Green Streets

Exploring the potential of community energy projects

Interim report prepared by ippr for British Gas

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September 2010

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Institute for Public Policy Research

Challenging ideas – Changing policy

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This paper was first published in September 2010. © ippr 2010

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Acknowledgements

For their valuable input into the drafting of this report thanks go, in particular, to Matthew Lockwood, Associate Director and head of climate change at ippr, Will Cook for his work on all of the quantitative aspects of the report, Ed Cox, Director of ippr north, for his input on community development and social enterprise, and Kate Stanley, ippr's Deputy Director, for her editorial input. Georgina Kyriacou at ippr copy-edited the report.

Thanks go to all of the participants in the research including all of the project leaders and British Gas Project Managers. Thanks also to British Gas for their cooperation and openness in carrying out the research, in particular to David Facey.

Finally, thanks go to all of the other people the author contacted while carrying out the research for this project, including Alice Casey at NESTA, Andy Deacon at Energy Saving Trust, Barbara Hammond at Low Carbon West Oxford, Jayne Cox at Brook Lyndhurst, Nicholas Gubbins at Community Energy Scotland and Will Dawson at Forum for the Future.

Executive summary

Green Streets is a unique challenge, run by British Gas, that is generating important lessons about the role 'community energy projects' can play in cutting carbon emissions, and about the opportunities and challenges involved in creating the 'Big Society'.

British Gas has awarded 14 projects across the United Kingdom a share of £2 million and technical support to run projects that save energy, generate energy and engage their wider communities. The most successful community will be awarded a prize of £100,000.

Acting in an independent capacity, ippr is conducting a range of quantitative and qualitative research, to generate lessons from Green Streets about the potential of community energy projects, the barriers to community energy projects and the solutions that are needed to overcome these barriers.

Six months into Green Streets, our early evidence suggests that community energy projects can:

- deliver significant carbon savings directly through the installation of sustainable energy measures (micro-renewables, energy efficiency and energy saving measures)
- have potentially important impacts on attitudes towards sustainable energy within a community, in particular by 'normalising' sustainable energy measures (making them less alien)
- bring additional benefits to communities, in particular in the financial sustainability of community facilities.

Community groups run the majority (12) of the Green Streets projects while two have local authority involvement. Our evidence suggests that the volunteer-run community groups can make important contributions to cutting carbon through energy projects, which bodes well for aspirations for the Big Society. But there are limits to these groups' capacity and they need to be supported by and work in partnership with private and public sector actors. To enable these relationships to flourish, central government needs to maintain and extend the financial support framework for micro-renewables (small-scale electricity and heating renewable technologies), as well as leading the transition to a 'smart grid'.

Interim findings

Using data generated from Green Streets we have calculated that:

- Micro-renewables at the domestic scale could theoretically contribute 20 per cent towards the UK's 2020 renewable electricity target and more than 200 per cent of the renewable heat target.
- There is a significant potential for micro-renewables on community buildings, including the potential for schools to generate electricity and energy savings to the value of £43,890,699, while saving 55,041 tonnes of carbon a year.

We have also identified a potential triple-win situation for sustainability in its wider sense to be gained from installing micro-renewables on community buildings. The impact of technologies on attitudes may be more important than the emissions reductions they deliver.

Win 1: Increasing the financial sustainability of community buildings
The income generated by micro-renewables can allow community groups linked to community buildings to focus less on paying energy bills and more on other activities for wider community benefit. Community groups who are not motivated by climate change can be highly motivated to undertake energy projects for this reason.

Win 2: Changing attitudes towards energy use within the wider community
The presence of these technologies in communities can impact attitudes by 'normalising' the technologies and demonstrating their benefit, which ultimately may

lead to an increase in their uptake. Community members who have been involved in the installation of the technologies could act as sources of information for the wider community.

Win 3: Direct emission reductions from the community buildings
Installation of the technologies makes a direct contribution to the UK's emission reduction targets.

Our evidence also suggests particular benefits that come from taking a community-scale approach to cutting carbon:

- Community groups can be highly motivated to take on energy projects related to improving their community and/or to climate change
- Some community energy projects can be sources of innovation and entrepreneurialism in generating new sustainable energy solutions
- Community energy projects have the potential to create a sense of common purpose about taking action on climate change, which can help to overcome the inertia of 'Why should I act when no one else is?'

Barriers

We have identified several key barriers restricting the growth of community energy projects:

Capital and financial expertise

- The Feed-In Tariff (FIT) has fundamentally altered the economics of renewable electricity, leading to a spate of innovation in new delivery business models, but the up-front capital costs of the technologies remain a major barrier for community groups.
- Gift funding remains an important source of funding for community energy projects, but there are questions about the sustainability of such funding in the current fiscal climate.

Technological expertise

- Many communities lack detailed knowledge of sustainable energy technologies and so the role of sustainable energy experts and delivery organisations is a key factor in their success.

Organisational capacity

- There are inevitably limits to what community groups – however dedicated – can achieve when working in a voluntary capacity.
- Community groups need appropriate legal and business support if they are to take on a large degree of responsibility such as making major spending decisions about micro-renewables and managing revenue.
- Local authorities are well placed to take a leading role in community energy projects but the attention of many is likely to be distracted by the need to implement budget cuts.

Interim recommendations

These recommendations will be further developed through the course of Green Streets and a full range of recommendations will be published in our final report.

Financing micro-renewables

Central government needs to provide a solid platform on which community energy projects can flourish. Supporting the finance of micro-renewables – in a fair way – should be the main mechanism through which it does this. The policy regime needs to enable private sector and third party investment in community energy projects, while also giving community groups the opportunity to own and generate their own renewable energy.

Recommendations:

Central government should:

- maintain the Feed-In Tariff (FIT)
- make clear its intention to implement the Renewable Heat Incentive (RHI) and the rates that will apply for different heating technologies
- fund and deliver extensive initiatives to improve the energy efficiency of lower income households and offset the regressiveness of the FIT and RHI
- support the development of community share initiatives, where community members take an equity stake in a community asset, for renewable energy.

'Big Society' and the role of different actors

Community energy projects are complex and community groups, support providers, sustainable energy experts and delivery organisations, and local authorities can all play a key role in ensuring their successful delivery. The capability of these different actors to coordinate in different ways in different communities will be key to growing the community energy sector.

Recommendations:

- **Community groups** should undertake energy projects and install micro-renewables to financially support their wider community work.
- **Community support and capacity-building providers** need to better coordinate their advice provision, target guidance at the appropriate stage in a community group's development, and signpost groups more effectively between services.
- **Support providers** in the community development and energy sectors should promote the financial benefits of renewable energy to community groups, ahead of the benefits in terms of climate change.
- **Providers of energy expertise** to community groups should individualise the support they provide to the greatest degree possible.
- **Local authorities** should undertake energy projects in recognition that they can be cost-neutral and bring wider community benefits beyond emissions reductions.
- **All actors** should actively seek to collaborate with potential partners and network and share best practice with peers.

Transforming our electricity grid infrastructure into a 'Smart Grid'

A massive expansion of decentralised micro-renewable generation and heat pumps poses major challenges for the electricity grid and government needs to show clear leadership in the transition to a 'Smart Grid' – a grid that enables greater monitoring and control over power use and generation and as such is far more responsive and efficient than our current infrastructure.

Recommendations:

- Government should work with Ofgem to ensure the timely roll-out of smart meters.
- Central government should consider indicating what levels of penetration of micro-renewable generation and heat pumps the grid will be expected to deal with by certain dates (for example, 2020 and 2025).
- The costs of connecting users to the distribution network should be 'socialised' – that is, shared among all users.

1. Introduction

Green Streets is a unique challenge. Designed and run by British Gas, it aims to generate evidence that will help citizens in the UK to cut carbon emissions. The first stage of the challenge saw householders on eight streets across the country take part in a year-long competition to reduce their emissions by installing energy efficiency measures and by changing their behaviour.

This report presents the findings and recommendations from the second stage of Green Streets, which focuses on communities. Fourteen 'community energy projects' are being provided with a share of £2 million, along with technical expertise from British Gas, to reduce emissions by saving energy, generating low-carbon energy, and engaging people within their wider community. The community that is most successful will receive a prize of £100,000. The challenge started in January 2010 and is intended to run for one year.

ippr is acting in an independent capacity, conducting a range of quantitative and qualitative research on Green Streets, to explore the potential contribution community energy projects can make towards the UK's climate change targets. This report presents early findings from the project, six months after its start.

Structure of the report

This introduction continues by introducing the policy context to Green Streets, what the challenge involves and the research methodology used. In Chapters 2 and 3 the teams leading the projects and the details of their projects are introduced. Chapter 4 details the energy profiles of the communities, the energy they have saved to date, and the potential capacity for micro-renewables at the residential and community scales. In Chapter 5 we discuss barriers to community energy projects, followed by our overall conclusions in Chapter 6, and finally, in Chapter 7, our recommendations.

Policy context

Green Streets is happening at a time when interest in the potential for community-based approaches to cutting carbon is growing rapidly. The last few years have seen a number of initiatives led by national, regional and local governments, by specialist agencies and think tanks, and by networks of community organisations (Box 1.1). Community-based approaches appear to offer the opportunity of achieving faster emissions reductions than individual-based approaches, for example by creating a common sense of purpose among individuals to take action.

The Government currently funds support for community organisations wishing to undertake climate change projects through the non-departmental government body the Energy Saving Trust in England and Wales and Community Energy Scotland in Scotland (Box 1.2). Before entering government as the new coalition, the Conservatives and Liberal Democrats both strongly supported a major expansion of decentralised energy generation through micro-renewables in their manifestos. The capacity of community projects to impact on climate change and the growth in the use of these technologies are fundamentally linked.

Renewable energy at household and community scale in the UK has historically been held back by high capital costs and long payback periods for the main technologies. However, the economics of micro-renewable electricity has now been transformed by the Feed-In Tariff (Box 1.3), and it is expected that the same will be true of heat from 2011 under the Renewable Heat Incentive (Box 1.4).

Green Streets is a unique contribution to our understanding of how these rapidly developing areas of policy may actually impact on the take-up of sustainable energy at community level.

Finally, the new Government has a wider vision for a 'Big Society' in which voluntary organisations play a key role in delivering public benefits and there is less emphasis on state-led action. The feasibility of the Big Society and how it will be put into operation is not yet fully clear, but climate change projects led by community organisations can be considered as a manifestation of a Big Society and as such provide important lessons.

Box 1.1. Examples of recent community energy and climate initiatives

The Big Green Challenge

This was an innovation competition run by NESTA to stimulate and support community-led responses to climate change. The challenge to the participating communities was to develop and implement sustainable ideas for reducing CO_2 in their communities. The competition recently concluded and winners achieved significant reductions of CO_2 emissions of between 10 and 32 per cent in one year. The main lesson from the competition was that the process of people acting together can have a major impact on changing people's perceptions of their own capabilities.

Low Carbon Communities Challenge

This is a Department for Energy and Climate Change-led initiative, which builds on the findings of the Big Energy Shift (www.bigenergyshift.org.uk) that suggested that joined-up 'packages' of support, delivered locally in a community, could be a significant help to households in reducing their home energy consumption. Twenty-two test bed communities are being provided with financial and advisory support to test a range of delivery packages. The initiative launched in February 2010 and is due to run for two years.

Low Carbon Zones

Recently launched by the Greater London Authority, as part of this initiative 10 local authorities will lead private and public sector partners, as well as community organisations, in developing a range of models with which to deliver carbon-saving measures. The aim of each of the schemes is to achieve at least 20.12 per cent CO_2 savings by 2012, with a longer-term plan to bring about a 60 per cent reduction by 2025.

Community Sustainable Energy Programme

CSEP is an open grants programme run by BRE as an award partner of the Big Lottery Fund (BIG). BRE carries out research, consultancy, training and testing to help create better buildings and communities.

The Community Sustainable Energy Programme will provide £8 million to community-based organisations for the installation of microgeneration technologies such as solar panels or biomass boilers and energy efficiency measures including loft and cavity wall insulation. It will also provide £1 million for project development grants that will help community organisations decide if they could benefit from a microgeneration and energy efficiency installation.

Transition Towns

Originally devised by Rob Hopkins, a Transition Town is a community-led response to peak oil and climate change. Transition Towns are now found across the world and there are currently 25 listed on the Transition Network website that are in the UK and involve an energy project.

Box 1.2. Support providers for community energy projects

Green Communities

Green Communities is an initiative from the Energy Saving Trust which aims to support, facilitate and promote community-based energy projects. It offers an integrated package of advice, support and funding, including free training and advice focused on project planning and funding, as well as technical support. It encourages communities to measure and plan its carbon reduction strategy using a community carbon footprinting tool.

Community Energy Scotland

CES is a charity dedicated to supporting community-based organisations to benefit from renewable energy. In April 2009 it won a three year contract with the Scottish Government to support the development of community energy in Scotland, including giving out government grants. Its aim is to build confidence, resilience and wealth at community level in Scotland through sustainable energy development, by building a national membership to help transfer knowledge and experience between members. CES helps groups to develop projects that improve their community, generate power and gain income for further community development. CES runs the Scottish Executive's Community and Renewable Energy Scotland (CARES) scheme. By 2009 there were over 200 community energy projects in Scotland.

Box 1.3. Feed-In Tariff

Feed-In Tariffs (FITs) for renewable electricity were introduced from 1 April 2010 under powers taken in the Energy Act 2008 (Department for Energy and Climate Change [DECC] 2010a). Larger electricity suppliers (those with more than 50,000 customers) are required through changes to the supply licence to make payments to micro-generators of renewable electricity, for each kilowatt-hour of electricity generated, and for each kilowatt-hour of metered exports.

A range of technologies are eligible, including wind, solar photovoltaics (PV), hydro and anaerobic digestion, all up to a capacity of 5 megawatts (MW). All tariffs will be index-linked to the retail price index, and income will be tax-free for private households. The tariff levels have been set by the Government on the basis of technology costs and electricity generation expectations at different scales, and are set to deliver an approximate rate of return on investment of 5–8 per cent for well sited installations.

There has been widespread support for the introduction of FITs, although some concerns have been expressed about who will end up funding the scheme*. The immediate cost is to be borne by licensed suppliers, in proportion to their share of the UK electricity supply market, with Ofgem undertaking a levelisation process between suppliers. It can be expected that suppliers will pass through most or all of the cost to their customers. The cumulative cost to customers is anticipated to be £3.1 billion to 2020 and £6.7 billion to 2030. This would convert to an increase in annual household electricity bills averaging approximately £8.50 (1.5 per cent) over the period 2011–2030. Average annual industrial bills are projected to rise by around 1.5 per cent over the same period.

