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Spatializing energy justice☆

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ABSTRACT

This paper introduces the concept of spatial justice and inequality to understandings of energy poverty and vulnerability. By applying an explicitly spatial lens to conceptualize energy poverty as a form of injustice, it contributes to debates in the domain of 'energy justice', where previous examinations of energy deprivation through a justice framing have focused on inequalities between social groups and often marginalized questions of spatial difference. We start from the premise that geographic disparities in the risk and incidence of domestic energy deprivation are a key component of energy justice. An extensive literature review has allowed us to highlight the spatial and temporal variation of cross-sectoral and entire-energy-chain injustices that lead to elevated energy poverty risks. These processes contribute to the rise of energy injustices via four mechanisms – which we term landscapes of material deprivation, geographic underpinnings of energy affordability, vicious cycles of vulnerability, and spaces of misrecognition – operating at a multiplicity of scales. While lending some support to area-based approaches towards energy poverty alleviation, our findings also suggest that such policies alone may marginalize the underlying structural dynamics that (re)produce spatial inequalities. Therefore, achieving energy justice necessitates broader interventions in the fundamental driving forces of spatial inequality.

1. Introduction

The application of justice theories and principles to the understanding of energy systems is gaining increasing traction in policy and research circles alike: a movement captured through the emerging concept and frame of 'energy justice' (Jenkins et al., 2016). At the same time, energy poverty – also termed fuel poverty or domestic energy deprivation – is being defined as 'the inability to attain a socially and materially necessitated level of domestic energy services' (Bouzarovski and Petrova, 2015, p. 31) with a distinctive set of debates emerging around energy vulnerability as an expression of the risk of suffering from an enforced lack of such services. A number of contributions have recognized energy poverty as a particular form of energy injustice that occurs at the 'end-use' stage of the energy system (Bickerstaff et al., 2013; Sovacool et al., 2014; Walker and Day, 2012). However, the links between energy poverty, vulnerability and justice have only begun to be explored in any depth. Much of the current literature in the area has focussed upon inequalities between social demographic groups, often marginalizing the justice implications of the spatial inequities operating throughout the energy system that are involved in the generation and manifestation of domestic energy deprivation. This is despite the indication that there are clear geographic patternings associated with energy poverty, as well as the geographically embedded and contingent nature of its underlying causes (Bouzarovski, 2014).

In the paper that follows, our aim is to develop a geographically-sensitive account of the relations between energy justice and energy poverty, by exploring the multiple territorial and locational disparities that underpin the expansion and persistence of domestic energy deprivation as a global issue. To do this, we draw on the notion of 'spatial justice', a concept that emphasizes the geographical dimensions of inequality and inequity (Soja, 2010; Yenneti et al., 2016). In analysing energy poverty through a spatial justice lens, we expand current energy justice based theorizations of the causes and experience of end-use energy deprivation by elucidating how the latter can be attributed not only to socio-economic or politico-legal issues but also has an inescapably spatial dimension. This is not limited to the territorial distribution of energy poor households, however, as our analysis goes deeper to highlight how domestic energy deprivation is fundamentally intertwined with, and produced through, geographical inequities and flows that are engrained in the economic, infrastructural and cultural make-up of society. We thus seek to contribute to wider energy justice theory by disturbing the artificial production vs. consumption binary that characterizes much energy poverty research. Even if the injustices that underpin energy poverty are primarily felt at

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the end-use stage, we use insights from human geography thinking to highlight how the material landscapes of nations, cities and regions are themselves actively implicated in the rise of this problem. At the same time the physical boundaries that define the locations of energy poor households are themselves porous, fluid and messy.

Our endeavour is also of policy relevance. At a broad level, consideration of the justice dimensions of energy policy decisions is a vital decision-making tool that can assist policy-makers, planners and regulators in making fully informed and comprehensive choices (Sovacool and Dworkin, 2015). In relation to energy poverty, those seeking to develop policies to alleviate the condition must take into account *where* resources should be focussed, *whose* needs should be recognized and prioritized in relation to geographical difference, and *how* democratic legitimacy might be achieved from a territorial perspective – questions that directly relate to the three tenets of distributional, recognition and procedural justice (McCauley et al., 2013), and can be addressed by the spatial justice framework presented in this paper. A spatially-sensitive and energy justice-based policy approach towards energy poverty would, therefore, be capable of recognizing that particular areas are more vulnerable than others – via, for example, area-based targeting – while simultaneously developing tools to address spatial inequalities embedded throughout the energy chain and acting across different scales of governance.

