

This is an Open Access document downloaded from ORCA, Cardiff University's institutional repository:<https://orca.cardiff.ac.uk/id/eprint/118300/>

This is the author's version of a work that was submitted to / accepted for publication.

Citation for final published version:

Roberts, Erin and Henwood, Karen 2019. "It's an old house and that's how it works": Living sufficiently well in inefficient homes. *Housing, Theory and Society* 36 (4) , pp. 469-488.
10.1080/14036096.2019.1568296

Publishers page: <https://doi.org/10.1080/14036096.2019.1568296>

Please note:

Changes made as a result of publishing processes such as copy-editing, formatting and page numbers may not be reflected in this version. For the definitive version of this publication, please refer to the published source. You are advised to consult the publisher's version if you wish to cite this paper.

This version is being made available in accordance with publisher policies. See <http://orca.cf.ac.uk/policies.html> for usage policies. Copyright and moral rights for publications made available in ORCA are retained by the copyright holders.



“It’s an old house and that’s how it works”: Living Sufficiently Well in Inefficient Homes

Erin Roberts^a and Karen Henwood^b

^a *School of Social Sciences, Cardiff University, Tower Building, Park Place, Cardiff, CF10 3AT, Wales, United Kingdom*

^b *School of Social Sciences, Cardiff University, Glamorgan Building, King Edward VII Avenue, Cardiff, CF10 3NN*

In the UK, the domestic sector is a major contributor of national carbon emissions. In a country with a low turnover of housing, improving the energy efficiency of the existing stock, particularly the oldest and least efficient homes, is of utmost importance if ambitious carbon reduction targets are to be met. Analysing the rich, narrative data of households living in old, hard-to-treat homes, this paper produces novel insights into the ways in which domestic thermal comfort practices are shaped by meaningful relationships, intimately bound to identificatory positions, that are deeply connected to these valued domestic environments. Findings concern how households renegotiate widely accepted understandings of thermal comfort to better fit with the materiality of their old homes by constructing for themselves meaningful ‘moral’ identities that focus on living sufficiently well. This relational understanding of domestic energy consumption highlights how materiality, practices and moral narratives are produced and reproduced dynamically over time, challenging static notions of utility maximisation and technical interpretations of efficiency that dominate contemporary energy policy.

Keywords: Relationality, Old Homes, Thermal Comfort, Meaningful Identities, Domestic Energy Consumption, Matters of Care and Concern

Introduction

How society produces and consumes energy is intimately bound up with the issues of energy security, fuel poverty and climate change; concerns which lie at the root of contemporary energy and environmental policy in the United Kingdom (UK). To address this so-called ‘energy trilemma’ (DECC, 2014) and to show leadership on the international stage, the UK Government introduced the Climate Change Act (‘the Act’) in November 2008. The Act formally commits the UK to an ambitious emissions reduction target of 80% below 1990 levels by 2050. At present 23% of national carbon emissions (CCC, 2010), as well as roughly a third of total energy consumption can be attributed to British homes (DECC, 2013).

With 80% of the current UK housing stock projected to still be in use in 2050 (Boardman, 2007), the UK is home to some of the oldest housing stock in Europe (DECC,

2012); the oldest of which having been primarily built during the late eighteenth and nineteenth centuries using solid-wall construction methods. At present there are 8.5 million solid-walled, so-called hard-to-treat¹ dwellings in Britain, equating to roughly 30% of the total stock (BEIS, 2016), but bearing responsibility for 50% of the carbon emitted from the domestic sector (Banfill, et al., 2012). Decarbonising housing, particularly the oldest and hardest-to-treat homes, is therefore crucial if the ambitious carbon reduction target set by the government is to be met.

At the heart of the UK's decarbonisation strategy is the notion of energy efficiency, that is, delivering more or maintaining the current level of service provision with less energy (Shove, 2018). When it comes to housing, this predominantly translates into strategies that focus on building performance in terms of thermal standards, by; promoting more stringent Building Regulations for new homes, promoting more efficient heating systems, and facilitating improvements to the fabric of older homes using financial incentives via market measures. The promise of energy efficiency is a powerful one, particularly from a governance perspective, as it is a relatively quick and cheap way to reduce carbon emissions without destabilising the high living standards and services that people have grown accustomed to in developed countries (Shove, 2018). Gains in efficiency however, have not translated into the anticipated reduction in demand (Toulouse, et al., 2017). Consequently, critics of energy efficiency as interpreted through a technical lens (hereby 'technical efficiency') argue that social change should accompany technical efficiency improvements in order to meet carbon reduction targets (Figge, Young, & Barkemeyer, 2014; Lorek & Spangenberg, 2017; Shove, 2018; Wilhite & Norgard, 2004). In a similar vein, while policy-makers' main focus continues to lie in improving the thermal performance of existing housing to decarbonise the stock, there is growing recognition that the social drivers of energy demand in older homes require greater attention (Ellsworth-Krebs, Reid, & Hunter, 2015; Fouseki & Cassar, 2014; Gram-Hanssen, 2014a; 2014b; Judson & Maller, 2014; Maller, Horne, & Dalton, 2012; Sunikka-Blank & Galvin, 2016).

In this paper, we draw on empirical examples of households living in older 'inefficient' homes, to better understand their thermal comfort practices in the absence of commonplace technical infrastructures (i.e. central heating systems). In order to do so, we draw on a set of relational theories that, together, enable us to understand household energy

¹ So-called because improving their energy efficiency can be challenging given that such dwellings cannot always accommodate what are considered to be 'staple' energy efficiency measures such as cavity wall and loft insulation, and often require bespoke solutions that are costly and unpopular (Vadodaria *et al.*, 2010).

consumption as stemming from matters of care and concern in the accomplishment of a life worth living. The paper begins by introducing theoretical perspectives of thermal comfort within the house as home from a social practice theory perspective, before engaging with complimentary theories regarding relationality, attachment and identity in relation to consumption; insights from which later form the groundworks of our reading of the empirical data. This is followed by a brief discussion of the context in which the research was carried out and the qualitative methodology used to generate our dataset. Our analysis, which focuses on two household case-study narratives relating to comfort practices in old hard-to-treat homes, is then presented and discussed.

From thermal performance to thermal comfort

The narrow focus on the thermal performance of buildings has been heavily criticised by scholars of domestic energy demand, with some calling for a shift in focus to look beyond domestic dwellings as houses to viewing them as homes instead (Ellsworth-Krebs *et al.*, 2015). Homes are both material and imbued with feelings and meaning; inhabited by loved ones, ideas, and belongings, and connected to numerous social conventions and cultural expectations (Blunt & Dowling, 2006). They are the familiar backdrop of our everyday lives, where particular activities and relationships take place (Blunt and Dowling, 2006; Hamilton, 2017; Mallett, 2004). People create a home through material processes (e.g. construction, using, placing and replacing products) inasmuch as they create a home through social and emotional relations (Madsen, 2018; Mallet, 2004). Likewise, the materiality of the home shapes the lifestyles (and consequent energy consumption) of those who dwell within them through the particular configurations of infrastructures, possessions and technologies embedded within them. The term ‘home’ therefore stresses a complex interweaving of the social and the technical in forming patterns of energy use, enabling researchers to look beyond dominant techno-economic approaches to better understand the dynamics of domestic energy demand (Ellsworth-Krebs, Reid & Hunter, 2015).

