Community Energy: A new democratised energy system?

Abstract

The UK energy sector has traditionally been one of large scale centralised energy production by big companies, with households seen as passive consumers of energy at the ends of wires. With the development of renewable energy technologies, such as solar photovoltaic (PV) panels, wind turbines and district heating, for example small scale combined heat and power (CHP), there is greater opportunity for small-scale energy production where households and communities are becoming more active consumers and producers of energy. This has the potential for the energy system to become both decentralised and democratised, empowering individuals, households and communities to contribute to the decarbonisation of the energy sector.

This paper will explore how community energy through the decentralisation and democratisation of the energy system has the potential to be an important factor in supporting the decarbonisation of the system.

Introduction

The concept of community energy has existed, as Walker et al describe (2010), since the 1970s, although not in the UK. It did not emerge in the UK until the late 1990s, first appearing, albeit fleetingly, in the 2003 Energy White Paper (Walker et al. 2010). Walker et al (2007) describe how community energy became important in the early 2000s as a way to diffuse the growing backlash against large onshore wind farms, by ensuring the development of projects involved local communities and offered benefits to them through such things as direct ownership of wind turbines. However, quelling opposition to wind farms was not the only motivation for community renewable energy projects. Involving communities in renewable energy projects such as district heating and solar PVs, was seen as a way to stimulate the development and diffusion of renewable technologies and support rural economies (Walker et al. 2007). Interestingly, also to help people feel more positive about renewable energy and sustainability and become actively involved in energy production and consumption (Walker et al. 2010). It is believed that involvement in community energy projects can lead to additional levels of psychological engagement with renewable energy (Rogers et al. 2012). Although community energy is likely to remain a small part of energy production, this wider benefit could be important as increased levels of engagement empowers communities and encourages social innovation, making energy consumption visible and practices more open to change (Nolden 2013). However, acceptance of small scale renewable energy is no guarantee of acceptance of larger scale renewable energy projects, especially utility owned wind farms (Walker and Devine-Wright 2008), where communities may feel forced to accept a scheme for which they see little benefit . With these broad ranging and developing policy motivations, it is not surprising that the definition of a community energy project has moved on to one that does not just

involve communities benefitting from projects developed by big business, to ones where the project is created and developed by the community.

In 2014 for the first time the Department for Energy and Climate Change (DECC) (2014a) (now Department for Business, Energy and Industrial Strategy (BEIS)) published a report to look specifically at a strategy for community energy that supported energy and climate change policies, as well as helping to make energy more affordable. This showed a step change in government policy away from centralised large-scale energy production to small scale dispersed generation and ownership. To support this process and encourage development in renewable technologies several grant schemes were put in place. Feed-in-tariffs (FiT), that pay a small amount for electricity generated and a further small amount for each unit exported back to the grid; Green Deal, a government backed loan scheme that ran between 2013-2015 to support energy saving measures in the home, where the loan was aimed to be paid back by savings made on energy bills; Energy Company Obligation (ECO), which offers support funded by the big energy companies to make homes energy efficient and create affordable warmth; and the Renewable Heat Incentive (RHI), aimed at decarbonising domestic and commercial heating systems (BEIS 2016; Which? 2017b, 2017a). These schemes have had mixed success. FiTs succeeded in encouraging people to install solar PV panels, to the extent that the level of FiT was cut from 35.95p/kwh in 2010 (Ofgem 2017) to 1.94p/kwh in 2017, as funds to finance the scheme rapidly ran out (ofgem 2017). Green Deal only lasted for two years with a very poor take up, although the Green Deal Finance Company were looking to relaunch the scheme in 2017, using private finance to fund the scheme (Which? 2017b). RHI and ECO continue, although ECO is now focussed on helping those in fuel poverty.