In developing our argument, we draw upon a systematic evaluation of existing literature, based on a review of 126 academic contributions focused on energy poverty and justice, predominantly in Europe. These publications were analysed with the aid of a thematic analysis approach (Clarke and Braun, 2014; Vaismoradi et al., 2013), using interpretive coding that resulted in the definition of four headings: 'landscapes of material deprivation', 'geographic underpinnings of energy affordability', 'vicious cycles of vulnerability', and 'spaces of misrecognition'. The formulation of these themes was also informed by the basic tenets of energy justice – distribution, procedure and recognition (McCauley et al., 2013). During our analysis, distributional and recognition justice emerged as the predominant issues, and therefore they are the primary focus in this paper, with the first three headings principally referring to distributional justice, and the fourth referring to recognition; although elements of procedural justice can be found in the third and fourth headings alike. Another central element of our framework is the integration of energy justice with vulnerability thinking (Bouzarovski et al., 2017), by bringing into the fore the spatial and temporal variation of risk factors that lead to the rise of energy injustice. To date, vulnerability thinking has rarely entered into a dialogue with energy justice debates.

In the remainder of the paper, we begin by outlining some of the current ways in which energy poverty is theorized as a form of injustice, before introducing the concept of 'spatial justice'. The discussion then focuses on first three themes identified in the literature review analysis by examining how energy poverty is underpinned by, and reproduces, distinct forms of spatial maldistribution. This is achieved via an exploration of, respectively, uneven landscapes of material conditions, territorial variation of energy affordability, and the mutually-reinforcing dynamics of vulnerability that arise at the nexus of human-environment relations. Then follows our discussion of the fourth theme: an investigation of the questions of recognition associated with stigmatising cultural representations in the energy poverty domain. We conclude by discussing the relevance of our findings for conceptualizations of (end-use) energy justice more broadly, before outlining their policy implications. In terms of the latter, we identify three areas where present decision-making frameworks can be improved: i) policies that target particular areas while providing comprehensive, spatially-sensitive support for vulnerable households across cities and regions; ii) strategies that address the underpinning, multi-scalar (energy, economic, cultural, and environmental) mechanisms and circulations through which spatially uneven energy vulnerability and injustice is (re)produced; and iii) approaches that lead to an improved ability to detect and assist socio-demographic groups that are vulnerable by virtue of spatially-based injustices.

2. Current theorizations of the injustice of energy poverty: a lack of geography

In this section, we briefly outline current work that applies concepts of justice to examine energy poverty. We argue that although very valuable, thus far this work has focused predominantly upon differences between social groups (e.g. based on age or income) and has not examined the justice implications of spatial disparities in the risk and prevalence of energy poverty.

As noted above, energy justice studies are typically concerned with three fundamental forms of justice: distributive justice, procedural justice, and justice as recognition (McCauley et al., 2013). Distributive justice relates to fairness in the distribution of resources; procedural justice to fairness in decision-making process; and recognition to the degree of respect given to different socio-cultural identities (Schlosberg, 2007). In recent years, researchers have argued that the issue of energy poverty is a key dimension of the broader energy justice paradigm (Jenkins et al., 2016). Walker and Day's (2012) pioneering contribution claims that, at its core, energy poverty is 'fundamentally a complex problem of distributive injustice' (p. 69); and suggests that this is underpinned by further injustices in recognition and policy-making procedures. Further studies have built upon this work to unpack the philosophical and moral foundations for considering energy poverty to be a form of injustice (Christman and Russell, 2016; Sovacool et al., 2016, 2014).

Alongside such conceptual claims, more grounded work has sought to unveil actual cases of injustice in the incidence and lived experiences of energy poverty. Snell et al. (2015) demonstrate that energy poverty disproportionately impacts disabled people in England, and suggest that this form of distributive injustice is driven by the misrecognition of disabled groups. Other studies have revealed how subsidies for low-carbon technologies that are funded through levies on household electricity bills take up a greater proportion of income from the poor compared to those on high-incomes (Boardman, 2010; Oppenheim, 2016; Preston et al., 2013; Stockton and Campbell, 2011), despite low-income groups generally having relatively minor carbon footprints (Jacobson et al., 2005) and often benefiting less from decarbonization-related interventions (Oppenheim, 2016; Walker, 2008). Similar claims have been made about the costs of building new nuclear capacity (Garman and Aldridge, 2015). These contributions lend support to a 'whole-systems' approach to energy justice, highlighting the ways that an injustice experienced at the household level (in this case, energy poverty) can be the result of decisions and mechanisms operating elsewhere in the energy system (Jenkins et al., 2016; McCauley et al., 2013).

Overall, there have been a number of contributions that have begun to explore links between energy deprivation and energy justice – with the emphasis has mainly been on issues of distribution rather than recognition or procedural justice. Throughout this body of work, injustices have predominantly been examined and evaluated in terms of inequalities between socio-demographic and/or socio-economic groups. The justice implications of various forms of specifically *geographical* forms of inequality have rarely been examined. Although a substantial body of literature demonstrates how the occurrence and prevalence of energy poverty is uneven across space (Burholt and Windle, 2006; Healy, 2004; Papada and Kaliampakos, 2016; Thomson and Snell, 2013), such work has principally focused on the drivers or consequences of energy poverty itself, and does not explicitly engage with questions or theories of justice and injustice. There is a need, we argue, to build upon this body of scholarship by foregrounding a more detailed and explicit analysis of spatial justice.