*The CBI is concerned about costs falling on industry. There has also been some debate about impact of the additional costs on low-income households. George Monbiot has attacked the FIT on a number of grounds, one of which is its distributional impacts, claiming that it will transfer £8.6 billion from the poor to the middle class (Monbiot 2010). Friends of the Earth have defended the FIT against this charge, but does note that the effect on bills will be regressive (Friends of the Earth 2010). Alan Simpson argues that it is important for community energy groups in low income areas benefit from the FIT, citing the Mozes group in his Nottingham constituency as a model (Simpson 2010). The Select Committee on Energy and Climate Change has also noted that 'Funding the new feed-in tariff through fuel bills will disadvantage most those people who are on low incomes and who are experiencing fuel poverty. The Government will need to keep the impact of this policy under review.'

Box 1.4. Renewable Heat Incentive

A proposal for a Renewable Heat Incentive (RHI), along similar lines to the FIT, was put forward by the previous government also under the 2008 Energy Act, with a consultation in early 2010 now closed and implementation expected from April 2011 (DECC 2010b).

The proposal was that installations completed after 15 July 2009 (so including those in Green Streets) but before the start of the RHI, would be eligible for inclusion. As with the FIT for electricity, the proposed tariff levels are designed to bridge the gap between the cost of conventional and renewable heat systems at all scales, and are intended to provide a rate of return of 12 per cent (6 per cent for solar thermal) on that additional cost. As with the FIT the income will be tax free.

The RHI powers under the 2008 Energy Act enable the introduction of a new levy on fossil fuel (for example, gas) suppliers to fund the RHI, but no decision has yet been taken on whether this approach will be taken.

The Green Streets process to date

To take part in Green Streets, 'communities' across the UK were invited to submit a proposal detailing how they would save and generate energy and engage the wider community with technical support and funding from British Gas. At least one community building and 20 residential buildings had to be included within the project plans.

Small groups of individuals and organisations, hereon referred to as 'project teams', from communities across the UK applied to take part. The strongest applicants were shortlisted to take part in 12 regional heats. In these heats the applicants presented their proposals to a panel containing a representative from British Gas, the Centre for Alternative Technology, the Institute for Public Policy Research (ippr) and in some cases a local journalist. The panel judged the project proposals against a list of criteria (see Appendix 1) to select which would be taken forward through Green Streets. In addition two 'wild card' applicants that had strong proposals but who had not won their heats were also selected to take part. The ippr representative assumed the role of independent chair in the heats and did not take part in the decision-making.

Following the regional heats, the successful project teams were asked to collate the energy bills and meter readings from 2009 for all the properties that would be participating in their project. This data has been used to generate a baseline of energy use against which the performance of the projects through 2010 will be compared. They were also asked to submit a document detailing the community engagement activities they planned to undertake during the year. These plans will be used to guide the evaluation of the project teams' community engagement activities, which will be happening towards the end of 2010.

Once their participation in the challenge was confirmed, each of the successful project teams has worked with British Gas to develop their project proposals and ensure they are realistic and deliverable. Through the period January to June 2010 British Gas conducted energy efficiency assessments on all of the buildings included in the challenge, as well as feasibility studies on all of the proposed renewable technology installations. Using the findings from these, British Gas and the project teams have worked together to determine which sustainable energy solutions should be carried out.

Most of the project teams are now at the stage of determining which sustainable energy measures to have installed and are submitting their proposals for renewable energy systems for planning permission. With the exception of the hydro system installation occurring in the Llangattock Green Valleys project, British Gas is carrying out, or taking the lead in arranging third parties to carry out, all of the sustainable energy installations occurring through Green Streets.

Research methodology

British Gas has commissioned ippr to act as an independent third party in carrying out a number of tasks for Green Streets. These are:

1. To act as an independent chair in the regional heats
2. To analyse and provide updates on the communities' energy usage
3. To evaluate the community engagement activities of the projects
4. To generate lessons about the potential for community energy projects, the barriers to them and the solutions needed to overcome these barriers.

This report presents our interim findings in relation to the last of these tasks. At the end of the challenge, in early 2011, we will publish a final report detailing all our findings.

This report is based on a number of data sources:

1. Data on the communities' energy use in 2009 and 2010
2. Interviews with the 'leaders' from each project team. This includes up to three people for each project team with the interviews conducted simultaneously via a telephone conference call (see Appendix 2 for discussion guide)
3. Interviews with the British Gas Project Managers who oversee British Gas's work on the projects and who are the key liaisons for British Gas with the community project teams. There are four project managers, each overseeing three or four projects. We also interviewed the overall British Gas Project Manager whose responsibility covers all of the projects. These interviews were conducted face to face (see Appendix 3 for discussion guide).

In this report we have also drawn on other data collected by British Gas including the findings from the energy assessments and renewable technology feasibility studies, data on the access rates to residential properties experienced when trying to carry out the assessments, and the results of a survey of participating householders' awareness of different energy saving measures.

2. The project teams

Understanding the nature of the project teams is important as we explore what they can deliver through their projects and what support they need. In this chapter we discuss their different characteristics and motivations, their members and present them in a typology.

Characteristics

Table 2.1 (pages 12–13) shows in detail various characteristics of the project teams prior to beginning their work on Green Streets.

The main distinction to note is between the two teams with local authority involvement, namely Solariham, and The Meadows, and the community group-led, or 'bottom up', teams. The former two project teams include people who are paid to deliver their projects (the funding for this is provided by the local authorities and not from their Green Streets budget). Also, as will be discussed in Chapter 5, having local authority involvement has implications for the scale of project the teams can undertake and for the sources of funding they can access.

The constitutional forms of the 'bottom up' project groups ranged from being unconstituted to being registered as companies or charities. This may have implications for the level of skills the project teams have in running a community project, and for their capacity to enter into legal or financial arrangements (see Chapter 5). Llangattock Green Valleys was unique because its aspiration was to become a financially self-sustaining social enterprise.

The teams' relationships with their communities also vary. Here the project teams with local authority involvement differ: whereas Solariham is led primarily by a local authority, The Meadows is led exclusively by The Meadows limited company, which is an umbrella organisation bringing together community representatives and the local authority. All of the 'bottom up' project teams are comprised exclusively of community representatives.

As the project teams including community representatives/members have an established, individual presence within their communities, we can hypothesise that their relationships with that community are deeper, stronger and potentially based on higher levels of trust, than those of Solariham. On the other hand, the Solariham project team has well established relationships with its community that may benefit it in other ways. Casterton is notable in that, as a newly established project group, it had no networks prior to Green Streets. We can hypothesise that this puts the project team at a disadvantage because it will need to build up its community relationships and profile from scratch.

Some of the project teams also had networks that extended beyond their communities. For instance, Beccles Lido described links it has with another organisation that runs a lido, explaining that they regularly communicated, sharing tips and advice, including on energy saving. These wider networks may prove to be important in terms of the support the project teams can access and the scale of community engagement they are able to achieve.

Motivations

A persistent challenge with engaging the public in energy saving/emissions reductions activities is that apart from the 'environmentally inclined', many people are simply not that motivated by climate change and instead prioritise other, more immediate, concerns (Giddens 2009, Hale 2008). Community energy projects may present major opportunities for reaching beyond the 'environmentally inclined' by tapping into the motivation of people to benefit their communities and to reduce the running costs of community buildings.[1]

1. A similar finding emerged in 'The Future is Local', a recent report by the Sustainable Development Commission, which argued that local people are more likely to become involved in improving their neighbourhoods through an integrated programme (looking at for example making neighbourhoods feel safe, making homes affordable to heat, providing access to transport) rather than a programme focusing purely on one issue such as carbon (Sustainable Development Commission 2010).

Table 2.1. Characteristics of the project teams

Project group name and location	Length of time established	Constitutional status	Community members-led (bottom up), local authority-led (top down), or mixed
Beccles Lido, Suffolk	5 years	Charitable company limited by guarantee	Bottom up
Casterton, Cumbria	0 years	Unconstituted community group. Had intended to become a community interest company but plans not come to fruition. Plan is to grow organisation	Bottom up
Climate Friendly Bradford on Avon, Wiltshire	4 years	Unconstituted community group	Bottom up
Easdale Island, Argyll	13 years	Charitable company limited by guarantee	Bottom up
Hyde Farm Climate Action Network, London	3 years	Constituted community group	Bottom up
Ingram Village, Northumberland	40 years	Charity	Bottom up
Llangattock Green Valleys, Powys	1 ¾ years	Began as an unconstituted community group, now a community interest company (as planned)	Bottom up
The Meadows, Nottingham	12 years	Limited company	Mixed – umbrella organisation with representation from residents and local authority
Peel Park BMX, West Yorks	6 years	Unconstituted	Bottom up
REAP Newmill, Aberdeenshire	REAP: 4 years; Newmill Village Hall Committee: 4 years (emerged out of a 10-yr-old community group)	Both groups have charitable status	Bottom up
Solariham, Surrey	Ongoing	Local authority	Top down
SusMo, West Mids	3 years	Committee, part of a large constituted community group, Moseley Forum	Bottom up
Tackley, Oxfordshire	6 years	Charitable status	Bottom up
Transition Town Horncastle Green Babies and Toddlers, Lincolnshire	6 months	Constituted community group	Bottom up

	Primary motivation for participation	Existing supporter networks	Voluntary/paid work
	Community facility	Contact database – 250 people	Voluntary Membership scheme – 87 members Lottery – 159 tickets
	Community development	Does not have an established network	Voluntary
	Climate change	Mailing list of 400 people, 50 active members	Predominantly voluntary
	Community development / facilities	Members list – 80 Delivers a newsletter to all islanders	Voluntary
	Climate change	300 people on email address list	Voluntary
	Community facility	Well connected to community of 200 people but no ongoing communications	Voluntary
	Climate change	30 people on mailing list	Voluntary
	Community development	450 people on mailing list	Paid
	Community facility	50 members who use the facility	Voluntary
	Climate change and community facility	100 uses of the village hall	Voluntary
			Paid
	Climate change and community development	Moseley Forum has strong, established links with 9000-strong community	Voluntary
	Community facilities	Strong links to whole of Tackley village	Voluntary
	Climate change	40-50 people on an email list	Voluntary

The Green Street project groups have embarked on their projects through a variety of motivations (Box 2.1). Wanting to do something about climate change is the main motivator for some, and for four this is explicitly why the groups were established. However, for others (six in total) the primary motivation is to improve their community, principally through running one or more community buildings – undertaking an energy project is a way to reduce the running costs (in the form of energy bills) of these buildings.

Box 2.1. Examples of project leaders' motivations for undertaking their community energy projects

(All quotes are extracted from the project leader interviews)

'[I am] feeling a very pressing need for there to be a massive reduction in carbon use very quickly.'

'Our plan is fundamentally about saving the [community building] and so a lot of what we've done is skewed towards that and engaging the community around that, either in terms of what we're doing at the [community building] or … the households who support the [community building] joining in.'

'[Our aim is] to enable the residents of [the community] and ultimately other areas to access affordable energy.'

In reality the project teams' motivations are often a mixture of wanting to benefit their community at the same time as having a positive impact on the environment. Interestingly, one British Gas project manager described how the motivations of one project team, the Easdale group, have changed. At the start the project was focused on reducing the energy bills of the community hall but it is now focusing primarily on environmental sustainability (see Box 2.2).

Box 2.2. The changing motivations of Easdale project team

Easdale had fitted under-floor heating in their community hall, run by electricity, which used a costly amount of energy, so much so that in the winter the hall had to be closed (except for one-off events). As a result, they were looking for an energy solution that would enable them to bring down the costs of their energy bills, allowing the building to be open for more of the year, providing a meeting place for the community over the winter.

The community hall on Easdale Island

As they began developing their Green Streets project they were looking for ways to install renewable technologies that would make the least visible impact on the island possible – the island (in the Inner Hebrides) is a conservation area and they wanted to preserve its look. However, as the project has continued, the team's approach to renewables has turned around. They now want to maximise the visibility of the renewables and turn them into an educational feature, including an energy walk where visitors to the island can follow an energy trail around different installations. They want to position the island as something that is looking to the future rather than something that should be preserved exactly as it is. They have also begun to look for other options to increase the sustainability of the island including introducing whole-island energy monitoring and moving the community away from importing coal and into importing wood, which is a significant change from the island's tradition.

Similar changes have not been observed with other project teams, so the example of Easdale should not be taken as evidence that such a shift in priorities will necessarily happen. However, it does show how, in some cases, changes in attitudes towards sustainability can come after actions for sustainability have been taken. In contrast, many behaviour change approaches continue to claim that is necessary to change people's attitudes before they change their behaviour.

Skills and leadership

Many of the project team members told this research that they hold a variety of skills and expertise learnt through professional employment and that they were using them in their projects. Having a strong leader or leaders appears to be a critical component for some of the projects and these individuals had often come up with the project idea and driven forward their successful application to Green Streets. The importance of leadership in community climate change projects emerged from NESTA's Big Green Challenge (NESTA 2010) and we expect it will prove a decisive factor in the Green Streets projects.

Project team typology

Table 2.2. Project team typology

		Climate change motivation	Climate change and community benefit motivation	Community benefit motivation
	Newly established			Casterton
Community member-led (bottom-up)	Previously established	Climate Friendly Bradford on Avon Hyde Farm Climate Action Network Transition Town Horncastle Green Babies and Toddlers	REAP Newmill Susmo	Beccles Lido Easdale Island Ingram Village Peel Park BMX Tackley
- with aspirations to be a social enterprise		Llangattock		
Local authority involvement		The Meadows Solariham		

3. The projects

This chapter briefly introduces what is happening in each of the projects. Of particular significance is how the sustainable energy measures planned for several of the projects have altered as a result of British Gas's feasibility studies (see Table 3.1) and how some projects include innovative uses of the Feed-In Tariff. The potential of 'exemplar' renewable installations and creating a sense of common purpose as community engagement approaches is also notable.

Community buildings

The project groups originally proposed a number of different micro-renewables to be installed on a wide range of community buildings. Following the feasibility studies carried out by British Gas, several of these plans have changed considerably. This is mainly because the proposed technology was identified as not being the most suitable for the building, and an alternative solution has been identified which is cheaper and/or more energy efficient.

