

'Citizen-practitioners': the critical path for a low carbon transition?

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Abstract

The consumer-citizen is widely identified as a key agent of environmental change in political discourse: individuals are framed as consumers and environmental change as a matter of consumer choice (e.g. Hobson, 2002). Much attention has focused on shaping consumer preferences, targeting individual attitudes and values on the assumption that this will lead to desired behaviours and choices. More recently, there has been a shift in focus towards facilitating the consumption of a range of energy efficient and renewable energy technologies in the home through policy mechanisms such as CERT, CESP and the proposed Green Deal. Criticisms of extant models of behaviour change, and the associated assumptions about individual agency and the drivers of consumption, are now well rehearsed (e.g. Shove, 2010). Yet recent calls for situated accounts of the practices, contexts and material settings of everyday life that enable or disable social transformation have seen only limited empirical application and debate. In this paper, we follow a number of socio-technical (energy efficiency) 'experiments' in homes in England and Wales, and explore their consequences for domestic practices and for wider social (and political) transformation. We consider the ways in which a practice-based understanding of the consequences of technological change offers new and productive insights for engaging household(er)s as political subjects and delivering reductions in domestic energy consumption, which may in turn support a transition to a low carbon energy system.

1. Introduction

In the UK, domestic housing accounts for roughly a third of the country's annual carbon dioxide emissions (DECC, 2011). Homes have been framed by a range of stakeholders, from energy companies to governments and campaigning groups, as an important site in which we can perform civic responsibilities around climate change (Hinchliffe, 1997, Slocum, 2004, Shove and Walker, 2007, Marres, 2008) or, as Marres puts it, as "a site of socio-economic-environmental change" (Marres, 2008: 30).

In line with neoliberal political economy, policy responses to climate change seek to encourage more sustainable choices among sovereign consumers (e.g. Hobson, 2006; Shove, 2010) – providing information to fill a presumed public 'knowledge' deficit (Owens, 2001) and inculcate more (eco)rational attitudes, beliefs and values as seen, for example, in Government-led campaigns such as 'Helping the Earth Begins at Home' (Hinchliffe, 1996, Blake, 1999), 'Are You Doing Your Bit?' and 'Act on CO₂'. More recently, the government's Framework for Pro-Environmental Behaviours (Defra, 2008) seeks to influence behaviour through the installation of particular technologies (insulation, micro-generation and energy efficiency products, upgrading heating and hot water systems). Through CERT (the Carbon Emissions Reduction Target, where energy utilities promote a range of technologies to customers often at a discount), CESP (the Community Energy Saving Programme, delivered through energy utilities, which targets packages of measures to households in areas of low income) and, more recently, the Green Deal (announced in the Energy Bill, currently being debated in Parliament, where technologies are distributed via the private sector in tandem with novel financing mechanisms)

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technology has become an increasingly important element of political approaches to behavioural change.

Picking up on this recent policy turn to behaviour change through the provision of technology, we follow a number of socio-technical (energy efficiency) ‘experiments’ in England and Wales that involve modifications to the physical infrastructure of homes. We explore their consequences not only for everyday (energy) consumption practices but also consider wider implications in terms of different understandings of environmental citizenship.

2. Technology, practice and energy citizenship

Academic research has long wrestled with the subject of individual environmental attitudes, behaviour and the widely discussed value-action gap (Blake, 1999) whereby individual behaviour does not match expressed beliefs. Much of this research is underpinned by notions of rational individuals, appealing to the responsibility of consumer-citizens to bring their consumption behaviours within ecological limits (Spaargaren 2011; Bickerstaff et al 2008). This fusing of consumption and citizenship – through a diversity of publicity campaigns – has been criticized along two particular lines.

First, it is argued that such conceptions of the individual deny the complexities involved in addressing global environmental problems like climate change from the perspective of the individual. Furthermore, consumption patterns may not change due to the very real practical constraints imposed by the social, infrastructural, material conditions that people have to negotiate in organising domestic life.

Second a post- Foucauldian line of critique, reads behaviour change campaigns as part of a wider neo-liberal project of devolving responsibility for the environment from state to individual consumer-citizens (cf Marres 2008).

