



Original research article

‘That’s when we started using the living room’: Lessons from a local history of domestic heating in the United Kingdom



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ABSTRACT

Indoor climate control forms a major share of residential energy demand. Policy measures to curb this demand tend to focus on energy-efficient technologies. However, while the energy efficiency of domestic heat provision in the United Kingdom (UK) has increased considerably over the past century, demand for space heating has increased as well. This paper offers a distinctive explanation of increasing levels of domestic demand for space heating. It is grounded in a case study on changes in social housing design and use in the UK between 1920 and 1970. Based on detailed analysis of the co-evolution of housing circumstances, heating provision and patterns of everyday practice, the paper argues that increases in demand for space heating can be understood as a spreading of such demand over domestic space and time. In explaining this spread, it identifies three key contributing processes, comprising: 1) materialisations of ideals of separating domestic activities; 2) delegations of work and control to infrastructures and appliances; and 3) shifts towards more indoor, sedentary activities. It closes by considering how understanding these processes historically can inform contemporary energy policy to curb domestic energy demand for heating, and how the distinctive approach taken has implications for energy research.

1. Introduction

Worldwide, energy use in buildings comprises approximately one third of final energy consumption ([1], p. 294), of which indoor climate control has been estimated to be roughly fifty per cent [2]. Indoor climate control is therefore a focal target in energy policies. As Nobuo Tanaka, executive director of the International Energy Agency puts it:

‘Energy-efficient and low/zero-carbon energy technologies for heating and cooling in buildings will play a crucial role in the energy revolution’

‘([2], p. 1).

However, the promises of energy-efficiency to lead to required reductions in energy demand have long been questioned, on two key fronts: first, because of rebound effects, where savings trigger new forms of consumption [3–5]; second, because of the inherently limited effects of aiming to maintain current, unsustainable standards in more efficient ways, without questioning those standards themselves [6,7]. To open up new avenues for energy policy to confront these shortcomings, this article examines relations between changing domestic heating provisions and escalating standards of domestic demand for space heating in the United Kingdom. In Section 4.4, we link this

specific case back to the global issue of indoor climate control in buildings.

Over the past century, domestic heating systems in the UK have become far more energy efficient. Muthesius, in his seminal study of ‘The English House’, mentions that for the coal fired open hearth popular in the early 1900s, only fourteen per cent of the heat effect would benefit the room ([8], p. 182). Since then, heating systems have changed from open coal fires to predominantly gas central heating. While just 5% of UK households had central heating in 1960 [9], today this is over 90%, of which the great majority is fuelled by gas [10]. In gas central heating, the conversion of fuel into heat is more efficient than in open coal fires – current standards require new boilers to be at least 86% efficient [10]. In parallel, homes have become easier to heat due to better thermal insulation. However, while detailed data of domestic energy demand for heating from before 1970 are lacking, the level of domestic coal consumption first recorded in 1943 [11], and more precise records in the latest UK Housing Energy Fact File [10], covering the period from 1970 up to 2011, indicate that it has not gone down in line with increasing efficiency. What this means is that over the past century, *demand for heat* in homes has increased.

In the UK, space heating accounts for approximately two thirds of average total energy use in homes [10], and home heating systems are

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held responsible for about 20% of the total UK carbon emissions [12]. Given the UK government's legal commitment to reduce carbon emissions by 2050 by 80% compared to 1990 emissions [13], domestic heating is an explicit target area in national carbon policies [14]. However, while more efficient domestic heating systems feature prominently in envisioned futures – in the form of stimulating the uptake of heat pumps, district heating and thermal insulation [15,16], efforts to address levels of demand for heat remain limited to measures stimulating households to 'turn down the thermostat by one degree centigrade' ([16], p. 90; [15], p. 80). Although such measures have potential to render reductions in energy demand, we hold that a deeper understanding of the processes by which levels of domestic demand for heat have increased historically is necessary to inform policies with potential to achieve reductions on the scales required, because they engage with standards of home heating.

In pursuit of this agenda, the paper focuses on gaining a better understanding of the co-evolution of domestic heating provision and levels of demand for heat. The following section sets out existing understandings of increasing domestic demand for heating and outlines the theoretical and methodological starting points for the case study underlying this paper. After a description of the study's specific aims and methods, the paper moves on to introduce and work through three interrelated historic processes identified in the case, covering a time span between 1920 and 1970, which we argue to have played key roles in the spread of demand for space heating over domestic space and time. The case discussion closes by highlighting how insights into these historic, local processes shed new light on the dynamics of domestic demand for heating more broadly, and discusses some wider implications for energy policy.

