden. Moreover, the complex and multi-factorial causes for energy vulnerability can make it difficult to identify those affected.” Similarly, Grossmann and Trubina<sup>73</sup> use the concept of dignity as a pathway to investigate less tangible, non-material deprivations associated with energy poverty and argue that “households living in energy poverty experience dignity violations.” People in such households report how they feel disrespected, powerless, and ashamed. This has severe effects on their participation in social life and society.

The impact of distrust and disrespect further feeds into feelings of belonging to political communities, altering how their boundaries are perceived based on issues such as identity, citizenship, and nationhood. At the crossroads of human geography and law, Teschner et al.<sup>74</sup> show how extreme energy poverty can take shape in the challenging context of the Bedouin population in Israel, compared with marginalized Roma communities in Romania. Despite the differences from one regional context to another, both communities face similar hurdles in proper access to energy services, mediated by low levels of trust between communities and policymakers and extended spheres of informality, which govern everyday life at the level of the community and shape identities.

The complexity of societal underpinnings of the triangle of income, energy prices, and lacking energy efficiency has been raised numerous times in previous years, pointing to basic societal structures, including the hegemony of markets, neoliberal agendas, and structural injustices.<sup>75–77</sup> With a wider perspective on sustainability agendas in energy, transport and urban greening, Grossmann et al.<sup>78</sup> show how the priority given to economic concerns is naturalized and how related taboos hinder a game-changing effect of many sustainability debates and policies, also in the field of energy poverty and energy transitions in general. They suggest reframing sustainability debates as social-ecological justice debates and engaging more explicitly with literature on conflicts to get to the heart of the problems. From a different perspective, the complex process of a socially just energy transition aimed at being formulated at the European Union level through ambitious policy packages such as the European Green Deal, raises different kinds of challenges to communities where the policy is implemented, especially where industries deeply rooted in cultures and ways of life will have to be phased out.<sup>55</sup> The country case studies in Jiglau et al.<sup>60</sup> document how low trust and perceptions of disrespect and marginalization at the level of the society stemming from energy issues are already instrumentalized by populist political discourses, especially in electoral contexts.

### From “consumers” to “people with the right-to-energy”

One emerging perspective addressing the complexities above, with profound implications at the conceptual and policy levels, refers to the universal right to energy. It builds on various conceptual streams, such as the trust, identity, citizenship, and dignity dimensions mentioned above. Still, it is complemented by work on rights claims and energy justice, such as Hesselman et al.<sup>79</sup> Furthermore, the right-to-energy narrative builds on significant work from action groups in civil society across Europe, such as the Right-to-Energy Coalition, and other climate-oriented groups, such as Fridays for Future or Extinction Rebellion. Additionally, an increasing number of initiatives bring together researchers, practitioners, and members of advocacy groups, such as the Right to Energy Forum or the ENGAGER Energy Rights Forum held one year into the COVID-19 pandemic in March 2021.

At a conceptual level, the right-to-energy narratives are embedded in debates around the social contract and the structure of relations between people, states, and markets. These bear profound empirical meaning since the rise of populist movements have highlighted and capitalized on the shortcomings of how the social contract model is implemented in modern democracies, the difficulties in accessing energy as a fundamental element of decent living, being rooted at the core of these discourses. Methodologically, the right to energy agenda also relies significantly on qualitative work speaking of “lived experiences” of energy poverty,<sup>10,80</sup> which call for a more sensitive or a more “human” approach, especially in the context of profound transformations brought by energy transitions.<sup>81</sup> This perspective has also informed

debates about the health impacts of energy poverty beyond the mental-physical health divide by, for instance, bringing in a “psychosocial impacts” angle that links domestic energy services with “central tenets of a person’s life [ ...] such as satisfaction, optimism, vitality, self-esteem, belonging, personal autonomy, competence, and social engagement,”<sup>82</sup> citing Burns.<sup>83</sup>

Sareen et al.<sup>23</sup> speak of a need to democratize energy poverty research and policy-making by enabling a necessary, yet currently lacking, participatory dimension, while DellaValle and Sareen<sup>84</sup> explore how behavioral economics can offer useful tools to bring individuals at the core of strategies aimed at alleviating energy poverty, by shaping individual behavior and promoting collective action which enhances energy justice. Another theoretical strand building the value of energy for an individual life is the capabilities approach, originally developed by Sen and Nussbaum,<sup>85</sup> which distances the quality of life from material well-being and speaks of people’s needs to live good lives based on their criteria and freedom of choice. Building further on Hillerbrand,<sup>86</sup> Bartiaux et al.<sup>87</sup> analyze the relation between energy and social systems, emphasizing the multiple roles energy plays in ensuring that basic opportunities and freedom of choice are met. Along the same lines, Hesselman and Tirado Herrero refer to “emancipatory narratives for household energy poverty [which] call for energy to be considered as a “human right” and as social “commons” to advocate for “citizen-led energy poverty dialogues.”<sup>88</sup>

Based on such contributions, the resulting “right-to-energy” narrative focuses on energy as an inescapable element of modern, decent, dignified standards of living and is approached from two main, sometimes overlapping directions: access and affordability. Increasingly, energy democracy emerges as a dimension of the right-to-energy which emphasizes people not just as beneficiaries or consumers of energy but as empowered citizens whose voices need to be recognized in how energy is used and produced in their communities. DellaValle<sup>89</sup> makes a similar claim from the perspective of behavioral economics by reviewing the cognitive biases that hinder citizens’ capacity to make decisions concerning energy and devise a strategy to overcome them. In order to translate the right to energy and its implications into policy, the conceptual framework of the right to energy draws on social contract theory and literature developed in the sphere of legal studies. Also, they resort to analogies to issues such as education or healthcare, which, throughout time, made their way from the privileges of the rich into the social contract and human rights frameworks, with various public and private means of making them available to everyone.<sup>79,90</sup> The variety of emergency responses undertaken by governments, regulators, and utility companies across Europe and beyond during the COVID-19 pandemic brought another layer of significance to the right to energy, as various policy solutions were put in place, with varying degrees of success, to ensure continuous and affordable access to citizens faced with long lockdowns and increased energy expenses.<sup>91</sup>

