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Why do homeowners renovate energy efficiently? Contrasting perspectives and implications for policy

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ABSTRACT

This paper contrasts two perspectives on energy efficient home renovations from applied behavioural research on energy efficiency and from sociological research on homes and domestic life. Applied behavioural research characterises drivers and barriers to cost-effective renovations, and identifies personal and contextual influences on homeowners' renovation decisions. Research findings inform policies to promote energy efficiency by removing barriers or strengthening decision influences. Sociological research on domestic life points to limitations in this understanding of renovation decision making that emphasises houses but not homes, energy efficiency but not home improvements, the one-off but not the everyday, and renovations but not renovating. The paper proposes a situated approach in response to this critique. A situated approach retains a focus on renovation decision making, but conceptualises decisions as processes that emerge from the conditions of everyday domestic life and are subject to different levels of influence. This situated approach is tractable for energy efficiency policy while recognising the ultimate influences that explain why homeowners decide to renovate.

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1. Introduction

Efforts to promote energy efficiency in the home have waxed and waned over the decades since the oil shocks in the 1970s sharply increased the financial incentive for reducing energy use. Policy concerns about energy efficiency are again ascendant, spurred by climate mitigation and energy security goals. Renovating existing buildings to improve their efficiency is an important element of climate policy [1]. In the UK, for example, long-term emission-reduction targets imply “one building would need to be retrofitted every minute for the next 40 years at an estimated cost of £85 billion for homes alone” (p. 500, [2]).

The majority of homes are owner-occupied: 70% on average across the EU, and 67% in the US and the UK [3]. In owner-occupied homes, renovations are necessarily preceded by homeowners' decisions to renovate. Energy efficiency policy seeks to influence those decisions. As noted in a recent global review, “retrofitting existing buildings is a discretionary investment . . . building owners . . . need to be persuaded not only of the merits of energy investment, but to finance it and bear whatever disruption it entails” (p. 734, [4]).

Policies for encouraging and supporting energy efficient renovation decisions by homeowners are widespread. They include: energy audits and assessments; energy performance certificates or ratings at the point of sale; financial incentives and capital support including grants, subsidies, tax credits, low interest loans, and third party financing; certification and training of contractors; community or neighbourhood renovation schemes (collective procurement, support for vulnerable or low income households); marketing and information campaigns. Although they vary considerably in design and implementation, these types of policy characterise efforts to promote energy efficient renovation decisions in the UK [5], in the EU [6], in North America [7,8], in China [9], and in other markets worldwide [10,11].

The common premise of all such policies is that homeowners are motivated to renovate to save energy and money, but are prevented from doing so by capital constraints and uncertainties about energy savings, financial returns, and contractors' quality and reliability. This premise is supported by a large body of ‘applied behavioural research on energy efficiency’. We use this label to characterise a body of research concerned foremost with empirical findings on behaviour and decision making, particularly in a domestic context, and with how these findings can be applied in policy or intervention design. Applied behavioural research on energy efficiency draws on microeconomics, social psychology and technology

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Box 1: Definitions and terms.

We use the term ‘renovations’ to mean major structural improvement work to a domestic property, i.e., “*substantive physical changes to a building*” (p. 499, [2]). Renovations have high time, cost, and skill requirements, and are typically carried out by professional contractors with appropriate technical expertise [17].

‘Energy efficient renovations’ typically involve changes or upgrades to the building envelope – windows, doors, cavity or loft insulation – or the heating and hot water systems [122]. In contrast, we use the term ‘amenity renovations’ to describe changes to kitchens, living areas, bathrooms, and so on. These are not primarily energy-related although may include some efficiency measures.

adoption research (e.g., [12,13]), as well as grey literature on consumer behaviour and marketing (e.g., [14]). It enshrines “*a more intense and narrower interest in instrumentally mobilizing people to achieve ... energy use reduction*” (p. 33, [15]). This is in contrast to research that advances theory, engages with social or cultural issues such as status and power, or reflects critically on policy rationales and how research problems are framed [16].

Applied behavioural research on energy efficiency represents individual homeowners making reasoned decisions, subject to personal and contextual influences, in order to achieve certain outcomes which can be analysed in isolation from domestic life.