Complementing this relational understanding of home, practice theory is a framework that has gained popularity among scholars aiming to better understand this interweaving of the social and the technical and its role in changing patterns of domestic energy consumption. By focusing on everyday practices such as cooking, showering and cleaning for example, practice theory scholars emphasise the interweaving of the social and the material (including technical) through practical action, where energy is a component and energy consumption is a by-product of the practical carrying out of everyday life (Shove & Walker, 2014; Strengers,

2010). In this framework, practices are understood as coordinated entities that are shared through common understandings but performed differently by individuals, owing to variations in competencies (skills and practical knowledge), meanings (socially shared ideas, norms and expectations) and materials (objects and infrastructures) available to them (Shove, Pantzar, & Watson, 2012).

From a practice theory perspective, thermal comfort is best understood as a socio-cultural construct that is both an idea and a material reality (Shove, 2003), as individuals' sensory engagement with their domestic environments are interpreted through the lens of shared social conventions, which in turn, inform a myriad of everyday practices (Madsen & Gram-Hanssen, 2017; 87). Thermal comfort is thus both achievement and performance, which differs according to culture, place and time (Shove 2003). Thermal comfort practices often involve the use of technologies for space heating/cooling as well as ventilation/airing (Day & Hitchings, 2011; Chappells & Shove, 2005; Gram-Hanssen, 2010; 2014a; Hitchings, 2011; Judson & Maller, 2014; Strengers, 2011; Vannini & Taggart, 2013; Wilhite, et al., 1996), can include the donning or shedding different types of clothing (Cupples, Guyatt, & Pearce, 2007), and are frequently involved in practices of home-making (Madsen, 2018a; 2018b; Pink, 2012; Rinkinen & Jalas, 2017). An important distinction found in this rich literature lies in the focus of study, as some scholars, such as Shove and colleagues, have sought to better understand why practices change over time at a societal level, whereas others study practices by focusing on specific socio-material settings, by going into detail with individuals and households about 'ways of doing' (e.g. Gram-Hanssen, 2010; 2014a; Madsen, 2018a; 2018b, etc.). It is this latter body of research that this paper draws upon.

Despite its focus on collective conventions, theories of social practice leave some forms of social interaction, such as the role of close personal relationships (i.e. family, friends, colleagues, etc.) in shaping certain practices, under-studied and under-theorised (see Bartiaux & Reátegui Salmón, 2014; Hargreaves, 2011). They might also be critiqued for what they do not elucidate about matters of care and concern when such matters are approached interactionally, as culturally formed discourses with material effects (Henwood *et al.*, 2016). We argue that paying attention to what matters to people in relation to their homes, and not simply explaining energy consumption in terms of social drivers (e.g. thermal heating norms) or utility maximisation, enables researchers to better understand why certain practices are maintained whilst others are not (Groves *et al.*, 2016; Henwood *et al.*, 2016).

Attending to matters of care and concern

In order to account for such matters of concern, we must first recognise that energy consuming practices matter to people in specific ways. They may be instrumental to achieving a particular goal for example which may no longer matter to them as their circumstances change. But ‘things’ – technologies that are integral to practices such as washing clothes for example – also mediate and give form to our concern and care through emotional investments in ideas and ways of ‘doing’, which are often connected to meaningful identificatory positions (Groves *et al.*, 2016). Identificatory positions not only delineate publicly knowable “selves” in ways that can provide traction in relationships, they also involve imagined connections that are capable of reaching backwards and forwards in in time and place (Finn & Henwood, 2009; Henwood, Groves and Shirani, 2016).

The connection between meaningful identities and ways of doing has been a central focus for studies that engage with the notion of moral or ethical consumption within the social sciences (Hall, 2011). Here, consumption is understood to be an inherently moral matter, as it inevitably involves some form of negotiation between our own interests and those of others, raising issues of fairness, power and justice for instance (*Ibid.*). Building upon Wilk’s (2001) argument, Hall argues that these moral concepts along with basic ethical principles (i.e. right vs. wrong; good vs. bad) render everyday consumption an expression of personal ethics and identity. What sets these moral or ethical evaluations apart from preference is that the former requires justification on the basis of the valued object’s ‘rightness’ or ‘goodness’, whilst the latter is merely an assertion of subjective will (Groves *et al.*, 2017).

Drawing on the notions of emotional attachments and everyday energy ethics to engage with how people make sense of their identities through their reflections on their everyday energy use has yielded some insights into why some unsustainable energy-consuming practices maintain a loyal following whilst others do not (Henwood *et al.*, 2016). Everyday energy dependencies matter to people, Henwood and colleagues argue, because they are connected to their understanding of who they are, and ideals of what constitutes a ‘good life’ or a life worth living, particularly when set against a background of future uncertainty. To attend to the question of what matters to people when it comes to their homes then, we must first ask who the subjects of such valuations are. Doing so necessarily entails abandoning the notion of people as driven solely by (more or less) rational individual motivations and economic self-interest, and instead, embracing an understanding of people as relational subjects (Henwood, Groves, & Shirani, 2016).

Subjects are relational in that they are constituted by their relationships with others (Archer & Donati, 2015). Paying attention to these relationships, allows us to understand how everyday practices are both personally experienced and socially valued – in ways that are historically entangled and temporally embedded (Henwood, Groves and Shirani, 2016). This necessarily means attending to the ways in which culturally available (discursive) resources, emotional investments – to people, places, things and ideas – and identificatory positions are drawn upon as people narrate their life stories and account for their lived experiences (Henwood et al. 2016). What we are as relational beings is thus inseparable from the relationships we have, as well as the places in which we live; ‘our lives are saturated by the places, and by the things and other persons intertwined with those places, through which we move, in which our actions are located, and with respect to which we orient and locate ourselves’ (Malpas, 2001; 231 – cited in Seamon, 2014). Paying heed to this ‘lived emplacement’ (Seamon, 2014), through the stories that people tell about their everyday lives, allows researchers to ‘plumb the depths’ of everyday meaning making in ways that ‘reach beyond the surface of accounts on what cannot easily be said’ (Henwood & Coltart, 2012; 3).

Research context

This paper draws on in-depth qualitative data generated from an ESRC-funded study that aimed to understand the ways in which households in the rural county of Gwynedd, north-west Wales (UK) engage with energy in and through time. While this project did not specifically aim to engage solely with households that dwelt in older, solid-walled properties, most of the sample lived in such dwellings², reflecting what is locally available in the rural housing market. When compared with the rest of the UK, Wales has the highest proportion of solid walled homes built prior to 1919 - accounting for roughly a third of the overall housing stock - the vast majority being owner-occupied (Atkinson, et al., 2015). Of the pre-1919 stock, terraced housing is the dominant typology, accounting for almost 60%, followed by semi-detached and detached housing that, when combined, account for over 35%³, and the remainder being attributed to flats (Whitman, Prizeman, & Barnacle, 2016). A lack of up-to-date data on the geographical distribution of older houses in Wales makes it difficult to know whether they are predominantly located in urban or rural contexts, however, it is possible to

² 7 out of 11 households lived in solid-walled properties that were pre-1919 - see Table 1.