### Approaching/expanding energy poverty from/to new policy fields

Advancements in the technology field and with respect to governance models, as well as the growing push for more direct and deliberative democratic processes, have led to an increasing number of innovative solutions addressing energy poverty in various European contexts. Varo et al.<sup>92</sup> have conducted a systematic review of sixty such initiatives in Europe, highlighting that technological innovations in the energy sector alone are insufficient to tackle energy poverty at a systemic level. Initiatives—governmental or stemming from civil society—that place an additional emphasis on local partnerships and citizens’ empowerment are better suited to reach their goals of alleviating both drivers and symptoms of energy poverty. Energy communities and positive energy districts are other innovative paths that gained traction and increased coverage in the literature and policy streams. Gouveia et al.<sup>93</sup> advocate for such community models as alternatives not just for newly built districts but also for historical ones, based on the example of the Alfama district in Lisbon (Portugal). However, a study by Hanke et al.<sup>94</sup> analyzing seventy-one European renewable energy communities throughout Europe nuances the capacity of such initiatives to empower and involve vulnerable households and to provide them with services reducing their energy vulnerabilities, thus falling short of delivering energy justice. The systematic reviews of locally oriented solutions shed further light on the difficulties of identifying larger-scale policies that bridge both contextual and systemic causes of energy poverty. Additionally, in-depth case studies such as Nordholm and Sareen<sup>95</sup> highlight opportunities to combine low-carbon energy transitions and energy poverty alleviation at multiple spatial scales within specific socio-technical and policy contexts, pointing to the democratic legitimacy of such endeavors.

One essential research scope expansion refers to the increasing insights on summer energy poverty. Traditionally, energy poverty has been explored mainly from the perspective of heating during cold seasons, as



the fuel poverty debate in the UK demonstrates. However, in the context of increasingly hotter summers and more frequent heatwaves brought by climate change, and with broadening the geographies of research, more and more attention is being devoted to summer energy poverty and the challenges households face to maintain adequate indoor cooling. Castano-Rosa et al.<sup>96</sup> analyze residential sector cooling demand in nineteen cities across seven countries and model the increase in cooling demand in the context of rising temperatures until 2050. Thomson et al.<sup>97</sup> use a mix of survey data and in-depth fieldwork in four Eastern European countries to assess both the causes and the coping strategies of households facing summer energy poverty. They conclude that “perceived overheating during summer occurs all across Europe, including within countries that have milder climates and where this phenomenon was thought to be rare, such as the UK,” citing Morgan et al.<sup>98</sup> Despite these research efforts to increase data-driven knowledge on summer energy poverty, specific policy measurements and indicators for this particular aspect of energy poverty are still lacking, which might, in turn, lead to difficulties in formulating specific policies tailored for its drivers and symptoms.

Further contributions to the expansion of the scope of energy poverty are made by Stojilovska et al.<sup>99,100</sup>, who explore the links between energy poverty and other broader debates such as taxation, climate policy, infrastructure, welfare, air pollution, gender, justice, or human rights. Gender increasingly occurs as a transversal dimension in studying energy poverty, and some research efforts are dedicated explicitly to energy injustices and different experiences with energy poverty occurring along gender lines.<sup>101</sup> Petrova and Simcock<sup>52</sup> argue that households, which are typically the micro-level of energy poverty analyzes, are not homogeneous and remain deeply gendered spaces. They use qualitative evidence from Poland, Czechia, and Greece to explore how the burden of energy poverty, both in terms of its impact and in devising coping strategies, falls disproportionately on women. Feenstra et al.<sup>81</sup> place gender at the core of their argument in favor of “humanizing the energy transition” and elaborating a national policy with this principle at its core for the Netherlands. The gender dimension also occurs in a broader context linking energy poverty with inequalities in society, with a particular focus on the normative interpretations of (in)justice within the current process of just transition.<sup>87</sup>

A critical issue in policy design is the repercussions of energy retrofits on poverty situations. To better explore the challenge of raising housing energy standards for poor people while keeping housing costs low, Stojilovska et al.<sup>99</sup> demand a conversation between the fields of housing affordability, gentrification, and residential segregation to avoid renovictions, which is displacement after energy retrofits. Grossmann<sup>102</sup> asks why energy efficiency policies tend to assume that the energy savings after retrofits would stay with income-poor households despite the well-known effects of housing markets that continuously lead to the clustering of income-poor households in the lower quality buildings and districts of European cities. She systematizes the impact of energy retrofitting on residential segregation using studies that show how energy efficiency measures privilege higher-income groups. Bouzarovski et al.<sup>103</sup> suggest the term low carbon gentrification for its effects on the neighborhood level.

Such research endeavors, dealing directly with experiences inside households, have also led to so-called “toolkits,”<sup>90,104</sup> documents with a practical nature aimed mainly at orienting the mindsets of decision-makers dealing with this broad array of policy fields toward energy poverty, in order to understand how their actions can have an impact on energy poverty and, ultimately, how its alleviation can be embedded in their specific policies. Moreover, they highlight the specific roles of key institutions, such as the Ombudspersons, in addressing energy poverty from a rights perspective in connection to social actors such as advocacy networks or institutions aimed at protecting consumer rights. One significant contribution made by such toolkits stems from their informative nature, directed both generally at the public and specifically at vulnerable households, but also toward public, private, and civic stakeholders with a stake in energy poverty policies. The toolkits reflect both the need for an increase in the participatory nature of policies and for an increase in the responsibility of these stakeholders, which speaks to the importance of trust and the rights-based perspective highlighted above while also highlighting the expanding scope of energy poverty.