3. Spatial justice

The notion of 'spatial justice' offers a useful framework for considering the geographic dimensions of social inequality in cities

and regions (Soja, 2010, 2009). One of the first mentions of 'territorial' issues within social justice can be found in Harvey (1973), with Pirie (1983) putting forward an explicit argument about the need for moving beyond such regional framings towards 'an alternative conception of space itself' (p. 471). Indeed, as Harvey (1996) observes, concerns about justice 'intertwine with the question of how to understand foundational geographical concepts' (p. 5). This suggests that a spatial justice approach involves not only revealing and describing geographical inequalities, but also critically *evaluating* such inequalities in terms of wider forms of (in)justice and their effect on human well-being.

In previous research, spatial justice paradigms have been utilized in examining how resources, risks and harms are distributed across Cartesian space (Dikeç, 2001), often with a particular focus on those spatial disparities that have an impact upon people's well-being and life chances (Smith, 1994). All distributional inequalities have a demonstrable spatial manifestation (Walker, 2009); as Soja (2010) writes: '[J]ustice, however it might be defined, has a consequential geography' (p. 1). Distributional justice is the focus of Harvey's (1973) work, in which he seeks to understand what a just distribution of economic resources between geographic regions (i.e. 'territorial justice') might encompass. He argues that the mechanisms of society – institutional, organizational, political and economic – 'should be such that the prospects of the least advantaged territory are as great as they can be' (pp. 116–117).

Although the dominant focus has been on the spatial dimensions of distributive justice, geographical approaches have also been applied to issues of recognition and procedural justice, particularly in the environmental justice literature (Walker, 2009). Such research has revealed how places, as well as people, can be stigmatized and denigrated (Simmons and Walker, 2004), and how the control of space can be used to exclude vulnerable stakeholders from decision-making fora by granting access only to the privileged or powerful (Holifield et al., 2009; Hunold and Young, 1998; Simcock, 2014). Building on the work of theorists such as Schlosberg (2007) and Young (1990), it has been argued that spatial inequalities of recognition and procedure are both unjust in their own right, while also helping structure and reproduce geographical distributive inequalities.

Taking arguments about the production of injustice further, for some scholars the concept of 'spatial justice' requires both the description and evaluation of spatial inequalities as well as an examination of the geographical processes through which these injustices are (re)produced (Dikeç, 2001; Harvey, 1996; Soja, 2009). In this line of thinking, space is not a neutral container within which the social world 'happens' – rather, it is socially constructed through social relations and practices, and space in turn constitutes those very relationships and practices (Dikeç, 2002). Therefore, space not only provides a backdrop for the manifestation of inequalities, but also actively *produces* and maintains them (Dikeç, 2001; Soja, 2010). As Alderman and Inwood (2013) state, 'social (in)justice does not simply have geographical outcomes; rather, space plays a more fundamental role in constituting and structuring the broader processes of discrimination or equality' (p. 3). This challenges perspectives on spatial inequality that do not consider the structural relations and dynamics through which it is produced (see also Harvey, 1996; Soja, 2010); a critique made of distributive paradigm of justice more broadly (Young, 1990).

Cutting across all the various dimensions of spatial justice is the issue of scale. Whether patterns of spatial inequality are revealed, and the forms these take, will depend on the scale of analysis employed and the material sites that are considered. Aggregating and averaging figures over units of political and material space both reveals and hides differences; justice in terms of distribution, procedure or recognition defined at one scale does not necessarily mean justice is achieved elsewhere (Harvey, 1973; Walker, 2012). For example, analysis at the global or continental levels can demonstrate difference or similarity between nations states, but masks any disparities that exist *within* those nation states. Similarly, studies focusing solely on local-level inequalities can mask wider variations – for example, rates of energy poverty within a city may not display any clear spatial discrepancies and concentrations, but at a larger scale the urban centre as a whole might have a much greater overall incidence of the condition compared to other urban areas (Bouzarovski and Tirado Herrero, 2017).

Although some papers have made moves toward integrating spatial disparities into conceptualizations of energy justice – for example, Jenkins et al. (2016) suggest that distributive justice refers to 'where' benefits and burdens are distributed through societies – to date only Yenneti et al. (2016) have explicitly utilized theorizations of spatial justice in an energy context. However, they do this in relation to the 'production' stage of the energy system (specifically, the siting of solar PV technology) and do not address energy justice issues relating to domestic energy 'end use' – namely, the rise and manifestation of energy poverty. Also notable is Bednar et al.'s (2017) contribution, which despite not using an explicitly spatial framework, talks about the geographies of racial and socio-economic disparities at the intersection of energy and justice. In light of this the remainder of paper, we utilize insights from the 'spatial justice' debate as a lens through which to analyse energy poverty. In particular, we focus on geographic disparities in distribution and recognition, the need to evaluate and describe such inequalities, and the importance of accounting for multiple scales in how space produces inequality.

