Working together to save energy?

Smart Communities

Report of the Smart Communities project

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June 2014

Kingston University London

Behaviour and Practice Research Group

E·S·R·C Economic & Social Research Council

Research Councils UK Energy For a Low Carbon Future

The research team

The Behaviour and Practice Research Group

The Behaviour and Practice Research Group (BPRG) is a small group of researchers at Kingston University working across a range of domains (energy, flooding, diabetes, physical exercise). The group employs research interventions, often featuring digital technologies, to develop interdisciplinary insights into the factors that shape behaviour and practice. Other BPRG energy projects include the CHARM Home Energy Study and Transforming Feedback.

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Published by
Behaviour and Practice Research Group
Kingston University

Please cite this report as follows:
Burchell, Kevin, Ruth Rettie and Tom Roberts (2014) Working together to save energy? Report of the Smart Communities project, June 2014, Behaviour and Practice Research Group, Kingston University (**http://smartcommunities.org.uk/ and http://business.kingston.ac.uk/smartcommunities**)

Acknowledgements

We are especially grateful to all of the Smart Communities participants and to the ESRC-EPSRC Energy and Communities stream of the RCUK Energy Programme (award number RES-628-25-0024). We are grateful to the following individuals: Chris Barnham, Fiona Booth, Adam Cooper, Sarah Darby, Ed Davey MP, Phil Downing, Zac Goldsmith MP, Liz Green, Eva Heiskanen, Michael Harrison, Peter Kästel, Matt Lipson, Sue Matthews, Charlotte McDonald, Paul Rouse, Sarah Royston and Fred Steward. Although many have moved on by now, we would like to express our sincere gratitude to many people in our project partners: Bounce Theatre (Louise Pendry), Energy Saving Trust (Graham Ayling), Fern Hill Primary School (Diana Brotherston, Phil Kale, Luisa Kilby, Adam Scott, Kim Tipping and Caroline Virgo), Ham and Petersham Low Carbon Zone (Andrew Beedham, Justine Glynn, Chas Warlow), HGA Creative (Ian Austin, Dan Laurence, Jansen Yee and Richard Whitehouse), Kingston Community Energy (Damon Hart-Davis and Peter Mason), Kingston Environment Centre (Jean Vidler), Kingston University (Andy Belsham and his team, Maggie Boyden, Clare Fox, Lynne Goff, Anita Gupta, Kate Hammond, Chris Hand, Tim Harries, Bakhona (BK) Hawes, Imogen Bellwood-Howard, David Martland, Stephanie Morgan, Charlotte Mulley, Chandan Nallal, Juliet Parry, Kavita Patel, Anna Reddy Jannepalli, Dan Russell, Clara Scott, Trish Sheehan, Lucy Walker-Evans, Viola Wang, David Wood). London Borough of Richmond (Chris Hunt, Amanda Kane and Jess Wiles), Royal Borough of Kingston Library Services (Christa Day, Alan Gale, Jo Gloyn, Sue Hurlock, Grace McElwee), Royal Borough of Kingston sustainability team (Marie-Claire Edwards, Matthew Howell-Hughes, Carlos Queremel, Shadia Rahman, Oliver Sutton and Oliver Walton), 2 Save Energy (Owl) (John Parmenter), South West London Environment Network (Colin Cooper, John Gallop, Robin Hewitt, Clive Messenger and Sue Williams), Thames Water (Heather Aiken and Matthew Walker), Transition Town Kingston (Elise Barron, Martin Birley, Liz Darley, John Fellows, Hilary Gander, Marilyn Mason, Peter Mason and Katie Watson), TR Control Solutions (ecodriver) (Hashim Poonawala and John Taylor), Tudor Area Residents' Association Kingston (Margaret Levy and Judith Pottinger) and, uscreates (Hannah Padgett).

Contents

Key findings

1 Smart Communities shows that community action on energy over two years can support: knowledge about domestic energy consumption and about the consumption of household appliances, as well as behaviour change and energy efficiency measures.

2 Lack of energy know-how – ideas about what to do and how to implement these ideas – is a significant constraint on behaviour change. In-home demonstration and longer term guidance by local experts can support the acquisition of energy know-how, and stimulate significant action and change.

3 Smart Communities produced long term engagement with energy feedback – after 2 years, up to 40% of IHD users claim to use their IHD every day. This level of engagement was supported by weekly emails that prompted use of IHDs and contributed to a sense of 'being part of something'.

4 Participation, action and change were extensive in some households, but in many others participation was limited and change confined to basics such as switching-off lights and not overfilling kettles.

5 Energy can rapidly become an integral part of primary school life. This is highly dependent on the head teacher and makes considerable demands on school staff. Parents' commitment to using less energy increased when they thought about it in the context of their children's education.

6 Energy behaviour change is a complex and lengthy process. It involves numerous changes some of which involve time-consuming consideration, information gathering and discussion by household members. Consequently, the funding of demand-side community energy projects needs to be ongoing.

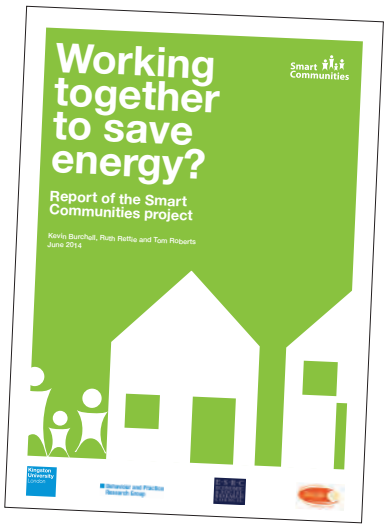
7 From a practice theory perspective, Smart Communities suggests that, while 'meanings' are particularly resistant to change, 'materials' and 'skills' are more amenable to change.

8 Smart Communities highlights the ways in which theoretical insights can directly support and inform practical action by local groups. Smart Communities helped to develop local community energy networks; as a result, the project will be continued, developed and extended in the future.

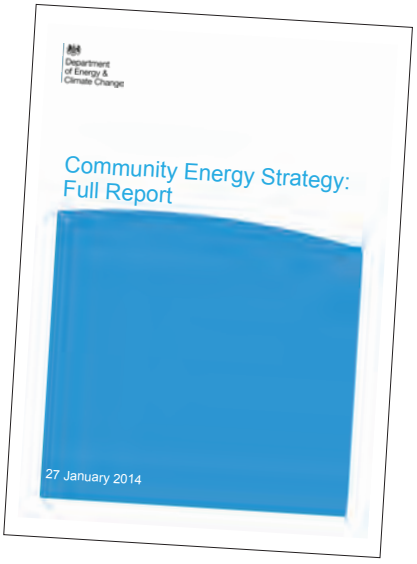
1 Introduction

Structure of the report

In Section 1, we provide a brief introduction to the UK community energy sector and introduce the Smart Communities project (including comments on the project location, set-up, objectives, partners, activities and research methods). Sections 2-5 present the results of the project. In Section 2, we discuss the patterns of participation that we observed in Smart Communities. Section 3 focuses on the change that the project produced, both within households and within the community. In Section 4, we discuss energy consumption monitoring and feedback in detail, while in Section 5 we focus on the other project activities in detail. In Section 6, we review our key findings and discuss their implications for policy and practice; in addition, we describe progress on ensuring the legacy of Smart Communities. The appendices contain further details about our key conceptual frames and research methods.



This report aims to give readers a sense of what it was like to develop and run Smart Communities, and addresses some of the instructive challenges, tensions and set-backs that we experienced, as well as the successes. It addresses a range of both practical and theoretical issues and we hope it will be of value and accessible to audiences across academic, policy and practitioner domains. With this in mind, wherever possible we cite sources that are publicly available and include hyperlinks.



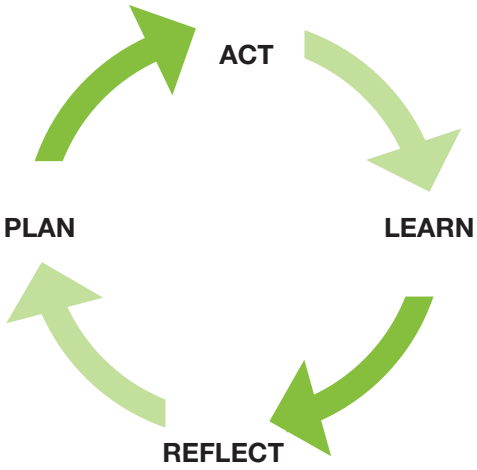
Community energy

Community energy is typically understood to be supply- and demand-side action on energy that is: local, community-led, participatory, often innovative, with benefits enjoyed collectively and locally[1]. With origins in the alternative energy movement of the 1970s, demand-side community energy has been an important element of the UK government's energy strategy since 2009. DECC recent published its first ever Community Energy Strategy, envisaging future growth and greater commercial collaboration[2]. Recent surveys of community energy reveal a diverse and vibrant sector of some 5000 initiatives. Gill Seyfang et al note that the sector remains reliant upon government funding, and suggest that the success of community energy might be compromised by commercial collaboration[3].

1 Peters and Jackson (2008); Walker (2011); Walker and Devine-Wright (2008); Aiken (2014). 2 Walker et al (2007); IPPR (2011); RSA (2010); Ipsos Mori (2009); HM Government-DECC (2009); DECC (2012); Greater London Authority (2010); ESRC (2010); Seyfang et al (2012; 2013); (DECC 2014a.) 3 DECC (2012); DECC (2014b); Seyfang et al (2012; 2013). See Appendix 1.

Introduction to Smart Communities

Smart Communities was funded by the ESRC-EPSRC Energy and Communities stream of the RCUK Energy programme. It was a three and a half year – largely demand-side or 'behaviour change' – community energy project (January 2011 to June 2014). Smart Communities drew on the principles of action research, emphasising: participation, change, and concurrent (or cycles of) collaborative action, learning, reflection and planning[4]. The main action phase of the project was from May 2011 to May 2013.



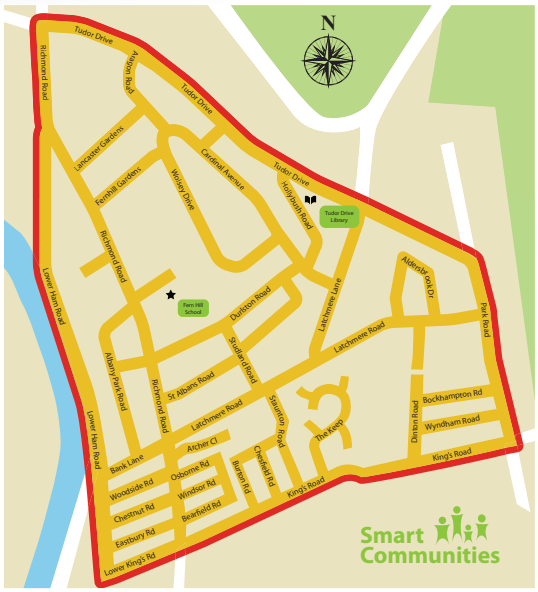
The aim of the project was ambitious: 'to encourage a community to discuss, develop and adopt new ways of doing everyday things, such as heating and lighting their homes, so that they consume less energy'. Reflecting the action research approach, the emphasis shifted as we found that community discussion of existing ways of doing things appeared to reinforce rather than challenge them. Conceptually, the original project objectives focussed on: social norms, energy visibility, social theories of learning and community action as ways of shaping change. Practice theory was central to the project proposal, shaping both the community action and as a way of understanding change. Our findings about the complexity of energy consumption change and our interest in social theories of learning led to a focus on energy know-how, and our interest in practice theory was complimented by a focus on the associated notion of everyday practice[5].

Project location

Smart Communities took place in a suburban area, in Kingston upon Thames in south west London, centred on the Tudor ward (one of the 15% least deprived wards in England)[6]. The area mainly contains 3-bedroom houses (often-extended) with some flats, and includes the 1930s Tudor Estate, as well as older and more modern housing[7] (see over). This area of Kingston was selected because it is home to Fern Hill Primary School (Fern Hill), which already had a good track record on sustainability, it offered an area that was reasonably easy to demarcate and contained an appropriate number of dwellings (1600). In the spring of 2012, to attract further participants, the project area was extended to encompass some 2500 households. The area also had the advantage of being within reach of the university campus, facilitating community engagement. The choice of an affluent suburb reflected the correlation between energy consumption and affluence; although some 80% of the UK population lives in suburban areas, these are often overlooked in research and action[8]. See gallery over the page.

