

Energy Poverty and Vulnerability

A Global Perspective

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1 Introduction

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1 Introduction

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When Brenda Boardman published her seminal book *Fuel Poverty: From Cold Homes to Affordable Warmth* (Boardman 1991), there was little public acceptance of the idea that significant numbers of households may suffer from a form of deprivation that cannot be easily subsumed under the aegis of low incomes. Revisiting her work after two decades, a special section of the journal *Energy Policy* was subtitled ‘Fuel poverty comes of age’ (Liddell 2012, 2). It was underpinned by an acknowledgment that ‘the concept has attained unprecedented prominence, mainly as a consequence of a new energy crisis far more complex and wide-ranging than any before’ (Liddell 2012, 5). In recent years, this has aided the emergence of a global understanding of energy poverty, in which the condition (often recognized via the term ‘fuel poverty’ or ‘domestic energy deprivation’) can be conceptualized as a household’s inability to secure a socially- and materially-necessitated level of energy services in the home (Bouzarovski and Petrova 2015).

Current public understandings, scientific research and policy action concerning insufficient energy provision in the home are a world away from the circumstances encountered by Boardman. Energy poverty is now an official component of many European Union policies, with a new European Energy Poverty Observatory having been launched in December 2016. In the United Kingdom, cold homes are the subject of extensive public attention and political debate – even if a previously well-developed suite of state policies to address the issue has been subject to significant downgrading of late. France and Ireland have also mobilized significant governmental capacity towards the monitoring and amelioration of their own energy poverty-related challenges. At the same time, the predicament is gaining significant public attention in Spain, Germany, Poland, Slovakia, Greece, Bulgaria and Belgium. Beyond Europe, debates on the topic are emerging in Australia, New Zealand, Japan, South Africa and even in the United States. These efforts and deliberations have evolved parallel to the significant number of initiatives and analyses of energy poverty in the Global South – where issues of infrastructural access and development, rather than affordability, have traditionally taken precedence.

This book aims to provide a global perspective on energy poverty, with the aid of novel theoretical approaches that disturb entrenched scientific preconceptions and

policy prescriptions. We are particularly interested in deepening existing conceptualizations of the systemic drivers of energy poverty, by drawing attention to the manner in which the condition is embedded in deeper forms and practices of social exclusion and injustice. Starting from the fact that energy poverty is an inherently spatial phenomenon – it is both experienced in and caused by the entanglement of the socio-technical infrastructures of the home, while varying significantly across cities, regions and nations – there is a strong focus on the geographic processes and contingencies that underpin the emergence of this predicament. We draw together the findings of original research conducted by leading experts from a wide range of countries in order to capture the rapidly expanding corpus of scientific and policy expertise on energy poverty. By furthering knowledge on the driving forces of the condition, the book also produces policy-relevant insights that can aid decision-making on how domestic energy deprivation can be ameliorated.

The book also speaks to recent advances in the state of the art in energy poverty research, largely developed in response to the limitations of early scholarship on the subject. Historically, the causes of energy poverty were considered through the ‘triad’ of high energy prices, poor housing efficiency and low incomes. More recent work has introduced a much wider set of factors into the debate, including, but not limited to cultural norms; the dynamic and evolving nature of household needs and circumstances; and underlying socio-technical, spatial and political issues that shape housing efficiency and energy prices. Considering that ‘fuel poverty is rapidly becoming one of the most hazardous remaining elements of human housing’ (Liddell 2012, 4), many recent contributions have involved a strong focus on the interconnections between energy poverty and health, as well as the mediating role that poor housing plays in this regard. Recent uses of relational geography (Buzar 2007), assemblage thinking (Harrison and Popke 2011), justice-based approaches (Walker and Day 2012) and vulnerability and resilience frameworks (Bouzarovski and Tirado Herrero 2017; Bouzarovski et al. 2016) to theorize energy poverty have been useful in highlighting more complex and nuanced issues that underpin and drive the condition. Whilst these indicate fruitful directions for further scholarship, more remains to be done in terms of both consolidating and advancing research agendas on the issue. We would make the case for a fuller incorporation of arguments that seek to understand the linkages between domestic energy deprivation, on the one hand, and the wider performativities of socio-technical service provision in residential buildings, on the other (Graham and Marvin 2002; Luque-Ayala and Silver 2016; Rutherford and Coutard 2014; Bouzarovski 2015).