4. Landscapes of material deprivation

The extensive body of energy and fuel poverty research has recognized that domestic energy deprivation is unevenly distributed in space, by being more prevalent in some places than others. Working at the scale of the European Union (EU), for example, Thomson and Snell (2013) have relied on data from the 2011 EU Statistics on Income and Living Conditions (EU SILC) to find that rates of energy poverty vary greatly among European countries, with particularly high levels being recorded in Eastern and Southern European states. Burholt and Windle (2006) have used information on excess winter deaths (EWD) – often used as a proxy for fuel poverty – to establish that EWDs are higher in the UK than in Scandinavian countries, despite the colder climate of the latter.

Concerning spatial variations within countries, in Greece Papada and Kaliampakos (2016) have found that areas in colder climatic zones or higher altitudes are characterized by higher numbers of households paying more than 10% of their income on energy bills (also see Katsoulakos, 2011). Healy and Clinch (2004) have studied rates of energy poverty in Ireland, finding that the shares of household affected by the condition to vary geographically between 15% and 18.9%, but with more notable differences in terms of absolute figures – rural areas and Dublin record the greatest number of households living with this predicament. Drawing on micro data sourced from Household Budget Surveys (HBSs), Bouzarovski and Tirado Herrero (2017) show that regional-scale patterns of domestic energy deprivation in the Czech Republic, Hungary and Poland do not always coincide with other forms of socio-economic inequality.

In order to understand how injustices are produced in different geographical contexts, however, it is important to illuminate the manner in which spatially uneven exposure to energy poverty is driven by deeper socio-material inequalities. There is widespread evidence to suggest that the environmental features of a place are crucial in shaping vulnerability to energy poverty. This spatially-variegated assemblage of material elements can be described via the more generic notion of 'landscape', so as to highlight the 'heterogeneity of socio-energetic relations and their dynamics' (Castán Broto et al., 2014, p. 194; also see Bouzarovski, 2014, for a theorization of "landscapes of vulnerability"). But even if energy poverty is manifested in particular places, the injustices linked to the environmental factors that produce it extend

beyond the spatial and temporal horizons of such locales – expressing a contingency that cannot be easily subsumed within the recognition-procedure-distribution triad. This points to yet another way in which a spatial justice approach illuminates landscapes of material deprivation and adds to existing understandings of energy justice.

Climatic conditions are perhaps the most obvious example of an 'environmental' characteristic that can determine household-level vulnerabilities to energy poverty. As climate is underpinned by spatial difference and changes over time, some places are thus more likely to face elevated risks. But the impact of climatic differences always occurs in interaction with the characteristics of the built environment, including the energy efficiency of homes, heating systems and appliances (Boardman, 2010), the 'flexibility' of heating systems and infrastructures (Buzar, 2007), and the availability of suitable and cost-effective energy carriers (Bouzarovski and Petrova, 2015). These characteristics are all unevenly distributed across space at a variety of scales; and themselves reflect variation in the provision of infrastructural services. Two contingencies are of particular importance:

First, there are multiple variations between nation states. For example, in the European context, socio-technically rigid District Heating (DH) systems are predominantly located in Eastern and Central Europe (ECE). Numerous households in these countries are exposed to a distinct, spatially embedded form of energy poverty in which they are 'trapped in the heat' due to insufficient control over consumption and energy costs (Tirado-Herrero and Ürge-Vorsatz, 2012).

In terms of energy efficiency, a lack of thermal insulation is a common problem for much of the housing stock in the United Kingdom (Boardman, 2010), ECE (Buzar, 2007; Petrova et al., 2013), and Mediterranean countries such as Greece and Portugal (Papada and Kaliampakos, 2016). In contrast, a much greater proportion of homes are well insulated in Sweden – a country with similar living standards to the UK, but with higher energy prices and much colder winters – and as a result the share of households living in energy poverty is around 70% lower than in the UK (Association for the Conservation of Energy, 2013). An extensive literature review of issues at the housing-energy poverty nexus show that façade insulation interventions have positive effects on cold-related mortality among women in particular, against a setting of extensive geographical variation in housing quality across Europe (Marí-Dell'Olmo et al., 2017).

Second, there are also notable variations within countries. For example, Papada and Kaliampakos' (2016) finding that rates of energy poverty are higher in Greek mountainous areas can be, in part, attributed to the manner in which lower temperatures interact with the inadequate housing stock that is prevalent in such places. The use of a Multidimensional Energy Poverty Index in India has shown wide geographical variation within the country, as well as relationships with health, labour market access and socio-economic disparities (Sadath and Acharya, 2017). Regarding access to suitable and cost-effective energy carriers, in the Global South access a reliance on biomass fuels is especially prevalent among informal neighbourhoods on the outskirts of cities, or in rural areas (Kaygusuz, 2010). In 'developed' nations, rural locations often have a greater proportion of households who lack access to natural gas infrastructure and as such are reliant on more expensive heating fuels such as oil, wood or electricity (Baker et al., 2008; Petrova, 2014; Roberts et al., 2015; Tirado Herrero, 2013; Walker, 2016).