4 Reason and Bradbury (2006). 5 See more detail in Appendix 1. 6 2011 Census of Population. 7 See: http://www.mervynsmith.co.uk/north_kingston_property_types.html. 8 DECC (2013a); Bioregional (2006); Local Futures Group (no date).

The Tudor Triangle



Around **400** out of **2500** households joined

Project set-up

The project was designed by researchers at Kingston University, in collaboration with our initial partners: Fern Hill Primary School, Transition Town Kingston (TTK), the Kingston council sustainability team, the local library, Bounce Theatre, and the Energy Saving Trust. At the outset, our commercial partners were: TR Control Solutions (provided the ecodriver energy monitoring system at Fern Hill), 2 Save Energy (provided the domestic Owl energy monitors) and HGA Creative (developed the web-based feedback). The project was implemented in collaboration with these partners and – as the project developed – we acquired further partners: South West London Environment Network (SWLEN), the Ham and Petersham Low Carbon Zone (H&P LCZ) and the local residents' association (TARAK). In addition, the project team worked commercially with uscreates, a co-creation specialist, to draw project members into more active roles, developing project materials and taking the project to new local social groups. At the time of writing, SWLEN are employing insights from Smart Communities in their own work, and are planning – with a project member – to take the Smart Communities approach to other areas in south west London and to further develop Smart Communities feedback format[9].

To broaden its appeal, Smart Communities was framed in terms of energy consumption reduction; climate change was not discussed in Smart Communities materials[10]. The key proposition of the Smart Communities project was encapsulated in the strap-line: Working together to save energy, and a free energy monitor was offered to all members. The name Smart Communities was intended as a response to the notions of smart grids, meters and homes, which emphasise technology but sometimes overlook people[11]. At the heart of Smart Communities was the notion that people and communities are smart, and have valuable knowledge, know-how, ideas and capacity to share (though the word 'smart' was sometimes interpreted as an endorsement of the technological 'smart' vision). Further key notions in determining the 'look', 'feel' and 'style' of the project were: local, informal and friendly; homes, people and children; non-commercial and university-based; and collaboration with local partners.

9 See details in Section 6.10 See Heiskanen et al (2010); Rettie et al (2012); Rettie et al (2014). 11 See Strengers (2013).

Project activities[12]

The Smart Communities activities included:

- A communications-based recruitment strategy, via a leaflet drop and local institutions.
- A novel form of electricity monitoring that involved real-time feedback on an in-home display (IHD), manual readings and web-based, community-norm feedback.
- An extensive programme of activities at Fern Hill Primary School.
- Community workshops and co-creation of project activities.
- Activities specifically designed to facilitate the acquisition of energy know-how (Home Energy Action Visits, Thermal Imaging Parties and a local energy advice network).
- Weekly emails, featuring: a reminder to submit readings, news about events and topical tips.
- Celebration events at Fern Hill Primary School.
- Further web features: a members' forum and a pledges page.
- An eco-gadget library at Tudor Drive library.

April 2013

Dear local householder

Please complete the Kingston University local initiative questionnaire
£500 in John Lewis vouchers to be won!

If you would prefer to complete the questionnaire online, please go to:
http://business.kingston.ac.uk/yourviews.

The questionnaire should take 10 - 15 minutes to complete.

We really appreciate your time, and as 'thank you' for helping with the questionnaire, we will enter the names of everyone who completes the questionnaire into a prize draw.

There will be:
One winner of a £200 John Lewis voucher
Six winners of a £50 John Lewis voucher

We would be grateful if you could complete the questionnaire, and return it to us in the FREEPOST envelope provided, by **Friday 17 May 2013. We will contact the winners of the prize draw by the end of May 2013.**

NB: Kingston University is the 'data controller' within the definition of the Data Protection Act 1998. All of the data that is collected in this questionnaire will remain confidential at all times. Anonymous data will be used in the analysis and dissemination of the research, and may be archived for use by other researchers; no individuals or households will be identifiable in this data.

Good luck, and thank you.

Dr Kate Hammond
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Research methods[13]

Smart Communities drew on the principles of action research. The project action yielded a range of informal materials for analysis: workshop transcripts, email communications, notes from interactions with members, written reports from project members, photographs and materials produced by the school children. This was complemented by extensive formal research and analysis designed to understand the dynamics of change that the project action produced within households and social groups:

- Forty two interviews with local households (thirty seven with project members and five with non-members). These interviews have been anonymised and the names used in the report are pseudonyms.
- Eight interviews with project partners. Real names are used in the report, with permission.
- A questionnaire survey of the entire project area at the end of the project (462 responses: 130 from members and 332 from non-members).

12 See further details in Sections 4 and 5. 13 See further details in Appendix 2.

2 Results: recruitment and participation

Recruitment

Recruitment to Smart Communities largely relied upon communications materials. A recruitment leaflet and, later, a newsletter were hand-delivered to all households in the project area (see gallery opposite). Project communications were also distributed by our project partners (Fern Hill Primary School, the library and the residents' association), and complemented by face-to-face recruitment at Fern Hill events. All project members were offered a free Owl energy monitor. Householders joined the project on the Smart Communities website, submitting basic contact details and an indication of how they heard about the project (this process may have discouraged some).

Although a membership of 750 had been aimed for, around 400 households from a possible 2500 joined the project; an overall recruitment rate of around 16%[14]. The end-of-project survey suggests that awareness of the project was around 40%. Recruitment through the materials that were distributed via local partners was more effective than the door-to-door leaflet drop; some ten times, in the case of Fern Hill[15]. Recruitment was supported by the free energy monitor, but may have been constrained by the on-line registration system.

People joined Smart Communities for a range of – and often multiple – reasons, predominantly interest in reducing energy consumption (86%), saving money (54%) and reducing carbon emissions (45%) (90% of members cited one or more of these reasons). These figures suggest that omitting climate change from the framing of Smart Communities did not deter people whose motivations lay in that domain, and attracted people who might not have joined a 'climate change' project.

Dean: The reason we first started getting involved with the project was the meter.

Faith: Because I am energy conscious, its impact on the environment, primarily, and also for purely selfish reasons, energy costs are incredibly high. It's both of those things, yes.

Audrey: One, I thought we might be able to highlight some areas and save some money, and secondly it's for the environmental impact.

14 By contrast, the nearby Ham and Petersham Low Carbon Zone (H&P LCZ) recruited around 26% of households in its area. This success can perhaps be attributed to intensive door-to-door recruitment by local Street Champions in the H&P LCZ (London Borough of Richmond 2013). 15 See section 5 for a broader discussion of the dynamics between action at home and action at school.

Recruitment leaflet

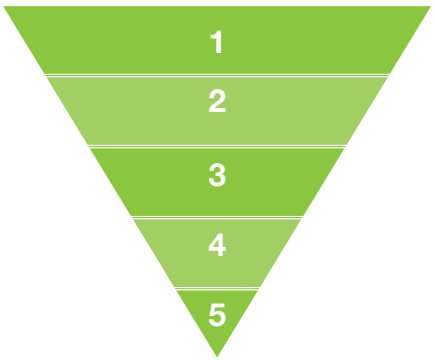
Banner

Recruitment leaflet

Newsletter

Pyramid of participation

Information about participation in each project activity are in Sections 4 and 5. The overall pattern of participation in Smart Communities conformed to a 'pyramid of participation'[16], with an inverse relationship between numbers of participants and intensity or extent of participation. In Smart Communities it is possible to identify five broad categories of intensity of participation:



1 Non-members. Households that did not join the project (but may have attended a celebration event at Fern Hill primary school).
2 Non-participation. Households that joined the project, but did not participate.
3 Low participation. Households that used the Owl for real-time electricity monitoring only.
4 Medium participation. Higher participating households would have submitted some energy readings, and may have contributed to the online Forum or attended one or more workshops.
5 High participation. Households that continued to submit energy readings and attended project workshops, perhaps participating in co-creation activities.

Thinking about participation in this way had practical value for the researchers:

- Enabling the project team to informally segment the project membership in the design of the action and research. This facilitated, for example, the targeted use of messages and more time-intensive communications, such as telephone calls (for example to follow-up previously emailed invitations).
- Encouraging the team to investigate the factors that were shaping 'low participation', with a view to both understanding these and making changes.
- Drawing attention to the potential to draw households up the pyramid by both recruiting further participants and encouraging greater participation among existing participants.
- Reminding the project team to write communications – in particular, the Monday email – so that they were relevant and meaningful to a range of levels of participation.

16 Stigsdotter and Grahn (2002); Chanon (2009); also see Walker and Cass (2007); Rogers et al (2008) on modes of participation in community energy, such as: supporter, participant and leader; also see the 80/20 or Pareto Principle (http://www.80-20presentationrule.com/whatisrule.html).

Working together to save energy?

While most of the action in Smart Communities project prompted participation, this was not strictly in the sense of a community working together. It is certainly the case that the workshops and other events brought some people together, supported the creation of new social networks, and facilitated the sharing and acquisition of novel ideas and energy know-how. However, the aim that was stated in the project proposal – to encourage a community to discuss, develop and adopt new ways of doing everyday things – proved over-ambitious. Instead, the picture was one of a smaller group of people 'working together to save energy', and a larger group acting on energy individually and at the household level, but within a broader context of community action.

Colin: I think it's a good thing to do, but it doesn't make me feel part of a wider community of energy savers.

Tom: I'm not very clubbable.

However, this is not to say that the notion of 'community' was not important within the project. For instance, 36% of members cited 'involvement in a community project' as a reason for joining Smart Communities. In addition, the qualitative data suggests that, in a number of ways, a sense of 'being part of something' was important to project members. For example, although Faith was not able to participate in the project workshops, she suggested that acting as a group is important, while Jill noted that she participated in the project because it is 'good for the community'. Tom, too, while suggesting that he 'is not very clubbable', also said that he joined the project because 'it was quite nice as a sort of community thing'. Comments on 'community' were mixed. While some participants said they felt a sense of community in the street or area where they live, others said this was not the case.

Doug: We're not very big on the social scene.

Fern Hill mum: Why do you call us a community? Don't call us a community!

The school community was widely acknowledged and valued among the parents at Fern Hill, although some disagreed. Participants with older children or whose children had grown up often said that they their own sense of community had declined since their children had moved on from primary school. Informal interactions with participants also suggest that the local nature of the project was very important to participants.

Faith: People as individuals often feel they can't make much of a difference and them putting the lights on or running the drier, well what difference does that make? But obviously if you feel that as a part of Kingston you're all doing something and also, obviously, the incentive now with the high-energy costs to save money.

In particular, participants were pleased that the lay experts who were involved in the project were local people that they could identify with. Bringing this theme together with the sense of 'being part of something', several participants informally highlighted the extent to which their ongoing involvement with the project was shaped by their desire to be part of and support a local university research project.

Mervin: It's not something I'd bring up if I chat to somebody or a local neighbour!

Kerry: Because the school was around the corner, you felt part of the community. I was on the parents association so I was quite involved. But since they changed schools, it's a completely different thing.

Interviewer: Was there anything in particular that persuaded you to join?
Norman: I think the fact that it was a community thing.

Sally: There definitely is a community in North Kingston and especially our road, Richmond Park Road and Burton Road.

Everyday life

In the analysis of the qualitative data, everyday life emerged as extremely important in three keys ways: as a constraint on participation (which we discuss here), as a key determinant of energy consumption, and as a potential constraint on behaviour change (which we discuss in Section 3). The participation of households in project action was often constrained by the busyness and competing priorities of contemporary everyday life[17]. Ironically, given that recruitment through Fern Hill was so successful and that action at the school deepened parents' commitment (see Section 5), this was particularly true of the parents of primary and pre-school children. Among the project activities, the workshops – which took place in the evening – were most affected by this phenomenon; these were largely attended by project members who do not have young children, often older people. In addition, project members' participation fluctuated over time as the exigencies of their everyday life shifted.

Sadie: A lot of the mums said, we haven't quite got round to monitoring things on a regular basis. It's just lack of time. It's not out of a lack of interest, it's just another thing to do, yeah, time.

Lynsey: Looking after the house, the kids, the washing, the tumble drying, you try and get as much done so that the weekend you've got some time to just enjoy being together, to go out on walks, take the kids out, just to potter around and not be bogged down in household stuff.

Project status and style

Recruitment to and participation in Smart Communities was supported by its non-commercial, university-based status. Anxiety and mistrust relating to energy advice from commercial interests were common in the discussions of project members. The style of the project materials and team also appears to have supported participation. In interviews, project participants used words such as, 'friendly, 'helpful', 'approachable' and 'easy' to describe the style of the project and the team. These findings provide a counter example to the view that community-led (or grassroots or bottom-up) initiatives per se are more likely to enjoy greater participation than more institutionally-led (or top-down) approaches[18].