³ Predominantly found in rural and semi-rural areas (Consumer Futures Unit, 2018).

build a rough picture of rural housing in Wales by drawing on data regarding the condition of the housing stock.

The most recent figures released by the Welsh Government (*Living in Wales, 2008*)⁴ show that the average SAP rating for properties in rural Wales is much lower (SAP 38; EPC band F) than their urban counterparts (SAP 54; EPC band E), indicating that generally, the rural stock is of a poorer condition. Additionally, approximately 20% of the Welsh stock is not connected to the gas grid (hereby off-grid) (Ofgem, 2015), the majority being located in rural areas (Office of Fair Trading, 2011). These off-grid rural households tend to utilise a greater diversity of fuel types, with solid fuel and oil-fired heating being more popular in rural Wales than in other parts of the UK, owing to the greater prevalence of detached, solid-wall properties in rural areas (Morrison & Moyes, 2018). Off-grid fuel options are unregulated and more expensive than mains-gas, and it perhaps comes as no surprise that the combination of lower-than-average incomes, higher fuel costs and poor thermal performance often leads to rural households spending a greater proportion of their income on space heating (Atkinson *et al.*, 2015). Indeed, the latest figures show that the proportion of rural dwellers in fuel poverty⁵ in Wales was almost twice that of their urban counterparts (Thomas, 2011).

Method

Viewing people as relational beings, our research utilised a narrative approach to engage with matters that are meaningful to people (Henwood, et al., 2016) - be that their valued relationships with places, significant others or with material things - in order to draw out how particular energy intensive lifestyles and practices unfold both temporally and spatially. The interviews were designed to elicit detailed descriptions of everyday energy use through questions regarding participants' everyday routines (both individual and household), and how these might have changed over time (i.e. different stages in the life-course; holidays), as well as similarities/differences between family members' 'ways of doing'. As in the research conducted by (Anderson, White, & Finney, 2012), we did not ask participants for details about their income and fuel expenditure, nor did we conduct detailed assessments of building energy performance. As such, it is impossible to tell whether or not the participating households were in fuel poverty. However, given the wider statistical data that

⁴ At the time of writing, an up-to-date Welsh Housing Conditions Survey (2017-18) was scheduled for release sometime in November 2018. This was not used in the writing of this paper, as it was not yet released.

⁵ In Wales, a household is considered to be in fuel poverty if it is required to spend 10% or more of its income on fuel use.

already exists regarding fuel poverty in rural Wales, it is reasonable to suggest that the households in our sample have a greater propensity to enter a state of energy vulnerability (Middlemiss & Gillard, 2015).

One of the defining features of this study was its use of a critical case sampling strategy, which was employed to "yield the most information and have the greatest impact on the development of knowledge" (Patton, 2015; 276). Intensive participation, by a small sample of diverse household arrangements (11 households), allowed for a variety of household compositions and circumstances to be explored. In all 25 individuals, both adults and young people⁶, were interviewed together and apart over the course of 29 interviews (see table 1 for an overview of the sample). Each household was visited at home twice, with initial narrative interviews taking place with each household member separately during the winter, with household-group interviews taking place six months later. Interviews were audio recorded and later transcribed by the researcher. Efforts to anonymise the data included changing the names and identifiable characteristics of participants, along with the names of significant others and places mentioned during interviews⁷.

Household	Composition	House type & locality	Connection to gas grid	Space Heating
Beckett	3 adults	Detached (18 th century; solid-wall); Isolated house	Off-grid	Wood (<i>Rayburn & wood stove</i>)
Thomas	2 adults 3 adolescents 2 children	Mid-terrace (19 th century; solid-wall); Small accessible town	Yes	Central Heating (<i>mains gas</i>)
Butler	2 adults	Detached (1990s); Isolated house	Off-grid	Central Heating (<i>bottled gas</i>) Wood (<i>wood stove</i>)
Hughes	1 adult	Semi-detached bungalow (Post-war); Small village	Off-grid	Central Heating (<i>bottled gas</i>) Wood & coal (<i>open fire</i>)
Grey	2 adults	Mid-terrace (mid-19 th century; solid-wall); Large accessible village	Yes	Central Heating (<i>mains gas</i>)
Evans	1 adult 2 children	Semi-detached (mid-19 th century; solid-wall); Small village	Off-grid	Central Heating (<i>oil</i>) Wood & coal (<i>open fire</i>)
Gwilym	2 adults	Detached (1850; solid wall); Hamlet	Off-grid	Electric storage heaters (<i>& electric underfloor</i>) Wood

⁶ Young people were invited to 'opt in' to the study if they so wished (either individual interview or as a sibling group) after gaining the consent of their parents. Only one sibling group - from the Thomas family - took up this offer, and were interviewed together. Young people in other households were either unavailable when initial interviews took place, or chose not to participate.

⁷ In some cases, this meant making significant alterations to certain participant/household details in order to prevent them from being recognised. Despite this altering of information, every effort was taken to retain the original meaning and significance of the data.

				(wood stove x2)
Smith	1 adult	Detached bungalow (1980s); Small accessible town	Off-grid	Central Heating (bottled gas)
Griffiths	2 adults 3 children	Semi-detached (1980s); Small accessible village	Off-grid	Central Heating (bottled gas)
Davies	2 adults 2 children	Detached farm-house (18 th /19 th century; solid-wall); Remote hamlet	Off-grid	Central Heating (oil) Wood (wood stove)
Dreyer	2 adults 3 adolescents	Detached (Ground floor dated to 1650; solid-wall); Isolated house	Off-grid	Wood & coal (Rayburn) Wood (wood stove)

Table 1 Overview of the sample, including household composition, house type⁸ and locality, connection to the gas grid and method of space heating

The complexity and richness of the data necessitated more than one analytic strategy to make sense of it. To do this, two differing, yet complementary, approaches drawn from biographical and narrative research traditions were utilised to understand the data both thematically, across the sample, as well as through individual and household case studies (Thomson, 2007). While analysing the data thematically allowed for comparison across the data set, analysing individual cases enabled us to better examine how biographies are shaped by wider structural factors - that is socio-technical systems and the cultural, historical and geographical contexts in which they are embedded - both in and through time (Henderson, et al., 2012).

As is evident in Table 1, the majority of our sample were off-grid households that were located in more sparse settlements⁹, and that utilised a mix of different fuel types. While most of these households used oil or LPG central heating systems, rather unusually, three households did not. All three households dwelled in older, solid-walled properties, of which two had altered the structure of their homes in different ways since their purchase. In this paper, we focus in-depth on these two households (the Gwilyms and the Dreyers) and their accounts of living in older off-grid properties without central heating, the most commonplace method of space heating in the UK. The households were selected to illustrate matters of concern that were commonly shared throughout the sample regarding the notions of stoicism and resilience, which shaped different energy consuming practices, including those related to thermal comfort. Where they differ from the rest of the sample, however, is in how this was practiced, owing to the particular configuration of meanings, materials and competencies at

⁸ It should be noted that the age of the dwelling is based on an estimate by the householder.

⁹ With the exception of the Smith household.

play in their off-grid ‘inefficient’ homes. Bringing together their accounts – presented here as case biographies (Henderson et al, 2012) - enables us to consider how matters of concern in the relationship between people and the built environment play out in the everyday energy-consuming practices in older properties.