In summary, household vulnerability to energy poverty is partly determined by the material characteristics of residential locations and neighbourhoods, which are highly spatially uneven at a variety of scales (Bouzarovski and Cauvain, 2016). The multiple spatially-embedded characteristics of the place in which people live – inflexible heating systems, energy inefficient buildings, and a lack of access to more suitable energy carriers – assemble to create situations of inadequate energy services and high costs (Maxim et al., 2017).

5. The geographic underpinnings of energy affordability

In addition to infrastructural and environmental contingencies, domestic energy deprivation is also deeply influenced by energy prices and household incomes. The combination of these two factors determines the relative affordability of end-use energy (Bouzarovski and Petrova, 2015), which in turn impacts a the ability to purchase financially accessible warmth, lighting, space cooling and other energy services (Boardman, 2010). Again, it is possible to observe numerous spatial inequalities in such drivers at a variety of scales. For example, household incomes clearly vary significantly between regions and nations. Substantial geographical segregation also exists within nations, with income poverty (or conversely, wealth) being much more prevalent in certain cities and neighbourhoods than in others (Dorling, 2014; Dorling and Ballas, 2008). Notably, states differ in terms of the extent of their internal income inequalities, with the UK, US and some Eastern European countries being characterized by relatively high levels of inequality compared to, for instance, Japan or Scandinavia (Dorling, 2014; Wilkinson and Pickett, 2009). It has been argued that territorially uneven development is inherent to capitalism – it is driven by the spatial division of labour and interdependencies between 'cores' and 'peripheries' (Massey, 1994) – but much also depends on practices of political and institutional governance. A key factor is, for example, how the labour market is regulated and the social welfare systems that are in place (ibid.). There are also temporal shifts, with economic and labour market changes configuring new spatial patterns of economic activity and income (Brown, 1997). This results in geographically differentiated 'opportunity structures' (Roberts, 2009), wherein individuals who live in some localities have fewer economic and employment opportunities than others. These differences in income and wealth are often reflected and reproduced in the geographic variation of energy poverty (Boardman, 2010).

In terms of domestic energy prices, at the global scale there are again clear differences between countries, shaped by a number of geographically situated factors operating throughout the whole energy supply chain. These include the patterns of energy recovery from natural resources, the systems of energy supply utilized, the efficiency and quality of energy transmission infrastructure, and the forms of price regulation and consumer support programmes that are in operation. In the European context, it has been shown that Mediterranean island countries without a large geographical 'hinterland' are characterized by higher electricity prices, while post-communist countries that remain infrastructurally and organizationally captive within the legacies of the Soviet energy system record the highest gas prices (Bouzarovski and Tirado Herrero, 2015; Bouzarovski et al., 2015a). It comes as little surprise, therefore, that rates of energy poverty are significantly higher in Central, Eastern and Southern Europe. Transitions toward low-carbon energy systems can also impact upon and potentially increase domestic energy prices (Hiteva, 2013) – a concern that has recently come to the fore in Germany's *Energiewende* (Heindl et al., 2014; Kopatz, 2009).

In their entirety, spatial disparities in household incomes and energy prices contribute to the emergence of geographically uneven energy injustices. Alongside the national scale, these differences also operate within the grain of cities and regions: local concentrations of low-income households are an important feature of elevated degrees of energy poverty in certain places (Morrison and Shortt, 2008; Walker et al., 2013a, 2013b). Moreover, there is also evidence to suggest that low-income households often live in the worst quality housing, partly because they lack the financial means to invest in energy efficiency measures (Boardman, 2010) – energy affordability inequalities therefore intersect with the material inequalities described above. For example, focusing on Kansas City, Reames (2016) found that areas with lower household incomes were also areas with less efficient homes. This relationship varies somewhat geographically; for instance, in the UK social housing tends to

be relatively more energy efficient than the rest of the housing stock. However, there is a growing vulnerability of 'transient' groups living in private-rented or multiple-occupancy homes with poor energy efficiency, with the greatest concentrations in large cities, where housing is less affordable (Cauvain and Bouzarovski, 2016). From an energy justice perspective, therefore, it follows that uneven distributions of economic resources, energy prices and material conditions (discussed in the previous section) may overlap across locations and territories in unpredictable and complex ways, intersecting in reproducing geographically differentiated patterns of energy vulnerability. Spatial justice offers a framework for considering such relationships though an integrated perspective.

6. Vicious circles of vulnerability: the spatial distribution of energy needs

In addition to directly driving geographically differentiated patterns of energy vulnerability, wider material and economic inequalities also indirectly contribute to spatial inequalities in how energy is demanded, consumed and experienced. This is particularly expressed via distributive disparities in bodily health, even if health also has a clear recognitional dimension in the context of fuel poverty and energy justice (Walker and Day, 2012). In distributional terms, health matters for energy poverty because those with a disability or underlying medical issue are often at an increased risk of exposure to the condition (Anderson et al., 2012; Palmer, 2011; Peate, 2008; Snell et al., 2015) due to more demanding energy requirements such as needing to heat one's home to a relatively higher temperature, to run energy intensive medical equipment, or to undertake more frequent laundry activities (Ormandy and Ezratty, 2012; Snell et al., 2015). Moreover, the *consequences* of energy deprivation can be more severe for such groups, who can find their pre-existing illnesses complicated or exacerbated (Collins et al., 1985; Liddell and Morris, 2010).

