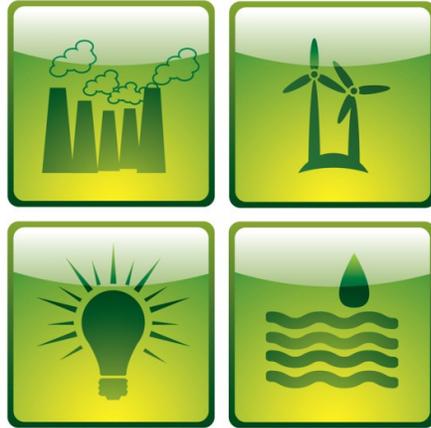




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E-Futures

Mini-Project Summary Report

Photovoltaics and Community Dynamics around Energy and Sustainability

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18 March 2012

Introduction

This report will argue that the barriers to community involvement in decentralised energy production are far greater than incentives to participate. Community decentralised energy projects, where electricity is produced and used locally, have been seen as a catalyst for behavioural change, increased consumer awareness of the environmental impacts of energy-consumption and greater acceptance and dissemination of renewable energy technologies [1]. However, substantial obstacles to community involvement in energy production have been identified. The UK has no culture of local energy production, with the public being accustomed to consuming electricity rather than being generators of power [2]. Furthermore the current energy and planning systems are complex and communities often lack the expertise and support required to plan, manage and sustain energy generation [3]. Financial incentives for Photovoltaic (PV) technologies have been substantially reduced and restrictions on the eligibility of community buildings to qualify for the Feed-in-Tariff (FiT) for generating solar energy have been introduced. These barriers to local low-carbon energy production are of importance because there are serious concerns about energy security. This is particularly the case in urban areas which consume a disproportionately high proportion of electricity, but which are generally unable to meet their own energy requirements, making them dependent on fossil fuels from geo-politically unstable areas [4]. This report set out to research public beliefs about and support for generating energy locally and to further understanding of local management, ownership and profit sharing models for energy generation being developed among UK communities [2, 5]. Drivers and barriers to community involvement were explored through a case study, documentary analysis, focus group and interviews. An overview of the study context and methodology is provided, followed by the main findings, conclusions and recommendations.

Study Context

PV has been seen as an important source of decentralised power because it is effective in urban environments and can be installed on domestic, commercial and community buildings. The UK government hopes that in addition to supplying low-carbon energy directly to the consumer, the highly visible technology will trigger behavioural change, resulting in reduced consumer-demand [2]. In our current centralised energy supply system, electricity travels long distances through often concealed power cables from fossil fuel fired power stations—distancing the consumer both spatially and psychologically from the environmental impacts of their energy use [6]. PV re-establishes this connection, transforming energy-consumers into generators of power. PV adoption can be seen as a statement of recognition by a household of the environmental impacts of its energy consumption and as a symbol of pro-environmental values. However, achieving long-term behavioural change at a household level has proved challenging due to effects such as rebound, leading the UK government to promote collective community-scale action.

The UK government anticipates that community scale energy generation will allow for the exchange of knowledge and skills; increasing personal accountability and changing social norms around acceptable energy use [7, 8]. This is important because the domestic sector accounts for 30.5% of final energy consumption, which is just below the 35.0% used by transport and far in excess of the 17.3% consumed by industry [9]. Existing institutions such as churches with established social networks and organisational structures have been seen as good candidates for facilitating decentralised energy at a community scale. Churches can build on shared values such as creation-care and social justice to involve congregation members, and as part of a wider institution they can also achieve a cumulative impact [10]. There are, for example, 16,200 UK Anglican churches, around 300 of which have already installed PV [11]. However, 45% of all Grade I listed buildings are Anglican churches, meaning that these communities face the challenge of reconciling the needs of contemporary congregations wanting to adapt to and mitigate against climate change, while preserving the historic and cultural fabric of their buildings [12]. For these reasons, this small-scale research project focused on an Anglican urban-faith community in Sheffield which successfully implemented a community-led PV project in a listed building. “Church X” is located in Sheffield, the third largest metropolitan authority after Birmingham and Leeds, with a population of 555,000 [13]. Sheffield, like many urban areas is largely energy dependent, having imported 99% of its energy requirements in 2000 [4].