Faith: No, I don't think it's at all preachy.

Saleem: I'm a bit mistrustful in the sense that, if a company gives me advice on what measures to take, I'm thinking: are they giving this advice because they think that they can improve the efficiency and reduce the cost or are they giving this advice just to sell their products?

17 See Wilson et al (2013). 18 See discussion in Walker and Devine-Wright (2008).

Gender and household conflict

Previous research suggests that action on energy within the context of consumption feedback is often undertaken by one individual only in a household; often, a man – a micro-resource manager whom Yolande Strengers calls 'resource man'. Research also suggests that negotiation and conflict around household practices limits the potential for change[19]. While a number of 'resource men' are recognisable in the Smart Communities data, other interesting patterns are also evident. In Smart Communities, Adam, Tom and Doug are good examples of 'resource man'; all took energy monitoring and energy consumption management very seriously and were interested in gadgets. Adam stated that his wife 'hated' his activities, citing cooking and standby practices as sources of conflict. Meanwhile, Tom reported that his wife never looks at their monitors (Tom has several), comes from a 'different [energy] culture', but is willing to engage in discussions of how to reduce energy consumption due to the cost. Doug and his wife, Miriam, were both involved in energy monitoring, but this did not lessen conflict.

Smart Communities provides a counter example because many women joined the project and some participated as much as, or more than, the men in their household. While we are not able to provide any solid evidence of why this is, we conjecture that this may be related to: the breadth of activities in Smart Communities, the importance of the primary school in the project, or because the energy monitoring component of Smart Communities was more active than is typical in energy consumption feedback projects. In addition, in the course of our work on the project, we met many couples who were participating in the project and working on energy in collaboration and with an apparent lack of conflict[20].

Doug: I've noticed that the 1.5 watt LED, which is on all night downstairs, is never switched off in a morning, and it's me that switches it off, and even though it uses nothing, it's still a little niggly.

Miriam: Yeah, but it's one of those things, when you leave things on like this you say 'Oh, it's only 1.5', when I leave it on it's a big disaster. Or you leave the radio on in your workshop and you're up here and I say, 'You've left your radio on', and you say, 'Well it's only very little.'

Doug: Well it is a little.

Miriam: Yes, but then if I leave something on it's, 'You've left this on'. No, there's definitely an inequality.

19 Hargreaves et al (2010; 2013); Grønhøj and Thøgersen (2010); Strengers (2013); van Dam et al (2010).
20 The other relevant issue here is that Smart Communities had a specific focus on school children, and this is discussed in Section 5.

‘Chaotic’ home computing

Informal interactions in members’ homes suggested that use of the website was often constrained by the – to academic researchers, at least – chaotic home computing arrangements. For instance, the team observed unreliable internet connections and email software, and cats walking over keyboards that are already falling off messy kitchen tables. The need for password-protected web pages also constrained participation within this chaotic environment. As these comments illustrate, participants’ difficulty with computers was sometimes linked to the acute sense of busyness that pervaded their descriptions of their everyday lives.

Chloe: Fiddly, technical, frustrating. And there’s always so many things to log in on the computer, and then passwords. It’s just one more thing to do on the computer. I just think, ugh.

Sonia: Oh, but then I’ve got to do my password and everything and I don’t know it, it’s not the one I thought.

3 Understanding change in Smart Communities

Energy consumption and everyday life

The academic and policy literature on energy consumption and change is considerable and includes work in sociology, social psychology, behavioural economics and other domains[21]. Although Smart Communities is interdisciplinary it draws particularly on practice theory and sociological approaches to everyday life. The Smart Communities interviews support a range of existing sociological and ethnographic understandings of the ways in which domestic energy consumption is shaped by everyday life[22]. This is vividly illustrated in an interview with Gail, a married woman in her early forties with two children (see Figure 1).

More change among project members and IHD users

The Smart Communities end-of-project survey data suggests that the project was effective in producing behaviour change, particularly among project members who fully engaged with the energy consumption feedback. Survey respondents were asked to indicate whether or not they had made twelve specific changes 'over the past year or so'[23]. The Gamma test[24] has been used to examine the extent to which the non-members differ from other three categories: people who joined the project, project members who claimed they frequently entered readings on the website and project members who claimed to use the IHD at least once a day (see Table 1). In this instance, the Gamma values of -.203 (all project members), and -.324 and -.362 (project members who fully engaged with the energy consumption feedback) suggests that these factors had small to moderate effects. The three significance values suggest that we can be highly confident of these results.

Table 1 Differences in self-reported behaviour change

Members vs. non-members		Readings entered frequently vs. non-members		Use IHD daily vs. non-members	
Gamma	Significance	Gamma	Significance	Gamma	Significance
-.203	.020	.324	.001 *	.362	.000**

21 See DECC/Chatterton (2011). 22 Shove (2003); Shove et al (2008); Pink (2009); Gram-Hanssen (2010); Shove et al (2012); Strengers (2013). 23 Some of these changes were relatively straightforward, such as: switching off lights, washing clothes at low temperatures and turning off the heating when going out. Others were more challenging, such as: installing insulation or micro generation, or draught proofing. 24 The Gamma test is recommended when both variables are ordinal or when one variable is ordinal and one is nominal but has only two categories (as here) (de Vaus 2002). The Gamma value indicates the strength of the effect, in this case the difference between the non-members and the other three categories. Gamma values range between 0, indicating a weak effect, and 1 (or -1), indicating a strong effect.

Figure 1 Social science, everyday life and energy consumption

People attach meanings to particular ways of doing things, and these shape energy consumption.

Energy consuming practices are shaped by the cookers, space and water heating systems, types of windows, shower heads and so on that people have in their homes.

Energy consumption is rooted in the sensory experiences that people have of their home – for instance, the things that they smell, see, touch and feel.

Energy consumption is shaped by our bodies, for example, the things that we physically cannot do.

People often find it very difficult to relate information or feedback about their consumption to their everyday lives.

Gail is 42 and lives with her husband and two children, one of whom is at Fern Hill. Gail uses her Aga, the central heating and electric heaters to achieve a 'nice heat' around the house. Gail runs her washing machine and tumble drier once, sometimes twice, a day. This is for several reasons. It is incredibly important for Gail that things are clean; she says, 'I love it, the fabric conditioner, everything smells fresh and clean'. Most clothes are washed after each wearing and different types of washing are washed separately (colours, clothes, towels, bed linen and so on). Gail says,

'We've got one double bed and two singles, so that's four times a week. And it's non-stop with clothes. My eldest and husband do sports, that's always needing to be washed, and you've got school uniforms, regular clothes and towels. I don't mix the clothes, I know there are people who put whites and coloureds together!'

Everything is tumble-dried all year round so that they feel right and because Gail cannot iron these days due to a serious back condition. Gail said,

'In the past in the summer, I got a clothes horse and I've put the stuff out there and let it dry and I've ironed. But as my back has deteriorated, I don't want to be ironing. With a tumble drier everything's so much softer and nicer, and you don't have to iron'.

The whole family showers once and sometimes twice a day and the hot water is permanently on. Gail particularly values modern high pressure showers; she says,

'I grew up in the seventies with a piddly shower. I can't see us having a quick sponge down. I think maybe the older generation might but I think younger people more or less have showers every day.'

Gail is concerned because she feels that her energy bills are too high; more than £300/month. However, she does not 'understand how they came up with those figures'. Since becoming concerned and using her Owl monitor, Gail has started switching off some lights and switching the TV to standby when it is not being watched. She also tried some energy efficient lighting in the past, but did not 'like the light'. Although involvement in Smart Communities and the interview itself is encouraging Gail to reflect on her practices, she has not seriously contemplated change.

Domestic energy consumption is shaped by the everyday practices that we perform in order to achieve what we understand to be 'normal' standards of comfort, cleanliness and convenience.

Everyday life is characterised by habit and routine, and by messiness and disorderliness.

Householders are often aware that ways of doing things have changed over time. However, current practices are often viewed as fixed or how things should be.

Householders' (lack of) skills and know-how shapes their practices and their energy consumption.

Change is a long term process

The Smart Communities research highlights the importance of understanding behaviour change as a process rather than as a one-off event. The interviews suggest that change in energy consumption behaviours should be understood as a gradual process that often unfolds over quite lengthy periods of time. While some simple changes may be possible almost immediately and with minimal financial and opportunity cost, change is often planned, negotiated, researched and discussed, and takes place over extended periods. Change often makes considerable demands in terms of time and effort. Thus, the busyness and competing priorities of householders' everyday lives can constrain behaviour change. Project participants also often mentioned cost as a constraint on change. Some changes can only take place when the time is right: for example, when work is done on the house, when something needs replacing, when the cost becomes affordable or when other priorities allow; Tony called this 'opportunistic greening'. Other changes are undertaken gradually to spread the costs (such as, replacing halogens with LEDs). As the broader conditions of people's lives change, processes of change can be terminated or interrupted, and previous changes can be reversed.

Audrey: We've been talking about longer term projects to increase the insulation and if we were going to do any building works how we could actually make those the most efficient that we could that would save us money in the future, rather than just choosing something basic.

Tom: Opportunist greening. No way am I going to take all the halogen lamps out and replace them with LEDs because that would cost hundreds. It's just not viable, but we'll replace them as we need to.

Jill: We've noticed it seems – and I don't know what she's doing – but when my daughter's home it seems that the electricity consumption goes up rather dramatically.

Energy know-how

In the early project workshops and in-depth interviews it became clear that many project members' efforts were constrained because they did not know how to reduce their energy consumption. Indeed, in many cases, householders had joined the project in an attempt to address this challenge. At the same time, we found existing concepts in this domain – such as energy literacy and carbon capability[25]- tend to overlook the highly practical, household-specific skills that people need to reduce their energy consumption. In response, we used the novel concept of *energy know-how* and experimented with two activities – Home Energy Action Visits and Thermal Imaging Parties (see details in Chapter 5). These were specifically designed to facilitate the sharing and acquisition of energy know-how, and were developed and delivered in partnership with local lay experts from our project partners, the South West London Environment Network, Transition Town Kingston and the Ham and Petersham Low Carbon Zone. Although it is not easy to identify direct relationships between activities and change, it seems clear that the most consistent and substantial changes observed in Smart Communities were instigated by these intensive forms of engagement between project members and the local lay experts.

Our *energy know-how* concept specifically focuses on the things that it is useful for people to know if they want to reduce their energy consumption[26]. For simplicity, we identify two key forms of energy know-how. In many cases, energy know-how takes the form of knowing about alternative ways of doing things, for example: *you **could** hang your clothes rather than tumble drying, you **could** set your hot water for just half an hour in the morning and evening or you **could** insulate your letterbox*. This form of energy know-how broadens the scope of what is possible. Energy know-how also involves having the skills required to implement these alternatives, for example: ***being able to** hang clothes so that they don't need tumble drying or ironing, **how to** change your hot water settings or **being able to** insulate a letterbox*. This form of energy know-how makes it easier to put desired changes into practice. Energy know-how emphasises the highly skills-based and practical nature of the things that householders need to know, the practical and experiential ways in which this form of knowledge is shared and acquired, and the value of hands-on and interactive demonstration and guidance (preferably in-home). Ideally, energy know-how should be household-specific, because it depends on the material objects that are in the home, the existing know-how of the household members and current household practices. A key finding of our practical experiments with energy know-how was that householders prefer sources of guidance that are non-commercial, for instance via local lay experts and community groups.

25 DeWaters and Power (2011); Whitmarsh et al (2009; 2011). 26 Our concept of energy know-how is informed by: Lave and Wenger (1991); Wenger (1998); Harris (2007); Pink (2009); Flyvbjerg (2001); Darby (2006); Shove et al (2012); Wilhite and Wallenborn (2013); also see Catney et al (2013); Royston (2014); Simcock et al (in review).