In DECC's 2014 report, community energy was seen by the UK Government as an important way to help meet targets to reduce carbon emissions, with the potential by 2020 to produce between 0.5GW (2.2%) and 3GW (14%) of installed energy (Department of Energy and Climate Change 2014b). As well as contributing to decarbonising the energy network, community energy schemes can deliver varied benefits, including meeting local needs, maintaining energy security, saving money and wider social and economic benefits. These could include stronger communities, the potential to improve skills education, generate work experience and satisfy needs for social esteem (Cherrier, Szuba, and Özçağlar-Toulouse 2012; Department of Energy and Climate Change 2014b). Despite these benefits, few citizens have been actively involved in energy projects, hence such projects are not considered normal practice (Rettie, Burchell, and Riley 2012). DECC sees the key barriers to community energy include problems with access to finance; reliable income streams, such as the FIT; the difficulties of becoming a licensed energy company and the wider problems of trying to navigate the regulatory systems for planning and network access. Although recognising these as barriers, since the strategy was written in 2014, little has been done to address them, with the regulatory system for both financing and the sale of energy lagging behind practice.

However, despite limited specific support for community energy schemes, what is emerging as a trend in the energy sector from both top-down changes in business and industry and bottom-up schemes, is a move towards a more decentralised and democratised system to support decarbonisation. The energy system is changing opening up opportunities for more

community energy projects. As the energy sector moves towards decarbonisation, the withdrawal of government support for decarbonisation of the existing fossil fuelled system through Carbon Capture and Storage, has sent signals to the industry to focus on smaller scale renewable technologies. This has created a new trend in energy production that moves away from large, centralised power plants to distributed generation, sometimes known as small scale, embedded or decentralised generation, where energy production and conversion units are situated close to the customers (Alanne and Saari 2006). Distributed generation, where the distinction between producer and consumer becomes blurred, is of particular relevance to community or local energy, (Watson and Devine-Wright 2011).However, it is not a new concept. Prior to industrialisation and subsequent urbanisation, it was common practice to collect wood from the environs of homes to burn in fires and furnaces (Alanne and Saari, 2006).

This new trend towards decentralisation supports energy security, especially in times of fears of terrorism (Asmus 2001) and other natural and man-made disruptions (Tomain 2015), reduces transmission inefficiencies, facilitates increased contributions from renewables (Wolfe 2008) and the democratisation of the energy system. Tomain (2015), describes how a more democratic energy and environmental paradigm will affect four aspects of the system, the production and delivery of energy, consumption and control, regulation and enforcement, and governance and legal institutions. Communities are able to become actively involved in the decisions about their interaction with the energy system (Tomain 2015) and local authority policies or regional trading systems become more important (Watson and Devine-Wright 2011). Democratisation facilitates the shift of regulation from producers to consumers as their choice increases and becomes more localised (Tomain 2015).Tomain (2015) argues that in such a system with more producers, varied technologies and increased consumer choice, there will be greater market discipline reducing the need for government enforcement. The challenge is for community energy to have enough of a voice to lead to the policy changes needed for them to be able to engage with and make a real difference to the energy system. They are competing with the incumbent big energy companies when lobbying for change to regulations and systems.

Using the mid-range theory, the Multi-Level Perspective (MLP), possible routes to mainstreaming community energy can be identified. The MLP demonstrates routes by which sustainability socio-technical transitions, such as community energy can arise. Geels (2011), describes the model as an interplay of ‘three analytical levels’. Niches, where radical innovations such as those in community energy projects occur; socio-technical regimes, where the incumbent businesses and energy system operates, with its associated rules, practices and infrastructure; and the exogenous socio-technical landscape, where pressures such as climate change are destabilising the regime. Community energy projects sit in the niche level and are well placed to support niche innovations, both in terms of technical and social innovation, including new business models.

This paper will present findings from an Innovate UK funded project in partnership with Coventry University, SmartKlub, a smart energy SME, the Satellite Applications Catapult, Tech Mahindra, The Open University, Milton Keynes Council and Community Action MK, to look at what it takes to get communities involved in local energy projects. Although the project was initially based in the Milton Keynes area, the study results are being used to roll

the project out to other parts of the country. The Community Action Platform for Energy (CAPE) project aimed to develop an interactive platform to support communities and local authorities in developing community energy projects. The vision was to connect communities and suppliers via an online platform that would provide citizens and local authorities access to the necessary information and resources to create and implement an energy project. Suppliers were also intended to benefit by using the platform as a shop window for their products and services. A distinctive feature of the platform is that it puts Big Data tools in the hands of local communities. These tools bring together satellite images of local buildings, with energy performance data, energy usage data and sociodemographic information.

