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Householder engagement with energy consumption feedback: the role of community action and communications

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HIGHLIGHTS

- We examine the challenge of householder engagement with energy consumption feedback.
- The potential of 'community action' and 'communications' is explored.
- These approaches are shown to support long-term engagement by householders.
- These approaches are also shown to support greater engagement by women.
- Recommendations for future IHD platforms and smart meter roll-outs are presented.

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ABSTRACT

The provision of energy consumption feedback on in-home displays (IHDs) has a prominent role in government strategies for domestic energy demand reduction. Research suggests that IHDs can support energy consumption reduction, but also that engagement with IHDs can be limited to men and is often short-term. In this paper, we draw on research carried out in Smart Communities, a two-year project in which electricity and gas consumption feedback played a key role. This study was distinctive because it was accompanied by a weekly email communications programme and was provided within the context of community action. Project findings suggest that, although by no means panaceas, approaches such as these can support long-term engagement with energy consumption feedback, including by women, and can support behaviour change.

1. Introduction

This paper is concerned with the role of energy consumption feedback as a route to householder action on energy consumption reduction. Drawing on empirical observations in a project called Smart Communities, our objective is to examine the potential of community action and communications programmes as routes to greater householder engagement with energy consumption feedback. The provision of electricity and gas consumption feedback to householders on in-home displays (IHDs) is an important energy demand reduction and management strategy in parts of Europe, the US, Canada, New Zealand and Australia (Darby, 2010). In the European Union, IHDs are encouraged by the Energy Efficiency Directive (European Commission, 2012). In the UK, where this case study is based, a nationwide roll-out of smart meters with IHDs in some 30 million homes – at a cost of between £11–12 billion – began in 2015 and is due for completion by 2020 (Department of Energy and Climate Change (DECC), 2015a). For advocates, smart meters with IHDs have a number of benefits. Most importantly from the perspective of this paper, IHDs provide householders with two forms of energy consumption feedback: near real-time feedback of current consumption and feedback of historical consumption in charts. The expectation is that householders will use this information to reduce their energy consumption and associated carbon emissions. Meanwhile, commercial organisations – such as British Gas (2015), iMeasure (2015) and OPower (2015) – are offering their own web and app based historical energy consumption feedback products. In addition, smart meters provide automated meter readings to energy suppliers, they communicate with smart appliances in the home and they make switching suppliers easier (DECC, 2015a).

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1.1. Research into the impact of energy consumption feedback

In early 2015, DECC published the results of its Smart Metering Early Learning Project, a large-scale qualitative and quantitative research project designed to understand the ways in which IHDs are being used by householders and ways in which their use might be enhanced (DECC, 2015b). This report is highly positive about the potential for energy consumption feedback via IHDs, stating: 'The vast majority of consumers involved in the research recalled being provided with an IHD, and in most cases they were still continuing to use them, up to two and a half years after installation. Continued use of the IHD to monitor consumption was associated with consumers being more likely to report energy saving benefits' (DECC, 2015b: 5).

The broader quantitative and qualitative research literature – which tends to focus on the electricity consumption – presents a more mixed picture. Meta-analyses of the extensive body of consumption data studies suggest that the impacts of IHDs vary widely – with average reductions in consumption of between 3% and 19% – depending on feedback formats, programme designs, and cultural, market and infrastructural contexts (Darby, 2006; Ehrhardt-Martinez et al., 2010; Stromback et al., 2011).

In common with DECC (2015b), qualitative studies have noted that engagement with IHDs can increase the visibility and salience of energy consumption and related behaviours, contribute to householder knowledge about their energy consumption, and prompt behaviour change and consumption reduction (e.g.: Grønhøj and Thøgersen, 2011; Hargreaves et al., 2010, 2013; Oltra et al., 2013; Strengers, 2011, 2013; Rettie et al., 2013; van Dam et al., 2010; Buchanan et al., 2014). However, these studies also note a number of constraints on the impacts of IHDs. In particular, studies note widely varying levels of engagement with IHDs across participants. For example, in their study, Murtagh et al. (2014) used qualitative data to broadly characterise the distribution of this variation as 20%/60%/20%, from low levels of engagement through to medium and higher levels. Studies identify a number of factors that constrain engagement. For instance, while energy, data, technology and management are motivating factors for some householders, for many more they are not (Strengers, 2013). For this reason, some of this work suggests, engagement with feedback is often limited to one household member, typically a man (Hargreaves et al., 2010; Strengers, 2013), although Murtagh et al. (2014) did not observe this gender distinction. Further, research suggests that differentiated levels of engagement within households often leads to negotiation and conflict between household members that can undermine efforts to change behaviour (Hargreaves et al., 2010). In addition, studies note that engagement is constrained since energy consumption feedback often lacks salience for many householders. This is partly because energy is invisible and is consumed only indirectly, but also because the units of measurement of energy are confusing to many householders (Hargreaves et al., 2010; Strengers, 2011).