2. Literature review: understanding the dynamics of domestic heating

While reports like the Housing Energy Fact File identify increases in demand for domestic heating over the past decades, explanations of this phenomenon remain speculative. Computational modelling of changes in the UK housing stock and levels of domestic energy demand for heating suggests an increase in average indoor temperatures from 13.7C in 1970 to 16.9C in 2008 [10]. The report mentions increasing home sizes, people heating their rooms to higher temperatures and heating more rooms for longer as possible explanations for this increase in heat demand ([10], p. 35). However, various housing surveys have found that the average size of newly built homes has gradually *decreased* since a peak in the 1950s [17,18]. Evans and Hartwich [19], for example, use EU housing statistics to show that, for 1996, the average size of newly built homes was around 10% smaller in comparison to the existing stock. Moreover, Shipworth [20] collected empirical data on changes in thermostat settings in owner occupied houses with central heating between 1984 and 2007, but found no evidence of higher temperature settings over time. This leaves the assumption that more rooms have become heated for longer.

A general explanation for this phenomenon, linking it to changes in heating provision, is that it was caused by the gradual transition from coal fires to gas central heating (notably, [21,22]). In these studies, which are grounded in theories of sociotechnical transitions [23,24], the emphasis is upon processes of technological and institutional change, with changes in the demand for energy services – such as demand for heated spaces – discussed in abstract terms, and featuring mainly as consumer choice influenced by prices of energy services. An attention to the sociotechnical relations at stake in changes like these means such approaches offer a more sophisticated understanding that do those such as thermal modelling. However, the assumption that the diffusion of new energy technologies happened because they provided 'useful services to end users' ([25], p. 84) passes over the fact that something must have changed in everyday life for these new technologies to *become of use* to large numbers of people.

Focusing more on changes in domestic demand for heating, a range of studies have engaged with indoor climate control from an end-user perspective. Shove et al. [7,26,27] focus on notions of comfort and how they have changed over time in interaction with professional standards and heating technologies. Other studies focus more on heating practices, and how they are configured [28–30], or reconfigured when encountering new heating technologies, such as heat pumps [31], or when moving home [32]. However, recent efforts in the area of understanding energy demand are arguing for an approach that views demand as an outcome of the full range of domestic activities, or practices [33]. Considering these practices as 'partly constituted by, and always embedded in material arrangements' ([34], p. 174), implies a move away from thermal comfort in itself, towards situating changing expectations of comfort, or levels of demand for heat in understandings of 'how complexes of social practices and infrastructures develop together' ([34], p. 175).

The account offered in this paper thus focuses on the intersections between material arrangements of the home and everyday domestic practices. Moreover, it builds on the idea that historical research can provide insights for contemporary energy challenges [35]. This facilitates a focus not on heating technologies themselves, or only on the practices involving direct engagement with them. Instead, of central concern are the ways demand for heat is implicated in the changing patterns of practices comprising daily life. Based on these starting points, energy demand for domestic heating is conceptualised as emergent from interactions between changes in material arrangements (infrastructures, heating systems, technologies, buildings) and temporal and spatial patterns of social practice in the home and beyond, such as cooking, shopping, bathing, eating, parenting, playing, doing homework, working, sleeping, getting around and more. In order to develop this account, the research underlying this paper aimed to gain an understanding of how changes in housing design, heating infrastructures and domestic practices interacted and shaped each other over time.

3. Methodology: capturing the co-evolution of practices and material arrangements

The account results from a research project the aim of which was to better understand how changes to the patterns of daily life, with consequence for energy demand, relate to changes in technologies, infrastructures and institutions of supply. The research was conducted between 2014 and 2016.¹ Exploring these relationships in line with the theoretical approach outlined above is empirically challenging, involving a level of detail which is only possible through focused qualitative research, enabled by a case study approach [36]. Our research aim led to an ambitious empirical strategy combining archival work with oral history interviewing, within a specific case study locale. Details of changes in housing design were obtained from archival material on municipally provided social housing – 'council houses', both on local and national scales. Related accounts of corresponding local changes in specific aspects of daily life were collected through oral history interviews.

Council housing was selected as a case study topic because of the accessibility of its detailed documentation over the extended period of fifty years, which also corresponds with the shift from coal fires to gas central heating. Council housing provision in the UK had its most active years from the 1920s to the 1970s and was responsible for a substantial portion of housing supply during this period so that by 1975, nearly one third of the UK housing stock consisted of council houses [37]. Council housing meant that local authorities commissioned the design and building of new estates, which were rented out, or in some cases sold to

¹ This project is part of the programme of research comprising the DEMAND (*Dynamics of Energy, Mobility and Demand*) centre – www.demand.ac.uk.

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