Through the data collected in this project, this paper will explore using the MLP the factors, such as emerging business models that could lead to the mainstreaming of community energy, and a new decentralised, democratised and decarbonised energy paradigm.

Methodology

Data collection

Reflecting the emergent and dynamic nature of the field, an exploratory, inductive approach using in-depth interviews and workshops was used (Kumar, Stern, and Aderson 1993). The over-arching aim was to explore the motivations for community involvement in energy projects, the process by which these projects unfold, the barriers faced, and the necessary resources to effectively implement them. This data gathering approach generated a rich understanding of community energy projects by exploring the perspectives of different stakeholders and communities with diverse experiences and knowledge of these projects.

A purposeful sampling approach was used to identify individuals who had relevant knowledge and experience of community energy and, who as a group, offered a wide range of perspectives. Key informant interviews were undertaken with local authorities, NGOs, landlords, suppliers, academics and community energy groups. Data were also gathered from two workshops to which a wider group of citizens with interests in community energy was invited.

Most interviews were conducted by two or three researchers, enabling greater opportunity to gain insights from being directly involved in the data collection. Interviews were audio recorded and later transcribed, with contemporaneous field notes being taken. Overall, 17 interviews and 2 workshops were conducted over an 18-month period between December 2015 and June 2017. The interviews lasted between 30 and 180 minutes. Data were gathered from the workshop in the form of field notes, rich pictures and photos.

Data analysis

The data analysis followed an iterative approach (Corbin and Strauss 2008), which began with members of the research team reflecting on each interview. Once the data gathering was complete, main data codes were generated at two data analysis workshops involving four members of the research team. One researcher then used NVivo to analyse the data in detail, beginning with the open codes agreed at the workshops and then assigning axial codes to further break down and delineate the data. A second member of the research team independently reviewed the open and axial codes, in a process designed to support

the triangulation of results (Denzin 1989). Finally, appropriate reliability was ensured by two researchers working together to re-check the emergent themes against the data.

Findings

New business models

Energy is unlike other forms of production where it is possible to store products for use at a later date, although storage technologies, such as batteries are now rapidly improving and becoming more prevalent. Energy production is largely on-demand, which requires close monitoring of supply and demand levels to balance the two (Seavers 2017). Decentralisation of energy through intermittent and inflexible renewable sources of energy raises challenges in managing this balance between supply and demand without overloading the network. This disrupts the regime and opens up opportunities for new business model innovations to be developed that community energy projects could take advantage of. Many of these business models focus on the need to manage demand and supply flexibly to support the intermittent flows of energy from renewables.

There are also challenges for these decentralised or distributed generation projects in that the current regulatory framework is not designed to support the unpredictable and inflexible nature of local renewable energy. The current market arrangements, known as the British Electricity Trading and Transmission Arrangements (BETTA), are designed to support conventional large scale energy production and penalise sources that are unable to guarantee certain levels of output (Woodman and Baker 2008). However, in the BEIS and Ofgem (2017) report on energy flexibility, there is a recognition of the need for local flexible markets that could support decentralised generation. This is something that is already beginning to happen with industrial and commercial customers, but there is a largely untapped potential for this amongst domestic customers and in the community. One of our participants saw this potential, but was unsure of the response from householders, suggesting there is a need to firstly develop this market and then to sell the concept of individuals providing a flexibility service to the grid.

‘If I was to say you should put a battery in your house because it’s going to help stabilise the grid, people would say, well actually that’s a reason not to do it because I hate the people... You know, I hate the fat cat that’s going to be making all the money, you know? So as much as people in the solar industry, you know, thousands of people realising that actually the grid needs help. The individual home owner isn’t going to want to do it because all they see is they pay so much out each month and the... If I'm paying that out each month, well they can pay to stabilise the grid. They don’t realise that actually billions of pounds are needed, are going to push their prices up even higher (Manager, Solar PV installer).