### Better policies through better methodological approaches

Building on previous work aimed at developing composite indicators to measure energy poverty, such as that of Thomson and Snell,<sup>105</sup> Bouzarovski and Tirado Herrero,<sup>64</sup> Bollino and Botti,<sup>106</sup> or Gouveia et al.,<sup>107</sup> several collaborative efforts were aimed at adapting or improving existing indicators or further developing

new ones. Castano-Rosa et al.<sup>108</sup> build an Index of Vulnerable Homes and test it in communities in England or Spain, Sokolowski et al.<sup>109</sup> build an index whose validity is tested at the national level in Poland, while Antepará et al.<sup>110</sup> aim to develop “a simplified way” of measuring energy poverty, which is then tested on local communities in several Southern European countries. Such endeavors rely on similar methodologies, using single expenditure-based indicators or combining them with perception-based indicators, the differences stemming from different weights given to each component or by slightly adjusting the components.

A different approach is followed by research that makes use of single or composite indicators across multiple regions or countries in order to evaluate the effectiveness of policy strategies regarding energy poverty or to contribute to better targeting of such policies. Karpinska et al.<sup>42</sup> use data from three national datasets to determine which regions and districts in Poland are most vulnerable to energy poverty, based on linear regression and principal component analysis, without aiming to create a new or better indicator. Kyprianou et al.<sup>36</sup> conducted a review for a diverse sample of countries, namely Cyprus, Spain, Portugal, Bulgaria, and Lithuania, by exploring what definitions are provided for energy poverty, how it is measured based on single indicators, how the energy poor are identified, and what policies are enacted, all in the context of EU guidelines. This study highlights, once more, the ongoing differences in approaches to energy poverty despite the commonalities stemming from the EU supranational layer.

With a similar goal to bridge better (mainly quantitative, data-oriented) methodological approaches and better policies, Sareen et al.<sup>23</sup> distance themselves from the way existing indicators are used and rather aim at creating a framework for metrological approaches to energy poverty which are easier to transpose into policy actions. They provide an overview of the steps which should accompany future methodological developments and argue that the development of indicators is inevitably politicized and too context-dependent. Therefore they identify five dimensions that must be at the core of a new analytical framework: historical trajectories of technologies involved in measurements, (the politicized interplay between) data flattening and contextualized identification, and (the reconfiguration of metrics through) new representation and institutionalization through policy uptake. They illustrate how these dimensions should be handled in practice by referring to several local contexts across Europe. They ultimately conclude that energy poverty can only be properly tackled by collaborative efforts aimed at avoiding a biased understanding of the phenomenon coming from narrow perspectives or interests of actors who are politically in charge of determining or designing the measurements or collecting data.

But one increasingly relevant methodological strand advocates for more and better use of qualitative techniques in understanding and, subsequently, addressing energy poverty. Emphasizing traditional strengths of qualitative research—the depth of insights acquired over small yet analytically relevant populations, the capacity to reveal contextual causes that can otherwise be overlooked when attention is given only to large populations—, Middlemiss et al.<sup>111</sup> argue that evidence acquired through qualitative evidence can be instrumental in informing policies aimed at tackling energy poverty. They argue that qualitative research can address the recommendation of practitioners working on energy poverty: placing people at the center of research and resulting policies, focusing on their lived experiences and their own perception of energy poverty within their own lives (as called for by the capabilities approach), and an overall better understanding of the specific role that various stakeholders can have in generating or alleviating energy poverty. Despite a growing body of research on energy poverty relying, at least partially, on people-oriented, qualitative methodology, some of which has already been mentioned throughout this article,<sup>70,73,91</sup> the argument of Middlemiss et al. refers rather to the difficulty of having such research reach policymakers, who aim to implement policies for large populations and who, we would argue, might also perceive quantitative methodology to be “more scientific” and a more suitable justification for their policies.

Beyond the work of our ENGAGER network, the scope of energy poverty research and policies has been expanded in multiple ways, which bear relevant empirical significance. Research-based EU-funded projects (summarized in [Annex 3](#)) such as ASSIST2GETHER, EnPower, ENPOR, EmpowerMED, SocialWatt, POWERPOOR, COMACT, WELLBASED, POWERTY, and others have greatly contributed to tying energy poverty to issues such as financing schemes, fire safety, mitigating CO<sub>2</sub> emissions, community-driven

interactive maps, empowering consumers in relation to market actors, and improving consumption behaviors, with significant policy inputs and recommendations. Other COST Actions, such as Positive Energy Districts European Network (PED-EU-NET), or other academic networks, such as the Fuel Poverty Research Network (FPRN), carry forward some of the key dimensions approached by ENGAGER, while grassroots movements such as the Right to Energy Coalition, the Poverty Alliance, the Alliance against Energy Poverty, or the End Fuel Poverty Coalition employ various hands-on advocacy strategies across governance levels across Europe in their attempt to draw attention to and alleviate energy poverty by engaging directly both with people and authorities. ENGAGER's members have been directly involved in many of these projects and networks, or ENGAGER has formally interacted with them. Some of them are direct spinoffs of work conducted within ENGAGER. Many of the contributions summarized above have resulted from such engagements, and formal ENGAGER events have provided a stage for these projects, actions, and initiatives to disseminate their work.

### CONCLUSIONS, LIMITATIONS, FUTURE RESEARCH - SETTING THE STAGE FOR A NEW RESEARCH AND POLICY AGENDA ON ENERGY POVERTY

The study of energy poverty has come a long way in the last thirty years, as did the policy approaches to address it. Despite the existing shortcomings and ongoing challenges highlighted throughout this article, we now increasingly see energy poverty embedded into policies elaborated and enacted at all governance levels, public institutions explicitly dealing with it, and an array of energy-oriented journals persistently placing it at the core of research they publish, and calls for research funding regularly referring directly or implicitly to it. As the field has developed and energy poverty as a concept has gained increased traction, it became apparent that energy poverty can only be understood and addressed through multidisciplinary conceptual and methodological approaches, while policies envisage a range of stakeholders which need to include public, private, civil society, and citizen organizations. This calls for the establishment of broad networks bridging researchers and practitioners across several fields, which could then have the capacity to build encompassing knowledge but also to communicate it efficiently.