Some of the more innovative uses of micro-renewables include the use of a solar PV panel to power a water pump in an allotment and a wind turbine being used to power an air source heat pump that is attached to a community hall.

Reap Newmill aims to install a district biomass boiler alongside a community hall and to establish an energy services company (ESCO) that will sell the heat the boiler generates to the hall and to a neighbouring school. It is using an ESCO contract that has been developed by Community Energy Scotland.

Llangattock Green Valleys intends to use an innovative business model for installing hydropower systems based upon the FIT the systems will generate (see Box 3.1)[2]. Llangattock Green Valleys stands out from the other projects as being highly entrepreneurial with a focus on developing financially sustainable social enterprises, including a wood fuel business and a Food and Energy Hub. Its overall aim is to create a *negative* carbon community within five years.

Box 3.1. Llangattock Green Valleys hydro-power business model

Llangattock Green Valleys is using £18,000 of the funding it has received from British Gas as seed funding for setting up a hydro system. With this seed money it is leveraging in further investment in the form of private equity loans, which will pay for the remaining £30,000 costs for the hydro. Within three years the feed-in tariff will have paid off the loan and all feed-in tariff money beyond this is profit. This profit can then be used to invest in further hydro systems.

Some other projects are also aiming to use the FIT in innovative ways by sharing the income between numerous organisations (see Box 3.2 for an example). It is unclear yet how successful the communities will be in achieving these ambitions as there are a number of financial and legal arrangements that they will need to put in place between the owners of the buildings for this to work.

2. Green Valleys, the winning community of NESTA's Big Green Challenge, was the developer of this model. Llangattock Green Valleys uses the model and in return pays Green Valleys a portion of the income it receives from their hydro installations. Although closely connected, Llangattock Green Valleys is a separate social enterprise to Green Valleys.

Table 3.1. Original and current project plans for sustainable energy measures

Project name	Community buildings		Residential properties	
	Initial proposals	Currently planned changes	Initial proposals	Currently planned changes
Beccles Lido	Swimming pool – no initial proposal for technology	Swimming pool – new high efficiency gas boilers, pool cover and high tech thermal lining, solar PV	39 homes	Reduced to 27 homes
Climate Friendly Bradford on Avon	3 schools and 1 community hall – 1 solar PV and energy efficient lighting on 3	Additional 2 community halls – 5 buildings to have insulation measures and 1 school to have solar PV	125 homes – based on assessments	Reduced to 105 homes. (86 of these currently assessed)
Casterton	Private secondary school – biomass and solar PV	No biomass	20 homes – based on assessments	No change
Easdale Island	Community hall, museum and ferry terminal – air source heat pump, insulation and smart meters	Additional wind turbine and a solar PV conopy. Creating an 'Energy Trail' of renewable energy	23 homes – based on assessments	No change
Hyde Farm Climate Action Network	School – solar pv	No change	40 homes	No change
Ingram Village	Village Hall – solar PV and Air Source Heat Pump. Strong focus on energy efficiency and insulation	No change	23 homes – based on assessment	No change
Llangattock Green Valleys	School, community hall, community hydro, allotments, wood fuel business, food and energy hub, bio-fuel business – solar PV, insulation, hydro systems	No change	20 homes	41 homes assessed. 20 receiving up to £4000 for energy efficency measures. 20 receiving c. £500. 1 resident has pulled out.
The Meadows	Eco-restaurant – solar PV and solar thermal	Building earmarked for being restaurant has changed	50 homes – based on assessments	Reduced to 29 homes
Peel Park BMX	BMX park – wind turbine	No wind turbine. Solar being installed on local council building with FIT passed to the BMX club	22 homes – based on assessments	Reduced to 20 homes
REAP Newmill	Village hall and school – district biomass boiler managed under a community energy service company	No change	22 homes – based on assessments	Reduced to 12 homes – based on assessment
Solariham	6 schools, 1 library, 1 children's centre – solar PV on all 8 and solar thermal on 6	Changed to 6 schools, 1 community block of flats – solar PV on 5 and solar thermal on 3	58 homes – 5 solar pv and 15 solar thermal	56 homes assessed – only 15 signed contract to take part. Aim to install as many solar PV/ solar thermal systems by asking for part-funding for residents

Cont. next page

Table 3.1. cont.

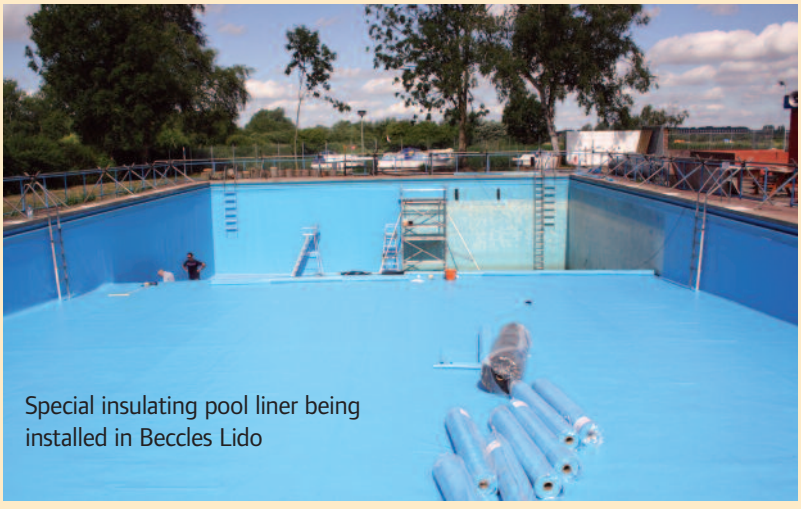
Project name	Community buildings		Residential properties	
	Initial proposals	Currently planned changes	Initial proposals	Currently planned changes
SusMo	Church, mosque, allotments, school – 3 solar PV, 1 solar thermal, wind turbine	Solar PV only on mosque and church. If church planning fails then double the amount of solar PV on the mosque	20 homes – based on assessments	No change
Tackley	Village hall – solar PV and GSHP	No change	78 homes – mainly insulation	No change
Transition Town Horncastle Green Babies and Toddlers	Community centre play group, Children's centre, war memorial, church – boilers on 1 and solar PV on 3	No change	26 homes – based on assessment	No change

Box 3.2. Peel Park BMX's creative plans to use the FIT

Peel Park BMX had originally planned to have a wind turbine installed on the site of the BMX Park. The feasibility study carried out by British Gas showed that the wind resource on the site was insufficient and so it looked for an alternative option. A council building in a local park was identified as having a roof that was suitable for solar PV panels. The community hopes to have these panels installed on the council building, so that the building can keep the electricity that is produced, and the proceeds of the feed-in tariff can be transferred to the BMX club.

Lack of funds to power the floodlights at Peel Park means riders are restricted to use the park during daylight hours only

Box 3.3. Beccles Lido's energy solution



Special insulating pool liner being installed in Beccles Lido

As part of the Beccles Lido project a feasibility study was undertaken to examine the possibility of using a ground source heat pump to heat the pool. The cost for this was estimated at approximately £500,000 which was prohibitively expensive. After further investigation it was found that purchasing a pool cover and having the pool lined could result in similar energy savings but at far less cost (approximately £30,000).

In the case of two projects the pursuit of micro-renewables led them to install energy efficiency measures (see Box 3.3 for an example). This is a good reminder that in the rush to upscale the use of micro-renewables it is still vital to keep a strong focus on energy efficiency measures, which can often deliver major gains in energy saving at a significantly lower cost.

Households

All the projects had to directly involve a minimum of 20 households. Actual proposals varied widely, with Bradford Climate Change Action Group involving the most households at 125.

Householders were recruited to take part in a number of different ways, mainly through existing networks and contacts (see Table 2.1 for examples of the nature of these networks). For example, some intended to communicate with potential participant households by including details about the project in a community newsletter. While using networks may have helped the project groups to recruit participants, inevitably it also means that those outside such networks may be excluded.

Two of the projects plan to seek part funding for sustainable energy measures from householders. For example, Ham and Petersham is giving residents a £1000 grant towards the cost of solar thermal panels and £2500 towards the cost of solar PV panels, and Hyde Farm Climate Action Network is planning to ask participants for voluntary contributions towards their installations. The success of the communities in securing this funding will be assessed in our final report.

Community engagement

The project teams planned a wide range of community engagement approaches to increase people's overall awareness of climate change and energy saving, and to encourage people to adopt lower carbon behaviours (Table 3.2 below). We will be evaluating how effective these approaches have been in the final report. Those project teams that are primarily motivated by climate change are generally more focused on community engagement than the others.

Table 3.2. The full range of engagement approaches the communities are using

Practical approaches to encourage changes in attitudes and behaviour
Smart meters
Eco-groups – in one case setting up a 'family friendly' group where parents can take their children
Introducing energy charging systems for groups using community facilities
Setting up energy saving competitions within a partaking community between residents receiving measures and those who won't be
Fitting selected households with extensive energy efficiency measures and renewable technology to act as exemplar homes
Normalising renewable technology in the community
Using community buildings as 'beacons' of renewable energy
Information and advice provision for example through an Energy Saving Day and an Energy Saving Clinic
Focus on community being involved in designing the project to increase their ownership of it and therefore also increasing their level of engagement
Communication approaches to change attitudes and behaviours
Face to face communications
Champions – in particular children
Using established community networks
Websites, newsletters
Some communications to emphasise money benefits rather than stopping climate change

Many of the project teams intended to use micro-renewables as educational and awareness-raising tools. ippr has previously advocated the use of 'exemplar' buildings in this way (Retallack and Lawrence with Lockwood 2007) as it enables people to see the technologies working in practice and helps the technologies to become 'normalised' by seeming less alien. This idea was expressed by many project leaders:

> *We had an approach where we were looking at selecting properties and then using them as demonstration projects … we think you can engage people where they can see what their neighbours have done in similar houses and similar lifestyles and the actual results that they got.*

> *Solar panels … are very visible so it's a good way of engaging residents in energy management activities. They will see what's going on at the local children's centre, what the school's doing. It's a good way of raising awareness.*

Many of the 'bottom up' project teams believed that communicating with people in their community face to face, and having people who 'championed' energy saving would be effective approaches. As described in Chapter 2, the project teams have different levels and types of existing networks to draw on. As the project continues this may emerge as an important factor in how successful the project teams are in engaging their communities.

> *We will be training people from the community to work with their own residents and friends to try and change their behaviours.*

> *I think word of mouth is going to be one of our most effective measures in encouraging other people beyond the [directly participating] households.*

> *We're really encouraging people – if they have done different things to save energy – [to] talk to their neighbours and to their friends.*

The potential strength of the messages communicated through a community's networks has been demonstrated in Green Streets. When arranging the bookings of energy assessments with participating householders, different approaches were taken with different communities. British Gas's usual approach is to send a letter to householders asking them to call to book an appointment. This approach was taken for two of the communities because the project teams did not feel they had the resources to book the assessments in an alternative way. When British Gas went to conduct the assessments it successfully accessed 71.4 per cent of the participants. For the other projects the project teams themselves took responsibility for booking the appointments. They were provided with a blank diary and asked to book in the participants, which they mostly did over the phone. For these communities the average access rate was 90.2 per cent.

The project leaders (except for Solariham's) described their networks as being built around face-to-face contact between individuals and consisting of high levels of trust. Conversely several of the British Gas project managers described instances where individuals in the project teams had expressed negative opinions towards the company. It may be that messages communicated through community networks have a higher likelihood of being responded to than if they are communicated to in a more 'top-down' way, by other potentially less trusted actors, such as energy companies and local authorities.

However, research has found that some people can be highly isolated from networks in their local community (for example see Commission for Rural Communities 2009). This can be for reasons such as illness, which may prevent people from being able to interact with their neighbours, or for more subjective reasons such as not 'fitting in'. There is therefore a high likelihood that relying too much on a community's networks will mean some people within that community are left out.

Some of the project teams also aimed to ensure their community was involved in the design and delivery of their energy project, as they believed the level of ownership the community has of the project will be important to its success. Linked to this, some of the project leaders aimed to emphasise how their community was acting together to reduce their emissions. Many hoped this would help to overcome the inertia that can emerge from a sense of 'what point is there in me acting when no one else is', which research has found to be a key barrier preventing people from changing their behaviour (Platt and Retallack 2009). The main finding to emerge out of Nesta's Big Green Challenge – that acting together can be a powerful force for changing people's perceptions of their own capabilities (NESTA 2010) – supports the assumptions of the project leaders, and this is potentially one of the most important benefits that can come from a community-scale approach to cutting carbon.

> *It's been tried and tested in other areas that if you actually get the local community to do the work themselves and design it they eventually take ownership of the project … [They] then have more ownership of it, they're more likely to promote it to their neighbours, to their friends and really have something that they are proud of that they want themselves.*
>
> *One of the things is making people feel that if they do change their behaviour it's really worth it because there's lots of people who will be doing it – not feeling helpless because changing their own behaviour doesn't really get anywhere – but if everybody in town changes their behaviour and it becomes the normal thing to do…*
>
> *By doing it as a community rather than as individually people are talking about it and comparing notes, so there are behavioural changes that happen because of what your friends and neighbours are doing.*

Easdale has encountered some objections from people within their community about the wind turbine installation it is planning. Local opposition has persistently been a major obstacle to the installation of on-shore wind turbines across the UK and as such, engaging and winning support from a community has become a key component of wind farm development. Therefore Easdale is undertaking community engagement activities that are not only about engaging people in energy saving and environmental issues but also about ensuring its project plans are deliverable. The project team have performed two community consultation events and distributed response cards in order to capture views from across the community. The responses have been overwhelmingly positive and the project team intends to use the response cards to demonstrate to the planning committee, which will determine whether the installation goes ahead, that everyone's views have been taken into account and that there is majority support.

4. Projects' energy usage and renewable technology potential

This chapter presents the energy profiles and savings of the households participating in each of the projects and some indicative estimates about the potential contributions that residential and community-scale renewables could make to the UK's climate change targets.

Projects' 2009 energy profiles

The energy use of the participating households in 2009 has been estimated from meter readings and energy bills. This will form the baseline against which the progress of the communities in saving energy will be contrasted.