4 Energy monitoring and feedback

Introduction

Smart meters with in-home displays (IHDs) will be rolled-out across the UK from 2015 at a cost of £12 billion[27]. Meta-reviews of quantitative studies reveal variations in extent and type of engagement with IHDs, as well as reductions in consumption (3-19%)[28]. Qualitative studies suggest that IHDs can increase the visibility and salience of energy consumption and related behaviours, and can prompt re-evaluation, behaviour change and consumption reduction. However, they also identify a number of factors that constrain change: engagement is often limited to one household member, monitoring may create conflict with other householder members, changes are often limited, householders find it difficult to contemplate changing their existing ways of doing things, and engagement may be short-lived[29]. Smart Communities energy consumption monitoring and feedback had a number of distinctive features:


Join today at www.smartcommunities.org.uk

Smart Communities: making energy visible

One of the biggest energy challenges is that energy is not really visible in our busy everyday lives. To make things even worse, we don't get up in the mornings and say, 'I know, I think I'll consume some energy today!' Instead, we just use energy – electricity and gas – incidentally through all the little things we do around the house every day. If you think about it, it's almost like going into a supermarket that has no prices on the food. That's why one of the key objectives of Smart Communities is to make energy visible in our lives. To help with this, everyone who joins Smart Communities receives a FREE energy monitor and has access to some helpful energy consumption feedback via the Smart Communities website. Another way Smart Communities makes energy visible is through thermal imaging parties (in the winter, when it's nice and chilly).

"We like the monitor to look at our energy usage, and we like the charts because we can compare our usage to others. Because you just don't know, otherwise, whether you're doing quite well or not doing well, or how you can do things better."

Fiona Pidgen, Park Farm Road.

JOIN Smart Communities and receive your FREE energy monitor

Energy monitors and feedback charts

To help make energy visible in our everyday lives, every household that joins Smart Communities (see www.smartcommunities.org.uk) is given a FREE energy monitor; we will even come round and install it for you. These are terrific little gadgets because they show you how much energy you are using at any one time. This allows you to find out which appliances around your house are grabbing electricity, and you can start to figure out ways of using these less. The monitors are portable, so you can even go around your home unplugging things on and off to find out how much electricity they use. After a while you also get a feeling for what the monitor should be reading at any given time; this means that you will easily notice when appliances have been left on accidentally.

The energy monitors also tell you how much energy you are consuming over time. However, this is still not always very helpful because we don't know if our consumption is more or less than the consumption of other households like ours. To deal with this problem, Smart Communities offers you the opportunity to input your weekly cumulative electricity consumption figure into the website. And then you can see how your consumption compares to the average of everyone else in the project (as well as the best 20%). You can do the same for gas, taking readings from your gas meter. When we come round to install your monitor, we'll get you started on monitoring both gas and electricity. Oh yes, there's also a £20 John Lewis gift voucher prize draw each week for those who enter their readings.

"I think the real glory is seeing the graphs and seeing the relationship between our home and the community on average."

David Crabtree, Lower Ham Road.

The Smart Communities website

Smart Communities members can access lots of detailed information on the Smart Communities website, much of it provided by other Smart Communities members, based upon their own experiences. For instance, there is a list of suggestions, compiled on by Smart Communities members, for reducing your energy consumption on lighting your home and – particularly relating to gas consumption in most cases! – for keeping sufficiently warm in the winter. But these are not just tips. Each idea is backed-up by detailed local information about how to implement it, where to buy things and so on. You can also join the Smart Communities members who made a web pledge to try out particular tips, and have reported on their progress as they implement new ways of doing things. There's also the Smart Communities web forum where you can make comments or ask questions, and other members can offer answers and solutions.

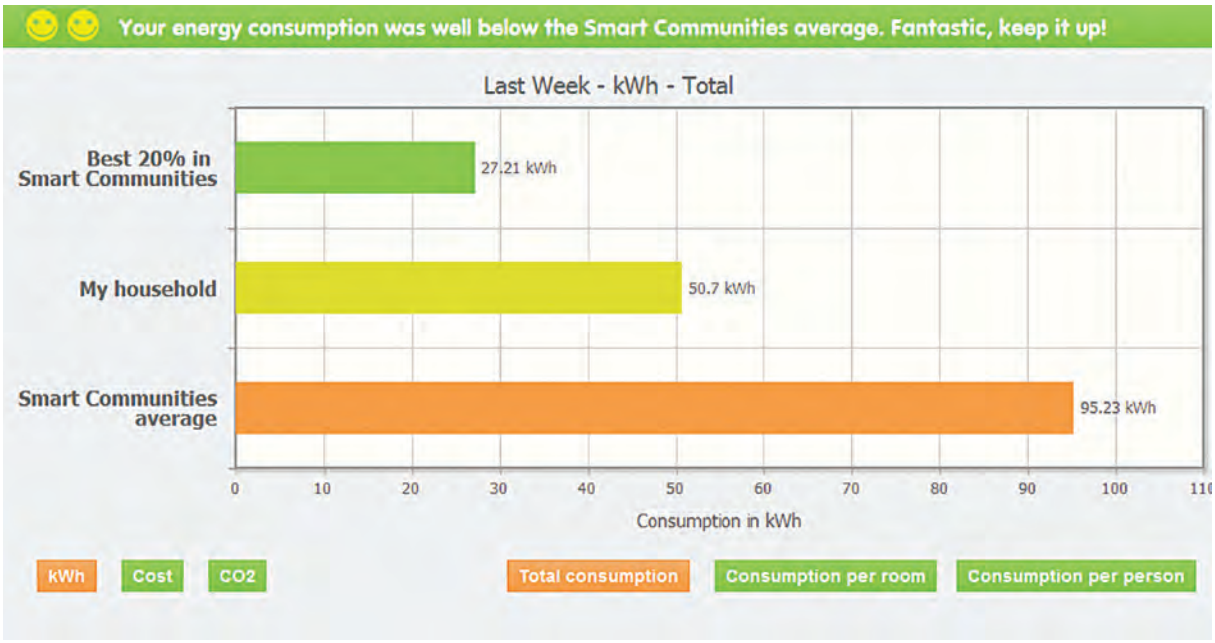
Don't forget to tell your neighbours!

- At two years, this is one of the longer studies of energy consumption feedback.
- Monitoring and feedback was undertaken within the context of community action.
- Real-time electricity feedback was provided on a very basic Owl IHD energy monitor.
- Once a week – on what we referred to as 'Metering Mondays' – participants received emails reminding them to enter their cumulative energy consumption reading into a secure section of the project website (electricity readings from the monitors and gas readings from their gas meters). The entry of readings was incentivised by a weekly £20 John Lewis voucher prize draw and the names of the winners were included in the following week's email.
- As soon as they entered their readings participants could see their last week's energy consumption alongside comparative community feedback (the average and best 20% consumption of participating households).[30, 31]
- This feedback could also be viewed relative to the number of occupants and the number of rooms in households.

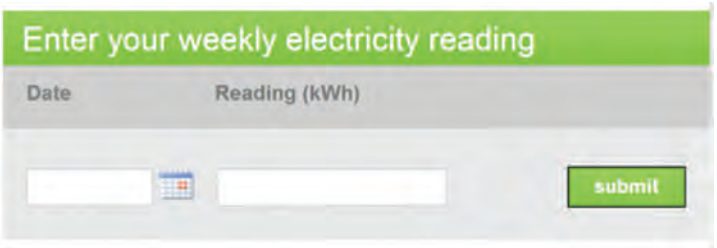
27 HM Government (2009; 2011); DECC (2013b). 28 Darby (2006a); Ehrhardt-Martinez et al (2010); Stromback et al (2011). Also see Ofgem (2011). 29 Hargreaves et al (2010; 2013); Grønhøj and Thøgersen (2010); Strengers (2013); van Dam (2010). There is some disagreement on long-term engagement with feedback; while Hargreaves and colleagues are sceptical, Stromback et al (2011) suggest that it is possible and that it can lead to substantial change. 30 When there were gaps in the weekly readings, the system estimated a weekly consumption based upon the most recent reading and the previous reading. 31 This is a novel adaptation of the social norm approach, employing principles of conformity and social normalisation (Rettie et al 2012; 2014): see Appendix 2, Burchell et al (2012)'s review, and empirical energy studies of Schultz et al (2007); Nolan et al (2008); Allcott (2010); Harries et al (2013a/b).

Faith: On the website, seeing that some people are using dramatically less energy you think, mm, okay, so what are they doing, do they live in a similar house, the type of property must make a big difference, and ours is an old boiler, and all these things. Our use per room is quite low, which is good. Mainly because we don't heat the rooms we're not in! And also per person we're not using too much.

Doug: I think the real glory is seeing the graphs and seeing the relationship between our home and the community on average.



Audrey: Over the past couple of weeks I've found that we have been using more than the Smart Communities average, which is unusual, and so I've actually been using it more recently to look at it and think, "Right, why is it doing that much?" and using it kind of go around the house and look at things. And I found that the fridge had been pushed up right to its highest setting so it was running a lot of electricity probably where it didn't need to. So I pushed the thermostat back down and that cut it down by about two thirds.



Our analysis relies upon the in-depth interviews, the end-of-project survey and the user database of electricity and gas consumption readings. The analysis focuses on four key topics: the association between use of the IHD and behaviour change; the longevity of engagement with feedback; variations in extent and mode of engagement with the IHDs and with online feedback; and the high levels of knowledge about their electricity consumption among project members.

Behaviour change

As was discussed in the previous section, higher levels of use of the IHD were associated with higher levels of behaviour change in Smart Communities, particularly among those who used the IHD a lot, either as a real-time display or to obtain consumption readings for entry on the Smart Communities website.

Longevity

Although some research is sceptical about long term engagement with real-time monitors, the Smart Communities research suggests that engagement can be sustained. Table 2 suggests that, up to two years after the installation of the IHDs, up to 40% of users were using their monitor at least once a day, a further 30% at least once a week and only 20% not at all. Further, Table 3 suggests that, although more than 50% of respondents indicated that their use of the monitor had declined over time, just under 40% stated that they were using it as much as or *more than* earlier in the project. There may be bias in these figures; project members who were engaged with their IHDs may have been more likely to complete the end-of-project survey.

Interviewer: Has your use of the Owl changed over the time you've been in the project?

Saleem: No, not really, it's generally been the same.

Table 2 Self-reported frequency of use of the IHD energy monitors (at the end of the project action)

	%
More than once a day	26
About once a day	15
2-3 times a week	11
About once a week	19
About once a month	8
Not at all	21

n = 108

Table 3 Self-reported changes in use of the Owl IHD over time

	%
We use the Owl more often now than when we started	13
We use the Owl less often now than when we started	53
We used to use the Owl but no longer do	7
We use the Owl as much now as when we installed it	26
We have never used the Owl	1

n = 106

The qualitative research suggests that long term engagement with energy consumption feedback was the result of a number of factors. A key factor was the relationship developed between the Smart Communities project (and the individuals running it) and its members. This seems to have created a sense of commitment and reciprocity among many members[32]. Although this was partly developed through personal interactions, for instance, at workshops or on the telephone, it is evident that the weekly Smart Communities emails played a vital role. It appears that the weekly emails prompted users to use their IHDs, not only to capture energy consumption readings for the project website, but also for other tasks (such as ascertaining the energy consumption of specific appliances). As the interview excerpts quoted here suggest, the submission of weekly readings to the project website became habitual for a number of project members.

Variation in engagement

The end-of-study survey and the user database suggest that up to 80% of project members installed the IHD[33] and that around 25% submitted some energy consumption readings. As in previous studies[34], the extent to which householders engaged with energy monitoring and feedback varied; in some cases, the monitor performed a significant role within households while in others it was discarded. Table i illustrates this variation. The interviews also reflect this variation, as well as illustrating how the monitors and online feedback made energy visible and salient, and prompted re-appraisal of energy consumption. This was particularly true of the community average feedback (though this was not always valued) and of feedback relative to the size of the house and the number of people in the household.

Jacqui: I agreed to do it, so I would feel that I have to fulfil that really. As soon as we came from holiday, we said oh, we must do our readings! [laughs]

Jill: I think I'd probably forget about it [laughingly].

Jess: It's like you might say Friday night's bath night. Monday, 4 o'clock, take your readings. It's a routine now.

Adam: It's kind of become just a little friend where it sits in the corner and flags that things are about where you'd expect them to be.

Interviewer: Do you use the energy monitor at all?

Lynsey: No, we've for some reason put it away.

Norman: It's a conscience. You look at it and you see when it goes over a pound an hour.

Chloe: I basically just watch it to see when it peaks and then think, why is it peaking?

32 See Cialdini's (1993) discussion of reciprocity. 33 In the early stages of the project, monitors were couriered to new project members; this approach proved inadequate because some members were not installing the monitors (due to concerns about installation or general busyness). In the latter part of the project, the monitors were delivered and installed by the project team. 34 Hargreaves et al (2010; 2013); Grønhøj and Thøgersen (2010); Strengers (2013); van Dam (2010).