Communication with the media and the general public has been a complementary goal of ENGAGER, and impact must remain a core output of scholarly endeavors, especially on topics as crucial to everyone's everyday life as energy. Apart from the research and policy outputs mentioned herein, the knowledge generated within ENGAGER has been disseminated to the broader public through tools such as the world's first encyclopedia on energy poverty (EP-PEDIA),<sup>112</sup> the calls for action issued by ENGAGER<sup>113</sup> in the early weeks of the COVID-19 pandemic, in the context of the rising energy prices in the winter of 2021-2022<sup>114</sup> or of the Ukraine war, or through media products such as the series of podcasts on the EnAct platform,<sup>115</sup> while communication of ENGAGER members with local, regional, national, and European institutional or civil society stakeholders has also been constant and increased. Moreover, ENGAGER has fostered a new generation of scholars by involving early-career researchers across Europe in the network's activities, through dedicated scholarships, summer schools, and workshops, many of the outputs reviewed above being enabled by their work. The partnerships and collaborations fostered throughout such networks will support long-term research and policy contributions on energy issues, providing an added value that is yet difficult to quantify.

The purpose of this article has been to explore how such a multidisciplinary network has contributed to advancing knowledge on the conceptual and methodological complexities of energy poverty and to develop tools that policymakers can use to address the drivers and symptoms of energy poverty more effectively. The need for such tools is quite timely. The formal end of the COST grant funding ENGAGER as a network has ended at a time when research on energy poverty is more needed and relevant than ever. The long-term impact of the ongoing pandemic on living conditions is yet to be fully understood. The rising energy prices, beginning in the fall of 2021, had already expanded the spectrum of vulnerability even before the devastating impact of the war in Ukraine over energy markets.

These specific contexts have brought to the fore numerous issues which we dealt with throughout our work. As we are finalizing this article, there are ongoing discussions about rationing gas consumption; some countries (such as Germany or Poland) are exploring switching back to coal-based energy to overcome the cuts in the supply of Russian gas, people are asked to turn down cooling and heating to avoid systemic energy shortages and to safeguard their energy security, public institutions and businesses are required to

implement rapid measures to save energy and even sanctioned if they do not. As a result, there is increasing social unrest around energy, strikingly, on the streets of high-income countries. Populist discourses are already mobilizing to decry and capitalize on the impact the actions of “elites” have on “ordinary people” and on the increasing inequalities in society. In this context, to prevent a deepening of these destructive dynamics, the near future should bring a radical change in energy market structures and an overall context of scarcity, all in the middle of an already necessary but disruptive energy transition and with climate change as an accelerator of problems. The more we grow aware of how vital energy is to our daily lives, the more difficult and expensive it becomes to produce, access, and operate with energy.

It is not only the markets that will (have to) change and adapt. The role of the states will also have to be transformed. The quality of policies will have to rapidly improve. As ENGAGER research has shown, there is a significant lag between scientific findings on energy poverty and the content of policies. When they aim to respond to challenges raised by energy poverty, policymakers often enact one-size-fits-all policies based on research findings from several years behind at a time when sensitivity and adaptation to the rapidly changing contexts are needed. As a result, many groups in society feel left out, and the danger of populist, radical discourses capitalizing on their discontent is on the rise.

In this context, the low levels of trust displayed by citizens in state institutions is a menace that will have to be dealt with. As policymakers will have to enact bold measures to tackle the piling challenges and guide the shift in paradigm on energy, trust will be a fundamental ingredient that might make the difference between rest and unrest, well-being and poverty, and conflict and peace. A right to energy could offer a way forward and constitute a central element for changes in the paradigm around energy that safeguard primary access to energy for everyone affected by or entering the spectrum of energy poverty. Still, it will have to be carefully designed and implemented in the context of increasing scarcity and transitioning energy systems.

Last but not least, should researchers and policymakers only aim to address the problems of the (energy) poor or should they also begin to challenge the rich? Rising inequalities and injustices are at the core of the contestation movements. The blurring lines between need and comfort have driven up the overconsumption of resources, which is now at the core of growing economies, particularly in abundant countries. Energy has been at the heart of this dynamic, and inequalities with respect to energy are sometimes the most striking precisely because energy is so intimately intertwined with the quality of life.

## EUROPEAN POLICY AND LEGAL DOCUMENTS MAKING CONTRIBUTIONS TOWARD A RIGHT TO ENERGY

### European document

(available at [eur-lex.europa.eu](http://eur-lex.europa.eu))

Article 14 of the Consolidated version of the Treaty on the Functioning of the European Union, as last amended on 26 October 2012, OJ C 326

Article 1 of 'Protocol No. 26 on Services of General Interest, annex to Consolidated version of the Treaty on the Functioning of the European Union, as last amended on 26 October 2012, OJ C 326

### Relevant content advancing toward a right to energy

“... given the place occupied by services of general economic interest in the shared values of the Union as well as their role in promoting social and territorial cohesion, the Union and the Member States [...] shall take care that such services operate on the basis of principles and conditions, particularly economic and financial conditions, which enable them to fulfill their missions.”

“The shared values of the Union in respect of services of general economic interest within the meaning of Article 14 of the Treaty on the Functioning of the European Union include in particular:

- the essential role and the wide discretion of national, regional and local authorities in providing, commissioning, and organizing services of general economic interest as closely as possible to the needs of the users;
- the diversity between various services of general economic interest and the differences in the needs and preferences of users that may result from different geographical, social, or cultural situations;
- a high level of quality, safety and affordability, equal treatment and the promotion of universal access and of user rights.”