To summarise, the research objectives were as follows:

1. To understand the drivers and barriers for urban faith-community solar energy projects.
2. To further understanding of public beliefs and support for community energy projects.
3. To research aspects of local management, ownership and profit-sharing associated with a community PV power project.

Methodology

The primary research was qualitative involving an in-depth case study, a focus group and two semi-structured interviews. Participants for the focus group were recruited on the basis of their involvement with the PV initiative. The project initiators and leaders as well as members of the community who had given time and money to support the project were represented. The focus group took place at “Church X” during March 2012 and lasted approximately 90 minutes. Based on referrals two semi-structured interviews were conducted [14]. The first interviewee was a representative of A Rocha, a Christian environmental charity [15]. This interview gave an insight into the issues faced by churches in hosting decentralised energy projects both in the Sheffield Diocese and nationally. The second interviewee was “Gareth” who volunteers on an informal basis, advising faith communities on renewable technologies. The focus group and interviews were digitally recorded and transcribed. The main findings from the primary research were manually drawn from the transcripts through thematic analysis [16, 17]. Themes were revised

and aggregated before inclusion in a coding manual. Documentary analysis was also undertaken, using the project files from the PV installation. All names of individuals in this report have been changed in respect of participant confidentiality.

Case Study: “Church X”, Sheffield, UK

- Grade II listed
- Conservation area
- Anglican church
- Geographically dispersed community
- Significant proportion of retired and professional members
- 10 Kw PV array
- Cost of PV: £39, 185 raised by donations from congregation

Motivations for Supporting a Community PV Project

While participants at “Church X” were primarily motivated to support PV by a desire to offset their own carbon emissions and those of the church building; the A Rocha representative argued that the majority of churches were primarily driven by financial incentives.

1. Ethical Incentives

Findings supported a study by Hoffman and High-Pippert [10] who found that church communities supported environmental action because of shared values and beliefs, particularly in acting as responsible stewards of the environment and promoting social justice:

“I mean in our faith tradition ... this idea of being responsible stewards of the planet and its resources is a strong thing...” (Jonathan, staff).

Participants also saw active support of the community PV scheme as a way of demonstrating their personal responsibility for the environmental impacts associated with their lifestyles and energy-use [18]. This was expressed in terms of feelings of guilt, with donations to the PV scheme being viewed as a way of compensating for, or to some extent offsetting, their lifestyles:

“[A] number of us have lifestyles which necessitate profligacy with scarce resources [...]. I am a bad person ... trying to be a moderately better person ... in one tiny respect and I leapt at it!” (Vivian, donor).

The community PV project had strong leadership and support because it was seen as an important aspect of the church’s work. As well as involving those who wanted to share good practises in energy saving and experiences of installing PV at home; working as a community also facilitated involvement of individuals who supported solar energy but were unable to install it themselves.

2. Financial Incentives: Feed-in-Tariff (FiT)

A Rocha representative “Timothy Holmes” gave an insight into the challenges faced by the Diocese of Sheffield. With dwindling congregations, aging buildings in need of maintenance and with the challenge of supporting deprived communities, Timothy observed that environmental

concerns were not high on the agenda of many communities:

... [I]f you are faced with feeding the kids ... you aren’t too worried about whether the church has solar panels on the roof ...

... Yes, personally, ... anecdotally I would say that churches come in two halves ... there are the ones driven by theological considerations and the ones driven by financial considerations ... [...]typically ... 80% with bills and 20% are really concerned about impact on the world’s poor (Timothy, A Rocha).

Timothy argued that this had made the FiT payments for generating low-carbon energy a strong incentive for considering PV adoption, leading the Diocese of Sheffield to recommend that churches in the area look into the viability of hosting community PV initiatives. The former FiT rate offered resource strained communities the opportunity for a government guaranteed investment which would provide generous repayments (in addition to energy savings) over 25 years. Unfortunately, however, it was observed that communities experiencing the greatest financial difficulties would also have the most serious issues in raising the money required to buy and install PV. The financial incentive has now been significantly reduced as a result of the government’s FiTs review leading Gareth, voluntary church advisor on renewable energy, to argue that many communities no longer saw PV as a viable investment [19].