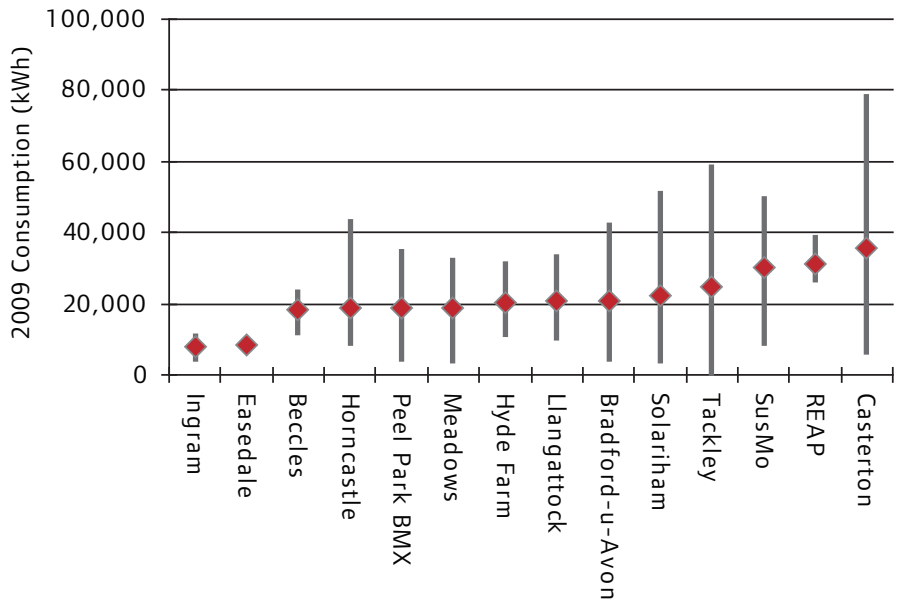
A quarter of the households used at least one non-metered fuel, such as wood, oil or coal, as their primary heating fuel. As meter readings and past bills are not available for these fuel sources in the way that they are for gas, they have posed particular challenges for modelling 2009 usage. Because of this, non-metered fuel users are excluded from the analysis that follows, and discussed briefly in a separate section below.

For most of the projects the average energy use per household was between 4,000–6,000kWh of electricity and 15,000–20,000kWh of gas, in line with the UK averages of 4392kWh and 17,614kWh respectively (DECC/ONS 2009). However, within most projects the range of energy use varied significantly. The range of overall energy consumption by households in each project is shown in Figure 4.1.

Ingram and Easdale display notably small ranges of energy use. This is because none of the households in either of these projects are connected to the gas grid; instead they use alternative, non-metered heating fuels, which are not accounted for in these statistics. Reap Newmill's low range of energy use is believed to be due to only a small number of participants having acceptably reliable 2009 energy data.

Figure 4.1. Energy consumption by project in 2009

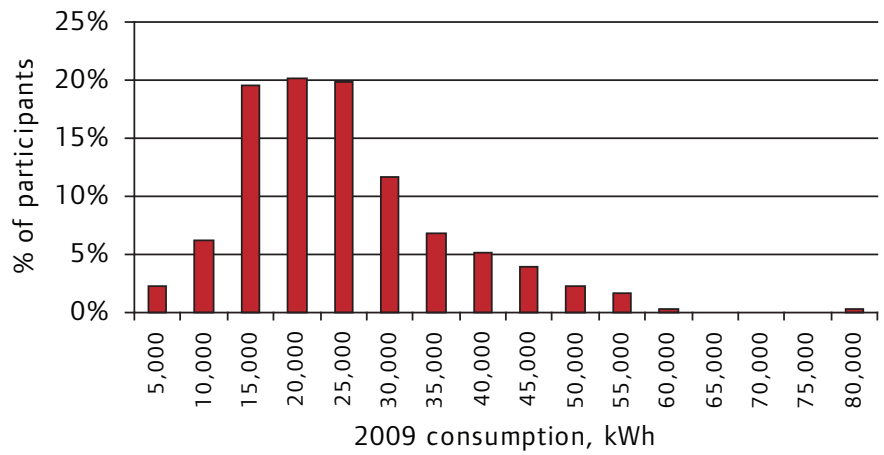
Note: data excludes those that use non-metered fuels as primary fuels



Individual households' overall energy usage is clustered around the average energy usage per participating household of 22,975kWh (in line with the average for the UK as indicated above) with a tail end of higher energy users (see Figure 4.2).

Figure 4.2. The overall energy use of participant households

Note: data excludes those that use non-metered fuels as primary fuels



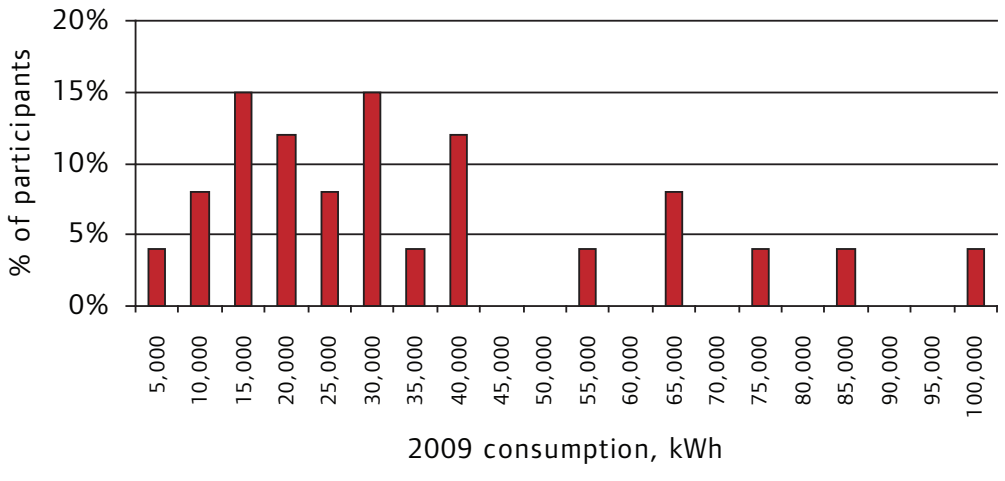
Across all of the communities high gas users tend to be high electricity users too, and the variation in overall energy use between projects is mostly due to variation in use of gas rather than difference in electricity use. In Appendix 4 we explore the impact of different variables on the households' gas usage.

Non-metered fuel use

A quarter of the households use at least one non-metered fuel. Of all those participants that use two heating fuels 44 per cent use wood, 30 per cent use electricity and 20 per cent use coal. It was found that 50 per cent of off-gas grid participants used more than one heating fuel. This figure fell to 20 per cent for mains gas users. The high number of non-metered fuel users is likely to be because there are a significantly greater number of communities taking part in rural areas than in urban areas.

The energy usage in 2009 for non-metered participants was approximated using the participants' own estimations of the amount of those fuels they used. It is important to note that self-reporting in this way is highly subjective and significantly lowers the accuracy with which we can be confident about these participants' levels of energy use. The average approximated energy usage per household using non-metered fuels was 32,877kWh. This figure is significantly higher than that for metered fuel users because there are some very high level users (see Figure 4.3).

Figure 4.3. The overall energy use of participant households using non-metered fuels



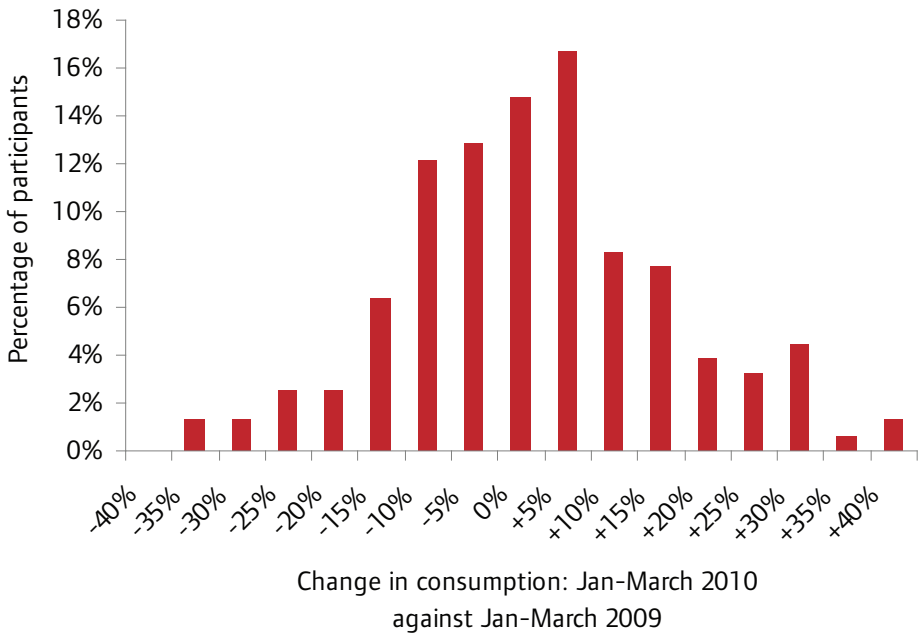
Energy saved by the projects

So far in the competition there have been very few sustainable energy measures installed. This means that any progress the households have made in terms of saving energy is almost entirely the result of changes in behaviour.

Two communities, Bradford Climate Change Action Group and Tackley, are excluded from our current analysis as there have been delays in obtaining the data on their energy usage in 2010. Also, only 22 per cent of participants have submitted full records of their consumption in 2009 and 2010 to date. This limits our ability to judge any impacts of the project so far.

Figure 4.4 shows the pattern of energy saved between January and March 2010 compared with January to March 2009 for individual participant households across all of the communities. The average saving is 1 per cent (although to reiterate, this finding is not statistically significantly different from zero).

Figure 4.4. Changes in energy use



In the final report we will be able to provide a more comprehensive analysis on the energy saving performance of the participating households looking across the full period of the Green Streets project.

Potential for residential-scale renewable technologies

British Gas has now assessed 491 residential properties for their suitability for micro-renewables. The assessments were carried out by energy experts who were trained to spot 'high-level' opportunities for the technologies. They did not carry out full feasibility studies, only taking physical constraints imposed by the fundamental building fabric (for example, the amount of space) and high levels of resource availability (for example, the amount of wind) into account. Other factors including whether significant alterations to the internal décor and heating distribution systems would be needed, the finances and carbon savings involved, and customer preference and planning permission constraints were not considered.

Using the findings of these assessments, indicative approximations of the potential for residential-scale micro-renewables in the UK can be made. The approximations have been calculated by firstly dividing participating Green Streets residential properties by house type (detached, semi-detached and so on). The percentage of properties of each type in which an opportunity was identified for each technology was then calculated. The results from this

have been overlaid against national housing stock data (Communities and Local Government 2009, Scottish Government 2009, Welsh Assembly Government 2008) to obtain national-level estimates of the theoretical potential for each technology.

Note these approximations illustrate technical maximum uptake given no demand-side barriers – for example where money is no object, and people are prepared to go through the inconvenience required to have the technologies installed. Nor do the approximations take into account the competition that will exist between measures, for example for roof space between solar PV and solar thermal panels. The findings are shown in Table 4.1.

Table 4.1. The potential for residential-scale micro-renewables in the UK

Energy type	Technology	National max volume	Total capacity (GW)	Total energy generated (TWh/yr)	Carbon savings (t/yr)	Total cost (£bn)	Money savings (£bn/yr)	Total FIT/ RHI (£bn/yr)
Electricity	Solar PV panels	13,787,088	21	18	9,545,146	138	1.6	7
	Wind turbine	1,442,561	4	5	2,573,175	26	0.4	1
Heat	Solar thermal panels	6,264,295	16	8	1,679,182	31	0.3	1
	Ground source heat pump	1,569,988	19	25	914,052	20	0.1	2
	Air source heat pump	12,470,762	150	197	-2,595,634	112	-1.4	15
	Biomass boiler system	2,295,578	41	43	8,860,946	23	-0.1	4
	Biomass stove	5,364,531	27	18	3,764,613	16	0.3	0

The resulting analysis shows that nearly 14 million households across the country could be suitable for solar PV installations, and 6.2 million households could be suitable for solar thermal. Biomass stoves could also be a 'quick win' to boost renewable heat. They have a large potential market of just under 5.5m and are relatively simple and cheap to retrofit compared with other renewable heating technologies. Air source heat pumps are theoretically the most widely suitable heating technology.[3]

Potential contribution of residential scale renewable technologies to the UK's climate change targets

The EU 20:20:20 targets legally commit the UK to generating 15 per cent of all energy from renewable sources by 2020. This requires 30 per cent of all electricity to be renewable (111TWh) and 12 per cent of all heat to be renewable (67TWh) (DECC 2009a).

To approximate the theoretical contribution that the residential scale micro-renewables could make to these targets we have taken the above findings and then used Energy Saving Trust figures for the performance of each technology in a typical home to generate the scale of energy generation and carbon savings that are possible nationally (typical savings are for a three-bed, gas-heated, semi-detached property).

3. However, it should be noted that in practice there are several potential difficulties with heat pumps in a UK context. Heat pumps have been developed mainly for Continental European markets, which have three-phase rather than the single-phase supply found in Britain. As a result, heat pumps can be noisier and less efficient than their specification. It is also likely to be the case that in the coldest days of winter air-source heat pumps in particular will not provide sufficient heat to maintain expected comfort levels, and will require some form of top-up. It should also be noted that heat pump markets will be strongly linked to the size of the solid and cavity wall insulation markets as this will be key to ensuring the existing housing stock is able to accommodate the pumps efficiently.

It is important to reiterate that the analysis does not take into account either the range of barriers that can restrict uptake of renewable technologies or the competition that may exist between different measures.

Our findings suggest that if every UK household that is able to installed solar PV panels (13.8m installations) and a domestic scale (i.e. 2.5kW) mast-mounted wind turbine (1.4m installations) this would generate 20 per cent of the energy required to meet the renewable electricity 2020 target. Under this scenario 80 per cent of renewable electricity would still need to come from community or business-scale installations or more centralised renewable sources, such as large hydro, wave and tidal and utility scale wind farms.

If all domestic properties installed all renewable heating measures possible then the UK heat target could theoretically be met three times over, although if the competition between different measures is taken into account then our calculations suggest the target could be met twice over.