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**European document**

(available at [eur-lex.europa.eu](http://eur-lex.europa.eu))

**Relevant content advancing toward a right to energy**

Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee, and the Committee of the Regions, 'A Quality Framework for Services of General Interest in Europe', COM(2011) 900

"Service of general economic interest (SGEI): SGEI are economic activities that deliver outcomes in the overall public good that would not be supplied (or would be supplied under different conditions in terms of quality, safety, affordability, equal treatment or universal access) by the market without public intervention."

Communication from the Commission: Toward a European Charter on the Rights of Energy Consumers (5 July 2007) COM(2007)386 final, 3

"Energy is of the greatest importance in ensuring social and territorial cohesion, economic stability, and sustainable development. In developed economies, individuals are cut off from society if they do not have access to electricity. The same holds true for business. Adequate energy provision, therefore, constitutes one of the key elements toward achieving citizens' successful participation in social and economic life."

Communication from the Commission to the Council and the European Parliament: Prospects for the Internal Gas and Electricity Market (10 January 2007) COM(2006) 841 final, 20-21

"Without energy, people cannot live in today's economic and social environment. Electricity is essential to citizens' daily life. It also often impacts on the availability of many essential services. Households with lower incomes spend proportionally more on energy than households with higher incomes. Also, households in rural areas spend proportionally more on energy than those in urban areas."

"The Commission considers that the highest possible standards of public service must exist across the EU. The changes taking place in the European energy market must fully protect the citizens' rights to be supplied with enough electricity to meet their basic needs at reasonable, easily, and clearly comparable and transparent prices. Special measures may also be taken to ensure the protection of the most vulnerable citizens, particularly in terms of fuel poverty."

Directive (EU) 2019/944 of the European Parliament and of the Council of 5 June 2019 on common rules for the internal market for electricity and amending Directive 2012/27/EU, Articles 26-28

"Member States shall ensure that all household customers, and, where Member States deem it to be appropriate, small enterprises, enjoy universal service, namely the right to be supplied with electricity of a specified quality within their territory at competitive, easily and clearly comparable, transparent and non-discriminatory prices."

"Member States shall take appropriate measures to protect customers and shall ensure, in particular, that there are adequate safeguards to protect vulnerable customers. In this context, each Member State shall define the concept of vulnerable customers which may refer to energy poverty and, inter alia, to the prohibition of disconnection of electricity to such customers in critical times. The concept of vulnerable customers may include income levels, the share of energy expenditure of disposable income, the energy efficiency of homes, critical dependence on electrical equipment for health reasons, age, or other criteria. Member States shall ensure that rights and obligations linked to vulnerable customers are applied. In particular, they shall take measures to protect customers in remote areas. They shall ensure high levels of consumer protection, particularly with respect to transparency regarding contractual terms and conditions, general information, and dispute settlement mechanisms."

"When assessing the number of households in energy poverty pursuant to point (d) of Article 3(3) of Regulation (EU) 2018/1999, Member States shall establish and publish a set of criteria, which may include low income, high expenditure of disposable income on energy and poor energy efficiency. The Commission shall provide guidance on the definition of 'significant number of households in energy poverty' in this context and in the context of Article 5(5), starting from the premise that any proportion of households in energy poverty can be considered to be significant."

Regulation (EU) 2018/1999 of the European Parliament and the European Council on the Governance of the Energy Union and Climate Action

"The goal of a resilient Energy Union with an ambitious climate policy at its core is to give Union consumers, including households and businesses, secure, sustainable, competitive and affordable energy ..."

Directive 2009/72/EC of the European Parliament and of the Council

"Member States shall ensure that all household customers [...] enjoy universal service, that is the right to be supplied with electricity of a specified quality within their territory at reasonable, easily and clearly comparable, transparent and non-discriminatory prices."

European Pillar of Social Rights

Principle 20: Access to essential services

## ENGAGER ACADEMIC PUBLICATIONS

Title	Authors	DOI	Type	Published in	Published by	ISSN
Low-Carbon Gentrification: When Climate Change Encounters Residential Displacement	Stefan Bouzarovski; Jan Frankowski; Sergio Tirado Herrero	<a href="https://doi.org/10.1111/1468-2427.12634">https://doi.org/10.1111/1468-2427.12634</a>	Journal article	International Journal of Urban and Regional Research	Wiley	0309–1317
Energy poverty policies and measures in 5 EU countries: A comparative study	I. Kyprianou; D.K. Serghides; A. Varo; J.P. Gouveia; D. Kopeva; L. Murauskaite	<a href="https://doi.org/10.1016/j.enbuild.2019.05.003">https://doi.org/10.1016/j.enbuild.2019.05.003</a>	Journal article	Energy and Buildings	Elsevier BV	0378–7788
Transferring the index of vulnerable homes: Application at the local-scale in England to assess fuel poverty vulnerability	Raúl Castaño-Rosa; Graeme Sherriff; HarrietThomson; Jaime Solís Guzmán; Madelyn Marrero	<a href="https://doi.org/10.1016/j.enbuild.2019.109458">https://doi.org/10.1016/j.enbuild.2019.109458</a>	Journal article	Energy and Buildings	Elsevier BV	0378–7788
Energy poverty and indoor cooling: An overlooked issue in Europe	Harriet Thomson; Neil Simcock; Stefan Bouzarovski; Saska Petrova	<a href="https://doi.org/10.1016/j.enbuild.2019.05.014">https://doi.org/10.1016/j.enbuild.2019.05.014</a>	Journal article	Energy and Buildings	Elsevier BV	0378–7788
People’s decisions matter: understanding and addressing energy poverty with behavioral economics	Nives DellaValle	<a href="https://doi.org/10.1016/j.enbuild.2019.109515">https://doi.org/10.1016/j.enbuild.2019.109515</a>	Journal article	Energy and Buildings	Elsevier BV	0378–7788
Low-Carbon Gentrification: When Climate Change Encounters Residential Displacement	Stefan Bouzarovski; Jan Frankowski; Sergio Tirado Herrero	<a href="https://doi.org/10.1111/1468-2427.12634">https://doi.org/10.1111/1468-2427.12634</a>	Journal article	International Journal of Urban and Regional Research	Wiley	0309–1317
Energy poverty policies and measures in 5 EU countries: A comparative study	I. Kyprianou; D.K. Serghides; A. Varo; J.P. Gouveia; D. Kopeva; L. Murauskaite	<a href="https://doi.org/10.1016/j.enbuild.2019.05.003">https://doi.org/10.1016/j.enbuild.2019.05.003</a>	Journal article	Energy and Buildings	Elsevier BV	0378–7788
Out of the margins, into the light: Exploring energy poverty and household coping strategies in Austria, North Macedonia, France, and Spain	Ana Stojilovska; Hyerim Yoon; Coralie Robert	<a href="https://doi.org/10.1016/j.erss.2021.102279">https://doi.org/10.1016/j.erss.2021.102279</a>	Journal article	Energy Research & Social Science	Elsevier BV	2214–6296
Humanising the Energy Transition: Toward a National Policy on Energy Poverty in the Netherlands	Mariëlle Feenstra; Lucie Middlemiss; Marlies Hesselman; Koen Straver; Sergio Tirado Herrero	<a href="https://doi.org/10.3389/frsc.2021.645624">https://doi.org/10.3389/frsc.2021.645624</a>	Journal article	Frontiers in Sustainable Cities	Frontiers Media SA	2624–9634