Partly in response to the criticisms and very limited success of individualistic approaches we see increasing efforts (in the UK and across Europe) at what Spaargaren (2011) has described as a more systemic model of environmental change. This approach is based on the premise that individuals are of little importance from an environmental policy-making point of view – rather stressing the role of institutional actors like utilities, companies, labour unions and the third sector. The basic premise is that appropriate (energy efficient) behaviours can be engineered and enforced on individuals (ibid) – and that eco-technologies will perform a 'sustainable lifestyle' for their inhabitants (Marres, 2008). In and of itself it is a perspective that is constrained by a diminished view of human agency.

It has been argued that this tension between structure (systems) and agency (individuals) can be overcome by attending to social practices – routinised forms of behaviour which are constituted by several interconnected elements: forms of bodily activities, forms of mental activities, a background of (social, institutional and embodied) knowledge, things and their use (Gram-Hanssen, 2011).

One aspect of practice theory on which there is disagreement is the question of how to incorporate materiality, things and technology (Gram-Hanssen 2011). Spaargaren (2011) argues that the co-structuring role of objects, technologies and infrastructures in the reproduction of social practices is critical. Similarly Gram-Hanssen stresses the role of technology both in holding practices together and an important element of bringing changes into practices. However, the emphasis to-

date has been on the role of technology in transforming particular social practices. There has been limited attention to the wider impacts of interventions into the fabric of homes for political (or civic) practices. Noortje Marres' work, which offers a material perspectives on environmental citizenship, is particularly instructive here. Marres (2008) specifically addresses the deployments of eco-homes as devices for public involvement in climate change. Homes "are redefine[d] as a place where its inhabitants are materially implicated in collective environmental problems" such as climate change (Marres, 2008: 34). In other words she examines the role of eco-homes themselves in the crafting of environmental messages, practices, and subjects. Likewise, she notes the ways in which media campaigns foreground ordinary domestic appliances (cookers, thermostats, TVs) to define energy-related routines in the home as moments of environmental (ir)responsibility.

The point here is that domestic objects are increasingly designed to function as devices of enrolment (smart meters, distributed energy technologies) capable of involving/entangling users with a service, brand, product, politics (Marres, 2008). For Marres (2008), then, devices like carbon calculators and smart meters must be understood as technologies for the materialization of citizenship. She argues that as, for instance, carbon calculators define domestic energy use as a site of engagement with climate change, they simultaneously enable the transformation of the home into a site that materially and physically implicates its occupants in matters of collective concern. For Marres this challenges (or at least complicates) the notion that the home cannot be defined as a site of citizen engagement with public affairs. Yet her work suggests that the material publics organised by the deployment of technologies (in her case, eco-homes) appear to be partial and rather fragile. Indeed, they may

even promise to do 'environmentalism' for their prospective occupants, adopting their civic responsibilities (ibid).

In what follows we draw on empirical research to consider the ways in which physical interventions into the fabric of homes disrupt and reconfigure the social and political practices of householders. We start with an outline of the research and material interventions around which this paper is based, which differ in a number of ways from Marres' work. Second, drawing on preliminary analyses, we discuss the ways in which technological interventions have both affected domestic practices, and catalysed different forms of citizen engagements. We end with some brief reflections on the role of physical interventions into the home in promoting (more efficient) social practices and (un)making environmental citizens.

3. Studying socio-technical experiments

We contend that domestic energy efficiency interventions can benefit from a detailed understanding of how householders interact with interventions in the home, either integrating these into their everyday practices or rejecting them, rather than assuming that they will deliver specific average energy savings. In this paper we argue this point drawing from preliminary findings from the study of two socio-technical experiments that attempt to drive reduced energy consumption via the provision of technological interventions. The first constitutes a form of 'bottom-up' intervention, where householders are studied in detail in order to provide relevant and tailored interventions in order to intervene in specific areas of practice. The second is an example of a kind of 'top-down' intervention, where households are

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targeted *en masse* to receive interventions that have not been specifically tailored to their situation. These two experiments are introduced next.

Experiment 1

The first experiment involves the study of seven households' everyday practices, from which specific material interventions have been developed that aim to reduce energy consumption whilst maintaining comfort. These interventions will be trialled in the same households in order to explore the extent to which they deliver changes in energy consumption and related practices.

