Smart Communities: shaping new low carbon norms through community action

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Abstract
Smart Communities is an action research project that examines a novel community process that aims to reduce home energy consumption. The three-year project draws on practice theory, social learning theory, the social norm approach and community action best practice. The project is a community action project in North Kingston involving collaboration between the householders, the local school and a range of local partners. The school and the householders will use energy monitors to develop energy literacy. Working together in cycles of action and reflection, householders will meet to discuss energy consuming practices (such as lighting, cooking or cleaning); develop and agree on new energy-saving ways of doing things; and decide how best to encourage their adoption by the rest of the community. The Smart Communities website will act as a virtual community hub where participants record their energy consumption, pledge to try new practices, record their progress, and share advice, experiences and know-how. Following the social norm approach, the website will also encourage adoption of new energy-saving practices by plotting participants' performance against the progress of the community as a whole. The community action will last two years; in the third year the process will be evaluated using a combination of qualitative and quantitative research.

Introduction
Smart Communities is a novel, collaborative, community-level action research project. It will contribute to the UK low carbon transition by developing and evaluating a process for encouraging a community to discuss, select and adopt new low carbon norms and practices. The project responds in a unique way to three of the four themes of the 'Energy and Communities' call: 'energy literacy and visibility', 'lifestyles and social technical practices', and 'communities, ownership and social movements'. The project will contribute to the development of a policy blueprint for community-level action, showing how individuals and community organisations can be encouraged to work together to redefine social norms and practices, in order to achieve a reduction in energy consumption.

There is now widespread agreement that community-level action is a potent resource for influencing energy and low carbon behaviour change. This theme is evident not only in academic work (McKenzie-Mohr 2000; Middlemiss 2008; Peters and Jackson 2008; Heiskanen et al. 2009; Darby 2009) but also in official policy documents (HM Government 2009; Department for Energy and Climate Change (DECC) 2009a; RCUK 2009; OFGEM 2009), and in sustainable community project networks (such as the Low Carbon Communities and Transition Towns networks). The Smart Communities project builds on this work in new and potentially powerful ways, drawing together and integrating interdisciplinary conceptual, empirical and practical insights from three conceptual frames.

The first of these frames is that the project is grounded in sociological practice theory. Practice theory emphasises the habitual, routine nature of individual behaviour and the ways in which consumption is shaped by the broader sociotechnical context within which it takes place. These approaches suggest that energy consumption is best understood as a *product* of everyday, taken-for-granted practices, such as heating, lighting, cleaning and recreational practices (Schatzki 1996; Wilhite 2000; Reckwitz 2002; Shove 2003; Warde 2005; Wilhite 2008). This body of work alerts us to the need for community low carbon projects to address taken-for-granted lifestyles, social norms and conventions (concerning what are considered normal, acceptable and appropriate ways of doing things) rather than focusing solely on individual behaviour or technological fixes. Practice theory draws attention to the invisibility of energy consumption (Guy and Shove 2000; Darby 2000; Shove 2003). This highlights the

importance of energy literacy and visibility; many studies have shown that improved feedback, for instance, in real time energy display monitors (RTDs) or utility bills, reduces energy consumption (see the reviews of Darby 2006a; Fischer and Duscha 2009). The potential role of RTDs is reflected in OFGEM trials involving 20,000 households (OFGEM 2009), and in UK government commitments to universal smart meters (DECC 2009b).

Integrated within the practice theory conceptual frame is a secondary frame, the social norm approach. This attempts to influence behaviour through the communication of descriptive social norms, i.e. by telling people what other people do. The social norm approach has been widely and successfully used to reduce alcohol and substance abuse among young people (Perkins 2003) and more recently, to encourage pro-environmental behaviours (Shultz 1999; Cialdini 2003; Goldstein et al. 2008). In the energy context, social norm studies show that household energy consumption can be reduced by complementing individual household feedback with social group feedback about neighbourhood energy consumption (Schultz et al. 2007; Nolan et al. 2008). These academic studies are confirmed by commercial trials in 35,000 US homes, using utility bills that include social norm feedback (OPOWER.com). The investigators are currently involved in the UK project CHARM (see attachment) which integrates the social norm and practice approaches. Rettie and Burchell argue (2009; 2010) that integrating the social norm approach with practice theory provides an interdisciplinary synergy, illuminating the transitions in practices which normalise low carbon behaviour facilitating mainstream adoption (Rettie and Barnham; 2009).

The third conceptual frame is community action research and practice. Within this context, there are three insights which inform our proposal. First, Darby (2003; 2006b) suggests that energy literacy and visibility should be understood in terms of social learning theory, emphasising the experiential and contextual elements of learning and the role of informal interaction, such as that found in community projects, in building energy awareness. Darby (2003) confirms the role of energy monitoring, but argues that feedback alone may be inadequate for those who lack the relevant tacit knowledge or energy literacy, and argues for a synergistic relationship between feedback, information and action. The synergistic effect of interventions which integrate many different elements is also supported by a recent meta-analysis of behaviour change studies (Dietz and Stern et al. 2009) and in reports on community intervention best practice (Schone 2009; Heiskanen et al. 2010). A second insight is the catalytic potential in community sustainability projects, and among social groups more generally, of: 1. schools and school children (Hart 1993; 1997; Zografakis and Menegaki et al. 2008; see also Government Office for London 2007; OFSTED 2009; DSCF 2009), 2. 'mavens', or community experts (Gladwell 2000; Barnett et al. 2009), 3. energy saving appliance libraries (Cotterill 2010; Ellacott 2010), and 4. geographical and social proximity (Fowler and Christakis 2008). Finally, we are mindful of the critical community practice literature, which stresses the valuable knowledge and capacity in communities and the importance of acting *with* rather than acting *upon* communities (e.g. Butcher et al. 2007; Adger 2003).