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**Continued**

Title	Authors	DOI	Type	Published in	Published by	ISSN
Rendered invisible: Institutional misrecognition and the reproduction of energy poverty	Neil Simcock; Jan Frankowski; Stefan Bouzarovski	<a href="https://doi.org/10.1016/j.geoforum.2021.05.005">https://doi.org/10.1016/j.geoforum.2021.05.005</a>	Journal article	Geoforum	Elsevier BV	0016–7185
Cooling Degree Models and Future Energy Demand in the Residential Sector. A Seven-Country Case Study	Raúl Castaño-Rosa; Roberto Barrella; Carmen Sánchez-Guevara; Ricardo Barbosa; Ioanna Kyprianou; Eleftheria Paschalidou; Nikolaos S. Thomaidis; Dusana Dokupilova; João Pedro Gouveia; József Kádár; Tareq Abu Hamed; Pedro Palma	<a href="https://doi.org/10.3390/su13052987">https://doi.org/10.3390/su13052987</a>	Journal article	Sustainability	MDPI AG	2071–1050
From sustainable development to social-ecological justice: Addressing taboos and naturalizations in order to shift perspective	Katrin Grossmann; James JT Connolly; Małgorzata Dereniowska; Giulio Mattioli; Luca Nitschke; Nicola Thomas; Anaïs Varo	<a href="https://doi.org/10.1177/25148486211029427">https://doi.org/10.1177/25148486211029427</a>	Journal article	Environment and Planning E: Nature and Space	SAGE Publications	2514-8486; 2514-8494
How the Concept of Dignity Is Relevant to the Study of Energy Poverty and Energy Justice	Katrin Grossmann; Elena Trubina	<a href="https://doi.org/10.3389/frsc.2021.644231">https://doi.org/10.3389/frsc.2021.644231</a>	Journal article	Frontiers in Sustainable Cities	Frontiers Media SA	2624–9634
Gender and energy: domestic inequities reconsidered	Saska Petrova; Neil Simcock	<a href="https://doi.org/10.1080/14649365.2019.1645200">https://doi.org/10.1080/14649365.2019.1645200</a>	Journal article	Social & Cultural Geography	Informa UK Limited	1464-9365; 1470-1197
Mapping Regional Vulnerability to Energy Poverty in Poland	Lilia Karpinska; Sławomir Śmiech; João Pedro Gouveia; Pedro Palma	<a href="https://doi.org/10.3390/su131910694">https://doi.org/10.3390/su131910694</a>	Journal article	Sustainability	MDPI AG	2071–1050
Positive Energy District: A Model for Historic Districts to Address Energy Poverty	João Pedro Gouveia; Júlia Seixas; Pedro Palma; Henrique Duarte; Henrique Luz; Giovanni Battista Cavadini	<a href="https://doi.org/10.3389/frsc.2021.648473">https://doi.org/10.3389/frsc.2021.648473</a>	Journal article	Frontiers in Sustainable Cities	Frontiers Media SA	2624–9634
Energy poverty leap during the pandemic: the case of Ukraine	Anatoliy Goncharuk; Kostiantyn Hromovenko; Alborz Pahlevanzade; Yurii Hrinchenko	<a href="https://doi.org/10.33223/epj/136521">https://doi.org/10.33223/epj/136521</a>	Journal article	Polityka Energetyczna – Energy Policy Journal	Instytut Gospodarki Surowcami Mineralnymi i Energia Polskiej Akademii Nauk	1429–6675

(Continued on next page)