Each of these households rent from the same Registered Social Landlord within Merthyr Tydfil, south Wales. However, the built form, heating system and household composition varies. In order to understand these householders' everyday practices, we undertook three in-depth interviews over the course of 18 months. The first of these was accompanied by a tour of the home, where participants discussed their use of different spaces and technologies in the course of their everyday practices. Key findings relate to thermal comfort (relating to managing air and body temperature), visual comfort, and ventilation (including air quality). These indicate that householders don't passively rely on technologies to deliver comfort, but actively interact with them to deliver adaptive comfort. It follows that the energy savings associated with adaptive comfort are more difficult to quantify than if we assume that the presence of a specific technology is associated with a specific value of energy consumption. Some of these practices are briefly introduced next; numbers in brackets following denote the number of households reporting a practice (the sample comprised seven households).

Three practices relating to the maintenance of air temperature were found in most households. Each of those households that had a room thermostat used it to regulate their heating (5); in some cases, room thermostats were used to turn the heating on and off, in addition to delivering more or less heat according to varying requirements. All seven households turned their heating on and off at different times rather than leaving it on all of the time; this was typically achieved by manually switching the system on or off (or using the room thermostat), where only one household used a timer/programmer but even then, only when planning to be away from home for several days. Most households (6) interacted with specific room heaters or radiators rather than leaving these alone, typically adjusting radiator valves depending on the use of a room, time of day or activity in that room.

In addition to attempting to manage the temperature of particular spaces, participants also managed their own body temperature using different strategies. Most (6) reported layering clothing in order to adapt to cooler or warmer conditions by adding or removing a layer. Many (4) altered their bedding according to the season in order to regulate body temperature when sleeping; several (3) also reported using blankets, throws and quilts in other rooms in the house when cold. Varying proximity to sources of heating or cooling also emerged as an important means by which thermal comfort could be achieved, either getting close to room heaters and/or hot water bottles (4) or moving to other spaces (5), often to cool down.

Two air-regulating practices were common throughout this sample: the use of windows (7) and vents (5). Windows were typically used to obtain fresh air and disperse smelly, moist or stale air, often in association with other practices such as rising in the morning, cooking and bathing. Some householders blocked up vents in

external walls in order to manage draughts, and used window vents (where these were present) in addition to or instead of windows depending on the weather. Other less common practices related to the use of doors (3) and extractor fans (2). External doors tended to be opened in warmer weather and internal doors kept shut in colder weather, in order to regulate internal temperatures. Extractor fans tended to be used in conjunction with other practices such as bathing and cooking, due at least in part to their location in relevant rooms in the house.

The use of artificial lights (7) to supplement natural light, and curtains and blinds (6) to control it, was common throughout this sample. Many households preferred to use different kinds of artificial lights for different purposes: brighter ceiling lights were typically used for things like reading or cooking, whereas dimmer table or side lights were generally used for the purposes of relaxation or reading in bed. Interestingly, each of those households that had an artificial fire used this to provide light in the evenings (3), often associated with feelings of warmth and cosiness.

Working with insights gained during this baseline data collection, our colleagues at the Loughborough Design School, Loughborough University have developed a small number of interventions relating to specific energy-intensive areas of practice. Specifically, they have been designed to address the use of windows whilst heating is on and to deter over- (or under-) heating, by providing feedback to householders. One intervention alerts the occupant to the undesirable (in terms of energy consumption) situation of a window being open and the heating being on by means of an LED. Another is a thermostat sticker, which attempts to encourage occupants to set it between 18-21°C by use of colour. Two designs of side lights

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also attempt to reinforce this appropriate temperature range by rewarding such temperatures with coloured lights, where 'cosy' colours denote desired temperatures. These interventions will be trialled for a three-month period during autumn/winter 2011, after which follow-up interviews and tours will be used to explore any change in practices associated with the introduction of these interventions.

In addition to this social research, our colleagues at the Welsh School of Architecture at Cardiff University are monitoring energy consumption and a number of indoor environmental parameters (including temperature, humidity and carbon dioxide levels) for each participating household, for the entire period of study. This will allow us to estimate any physical changes in energy consumption or comfort conditions associated with the introduction of these interventions. Together we will be able to judge the extent to which such 'bottom-up' interventions deliver change in householder practices, comfort conditions and energy consumption – in addition to the different forms of citizenship that these interventions produce, if any – and contrast this with the 'top-down' interventions considered in experiment 2.