As Table 4 illustrates, the monitors were used for a variety of purposes, two of which are of interest. First, it is striking that 69% of users used the monitor to obtain readings for the Smart Communities website; this points to the value of specifically prompting engagement with the monitor for specific reasons (in Smart Communities this was done in the weekly emails). Second, the monitors were frequently used to find out how much energy was used by particular appliances. Unfortunately, the research suggests this tends to focus attention on appliances that draw a lot of energy for relatively short periods (such as kettles or toasters), potentially deflecting attention from practices that consume more energy over longer periods (such as electric ovens or washing machines).

Chloe: It seemed like one more middle-class competitive thing. I thought they're going to be bragging about consumption saving now at the school gates, along with their genius children and the husband's bonus [laughs]. I'm sure it's a good idea but I just sort of thought, nah.

Table 4 Self-reported uses of the Owl IHDs

	%
To take readings for the Smart Communities website	69
To find out how much energy individual appliances use	56
To find out about baseline consumption	50
To find out about maximum consumption	38
To check if something has been left on	21
To check that everything is switched off at the end of the day or when going out	11
Three or more of these purposes	50

n = 108

Knowledge about energy consumption

Analysis of the Smart Communities end-of-project survey indicates that project members' engagement with the IHD and the web feedback increased members' levels of knowledge about their own and other's energy consumption, and about the consumption of the appliances that they have in their home. The interviews also support this. Survey respondents were asked three questions about their electricity consumption and a further question about the electricity consumption of seven of the appliances that they might have in their home:

1 Do you know roughly how much electricity your household consumed last week?;
2 Do you know how your household's electricity consumption usually compares with others?
3 When 'everything' is switched off in your home, for example when you are just about to go to bed, do you know how much electricity is being consumed in your home? This is variously referred to as your baseline, background or vampire consumption[35].
4 When you switch on these appliances, how much electricity do they draw?: **i** kettle, **ii** tumble drier, **iii** iron, **iv** TV, **v** PC, **vi** washing machine and **vii** oven[36].

The Gamma test was used to examine the extent to which the members of Smart Communities differ from the non-members in terms of this knowledge[37]. In addition, the Gamma test was used to examine whether members who had installed their Owl monitors knew more than *members and non-members* who did not have monitors installed. The results of these tests are shown in Table 5.

George: Fan heaters, the amount of energy they use is dreadful. But we needed one for very short term, got it out of the attic ... and tested it before we used it. So it's that sort of awareness. Whereas before, you go and plug it in and let it go. At least I now know that the power consumption or have a rough idea.

Audrey: It's very useful to have the digital display on view and see how it zooms up when you do something like switch on the tumble drier, boil the kettle or put the washing machine on.

35 The possible answers to these three questions were 'Yes' and 'No'. 36 The possible answers to this question were 'Don't know' (which was analysed as 'no') and three categories in kW (which were analysed as 'yes').
37 The Gamma test is recommended when both variables are ordinal or when one variable is ordinal and one is nominal but has only two categories (as here) (de Vaus 2002). The Gamma value indicates the strength of the effect, in this case the difference between the non-members and the other three categories; Gamma values range between 0, indicating a weak effect, and 1 (or -1), indicating a strong effect.

Table 5 Differences in self-reported knowledge about domestic energy consumption (at the end of the project action)

	Project members (n = 130) vs. non-members (332)		IHD installed (108) vs. no IHD installed (226)	
	Gamma	Significance	Gamma	Significance
1 Own energy consumption?	.755	.000	.746	.000
2 How this compares to others'?	.781	.000	.827	.000
3 Own baseline?	.810	.000	.807	.000
4 Consumption of appliances:				
i Kettle	.531	.000	.609	.000
ii Tumble drier	.203	.074†	.318	.008
iii Iron	.309	.004	.363	.001
iv TV	.379	.000	.436	.000
v PC	.384	.000	.446	000
vi Washing machine	.406	.000	.480	.000
vii Iron	.430	.000	.498	.000

n = 462
†Not significant.

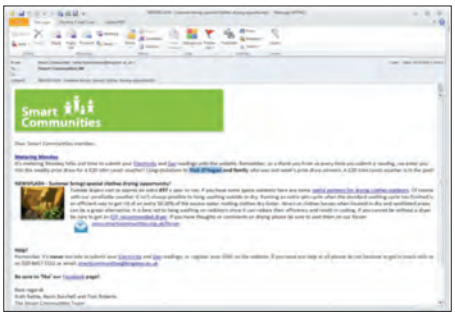
The Gamma values for the general energy consumption questions – the first three items – indicate a strong effect. This means that project members claim to know much more about their energy consumption than non-members, and that members who have installed the monitors claim to know much more than other survey respondents (members and non-members). The significance values of .000 indicate that these results are statistically significant. The Gamma values for the seven appliances featured in item four indicate low to moderate effects. This means that project members claim to know more in these areas than non-members do, and members who have installed monitors claim to know more about their appliance energy consumption than other survey respondents, but these differences are smaller than for general energy consumption. The significance values for all appliances are statistically significant except for dishwashers, which was not statistically significant in the case of the members vs. non-members test.

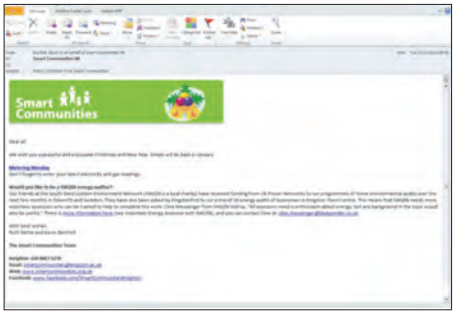
5 Other project action

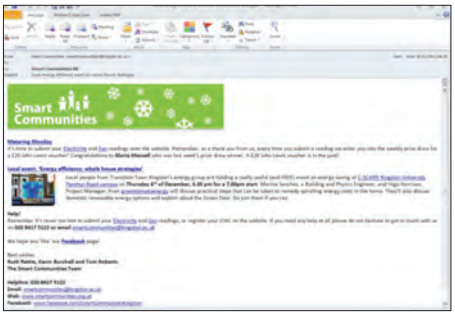
Weekly emails

On Mondays throughout the Smart Communities action period a Smart Communities email was sent to all of project members. The emails served a range of purposes, such as:

- Reminders to enter gas and electricity readings on the Smart Communities website, under the heading Metering Mondays (see section below on Energy monitoring and feedback).
- Topical or seasonal energy saving tips.
- Invitations to project events.
- Information about other local and national events and initiatives.
- Distributing project materials.
- Communicating the name of the person who won the previous week's prize draw.







The research suggests that the weekly emails were valued by many participants. For example, as shown in Table 6, in the end-of-project survey 62% of project members claimed they read the emails 'every week' or 'most weeks', while only 6% claimed they never read them. The emails were not universally appreciated; for example, as Chloe's comment illustrates, project members sometimes found it difficult to engage with the emails after a day at work. For those who read them, the interviews suggest that they supported frequent and sustained engagement with the Owl IHD (as discussed in the previous section) and contributed to a 'sense of being part of something'.

Table 6 Self-reported frequency with which members read the Monday emails (at the end of the project action)

	%
Every week	41
Most weeks	21
Some weeks	21
Few weeks	11
Never	6

n = 122

> Audrey: I find that the weekly email from yourselves is really useful in prompting me to do those readings weekly.

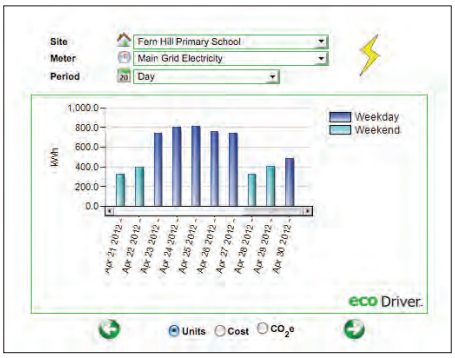
> Chloe: Yeah. I don't generally read them. They come at, I don't know, about four or five in the evening generally, when I'm busy when I'm like 'arghh.'

School, children and parents

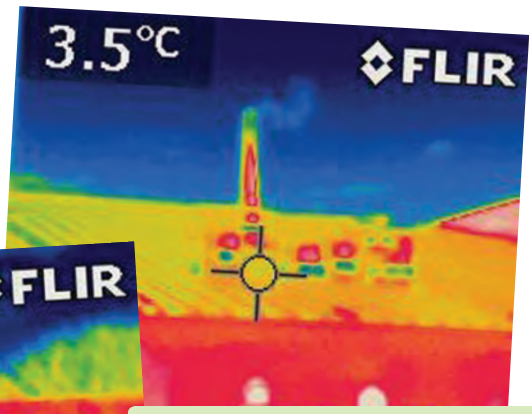
Schools are often seen as an important site for the development of literacy and action in the context of energy and sustainability[38], and considerable UK activity on sustainability was undertaken within the Sustainable Schools framework (cancelled in 2010)[39]. Previous research suggests that children can carry energy saving messages to parents and that this can engage parents when framed as part of their children's education[40].

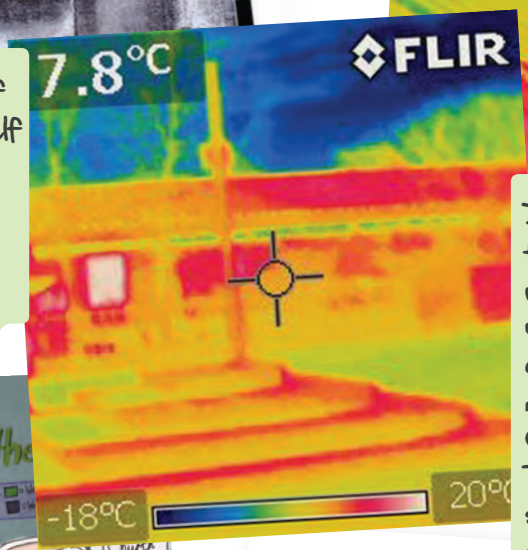
The potential synergy of working with children and parents both at school and at home was central to the design of Smart Communities. The objective was to embed action on energy within school life, curricula activities and estates management, and to encourage interaction with home action on energy. In collaboration with Diana Brotherston, the head teacher (now retired) and other staff, the following action was implemented at Fern Hill:

- Installation of a sophisticated ecodriver energy consumption monitoring and feedback system, providing online feedback showing gas and electric usage for different parts of the school, for various time periods, and in kWh, £ and CO2.
- A staff communications programme focussing on energy in the classroom and the school kitchen.
- Energy drama workshops were used to make energy more visible. These were provided by local community drama company, Bounce Theatre, and encouraged the children to think creatively about energy. Over the course of the school year, each year group took a turn in developing a story that started with the title The Energy Collector and the thought: imagine what would happen if someone came along and took away all the energy in the world. Bounce developed a project website and resources pack. The drama culminated in a performance at the Smart Communities one-year celebration in May 2012.
- Each class appointed an Energy Monitor whose responsibility was to check that the lights and computers were switched off at the end of the day. Each week, two Year Six children toured the school to inspect all the classes, and the school Green Cup was awarded to the best performing class.
- A programme of class work on energy and water conservation, supported by materials from Thames Water and Smart Communities.



38 DeWaters and Power (2011). 39 Hart (1993); Specialist Schools and Academies Trust (2008); Department for Children Schools and Families (2008; 2010). 40 Bartiaux (2008); Grønhøj and Thøgersen(2011); Fell and Chiu (2013).





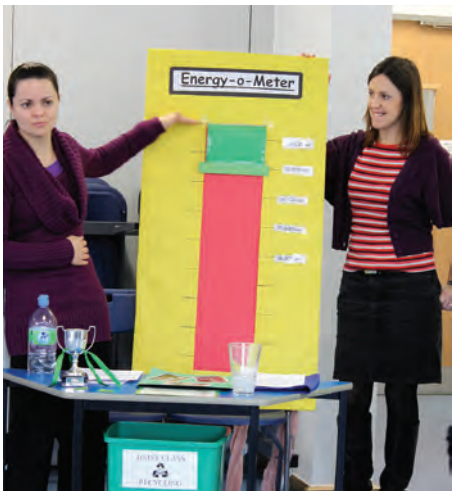
Caroline Virgo (Eco Team): One of our site managers took it on himself to start tracking which classes were leaving things on...and then he started actually [smiling] targeting individual teachers.