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The critical role of trust in experiencing and coping with energy poverty: Evidence from across Europe	Katrin Grossmann; George Jiglau; Ute Dubois; Anca Sinea; Fernando Martín-Consuegra; Malgorzata Dereniowska; Robert Franke; Rachel Guyet; Ana Horta; Filiz Katman; Louiza Papamikrouli; Raúl Castaño-Rosa; Leona Sandmann; Ana Stojilovska; Anais Varo	<a href="https://doi.org/10.1016/j.erss.2021.102064">https://doi.org/10.1016/j.erss.2021.102064</a>	Journal article	Energy Research & Social Science	Elsevier BV	2214–6296
Extreme energy poverty in the urban peripheries of Romania and Israel: Policy, planning and Infrastructure	Naama Teschner; Anca Sinea; Andreea Vornicu; Tareq Abu-Hamed; Maya Negev	<a href="https://doi.org/10.1016/j.erss.2020.101502">https://doi.org/10.1016/j.erss.2020.101502</a>	Journal article	Energy Research & Social Science	Elsevier BV	2214–6296
Improving Energy Poverty Measurement in Southern European Regions through Modelled Energy Costs	Iñigo Antepará; Lefkothea Papada; João Pedro Gouveia; Nikolas Katsoulakos; Dimitris Kaliampakos	<a href="https://doi.org/10.3390/su12145721">https://doi.org/10.3390/su12145721</a>	Journal article	Sustainability	MDPI AG	2071–1050
Nudging and boosting for equity? Toward a behavioral economics of energy justice	Nives DellaValle; Siddharth Sareen	<a href="https://doi.org/10.1016/j.erss.2020.101589">https://doi.org/10.1016/j.erss.2020.101589</a>	Journal article	Energy Research & Social Science	Elsevier BV	2214–6296
The validity of the index of vulnerable homes: evidence from consumers vulnerable to energy poverty in the UK	Raúl Castaño-Rosa; Graeme Sherriff; Jaime Solís- Guzmán; Madelyn Marrero	<a href="https://doi.org/10.1080/15567249.2020.1717677">https://doi.org/10.1080/15567249.2020.1717677</a>	Journal article	Energy Sources, Part B: Economics, Planning, and Policy	Informa UK Limited	1556-7249; 1556-7257
A perspective on household natural gas consumption in Ukraine	Anatoliy G. Goncharuk; Giuseppe T. Cirella	<a href="https://doi.org/10.1016/j.exis.2020.03.016">https://doi.org/10.1016/j.exis.2020.03.016</a>	Journal article	The Extractive Industries and Society	Elsevier BV	2214-790X
A multidimensional index to measure energy poverty: the Polish case	Jakub Sokołowski; Piotr Lewandowski; Aneta Kielczewska; Stefan Bouzarovski	<a href="https://doi.org/10.1080/15567249.2020.1742817">https://doi.org/10.1080/15567249.2020.1742817</a>	Journal article	Energy Sources, Part B: Economics, Planning, and Policy	Informa UK Limited	1556-7249; 1556-7257

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Title	Authors	DOI	Type	Published in	Published by	ISSN
European energy poverty metrics: Scales, prospects and limits	Siddharth Sareen; Harriet Thomson; Sergio Tirado Herrero; João Pedro Gouveia; Ingmar Lippert; Aleksandra Lis	<a href="https://doi.org/10.1016/j.jgt.2020.01.003">https://doi.org/10.1016/j.jgt.2020.01.003</a>	Journal article	Global Transitions	Elsevier BV	2589–7918
Perspectives on Energy Poverty in Post-Communist Europe	George Jiglau, Anca Sinea, Ute Dubois, Philipp Biermann (editors)		Collective book		Routledge	9,780,367, 560,683

**ENGAGER POLICY BRIEFS**

Title	Link
European Energy Poverty Agenda Co-Creation and Knowledge Innovation (ENGAGER 2017–2021) Policy brief no. 1, December 2018	<a href="https://www.engager-energy.net/wp-content/uploads/2019/01/Engager-Brief-1.pdf">https://www.engager-energy.net/wp-content/uploads/2019/01/Engager-Brief-1.pdf</a>
European Energy Poverty Agenda Co-Creation and Knowledge Innovation (ENGAGER 2017–2021) Case study: Innovation and energy poverty policies	<a href="https://www.engager-energy.net/wp-content/uploads/2018/12/WG4-Case-study.pdf">https://www.engager-energy.net/wp-content/uploads/2018/12/WG4-Case-study.pdf</a>
Guiding Principles For Effective Policies To Address Energy Poverty	<a href="https://www.engager-energy.net/wp-content/uploads/2019/02/Position-paper.pdf">https://www.engager-energy.net/wp-content/uploads/2019/02/Position-paper.pdf</a>
European Energy Poverty: Agenda Co-Creation and Knowledge Innovation (ENGAGER 2017–2021) Policy Brief No. 2, June 2019 The Right to Energy in the European Union	<a href="https://www.engager-energy.net/wp-content/uploads/2019/06/ENGAGER-Policy-Brief-No.-2-June-2019-The-Right-to-Energy-in-the-EU.pdf">https://www.engager-energy.net/wp-content/uploads/2019/06/ENGAGER-Policy-Brief-No.-2-June-2019-The-Right-to-Energy-in-the-EU.pdf</a>
Integration - transforming the state of the art on energy poverty	<a href="https://www.engager-energy.net/wp-content/uploads/2019/10/ENGAGER-WG1-report_2019_final.pdf">https://www.engager-energy.net/wp-content/uploads/2019/10/ENGAGER-WG1-report_2019_final.pdf</a>
Moving beyond the state of the art in energy poverty measurement	<a href="https://www.engager-energy.net/wp-content/uploads/2019/12/WG2-report-November-2019-1.pdf">https://www.engager-energy.net/wp-content/uploads/2019/12/WG2-report-November-2019-1.pdf</a>
Making the Most of Qualitative Evidence for Energy Poverty Mitigation: A Research Agenda and Call for Action European Energy Poverty: Agenda Co-Creation and Knowledge Innovation (ENGAGER 2017–2021) Policy Brief No. 3, February 2020	<a href="https://www.engager-energy.net/wp-content/uploads/2020/02/ENGAGER-Policy-Brief-No.-3-February-2020-Making-the-Most-of-Qualitative-Data-for-EP-Research-and-Action.pdf">https://www.engager-energy.net/wp-content/uploads/2020/02/ENGAGER-Policy-Brief-No.-3-February-2020-Making-the-Most-of-Qualitative-Data-for-EP-Research-and-Action.pdf</a>
Compendium: On existing and missing links between energy poverty and other scholarly debates	<a href="https://www.engager-energy.net/wp-content/uploads/2020/04/COST_ENGAGER_WG4_Case_Study_Linking_debates_3-April-2020.pdf">https://www.engager-energy.net/wp-content/uploads/2020/04/COST_ENGAGER_WG4_Case_Study_Linking_debates_3-April-2020.pdf</a>
Energy poverty will increase with the COVID-19 crisis. Time for a right to energy! European Energy Poverty: Agenda Co-Creation and Knowledge Innovation Call for Action	<a href="https://www.engager-energy.net/wp-content/uploads/2020/05/ENGAGER-Call_for_Action_COVID_19_R2E.pdf">https://www.engager-energy.net/wp-content/uploads/2020/05/ENGAGER-Call_for_Action_COVID_19_R2E.pdf</a>
European Energy Poverty: Agenda Co-Creation and Knowledge Innovation Working Group 3 (WG3) Dialogues – co-producing emancipatory research and practice Policy Brief No. 4 New narratives and actors for citizen-led energy poverty dialogues	<a href="https://www.engager-energy.net/wp-content/uploads/2020/09/WG3-Policy-Brief_Sept-2020.pdf">https://www.engager-energy.net/wp-content/uploads/2020/09/WG3-Policy-Brief_Sept-2020.pdf</a>