Experiment 2

The second 'experiment' involves the study of the impacts of 'top-down' interventions associated with four existing projects, undertaken in association with specific stakeholder groups, delivered within targeted communities in London. These interventions are typically already available through the market, and are delivered to householders via relationships between each project and particular suppliers and installers. We have undertaken in-depth interviews with stakeholders involved in the design and delivery of these interventions, and with a small number of householders (2 for each case study project) who have received them in order to explore the

effects of these interventions on everyday practices and energy consumption in the home. The four case study projects studied are summarised in table 1.

Case study project	Target community	Interventions
Brent Hotspots	Predominantly vulnerable and/or fuel poor residents of Brent (no upper limit on recipients)	Free or discounted heating upgrades, draught proofing, insulation
Ham & Petersham Low Carbon Zone (LCZ), Green Streets & Street Champions	Those living and/or working in Ham & Petersham, Richmond upon Thames (up to 1000 households for the LCZ; Green Streets open to just 15 households)	Free heating upgrades, insulation and solar panels for Green Streets participants Free ‘easy measures’ (e.g. energy monitors, light bulbs, eco kettles) and discounted heating upgrades and insulation, plus support from local volunteer ‘street champions’ throughout the LCZ
Hyde Farm Green Streets	Those living in or near the Hyde Farm estate, Balham (open to 40 households)	Free heating upgrades, insulation, draught proofing, solar panels and ‘easy measures’ (e.g. energy monitors, light bulbs, eco kettles)
Queen’s Park Low Carbon Zone	Those living and/or working in Queen’s Park, Westminster (open to 8 participants)	‘Carbon Conversations’ course (comprising 6 sessions encouraging individuals to reduce their ecological footprint)

Table 1: Summary of the four London case study projects

In this paper we consider two of these case study projects, Ham & Petersham and Hyde Farm, reflecting the limits of data currently available. There are important similarities between these two projects: both have delivery partnerships with British Gas, including but not limited to the Green Streets projects in each area; and both focus on the delivery of very similar technical interventions. There are also important differences, relating to the number of people to whom interventions were made

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available (small numbers for Green Streets projects, much larger for the wider Low Carbon Zone) and the local stakeholders leading on the delivery of the project: for Ham & Petersham, the local authority administered the project in association with local third sector groups, whereas in Hyde Farm one local community group administered the project.

In the next section we work with interview material from 4 householder interviews (2 from each project) and an additional 4 volunteer Street Champions for the Ham & Petersham project (where Street Champions are local householders that have already received such interventions and volunteer to tell their neighbours about the project; some of these Champions were also Green Streets participants). We consider the social and political effects of these material changes to the fabric of homes.

4. Materialising energy citizenship?

In this section we consider the consequences of a range of technological interventions – including heating upgrades, insulation, solar panels and a range of ‘easy measures’ (e.g. electricity monitor, ‘standby savers’, reflective radiator panels, CFLs, hot water insulation jackets, draught proofing (door brushes, letterbox brushes, adhesive draught proofing strips), low flow shower heads, digital shower timers, save-a-flush cistern devices and tap aerators) – and in what ways, if at all, these consequences can be read as producing new forms of citizenship. (A table summarising which interviewees received which interventions is presented in appendix 1.) We discuss changes in domestic practices, the emergence of new socio-political practices, and consider some of the reasons why some interventions may not deliver any such change.

Changes in domestic practices

In a number of cases, the introduction of an intervention disrupted everyday domestic practices. We briefly discuss the effects of the introduction of draught proofing, solar photovoltaic panels, and an energy monitor in this context. Where these shifts precipitate a reduction in the household's ecological footprint, this could be considered an instance of material citizenship (following Dobson (2007) and Marres (2008)). Interestingly, the overall environmental consequences of these changes in practice are not always clear; as such, the extent to which they produce material (ecological) citizenship is similarly opaque.

One householder (HFH1) benefitted from a range of interventions including professionally installed draught proofing throughout her home, around sash windows and external doors. Prior to this installation, she had used a cold and draughty stairway linking the kitchen to the back door as a pantry, to store comestibles when there was insufficient space in the refrigerator. After the installation of the draught proofing, this passageway ceased to be cold and draughty (therefore thermal comfort in the kitchen has improved) and as such is no longer suitable for use as a pantry; this could reasonably lead her to invest in a larger refrigerator (or make do with less food that requires chilling).

