BEHAVE 2021
6th European Conference on Behaviour and Energy Efficiency
Copenhagen, 21-23 April 2021

PROCESS PERSPECTIVE ON HOME RETROFIT DECISIONS: A QUALITATIVE METASYNTHESIS

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Keywords: retrofit, energy efficiency, homeowners, process, qualitative metasynthesis

1. Introduction

The promotion of low carbon home retrofit among homeowners is widely recognised as an important strategy to reduce operational energy use in dwellings and mitigate climate change. Building research and policy has traditionally seen the decisions that homeowners make with regard to low-carbon retrofit as isolated events [1]. Nevertheless, research on domestic retrofit shows that retrofit decisions are often spread over lengthy time periods [2]. Driven by the evidence on the temporal nature of retrofit decisions, this adopts a process research strategy [3] to review and produce a metasynthesis of evidence on homeowner retrofit decisions available in the literature.

2. Methodology and Sample

A qualitative metasynthesis approach is used to assemble process research view on retrofit decisions [4]. The approach is more than a summary of findings, as it offers novel interpretations of findings and a possibility to construct narratives larger than in any individual report reviewed.

Potentially relevant articles were identified by search with no timespan restrictions in Web of Science, Scopus and International Bibliography of the Social Sciences (IBSS) databases. Five search terms were used: *energy, home, retrofit, homeowner* and *qualitative research*. They were combined with the synonyms of each term via appropriate operators, i.e. Boolean, and together formed 61 search concepts. Qualitative studies eligible for inclusion were all those

with a rich description of retrofit processes that resulted in improved energy efficiency in owner-occupied dwellings. No geographical constraints were imposed. ‘Qualitative research’ was liberally defined as empirical research with human participants that used, what are commonly viewed, as qualitative techniques for sampling, data collection, data analysis and interpretation. Research conducted in any paradigm and guided by any theoretical framework was eligible for inclusion. Studies had to be written in English, and only peer-reviewed original journal articles were included. The search recall was 1,676 items, their titles and abstracts were checked for relevance.

Only ten articles were eligible for inclusion in the metasynthesis, which reflects the scarcity of the case study research on dwelling retrofit [5]. These ten articles are listed in references [6]–[15]. The content of every article was analysed with a reading guide, adapted from the original appraisal guide developed by Sandelowski and Barroso [4]. The analysis reports were coded to identify processes that lead towards or away from post-retrofit reduction in energy use.

Overall, the ten reports used in the synthesis constitute a combined sample of 18 energy retrofit cases in single-family owner-occupied dwellings, visible in the reports. All case households comprised of at least two members. The dwellings were of varied construction type with an age range from 19th century to mid-1960s. Sustainability-related retrofit activities ranged from fabric insulation only to in-depth retrofit to Passivhaus standard.

3. Results

The analysis highlighted the importance of three processes necessary to reduce domestic energy use via retrofit. First, the review highlighted the importance of the goal alignment process between the goals of different actors involved in the retrofit. Homeowner retrofit activity (or the absence of it) is often used as an indicator of homeowner retrofit goals and motivations (or a lack of them). However, the attribution of retrofit outcomes to homeowner intentions only is a simplification of reality. Homeowner retrofit decisions are shaped by various actors, such as contractors, advisors, planners and conservation officers [7], [16]. Each actor has often different understandings, motivations and expectations of the retrofit process [7], that in their totality can steer the retrofit decision closer to or further away from a low-carbon solution.

Second, the review highlighted the need to create an overarching vision of how to transform a house via retrofit into a technological system of a low-carbon dwelling. Low-carbon retrofit projects require typically the installation of a collection of energy-saving measures and appliances, and often the installation of energy-generation technologies such as photovoltaics. However, a simple amalgamation of individual measures and appliances is unlikely to result in the desired energy use savings [17]. Instead, a building should be considered as a system, as optimising the operational energy use of a whole system might be more efficient than

optimising its individual components [18]. An understanding of the building as a system is also necessary to minimise the risk of unintended consequences associated with low-carbon retrofit, such as reduced ventilation rates and poor indoor air quality [19], [20].

Third, the review highlighted the need to change everyday domestic practices post-retrofit to accommodate and maintain lower energy use. It should be noted that energy efficiency retrofit is not an ultimate goal in and of itself, but rather a necessary step to reduce operational energy use. The goal of such retrofit is to reduce energy use, not to support wasteful behaviour through increased efficiency of building components. An effective low-carbon retrofit should ideally facilitate a transition to more sustainable energy consumption practices. Instead, the review showed that pre-retrofit energy-related practices, such as cooling and heating, tend to carry on after low-carbon retrofit, even if they are less than optimal from an energy perspective in the new technical configuration of the house [14]. Moreover, the owners tend to carry retrofit activities to accommodate current, often non-sustainable, everyday practices [8].

4. Discussion and Conclusions

This metasynthesis focused on the temporal sequences of retrofit decisions by drawing on analyses done through process research, which revealed new areas that current policies should focus their efforts upon, for greater impact. The findings presented in this abstract highlight that homeowner retrofit decisions, or their absence, are better understood in relation to the actions of other relevant actors. The metasynthesis highlighted three processes necessary to achieve and sustain low-energy use post-retrofit: (i) the alignment of retrofit goals of the actors involved; (ii) the integration of the retrofit solutions in a technological system; (iii) the transition to more sustainable energy-consumption practices post-retrofit. All these processes are inherently social and are shaped in the process of homeowner interaction with various actors. Further research is necessary to look at how the dynamics of such interactions and the processes can lead towards or away from a reduced energy consumption post-retrofit.

Funding: This research was partially supported by the Economic and Social Research Council (UK) under the project Fast-tracking Low-Energy Use via Retrofit (FLEUR) [grant number: ES/V012606/1].

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