Analysis

The Gwilyms

Eluned and Glyn are both in their late fifties, and live with their two cats in a small hamlet nestled within the borders of Snowdonia National Park. Their home is a traditional, detached, stone-built house dating back to 1850s. The house is not connected to the gas grid, and does not contain a central heating system. Instead, the Gwilyms use electric storage heaters, installed before they bought the property some two decades ago, as their main mode of space heating. This is supplemented by two log burners in the downstairs living spaces, and electric underfloor heating in the conservatory-come-kitchen. Perhaps things would have been different, Eluned mused during our first interview, had the couple had the (personal) energy to refurbish the heating system after moving in.

Born in a council house, just a few doors down from where she now resided, Eluned has spent most of her life in the little hamlet. Indeed, other than her time at university, she has never lived anywhere else; “I haven’t gone far” she said. Eluned spoke of her familial connection to her home-place, stating that her family had resided there “for centuries”. It is for this reason that Eluned has, from a very young age, always felt determined to stay there, as she felt that she had “inherited a legacy”.

Eluned and Glyn have always lived in traditional stone properties, none of which had central heating systems. Rather than being out of choice, this was more of a reflection of what was typically available in the area. The couple referred to what was to them “common sense” (Glyn) strategies for maintaining thermal comfort –such as layering clothes, wrapping up in a blanket or limiting movement around the house. Such strategies are ‘common sense’ to the couple in that they were learned during their respective childhoods;

“[...] Back then you only had a fire to keep warm, and so everyone in the family were all in the same room where the fire was, and then you had to rush up to your bedroom with a hot water bottle. You only made a fire in the living room you see. It was the same for Glyn too. They didn’t have central heating either,

and those were cold houses – three storeys! Dear me they were cold houses! Glyn would sometimes find snow had blown in through the window in the mornings! And so, you get used to having to wear more clothes to be honest, because you had to.” (Eluned)

Reflecting on how a lifetime of living in old stone houses had shaped her expectations of comfort, Eluned describes a process of adaptation, whereby families became accustomed to the conditions in which they found themselves through their coping strategies. In the absence of a central heating system, she and Glyn had simply become ‘used to’ lower indoor temperatures because there was no other alternative. Having become acclimatised to and even preferring lower temperatures was something that was brought into view for the Gwilyms when they visited other people’s homes or places of businesses;

Glyn *I don’t like a place that’s too hot. People’s houses are way too hot, hotels are too hot-*

Eluned *-Yes, it is a nuisance, you have to leave the window wide open in hotels.*

Glyn *Houses with central heating feel hot, you know? Definitely too hot for me, I don’t like it. Instead of turning the heat up, you just put on another jumper, don’t you? It makes more sense and it’s a lot easier [...]*

Making comparisons between their personal thermal preferences and contemporary norms, Eluned and Glyn emphasise their non-conformity. Their preference for lower temperatures can be interpreted as being cast along moral lines, whereby contemporary heating practices are negatively branded as being ‘excessive’ (Groves *et al.*, 2016b). This, along with the earlier quotation, project an identificatory position that is associated with resilience and stoicism. Here, stoicism is understood to be an expression of physical/mental tolerance, often in response to less-than-comfortable conditions, that enables an individual to acclimatise to those conditions rather than experience discomfort or suffering (De Vet, 2017). The related notion of resilience is about capabilities, which enable people to thrive despite the stresses or shocks that they encounter. Indeed, living in this way is something that Glyn in particular associates with health, as he goes on to state that living with higher temperatures “isn’t healthy is it?” (see also Royston, 2014).

Despite the couple's insistence that putting on another jumper made 'more sense' and was 'easier', it was not without its challenges;

"People with ex-council houses have an easy time of it. They all have central heating. They've never had to go without. I say that a lot, you know, when you work from home without central heating - although I do have a storage heater in the office, it's nothing like central heating - and so I tend to pile on a lot of clothes, and when I go to other people's houses, I've got to strip off 'cause it's too hot!" (Eluned)

Here, Eluned contrasts her experience to those of others that she deems to be having an 'easier time' of it, highlighting how she has had to 'go without' the comforts that they expect. While 'pil[ing] on the clothes' in her own home was easy enough however, anticipating and adapting to other thermal environments is a source of irritation for Eluned. Keeping warm and comfortable in an old house it seems, involves some form of effortful engagement - in the strategies that individuals employ to keep warm - that whilst valued, can at times be less convenient (see also Groves *et al.*, 2016; Vannini & Taggart, 2013b; 2014).

Along with a cooler indoor climate, the couple inherently associate dampness with the character of older buildings; "the amount of damp that we get here, that's how you know it's a stone house!" (Eluned). Eluned attributes the house's dampness not only to its fabric, but to poor workmanship and the building's geographical positioning as well, as she believed that the house was built "fairly quickly" on marsh land back in the nineteenth century; "...we know that the land [the house] was built on was called 'Gwern'¹⁰, and a 'gwern' is a wet place isn't it?" Driving out the damp in old stone houses is "a hell of a trick" according to Eluned, which means that the house needs to be kept airy.

"I tend to leave [the heater] on a low setting, a one or a two, even in the summer, just to keep the temperature constant. Otherwise you haven't aired [the room] properly, and because you don't have a door in some of the rooms, you somehow aren't able to change the air, and so you just want to keep it that way." (Eluned)

In the above excerpt, Eluned demonstrates how her home, through 'meanings about its needs', exhibits a form of material agency in the performance of Eluned's energy-

¹⁰ Gwern is a Welsh word meaning marsh or swamp.

consuming practices (see Strengers, Nicholls, & Maller, 2014; 774). Such meanings - that is, that the Gwilyms must keep their home at a constant temperature to properly 'care' for it, and for it to 'care' for them in return – exert a real power in the practical accomplishment of creating a homely environment. In this sense, Eluned's home can be thought of as what Strengers and colleagues (2014) call an 'inanimate actant' that exerts its influence through a distributed assemblage of practices and things.

The house exerts its influence on the Gwilyms' everyday practices, not only through meanings about its needs but also through its very materiality, as Eluned's everyday routines are spatially configured to avoid draughts; another quality of her home's special character. When she is not working in her home office, Eluned spends most of her time during the day in the conservatory (a relatively new addition to the house), and spends her evenings in the newly refurbished cosy 'middle room'.

Built shortly after moving in, the conservatory boasts an electric underfloor heating system. Comparing her current home to her previous one, Eluned discussed her motivations for building the conservatory.

"[...] Where we used to live, the kitchen didn't have a window at all and so it was a very dark place - I just wanted some light - and we thought we had to do something because it was so cold here. We thought a conservatory was just the thing, because we would get some light in and there's the underfloor heating. I think it's great. It doesn't get terribly hot 'cause it's not south-facing. It can get hot in the summer if it's a hot summer, but it's generally quite pleasurable to tell you the truth [...] It's handy I have to say. It's made a huge difference to the house. The house is so much bigger because of it, and there's no draft here either, it's the warmest room in the house." (Eluned)

Here we can see that Eluned's relationship with her current home is at least partially textured by past experiences of living in another. By building the conservatory, she could continue to live in a manner that she deemed acceptable whilst also feeling more comfortable. Eluned thus shows a concern for creating a comfortable home without compromising the valued identificatory position that she has built for herself. Balancing these concerns however, is gradually becoming more difficult for Eluned over time;

“I have a view here and everything, but as I’m getting older I just want warmth, truth be told [...] I’ve always said that when I’m old I want to be warm. I’m always cold!” (Eluned)

Despite only being in her late fifties, in the above quote Eluned describes becoming more sensitive to the cold as she ages (see also Wright, 2004). In contrast to Glyn’s earlier comments about lower indoor temperatures and health, it seems that as the body ages, physiological changes may mean that individuals’ needs may no longer be compatible with the aforementioned ‘needs’ of the house. This is something that Eluned reflected upon during our interview as she stated that she was considering moving, so that she may be free of the cold and draught.