This role of community energy or individuals as an energy service provider could develop what Geels (2011) describes as a symbiotic relationship, where the energy companies in the regime, work with communities to balance the network. Geels (2011) describes this pathway as a reconfiguration pathway. Where the symbiotic niche innovations are adopted by the incumbent actors as ‘add-ons’ to solve local problems. This could be local restraints on the network from a mis-match between demand and supply, either from increased

demand at peak times or increased supply from renewables when demand is low. Such involvement by communities or individuals plays an important function in engaging and empowering communities in energy production, supporting the democratisation of energy.

One of the major barriers for community energy and decentralisation is a continued focus on investment in large scale energy production, as a consequence of the structure of the electricity and gas markets (Watson and Devine-Wright 2011). For example, micro generators, such as community energy projects, cannot sell the electricity they produce to the wholesale markets (Watson and Devine-Wright 2011), they are limited to earning income from FITs and so unable to take advantage of the more lucrative time-of-day pricing. There are also barriers for the use of demand side measures, as the taxation measures are less favourable. Without what Watson and Devine-Wright (2011) describe as a 'levelling of playing fields', greater investment and development of decentralised local energy projects is going to be limited. Levelling this playing field is not easy with the significant lock-in in the existing regime, where the energy system benefits from scale economies, as well as considerable sunk investment in the infrastructure and competencies (Geels 2011).

However, despite these barriers almost 1 million homes have solar panels on their roofs (HM Government and Ofgem 2017). Other changes to the energy system are also occurring. There are other demand side factors that will force the system to adapt, such as the roll out of smart meters, electric vehicles set to be the norm by 2050 (Joint Air Quality Unit 2017) and increased use of electric heat systems, such as heat pumps. With more homes, some of which will be in community energy schemes, producing their own electricity they will be looking for ways to generate revenue from their energy beyond the dwindling FIT, prompting new business models. When the FIT was first introduced it was possible to earn a reasonable income from electricity generation through the FIT. At this stage PV panels were positioned largely on south facing roofs. As the FIT dropped a change in the business model developed to take advantage of the ability to use rather than 'sell' the energy, by changing the orientation of the PV panels to east and west facing roofs. In effect generating electricity at either ends of the day when the usage is higher.

'In homes, definitely in homes, an east/west system in the current climate is better than south system. When you were being paid a lot of money per kilowatt hour, south is a better financial return and will generate more energy. But not that much more energy. If you go east/west, in a home particularly, you're generating when you get up in the morning and when they're home in the evening, you know, you still generate through lunchtime as well, but your main generation, your curve is a lot lower, a lot less steep, and a lot more of that will get used' (Manager, Solar PV Installer).

However, the viability of this east/west orientation model is dependent on how regulation and technologies develop. With improving battery storage technologies and increasing use of EVs in vehicle-to-grid demand side response (DSR), installing a south facing orientation could still be a good option, especially if Ofgem's review of the licenses for storage (HM Government and Ofgem 2017) is favourable for microgeneration projects and it is possible to earn money from delivering an energy storage service.

A further disruption to the regime is the development of 'smart grids', enabled by technology that react to local changes in usage. Smart grids are better suited to the integration of decentralised or distributed generation than purely centralised energy production. Distributed generation is connected to the electricity grid enabling bilateral trading (Alanne and Saari 2006). Such schemes have the potential to feed into the needs of the grid to deliver new forms of flexibility that manage supply and demand in line with current government policy (see HM Government and Ofgem 2017). These schemes have differing and interesting implications for community energy projects in how they are set up and run and new business models are being developed to allow communities to sell their energy locally. A community energy group explains how they see themselves developing a new business model and becoming a very local energy supplier.

'Okay, we have a number of sources of revenue. So we are getting an income. Those sources are people paying their bills, yes? So we've got solar... So we chuck solar panels on a roof, the people underneath...So there's no capital outlay for that business. But they pay for their energy. They pay a better rate than they'd pay to any of the big six, but they're still paying. So we invoice them monthly for their energy. We are EON, but we're lovely. We're nothing like EON' (Director, Community Energy Group).

