

COMMUNITY ENERGY FROM POLICY TO PRACTICE

Mary GILLIE
EA Technology – UK
mary.gillie@eatechnology.com

Roy ALEXANDER
University of Chester – UK
r.alexander@chester.ac.uk

David ROBERTS
EA Technology – UK
david.roberts@eatechnology.com

ABSTRACT

This paper draws on the practical experience of Ashton Hayes, an enthusiastic engaged community that has run a “Going Carbon Neutral” project since 2006. Awareness raising and behavioural change resulted in a 20% reduction in average household carbon emissions by 2007.

Such an engaged community, keen to ‘do its bit’ to reduce carbon emissions further represents an ideal test-bed for innovative approaches to community energy supply and management. It was used as a case study for an investigation into a community microgrids providing valuable learning. Further lessons have been learnt in the past year as the village has attempted to implement a demonstration project. Even with such enthusiasm, the experience has revealed a number of significant regulatory and policy barriers that need to be overcome and these are likely to be even more demoralising to a less organised community.

Development of domestic and community level generation in the UK is still a new phenomenon and the associated policy and regulations are evolving at a slower pace than public demand. Government initiatives in the UK have laudable aims but have served to highlight the disparities between the incentives necessary for wide uptake and the current regulatory and policy systems. There is a mismatch between required stimulus and what is currently deliverable under the balancing and settlement code, and UK and EU regulations, particularly those pertaining to State Aid.

There are significant opportunities for distribution system operators to develop their networks in a co-ordinated fashion and to benefit from measures such as demand side management. However, whilst there is good will and enthusiasm from those on the ground, the regulatory framework for the electricity industry has not evolved fast enough and is holding back collaborative initiatives between different stakeholders.

This paper examines the current state of community energy through an analysis of the organisational, structural, and legal and support requirements for successful delivery and the regulatory and policy barriers that currently stand in their way. We draw on examples of projects in Cheshire to illustrate the key issues and highlight the potential dangers inherent in partial approaches to their resolution.

INTRODUCTION

Ashton Hayes, an enthusiastic engaged community in rural Cheshire, UK, has run a “Going Carbon Neutral” project since 2006. [1] Awareness raising and behavioural change resulted in a 20% reduction in average household carbon emissions by 2007. Annual monitoring indicates that this level of reduction has been maintained since 2007 but has barely improved thus suggesting a limit to what can be achieved through behavioural change alone. [2]



Using such an engaged community, keen to ‘do its bit’ to reduce carbon emissions as a case study EA Technology and the University of Chester carried out a feasibility study between 2008-2009 into a community microgrid for the village as it represents an ideal test-bed for innovative approaches to community energy supply and management.

The study provided valuable learning in terms of opportunities and barriers to such a development. [3]

Further lessons have been learnt in the past year as the village has attempted to implement a demonstration project

using innovative technology and through working closely with the local distribution network operator (DNO), often referred to as distribution system operator (DSO) outside the UK. The generators, electric vehicle (EV), EV chargers, co-ordination and installation are funded under the Department of Energy and Climate Change's (DECC) Low Carbon Communities Challenge (LCCC) [4] and was chosen under a competitive bid process. Around 240 communities entered demonstrating the enthusiasm for such projects. Unfortunately there was only funding for a handful. Even with such enthusiasm, the experience has shown that there are a number of significant regulatory and policy barriers to overcome and these are likely to be even more demoralising to a less organised community.

After various changes detailed below, the mix of generation planned in the first stage of the project is 15kW of photovoltaics (PV) installed at the local primary school and a 33kW wood chip gasifier and combined heat and power (CHP) plant located at the village hall. In addition, the village is purchasing a community electric vehicle (EV) with the EV charger at the village hall.

COMMUNITY ENERGY BENEFITS

Community energy offers an efficient means to install small scale renewable energy. A co-ordinated approach can reduce installation costs compared to individual installations. For example a 15kW system costs around 20-30% less than 3, 5 kW systems and around 40-50% less than 15, 1 kW systems. Larger capacities can be justified for community buildings or to serve more than one home. The larger capacity often results in more efficient technologies or products being available. For example, the smallest wood chip gasifiers are around 10-15kW with the majority rated at above 100kW. A community approach can also engage and benefit more people including those who may not have the ability or financial capital to install generation on an individual basis. This approach raises awareness among a greater proportion of community and across age ranges. In Ashton Hayes the proposal to install generation at the Village Hall and the school has allowed the project to reach a wide range of people and ages. Such venues have also been used to hold meetings to attract and inform different members of the village.