Research agenda and questions
Smart Communities integrates these conceptual frames in an innovative and interdisciplinary response to three themes in the 'Energy and Communities' call. First, the project responds to the 'lifestyles and social technical practices' theme, encouraging the community to discuss, re-evaluate and change the community social norms and practices that yield energy intensive lifestyles, through a combination of meetings, community drama, online pledges, expert presentations, and discount offers on relevant technologies . The research also explicitly responds to the 'energy literacy and visibility' theme, recognising the role of real time energy monitoring, but extending this with energy consumption recording, individual trend feedback, social norm feedback at community and school level, curriculum work in the school and an energy saving appliance library. Finally,

the project responds to the 'communities, ownership and social movements' theme in its exploration and analysis of new ways in which community dynamics can be consolidated to work towards a common purpose. The research questions are:

1) Can members of a community be facilitated to consciously debate, develop and adopt new low energy norms, practices and lifestyles? What factors promote/inhibit this process? In what ways can a school, a library and mavens contribute to this process?
2) What is the impact of this process on community and household energy consumption and on community members' norms, practices and lifestyles? What are the rebound or spill over effects of this process?
3) Can energy literacy and visibility be developed through a social learning process that combines electricity consumption monitoring and recording, feedback of community and school level performance and environmental education?
4) How can the social norm approach contribute to the adoption of low carbon practices? What is the contribution of community and school level social norm communication?
5) How can community networks be developed and harnessed to work together on energy reduction? How and to what extent do low carbon behaviours spread in geographical communities? What is the impact of the Smart Community approach on community cohesion and social capital?

Project background

The community is located in a residential area to the north of Kingston-upon-Thames in south west London.

Fig 1. Map of the Smart Communities research area

The community includes approximately 1500 households and consists of the households of the children who attend Fern Hill school and other households in the vicinity of the school; more specifically, the area within the triangle defined by Richmond Road, Tudor Drive and Latchmere Road. Household energy consumption data at the level of the community area is not available, but based upon socio-economic level, and type, age and tenure of housing, it is estimated that energy consumption is above UK average, with consequent potential for significant energy reduction (BRE 2008; RBK 2009; Rahman, 2010).

Five partners are involved in the project:

1) **Fern Hill Primary School** is a community primary school located within the community area, with an already impressive record on sustainability issues. Through its use of a sophisticated energy monitoring system and energy drama workshops (see details below), Fern Hill school will act as a catalyst and example of excellence for the wider household and community action. The school will also serve as a meeting place for the community.
2) **Tudor Drive library**, also within the community area, will: provide access to the project website to participants without home internet access, host an energy saving appliance library, display project leaflets and act as a further community meeting place.
3) **The Climate Change and Sustainability team at the RBK council** will provide local and substantive advice, knowledge and expertise throughout the project, and will support the project at community meetings and events.
4) **Transition Town Kingston** (TTK), the local community-based sustainability organisation will provide local knowledge and sustainability commitment.
5) **The Energy Savings Trust** (EST) will provide ongoing advice, community sustainability training and support with materials development.

Methodology
This is an action research project. Action research is not a specific methodology but an approach in which participative communities of inquiry engage with practical issues, typically in cycles of action and reflection (Reason & Bradbury, 2008). In Smart Communities community engagement will be central at all stages of the research process from formulation of potential new norms and practices, to design of interventions, to post action research and analysis of the study, to dissemination and impact activities. During the action phase, the researchers will act as facilitators, providing access to expert information and equipment, liaising between active community members, partners, and suppliers, and ensuring regular cycles of review, reflection, development and action. In the post action research and evaluation phase of the project, the researchers will take the lead, conducting qualitative and quantitative research with participants and partners.

The Smart Communities action research revolves around three interconnected hubs: Fern Hill Primary School, Tudor Drive library and the Smart Communities website. All elements of the intervention are designed to build and renew community involvement and to minimise community fatigue. Every household in the defined community will be invited via a range of communications (posters, leaflet drops, emails, leaflets in school 'book bags') and a launch event to join the project. Each household that registers on the Smart Communities website or by paper form will be offered a free RTD and asked to monitor their household electricity consumption, entering the data directly onto the website or on a paper form (participants will also be asked to record historical consumption data, where possible). Community members will be able to see the trend of their electricity consumption online; this feedback will incentivise further monitoring and recording, and will encourage the development of energy literacy. In addition, employing the social norm approach, community members will see average electricity consumption for the whole community. Where needed, internet access will be provided at Tudor Drive library.