Notably, differences in bodily health display clear geographical patternings – poor health (and good health) is more prevalent in some places than in others (Borrell et al., 2013; Rydin et al., 2012). These 'health inequalities' (Dorling et al., 2009) do not occur purely by chance, but are often partly the *result* of the material and socio-economic spatial inequalities we have already discussed (Marmot and Bell, 2012). As Graham (2007, p. xi) surmises, 'inequalities in people's health are intimately and inextricably connected to inequalities in their material and social circumstances' (p. xi). Health outcomes tend to be worse in economically deprived places (Dorling, 2013), as low-incomes and insecure work can result in poor health through mechanisms such as increased levels of stress (Pickett and Wilkinson, 2012). Furthermore, those suffering from chronic illness often receive low-erwages or are unable to find work (Gore and Parckar, 2009). Quality healthcare can also be rarer in socio-economically deprived locales; for example, in the UK medical doctors are more likely to be found in more affluent areas (Dorling, 2013). Nations also vary in terms of their form of healthcare provision, and those on low-incomes can face a challenge in affording healthcare in countries where it is not available free-of-charge.

It is also well documented that insufficient energy services in the home – such as inadequate heating or lighting – can have their own deleterious effects on both physical and mental health (Liddell and Morris, 2010; Marmot Review Team, 2011; Ormandy and Ezratty, 2012). As has been noted, such relationships are closely linked to the material condition of the home; low temperatures, damp and mould can result from inefficient buildings or inadequate heating systems. A geographically-embedded vicious circle may potentially arise, in which those living in places with poor material conditions experience damage to their health due to energy poverty. This in turn increases their energy needs and puts upward pressure on energy bills.

Vicious circles of energy vulnerability also involve spatially reinforcing mechanisms associated with the practices undertaken by disadvantaged households. People's responses to energy poverty are associated with a wide range of everyday adjustments, behaviours and transformations (Brunner et al., 2012; Middlemiss and Gillard, 2015; Wu et al., 2004) which are simultaneously shaped by, and shape, the socio-technical infrastructures of indoor and outdoor environments (Biehler and Simon, 2010). The disproportionate concentration of such dynamics in particular areas has demonstrably lead to adverse impacts on air pollution in cases where high numbers of households have switched to low-grade coal or fuelwood in order to save money (Knight, 2014; Reeve et al., 2013). In the case of DH, household-level arrears and non-payment have strengthened the drivers of energy poverty by undermining the capacity of heat providers to improve the energy efficiency of such systems (Poputoaia and Bouzarovski, 2010; Rezessy et al., 2006).

7. Spaces of misrecognition

Thus far, we have discussed *distributive* spatial inequalities. We now move on to explore the geographical dimensions of justice as recognition. Rather than the distribution of resources, justice as recognition concerns the respect (or lack of) given to different identities in social, cultural, and political relations. Fraser (1995) argues that one important way in which recognition injustice (often termed 'misrecognition') manifests is through what she terms 'non-recognition' – a situation in which the needs or circumstances of certain groups are not identified or, worse, simply ignored. In terms of energy poverty, the degree to which non-recognition of the condition is an issue varies among nations. For example, in the UK there has a relatively long history of fuel poverty activism, and the issue has been formally recognized in national policy and public discourses since the early-2000s. In contrast, in many continental European states, explicit awareness of energy poverty as a problem that is distinct from income-poverty has historically been more limited (Thomson et al., 2016). A further potential geographical form of 'non-recognition' relates to inaccurate ideas of the territorial extent of energy poverty, meaning that certain vulnerable areas are not identified as requiring help.

Misrecognition can also be manifested through 'disrespect', a situation in which groups of people are maligned or stigmatized in public discourse and cultural representations (Fraser, 1995). In relation to energy poverty, a range of contributions have demonstrated that 'under-consuming' or lacking access to energy services that most people consider normal can be a source of stigma, linked to the 'spoiled identity' of someone who is poor or incapable (Hards, 2013). However, stigma is highly context dependent (Reid et al., 2015), and therefore the prevalence of disrespect toward the energy poor, and the particular form that this takes, will also be geographically contingent at a variety of scales (Connon, 2016).

For example, it has been found that the stigma associated with poverty and 'under-consumption' is often strongest in societies with greater economic inequalities (Pickett and Wilkinson, 2012; Sayer, 2014), and where public discourses that suggest the poor are personally responsible for their poverty are prevalent (Walker et al., 2013a). Moving beyond this context, there is evidence to suggest that energy poverty might be especially stigmatizing in nations such as the United States, where relatively high levels of energy consumption are often expected and normal (Sovacool, 2009), or in Scandinavian countries where having a warm and 'cosy' home is highly valued (Wilhite et al., 1996).