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Title	Link
European Energy Poverty Agenda Co-Creation and Knowledge Innovation (ENGAGER 2017–2021) Working group 4 Policy brief no. 3, March 2021 Energy communities and energy poverty: Moving toward a new social and ecological contract?	<a href="https://www.engager-energy.net/wp-content/uploads/2021/03/WG4-policy-brief-March-31.pdf">https://www.engager-energy.net/wp-content/uploads/2021/03/WG4-policy-brief-March-31.pdf</a>
European Energy Poverty Agenda Co-Creation and Knowledge Innovation (ENGAGER 2017–2021) Moving forward on the right to energy in the EU A toolkit for a just transition with the people	<a href="https://www.engager-energy.net/wp-content/uploads/2022/02/ENGAGER_Right-to-Energy-Toolkit_FINAL.pdf">https://www.engager-energy.net/wp-content/uploads/2022/02/ENGAGER_Right-to-Energy-Toolkit_FINAL.pdf</a>
Building renovation won't solve energy injustices: intersectional policies will	<a href="https://www.engager-energy.net/wp-content/uploads/2021/11/Engager-Toolkit_-draft-2.pdf">https://www.engager-energy.net/wp-content/uploads/2021/11/Engager-Toolkit_-draft-2.pdf</a>
European Energy Poverty Agenda Co-Creation and Knowledge Innovation Policy Brief The summertime energy poverty problem	<a href="https://www.engager-energy.net/wp-content/uploads/2021/11/Summertime-energy-poverty_policy-brief_v3.pdf">https://www.engager-energy.net/wp-content/uploads/2021/11/Summertime-energy-poverty_policy-brief_v3.pdf</a>
European Energy Poverty Agenda Co-Creation and Knowledge Innovation Policy Brief Energy poverty in times of crisis: Has the EU failed to protect its most vulnerable citizens?	<a href="https://www.engager-energy.net/wp-content/uploads/2021/11/PB-EP.pdf">https://www.engager-energy.net/wp-content/uploads/2021/11/PB-EP.pdf</a>

**ANNEX 3:**

Project/initiative	Website
ASSIST2GETHER	<a href="https://www.eapn.eu/assist2gether-energy-poverty-project/">https://www.eapn.eu/assist2gether-energy-poverty-project/</a>
Mitigating GHG Emissions through energy poverty alleviation in Romania (EnPower)	<a href="https://energy-poverty.eu/">https://energy-poverty.eu/</a>
ENPOR	<a href="https://www.enpor.eu/">https://www.enpor.eu/</a>
EmpowerMED	<a href="https://www.empowermed.eu/">https://www.empowermed.eu/</a>
SocialWatt	<a href="https://www.socialwatt.eu/en/home">https://www.socialwatt.eu/en/home</a>
Empowering Energy Poor Citizens through Joint Energy Initiatives (POWERPOOR)	<a href="https://powerpoor.eu/">https://powerpoor.eu/</a>
Community Tailored Actions for Energy Poverty Mitigation (ComAct)	<a href="https://comact-project.eu/">https://comact-project.eu/</a>
Exiting energy poverty and related health problems: European pilots take action (WELLBASED)	<a href="https://energy-cities.eu/project/wellbased/">https://energy-cities.eu/project/wellbased/</a>
Renewable energies for vulnerable groups (POWERTY)	<a href="https://projects2014-2020.interregeurope.eu/powerty/">https://projects2014-2020.interregeurope.eu/powerty/</a>
Fuel Poverty Research Network	<a href="https://www.fuelpovertyresearch.net/">https://www.fuelpovertyresearch.net/</a>
Right to Energy Coalition	<a href="https://righttoenergy.org/">https://righttoenergy.org/</a>
The Poverty Alliance	<a href="https://www.povertyalliance.org/">https://www.povertyalliance.org/</a>
Alliance against Energy Poverty	<a href="https://www.tni.org/en/article/alliance-against-energy-poverty-cataluna">https://www.tni.org/en/article/alliance-against-energy-poverty-cataluna</a>
End Fuel Poverty Coalition	<a href="https://www.endfuelpoverty.org.uk/">https://www.endfuelpoverty.org.uk/</a>

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## AUTHOR CONTRIBUTIONS

All authors have equal contributions in generating the content of this paper and throughout the networked research endeavors reflected in it. G.J. has coordinated the collective team effort and has revised successive drafts based on collective inputs from all co-authors.

## DECLARATION OF INTERESTS

The authors declare no competing interests.

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