Applying practice theory for the first time in a community action project, after a benchmarking period members of the community will be encouraged to tackle different energy consuming practices in five four-month cycles, e. g. switch-off/standby; lighting/heating; bathing/laundering; travel. In each cycle, and drawing on the support and expertise of RBK, EST and TTK, participants will meet at Fern Hill school: to discuss their practices; to develop new practices for adoption by the community (for instance 'at least 50% low energy light bulbs' or 'showering on alternate days only'); to decide how a small budget should be spent; to decide on relevant communication materials for emailing and inclusion on the website, and to identify community experts or 'mavens'. In each cycle, this planning stage will be followed by stages of action and reflection by the community members, the researchers and the partners.

The website will explain why climate change action is important and will show how community members can contribute, encouraging them to pledge to adopt new norms and practices related to the current intervention. They will be able to record their progress as they achieve and maintain these new practices, and to share problems and tips in a discussion forum. Again following the social norm approach, the website will show the progressive community commitment, achievement and maintenance of the new norm or practice. Where pertinent, participants will be able to buy discounted consumables from local retailers. This approach provides an appropriate balance between community autonomy and action researcher support and facilitation. The motivation provided by community engagement will be complemented by low carbon prizes.

Fern Hill school will act as an energy literacy catalyst, helping to inculcate energy awareness and literacy in the school children, their parents and the wider community. A sophisticated energy monitoring system will be installed in the school. This will facilitate the monitoring, analysis and display of electricity consumption in the three different parts of the school, as well as overall gas consumption. This interactive technology will focus attention on energy consumption, increasing energy visibility and literacy, and will provide a cross curricular teaching resource within the school. Fern Hill school will serve as an exemplar of energy best practice, displaying the energy reduction achieved by the community and the school on a computer screen in the school foyer. The school children will help their parents to record data from the home energy monitors onto the website, becoming ambassadors for the project and for energy reduction. To further facilitate low carbon education, all children at the school will take part in drama and art workshops on the theme of energy reduction, and the school will be provided with resource packs. Photographic and art materials from the workshops will be displayed in a school exhibition, and placed on the community website. The school will provide a venue for community meetings and will distribute leaflets to parents throughout the project. Tudor Drive Library will be a further hub of the community action. The library will display information about the project, host an energy saving appliance and book library service and provide free internet access. Library members will be able to borrow devices to help them to monitor and reduce their energy consumption, such as energy saving light bulbs, standby gadgets, etc.

Action research challenges traditional concepts of research objectivity, nevertheless research, evaluation and analysis is essential for learning, dissemination and policy impact. In Smart Communities, research and reflection is ongoing throughout the action phase of the project. Data for analysis will include electricity usage as recorded by participants and for the school, pledge commitments and achievements, community library records, minutes of community and partner meetings, community helpline email and phone call records, discussion forum comments, and informal interactions with community members, project partners, and people who are within the defined community who do not sign up as members of the community (rejecters). Findings will be fed back to community members and project partners in meetings, on the website and in leaflets.
More formal phases of research and evaluation will take place as community participants

join the project and, more intensively, at the end of the action phase of the project

The focus of the post action evaluative research will be qualitative and interpretative to provide in-depth understandings of the experiences and attitudes of the community participants. This research will consist of household and group interviews – using 'social network drawings' to illuminate community relationships – with: local area community households (10), parent community households (10), partners, suppliers and school staff (5), and project rejecters (5). Interviews will be recorded, professionally transcribed and edited by the research team. All interview transcripts will be coded and analysed with the qualitative data analysis software ATLAS-ti (inter-coder reliability will be achieved through frequent contact between members of the research team). In addition, the researchers will conduct documentary analysis on the written materials produced in the project, all meeting minutes and the online discussion forum. Constant comparison, within and across data sets, will be used to develop themes and to refine and develop findings. This qualitative research will be complemented by quantitative research and analysis.

Quantitative data includes the energy monitor data of community members and of the school, and pledge commitments and achievements. In addition, as members of the community join the project, they will be asked to complete a short online questionnaire; this questionnaire will provide basic baseline data including demographics, energy literacy and visibility, selected energy and energy saving norms and practices and perceptions of community cohesion. At the end of the action phase of the project, community members will be asked to complete a more detailed questionnaire including appropriate elements from the baseline questionnaire. The school children will complete simpler questionnaires, tailored to different age groups. The quantitative data and questionnaires will be analysed in SPSS using standard measures of significance. The use of membership IDs will enable correlation of survey data with data collected on the website. Project analysis will draw on two conceptual frames. First, following a sociological practice theory approach, we will attempt to understand the project in terms of social practices, focusing at the community rather than the individual level. This will help us to understand the dynamics of community relationships and the shaping of new norms and practices. The social norm approach will provide the second theoretical framework, and we will attempt to establish connections between individual behaviour and the community social norm feedback provided. The social norm approach will be particularly relevant to the quantitative analysis of the project, whereas practice theory is more relevant to the qualitative data, and to the evaluation of community engagement, community dynamics, community network effects and the action research method adopted.

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