REGULATORY UNCERTAINTY AND TECHNICAL CHANGES

In Ashton Hayes the initial planned mix of generation was changed due to economic and regulatory uncertainty. Due to the confusion over whether the Feed-in Tariffs are State-Aid and therefore ineligible with the LCCC funding, the original planned use of biodiesel became unviable. This was exacerbated due to a decision to delay installation of a wind turbine following antagonism within

neighbouring communities who had objected to what they felt was the imposition of a separate private wind development. The delay in the wind turbine removed a significant income stream. Despite central government expressing a wish to support community energy schemes there appeared to be an unwillingness to work collaboratively to find a workable and definitive answer to questions over State-Aid rules and ensuring the viability of the project. This placed a heavy burden of potential financial risk and legislative understanding on untrained volunteers.

As a result the village had to rethink the project consuming time and money whilst increasing frustration. The alternative was to use gasified wood chip but the space and delivery requirements meant the plant was unsuitable for location at the school as originally planned. An alternative site at the Village Hall was found.

The learning from this experience is that simple straightforward financing options are needed for communities to have the confidence to proceed with projects. The burden of complying with funding regulation should lie with trained professionals.

The level of technical support required depends on the types of technology needed. Photovoltaics, for example, require less technical knowledge than for instance, combined heat and power and gasification. However, a key learning point is that unless communities have technical knowledge within their midst, they will need appropriate technical guidance throughout the project.

TIMESCALES

As a result of delays in confirmation of funding the implementation time was cut from 15 months to 6 months. Such a tight timescale and changes in location and technology add unnecessary risk to the project. The situation was not helped by the fact that unfortunately the funders were unable to give a swift answer to whether the installation period could be extended into the next financial year.

The learning from this was that timescales need to be flexible to ensure that changes can be made with sufficient time to consider all the issues involved so that the optimum solution is found.

COMMUNITY ENGAGEMENT

The starting point for engagement should focus on the priorities of the community. In deprived areas this may be savings in bills rather than carbon savings. This was the starting point for engagement in an area of social housing in Chester. Community benefit and carbon savings were more significant in Ashton Hayes as the average household is relatively affluent.

The community in Ashton Hayes is very engaged and committed to the project. Nevertheless there are genuine concerns for example, over safety issues or any emissions from biomass combined heat and power. In the case of wind power the views of neighbouring communities who may not see the benefits also need to be taken into account.

When changes have to be made in short timescales, it is difficult to carry out thorough community liaison. There is therefore the danger that the community feel imposed upon or ignored.

In Ashton Hayes a useful method to provide a more continuous liaison was to have key members of the community as points of contact as well as using the community website, leaflets, posters and village meetings.

THE ROLE OF THE DSO

In the vast majority of cases it is inadvisable for a community energy project to run completely isolated from the public electricity network. The additional expenditure and likely reduced security of supply means off-grid projects are only appropriate for very remote areas. The DSO can be concerned about the amount of generation that may be connected to its LV network as the networks were not designed for two way flow of power. However there are potential opportunities for DSOs. In Ashton Hayes a parallel network innovation project is running alongside the installation of the generation under Tier 1 of the Low Carbon Networks Fund [5]. The DSO has the opportunity to liaise with a whole community at once in a planned manner rather than dealing with many individuals. The aim is for community energy to become a benefit rather than a threat to the DSO.

The DSO is monitoring the network to understand the power flows and likely impact of generation. Alongside this the network is being modelled to understand the level of detail that is required to assess future generation connections and how this can most easily be implemented on a day to day basis. For example,

- Will the load of each individual house be needed?
- Will 3 phase models be required?
- What scenarios in terms of generation output and load should be studied?

It is hoped to trial demand side management (DSM) to aid LV network control to understand the level of load shifting that consumers will make and what devices are likely to help them make the move (e.g. timers, remote controllers, displays). At present it is not possible to provide individual, financial rewards but it is hoped that a collective reward to the village will be possible.

The DSO, the EV charging manufacturer and the community are working together to demonstrate how the level of power supplied by the charger can be varied according to local network conditions. This could help prevent the charging of electric vehicles significantly increasing the peak load demand on a circuit.

By engaging with the DSO from the earliest stage the cost of connection to the network can be kept to a minimum whilst improving network control at LV.