The Dreyers

Rhian and Peter Dreyer (both in their mid-fifties at the time of the interviews) live in a stone-built, isolated house on the Llŷn Peninsula. Living with them is their teenage son, and on occasion, their two elder children who are otherwise at university. Originally a single-storey traditional stone cottage, the Dreyers extended the property to include a first floor shortly after purchasing it. Being so isolated, the house is not connected to the mains gas grid, and so the family rely on a wood-burning stove - supplemented by an old, second-hand Rayburn for space and water heating. According to Rhian the coal-fired range is too inefficient to be a source of primary heat or, indeed, for any sort of cooking, leading her to believe that their household “isn’t very sustainable at all”.

Peter and Rhian came to live in their house shortly after marrying in the late 1980s. For the first few years the couple rented what was then a small cottage, before purchasing it from its elderly owners who were, according to Rhian, “getting too old to renovate a house”. This relationship between the house and the occupants’ ageing mirrors the ideas projected earlier in the Gwilyms’ narrative; that living in an old house in old age is not as desirable or as feasible as it may have once been in youth. Whilst the Gwilyms related this to the physical processes of ageing (i.e. being less able to tolerate the cold), the Dreyers seemingly relate it to decreasing levels of personal energy that are required to undertake the necessary renovations to make an old house hospitable. Indeed, as alluded to in the Gwilyms’ earlier narrative, high levels of personal energy in the form of active thermal management styles are required to maintain a sense of comfort in such houses, even after the built environment has been altered.

Upon purchasing their home, the Dreyers extended the cottage “to how they wanted it”, adding a second storey to the property. It was during this time that Peter became very interested in the history of the building;

“The information that I was given at the beginning was that the house was built in the 19th century, but it’s a lot older than that. I’ve looked into this [...] I’ve been to the archives in Aberystwyth, I’ve spoken to elderly locals, I’ve measured houses, walls and everything to build up a better picture [...] The house dates back to the mid-17th century [...] All this searching for the house’s history - it started when I was extending the house. I realised how very skilled the builders were, to place stone upon stone and to have it stand the test of time, and that centuries later you can’t do the same- that’s why I started my search, to find out who the people that built this house were.” (Peter)

Years of painstaking research had yielded interesting and unexpected results for Peter. Thinking back, he felt that this late discovery about the property’s origins, made years after extending the house, was probably a blessing in disguise; “Lucky we didn’t find this out until after we extended the house otherwise we might not have done it [laughs]”. Here, Peter seemingly alludes to the role of formalised protection of the built environment (or, in the words of Sunikka-Blank & Galvin (2016), ‘heritage by designation’) in limiting what owners of older properties may or may not change regarding the aesthetic appearance of their homes. Despite the lack of formalised designation of heritage however, Peter was keen to retain as much of the cottage’s history as possible. On the ground floor, many of the original features had been kept, which included the thermally-massive, unlined stone walls and small windows. These characteristics were seen as being worthy of preservation (what Sunikka-Blank & Galvin, 2016, deem ‘heritage by appropriation’) due to their perceived historical significance as well as their practicality in terms of space heating;

“... we’ve kept the walls bare, and this works in two ways. The walls take in a lot of heat- they hold a lot of heat- but they lose a lot of heat too, we know that. We often find that if the Rayburn has gone out overnight we don’t notice because the house keeps its heat so well, but when we used to go on holiday every Christmas for a week or two, the house would get so cold while we were gone. It would take a good two days to get warm again. So, then you realise how important the walls really are. If I wanted to reduce the amount of energy I use in the house, I’d line

all the walls, but then you'd lose the history of the house. It's hard but I'm glad in a way that we didn't think of things like this when we were renovating the house - we would have ended up with a generic bungalow in the end!" (Peter)

In the above extract Peter alludes to the additional aesthetic significance of the unlined walls in making the house different or unique, by stating that they would have made the house "generic" had they lined the walls. Peter considers the masonry walls to be both a blessing and a hindrance when it comes to heating his home; while they do help maintain a comfortable indoor temperature, in order to do so they require constant attention in the form of fuelling the stove and the inefficient range, which can be rather inconvenient;

"The only thing is, is that [the style of heating] is not very convenient, you know, you have to carry in the coal and you have to carry out the ash, and there's a lot of ash, every time you open the [Rayburn] door." (Peter)

While Peter acknowledges the associated inconvenience of heating his home in a more active way, he nonetheless continues to live in the same manner, suggesting that whilst living in this way might be more onerous, it is not without meaning (see also Groves *et al.*, 2016; Vannini & Taggart, 2013b; 2014). The inefficient Rayburn - originally given to the couple as a stopgap by a friend - along with the stove and unlined walls kept the house "warm enough" for them. While the couple had intended to replace the Rayburn with a more efficient central heating system, Peter's claim that the cottage is "warm enough" for his family suggests that the Dreyers' understanding of thermal comfort is intimately bound to the fabric of their home as it currently stands; "it's an old house" Peter said, "and that's how it works".

Unlike Rhian, who had been brought up in the surrounding area, Peter had spent his childhood abroad where most people relied on central heating or gas stoves to keep warm. Peter reflected upon how moving to Wales, and to an old stone-built house, had reconfigured his understanding of what it means to be thermally comfortable;

"... usually the whole room is the same temperature; that's the idea of being comfortable [abroad], and it's completely different here because you've got a fire, and you sit around the fire to get warm. It took me a while to get used to that because my back always felt cold! It's odd, isn't it? I used to always feel the draught, but I don't anymore, because I've gotten used to it." (Peter)

In order to feel comfortable in his new home, Peter had to adjust his thermal expectations in line with the house in which he lived. This narrative of acclimatisation may also signify Peter's assimilation into a culture different from his own. Indeed, having had a quarter of a century or so to adapt, Peter had become more resilient to the cold, and even *preferred* heating his home in the 'Welsh' way.