Expectations of Involvement in a Community PV Project

Community involvement in the PV project at “Church X” was shaped by the chosen model of management and profit sharing. The model was designed to benefit the church community as a whole through reduced running costs as well being environmentally beneficial through reduced CO₂. One participant summarised the priorities of the community by saying:

“I am really pleased the church’s electricity bill will go down and that it will get income but I am hugely committed to the idea of carbon reduction” (Susan, donor).

“Church X” had a central core of individuals who were responsible for managing the scheme. The wider community were involved through fund raising¹, offering skills and expertise and through having an input in the decision making process. One member of “Church X” described how members of the community participated in whatever way they could, according to their availability and resources:

[W]e are a strongly professional ... and ... where people work hard and haven’t got a lot of time but are able to contribute financially to things [...] we do that (Aiden, volunteer).

The A Rocha representative claimed that donations and loans from communicants are traditionally used to raise funds in Anglican communities. However, the former high FiT rate encouraged innovation, with funding models based on private sector methods being employed. In one church PV scheme he described, participants from the faith

¹ Members of the congregation voted to give unconditional donations, that is, without expectation of repayment to fund the PV scheme.

community and local area invested money in PV in return for a share of the FiT profit. It may be supposed that participants buying shares to profit from community PV expect to participate in a different way to those working to build and benefit their faith community.

Community Experiences of Planning Procedures

The planning procedure was described by “Church X” as a major barrier to faith community involvement with decentralised energy generation. Churches typically have large south facing with roofs making them ideal for PV installations. However, study participants believed that there was a conflict between the visibility of PV, which they felt was an important symbol of the churches’ commitment to addressing climate change, and the fact that many buildings are listed. The A Rocha representative encapsulated these sentiments by saying:

“[B]asically the general planning view is that on a listed building ... solar panels should not be visible [...]. I understand that people are concerned with what churches look like but [...] this is not a life changing institution if we pickle our buildings” (Timothy, A Rocha).

Participants argued that the planning procedure was not only costly in terms of money and time but also emotionally:

Smooth it was not! We had our emotional ups and downs but certainly when the local authority planning people originally said they were not minded to proceed with it that was the lowest point I think [...]. So it was a rollercoaster really (Alexander, champion).

“Church X” eventually gained permission and installed a 10 Kw PV array, despite its status as a listed building in a conservation area. However, participants expressed reluctance to be involved with similar schemes because they had found the process stressful and resource intensive:

[[I]t’s going to be very hard put to find people that have done it once that would be happy to do it again for fun and for principle because it was plainly so exhausting and so demanding ... (Vivian, donor).

This has serious implications for the dissemination of PV and for the sharing of knowledge and skills required for increasing the number of community-led initiatives.

Effects of Community PV Projects

Focus group participants felt that it was too soon to assess the possible influences of PV technology on the church community in terms of, for example, raised awareness about energy issues or increased uptake of the technology. They argued that while PV on the church roof was important as a statement of community values, an internal display and information board would be essential in educating and in maintaining awareness. “Church X” is used by a wide range of other community groups and individuals meaning that the internal information board and display could be important in sharing information about the benefits of PV with the wider community.

“Church X”: Factors Contributing to a Successful Project

A number of factors contributed to the successful PV installation including the PV project leaders who were well established and influential members of the community. One participant observed that the “*key thing was that they were people we trusted*” (Vivian, donor). Gareth, voluntary church advisor repeatedly returned to the subject of “*community champions*”. He argued that leaders including Henry at “Church X” were essential in involving and recruiting members of the community:

I think one of the reasons why “Church Y” has not gone ahead and “Church X” did... is that we don’t have any one with the passion that Henry had about climate change [...]. I don’t have the same [...] position within “Church Y” to push it through ... and so I think the main reason it hasn’t gone through there is that there is no Henry and the generic term I would use is “champion” (Gareth, volunteer advisor).