The introduction of solar PV panels into two interviewees' homes (SC1 & 4, both Street Champions) precipitated a shift in the timing of certain practices, notably around laundering clothes and washing dishes in the dishwasher. On sunny days, washing may be brought forward to earlier in the week to make the most of the 'free' electricity provided by the sun, in addition to the concomitant good weather conditions for line drying clothes. Here, shifting the timing of practices to capitalise

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on 'free' electricity could potentially lead to an increased consumption of water, if this means that washes are done more frequently during sunny periods, along with a reduction in the consumption of energy from high carbon sources.

Several interviewees reported having an energy monitor in their homes, but in one case (HPH1), the presence of such a monitor catalysed a number of changes (in terms of frequency and duration) in several practices. Prior to participating in this project, only one member of the household was interested in energy consumption in the home; after installing an electricity monitor in the kitchen, at eye-level next to the kitchen sink and the dishwasher, the whole household became interested in how much energy was consumed when using different appliances. Observations led to the consideration of some practices as not very energy intensive and so ok (including use of gaming consoles and the Internet), and some as too energy intensive and so should be limited (including use of the kettle, dishwasher, washing machine and electric shower). Now the household boils less water in the kettle each time they use it, use the washing machine and dishwasher less often by waiting for a full load. In order to use the dishwasher less, the household now rinses all dishes before washing them in order to reduce the build-up of smells, which could result in an increase in water consumption.

New socio-political practices

Reviewing this interview material, we see preliminary evidence that some material interventions functioned as a source of novel political engagements with energy, involving new practices of social engagement and experimentation with energy systems.

In some cases, the presence of technologies catalysed conversations. The effects of an energy monitor in HPH1's household is one example of this occurring within the home, but there are other examples of energy conversations occurring outside the bounds of the household. Some outwardly visible interventions, like solar panels, sparked conversations with neighbours that would not normally talk to each other in passing (e.g. SC1's solar PV panel catalysed conversations about energy and related local projects with HPH2, her neighbour, and was associated with his application to the Low Carbon Zone). The relative novelty of this intervention within specific groups encouraged those with solar panels to share their experiences of living with them with their peers (e.g. SC2&3, a married couple of Street Champions who installed their own PV array, regularly discuss their energy savings and experiences of living with the panels with neighbours and others in local groups, such as SC1 and HPH1). One householder (HPH1) reported engaging in a kind of heating experiment with a friend, testing advice she had received from a number of sources including via the LCZ project to leave heating on continuously, set at a lower temperature than normal, rather than turning it on and off throughout the winter; they both used less energy than normal by doing this.

The presence of new technological interventions was reported as a cause for organised or impromptu visits, tours or demonstrations of these interventions in local people's homes by some interviewees. When SC2&3 host parties for their friends and neighbours, they use various technological interventions as talking points, such as their double glazed sash windows and wood burning stove. One of the founders of the community group administering the Hyde Farm project regularly invites group members into her home, and discusses the various interventions they have installed

such as sash window draught proofing, secondary glazing, and a portiere (a thick curtain behind the front door) with visitors. This kind of activity has in some cases inspired others to adopt such interventions, such as HFH1's installation of secondary glazing and consideration of a portiere.

Interestingly, many of the householders and Street Champions interviewed were already involved in environmental and/or community groups. Some reported participating in the project as a result of personal convictions about right behaviour, such as taking action as individuals and volunteering (SC1); contributing to community cohesion (SC2&3); leaving a good legacy (SC4); and helping people wherever possible (HFH1). The introduction of some form of technological intervention was associated with motivation to volunteer as a Street Champion in Ham & Petersham (SC1, 2 & 3). We might, therefore, consider the introduction of some of these interventions into participants' homes to enlarge their citizen identities to some extent, rather than necessarily create them entirely.