This is an example of a new business model in the energy market, peer-to-peer energy selling. The idea of this is to allow people to buy energy directly from the producers. An existing scheme is run by Piclo in partnership with Good Energy, matching customers with local renewable energy suppliers. At the moment this is only available to businesses, but Ofgem's plan is to extend this to domestic customers with smart meters (HM Government and Ofgem 2017).

This community energy group demonstrates what Geels (2011) describes as 'grassroots fighters', where change develops outside the existing institutions. He describes social movements that develop alternative structures, such as cooperatives and the majority is influenced by the example of these pioneers. As the regime is further disrupted by new business models and changes to regulation, these types of grassroots fighters are able to adopt and foster other business models within the niche.

Empowerment

This ability to sell energy by becoming energy suppliers supports the democratisation of energy. Democratisation can be seen as a consequence of the decentralisation of decision making (Alanne and Saari 2006). It promotes greater participation and voice in the political and economic institutions within the energy system (Tomain 2015), where ownership is not just in the hands of big companies, but in the hands of individuals, community groups and local authorities (Watson and Devine-Wright 2011). This was something felt strongly by the community groups we interviewed, suggesting that this empowerment was important not just in the democratisation of energy, but more widely for inclusion and democratisation of the community in the economy and policy making.

'There is something about community ownership, but I think it is really important, community empowerment in a sense, that certainly their taking some control and responsibility for production of energy. For me, there is a practical and a political element to

that really which is that so many of today's technologies don't empower local communities, they disempowered them, they can't be involved, it's too big etc. So I think that move has been really important in enabling communities to generate; and political with a small P bit for me is that I think it's a really important that, beyond the practical, people feel more in control of their communities and that, they're not marginalised by that, by processes and the economy, and the politics actually' (Super Homes owner and Co-Director of a faith based organisation).

Such increased empowerment can lead to wider social change that further disrupts the regime, that could lead to the wider socio-technical change required to democratise and decarbonise the energy system.

Energy as a vehicle for change

This increase in empowerment through control of production and consumption for communities can be supportive of wider changes and learning. There is the opportunity for small-scale projects developed in the niche to be a place for government to test out new regulatory frameworks, in what Tomain (2015) describes as "policy laboratories". This would enable local projects to be involved in the development of best practice and education at a scale appropriate to their needs (Tomain 2015). Such grassroots projects are also of interest in their potential to inform more sustainable ways of living (White and Stirling 2013). White and Stirling (2013) suggest that these bottom-up grassroots projects could be useful in highlighting the unsustainability of current systems, solving local problems in new ways and experimenting in methods that could inform or be integrated into the mainstream with shorter time-scales and lower capital investment requirements than large-scale projects. This ties in with the niche in the MLP, as places to try out and test new innovations. What this research has shown is that these grassroots projects can go beyond protected spaces for innovations, but also be protected spaces for social development. Involvement in such projects can act as an impetus for communities to unite behind a common goal, heightening citizen participation, engaging them in energy, but also more generally in the community.

'Energy is often, or energy and climate change certainly, are often a useful kind of vehicle by which they can do other things, if you like….They often were, more than anything, were looking to improve their local community in some way, shape or form, and energy became a useful vehicle for at a certain point in time to allow them to do that, you see what I mean' (Tom, Academic)?

Discussion

Local community energy systems are beginning to challenge the existing regime of centralised production and control, moving towards a more decentralised and democratised paradigm. A paradigm that supports the shift to a flexible system that is better suited to manage the intermittency of low carbon energy sources. As this paper has shown, new business models are developing that could be beneficial for community energy. There is certainly an interest from local community groups in developing their own community energy projects, despite the barriers they face from changes in policy and funding sources. They see the wider benefits of community cohesion, empowerment and improving their local community as being important motivators. It is however questionable the level of impact that these bottom-up schemes can have on their own.