The energy efficiency improvements designed to tackle energy deprivation can also be stigmatizing, by visibly marking out people or places as deprived or vulnerable. Reid et al. (2015) suggest that 'area-based' schemes of energy efficiency – in which spatial loci may be targeted because they are considered, inter alia, more vulnerable to energy poverty – can potentially stigmatize neighbourhoods and the people that live within them. Alongside visibly indicating that certain places are 'deprived', such schemes may also suggest that problems of

energy vulnerability are somehow *internal* to, and the fault of, the neighbourhood itself (Dikeç, 2002).

These various forms of energy poverty-related misrecognition have significant implications. Not only are they problematic in their own right, but they are also involved in (re)producing the distributive inequalities in energy affordability and material conditions that were described earlier. At the level of policy, non-recognition or disrespect toward energy poverty within a society influences alleviation policies and, if they do exist, the particular form that they take. For example, in the UK – where fuel poverty has been recognized for several years – a number of definitions, strategies and alleviation policies have been implemented at both the national and local level (Middlemiss, 2016; Moore, 2012). Moreover, recognition that the problem is partly caused by poor energy efficiency has meant that at least some interventions have focussed on reducing material inequalities by installing insulation and other efficiency measures (Simcock and Walker, 2015). In contrast, in EU countries where the problem is less recognized the result is a lack of official definitions, strategies, targets and amelioration policies (Bouzarovski et al., 2012; Thomson et al., 2016), and even existing efforts have tended to focus on populist and short-term interventions such as energy price freezes (Bouzarovski and Tirado Herrero, 2015). Meanwhile, the degree to the spatial extent of energy poverty is accurately understood and acknowledged will impact upon the accurate and effective targeting of resources (Walker et al., 2013b). In places characterized by a high degree of 'non-recognition' of energy poverty, fewer effective alleviation policies are likely to be implemented that tackle the condition's underpinning material or energy affordability inequalities, thereby helping to (re)produce these distributive disparities.

The political non-recognition and stigmatization of domestic energy deprivation also has implications for household practices, which can create further inequalities in distribution. In places where energy poverty – or the importance of energy efficiency in alleviating it – are misrecognized, the inclination of vulnerable households to access support is likely to be reduced. This increases the risk of 'normalizing' the condition and creating an additional vicious circle in which those who are at greatest risk of energy deprivation fail to receive help. For example, Hitchings et al. (2015) have found that in Wollongong, Australia a local norm of the winter cold being 'no big deal' means that some respondents downplay the hardships of cold indoor temperatures and believe that there is no need for thermal insulation. On New Zealand's South Island, where winters are cold and homes are often badly insulated, cultural beliefs about 'personal toughness' discourage households from investing in insulation or new heating systems (Cupples et al., 2007). In terms of disrespect, research has shown that, due to fear of being stigmatized as 'poor' or 'incapable', people suffering from energy poverty may actively attempt to 'hide' their situation from others; for example, by not seeking out advice and support (Dobson et al., 2013; Hitchings and Day, 2011), or by avoiding certain 'coping strategies' (Day and Hitchings, 2011). Similarly, Reid et al. (2015) suggest that households may refuse to engage with energy efficiency initiatives if they consider it to compound the already spoiled identity of their neighbourhood.

8. Concluding thoughts and policy implications

The spatial justice framework we have adopted in the paper is not only about revealing energy-related inequalities, but also *evaluating* them. What do the identified spatial differences mean in terms of energy justice? From perspectives that see all human beings as having fundamental rights to a certain standard of living purely by virtue of being human (de Vita, 2007), the simple fact some people are unable to attain adequate energy services is a self-evident injustice – this is the reasoning utlised in previous research that has argued energy poverty is a form of (energy) injustice (Christman and Russell, 2016; Sovacool et al., 2016). However, from a spatial justice perspective, Dikeç (2001) and others have suggested questions of *responsibility* for inequality – how it is produced, and by whom – matters when evaluating (in)justice, and that there is thus a the need to consider the underlying structural mechanisms that produce spatial inequality. For some theorists working in this vein, inequalities are acceptable only if they are the result of differences in individuals' own choices or contributions, while those that result from factors outside of an individual's control are unjust (Dworkin, 2000; Sayer, 2012, 2002; Young, 2011).

As a whole, the evidence surveyed in this paper indicates that spatial differences in energy poverty and vulnerability are not the responsibility of variations in individual 'choices', but instead predominantly result from structural geographical inequities that are engrained in various stages of energy systems, and, moreover, in the fundamental infrastructural, economic, and cultural make-up of societies. As such, it can be argued that where people live is one particular 'morally arbitrary' difference that should not impact upon people's fundamental life chances (Dorling and Ballas, 2008), and that spatial inequalities in energy vulnerability are thus a clear case of (energy) injustice because those living in certain localities are arbitrarily disadvantaged in their ability to attain essential energy services. It is also worth taking into account Walker's (2009) suggestion we should move beyond assessing only inequality in exposure to also consider inequality in terms of its *consequences* for well-being. Important in this regard are the geographical health inequalities that we earlier discussed, as they both increase the likelihood of energy poverty emerging in certain communities, and moreover intensify the consequences of the condition. While all energy poverty might be considered a form of energy injustice, this injustice is most *severe* if it is spatially concentrated in localities of relatively poor health.

