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Estimating the environmental impact of home energy visits and extent of behaviour change

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HIGHLIGHTS

- The environmental impact of the RE:NEW home energy visit programme is estimated.
- Visits do not generate significant pro-environmental behaviour change.
- Visits do not overcome the barriers to the installation loft and wall insulation.
- Small energy saving measures yield carbon savings of 145 $kgCO_2$/year.
- The average carbon abatement per household was estimated to be 146 $kgCO_2$/year.

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ABSTRACT

The objective of this study was to estimate the environmental impact of a home energy visit programme, known as RE:NEW, that was delivered in London, in the United Kingdom. These home energy visits intended to encourage reductions in household carbon emissions and water consumption through the installation of small energy saving measures (such as radiator panels, in-home energy displays and low-flow shower heads), further significant energy saving measures (loft and cavity wall insulation) and behaviour change advice.

The environmental impact of the programme was estimated in terms of carbon emissions abated and on average, for each household in the study, a visit led to an average carbon abatement of 146 $kgCO_2$. The majority of this was achieved through the installation of small energy saving measures. The impact of the visits on the installation of significant measures was negligible, as was the impact on behaviour change. Therefore, these visits did not overcome the barriers required to generate behaviour change or the barriers to the installation of more significant energy saving measures. Given this, a number of recommendations are proposed in this paper, which could increase the efficacy of these home energy visits.

1. Introduction

In the UK, the target to reduce greenhouse gas (GHG) emissions by 80% by 2050, was legislated under the Climate Change Act (DECC, 2008). In 2011, British residential energy consumption was responsible for 23% of all carbon emissions (DECC, 2013). Therefore, households clearly constitute an important target group for action, if climate change targets are to be met. Carbon modelling by the Committee on Climate Change (CCC) has demonstrated that if targets are to be met under a medium abatement scenario, then a total saving of 98 $MtCO_2$ will need to be achieved from the residential energy use sector between the years 2010 and 2030. To put this figure into perspective, of the total reduction in GHG emissions required nationally and from all sectors, this represents 34% of the total (CCC, 2012).

However, understanding the ways in which energy is used in the home and how household energy consumption can be reduced is a complex topic that has permeated the literature of a number of disciplines (Abrahamse and Steg, 2009; Abrahamse et al., 2005; Lopes et al., 2012; Steg, 2008; Steg and Vlek, 2009). As a result, different strategies are proposed to encourage energy conservation behaviours (Chatterton, 2011; Steg, 2008; Wilson and Dowlatabadi, 2007). Though generally, programmes to reduce energy consumption tend to focus on encouraging two types of household energy conservation behaviour: efficiency behaviours and curtailment behaviours (Abrahamse et al., 2005; Gardner and Stern, 1996).

Curtailment behaviours are those that are habitual and repeated, for example, taking shorter showers to use less hot water, switching

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off unnecessary lights and turning down the thermostat (Barr et al., 2005; Gardner and Stern, 1996). Efficiency behaviours can be described as one-off or occasional behaviours and include the installation of energy saving measures such as wall or loft insulation but can also relate to purchasing, for example, the purchasing of an energy efficient appliance (Barr et al., 2005; Gardner and Stern, 1996). These behaviours can be encouraged through numerous behaviour change interventions ranging from informational strategies to fiscal incentives to regulation (Parliamentary Office of Science and Technology, 2012). This paper will focus on one particular type of intervention, the home energy visit.

1.1. Abbreviations

CCC	Committee on Climate Change
CERT	Carbon Emissions Reduction Target
CFL	Compact Fluorescent Lamp
DECC	Department of Energy and Climate Change
DEFRA	Department for Environment, Food and Rural Affairs
EA	Environment Agency
EST	Energy Saving Trust
GHG	Greenhouse gas
GLA	Greater London Authority
$MtCO_2$	Mega-tonnes carbon dioxide
OFGEM	Office of Gas and Electricity Markets
RSL	Registered Social Landlord

1.2. Home energy visits

A home energy visit is described by Abrahamse et al. (2005) as a 'visit by an auditor who gives households a range of energy-saving options based on their current situation'. The visit is therefore a type of informational behaviour change strategy that revolves around the provision of specific, personalised and tailored information. This approach is contrary to more generic informational strategies, such as those delivered through mass information campaigns, which rarely result in any more than modest behavioural changes (Burgess et al., 1998; Kollmuss and Agyeman, 2002; Steg, 2008; Steg and Vlek, 2009). As a result, home energy visits may be seen as 'potentially a more effective way to encourage behavioural change' and reduce energy consumption (Abrahamse et al., 2005, 2007).