Exposing and confronting infrastructural inequalities: new research directions

As noted above, recent years have seen the rise of a planetary sensibility with regard to energy poverty, moving beyond the dichotomy between ‘Global North’ vs. ‘Global South’ contexts in the study of the issue. A number of authors have aimed to address the lack of conversation or exchange of concepts, ideas and

findings between these two realms of research (Li et al. 2014). In terms of policy, such a move also helps position domestic energy deprivation as a major human security issue that should receive urgent attention. It is predicated upon the premise that regardless of the drivers of domestic energy deprivation, its consequences remain the same – households are unable to meet their energy needs in the home. Moreover, empirical evidence challenges the notion that infrastructural access to modern energy is primarily an issue faced by citizens of the Global South, while households in the Global North are meant to struggle with high prices and incomes: affordability problems are common in many countries that are commonly classified as ‘developing’ – particularly in urban areas – while more technologically advanced networked forms of energy provision are often absent in large tracts of states that are conventionally labelled ‘developed’ (Bouzarovski and Petrova 2015).

Unpacking the North-South binary has been enabled by energy vulnerability thinking – an approach that highlights the distinction between energy poverty as a descriptor of a state at a given point in time, on the one hand, and vulnerability as a set of conditions that characterize the emergence and persistence of deprivation, on the other (Bouzarovski 2013; Hall et al. 2013; Middlemiss and Gillard 2015). The vulnerability approach hinges upon the notion that energy poverty itself is a fluid state, which a household may enter or exit after an externally- or internally-induced change in housing, social, political or economic circumstances; as a result, the energy vulnerability demographic will always be larger than that of people who are energy poor. In essence, energy vulnerability thinking operates with risks and probabilities, because they express the likelihood of becoming energy poor. When combined with approaches that focus on the entire ‘energy chain’ via which utility services get delivered to consumers, the vulnerability paradigm destabilizes the ‘affordability-access binary to encompass the nature and structure of the built environment of the home, as well as the articulation of social practices and energy needs’ (Bouzarovski and Petrova 2015, 35).

Energy vulnerability thinking is closely connected to approaches that focus on how the demand for energy services in the home is constructed via, and embedded in, a much wider set socio-technical relations (Walker et al. 2016). However, recognizing the need for energy as a socially necessitated phenomenon problematizes the idea that basic energy standards can be easily defined in any kind of social setting (Simcock and Petrova forthcoming). This also suggests that the reduction of energy poverty measurement and indicator frameworks to particular carriers cannot capture the entirety of household needs and situations across the world. Vulnerability thinking exposes the risks faced by groups that have received little policy recognition to date. This includes urban households living in transitory housing arrangements within the Global North – mainly young people, immigrants, tenants in private rental housing and residents of informal settlements – which are difficult to detect and target via conventional policy frameworks (Bouzarovski and Cauvain 2016; Jencks and Peterson 2001; Visagie 2008). In developing country contexts, the framework highlights the need to ensure that the technical and financial

availability of energy carriers is matched with socially-necessitated household needs.

Recent years have also seen increasing understanding and acknowledgement of the serious health impacts of energy poverty across the globe. In places where domestic access to advanced heating and electricity infrastructure is limited, households face a range of health outcomes including physical injury during fuel-wood collection and inadequate storage of medicines due to a lack of refrigeration, to more serious issues relating to indoor air pollution (IAP) (Sovacool 2012). Globally, many households rely on polluting solid fuels – such as wood, dung and coal – for heating and cooking. When open or poorly ventilated stoves or open fires are used indoors, large quantities of harmful pollutants are released, which have been implicated as a causal agent of several diseases, including stroke, lung cancer and chronic obstructive pulmonary disease (Jin et al. 2006). As Sovacool notes, there is a hazardous spatial and temporal dimension to IAP, with it being spatially concentrated indoors within small rooms, and occurring at times when people (typically women) are preparing and eating food (Sovacool 2012, 275). Furthermore, lighting in energy poor households that lack electricity access is often provided by candles or diesel/kerosene lanterns, both of which pose health and safety risks to occupants, including poisoning from ingesting fuel, explosions and burns (Lam et al. 2012).