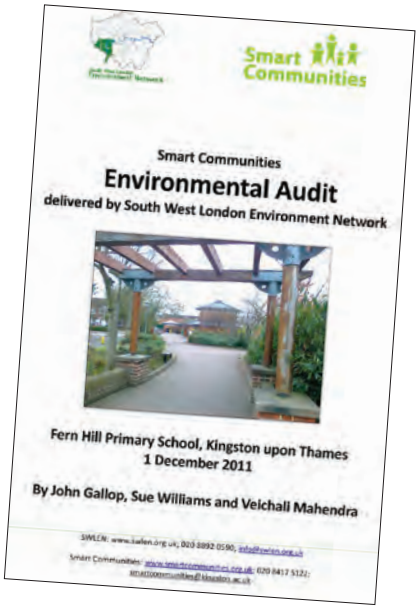
Diana Brotherston (Head teacher): We felt the children were becoming more aware of their energy usage. It worked better in classes where the teachers were more involved themselves.
Caroline Virgo (Teacher and Eco Team): Things that were really successful were the launch and celebration days. That was a really, really good event.

Gail: It does have an effect on them. Sally, she was just five, but already the last year, she's been, you know, "Why is that TV on and nobody's in that room? Who's put all the lights on?" And then she made herself the energy monitor at home.

Diana Brotherston: It did require more time and energy from myself than we expected...sometimes you thought, oh dear, this is quite a big thing on top of everything else.

- The ecodriver feedback and thermal imaging work was integrated into school life, for example, in assemblies and curricula activities (for example, teaching on graphs).
- Work with the school's site manager who used the energy feedback as part of his energy management strategy. This was augmented by an environmental audit with thermal imaging (provided free-of-charge by South West London Environment Network using cameras provided by Ham and Petersham Low Carbon Zone). In addition, the project provided smart plugs and powerdowns that the site manager used to monitor individual appliances around the school.
- Fern Hill was used as the venue for project events, such as: the launch event, the one-year celebration event and five community workshops.





The research suggests that after a relatively short period of time, with the kind of support provided by Smart Communities, energy can become an integral part of school life, for both pupils and staff, and within curricula activities, day-to-day school life and estates management. However, the project also illustrates the extent to which such outcomes rely upon the personal enthusiasms and commitment of head teachers and school staff. While the decision to participate in Smart Communities was taken by a group of staff at Fern Hill, it is clear that this was driven by what former head teacher, Diana Brotherston, referred to as her own 'personal ethos' in the contexts of sustainability and the value of external links. This is an important point, because neither sustainability nor community engagement are statutory responsibilities of schools or part of the National Curriculum; instead, they are part of what Diana Brotherston called the 'hidden curriculum' which is associated with the 'personal ethos' Even with a highly supportive head teacher, it is extremely difficult for committed school staff to accommodate the additional work within their already busy schedules. Following Diana Brotherston's retirement in July 2012, the deputy head, Adam Scott, managed to support further action in the school during the Autumn of 2012, despite his challenging role as interim head. Unfortunately, we were unable to develop a similar relationship with the new head teacher appointed in January 2013.

The Smart Communities project illustrates the potential synergy between action on energy in a school and action on energy at home. However, ironically, parents' participation and engagement was often constrained by the time pressures associated with having primary age children.

Recruitment to Smart Communities via Fern Hill Primary School was highly successful; around half of the households associated with Fern Hill registered for the project. In addition, the interviews suggest that: the children's experiences at Fern Hill shaped their activities at home; parents' commitment to using less energy increased when they thought about their children's future, and when they heard about Smart Communities activity in school.

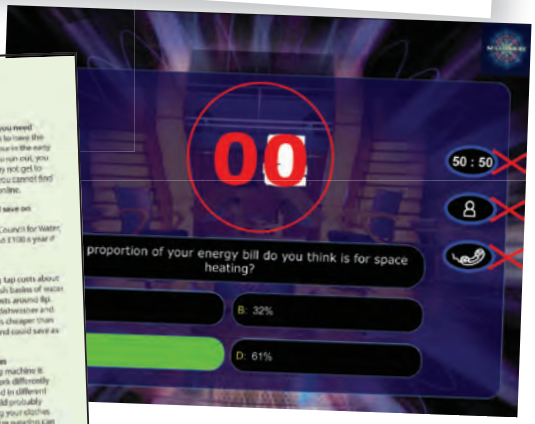
Workshops

Over the two years of the project action – supported by social change agency, uscreates, and local experts from South West London Environment Network and Transition Town Kingston – we held six workshops: two on lighting, two on thermal comfort and two on hot water. At the end of the action period, a further workshop was held to discuss the future of Smart Communities. The Smart Communities workshops took place in the evening, lasted two hours and were hosted and facilitated by the Smart Communities team. We are grateful to Fern Hill Primary School for providing a space in which we could run the workshops. The workshops had a number of objectives:

- A key objective of Smart Communities was to encourage discussion, development and adoption of new ways of doing everyday things, such as heating and lighting their homes, to reduce energy consumption. The workshops were designed to play a key role in this. We encouraged discussion of alternative ways of doing things by seating members in small groups in 'World Cafe-style' sessions[41], and by using pre-prepared scenarios and prompts.
- Dissemination of these ideas to the wider Smart Communities took place via features on the Smart Communities website and specially produced leaflets that were distributed to the Smart Communities members.
- The workshops were designed to be enjoyable, social and community building events. We provided wine and snacks, ran icebreakers and a 'who wants to be a millionaire' quiz on the theme of the workshop.
- In addition, at each workshop, local experts discussed key issues related to the workshop theme and answered questions from the attendees.
- The workshops were also conceived as part of the project research. They were recorded and transcribed, including the small group sessions.

We estimate that around eighty project members attended one or more of the Smart Communities workshops, representing around (15%) of members' households. Although some project members attended just one workshop, a core group of around 15 to 20 attended workshops on all three topics.

41 http://www.theworldcafe.com/



Gail: I'll be honest, I've never been to school to any of your project evenings. I want to do something, partly it's not that interesting for me. Maybe it's not high enough on my list of priorities.

The workshops typically appealed to older project members, although some younger people and parents also attended. For many of the parents, participation in Smart Communities activities and engagement with energy consumption had to compete with a range of other priorities.

Two key outcomes can be identified with respect to the workshops:

1 We found it extremely difficult to get members to discuss and contemplate alternative less energy intensive ways of doing things. For instance, when we tried to discuss keeping porch lights off, many members talked about 'safety' and 'being welcoming'. Contrary to our expectations, group discussion appeared to reinforce rather than challenge existing ways of doing things. This was because people seemed to feel they were forced to rationalise and justify what they were doing. This seemed to stabilise rather than disrupt these practices, and in some cases, to persuade others to adopt them.

2 Although the workshops supported the acquisition of some energy know-how among the attendees, the early sessions revealed the lack of know-how among members and the limitations of the workshop format for addressing this. In particular, the workshops demonstrated the complexity of many energy know-how issues, and the difficulty of establishing and responding to the highly specific conditions that people were dealing with in their homes. It was these emerging findings that led us towards the development of HEAVs – Home Energy Action Visits.

Nelly: I've never attended any of the seminars or drinks evenings or anything. I just haven't had the chance with Peter away quite often, to get a babysitter to then go to these evenings that would be then starting to get a bit more hassley if you see what I mean?

Paul: I came out of that [Smart Communities] meeting, no intention of getting solar PV. Within a week they were installed. You lot got me thinking about it.

Facilitator: My thermostat is set to 18, but I've learnt that the temperature in our living room is around 21. We were dismayed, so we're experimenting now with 17, to see what we end up with.

Phil: I think I experienced the same, my thermostat is set for 19, but I have a thermometer that tells me the real temperature is usually over 21.

Graham: Ours is set for 18 and a half. It's in the hallway, so I have no idea what the other rooms are.

Keith: Well, mine's about 17, but I don't think that is the temperature in the room, I think it's higher than that because it's in the hall.

Facilitator: So this issue of thermostats in the hall is a confounding factor?

The Smart Communities celebration events

The Smart Communities celebration events had a number of objectives. Primarily designed to celebrate the project in an enjoyable and fun way, the aim was also to bring together local project members, the children, parents and staff at Fern Hill, project partners and other local sustainability groups in order to create a Smart Communities 'buzz' and develop networks. These events also aimed to make parents more aware of Smart Communities and to encourage recruitment and local press coverage. The Smart Communities celebration events took place at Fern Hill. The first launched the project (Friday 27 May, 2011) and the second celebrated the project's first anniversary (Friday 25 May, 2012). To maximise the attendance and celebratory atmosphere, both events were timed to coincide with the end of the school day on the last day before spring half term. The first event was attended by local MP, Zac Goldsmith, who officially launched the project, and the second by local MPs, Edward Davey (who was the Secretary of State at DECC by this time) and Zac Goldsmith.

At both events, Smart Communities partners and other local sustainability groups set-up stands featuring interesting and fun sustainability-related activities for the children and adults – including the MPs – to try out, such as: pedal powered music and bubble machines, a solar powered mobile charger and a make-do-and-mend stall. Refreshments were provided by the Fern Hill Parent-Staff Association, and raised funds for the school. Both events featured very short messages of welcome from Fern Hill head teacher, Diana Brotherston, the Smart Communities team and the MPs. The school orchestra performed at the launch event, while – at the anniversary event – project materials were displayed and a group of Fern Hill children presented a performance derived from the Energy Collector drama workshops earlier in the school year. While time-consuming to organise and host (for both the project team and staff at Fern Hill), both events were highly successful in the ways that they were intended.

Surrey Comet

NEWS

Kingston people go green in pilot environmental study

By Martin George

Hundreds of households could take fewer showers, boil less water and turn down their thermostats as part of a pioneering community project to save energy.

The Smart Communities project, the first of its kind, aims to see what sacrifices people are prepared to make in their everyday lives to help save the planet.

Fern Hill primary school and 500 north Kingston households will take part in the three-year project run by Kingston University academics.

The volunteers will compare their gas and electricity usage with the community average online, and organisers hope they will be spurred to cut their consumption and share tips on cutting bills.

Sriphorn Duncan, 64, who lives in Tudor Drive with her daughter, said: "We will be more conscious about everything – maybe not waste so much water, and don't boil too much water unnecessarily.

"It's nice to see

Edward Davey MP: I think projects like Smart Communities are exactly what we want to see all over the country...people, their friends, their neighbours, housing providers, church groups, other local groups. Unless we have very strong action at the community level, I don't think we'll make the changes we need to make.

Caroline Virgo (Teacher and Eco Team): Things that were really successful were the launch and celebration days. That was a really, really good event.

Chair of school governors: Today has been successful, to get probably a couple of hundred people out on a day like today, and to get the children so passionate and so eloquent in what they said. Fantastic, well done to you and your team, absolutely fantastic turn out.

Home Energy Action Visits

The Smart Communities activity that most consistently produced substantial change was the Home Energy Action Visit (HEAV). HEAVs were developed in order to explore ways of developing energy know-how. They were developed and delivered in collaboration with local lay experts John Gallop and Sue Williams from South West London Environment Network, and made use of thermal imaging cameras kindly loaned by the Ham and Petersham Low Carbon Zone. Twelve HEAVs were organised in the winter of 2012-2013. The idea of using home visits as a means of advising householders about energy consumption reduction is not new; indeed, its history can be traced to the energy crises of the 1970s[42]. Formats vary, but traditional home visits tend to emphasise comprehensive, whole-house auditing and reporting. In contrast, drawing on the project team's emerging recognition of the significance and potential of gas consumption, the HEAVs particularly focused on the use of gas for space and water heating. Further, during the visit itself, the Smart Communities HEAVs emphasised action, hands-on demonstration, thermal imaging and the provision of materials. A few days after the visit, recipients were sent a short report containing ten relatively simple and impactful actions for implementation, illustrated by relevant thermal images. Responding to our observation that energy behaviour change is a long term process, HEAVs also involved follow-up visits, guidance and support.

Saleem: I put the strips on the kitchen door, that works brilliantly, it has reduced the draught. I've put in the chimney balloon, and also the reflective panel on the radiator in the front room, which is facing the outside wall. The only thing I haven't done is the insulation at the top.

Sophie: I thought it was brilliant because it really personalises what your issues are and it pinpoints succinctly the little things that you can do in sort of like a priority.

The HEAVs were very positively received and the interview data shows that they led to substantial changes. HEAV participants particularly liked: the bespoke nature of the advice; the emphasis on a few impactful ideas; the emphasis on action (demonstration and guidance) in the visit; the highly visual nature of the thermal images; the friendly, authoritative and non-judgemental tone of the local experts; the highly knowledgeable, but non-commercial role of the local experts.