The Dreyers' only sources of heating are on the ground floor, with the upper portion of the house being heated by nothing but the chimney stack and the occasional portable electric heater; "We had put pipes upstairs to be ready in case we wanted to put radiators there, but we've never got around to doing it". Given the lack of heating upstairs, the bedrooms in particular were described as being much cooler than the main living areas downstairs. Peter reflected upon the difference in temperature in a positive manner;

"...in my experience, it's very nice and very healthy too, to have colder bedrooms and corridors and to have a warm living room, you know, not having the whole house at the same temperature. I don't think that's very healthy." (Peter)

Here, Peter discusses how he views thermal variation as being superior to solutions that deliver conditions of what Chappelles and Shove term 'thermal monotony' (2005). This variation is not only integral to Peter's sense of comfort, but is also associated with better health (see also Gram-Hanssen, 2010; Royston, 2014). In highlighting this, it seems that Peter, like the Gwilyms, associates living in an old home without the modern conveniences of a central heating system with resilience; something meaningful and material about a way of living in his home that has become integral to his identity. This sentiment was also shared by the rest of the household during the later household-group interview. Specifically, the whole family reflected on their individual experiences of entertaining guests and visiting friends' houses; times where the cooler indoor climate of their home was brought into stark contrast with those of others. Drawing similarities with the Gwilyms, the Dreyers often felt that other people's houses were kept too warm. The presence of guests in their own home, however, seemed to suddenly make the Dreyers aware of the cold; something which otherwise went unnoticed.

Rhian *I think we're more aware of [the temperature] when we have people over, 'cause they're used to a warmer house [laughs][...]*

- Glesni** *Yeah, 'cause sometimes when I have friends over, we go upstairs to watch a film or something, and I realise that it's cold up there, and they say "oh, have you got a blanket?" [laughs]*
- Cai** *Yeah, I've noticed that too, that other people's houses are a lot warmer. Like when I walk into some people's houses, I'm just like [pfft!] it's hot in here! It's too hot – it's not warm, it's too hot! [...]*
- Glesni** *I don't think about it when it's just us, only when we have visitors [...] you think about them, whether they're warm enough.*

Associations of comfort are evidently different for different households. While thermal variation is considered to be superior for the Dreyers, the same cannot be said for their visitors. Having a (thermally) comfortable home is commonly associated with caring responsibilities not only in relation to those who dwell within the home but also in relation to guests (Shirani *et al.*, 2017). The above excerpt demonstrates an awareness of how linked others give form to their concerns just as much as their own familial identity, as they attempt to make guests more comfortable within the material parameters that they have set themselves.

Discussion

In the Gwilyms and Dreyers' narratives it is possible to see that thermal comfort practices develop through the households' relationships with their respective homes as 'inanimate actants' (Strengers, Nicholls & Maller, 2014), as both households discussed *adapting* and *changing* their expectations of thermal comfort to suit their respective homes' needs. The households' subsequent preference for lower temperatures, for example, was textured (Thomas, et al., 2017) through relationships with the materiality of their respective homes, significant others and past experiences. Both households renegotiate commonly accepted understandings of thermal comfort (as well as related understandings of health and moral consumption) that are bound up with commonplace technical infrastructures such as central heating systems, by drawing on practices of thermal comfort from a time where the technical infrastructure was very different. In their resulting narratives of stoicism and resilience (i.e. living sufficiently well or 'making do' and rejecting 'excessive' practices), both Gwilyms and Dreyers construct for themselves meaningful 'moral' identities that centre around a different understanding of efficiency to the technical definition set out at the beginning of the paper. The focus on 'doing things better, with least energy consumption'

(Lorek & Spangenberg, 2017; 7) evident in notions of technical efficiency, often involves a narrow focus on the thermal performance of a building, with the focus being on the energy required to maintain what is widely considered to be an optimal room temperature of 21 °C (Lorek & Spangenberg, 2017; Shove, 2018). However, as noted by Chappells and Shove (2005), there is more to (thermal) comfort than temperature (p.33). For the households in our analysis, thermal comfort was achieved relationally, through biographically textured experiential and sensory engagement with the environment, resulting in thermal comfort practices where wearing more layers of clothing, wrapping up in blankets or moving to warmer rooms (that is, warming the body, not the room) was the most efficient way of keeping warm (see also Cupples et al., 2007; Pink, 2012; Madsen 2018a; 2018b; Vannini & Taggart, 2013b; 2014, Shove, 2018).

Practices, or ‘ways of doing’, are deeply connected to meaningful identificatory positions that are reflected in the ways that we justify/make sense of what we do. The process of home-making, for instance, can entail the creation of sensibilities to aesthetic changes that are deemed acceptable (i.e. ‘good’) within older homes (see also Sunikka-Blank & Galvin, 2016). Both Gwilyms and Dreyers had altered the physical structures of their respective dwellings to better fit with their ideas and visions for their homes. For the Gwilyms for example, cosiness and light were deeply valued, whilst for the Dreyers, creating more space for their growing family, without compromising their home’s historical integrity was a major concern. Aesthetic and structural changes are thus not only influenced by the materiality of the home, but are also shaped by idealised notions of what it means to live a ‘good’ life in older homes, as well as expectations for the future; matters of concern that, in the narratives presented in this paper, have little to do with technical notions of efficiency.

Living well in older homes is, evidently, not an easy feat; in both narratives, living well often means avoiding cold draughts and damp, which are sources of great discomfort. In this vein, the subtle discourse of stoicism and resilience in both narratives could also be interpreted as a discursive means of protecting against being labelled as energy vulnerable. Neither household (and indeed, none in the wider sample) explicitly described themselves as being vulnerable, despite their greater propensity to be classified in such a way given the materiality of their respective homes (old, solid-walled) and their location (rural, off-grid). Instead, both households recognise that living in such homes require greater levels of personal (bodily/mental) energy: a form of energy that is rarely considered in notions of technical efficiency (Shove, 2018). Moreover, in both narratives, anticipated future changes relating to aging are acknowledged as having the potential to make some household members

less resilient and capable of adhering to their negotiated understandings of comfort. In other words, as individuals progress through the lifecourse their (physical/mental) energy and thermal comfort needs will change in ways that may no longer be compatible with the needs of their homes as ‘inanimate actants’. Remaining in such homes without altering the materiality of the dwelling and their associated thermal comfort practices in old age is likely to push elderly individuals into energy vulnerability.

Lastly, our analysis suggests that ‘convenience’ and ‘ease’ aren’t always critical to a life worth living, as people can draw meaning from hard work and attendant *inconvenience* (see also Groves *et al.*, 2016a; Royston, 2014; Vannini & Taggart, 2013b; 2014). This paper has demonstrated that the relationship between people and their homes – manifested in ideas about hard work - matters to people as it aligns with, and adds to, their position as resilient and stoic. When articulated within narratives of everyday life, such as those shown in this paper, such stoical positions configure aspects of subjectivity in ways that carry affective depths because of the way they are channelled through a lifetime of experiences. Technical efficiency and its related conceptualisation of thermal performance only consider energy that is networked into homes and serve as the input to the services that people use, disregarding other forms of energy (Shove, 2018; 783). However, as is evident in our analysis, networked energy is not the sole form of energy that is utilised in the carrying out of everyday practices; human (i.e. bodily/mental) energy also plays a part in the accomplishment of thermal comfort, particularly for those that live with technologies that require more corporeal engagement (see also Royston, 2014; Shove, 2018; Vannini & Taggart, 2013b; 2014).