Meanwhile, a growing evidence base is forming on the diverse range of adverse health and well-being effects that manifest when households are unable to attain the energy services necessary to keep their homes sufficiently warm or cool (Tod and Thomson 2016). This body of work provides a nuanced picture of the impacts of extreme temperatures on those with pre-existing health conditions (Osman et al. 2008; Snell et al. 2015), as well as offering evidence on the ways in which energy poverty can lead to a deterioration of health and well-being (Harrington et al. 2005; Liddell and Morris 2010), creating a situation in which impaired health becomes both the outcome of and additional risk factor for experiencing energy poverty (Liddell and Guiney 2015). More recently, the spatial characteristics of health and well-being in relation to energy poverty has received attention in a comparative study of 32 countries in Europe (Thomson et al. 2017). This work draws attention to a paradoxical situation whereby the disparity in poor health and well-being between those who are energy vulnerable and those that are not is greatest within some countries that experience higher levels of income equality and lower rates of energy poverty (compared to European averages). The links between energy poverty and increased mortality during winter (termed excess winter mortality) has been known for some time (Braubach et al. 2011; Healy 2003). More recently, new advances have been made in how climatic variations are captured in the measurement of this phenomenon (Hajat and Gasparrini 2016; Liddell et al. 2016) with attention also shifting to how we calculate excess summer mortality.

A further conceptual direction has been the move toward theorizing energy poverty as a distinct form and manifestation of social, environmental and energy injustice (Christman and Russell 2016; Sovacool et al. 2016; Walker and Day

2012). Such work has made clear that the amelioration of energy poverty should be considered a fundamental moral and political obligation, rather than an optional act of charity or benevolence. It has also helped to enrich understandings of the leading causes of the condition, with the three tenets of distributional, recognition and procedural justice offering a useful lens through which to examine the underpinnings of domestic energy deprivation. The recent move toward a ‘whole systems’ perspective on energy justice (McCauley et al. 2013) has highlighted how the occurrence of energy poverty at the household level results from distributional inequities operating ‘upstream’ in the energy system – such as unfair or regressive pricing structures, subsidies for energy technologies, poorly designed or targeted energy efficiency policies or dated transmission infrastructure (Bouzarovski et al. 2017; Hiteva 2013). The concept of ‘justice as recognition’, meanwhile, focuses on how institutionalized patterns of cultural stereotyping, exclusion and stigmatization work to (re)produce energy poverty by devaluing and marginalizing some groups in policy design. Examples include a lack of consideration of the particular and highly varied needs of disabled people (Snell et al. 2015) and the negative stereotyping of tenants in multiple occupancy housing in the UK that results in such groups receiving little policy attention or support to improve the energy efficiency of their homes (Bouzarovski and Cauvain 2016). Where policy support is available, fear of stigmatization can also discourage households from revealing their situation in order to access support or advice (Reid et al. 2015). Finally, authors have also argued that procedural injustice also underpins energy deprivation, with inadequate opportunities for vulnerable groups to participate in policy-making leading to a lack of consideration for their situation (Walker and Day 2012).

Contents of this book

The chapters that constitute the remainder of the book expand some of these theoretical ideas while introducing a number of new frameworks to the debate. The studies are geographically diverse and encompass a wide range of economic, cultural and political contexts, cutting across the developed/developing country divide and exploring energy poverty in territories that have received little academic attention to date.