Nevertheless, these changes and pressures from the niche level are supported by the changes in the landscape, with pressure from concerns about climate change. The existing regime is locked into a set of rules and infrastructure that are hampering a change to a low carbon sector, but it is being forced to change. The existing regime is being disrupted by the further introduction of intermittent renewable energy sources, and the decarbonisation and electrification of transport and heat with electric vehicles and heat pumps. Because of this lock-in, these changes are hard to implement, requiring the development of new ways to manage the network. Renewable energy sources do not offer the same options for flexibility to respond to changes in demand that fossil fuelled power stations do. As a result, there is a need for new forms of flexibility, such as demand side response (DSR) (demand-side balancing of the electricity system) and energy storage. All of these disruptions are opening up opportunities in the regime for new innovations from the niche to emerge.

Community energy is well placed to take advantage of these opportunities. Community energy can be at different scales from small local rural or urban communities through to projects led by local authorities, including new housing developments or where the local authority becomes a not for profit Energy Service Company (ESCo). These community energy projects could be important in an energy mix, contributing symbiotically with a centralised system as an energy service provider, providing DSR, through managing demand or providing energy storage from batteries, including vehicle-to-grid. Watson and Devine-Wright (2011), describe a hybrid energy system of centralised power plants, a transport system fuelled by oil and locally produced electricity, and decentralised heat and power systems in towns and cities. A hybrid system such as this would have a major impact on the existing regime, by bringing together the different regimes of electricity, heat and transport together. This disruption to the regime opens up opportunities for a new democratised energy paradigm. This paradigm brings new roles and actors, for example local authorities and communities into the market, putting pressure on the incumbents to change.

Community energy projects are green niches in which new innovations can be tried out. Indeed, there are things that a community can do that the larger incumbents cannot. For example, Distribution Network Operators (DNOs) as a network operator rather than a supplier of energy, are not allowed to own battery storage and sell this energy in the markets, even though this could be a useful way for them to balance demand and supply and mitigate the need for network reinforcement at peak times. This is a service they need to contract out to other operators, which could include communities or local councils.

It appears there could be an important role for communities in the development of low carbon energy, whilst also empowering communities and democratising energy. However, these bottom-up community energy schemes are more likely to be set up by middle income communities, with an interest in the environment and community cohesion. Lower income communities may not see these issues as such a priority, but this does not mean they should be excluded from the benefits of these schemes. Indeed, if more communities create their own community energy schemes and in effect go ‘off grid’, this has implications for those unable to benefit from these schemes who potentially become more disempowered, while others become more empowered. The cost of running the grid will be disproportionally focussed on a smaller number of customers, particularly those least able to pay, resulting in

a two-tiered system of democratisation. Here, there is an important responsibility of delivering equity for local authorities in community energy schemes.

There are nonetheless important reasons to engage consumers in the process of energy production. As well as delivering local community benefits it could also change energy use behaviours. Changes in consumer behaviours are crucial for any socio-technical change in the regime to arise. Energy production is psychologically and physically remote from consumers, contributing to a passive engagement with energy, which encourages unconscious and potentially wasteful consumption practices (Rogers et al. 2012). Community energy has the potential through social learning to increase levels of engagement, bringing energy closer to citizens and changing energy consumption practices (Rogers et al. 2012). This is in contrast to the 'information deficit' of consumers perceived by policy makers and industry, where a lack of knowledge and interest from the public is considered the norm (Watson and Devine-Wright 2011). Indeed, as Watson and Devine-Wright (2011) point out there is no guarantee that decentralised energy production will lead to lower carbon energy, greater levels of engagement or greater energy security. Changes to these factors depend on the form of decentralisation and the extent to which it is bottom up or top down and the levels of democratisation.

Ultimately, it is unlikely that community energy will remove the existing regime of energy production. Although, the existing regime does need to change and there are opportunities for community energy to play an important role in that change. Community energy is more likely to exist in a symbiotic form with the existing regime. Offering the support needed to transition to a low carbon energy sector through the decentralised production of energy and offering energy services such as DSR and energy storage. This new role in the energy sector will inevitably lead to a democratisation of energy as individuals and communities move from being passive users of energy to those actively involved in the delivery of energy services.