Martin: Yeah the report helped because we could just say, right, we'll do that, we'll do that. We've done all these, well, not the microwave.

Thermal imaging parties

The Smart Communities thermal imaging parties (TIPs) were based on an idea that had been trialled by the Ham and Petersham Low Carbon Zone. We were interested in TIPs because of their potential for the development of energy know-how. The TIPs involved people from three or four households, as well as local lay experts with a thermal imaging camera, going together from house-to-house taking thermal images as they go. This was followed by refreshments, and viewing and discussion of the images at the home of the organiser. After the events, reports were sent to each participant. As in the case of the HEAVs, the thermal imaging cameras were kindly loaned by the Ham and Petersham Low Carbon Zone and the TIPs themselves were run for us by associates of the South West London Environment Network.

June: It was really helpful for me just to sort of walk round the house and go over a few things with them.

Martin: The thermal images were quite a surprise for the windows. since then we've had them all taken out and put draught excluder in. These large blue areas, you could feel it, but when you can actually see it, crikey.

42 See review of studies in Abrahamse et al (2005).

Home Energy action visits

Sophie: It was great! They were very personable and very informative.

June: They were lovely, very friendly, approachable, polite and interesting. I felt really comfortable with them.

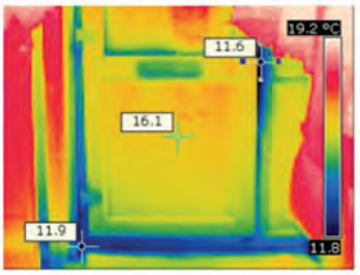
June: Well, because they've got experience and knowledge, and they'll come to your home and give advice but it's not hard sell.

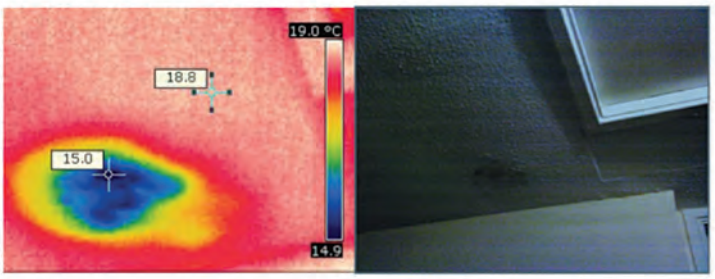
Sophie: Because they're enthusiasts and there's nothing pushing it apart from a real desire to help the planet, it's not profit related.

Thermal Imaging parties

IR_0457.jpg

This inside view of the front door shows that the door itself is a good insulator but the frame around it is much colder, especially below it and also on the right hand side at letter box level. This suggests a draught here and might benefit from draught strip.





IR_0449.jpg DC_0450.jpg

The thermal image above is of the ceiling where the leak occurred and it shows that the insulation has been damaged so more heat leaks out through this region than through the undamaged region.

We were able to run two TIPs. These were very difficult to organise, relying on a project member who was willing to act as organiser and host, and the availability on the same evening of people from two or three other households. We are very grateful to project members, Peter and Marilyn Mason, and Kate Hammond, for organising and hosting these events. The TIPs proved successful as social events, as contexts for making energy visible and the acquisition of energy know-how, and as prompts to action. However, they did not prompt action by householders in the same consistent and substantial way as the HEAVs. Our impression is that this could be improved through the provision of more specific advice (as in the HEAVs) and follow-up support and guidance.

Percy: Everybody who came has taken away something to do, not necessarily a huge job. One of the guys is rebuilding his front door, trying to keep the original door, but improve the thermal performance.

However, the second TIP produced an unexpected and potentially significant outcome. This event was run in a small military services housing estate within the project area. The potential that new gas heaters were causing excessive draughts had become a source of disagreement between the residents and the property managers. On the basis of the thermal images that were produced during the TIP, Kate Hammond was able to demonstrate the problem to the property managers and to persuade them to reconsider this aspect of their property management strategy.

Kate: It's really perverse, I could feel it was draughtier since they fitted these heaters, but now I have the evidence.

Co-creation

At the two workshops on hot water, our partner, uscreates, implemented a number of additional co-creation activities. These were designed to draw project members into developing new ideas for project action:

- Local mapping exercise in which attendees added detail to a large scale map of the local area, including: venues and meeting places, resources and assets, and routes.
- Drawing, writing and modelling ideas for project action; building on each other's ideas; and narrowing down ideas to those with practical potential.

These workshops were followed by more informal meetings in a pub at which ideas were further developed. Two key actions took place as the result of these activities:

1 The participants and the project team developed a variety of messages designed to challenges norms relating to the use of hot water around the home. These messages were reproduced on a range of badges and wristbands which were used in project activities at Fern Hill Primary School and at a local sea scouts group (see below).

Nancy: It took a long time to prepare, I had to do my own research and self-education, I'm not an expert, and have to learn, so it's a bit uncomfortable. I felt like I needed to find out the latest on everything.

2 Project members took Smart Communities materials (leaflets, Owl IHDs, badges and wristbands where appropriate, and materials provided by Thames Water) to other local social groups:

i Nancy prepared a session on energy and water for the local sea scouts group with which she is involved. As well as using Smart Communities materials, Nancy also sourced and developed her own materials and activities, and encouraged the sea scouts' parents to join Smart Communities. While Nancy felt that the session was successful in raising energy as an issue, she also commented on the unexpectedly high time-commitment this required.

ii Percy invited his friends from a local club to join Smart Communities. While half a dozen did join and participate, Percy himself felt disappointed at the lack of interest.

iii Jacqui, who is also a member of the nearby Ham and Petersham Low Carbon Zone project, invited other members to join Smart Communities. As a result of this activity, twenty Low Carbon Zone members joined Smart Communities, many of whom attended subsequent the Smart Communities workshop on thermal comfort.

Other web features

Percy: I tried to form a sub-group in my club, which struggled because they're not very green.

In addition to the energy consumption feedback system, the Smart Communities website had two further key features, both of which were designed to extend the discussion of new ways of doing things from the workshop participants to the wider project membership:

1 Pledges page. Following the two lighting workshops and – later – the first thermal comfort workshop, ten pledges related to each topic were added to the project website. The pledges themselves were derived from ideas that were discussed at the workshops and included a range of ideas from very straightforward to more difficult. Further information related to each pledge was also available. Members were invited in Monday emails to record their progress as they: pledged to try something, were working on it and adopted it. As in the energy consumption feedback, participants were able to see how many pledges they had made compared to the community average.

2 A forum designed for sharing questions, answers and ideas. The project team regularly initiated and contributed to forum discussions, and promoted it through the Monday emails.

While both of these features of the website were used by some members, participation was disappointing. Forty project members used the lighting pledges pages, but our impression is that most project members were not interested and did not return to the page after their initial visit. While some 250 posts were made to the forum, our impression is that these were made by only a small number of project participants (though some who used the forum valued it highly). Possible reasons for this relative lack of success are: poor or inadequate communications, the challenges that some members experienced engaging with the emails and with the website, the complexity of the pledges page, issues related to contributing to online forums and the perceived limited value of engagement with these pages (especially within the context of people's busy lives).

Paul: It was through the forum that I got the people who did the PV. I had one company come and then I went on the forum and said, I've got a quote, 14 grand for three kilowatts. Someone on the forum said, sounds a bit high, but this is who I used, they were really good. I couldn't have done that or found that out any other way.

Eco-gadget library

Based on informal positive reports of the success of eco-gadget libraries, the Smart Communities team set-up an Eco-gadget library at Tudor Drive library, and promoted it to the Smart Communities and library memberships. The library contained: shower timers, fridge thermometers, remote control plug sockets, power downs, radiator boosters and single appliance monitors. The eco-gadget was not used to the extent that we had hoped; borrowing rates were low and quickly tailed off. This was possibly because promotion of the eco-gadget library by Smart Communities and Tudor Drive library was inadequate and, due to insufficient space in the library itself, the eco-gadget library materials were not on display (when we visited the library, even the eco-gadget library brochures were not on display).

Audrey: No, I'm a dinosaur. I'm not a blogger or a twitterer or anything like that.

Kingston and Richmond Energy Advice Network

In a further experiment designed to promote the development of energy know-how, the team also set-up the Kingston and Richmond Energy Advice Network (KREAN). The network consisted of around ten local lay experts from South West London Environment Network (SWLEN) and Transition Town Kingston (TTK). The idea was that local institutions (our project, Kingston and Richmond councils, the University, SWLEN and TTK themselves, and other local groups) would promote the network, and the Smart Communities team would act as a broker, distributing householders' emailed requests for information to the local experts. The experts would then liaise with householders (by email, telephone or face-to-face) to provide advice and guidance. Unfortunately, this idea did was not successful, perhaps because we were unable to promote of the network adequately.

6 Discussion

In this final section, we discuss the implications of our work for policy and practice, and we comment on our work so far – in collaboration with project partners – on ensuring the legacy of Smart Communities.

Implications for policy and practice

The Smart Communities findings have a number of implications for policy and practice. Demand-side community energy has played an increasingly important role in government energy policy in recent years. Smart Communities suggests that this is an appropriate move. The project suggests that demand-side community action on energy – in this case, over 2 years – can support behaviour change and energy efficiency measures, and reductions in consumption. For many people in Smart Communities, community energy was a practical reality; people came to workshops, to celebration events and they had visits from local experts. For many others, broader community action provided a valuable context within which to act at the household or individual scale. To many of the project participants, community has positive connotations of local trustworthiness. In particular, the findings suggest that the broader idea of 'being part of something' – sometimes a community, but also sometimes a project, a group of people or a school community – can be an important and valuable motivating factor for many people. This could have relevance in a range of domains, such as the smart meter roll-out (which we discuss below) as well as other DECC demand-management and demand-reduction policies.

However, the project also demonstrates a number of challenges. Community action on energy takes a long time to develop. The research suggests that energy behaviour change is a much more complex and lengthy process than, say, stopping smoking; it involves numerous changes some of which involve time-consuming consideration, information gathering and discussion by household members. Furthermore, Smart Communities suggests that the busyness and competing priorities of everyday life are a key constraint both on participation in community action and on energy behaviour change. As the priorities and patterns of everyday life shift over time, patterns of participation ebb and flow, and behaviour change can be interrupted or reversed. Although action and change was extensive in some households, in many more change was limited to basics such as switching-off lights and not overfilling kettles.

These findings have implications for the way in which demand-side community energy is funded. UK demand-side community energy is largely reliant on government funding except where subsidised by income generating supply-side activities. This is particularly important in urban areas where large-scale community renewable schemes are rarely feasible. Although DECC's Community Energy Strategy features an array of government grants for demand-side community energy activity, Smart Communities suggests that this would benefit from a shift from the current standard 2-3 year grant model to a longer-term or core funding model. In the longer-term, research into alternative ways of funding demand-side community energy would be of value.

Smart Communities illustrates both the importance of energy know-how (ideas about what to do and information about how to do these things) and a widespread lack of energy know-how. The activities that produced the most significant and consistent change in Smart Communities were the Home Energy Action Visits (HEAVs); these emphasised the development of energy know-how through tailored in-home guidance, demonstration and thermal imaging. They had substantial positive impact, but are time-consuming and labour intensive. In addition, much of their success may be due to the distinctive style of the local experts with whom we worked; it is no mean feat to be, at once: authoritative, informal, respectful, understanding, informative and modest. In addition, the locally-provided and non-commercial nature of these activities was important to householders who received HEAVs. These issues represent considerable challenges in terms of scaling-up. Nonetheless, since they appear to have considerable potential, we suggest that the provision of such services by networks of local authorities and local groups warrants further research and investment.

Broadly speaking, the findings in Smart Communities are supportive of the logic that underlies the IHD element of the smart meter roll out. Engagement with the Smart Communities feedback was associated with: behaviour change, knowledge about household energy consumption, knowledge about the consumption of specific appliances and consumption reduction. However, our work and others' shows that the provision of energy consumption feedback does not ensure householder engagement with that feedback, and engagement often does not lead to action. Our findings lead us to offer a number of suggestions, which could be summed up as thinking about energy consumption feedback as part of a broader package of energy reduction support. In Smart Communities, long-term engagement was enhanced by regular email communications that suggested particular uses of the monitors, provided tips and engendered a 'sense of being part of something'. We believe that email communications have considerable potential in the context of the national smart meter roll out.