The project also provides an ideal forum for the DSO to explain how the electricity network operates and the problems that DSOs face. As well as increasing general awareness of engineering, such engagement can demonstrate to the public that the DSOs are not being deliberately obstructive.

LIMITATIONS OF SETTLEMENT

At present the balancing and settlement system (BS) in the UK uses an estimated profile of domestic use to settle LV customers' electricity consumption. Even with the roll out of smart meters without a change in the BS, time of use electricity charging for LV customers will not be possible. This limits the scope for DSM as there is no incentive to load shift. Ideally Ashton Hayes would like to sell the power that the community generates directly to the community but this is not possible at present. Only the school and the village hall will be able to use power directly as these buildings are connected to the generation before it is exported to the network.

The lack of time of use settlement also introduces some logistical problems. To use power directly to charge the EV (rather than pay a supplier) the charger must be located at the village hall. The village hall is not in the centre of the village and therefore residents will either have to arrange for the vehicle to be driven into the centre or walk to the hall to collect it. This will reduce the attractiveness of using the EV as a community vehicle. However, paying a supplier would cost around 11 pence/kWh compared to the price paid for exporting the power of around 2-3p/kWh (a loss of around 8-9pence/kWh).

There has been some significant bad press in the UK regarding smart meters. Some consumers are concerned that their movements and use of power could be overly scrutinised. Others suspect that all the benefits will accrue to the suppliers rather than the consumers. If the BS was reformed to allow consumers to benefit, this may mitigate some of these fears.

A key learning point from Ashton Hayes is that for consumers to see real benefits and for community projects to be more viable, smart metering and time of use settlement are required. The role of community energy must be considered when reforming the BS system so that

communities and individuals can benefit as well as suppliers.

INNOVATIVE TECHNOLOGY

Engaging with a community is an excellent means to introduce to technology and to get feedback as to how consumers react to it. In the case of Ashton Hayes, the EV and the gasifier are relatively new technologies. However, in a 'real life' situation, technology must be reliable. In a community setting there need to be sufficient safeguards in place to protect the community in case of breakdown. In the case of the Village Hall, it has a boiler that will remain as a back up until the gasifier is proven. This also illustrates the need for grants for the first installations of new technologies so that they can be proven. A community is unlikely to wish to take the risk of obtaining a loan, the repayment of which relies on Feed-in Tariffs or income from power generated, if the technology is not proven and the income is not guaranteed. Without grants, a 'chicken and egg' situation arises as communities will not risk taking on unproven technologies but technologies cannot demonstrate their effectiveness without real life installations.

CONCLUSIONS

There are considerable benefits from community energy projects in terms of efficiency in scale and installation. Such projects can also engage and benefit a wider range of individuals. The key learning points from Ashton Hayes are:

- Clear, simple funding mechanisms are required that are suitable for volunteers to understand.
- Timescales should be sufficient and flexible enough to allow all options and issues to be resolved.
- Key contacts are a useful means for ongoing community liaison as well as using leaflets, websites and meetings.
- Communities require ongoing technical support.
- Smart metering and time of use settlement are required for the full benefit of community energy to be achieved.
- Early engagement with the DSO is of benefit to the community and also the DSO in terms of connection of generation at LV and managing network control. It increases understanding of the electricity network and

engineering in general.

- Using innovative technology in communities can help them be adopted however there must be sufficient safeguards in case of failure.

Acknowledgments

We would like to thank the residents of Ashton Hayes for the support in implementing this project and ScottishPower for their engagement through the Low Carbon Networks Fund.

REFERENCES

- [1] R. Alexander, M. Hope and M. Degg, 2007, "Mainstreaming Sustainable Development – A Case Study: Ashton Hayes is going Carbon Neutral", *Local Economy*, 22-1, 62-74.
- [2] Outcomes of 2010 carbon footprint survey <http://www.goingcarbonneutral.co.uk/village-footprint-survey-2010/>
- [3] M. Gillie, 2009, "Getting The Most From Community Generation – An Technical Model To Control Small Scale Renewable Generation And Create A Local Energy Economy title of paper", *Proceedings 20th international Conference on Electricity Distribution*, Prague, Session 6, Paper No. 0190
- [4] Low Carbon Communities Challenge http://www.decc.gov.uk/en/content/cms/what_we_do/consumers/lc_communities/lc_communities.aspx accessed 4th January 2011.
- [5] Low Carbon Networks Fund <http://www.ofgem.gov.uk/NETWORKS/ELECDIST/LCNF/Pages/lcnf.aspx>