Maller and Horne [17] argue that this depiction of reasoned, goal-oriented and isolable decisions are part of a ‘rationalisation discourse’ in energy efficiency research that highlights individual choice and rationality. This fails to address “*the conventions and practices of households ... which have remained largely in the shadows*” (p. 61, [17]). Several decades of sociological research into these conventions and practices have established a rich and compelling critique of applied behavioural research on energy efficiency (e.g., [18,19,20]). This critique rejects individuals and their cognitive or decision-making processes as the central objects of enquiry. It understands renovations through the lens of the routine, everyday, and socially shared practices that constitute life at home.

The aim of this paper is to show how situating applied behavioural research on energy efficiency within a broader conceptualisation of renovating, homes and households can enrich and strengthen an instrumental understanding of why homeowners decide to renovate energy efficiently. This in turn can broaden the evidence base for energy efficiency policy. By ‘situated’ we mean making descriptively realistic renovation decision processes endogenous to the dynamics of life at home.

The paper is structured in three parts. First, we synthesise the key approaches and findings of applied behavioural research relevant to energy efficient home renovations, and show how it informs energy efficiency policies. Second, we develop a systematic critique of this body of applied research along conceptual, empirical and methodological lines. Third, we set out a situated approach to renovation decision making that conceptualises renovation decisions as processes emerging from the conditions of everyday domestic life, subject to different levels of influence. We draw implications for energy efficiency policy from this situated approach. These include supporting efficiency measures as part of broader amenity home improvements. Box 1 defines key terms used throughout this paper.

Our paper contributes to this journal’s engagement in ongoing debates about energy efficiency research and the effectiveness of policy. Stern [21] notes a specific lack of cross-disciplinary studies needed to explain the complexities of individual and household decision making processes related to energy. Lutzenhiser [16] goes further in characterising the “*singularly narrow theoretical and*

policy model of energy use and energy savings that governs energy efficiency activities” (p. 141). He argues that this model or way of thinking is enshrined in an “*energy efficiency institutional complex*” that coordinates the actions of policymakers, utilities, and service providers, and squeezes out any receptiveness to critical social science. Moezzi and Janda [15] call for a scope of action on energy efficiency that moves beyond individual decisions and actions in the home and emphasises the social nature of energy use. Wallenborn and Wilhite [22] point to a different under-researched aspect of domestic energy use: its physicality. They argue that an emphasis on “*rational choice and methodological individualism*” (p. 58) for understanding energy consumption has ignored the importance of sensory and physical experiences, and the knowledge embodied in such experiences. Providing a specific example, Royston [23] focuses on how physically experiencing heat flows generates various forms of know-how or practical knowledge that conditions energy use in homes.

Improving thermal comfort is frequently cited by homeowners as a motivation for renovating, but applied behavioural research on energy efficiency pays scant attention to the physicality of domestic life and the mundane skills and competences used in heating homes. This shortcoming is picked up in the situated approach to renovation decisions proposed in this paper in an effort to show how social science research can explain how and why homeowners decide to renovate energy efficiently.

2. Applied behavioural research on energy efficiency

This section synthesises a large body of applied behavioural research on energy efficiency with relevance to home renovations. It sets up the dominant ‘drivers and barriers’ framing of renovation decision making, and shows how formal models of renovation decisions overwhelmingly emphasise financial attributes. It considers a range of personal and contextual influences on decisions, and gives examples of how research informs policy design.

2.1. Drivers, barriers, and the energy efficiency gap

Cost savings from efficiency improvements can provide short payback periods on capital invested [24,25], as well as a host of co-benefits such as improved thermal comfort, reduced draughts and condensation, and increased property value [26]. Consumer behaviour studies commonly find households report positive attitudes and strong intentions towards energy efficient renovations [27,28,14].

Yet installation rates of efficiency measures are stubbornly slower than instrumental drivers of renovation decisions would suggest. The ‘energy efficiency gap’ between technical and economic potential on the one hand, and actual market adoption on the other, has long been documented [29]. Explanations tend to invoke barriers to otherwise cost-effective technology adoption decisions: “*If there are profits to be made, why do markets not capture these potentials? Certain characteristics of markets, technologies and end-users can inhibit rational, energy-saving choices...*” (p. 418, [30]).

Commonly identified barriers to energy efficient renovations in owner-occupied homes relate to finances, information and decision making. Financial barriers include capital availability and strong aversion to delayed gains [31]. Information barriers include a perceived lack of credible and available information on efficiency measures [32], low salience or misperceptions of energy costs [33], and uncertainties about contractor reliability and cost-saving outcomes [34]. Decision-making barriers include the cognitive burden (or transaction costs) of making complex and irreversible decisions

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