After a relatively short period of activity, energy can become an integral part of primary school life. In addition, Smart Communities suggests that recruitment through a primary school can be highly effective, and that parents' commitment to using less energy increased when they thought about it in the context of their children's education and the activity in school. However, Smart Communities shows that this is highly dependent on the personal preferences and commitment of the head teacher and makes considerable demands on school staff. The Smart Communities research suggests that giving energy efficiency a more formal place in the curriculum and reintroducing programmes designed to improve the sustainability of schools would be of great benefit, both within school and beyond.

Recruitment to Smart Communities included a door-to-door leaflet drop, and recruitment via the primary school, the local library and the local residents' group. It is notable that recruitment through Fern Hill Primary School was many times more successful than the other approaches. It is also worth reflecting on the ways in which the absence of climate change in the Smart Communities materials shaped the recruitment to the project, and the action and change within the project. Our impression is that this omission broadened the appeal of the project; many people seem to want to act on energy for reasons other than climate change (in particular, the cost of energy), and we feel that many people joined Smart Communities who would not have joined a climate change project.

Our final point relates to the potential role of gas consumption reduction. This is often treated as an matter of insulation and boiler replacement, rather than behaviour change. Moreover, there is little emphasis on gas feedback because it typically shows much less variation than electricity feedback. We disagree with this view and believe that gas consumption behaviour change is a potentially an important source of energy consumption reduction. Electricity consumption is distributed across numerous household appliances and practices. Consequently substantial behaviour change often has no noticeable affect, creating disillusionment. In contrast, 98% of gas consumption is typically related to use of the boiler for space and water heating. This means that relatively straightforward behaviour changes – such as turning down thermostats, turning off radiators in rooms that are rarely used, or using timer controls – can produce significant reductions in gas consumption and provide positive reinforcement for energy behaviour change. It was these thoughts that led us to increasingly focus our efforts on gas consumption in Smart Communities, for instance, in monitoring and feedback, the workshops, the associated leaflets and the work within Fern Hill Primary School.

The legacy of Smart Communities

Ensuring a long-term future for Smart Communities in north Kingston upon Thames was a key objective in the original Smart Communities proposal. By early June 2014, plans are well underway to achieve and exceed this objective. The plan is to hand over Smart Communities to our project partner, South West London Environment Network (SWLEN), during the summer of 2014. The SWLEN strategy has two key elements to it. The first is to use the name, Smart Communities, and to combine the following activities from Smart Communities and the Ham and Petersham Low Carbon Zone (H&P) in new projects across south west London:

- The current Smart Communities monitoring and feedback approach.
- The H&P Street Champions approach (the SWLEN website describes Street Champions as, ‘a familiar and friendly face as they spread the energy efficiency word’.
- Workshop formats based on both projects.
- The Smart Communities Home Energy Action Visit (HEAV) approach.

This combination of activities has already been trialled in several areas in the boroughs of Kingston and Richmond (including further HEAVs in the Smart Communities area). In addition, a number of members of Transition Town Kingston, as well as other Smart Communities members, are now training to conduct HEAVs with SWLEN.

The second element of the SWLEN strategy is to expand the capabilities of the Smart Communities web-based feedback; in particular, to allow households to see longer term historical comparisons (as opposed to the limited one week period in the current Smart Communities feedback). Within the context of the smart meter roll-out, SWLEN see benefit in the local comparisons that are facilitated by the Smart Communities feedback approach.

Kevin Burchell from the Kingston University Smart Communities team will remain involved in the SWLEN Smart Communities projects as a voluntary member of the management team. By early June 2014, all of the legal arrangements are in place, data protection issues have been addressed and the website is ready to be transferred to a new host. Perhaps reflecting the funding challenges identified earlier, SWLEN are actively seeking the funding that will allow them to take this project forward.

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Appendix 1: Key analytical frames

Community energy

The notions of community and community action have long held an ambiguous place in social science. For some, community represents local authenticity, social capital, agency and benefit; something that is to be cherished, but is disappearing. For others, community denotes power relations, conflict, and processes of inclusion and exclusion. For many, community is understood as largely imagined, a rhetorical device. Researchers identify six interlinked meanings of community energy that are reflected in policy documents and community materials:

1 Place: a set of social relationships embedded in a particular area.
2 Interest: social groups – possibly virtual – that form around a particular issue.
3 Process:
  a Preferably community-led, but sometimes institutionally-led.
  b Participation of 'ordinary civic-minded people', collaborative action.
  c Benefits enjoyed collectively and locally.
4 Scale: a scale of action above individuals and households, but below local government.
5 Actor: a distinct and independent actor that can take action and interact with other actors.
6 Niche: a test-bed in which socio-technical innovation is possible[43].

A recent social science survey of UK community energy describes a burgeoning and diverse sector, and attributes its success and potential to its non-commercial and non-governmental status. At the same time, social science commentaries identify a number of challenges. Some revisit the politics of community and community action that have preoccupied social scientists for many years. On a practical level, researchers point to the lack of evidence of the value of community energy, and call for evaluation tools that go beyond crude 'kWh saved' (both concerns that informed the Energy and Communities call). Studies also note that the sector continues to rely upon funding from government, and is often constrained by its voluntary characteristics and a lack of knowledge sharing networks (particularly relating to project management, legal, planning, technical and behaviour change issues). It is also pointed out that the success of the sector might be compromised by collaboration with commercial interests[44].

More critically, researchers have argued that contemporary neo-liberal governments employ the harmonious connotations of the imagined community to divert attention from social problems, and to provide a pretext for rolling-back the state, thus abdicating responsibility to the local level. The specifically demand-side, behaviour change element of the community energy policy agenda has also been criticised. In particular, behaviour change is seen as an inadequate and flawed response to climate change and – drawing on the governmentality literature – community action and behaviour change are framed as the application of an ambiguous form of governmental power that guides the conduct of citizens in particular ways[45].

43 Peters and Jackson (2008); Walker (2011); Walker and Devine-Wright (2008); Aiken (2014). 44 Seyfang et al (2012/2013); Heiskanen et al (2010); Middlemiss (2008); DECC (2012). 45 McCarthy (2005); Walker (2011); Shove (2010); Hargreaves (2013); Aiken (2014).

Social norm approach

The social norm approach (SNA) has its roots in psychological and social psychological theories of conformity, which suggest that behaviour is often shaped by what we understand other people to do. In SNA campaigns, the objective is to shape behaviour by telling people about what the majority of other people do or the average. In a variety of forms, the SNA has been employed in the contexts of – among others – energy consumption, physical exercise, alcohol, tobacco and drug use, sustainability, domestic violence, road safety, bullying and risky sexual behaviours[46]. In Smart Communities, the social norm approach was incorporated into the on-line energy consumption feedback.

Practice theory and everyday practice

Practice theory takes practices (e.g. doing the laundry) rather than individuals, groups or societies as the primary unit of analysis[47]. Practice theory emphasises the habitual and taken-for-granted nature of behaviour, and the ways in which this is shaped by broader socio-technical contexts. Instead of focusing on individual attitudes, behaviours and choices, theories of practice understand change in terms of change in the relationships between interlinked elements of practice, such as: actions, meanings, rules/norms, things and skills/know-how. For example, the way people do their laundry is shaped by meanings (such as 'clean' and 'dirty'), rules (such as 'separate colours' and 'wash the sheets every two weeks'), things (such as washing machines and clothes pegs) and skills (such as hanging clothes so that they don't need ironing). Practices stabilise behaviour, because what people do is influenced by the relevant elements, however practices change as elements change. For example, ways of doing the laundry might change if the 'frequency of washing the sheets' rule or the washing machine changes. In Smart Communities, practice theory was used as a frame to understand behaviour and behaviour change, and to inform action and research interventions on particular 'elements' of practice, especially skills/know-how.

Towards the end of Smart Communities, our analysis was increasingly also informed by Yolande Strengers' associated notion of the *ontology of everyday practice*[48]. Strengers' work is a compelling interpretive critique of the visions of a smart utopia – made up of smart grids, meters and homes – that informs much contemporary energy policy activity. For Strengers, these visions are the outcomes of a flawed smart ontology (an ontology is a simply a view of how the world is). Strengers claims that the smart ontology is a flawed and illusory view of how the world is, born of technologists and engineers; more specifically, she claims that the smart ontology assumes and envisions a world in which technology and data are appropriate solutions to social problems, and in which householders are willing and capable micro-resource managers. On the basis of a considerable body of ethnographic and anthropological empirical work, Strengers argues that these assumptions are flawed; more specifically, she argues that they overlook the importance of understanding the ways in which people live their everyday lives.

46 See Burchell et al's (2012) review; on energy, see: Schultz et al (2007); Nolan et al (2008); Allcott (2010); Harries et al (2013a/b).
47 Shove 2003; 2010; Warde 2005; Gram-Hannsen (2010); Shove et al (2012); Rettie and Harries (2013). Also see Hitchings (2011) on the methodological challenges of talking to householders about practices. 48 Strengers (2013).

The invisibility of energy and social theories of learning

Researchers have drawn attention to the invisibility of energy: it is consumed in the unconsidered habits and routines of everyday life and it is materially invisible. Approaches to making energy visible include: historical energy consumption feedback on bills, energy efficiency labels on domestic appliances, communications campaigns, and – most conspicuously – real-time and historical energy consumption feedback on in-home displays (IHDs)[49]. Rendering energy visible over lengthy periods in energy consumption feedback was a key objective of Smart Communities. It has been argued that energy consumption feedback needs to be complemented by the experiential and contextualised forms of learning that are advocated within social theories of learning. In addition, it is suggested that community action provides opportunities for experiential and contextualised learning[50].

These insights supported the original emphasis on workshops in Smart Communities, which later developed into the work on energy know-how, Home Energy Action Visits and Thermal Imaging parties.

49 Guy and Shove (2000); Shove (2003). 50 Darby (2006b).

Appendix 2: Research methods

In keeping with the principles of action research[51], informal research was undertaken throughout the course of the action. This yielded a range of textual materials: transcripts from five community workshops; a transcript from a discussion with a class at Fern Hill; two reports written by organisers of Thermal Imaging Parties; notes taken during or after informal interactions with participants, such as telephone conversations, or visits to Fern Hill or project participants' homes; and email exchanges with and web posts by project participants. The action also yielded graphic materials, such as photographic and class work materials from our work with Fern Hill Primary School. These informal materials are complemented by a total of fifty interviews and a questionnaire survey of the entire project area.

The interviews were professionally transcribed and – along with the other textual materials – were coded in Atlas.ti. Thirty interviews were conducted with a total of forty five project participants. Ten interviews were conducted in early 2012 (these informed changes in the execution of the project action). Fifteen interviews were undertaken in March and April 2013, and a further five in October 2013. The interviews variously emphasised discussion of: motivations for joining the project, impressions of the project, changes within the household, experiences over time relating to particular aspects of the project. In March and April 2013, five interviews were conducted with a total of seven people who had not joined the project. These interviews were conducted in participants' homes and lasted around one hour. A further two telephone interviews with project participants were undertaken regarding the Thermal Imaging Parties.

Seven in-depth interviews were conducted with project partners (names are used with permission):

Four with key staff at Fern Hill Primary School:
- Head teacher: Diana Brotherston
- Estate manager: Phil Kale
- Teacher responsible for sustainability: Caroline Virgo
- Teacher responsible for sustainability: Kim Tipping

Two with SWLEN:
- Chief Officer, Colin Cooper
- Senior assessors (volunteers), John Gallop and Sue Williams, with whom the project team worked on the HEAVs and TIPs

One with the Kingston council sustainability team:
- Carlos Queremel

A further telephone interview was conducted with a manager at Tudor Drive Library:
- Sue Hurlock

51 Reason and Bradbury (2006).

In addition, a survey of the entire project area was conducted in April 2013. To minimise sampling bias the survey was described as a 'Kingston University local initiative survey' as rather than as a Smart Communities survey. Participation in the survey was encouraged by generous prize incentives.

The survey was distributed door-to-door throughout the extended study area. In addition, the survey was distributed electronically via: the Smart Communities member database (to minimise sampling bias, the email was sent by a colleague not associated with Smart Communities), the weekly Fern Hill Primary School newsletter, and relevant residents' associations.

The combination of mail and internet surveys, the diverse distribution methods and the likelihood of self-selection will have introduced sampling and mode bias. In particular, it may be that the survey had a higher completion rate among particularly active project members and those attracted by the incentives. The survey yielded 462 responses, 130 from project members and 332 from people who did not join the project. Analysis was conducted in SPSS and focused on frequency data and non-parametric tests of difference.

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