Figure 4.5. The potential contribution that small-scale renewable electricity generation could make to the 2020 renewable energy targets

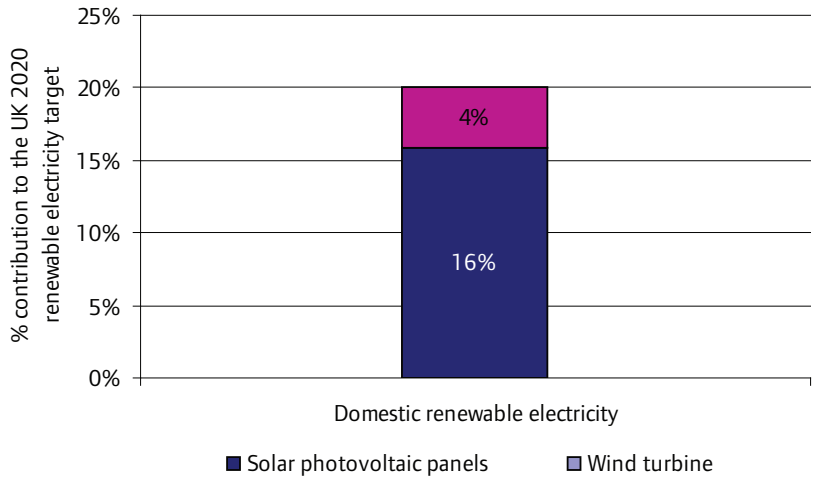
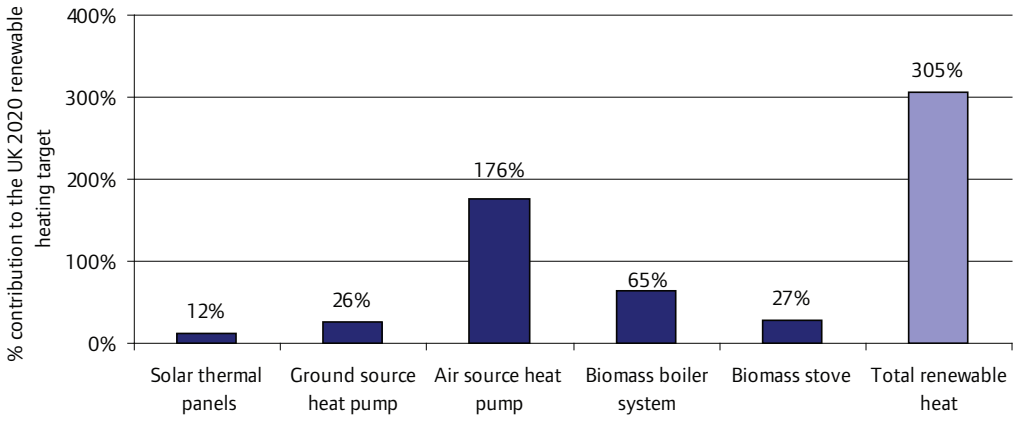


Figure 4.6. The potential contribution that small-scale renewable heat generation could make to the 2020 renewable energy targets

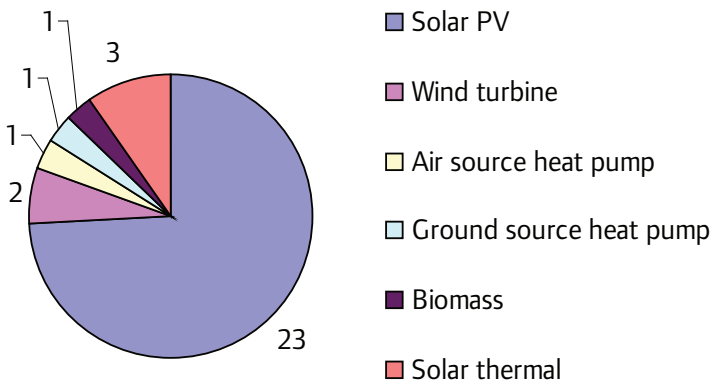
Note: This graph does not take into account competition that will exist between measures



Potential for renewable technologies on community buildings

Through Green Streets it is planned that a wide range of different renewable technologies will be installed on community buildings (see Figure 4.7).

Figure 4.7. The micro-renewables planned to be installed on community buildings



Solar PV panels account for 74 per cent of the planned installations, largely on account of their ease of installation and the financial returns they can generate through the FIT. British Gas found that all of the community buildings on which it conducted feasibility studies had the potential to use renewable technologies, but that the option of which technology was often highly individual to a single building. This puts limitations on the approximations we can calculate about the renewable energy generation potential of community buildings, and so here we focus solely on the potential for solar PV panels on schools and churches.

There are seven schools participating in Green Streets, and they have had an average of 4kWp (kilo-watt peak) of solar PV installed. By multiplying this figure by the total number of schools in Great Britain (29,813; see Appendix 5 for how we arrived at this figure) we get an approximation of the total PV opportunity on schools of 119,252kWp. If 60 per cent of this electricity is used on site, which is a standard industry assumption, with the remainder exported to the grid, including the FIT payments this could generate £43,890,699 for schools annually and result in 55,041 tonnes of carbon saved a year (see Appendix 5 for full calculation).

The ratio of kWp of solar PV panels to be installed to the size of the congregation of the churches taking part in Green Streets is 0.06kWp per person. We can define this as the average opportunity for PV installations per member of the church congregation and use this to calculate an approximation of the overall opportunity for solar PV on churches. There are 16,247 Church of England churches in the country with an average congregation size of 54 people (see Appendix 6 for calculation). Using these figures we approximate that the solar PV opportunity across churches is 54,834kWp. If 60 per cent is used on site, as above with schools, the total value of the installations would be £20,181,516 to the churches annually, delivering 25,308 tonnes of carbon savings per year (see Appendix 6).

Although we cannot provide a full approximation of the potential capacity for micro-renewables on community buildings we can observe that there are a large number of community buildings in the UK and that the capacity is likely to be significant. A 1998 study identified 18,809 'community buildings', which included mostly village and community halls, church halls and other faith-connected buildings, and some buildings attached to schools. The study was believed to be the most comprehensive at the time and an underestimation of the true number of community buildings. Other community buildings include pubs, of which there are 56,785 according to the British Beer and Pub Association, and Post Offices, of which there are 14,951 according to Postcomm.

5. Barriers restricting the potential for community energy projects

In this chapter we identify a range of barriers to community energy projects including capital and financial expertise, technological expertise, organisational capacity and the need to upgrade the electricity grid to accommodate a major growth in micro-renewables.

Capital and financial expertise

The upfront capital costs of renewable technologies have persistently been the major barrier restricting their uptake (Retallack and Lawrence with Lockwood 2007). In this section we discuss two types of funding options for community renewables – those created since the introduction of the FIT and gift funding – and the skills necessary to benefit from these.

The Feed-In Tariff

Ideally, a community energy project team should be able to install and own a renewable installation – using the electricity it generates *and* receiving the income from the Feed-In Tariff (FIT). Renewable electricity installations funded by a public sector grant are ineligible for the FIT and so an alternative route to funding the upfront costs is required.

While the FIT does not directly address the upfront capital costs of renewables, many developers are successfully using the relatively generous rate for solar PV panels to offer financing deals that overcome this barrier (see Box 4.1). The initiatives are made viable through business models that demonstrate a low enough risk and high enough return (for example by achieving sufficient scale) to attract equity investment and the leveraging in of debt from financial institutions, which are then used to fund the upfront costs.

The initiatives vary in detail and are mostly led by the private sector, although some are led by local authorities.

Box 4.1. Illustrations of new business models for installing solar PV panels created by the Feed-In Tariff

- 'Leasing' model: A developer leases the roof space on a building and installs a solar PV panel. The developer retains ownership of the panel and receives the income from the FIT. The building occupier uses the electricity the solar panel generates for free. The income from the export tariff could go to either the company or the building occupier.
- 'Loan' model: A developer loans a building owner the capital to install a solar photovoltaic panel. Ownership of the panel lies with the building owner who then pays back the loan via the income they receive from the FIT, meaning the loan is effectively nought per cent interest.

These arrangements introduce a number of complex legal issues that have not necessarily been fully resolved; for example, what happens when a homeowner moves? Does the responsibility for paying back a loan automatically move to the new homeowner? (See Centre for Sustainable Energy 2010 for a more thorough discussion of these issues.)

While one Green Streets project, Llangattock Green Valleys, is using such a model (see Box 3.1) it is the exception rather than the rule, and for most 'bottom up' energy projects establishing such a business model is likely to be unfeasible. 'Bottom up' community energy projects are likely to be perceived as high risk by investors and creditors. As such they will need to deliver higher rates of return on investment and will be required to pay higher rates of interest on loans compared to what a private company or local authority may be able to achieve. Also the small scale of these projects means they will incur higher transactional costs than larger scale projects. Finally, establishing such a business model requires a high level of financial expertise that is likely to be beyond the capacity of many community groups.

Gift funding

Gift funding is money donated for free, and includes grants from organisations and fundraising directly from the public. This will remain an important funding source for community energy projects, although the sustainability of these sources is questionable in the context of public sector cuts and ongoing uncertainty in the economy. It is the gift funding the Green Streets project teams have received from British Gas that has enabled their projects to be carried out.

Fundraising from organisations requires some important key skills, such as the ability to write a coherent grant bid and to identify potential funders. As a result, project teams that have previous experience of successfully accessing funding, or that have team members who have experience of similar processes through their professional work, are likely to be more effective at fundraising than project teams that do not. Fundraising from the public requires different skills. One innovative example of this from Green Streets is the team at Beccles Lido running an ongoing community lottery to help fund the upkeep of its swimming pool.

A specific fundraising skill is to use an initial piece of funding (or support) as 'anchor funding' with which to attract additional funding (or support). Here the initial piece of funding is used to demonstrate the credibility of a project to other funders. Also, the case can sometimes be made that by aggregating together two pieces of funding the overall impact achieved would be greater than if the two pieces of funding were employed separately. Similarly, some funders (for example the Big Lottery) may acknowledge the 'in kind' work that goes in to a project (that is, the work put in by people for free). By costing this work into a funding application it demonstrates the value of a project above and beyond the level of funding being requested.

In Green Streets there are several examples where project teams have been able to attract additional gift funding: Solariham received funds through the Low Carbon Zones programme, and The Meadows received funding from the Low Carbon Communities Challenge and previously through Nesta's Big Green Challenge, to undertake large-scale community climate change work. Easdale Island has made a successful bid to the Scottish Government's Climate Challenge Fund for funding to install a whole-island energy monitor, which the British Gas project manager for Easdale believes was successful in part due to the involvement of British Gas in the bid as it demonstrated a strong likelihood that the project would be successfully delivered. Finally, REAP Newmill may receive funding from Community Energy Scotland for the district biomass boiler it had planned to pay for from its Green Streets budget, which would enable it to reallocate the funds to other aspects of the project.

There are an increasing number of communities that are financing or aiming to finance the purchase of renewables by asking for equity investment from people within that community. The number of these 'community share' schemes has grown significantly in recent years. Some successful examples of this occurring in practice are by Energy4all, which supports community wind farm developments and h2ope, which supports community owned hydro systems. As the number of these share offers increases there are important questions to be asked about the quality of the offer that is being made to communities, and how it is being communicated to them.[4]

Technological expertise

The process through which a community energy project must go to install sustainable energy measures involves choosing the right measures, taking into account their location, likely energy performance and cost effectiveness, and choosing a competent installer. In the case of renewable technologies, technology choice is also determined by the likelihood that the installation will be granted planning permission.

4. The Development Trust Association is currently undertaking a major piece of work looking at community shares and is exploring these issues in depth. See www.dta.org.uk.

Community energy project teams have an important role to play right through the process detailed above. While some project leaders indicated that energy experts were involved in their projects, for example a renewable technology expert, for the most part the project groups appeared to have a broad yet limited knowledge of sustainable energy measures – for example, a general knowledge about what renewable technologies are available, but not technical knowledge about where and how they can be installed and the levels of energy saving they will achieve. British Gas completed a survey of the householders participating in Green Streets and found awareness of different measures was highly varied, for example while 98 per cent of respondents claimed to know something about cavity wall insulation only 60 per cent claimed the same about solid wall insulation (see Appendix 7 for the full survey results).

Many of the project teams indicated they were very happy to draw heavily on the expertise of British Gas. As one project leader said:

> *We need to work with British Gas. We're not going to go ahead and champion anything without British Gas coming on board and without having taken advice from British Gas.*

This was not the view held by all of the project teams however and British Gas project managers reported some instances where the energy solutions it had proposed had been challenged by a project team.

Two renewable installations have occurred so far, both in Ingram. A British Gas project manager described how Ingram had arranged to have an air source heat pump installed by a company other than British Gas prior to Green Streets. Its choice of installer meant the project would have received no income for the energy the installation produced via the Renewable Heat Incentive. British Gas took over the installation and discovered a more efficient energy solution to the one that was planned. The solution is described in Box 4.2.

Box 4.2: Ingram village's community-building micro-renewable choice

Prior to Green Streets, Ingram village had received funding for, and arranged the installation of, an air source heat pump in its community hall. However, the installer it planned to use was not government-accredited under the Low Carbon Buildings Programme. The village consulted with British Gas on the implications of this and was informed that if it used this installer it would not be entitled to receive any income under the Renewable Heat Incentive should it be implemented as planned in April 2011. British Gas took over responsibility for the installation. However, after carrying out its own feasibility assessment, it discovered there was a more efficient option for installing the technology than the community had planned. British Gas suggested connecting the pump to an under-floor heating system rather than blowing heat into the building through a fan. The expert guidance of British Gas was clearly important in ensuring the community made the best choice of energy solution in this case.

The heat pump will be powered, in part, by a 7kW solar PV installation

Given the potential for making expensive mistakes such as these, it is not surprising that we heard from British Gas project managers how some of the project teams were very anxious about the decisions they were making regarding sustainable energy measures. The British Gas project managers believed this was due to the long-term and high-cost nature of the measures, as well as the project teams' sense of responsibility to their communities, including their desire to do the right thing and their concerns that making a wrong decision could damage their reputation. The Energy Saving Trust has also found that communities are often more comfortable undertaking 'softer' activities, such as encouraging behaviour change than carrying out 'harder' measures, like technology installations, for similar reasons (personal communication with EST staff).

Evidently, most communities need a lot of support when they are making decisions about sustainable energy measures. Firstly, they need access to top-level information on what measures are likely to be appropriate for their individual circumstances to help them construct their project plans. Using this information they can commission feasibility studies from technical experts, and here it is important that they have access to trusted and accredited experts. As we have seen in Green Streets some of the project teams' proposals for which renewable technologies to install were found not to be the most cost and energy efficient option, and, in two cases, the pursuit of renewable technologies led the project teams to decide to install energy efficiency measures, which will tend to be a far more efficient option (see Chapter 3). Therefore, ideally the community would be able to access individually tailored advice from an *energy solution* expert as opposed to an expert in one or another measure.