The advantage of tailored information provision over generic information campaigns is that householders should only receive tailored information that is relevant to them, rather than be bombarded with irrelevant information (Abrahamse et al., 2005). This tailored information therefore intends to address individual needs because it is personalised, but as Dowd and Hobman (2013) observe, it is difficult to provide highly individualised information cost-effectively. Examples of tailoring include providing advice on specific insulation measures available to that household for the type of building that they live in, or giving specific advice on the operation of their boiler timer and heating controls.

However, a review of home energy visits by Abrahamse et al. (2005) demonstrated varying levels of success in relation to energy conservation behaviours. As a result, this paper has strived to better understand the efficacy and environmental impact of a home energy visit programme known as RE:NEW. The first phase of the RE:NEW home energy visit programme (which this paper relates to) was delivered within London, the capital city of the United Kingdom, between July 2011 and April 2012. The programme was delivered by local authorities across the city's 32 administrative boroughs with the support of local contractors. During this programme 50,683 homes underwent a RE:NEW home energy visit (GLA and EST, 2013b). This paper will focus on the delivery of RE:NEW in three inner London boroughs.

1.3. The RE:NEW programme

In 2008, the Mayor of London through the Greater London Authority (GLA) committed the city to ambitious climate change targets, asserting that London would reduce its carbon emissions by 60% by 2025, based on 1990 levels (GLA, 2008). In the same year, the average London household was emitting approximately 4970 $kgCO_2$/year (GLA, 2011) which was responsible for 36% of the city's total emissions (15.9 $MtCO_2$). The RE:NEW home energy visit programme was conceived by the Office of the Mayor of London and the GLA, which controls city-wide administration, and was developed in response to this target. The main aim of this programme was to reduce domestic CO_2 emissions in London, whilst helping residents save money on their energy bills (Climate Energy, 2012; GLA and EST, 2013b).

The 'RE:NEW home energy retrofit scheme' involved 'a trained energy advisor' who visited a resident's home and gave them a 'full energy audit, simple energy and water efficiency measures and behaviour change advice' (GLA and EST, 2013b; Mayor of London, 2011d). The visit therefore intended to encourage both curtailment and efficiency behaviours. To encourage curtailment behaviours, information was provided about changes that householders could make to their behaviour 'to stop wasting energy and water' (Mayor of London, 2011d). Curtailment behaviours were also encouraged through the provision of tools such as in-home energy display meters and shower timers.

Efficiency behaviours were encouraged through the provision of a number of 'easy' measures that were provided for free. These easy measures included radiator panels, low energy light bulbs, standby switches, radiator panels, 'save a flush' cistern water savers, tap aerators, garden hose guns, letter box draught-proofers and aerating showerheads (Mayor of London, 2011c). The RE:NEW programme also aimed to convert these home energy visits into referrals and installations of what the GLA termed further measures. These were more substantial and significant structural energy saving measures, such as wall and loft insulation. If householders were interested in these options then they were offered a referral visit to explore these options further, at a later date.

This emphasis on behaviour change was further demonstrated in the RE:NEW Good Practice Manual (Mayor of London, 2011d), which was a guidance document for local authorities delivering the programme. This manual made it clear that along with being an opportunity to install easy energy and water saving measures, a RE:NEW visit was intended to be used as a platform to give 'behaviour change advice [that] will provide customers with a means to reduce their energy and water use and associated utility costs' (Mayor of London, 2011d). In addition the behaviour change element of the programme was eligible for accreditation under the national Carbon Emissions Reduction Target (CERT), a target which obliged large energy companies to support citizens in reducing their emissions. A RE:NEW home energy visit was attributed a carbon score of 0.625 t.

2. Method

This research has strived to better understand the efficacy of the RE:NEW home energy visit programme, and estimate the change in environmental impact of a household, as the result of a visit. This research relates specifically to the period of January to April 2012, when the programme and the delivery of home visits started to gain momentum. The aim of this study was to estimate