Conclusion

This paper set out to explore the thermal comfort practices of households living in older ‘inefficient’ homes by drawing on in-depth narrative data with two households living in such dwellings. Drawing on insights from practice-theory, we understand thermal practices in the house as home as resulting from a complex interweaving of the social and the technical, generating particular patterns of energy use. Despite what theories of social practice might elucidate in terms of thermal comfort practices however, we argue that paying attention to what matters to people (i.e. their relationships with people, places, and the materialities of their homes) through situated stories of lived experiences enables us to deepen and enrich our understanding of everyday meaning making when it comes to thermal comfort practices in older, ‘inefficient’ homes. As well as reflecting their mutual shaping within relationships that

are experientially, culturally and historically co-constitutive, thermal comfort practices and their related emplaced identities are configured by the dynamic processes through which practices and modes of being become entangled together in ways that make a life worth living (see Henwood *et al.*, 2016). Taking such a view enables us to understand achieving thermal comfort as a relational process that involves tinkering and improvising as individuals seek to balance different purposes/goals. Moreover, current thermal comfort practices are often shaped by past experiences as well as anticipated futures, and so, are not only relational but also constantly in flux. The logic that underlies the seeking of thermal comfort therefore, is not one of maximisation, as is the case with technical efficiency, but rather of having needs satisfied in a meaningful way, so as to live sufficiently well.

Acknowledgements:

The authors would like to thank the families that took part in the research, and would like to acknowledge the contribution of Professor Nick Pidgeon, Director of the Understanding Risk Group at Cardiff University, in the development and completion of the project. Special thanks is also extended to colleague, Chris Groves, for his invaluable assistance along the way.

Funding:

This work was supported by the Economic and Social Research Council [grant number: ES/J500197/1 R78173X], [grant number: RES-628-25-0028], and the FLEXIS project, which is part-funded by the European Regional Development Fund (ERDF), through the Welsh Government.

Bibliography

- Anderson, W., White, V., & Finney, A. (2012). Coping with low incomes and cold homes. *Energy Policy*, 49, 40-52.
- Archer, M., & Donati, P. (2015). The Plural Subject versus the Relational Subject. In P. Donati, & M. Archer, *The Relational Subject*. Cambridge: Cambridge University Press.
- Atkinson, J., Littlewood, J., Geens, A., & Karani, G. (2015). Did ARBED I Save Energy in Wales' Deprived Dwellings. *Energy Procedia*, 83(1), 444-453.
- Banfill, P., Simpson, S., Haines, V., & Mallaband, B. (2012). Energy-led retrofitting of solid wall dwellings: technical and user perspectives on airtightness. *Structural Survey*, 30(3), 267-279.

- Bartiaux, F., & Reátegui Salmón, L. (2014). Family Dynamics and Social Practice Theories An Investigation of Daily Practices Related to Food, Mobility, Energy Consumption, and Tourism. *Nature and Culture*, 9(2), 204-224.
- BEIS. (2016). *Household Energy Efficiency Headline Release*. Retrieved September 2016, from https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/554417/Headline_Release_-_HEE_stats_22_Sept16_final.pdf
- Blunt, A., & Dowling, R. (2006). *Home*. London : Routledge .
- Boardman, B. (2007). *Home Truths: A low-carbon strategy to reduce UK emissions by 80%by 2050*. University of Oxford's Environmental Change Institute. Oxford: University of Oxford.
- Butler, C., Parkhill, K. A., Shirani, F., Henwood, K., & Pidgeon, N. (2014). Examining the Dynamics of Energy Demand Reduction through a Biographical Lens. *Nature and Culture*, 9(2), 164-182.
- CCC. (2010). *Building a low-carbon economy –the UK’s innovation challenge*. London: Committee on Climate Change.
- Chappells, H., & Shove, E. (2005). Debating the Future of Comfort: Environmental Sustainability, Energy Consumption and the Indoor Environment. *Building Research & Information*, 33(1), 32-40.
- Cupples, J., Guyatt, V., & Pearce, J. (2007). "Put on a jacket, you wuss": cultural identities, home heating, and air pollution in Christchurch, New Zealand. *Environment and Planning A*, 39, 2883-2898.
- Day, R., & Hitchings, R. (2011). "Only old ladies would do that": Age stigma and older people's strategies for dealing with winter cold. *Health & Place*, 17(4), 885-894.
- De Vet, E. (2017). Experiencing and responding to everyday weather in Darwin, Australia: The important role of tolerance. *Weather. Climate and Society*, 9(2), 141-154.
- DECC. (2012). *Energy Consumption in the United Kingdom: 2012, DECC Factsheet*. Retrieved September 2016, from <https://www.gov.uk/government/statistics/energy-consumption-in-the-uk>
- DECC. (2013). *Smart meters: A guide*. Retrieved November 2016, from <https://www.gov.uk/guidance/smart-meters-how-they-work#the-new-meters>
- DECC. (2014). *Delivering UK Energy Investment*. Retrieved November 2017, from https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/331071/DECC_Energy_Investment_Report.pdf
- Ellsworth-Krebs, K., Reid, L., & Hunter, C. J. (2015). Home –ing in on domestic energy research: “House,” “home,” and the importance of ontology. *Energy Research & Social Science*, 6, 100-108.
- Figge, F., Young, W., & Barkemeyer, R. (2014). Sufficiency or efficiency to achieve lower resource consumption and emissions? The role of the rebound effect. *Journal of Cleaner Production*, 69, 216-224.
- Finn, M., & Henwood, K. (2009). Exploring masculinities with men’s identificatory imaginings of first-time fatherhood. *British Journal of Social Psychology*, 48(3), 547-462.
- Fouseki, K., & Cassar, M. (2014). Energy Efficiency in Heritage Buildings — Future Challenges and Research Needs. *The Historic Environment: Policy & Practice*, 5(2), 95-100.
- Gram-Hanssen, K. (2010). Residential Heat Comfort Practices: Understanding Users. *Building Research & Information* , 38(2), 175-186.
- Gram-Hanssen, K. (2014a). Existing buildings - Users, renovations and energy policy. *Renewable Energy*, 61, 136-140.