There are other forms of technical expertise that community energy projects may also wish to draw on. Two Green Streets projects are receiving expert support for their community engagement work: one from the London Sustainability Exchange to run an energy champions scheme, and another from the Energy Saving Trust to help run an Energy Saving Day. Also, there are specific legal issues in relation to renewable technologies that community energy projects may need support with. For example, as is the case with Reap Newmill (see Chapter 3), a project team may wish to set up an Energy Services Company. Reap Newmill is paying Community Energy Scotland for the use of an ESCO contract it has developed.

Planning

A number of micro-renewables, including solar PV and thermal panels, wood burners and ground source heat pumps, are 'permitted developments' on residential properties according to planning regulations, meaning they do not require planning permission. Micro and small wind and air source heat pumps do not currently have this same status. A consultation is in progress about whether similar rules should apply to non-domestic properties, which will include community buildings (Energy Saving Trust n/d).

As the majority of the Green Streets renewable installation proposals have yet to go through the planning application process it is currently unclear to what degree planning will be a barrier. Experiences to date suggest a mixture of experiences is likely across the projects. So far, two proposed installations have encountered objections: the wind turbine proposed for Easdale Island has encountered objections from the local community and the project team has undertaken community engagement work to try to overcome these objections (see Chapter 3); a planning application to install solar panels on a church roof as part of SusMo was declined due to objections from two local interest groups, and the project team is now submitting an appeal against the decision. For the two installations that have occurred (an air source heat pump and solar panels on Ingram village hall) the planning permission had been gained prior to their involvement in Green Streets.

We will assess the degree to which planning regulations are barriers to residential and community-scale renewable technologies in the final report.

Organisational capacity

As detailed in Table 2.1, the Green Streets project teams take a variety of legal forms. We have not encountered any specific difficulties that the project teams have encountered in relation to these forms yet we believe there are likely to be barriers. The legal form a project team adopts could be important if, for example, it wanted to project manage large-scale sustainable energy installations and required clear arrangements about issues such as liability in order to achieve this. In such circumstances either a project team will be able to draw on its previous experiences to identify the legal form it should take and the process to adopt this form, or it will need to draw on external guidance.

Time

The vast majority of the project teams' work is done on a voluntary basis with only two of the project teams comprising people who are paid (see Table 2.1). We spoke to the project leaders during the writing of this report to assess the amount of work they were doing on their projects, and several described investing very large amounts of time and energy, with some individuals indicating they had invested as much as two or three days a week for the duration of their project (others indicated they spent more time but this was either as paid employment or with the view that the work would ultimately transform into paid employment).

While the project leaders were in general very happy to work hard on their projects, there are clearly limits to the amount of time they have available to do so. Several indicated their workload was at times very difficult to manage and some suggested that the absence of funding for their time and administration costs were at the route of these difficulties.

Community engagement

Successful community engagement is necessary both from the perspective of an external actor that wishes to engage with or facilitate an energy project within a community, as well as from a project team wishing to lead an energy project.

There may be particular challenges for external actors who do not have strong relationships with a community. Several of the British Gas project managers described how members of project teams and/or wider communities had expressed negative feelings towards British Gas (although despite these experiences they mainly described having very positive personal relationships with the project teams). However, there are also challenges for project leaders who need to engage with disparate groups and individuals to galvanise the support they need.

From both perspectives it is important to understand the role that 'gatekeepers' can play within a community. Gatekeepers can be thought of as influential individuals who can either enable or block access to a wider community network. Some of the Green Streets project teams that have been the most successful in bringing a wider community on board with their project are those where gatekeepers have been successfully engaged. For example, a project leader for Transition Town Horncastle Green Babies and Toddlers group successfully engaged with staff in local children's centres to involve them in the project, and SusMo project group established a steering group with leaders from local churches and a mosque to assist in the running of its project.

Micro-renewables and the electricity grid

The growth of micro-renewable electricity on the scale outlined in the previous chapter would present major challenges to the electricity grid (see for example Electricity Networks Strategy Group 2009, Green Alliance 2010, DECC 2009b). The grid is divided into the high-voltage transmission system (the 'motorways') and the lower voltage distribution network (the 'side roads').The low voltage (less than 11kV) part of the electricity distribution network has been designed for a one-way flow of power from large central power stations to consumers of electricity. It was not designed for the two-way flows of power that arise when micro-renewables start exporting into the local distribution network.

A further challenge would be presented by the large-scale use of heat pumps, which would represent a significant increase in the average domestic electricity load. Ground source heat pumps in particular can draw considerable power – 10kW at peak load for a large domestic system, as opposed to the 1.5kW that distribution network companies currently use as a rule of thumb for the average peak demand per household. There are other potential problems with the heat pumps on the GB single phase electricity system, including high start-up current and reactive power.

With today's very low levels of micro-renewables and heat pumps, distribution network operators (DNOs) are not particularly concerned, although in the cases where reinforcement of networks is required to accommodate installation of technologies, this will be a barrier to projects, since the project will be charged the full cost of reinforcement in most cases.

With a large-scale take-off of these technologies, and especially if take-up is concentrated in particular parts of cities and towns, as may well be likely, two problems arise:

- A lot of power export from micro-renewables in particular locations, with no modifications or management of the distribution network, may lead to voltage rise and ultimately to tripping of sub-stations.
- A large concentration of heat pumps, all operating at or near peak load at the same time of day, without reinforcement of networks, is likely to lead to the opposite problem of voltage drop, and possible cable and equipment failure.

An underlying problem is that at present DNOs have very limited information about the state of the low-voltage network. There is hardly any metering of sub-stations below 11kV, and no direct information at all about voltage at the level of individual streets.

6. Conclusions

Green Streets is a unique challenge that helps us understand the contribution that community energy projects could make to cutting carbon and the opportunities and challenges there are in creating a 'Big Society'.

The challenge has now been running for six months and most of the sustainable energy measures planned for the projects have yet to occur. Therefore we have been unable to draw conclusions as yet on how the challenge has impacted on the participating communities' energy usage.

However, Green Streets has already generated important lessons about the potential for and barriers to community energy projects.

Our early findings suggest that community energy projects could make a significant contribution to the UK's national climate change targets. We have calculated that micro-renewables on residential properties could theoretically generate 20 per cent of our 2020 renewable electricity and 200 per cent of our renewable heat targets. There is also significant capacity for micro-renewables on community buildings.

Beyond these direct emissions savings, community energy projects could potentially have more important impacts by affecting the attitudes and behaviours of people within a community towards sustainable energy measures. They have the potential to normalise sustainable energy measures and to create a sense of common purpose about taking action on climate change, which can help to overcome the inertia characterised by the attitude 'why should I act when no one else is?'

There are also wider benefits that community energy projects could bring, for example increasing the financial sustainability of community buildings.

Drawing together these different aspects we have identified a potential 'triple-win' for sustainability in its wider sense to be gained from installing micro-renewables on community buildings, such as schools and community halls (see Box 6.1).

Given these positive impacts, growth in the number of community energy projects should be encouraged. However, to achieve this the barriers we have identified around capital and financial expertise, technological expertise, organisational capacity and the need to upgrade the electricity grid need to be addressed.

Box 6.1. Three wins

Win 1: Increasing the financial sustainability of community buildings

The income generated by micro-renewables can allow community groups linked to community buildings to focus less on paying the energy bills of that building and more on other activities for wider community benefit. Community groups that are not motivated by climate change can be highly motivated to undertake energy projects for this reason.

Win 2: Changing attitudes towards energy use within the wider community

The presence of these technologies in communities can impact attitudes by 'normalising' the technologies and demonstrating their benefit, which ultimately may lead to an increase in their uptake. Community members who have been involved in the installation of the technologies could act as sources of information about the technologies to the wider community.

Win 3: Direct emission reductions from the community buildings

Installation of the technologies makes a direct contribution to our emission reduction targets.

Finally, our evidence strongly suggests that volunteer-run community groups can make important contributions to cutting carbon through energy projects, which bodes well for aspirations for the Big Society. In particular, we have found that community groups can be sources of innovation and may be able to galvanise a common sense of purpose about taking action. However, most groups will require a lot of tailored support from other actors, as there are clear limits to their capacity. This is an important lesson to take forward as aspirations for the Big Society develop.

7. Policy recommendations

This closing chapter includes early recommendations for growing the number of community energy projects relating to finance and funding, the Big Society and the role of different actors and on the need to move towards a smart grid. These recommendations will be further developed through the course of Green Streets and a full range of recommendations will be published in our final report.

Finance and funding

Central government should:

- maintain the Feed-In Tariff (FIT)
- make clear its intention to implement the Renewable Heat Incentive (RHI) and the rates that will apply for different heating technologies
- fund and deliver extensive initiatives to improve the energy efficiency of lower income households and offset the regressivity of the FIT and RHI
- support the development of community share initiatives, where community members take an equity stake in a community asset, for renewable energy.

To increase the number of community energy projects the main role for central government is to provide a consistent and fair financial support framework for micro-renewables.

The impact the FIT has had on the financial viability of micro-renewables should not be underestimated. A wave of new delivery models are being introduced which companies and local authorities, with their ability to access finance and deliver to scale, are well placed to take advantage of. We anticipate that the RHI, due to be introduced in April 2011, will have a similar impact on the renewable heat market.

While the coalition government has committed to the FIT (HM Government 2010) it has yet to make a similar commitment regarding the RHI. This uncertainty limits the ability of the renewable heat sector to plan. For the full potential of the decentralised energy revolution to be realised it is important that the Government makes clear its intention to proceed with the RHI, and the rates that will be set for the different technologies, at the first possible opportunity.

While the FIT and RHI are incredibly positive contributions to the climate policy framework, the regressivity of the former and potential regressivity of the latter are important issues. To offset this central Government needs to focus strongly on improving the energy efficiency of the poorest households, while also ensuring it enables all communities to reap the benefits of owning micro-renewables.

New mechanisms are needed that enable community groups to finance the upfront costs of micro-renewables using the income that will be generated through the FIT/RHI, for example by leveraging in private sector investment. One option is for a third party to bundle numerous projects together and properly evaluate and communicate the risks they constitute to make them more attractive to investors and creditors. Potential third parties include the Green Investment Bank, local authorities (although the budget cuts local government faces raise doubts about the degree to which they will and can prioritise this work), community development finance institutions, social enterprises and private ethical finance bodies.

Community equity investment is emerging as a potentially powerful mechanism for funding the upfront costs of renewable energy. However the 'community shares' sector is very much in its infancy and attention is needed to ensure a minimum level of competence applies across the sector, in particular so that the risks community investors are taking are properly communicated and understood.

'Big Society' and the role of different actors

- **Community groups** should undertake energy projects and install micro-renewables to financially support their wider community work.
- **Community support and capacity-building providers** need to better coordinate their advice provision, target guidance at the appropriate stage in a community group's development, and signpost groups more effectively between services.
- **Support providers** in the community development and energy sectors should promote the financial benefits of renewable energy to community groups – before the benefits in terms of climate change.
- **Providers of energy expertise** to community groups should individualise the support they provide to the greatest degree possible.
- **Local authorities** should undertake energy projects in recognition that they can be cost-neutral and bring wider community benefits beyond emissions reductions.
- **All actors** should actively seek to collaborate with potential partners and network and share best practice with peers.

Community energy projects are complex and community groups, support providers, sustainable energy experts and delivery organisations, and local authorities can all play a key role in ensuring their successful delivery. The capability of these different actors to coordinate in different ways in different communities will be key to growing the community energy sector.

With their attention focused on managing budget cuts it is likely that many local authorities will have neither the capacity nor the motivation to lead energy projects, despite the huge impact they can potentially have in this area. The challenge for increasing the number of local authority-led energy projects is two-fold:

- Firstly, the case needs to be made that energy projects are a wise use of limited resources in the current political and economic climate. It is key to emphasise how these projects can be carried out for little or no cost (by using rolling investment mechanisms based around the FIT and rolling loans for energy efficiency). Arguments about the potential for these projects to create stronger communities with more financially sustainable facilities are likely to hold more traction than arguments about the need to reduce emissions alone.
- Secondly, the process by which an energy project is carried out needs to be simplified, and knowledge and best practice sharing between local authorities has an important role to play.

There are clearly limits to what individuals are able to achieve on a purely voluntary basis and different community groups will have greater and lesser propensities to take such collective action. Currently only the most highly motivated groups, with the right skills and expertise, are able to navigate their way through the numerous barriers to successfully delivering on their ambitions. Most community groups need significant support to deliver an energy project.

There is little difference between the community energy arena and other aspects of voluntary action, with the capacity of a community group being both a strength and a weakness in a variety of spheres.

One key area of concern in recent times has been the financial sustainability of much voluntary sector activity which is funded primarily through grants. With sources of grant funding badly affected by the recent recession and with the so-called 'funding cliff-edge' in March 2011 caused by public sector cuts, there has been a significant drive to encourage voluntary and community sector organisations to move to models of not-for-private-profit social enterprise.

There is a burgeoning social enterprise support sector, including a big focus on social enterprise support within Business Link. But for the majority of groups there are some significant challenges to generating profitable revenue streams and the kinds of agencies to which they might turn for support are not well placed to advise about social or community enterprise.

ippr north recently carried out research into social and community enterprise in the North West of England and generated a number of recommendations about how support could be improved, including better targeting and coordinating of support at the appropriate stage in a group's development (Cox and Schmuecker 2010).

Local authority and community groups will generally need very high levels of technical support to carry out an energy project. The highly individualised nature of community energy projects suggests that, as far as is feasible, individually tailored technical support should be provided. The demands associated with sourcing the appropriate technical information without individualised guidance is likely to deter many of the lesser motivated communities.

In this context, Community Energy Scotland's model, where the team works directly with a community group through all stages of an energy project from inception to delivery, seems highly appropriate. The support it provides covers both community development and technical aspects.

Linked to the support framework is the need to communicate the benefits of sustainable energy measures to community groups. As Green Streets has demonstrated, communities can be highly motivated to undertake energy projects for the financial benefits they can bring, in particular to community buildings, and not necessarily for reasons related to climate change. Community Energy Scotland places a strong focus on community buildings within its work, which again seems highly appropriate. The Energy Saving Trust encourages communities to undertake carbon footprinting and to map out a carbon reduction strategy. It is unlikely that these tools will appeal to many community groups.