Gareth and Timothy emphasised that the communities with the greatest success in managing and completing decentralised energy projects had a strong sense of community and shared pro-environmental values. Gareth spoke with reference to Church Y; a community capable of hosting decentralised energy, with ample income and skilled members but which believed that environmental action was not a priority for their Christian mission. The A Rocha representative observed that the theology of some congregations impeded change: “*I’m paraphrasing but you probably get the reaction that Christians are about saving souls not seals ...*” In contrast the members of “Church X” not only had the necessary skills and resources but they were driven by powerful shared values. They were aware of the social and environmental consequences of climate change and had integrated the environmental agenda into the pattern of church life: “*we had been softened up by the parish magazine and discussions in the Lent group*” (Vivian, donor).

The timing of the project at “Church X” was also influential in its completion. The members of the core team leading the project had been proactive sending their planning proposals to local community groups as well as official bodies such as English Heritage to minimise opposition and prevent costly delays in the planning process:

[W]e took the trouble to send the full application through them so that they knew in advance what was going on [...] they didn’t have to be reactive to our planning application (Alexander, champion).

“Church X” was also fortunate in being able to raise the required funds in time to install PV before major changes to the FiT were introduced. The government’s review of the FiT not only dramatically reduced the payments but also imposed the requirement for community buildings to achieve an Energy Performance Certificate at Level D in order to qualify for payments (see below).

Future Prospects for Church Community PV Projects

The introduction of Energy Performance Certificates (EPC) regulations now required for FiT applications was the most significant barrier to churches adopting PV identified by this study. From April 2012 all heated and cooled buildings including those used for domestic, commercial and community purposes have to have an EPC at level “D” to

qualify for the FiT [20]. EPCs are designed to insure that basic efficiency measures are taken before renewable energy installations are fitted and financial incentives claimed. However, buildings like churches will find it difficult to attain a level “D” because of large single glazed leaded windows, solid walls and high ceilings. In addition, many churches are unable to make significant changes to their buildings to increase efficiency because they are listed. In order to gain a “D” rating, churches can install PV and then take the EPC assessment [20]. Nonetheless, this would mean that communities would risk making a significant financial outlay without guarantee of qualifying for the FiT.

EPCs are based on predicted energy use from an assessment of the building’s fabric and heating system [21]. In cases where buildings are predicted to be inefficient but actually use relatively little energy — perhaps only being heated once a week for Sunday worship, the EPC is a very crude mechanism for estimating energy use. In these cases rather than stimulating efficient behaviour EPCs may pose a barrier to the only feasible way of improving the environmental performance of the building—that is, to generate low-carbon energy. The combination of EPCs and the dramatic fall in the actual FiT rates will be a serious blow to communities considering PV installations.

Conclusions and Recommendations

This small scale study supports wider research, finding that church communities can be motivated to adopt PV because of shared values and a Christian stewardship ethic. However, interviews gave insight into the often severe financial issues facing church communities, particularly in deprived urban communities. This made the previous high FiT rate a strong incentive for community PV. The success of PV at “Church X” was largely dependent on the sense of community cohesion, strong leadership, shared values and resources. “Church X” saw climate change as part of the Christian mission, with members being motivated to support the project in recognition of the impact of their own lifestyles. The model for management and funding the initiative was influenced both by the motivations of participants and their expectations of involvement.

Finally, this study supports the findings of Walker [7] who stated that the conditions for community *“potential to be realised have not been in place and barriers have been stronger than incentives”*. Recent reforms to the FiT rates and the introduction of EPCs present a serious blow to community energy projects, not only dramatically reducing financial incentives but also making many communities unable to support PV installations because they are unable to attain a the required EPC rating. The expectation for historic and listed buildings to reach a theoretical efficiency on par with domestic dwellings is unrealistic [12]. This report supports the recommendations of Watkinson [12] who called for the introduction of a community FiT rate in recognition of the contribution of voluntary, community and faith groups to society and for EPCs to be reformed in order to take into consideration actual energy consumption.