- Gram-Hanssen, K. (2014b). Retrofitting owner-occupied housing: remember the people. *Building Research & Information*, 42, 462-476.
- Groves, C., Henwood, K., Shirani, F., Butler, C., Parkhill, K., & Pidgeon, N. (2016). The grit in the oyster: using energy biographies to question socio-technical imaginaries of “smartness”. *Journal of Responsible Innovation*, 3(1), 4-25.
- Hall, S. (2011). Exploring the ‘ethical everyday’: An ethnography of the ethics of family consumption’. *Geoforum*, 42(6), 627-637.
- Hamilton, O. (2017). Senses of the home. . In J. Lloyd, & E. & Vasta, *Reimagining Home in the 21st Century*. . Cheltenham: Edward Elgar Publishing.
- Hargreaves, T. (2011). Iying social practice theory to pro-environmental behaviour change. *Journal of Consumer Culture*, 11(1), 79–99.
- Henderson, S., Holland, J., McGrellis, S., Sharpe, S., & Thomson, R. (2012). *Using case histories in qualitative longitudinal research*. Retrieved November 2016, from Timescapes Methods Guide Series, Guide No 6.: <http://www.timescapes.leeds.ac.uk/assets/files/methods-guides/timescapes-holland-case-histories-in-ql.pdf>
- Henwood, K., & Coltart, C. (2012). Retrieved February 2017, from Researching Lives Through Time: Analytics, Narrative and the Psychosocial: <http://www.timescapes.leeds.ac.uk/assets/files/methods-guides/timescapes-henwood-researching-lives-through-time>
- Henwood, K., Groves, C., & Shirani, F. (2016). Relationality, entangled practices, and psychosocial exploration of intergenerational dynamics in sustainable energy studies. *Families, Relationships and Societies*, 5(3), 393-410.
- Henwood, K., Pidgeon, N., Groves, C., Shirani, F., Butler, C., & Parkhill, K. (2016). *Energy Biographies Research Report*. Cardiff: Cardiff University.
- Hitchings, R. (2011). Researching Air-conditioning Addiction and Ways of Puncturing Practice: Professional Office Workers and the Decision to Go outside. *Environment and Planning A*, 43(12), 2838-2856.
- Judson, E., & Maller, C. (2014). Housing renovations and energy efficiency: insights from homeowners' practices. *Building Research & Information*, 42, 501-511.
- Lorek, S., & Spangenberg, J. (2017). *Stocktaking of social innovation for energy sufficiency*. EUFORIE - European Futures for Energy Efficiency. Deliverable 5.3.
- Madsen, L. (2018a). Materialities shape practices and notions of comfort in everyday life. *Building Research & Information*, 46(1), 71–82.
- Madsen, L. (2018b). The Comfortable Home and Energy Consumption. *Housing, Theory & Society*, 35(3), 329-352.
- Madsen, L., & Gram-Hanssen, K. (2017). Understanding comfort and senses in social practice theory: Insights from a Danish field study. *Energy Research and Social Science*, 29, 86-94.
- Maller, C., Horne, R., & Dalton, T. (2012). Green Renovations: Intersections of Daily Routines, Housing Aspirations and Narratives of Sustainability. *Housing, Theory and Society*, 29, 255-275.
- Mallett, S. (2004). Understanding Home: A Critical Review of the Literature. *The Sociological Review*, 52(1), 62-89.
- Middlemiss, L., & Gillard, R. (2015). Fuel poverty from the bottom-up: Characterising household energy vulnerability through the lived experience of the fuel poor. *Energy Research & Social Science*, 6(1), 146-154.
- Milbourne, P. (2011). Conclusion: Continuity and Change in Rural Wales. In P. Milbourne, *Rural Wales in the Twenty-First Century: Society, Economy and Environment*. Cardiff: University of Wales Press.

- Morrison, K., & Moyes, D. (2018, June). *Off-gas consumers-Updated information on households without mains gas heating*. Citizens Advice Scotland. Consumer Futures Unit publication series 2018/19-3.
- Office of Fair Trading. (2011). *Off-Grid Energy: An OFT market study*. Retrieved from http://webarchive.nationalarchives.gov.uk/20140402222541/http://www.oft.gov.uk/shared_of/market-studies/off-grid/OFT1380.pdf
- Ofgem. (2015). *Insights paper on households with electric and other non-gas heating*. Ofgem.
- Patton, M. (2015). *Qualitative research & evaluation methods: Integrating theory and practice (4th ed.)*. Thousand Oaks, CA: Sage.
- Pink, S. (2012). *Situating Everyday Life*. London: Sage.
- Rinkinen, J., & Jalas, M. (2017). Moving home: houses, new occupants and the formation of heating practices. *Building Research & Information*, 45(3), 293-302.
- Royston, S. (2014). Dragon-breath and snow-melt: Know-how, experience and heat flows in the home. *Energy Research and Social Science*, 2, 148-158.
- Seamon, D. (2014). Lived Emplacement and the Locality of Being: A Return to Humanistic Geography? In S. Aitken, & G. Valentine, *Approaches to Human Geography: Philosophies, Theories, People and Practices*. London: Sage.
- Shove, E. (2003). *Comfort, Cleanliness and Convenience: The Social Organization of Normality*. Oxford: Berg.
- Shove, E. (2018). What is wrong with energy efficiency? *Building Research & Information*, 46(7), 779-789.
- Shove, E., & Walker, G. (2014). What is Energy For? Social Practice and Energy Demand'. *Theory, Culture & Society*, 31(5), 41-58.
- Shove, E., Pantzar, M., & Watson, M. (2012). *The Dynamics of Social Practice: Everyday life and how it changes*. London: Sage.
- Simonsen, K. (2007). Practice, Spatiality and Embodied Emotions: An Outline of a Geography of Practice. *Human Affairs*, 2, 168-181.
- Statistics for Wales. (2008). *Living in Wales*. Welsh Assembly Government.
- Strengers, Y. (2011). Negotiating Everyday Life: The Role of Energy and Water Consumption Feedback. *Journal of Consumer Culture*, 11(3), 319-338.
- Strengers, Y., Nicholls, L., & Maller, C. (2014). Curious energy consumers: Humans and nonhumans in assemblages of household practice. *Journal of Consumer Culture*, 16(3), 761-780.
- Sunikka-Blank, M., & Galvin, R. (2016). Irrational homeowners? How aesthetics and heritage values influence thermal retrofit decisions in the United Kingdom. *Energy Research & Social Science*, 11, 97-108.
- Thomas, G. (2011). *Energy costs and fuel poverty in rural Welsh communities*. Welsh Assembly Government. Retrieved from National Assembly: <http://www.assembly.wales/NAFW%20Documents/ki-011.pdf%20-%2003112011/ki-011-English.pdf>
- Thomas, G., Groves, C., Henwood, K., & Pidgeon, N. (2017). Texturing Waste: Attachment and Identity in Every-Day Consumption and Waste Practices. *Environmental Values*, 26(6), 733-755.
- Thomson, R. (2007). The Qualitative Longitudinal Case History: Practical, Methodological and Ethical Reflections. *Social Policy and Society*, 6(4), 571-582.
- Toulouse, E., Le Du, M., George, H., & et al. (2017). Stimulating energy sufficiency: Barriers and opportunities. *ECEEE Summer Study* (pp. 59-70). Toulon: ECEEE.
- Vannini, P., & Taggart, J. (2013). Making Sense of Domestic Warmth: Affect, Involvement, and Thermoception in Off-grid Homes. *Body & Society*, 20, 61-84.

- Vannini, P., & Taggart, J. (2013b). Onerous consumption: The alternative hedonism of off-grid domestic water use. *Journal of Consumer Culture*, 16(1), 80-100.
- Vannini, P., & Taggart, J. (2014). Making Sense of Domestic Warmth: Affect, Involvement, and Thermoception in Off-grid Homes. *Body & Society*, 20(1), 61-84.
- Warde, A. (2005). Consumption and theories of practice. *Journal of Consumer Culture*, 5(2), 131-153.
- Whitman, C., Prizeman, O., & Barnacle, M. (2016). *Correlating maintenance, energy efficiency and fuel poverty for traditional buildings in the UK*. Cardiff University, Welsh School of Architecture. Cardiff: Welsh School of Architecture, Cardiff University.
- Wilhite, H., & Norgard, J. S. (2004). Equating efficiency with reduction: A self-deception in energy policy. *Energy & Environment*, 15(6), 991-1009.
- Wilhite, H., Nakagami, H., Masuda, T., Yamaga, Y., & Haneda, H. (1996). A Cross-cultural Analysis of Household Energy Use Behaviour in Japan and Norway. *Energy Policy*, 24(9), 795-803.
- Williams, E., & Doyle, R. (2016). *Rural Poverty in Wales: Existing Research and Evidence Gaps*. Public Policy Institute of Wales.