Smart grids

- Government should work with Ofgem to ensure the timely roll-out of smart meters.
- Central government should consider indicating what levels of penetration of micro-renewable generation and heat pumps the grid will be expected to deal with by certain dates (for example 2020 and 2025).
- The costs of connecting users to the distribution network should be 'socialised' (that is, shared among all users).

In the longer term a community-level sustainable energy revolution on a major scale cannot happen without the development of a smarter electricity distribution network or grid.

The UK will inevitably have to reinforce its low-voltage grid to accommodate major take-up of generating technologies like solar PV, as well as new loads, like heat pumps. But investments to make the grid 'smarter' – enabling network companies to monitor the state of the grid, route power and control loads and generation remotely – should save us a considerable amount of money (Electricity Networks Strategy Group 2009, Imperial College/Energy Networks Association 2010).

The most important first step to a smarter grid is to ensure the timely roll-out of smart meters, and to ensure that the associated communications infrastructure allows electricity network companies to get timely and affordable access to the data they will need.

In the longer run, network companies will also need to be able to signal to households or organisations with heat pumps when demand on networks is rising to high levels, automatically turning them on and off to help smoothe the load. They might also want to be able to signal to owners of micro-renewables, especially in cases where energy can be stored

in batteries, to help meet local peaks. A number of domestic and community generators could be coordinated together to form a 'virtual power plant', helping to balance the electricity system as a whole, moving us in the direction of a decentralised electricity system for the 21st century.

Developing such systems requires new kinds of investments, which introduces an element of risk into what has historically been a low-risk business. Ofgem has recently recognised that the existing system regulating network companies has not provided the incentives to take these risks, and has proposed some changes (see Ofgem 2010).

However, the development of a smarter grid is a major *system* change, and will need leadership from the highest levels of government. Both Ofgem and the network companies are looking to government to set a clear course on smart grids. One of the most effective ways in which it could do this is to give an indication of what levels of penetration of micro-renewable generation and heat pumps the grid will be expected to deal with by certain dates (for example 2020 and 2025).

A final issue to be addressed is connection charging, which may be a serious barrier for some projects. Under current arrangements, if a micro-renewable project requires local reinforcement of the grid, the full cost will be borne by that project, even if others subsequently benefit. The Government is proposing that at larger scales the costs of connecting the high voltage transmission network are 'socialised' or shared among all users. The same principle should be applied to the distribution networks to enable the growth of community micro-renewables.

References

British Beer and Pub Association (n/d) Industry statistics, www.beerandpub.com/industryArticleList.aspx

Communities and Local Government (CLG) (2009) Housing and planning statistics 2009, www.communities.gov.uk/publications/corporate/statistics/housingplanningstatistics2009

Commission for Rural Communities (CRC) (2009) A range of reports into service accessibility following major life events available at http://ruralcommunities.gov.uk/category/our-work/impact2/majorlifeevents/

Cox E and Schmuecker K (2010) Growing the Big Society: Encouraging success in social and community enterprise in deprived communities, Newcastle upon Tyne: ippr north, www.ippr.org/ipprnorth/publicationsandreports/publication.asp?id=761

Centre for Sustainable Energy (CSE) (2010) Fair deal feed in tariffs, Bristol: CSE

Cox E and Schmuecker K (2010) Growing the Big Society: Encouraging success in social and community enterprise in deprived communities, Newcastle-upon-Tyne: ippr north, www.ippr.org/ipprnorth/publicationsandreports/publication.asp?id=761

Department for Energy and Climate Change (DECC) (2010a) FITs impact assessment accompanying Government response, www.decc.gov.uk/en/content/cms/consultations/elec_financial/elec_financial.aspx

DECC (2010b) Renewable heat Incentive: Consultation on the proposed RHI financial support scheme

DECC (2009a) Renewable Energy Strategy, www.decc.gov.uk/en/content/cms/what_we_do/uk_supply/energy_mix/renewable/res/res.aspx

DECC (2009b) Smarter Grids: the Opportunity

DECC/Office for National Statistics (2009) Energy Trends, www.bis.gov.uk/files/file50354.pdf

Electricity Networks Strategy Group (2009) A smart grid vision, www.ensg.gov.uk/assets/ensg_smart_grid_wg_smart_grid_vision_final_issue_1.pdf

Energy Saving Trust (EST) (n/d) Getting planning permission, www.energysavingtrust.org.uk/Generate-your-own-energy/Getting-planning-permission

Friends of the Earth (2010) 'In defence of feed-in tariffs: Friends of the Earth response to George Monbiot', FoE briefing, March, www.foe.co.uk/resource/briefings/monbiot_fits_response.pdf

Giddens A (2009) The Politics of Climate Change, Cambridge: Polity

Green Alliance (2010) Future proof: An electricity network for the 21st century, www.green-alliance.org.uk/uploadedFiles/Publications/reports/Future%20proof%20electricity%20network%20for%2021st%20century.pdf

Hale S (2008) The New Politics of Climate Change: Why we are failing and how we will succeed London: Green Alliance

HM Government (2010) The Coalition: Our programme for government, London: Cabinet Office

Imperial College/Energy Networks Association (2010) Benefits of Advanced Smart Metering for Demand Response based Control of Distribution Networks: Summary Report, www.energynetworks.org/ena_energyfutures/Smart_Metering_Benerfits_Summary_ENASEDGImperial_100409.pdf

Joseph Rowntree Foundation (1997) The Role of Community Buildings: Housing Research 218, York: JRF

Monbiot G (2010) 'Are we really going to let ourselves be duped into this solar panel rip-off?' The Guardian, 1 March

NESTA (2010) Galvanising Community-Led Responses to Climate Change, www.nesta.org.uk/publications/policy/assets/features/galvanising_community-led_responses_to_climate_change

Ofgem (2010) Regulating energy networks for the future: RPI-X@20 Recommendations, London: Ofgem, www.ofgem.gov.uk/Networks/rpix20/ConsultDocs/Documents1/RPI-X@Recommendations.pdf

Platt R and Retallack S (2009) Consumer Power: How the public thinks low carbon behaviours can be made mainstream London: ippr, www.ippr.org/publicationsandreports/publication.asp?id=698.

Postcomm (n/d) Research, www.psc.gov.uk/post-offices/research.html

Retallack S and Lawrence T with Lockwood M (2007) Positive Energy: Harnessing people power to prevent climate change, London: ippr, www.ippr.org/publicationsandreports/publication.asp?id=541

Scottish Government (2009) Scottish housing statistics 2009, www.scotland.gov.uk/Topics/Statistics/Browse/Housing-Regeneration/HSfS

Simpson A (2010) 'Not the great green rip-off, by George', The Guardian, 5 March

Sustainable Development Commission (2010) The Future is Local: Empowering communities to improve their neighbourhoods, www.sd-commission.org.uk/pages/the-future-is-local.html

Welsh Assembly Government (WAG) (2008) Welsh Housing Statistics 2008, http://wales.gov.uk/topics/statistics/publications/housing2008/?lang=en

Appendix 1: Criteria for selecting winners of the regional heats

(Text given to the judges)

In order to facilitate the process of deciding a winning project, judges might like to focus their discussions around the following five topics. In order to ensure that these topics can be debated fully, judges may like to use their opportunity to question the project teams to draw out the details required to answer these questions:

1) Goals: Which project do you think will perform the best against the Green Streets goals of:

– Saving energy

– Generating energy

– Engaging the community in energy and climate change issues

– Bringing wider benefits to the community

2) Change: Which project is likely to create the most positive, long-lasting and sustainable change within the community?

– Changes to behaviour in relation to energy use, generation and climate change

– Changes in levels of awareness of environmental issues

– Changes in the community cohesion/spirit in the area

3) Interest: Which of the project ideas or stories is the most innovative, emotive, exciting or unique?

– What is the scale of the ambition?

– Are the ideas fresh and new?

4) Learning: Which project provides the greatest learning opportunity?

– Supply chains learnings?

– Demand constraints?

– Barriers to wider uptake?

5) Risk: Is there any reason to believe that any of the projects will not be completed within the Green Streets project budget and timescales?

– How well thought through is the project?

– How realistic and deliverable is it?

Appendix 2: Discussion guide for the project leader interviews

Times	Introduction
0.00	My name is xxxx. I am from an independent research organisation. British Gas has asked us to undertake some independent research into the 'Green Streets' competition.
	We are going to be monitoring the amount of energy saved and generated by each project throughout the year, and this information will be fed back to you via British Gas.
	We are also going to be involved in evaluating the community engagement you undertake throughout the year.
	To be clear, though, this interview is not part of the evaluation and will not affect how well you do in the competition.
	We are speaking with people involved in each of the projects so that we can learn from your experiences and provide advice to other people who are trying to run similar projects.
	We are not experts on energy or on running community initiatives, so please do feel free to say anything that comes to mind.
	There are no right or wrong answers.
	I'd like your permission to record the interview. This is so that everything you say is captured correctly and kept safe, and will really help with writing up an accurate report. Everything you say is confidential. The recordings will only be accessible to the researchers working on the project and we won't use anybody's names when we write the report.
	The interview should take just over an hour.
	Do you have any questions before we start?
0.05	First it would be good to talk about the area that you live in.
	Can you describe for me the community you live in?
	Are there any distinctive demographics of people that live in the community?
	Prompts:
	Ethnicity
	Age
	Affluent/deprived/types of work
	Diverse/similar
	Can you describe what the 'community spirit' is like?
	Is there a strong sense of community?
	All projects in the Green Streets competition need to achieve three aims: generating energy, saving energy and engaging the community. It would be good to talk about each of these in turn.
0.10	Generating energy:
	Which micro-generation technologies are you planning to install and where?
	Why did you choose those technologies?
	Have you drawn on any support or advice in putting together your proposals to generate energy?

What level of support do you anticipate needing from British Gas during Green Streets to you generate energy?

Are there any particular challenges you see to your proposals to generate energy?

If so, how will you overcome these?

Saving energy:

Who will be involved in saving energy as a part of your project?

What energy efficiency measures will you be installing as part of your efforts to save energy?

Where will you install them? How will they decide who gets what?

Have you drawn on any support or advice in putting together your proposals to save energy?

What level of support do you anticipate needing from British Gas during the competition to help you generate energy?

How will you encourage people to save energy by changing their behaviour?

Why have you chosen this approach?

Are there any particular challenges you see to your proposals to generate energy?

If so, how will you overcome these?

How much energy will you save?

0.20 Community engagement:

You have been asked to produce a community engagement plan. Thanks for sending this in. It's good to have the document but also great to hear this in your own words, so to ask the questions that were in the guidance we sent you:

Who are you defining as the 'community' that you wish to engage through the community engagement plan?

Why have you chosen these people?

What outcome or outcomes do you hope to achieve through your community engagement?

Why have you decided to focus upon these outcomes?

What methods will you undertake to try and achieve these outcomes? (what kind of activities/actions)

Why have you decided to use these methods?

Are there any particular challenges you see to your proposals to engage the community?

If so, how will you overcome these?

0.30 Funding:

Were there any other funding sources apart from the Green Streets competition that you had in mind when you were developing your project proposal?

Have you secured this funding already?

The team:

It would be good to talk about the team of people you are working with on Green Streets.

Who is directly involved in the team you have working on the Green Streets project?

How many people are involved in the team?

Are there any organisations, such as established community groups, that form part of the team?

Have you done any work together prior to Green Streets?

How well connected is the group to the wider community?

Can you describe the different roles that individuals/organisations take within the group and how you work together?

Is there anyone who you would consider to be leading the team or would you describe it more as a committee?

How much time do you put into the running of the group?

0.40 <u>Their background:</u>

Can you describe any professional skills and expertise individuals or organisations within the team have which you will be drawing on for Green Streets?

Prompts: Relating to:

Energy

Community projects

Environmental projects

Have any of the team been involved in setting up community initiatives related to climate change and/or energy use before?

If so:

What was the aim of the project/s?

What were the main successes of the project?

What were the main challenges for the project?

How did you overcome them?

What did you learn from doing this project?

It would be good to ask you about some programmes the government is running and some other organisations who work in this area that are relevant to saving and generating energy. This is not a test. It's just to get an idea of if how widely they are known about and if they are being promoted effectively or not.

0.50 For each of the following please tell me if you have heard of them and what you know about them:

The Renewable Energy Feed-In Tariff

The Renewable Heat Incentive

The Low Carbon Buildings Programme

Warm Front

Warm Zones

Certified Emissions Reduction Target (or 'CERT')

The Energy Saving Trust

The Renewables Obligation

Community Energy Savings Programme (or 'CESP')

Smart meter roll out to all homes by 2020

Act on CO2 campaign

0.55 Now some final questions thinking about the project overall:

Why did you decide to enter Green Streets?

What is your main motivation for being involved in the competition?

Do you have any plans for your project to continue beyond the end of Green Streets?

1.00 **Closing**

Thank you very much for taking part.

Do you have any more questions?

Here are my contact details if you want to get in touch.

There will be another round of interviews towards the end of the year which we will conduct over the phone.

Best of luck with the competition.

Appendix 3: Discussion guide for the interviews with British Gas project managers

This discussion guide will form the basis of the interviews. We will go through these questions for each of the projects that you manage. This will take about half an hour for each project. The aim of the interviews is to get factual information about what has been happening in the communities. In particular, it would be great if you are able to think of examples of things that have happened on the ground to illustrate your responses to the questions.

Before the interview please try and concisely answer all of the questions written in black on this form. Please also consider your answers to the questions written in red but do not fill these in. Your response to these will be discussed during the interview. Thank you!

NB. Project team refers to the key team of people (or individual) within the community who are driving the Green Streets work forward.

UNDERSTANDING THE PROJECT TEAM:

Who is involved in the project team? *For example individuals, community organisations, the local council, other organisations*

How is the project team organised? *For example core group of people working on the project with links to a wider volunteer network*

What is the balance between the work done by the project team on a voluntary/paid basis?

Do the project team bring any particular expertise/skills to the project?

What type and level of support do they require from British Gas? *For example on technologies and installation/project management/community engagement?*

How motivated are the project team?

UNDERSTANDING THE PROJECT:

Does the project have any links to other major low carbon initiatives, and, if so, what does this/these other initiative/s involve? *For example Low Carbon Communities Challenge, Low Carbon Zones, CESP, Transition Towns, other community-based initiative*

Is there a clear distinction between what is occurring between this/these other initiative/s and the Green Streets project?

What are the implications of having this/these other initiative/s for Green Streets?