The initial three chapters in the book introduce a diversity of new conceptual insights and reflections on the underpinning drivers of energy deprivation. This begins with a discussion of the theory of intersectionality by Katrin Großmann and Antje Kahlheber. They powerfully argue that energy poverty is fundamentally the result of deep structures of mutually reinforcing inequalities – economic, racial, gender-based and others – that exist in societies. In this conceptualization, the classic ‘triad’ of energy poverty causes – low incomes, poor energy efficiency and high energy prices – is understood as a *symptom* of these deeper, more systemic forms of discrimination. Drawing on documentary analysis, energy poverty is often most severe and difficult to escape, Großmann and Kahlheber suggest, in households that are simultaneously disadvantaged along multiple axes

inequality – such as race, income, gender or health. Focusing on the household scale, Fatima McKague, Rob Lawson, Michelle Scott and Ben Wooliscroft utilize the emerging ‘energy cultures’ framework to understand how energy poverty is constituted through an interaction between a household’s material culture (such as the energy efficiency of the home), practices (routinized behaviours) and norms (expectations and values). The interaction between these dimensions, they argue, can produce a self-reinforcing situation, in which households are ‘trapped’ in vulnerable predicaments, whilst ‘external’ influences from beyond the home space, such as policy changes, can help to break this feedback loop. Their findings lend support to holistic approaches to policy-making that address each of the dimensions of energy culture. Following this, Irena L.C. Connon focuses on the role of socio-cultural values and norms – often overlooked in many traditional conceptualizations of energy poverty – in (re)producing domestic energy deprivation. Drawing on a rich set of qualitative interviews with households in Scotland and England, her findings reveal a cultural stigma toward being unable to heat one’s home and a norm of distrust toward energy companies and national government. These work to encourage householders to conceal their vulnerability and disincline them from seeking support or advice that may partly relieve their situation.

The next five chapters then move on to take a more explicitly geographical approach, focusing particularly on the multi-scalar spatial contingencies that underpin energy vulnerability and its manifestation in different localities, alongside an examination of the uneven spatial distribution of the condition. This commences with a persuasive exploration of energy poverty in post-apartheid urban South Africa, by Abigail J. Knox, Jiska R. de Groot and Nthabiseng Mohlakoana. Taking a highly contextualized historical and spatial approach, they explore the ways that apartheid legacies of spatial segregation, housing policy and energy service provision act as systemic drivers of urban energy vulnerability. Uniquely, their chapter moves beyond the traditional focus of energy poverty studies to incorporate *mobility* as an important energy service for households, and they thus analyze the lack of adequate transport options as a form of energy deprivation. Moving to very different context, Alison Browne, Saska Petrova and Beth Brockett discuss energy vulnerability in China. They do so through a unique ‘nexus’ approach that examines the connections between energy and water services. Their analysis illustrates how infrastructures of provision – connected, as in South Africa, to particular path-dependencies resulting from historical policy decisions – interconnect with everyday practices to produce a range of household vulnerabilities that vary between urban and rural areas, the north and south of the country and different socio-economic groups. Evangelia Chatzikonstantinou and Fereniki Vatavali then examine the spatialities of energy deprivation in Athens in the context of the Greek debt crisis. Combining data from city, neighbourhood and household levels, and using both quantitative and qualitative methods, they argue that energy deprivation has emerged as a crucial for the geography of the city, though the condition displays no clear spatial segregation. They also find that established perspectives on the relative vulnerability of high-/low-income

households, and homeowners and tenants, are somewhat disrupted and redefined: for example, they found tenants to often be less vulnerable due to their ability to move apartment, whilst homeowners may be ‘trapped’ in their cold homes and overburdened by significant property taxes. Meanwhile, some low-income households can attain sufficient energy services if they live in an apartment building with supportive neighbours or an effective heating system – in these ways, apartment buildings are a crucial geographic site and scale in determining energy vulnerability.