A failure to engage

Although the introduction of technological interventions led to some changes, in some cases such interventions failed to engage householders in any discernible way. Some interventions were rejected: either by the surveyor, after discovering that the home was unsuitable (e.g. the only wall insulation offered was for cavity not solid walls, yet no interviewees had cavity walls; radiator panels and hot water tank jackets were offered, yet some homes did not have these (e.g. HPH2 and HPH1 respectively); the loft insulation offered was unsuitable for lofts floored and used for storage (HFH1)). Some interventions failed to work with existing technologies in the home: tap aerators failed to fit on older taps (HPH2); low flow shower heads fail to

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work in areas of low pressure, such as Ham & Petersham; TV standby savers fail to work at all with cable TV (HPH1), and unreliably with satellite receivers (HPH2); and the one size of CFL distributed fails to work with dimmer switches or the range of light fittings in some homes (HPH1). Other interventions were rejected for being ugly (e.g. draught proofing strips, rejected by HFH2), irrelevant (e.g. a shower timer was rejected in favour of an existing egg timer by SC4) or failing to work well (e.g. the eco-kettle provided to SC2&3 does not work). Some interviewees accepted mobile interventions such as energy monitors, radiator panels and eco kettles but have not yet installed them, waiting either for spare time, the completion of decoration projects or the need to replace existing technologies (HPH2, HFH2 and HFH1 respectively).

Importantly, if an intervention can be considered to deliver environmental citizenship when it leads to a reduction in a household’s ecological footprint, then the inevitable difficulties in ascertaining exactly how much energy is saved as a direct or indirect result of the introduction of a technology is important. This problem is being grappled with in the first experiment outlined above, but in these ‘top-down’ interventions the detailed monitoring of energy consumption per household following the introduction of a technology is unfeasible due to resource constraints. Although these case study projects tend to be judged on the basis of how much energy (and therefore carbon) is saved as a result of the distribution of these technologies, the exact consequences are hard to measure; average savings tend to be used instead. In the Hyde Farm Green Streets example, energy consumption amongst participating households increased on average during the year of the project, following these technological interventions – however, many interventions were installed near the end of this year; energy consumption was estimated from irregular

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meter readings; and the installation of interventions occurred alongside the flux of householders’ everyday lives, including changes in household composition and engagement in other renovation projects.

5. Reflections

We end with two brief reflections on the preliminary analysis outlined above – issues that we will be progressing in ongoing work:

Firstly, our findings point to only very incremental changes in practices resulting from technological interventions, but with some evidence of effects extending beyond the private (domestic) sphere. Effects, at the level of practices and political identities, would of course not be picked up by conventional assessment methods focused on energy savings. In this regard we need to develop more ‘practice-sensitive’ approaches to studying the roll-out of such schemes and their transformative potential. Specifically we must attend closely to the ways in which novel technologies challenge or reinforce a whole range of social (and political) practice (that may well extend beyond the home), how these impacts vary over time and the consequences of different types of intervention and their delivery (e.g. bottom vs top down)?

Secondly, we have noted a number of instances in which novel (energy efficiency) technologies have failed to engage householders (as anticipated or at all). It is thus critical that the failures (as well as successes) of material interventions are fully examined. Our participants often raised structural constraints (beyond their influence) in accounting for this disengagement - technological irrelevance,

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infrastructural problems, the delivery process etc. This, we suggest, underlines a critical need for research concerned with (changing) practices and conventions to more fully consider the play of such systemic factors.

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Appendix 1

Interventions	Ham & Petersham					Hyde Farm	
	HPH1	HPH2	SC1	SC2&3	SC4	HFH1	HFH2
Demonstration house				✓		✓	✓
Draught proofing	✓	((((
Eco kettle				(((
Energy monitor (electricity)	((((((
Gas boiler (+ DHW tank)							(
Gas boiler (combi)			((
Heating controls						((
Letterbox cover	(((
Low energy light bulbs (CFLs)	(((
Online footprinting tool			✓				
Public meetings			✓	✓	✓	✓	✓
Radiator panels	✓			✓		✓	(✓)
Report (post-survey)	✓						
Secondary glazing (magnetic)						✓	
Smart meter (gas & electricity)				✓			
Solar panels (PV)			✓		✓		
Standby saver	✓	✓					✓
Street champion	✓	✓					
Survey [British Gas]	✓	✓	✓	✓	✓	✓	✓
Tap aerator	✓				✓		
Thermal image	(✓)	(✓)	✓	✓	✓		
Workshops			✓	✓		✓	

Table 2: Summary of the interventions each interviewee received. Key: HPH stands for Ham & Petersham Householder; SC stands for Street Champion; HFH stands for Hyde Farm Householder. Presence of an intervention is indicated by a ✓; a (✓) denotes some problem with its installation: in most cases, such interventions were

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not currently installed (but with intentions to install later), apart from for thermal images, where thermal images were provided but not of the correct house.