Are the project team drawing on any other sources of funding? *For example from local residents or businesses, other grants*

Are they planning to use the proceeds from the FIT? Please give details

Does the project team have any aspirations for turning their initiative or part of it into a social enterprise/community interest company or other similar enterprise? If so, please briefly outline the nature of the enterprise.

How far are they progressed?

What are their plans for making the enterprise financially sustainable?

TECHNOLOGY AND INSTALLATIONS:

Which microgeneration technologies and energy efficiency measures did they originally plan to have installed on which community buildings?

Which microgeneration technologies and energy efficiency measures are they now planning to have installed (or have already installed) on which community buildings?

What barriers have you encountered around the installation of measures in the community buildings and how have these been overcome? *For example the wrong type of technology; practical barriers; planning barriers; barriers around the perceptions of the local community? Something to do with the owners of the community building?*

What microgeneration technologies and energy efficiency measures did they originally plan to have installed on the residential buildings?

What have been the experiences of carrying out the energy assessments with this community? For example, any challenges in recruiting people to take part?

Do any of the participants involved in the project use unusual fuel types, such as wood or fuel?

Have you encountered any unique issues when working with these participants on the project? *For example residents being unaware of the amount of these fuel types they use; the fuel type affecting the scope of what can be done in their property*

RELATIONSHIPS:

What methods have they used for engaging the community so far?

How did they select the residential properties to take in the project?

What is the relationship between the project team and the wider community like?

Have their methods for engaging the community affected this, and if so in what way?

What is the relationship between yourself/British Gas and the project team like?

Does this have implications for running the project? If so, please explain.

ANYTHING ELSE:

Is there anything about the project which we have not covered which you think is important?

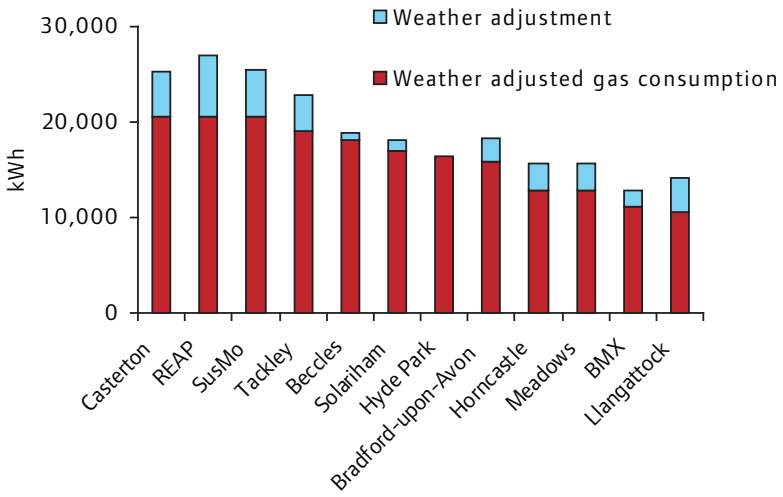
Appendix 4. Variables on gas usage

The following graphs examine the effect of different variables on the gas usage of participating householders.

Overall there is a fairly wide variation in gas usage, and this remains even when climatic differences are adjusted for.

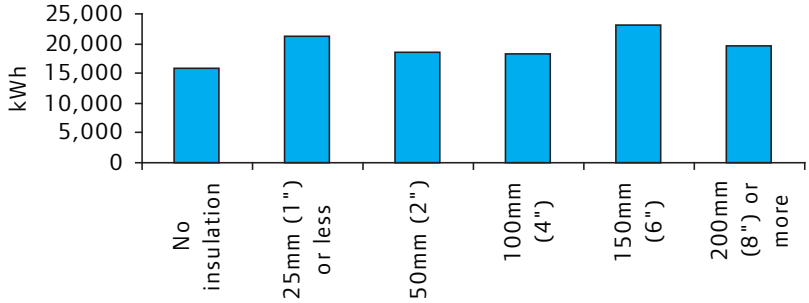
Figure A4.1. Average gas consumption by project before and after weather adjustment

Note: The South East region is the baseline weather reference group



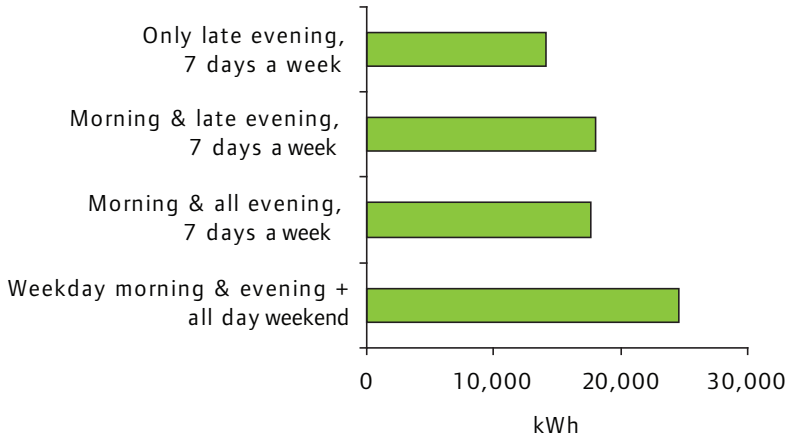
We found no correlation between the households' levels of loft insulation and levels of gas usage, suggesting that other variables must be having an important influence on energy usage.

Figure A4.2. Average gas consumption by loft insulation thickness



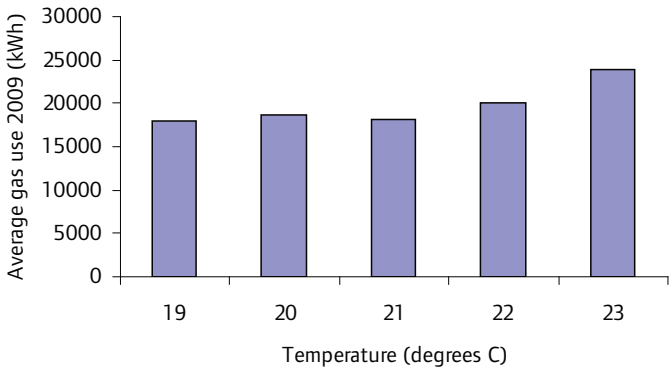
There is a correlation between the time at which heating is turned on and the overall level of gas usage. The time at which the heating is turned on is likely to be a result of demographic factors affecting what time of day people use the property – for example if the householders are retired they may be at home during the day and use the heating then, whereas this may not be the case for people in full-time employment.

Figure A4.3. Average gas consumption by heating behaviour



There is also a strong correlation between households having their thermostat set on a high setting and having higher levels of gas consumption.

Figure A4.4. Gas consumption by thermostat temperature setting



Appendix 5. Capacity for micro-renewables on schools

Model approach and assumptions:

- We are assuming that the majority of schools or outbuildings will have at least one area of roof that is oriented south east, south or south west
- For the purpose of FiT calculations, we will assume that all PV installations fall into the second scale banding (probably a conservative estimate)
- We assume that the experience of the schools in Green Streets can be broadly applied to the national population.

Number of schools in Green Streets	a	7	schools	
Average scale of PV installation	b	4	kWp	
Total number of schools in England	d	25,018	schools	Source: DCSF 2007 figures
Total number of schools in Scotland figures 2002	e	2840	schools	Source: Scotland.gov.uk – schools
Total number of schools in Wales	f	1955	schools	Source: Wales.gov.uk – cabinet statement 2006
Total number of GB schools		29,813	schools	calc: sum(d,e,f)
Total PV opportunity in GB schools		119,252	kWp	Note: assumes green streets schools are representative of all schools
Assumed annual solar PV load factor	g	850	kWh/ kWp/y	Source: Element Energy in UK Assumptions (DECC Consultation doc – July 09)
Estimated electricity output of school solar PV population	h	101,364,200	kWh/y	Calc: f*g
Carbon intensity of electriciy grid	i	0.543	kgCO2/ kWh	Source: Energy Saving Trust – Energy Assumptions Q12009
Estimated carbon savings from school solar PV population	j	55,041	t/y	Calc: i*h
% of energy used on site	k	60%		Source: standard industry assumption
Volume of energy used on site	l	60,818,520	kWh/y	calc: k*h
Average cost of electricity	m	10	p/kWh	Source: BGB estimate
Total money saved on electricity bills	n	6,081,852	£/y	calc: l*m
Value of exported electricity	o	0.03	£/kWh	Source: DECC decision on Clean Energy Cashback
Total money earnt via exported electricity	p	1,216,370	£/y	calc: (1-k)*h*o
Clean energy cashback (FiT) payment	q	36.1	p/kWh	Source: FIT – Government Decision Feb 2010 – DECC
Total clean energy cashback payments across school solar PV population	r	36,592,476	£/year	Calc: q*h
Total value to schools in GB	s	43,890,699	£/year	Calc: r+p+n

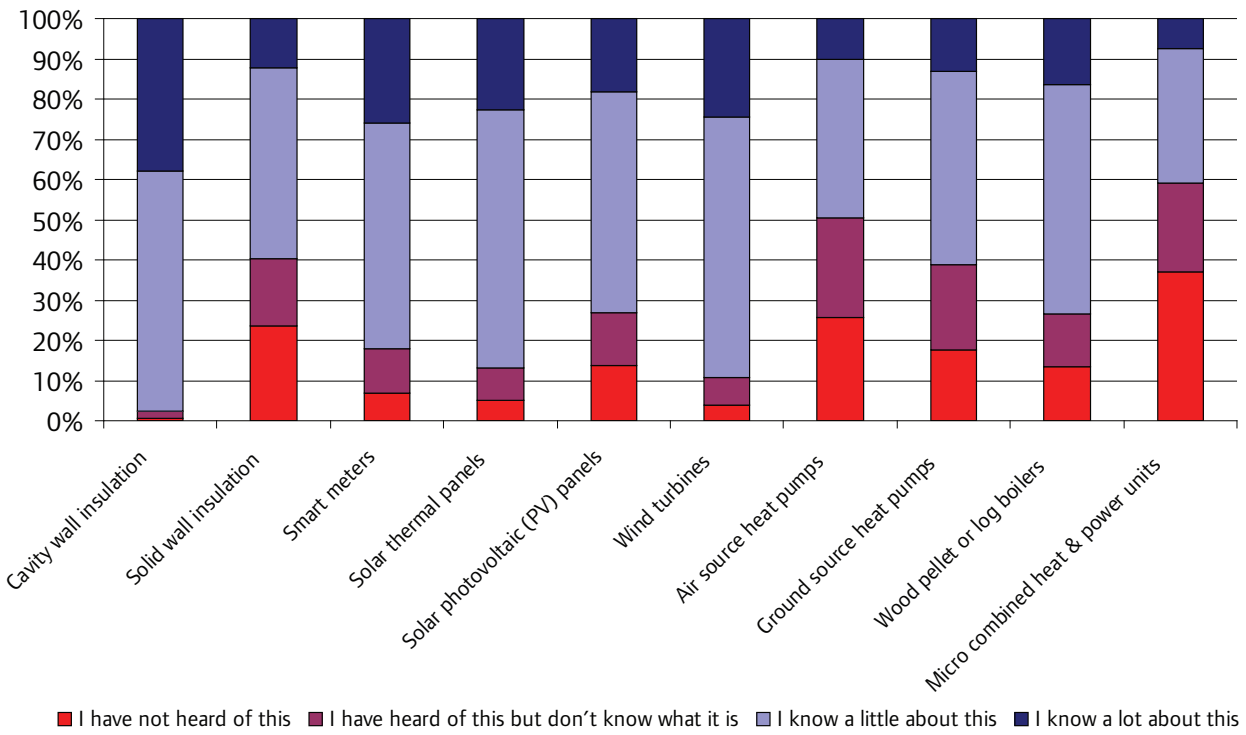
Appendix 6. Capacity for micro-renewables on churches

Model approach and assumptions:

- Determine the ratio of kWp of PV to be installed to membership of congregation in the Christian churches as part of the Green Streets project
- Make use of these statistics to calculate a potential market size across all Church of England buildings
- We are assuming that the size of the congregation can be used as a proxy to the size of the church, and therefore the size of the roof-tops
- We are assuming that the majority of churches or outbuildings will have at least one area of roof that is oriented south east, south or south west (not unreasonable due to propensity for alter to face east)
- For the purpose of FiT calculations, we will assume that all PV installations fall into the second scale banding (probably a conservative estimate)
- We assume that the experience of the churches in Green Streets can be broadly applied to the national population.

Total congregation size of Green Streets churches	a	160	people	Source: Horncastle Methodists
Total size of planned PV installations as part of Green Streets	b	10	kWp	Source: Results from technical surveys from Solar Technologies
Average opportunity for PV installations per member of congregation	c	0.06	kWp/ person	Calc: b / a
Total number of Church of England churches in UK	d	16,247	churches	Source: Church Census 2005
Average congregation size of Church of England churches in UK	e	54	people	Source: Church Census 2005
Estimated solar PV opportunity across all Church of England churches in UK	f	54,834	kWp	Calc: e*d*c
Assumed annual solar PV load factor in UK	g	850	kWh/ kWp/y	Source: Element Energy Assumptions (DECC Consultation doc – July 2009)
Estimated electricity output of Church of England solar PV population	h	46,608,581	kWh/	Calc: f*g
Carbon intensity of electricity grid	i	0.543	$kgCO_2$/ kWh	Source: Energy Saving Trust – Energy Assumptions Q1 2009
Estimated carbon savings from Church of England solar PV population	j	25,308	tonnes	Calc: i*h
% of energy used on site	k	60%		Source: standard industry assumption
Volume of energy used on site	l	27,965,149	kWh/y	calc: k*h
Average cost of electricity	m	10	p/kWh	Source: BGB estimate
Total money saved on electricity bills	n	2,796,515	£/year	calc: l*m
Value of exported electricity	o	0.03	£/kWh	Source: DECC decision on Clean Energy Cashback
Total money earned via exported electricity	p	559,303	£/year	calc: (1-k)*h*o
Clean energy cashback (FiT) payment	q	36.1	p/kWh	Source: FIT – Government Decision Feb 2010 – DECC
Total clean energy cashback payments across Church of England solar PV population	r	16,825,698	£/year	Calc: q*h
Total value to Church of England	s	20,181,516	£/year	Calc: r+p+n

Appendix 7. Participating householders' awareness of different sustainable energy measures



Note: results based on 161 responses, which is approximately one quarter of all participating householders