Maciej Lis, Agata Miazga and Katarzyna Sałach then explore the regional distribution of energy poverty in Poland through the use of statistical methods. Although they find significant regional disparities, the geography is complex and changes depending on the precise indicator of energy poverty that is used – rural areas are more susceptible to issues with energy affordability (as defined by the ‘low-income high-cost’ indicator), whilst urban areas face issues with a lack of adequate thermal comfort (as defined by subjective perceptions of households). They argue that spatial variations in energy efficiency, prices of energy carriers, household incomes and average outdoor temperatures explain these regional inequalities. Subsequently, Caitlin Robinson, Stefan Bouzarovski and Sarah Lindley use a GIS approach to interrogate whether two dominant ways of modelling and measuring energy poverty – the ‘10%’ and the low-income high-cost (LIHC) indicators, respectively – adequately capture the complex and uneven geographic distribution of energy in England. Their analysis shows that both measures have blind spots, with the 10% measure emphasizing pensioners and households lacking gas central heating and the LIHC emphasizing low-income families, and thus both fail to capture the full spatial complexity of energy vulnerability. A more explicitly geographic approach to the design of composite indicators, capturing the unique spatial distributions of vulnerability dimensions, is required if energy poverty measures are to reveal those most in need.

The role of divergent household needs in shaping energy vulnerability has begun to be acknowledged in recent years (e.g. Bouzarovski and Petrova 2015; Snell et al. 2015), and the chapter by Anna Cronin de Chavez helps to further this agenda through a rich qualitative analysis of households living with sickle cell disease. Her study powerfully demonstrates what she terms the ‘triple-hit’ effect of disability, encompassing a difficulty in gaining and sustaining income, increased needs for and costs relating to home heating and the potential for a vicious circle in which poor health is worsened by an inability to obtain or afford increased heating needs. Young people are another group that face heightened susceptibility to the impacts of colder temperature. The particular vulnerabilities of this group are analyzed in the chapter by Kimberley C. O’Sullivan, Helen Viggers and Philippa Howden-Chapman, who argue that, as well as being physiologically less able to cope with cold temperatures, young people also have reduced agency to make changes that improve their ability to attain adequate energy services and can also face exposure to cold temperatures outside the home – particularly at school. Drawing on their own experiences, they make a strong

case for participatory methodologies that fully involve young people through the entire research process, arguing that this results in richer and more successful investigations.

The next three chapters adopt a stronger policy and solutions-based focus, critically analyzing current policy responses to energy deprivation and proposing how these might be improved. Slavica Robić, Ivana Rogulj and Branko Ančić begin, with a focus on the Western Balkans region of Europe. They argue that energy poverty policies in this region focus too strongly on providing households with financial relief, whilst doing little to improve the quality of dwellings. Partly, they suggest, this is symptomatic of a lack of full awareness and recognition of the condition – notably, none of the countries have official definitions of energy poverty. They argue for a more comprehensive energy efficiency strategy, the provision of advice to help households manage their energy use, and a general campaign to raise awareness of energy poverty as a distinct and pressing concern. The next chapter moves to an East African context, as Dorice Agol critically examines rural electrification programmes (REPs) in rural Kenya. Her findings show that, while REPs are designed to ameliorate energy poverty in rural areas, they encounter multiple challenges that shape their outcomes and impacts. These include technological issues (e.g. poor infrastructure and housing quality); institutional barriers (poor service provision, corruption); households' socio-cultural practices and preferences; the logistics of connecting geographically dispersed households; and the fact that electricity can be unaffordable to use once a household has been connected. Moreover, by targeting only specific demographics or narrowly defined spaces, REPs can produce new inequalities of access. She argues that, when assessing the relative 'success' of REPs, rather than considering only the crude figure of number of households connected to electricity infrastructure, greater attention is needed on the equitability of the outcomes and the quality of energy services households are able to achieve. The book's final chapter then returns to South Africa, as Peta Wolpe and Yachika Reddy build on the earlier chapter by Knox and colleagues to examine the difficulties of alleviating energy poverty in the country. They identify a series of challenges that policies have faced and provide suggestions for how they might be made more effective; of crucial importance, they argue, is the need for integrated, coordinated and holistic governance that goes beyond exclusively 'energy' departments to also incorporate issues of housing and neighbourhood planning, as well as greater incorporation of the voices of civil society and community groups.

The concluding chapter of the book, co-written by the editors, revisits the commonalities and differences observed in the preceding 14 chapters. It also identifies a set of policy implications at the global scale, as well as avenues for future research.

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