References

1. Walker, G., *The role of 'community' in carbon governance* WIREs Climate Change, 2011. **2**(5): p. 777-782.
2. Rogers, J.C., et al., *Public perceptions for community-based renewable energy projects*. Energy Policy, 2008. **36**(11): p. 4217-4226.
3. Sheffield City Council, *Sheffield – The Decentralised Energy City: Enabling Low Carbon Growth in the 21st Century*, SCC, Editor 2005, SCC: Sheffield. p. 1-19.
4. Kellett, J., *Community-based energy policy: A practical approach to carbon reduction*. Journal of Environmental Planning and Management, 2007. **50**(3): p. 381-396.
5. Devine-Wright, P., *Local aspects of UK renewable energy development: exploring public beliefs and policy implications*. Local Environment: The International Journal of Justice and Sustainability, 2006. **10**(1): p. 57-69.
6. Darby, S., *Making it obvious: designing feedback into energy consumption*, in *Proceedings of the 2nd International Conference on Energy Efficiency in Household Appliances and Lighting*. 2000: Italian Association of Energy Economists / EC-SAVE programme.
7. Walker, G., *What are the barriers and incentives for community-owned means of energy production and use?* Energy Policy, 2008. **36**(12): p. 4401-4405.
8. Walker, G., et al., *Harnessing Community Energies: Explaining and Evaluating Community-Based Localism in Renewable Energy Policy in the UK* Global Environmental Politics, 2007. **7**(2): p. 64-82.
9. Department of Energy and Climate Change, *Statistical Release: UK Climate Change Sustainable Development Indicator. 2010 Greenhouse Gas Emissions, Provisional Figures and 2009 Greenhouse Gas Emissions, Final Figures by Fuel Type and End-User*, 2011: http://www.decc.gov.uk/assets/decc/Statistics/climate_change/1515-statrelease-ghg-emissions-31032011.pdf.
10. Hoffman, S. and A. High-Pippert, *From private lives to collective action: Recruitment and participation incentives for a community energy program*. Energy Policy, 2010. **38**(12): p. 7567-7574.
11. The Church of England, *Church and Earth 2009-2016: The Church of England's Seven Year Plan on Climate Change and the Environment 2009*: <http://www.arcworld.org/downloads/Christian-CofE-7YP.pdf>.
12. Watkinson, R., *Comprehensive Review Phase 1: Consultation on Feed-in Tariffs for Solar PV*, 2012, Church of England - Shrinking the Footprint: London. p. 1-7.
13. Sheffield City Council, *A Demographic Profile of Sheffield*, 2003.
14. Krueger, R. and M. Casey, *Focus Groups: A Practical Guide for Applied Research*. 4 ed2009, California: Sage Oaks.
15. A Rocha and Eco-congregation. *What is eco-congregation?* 2012 01.05.2012]; Available from: <http://ew.ecocongregation.org/about>.
16. Allen, J., W. Sheate, and R. Diaz-Chavez, *Community-based renewable energy in the Lake District National Park - local drivers, enablers, barriers and solutions*. Local Environment: The International Journal of Justice and Sustainability 2012. **17**(3): p. 261-280.
17. Spartz, J. and B. Shaw, *Place meanings surrounding an urban natural area: A qualitative study*. Journal of environmental Psychology, 2011. **31**(4): p. 344-352.
18. Keirstead, J., *Photovoltaics in the UK domestic sector: a double-dividend? ECEE Summer Study – what works and who delivers?*, 2005, eceee: Mandelieu La Napoule, France.
19. Parliament.UK. *Urgent question on feed-in tariffs*. 2012 09.05.2012].
20. Solar Media Limited. *Solar PV will count towards meeting EPC requirement*. 2012 07.05.2012]; Available from: http://www.solarpowerportal.co.uk/news/solar_pv_will_count_towards_meeting_epc_requirement_2356.
21. British Property Federation. *What we do: Existing Buildings - The toughest challenge has already been built*. 2012 07.05.2012]; Available from: http://www.bpf.org.uk/en/what_we_do/sustainability/existing_buildings.php.