Work that has examined the longer term impacts of IHDs presents an interesting tension. Hargreaves et al. (2013) suggest that engagement with IHDs tends to be short-lived, often because users feel that they are not learning anything new, or because changes in behaviour do not yield noticeable reductions leading to disillusionment. In contrast, on the basis of their meta-analysis, Stromback et al. (2011) suggest that long-term engagement with energy consumption feedback is possible, and that reductions in consumption can increase over time (as discussed earlier, DECC (2015b) also tends towards the first part of this conclusion). This suggests, perhaps, that change in the household takes longer than has been assumed in some studies. This apparent tension between reductions in engagement over time and gradual change over time is puzzling and bears further examination. Finally, some of this work suggests that IHDs do not challenge – and may reinforce – a raft of energy-consuming practices that are treated by householders as normal or immutable (Hargreaves et al., 2013; Strengers, 2013).

Wilhite and Ling (1995) have observed that the rationale for energy consumption feedback relies upon a relatively straightforward and linear relationship between: increased feedback, increased awareness or knowledge, changes in energy-use behaviour and decreases in consumption. Support for this rationale can be found in a range of theory. For instance, neoclassical economics emphasises the ways in which individuals respond to price signals (Weintraub, 2007), and the behavioural models of social psychology point to the relationships between information, knowledge and behaviour (Ajzen, 1985; Triandis, 1977). Sociologically-informed commentaries, though critical of the simplistic nature of this rationale, nonetheless emphasise the invisibility and immateriality of energy, and suggest that energy consumption feedback has the potential to render energy visible and material (Hargreaves et al., 2010, 2013; Shove, 2003; Pierce and Paulos, 2010). From a practice perspective, Shove et al. (2012) have reflected on the ways in which feedback 'feeds forward', and has the potential to shape future practice.

However, a conceptual critique of energy consumption feedback as a route to demand reduction has also emerged. Above all, this critique maintains that the assumption of causal links between information, knowledge and behaviour represents an oversimplification; for instance, see Shove (2010) on the broader behaviour change agenda. Strengers (2013) locates IHDs as part of a broader – possibly illusory – vision of a 'smart utopia'. Strengers argues that this rests upon a limited technological perspective and is characterised by a number of misapprehensions: technology and data are reliable responses to social problems; energy itself and the units in which it is measured are relevant and understandable to householders; householders are inclined towards resource management; and, everyday life is amenable to straightforward change. Noting the empirical observation that those who engage with energy consumption feedback are often men, Strengers (2013) coins the term, Resource Man, to capture the archetypal data- and energy-minded domestic energy consumption manager. Strengers (2013) argues that domestic energy consumption feedback could be of more value if it can be implemented in ways that acknowledge these misapprehensions, and in ways that are meaningful to householders within the contexts of their everyday lives and practices.

1.2. Proposals for future development

This body of literature contains two broad categories of proposals for the future development of energy consumption feedback. Of central relevance to this paper, the first category of proposals relates to the *context* within which energy consumption feedback is provided. Drawing on their meta-analysis, Stromback et al. (2011) highlight the benefits of direct communication with householders as part of feedback programmes. From some perspectives, this is a surprising finding. In their review of 38 energy behaviour change studies, Abrahamse et al. (2005) note that, while knowledge often accrues, mass communication does not necessarily lead to behavioural changes or energy savings. Others have similarly noted that mass communications are not adequate in the context of the highly specific and practical forms of know-how that are most important in the context of energy consumption and behaviour change (Simcock et al., 2014; Royston, 2014; Wallenborn and Wilhite, 2014; Burchell et al., 2015). However, Stromback et al.'s findings suggest that this dynamic might be different within the more specific context of energy consumption feedback.