Like other forms of inequality (Dorling and Ballas, 2008; Walker, 2009), end-use energy injustice, therefore, is a deeply geographical phenomenon. It is unequally distributed and experienced across different places, and is produced through multiple and complex spatialities of distribution and recognition. The main implication of this argument is that, in terms of vulnerability to energy poverty, *where* a person lives seems at least as significant as the socio-economic group that they are part of – yet in much of the current literature and policy discourse inequalities and vulnerability tend to be defined in terms of the latter, rather than in socio-technical, housing, or locality terms (Moore, 2012). In showing how spatially uneven patterns of energy poverty are the result of processes and injustices operating throughout the whole energy system, along with economic, material and cultural inequalities acting at various scales, we have also contributed to energy justice theory by responding to calls to disturb the energy production/consumption binary (Jenkins et al., 2016). Future energy justice investigations at the production or resource extraction end of the lifecycle should consider the implications of how, for example, geographic issues of access to energy different carriers and the manner in which the supply chains of various energy resources are spatially distributed may generate vulnerabilities on the demand side. Even if our study is primarily based on evidence sourced from the European context, we nevertheless show that energy transitions are generators of geographically-uneven social, political, and environmental displacements which may increase the vulnerability of particular social groups or places: a finding that is of special relevance to the global movement towards a low carbon future. The geographies of energy justice, therefore, embody a distinct temporal dimension, which means that identifying vulnerable areas also needs to take into account predicted changes in energy prices, forms of infrastructure provision, and economic inequality.

In terms of policy implications, emphasizing that energy poverty is a form of injustice acts as a reminder that its alleviation is a fundamental political duty rather than simply an optional act of benevolence (de Vita, 2007). More practically, and in the first instance, our findings lend some support to locally-targeted 'area-based' policies of energy poverty alleviation – as have already been undertaken in several places (Reames, 2016; Walker et al., 2013b). These have the

potential to achieve greater geographic equity and correct some of the spatially uneven patterns of energy injustice, by echoing Harvey's (1973) principle of 'territorial justice', in which he argues that resources should be distributed 'such that the prospects of the least advantaged territory are as great as they can be' (pp. 116–117). But there is an important caveat to such arguments: when a spatial conceptualization of the causes of energy poverty is narrowly focussed on the 'local' level, corresponding area-based policies will similarly emphasize spatially-narrow and discrete structures such as residential energy efficiency. They may therefore marginalize the underpinning structural dynamics that, as we have noted throughout this paper, also (re)produce spatial inequalities and energy vulnerability at the regional and national level – such as institutional energy restructuring, uneven development, and stigmatizing cultural attitudes (Bouzarovski et al., 2017, 2015b; Tirado-Herrero and Jiménez Meneses, 2016). As argued, spatial justice involves not only rectifying previous injustices but also addressing the underlying *causes* of these injustices (Dikeç, 2002, 2001; Soja, 2009; Young, 1990).

Therefore, and in the second instance, we would call for the development of policies that can address the (re)production of distributional, procedural and recognition injustices via dynamic and mutually-reinforcing spatial formations. This requires a comprehensive, multi-scalar strategic approach to address the *mechanisms* through which the geographic embeddedness of maldistribution and misrecognition and inadequate recourse to fair decision-making procedures render households incapable of meeting their energy needs. As Hiteva (2013) suggests, measures to alleviate energy poverty should span the whole energy system, rather than focusing solely on the 'consumption' end of the chain; for example, funding low-carbon infrastructure through less regressive means than carbon taxes or flat levies on energy bills, reconfiguring energy transmission infrastructure and regulation, and shifting away from increasingly expensive and centralized fossil fuel plants onto more localized and distributed forms of micro-renewable generation, have been suggested as having the potential to reduce energy poverty (Hiteva, 2013; Sovacool et al., 2014). We argue that area-based energy efficiency policies should be used *in combination* with such interventions. In practice, it therefore becomes necessary to develop policies aimed at building urban resilience across a multiplicity of temporal and scalar frames (Bouzarovski, 2015), by taking into account the relationship between energy poverty, on the one hand, and wider socio-environmental contingencies such as climate change, urban and rural social segregation, and global chains of energy provision, on the other.

Third, correcting end-use energy injustice requires improved energy poverty detection and monitoring frameworks. As noted above, area-based policies can suggest that the responsibility for problems resides *within* communities or localities, which can have a stigmatizing effect. This points to the need for improving the spatial sensitivity of existing detection and monitoring frameworks. Instruments such as, for example, EU SILC offer almost no disaggregation of energy poverty indicators beyond the national scale, while the sample sizes of state-level datasets such as HBSs are insufficiently representative for the purpose of regional and urban analyses. An improved awareness of the geographic variation of energy-related injustices can also feed back into the discursive and policy sphere, by qualifying and challenging practices of misrecognition and stigmatization.

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