Conclusions

Community energy has the potential to support the decarbonisation of the energy network, whilst also leading to a decentralised and democratised system. The role of community energy could be vital in this shift in paradigm away from fossil fuelled to low carbon energy production and the growing need to manage supply and demand in new flexible ways that include energy storage and demand management. As the energy system changes and adapts to new demands from renewables, EVs and heat pumps, it is clear that how consumers engage with the system is also going to change. This role is likely to be symbiotic to, rather than replacing the existing regime. Although the regime needs to change, community energy is not going to be the regime that replaces it, but there to support that process to change. As the production of energy becomes more decentralised, the ways of balancing supply and demand will also need to follow suit. The changes to the system are inevitably opening up new dispersed opportunities, so rather than community energy having to displace the incumbent system, it is able to take advantage of these opportunities as the regime is destabilised. What is clear is that as energy production and management becomes more decentralised, there is going to be a greater democratisation of the system as power and control moves from the big energy companies to local authorities, communities and individuals.

Bibliography

Alanne, Kari, and Arto Saari. 2006. “Distributed Energy Generation and Sustainable Development.” *Renewable and Sustainable Energy Reviews* 10 (6): 539–58. https://doi.org/10.1016/j.rser.2004.11.004

Asmus, P., 2001. The war against terrorism helps build the case for distributed renewables. The Electricity Journal. 14, 75–80.

BEIS, 2016. The Renewable Heat Incentive: A Reformed Scheme. Government response to a consultation. Department for Business, Energy and Industrial Strategy, London.

Cherrier, Hélène, Mathilde Szuba, and Nil Özçağlar-Toulouse. 2012. “Barriers to Downward Carbon Emission: Exploring Sustainable Consumption in the Face of the Glass Floor.” *Journal of Marketing Management* 28 (3–4): 397–419. https://doi.org/10.1080/0267257X.2012.658835.

Corbin, Juliet, and Anselm Strauss. 2008. *Basics of Qualitative Research*. 3rd ed. Los Angeles: SAGE Publications Ltd.

Denzin, N.K. 1989. *Interpretive Biography (Qualitative Research Methods, Vol.17)*. Newbury Park, CA: Sage.

Department of Energy and Climate Change. 2014a. “Community Energy Strategy: Full Report.” London: DECC.

———. 2014b. “Community Energy Strategy: People Powering Change.” DECC.

HM Government, and Ofgem. 2017. “Upgrading Our Energy System: Smart Systems and Flexibility Plan.” BEIS and ofgem. https://www.gov.uk/government/uploads/system/uploads/attachment_data/ le/568982/An_analysis_of_electricity_ exibility_for_Great_Britain.pdf.

Joint Air Quality Unit. 2017. “UK Plan for Tackling Roadside Nitrogen Dioxide Concentrations - An Overview.” London: Department for Environment, Food & Rural Affairs and Department for Transport. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/633269/air-quality-plan-overview.pdf.

Kumar, Nirmalya, Louis W. Stern, and James C. Aderson. 1993. “Conducting Interorganizational Research Using Key Informants.” *Academy of Management Journal* 36 (6): 1633–51.

Nolden, Colin. 2013. “Governing Community Energy—Feed-in Tariffs and the Development of Community Wind Energy Schemes in the United Kingdom and Germany.” *Energy Policy* 63 (December): 543–52. https://doi.org/10.1016/j.enpol.2013.08.050.

Ofgem. 2017. “Feed-In Tariff Rates 1 April 2010 to 31 March 2011.” Ofgem. https://www.ofgem.gov.uk/environmental-programmes/fit/fit-tariff-rates.

ofgem. 2017. “Feed-In Tarrif Rates 2017.” Ofgem. https://www.ofgem.gov.uk/environmental-programmes/fit/fit-tariff-rates.

Rettie, Ruth, Kevin Burchell, and Debra Riley. 2012. “Normalising Green Behaviours: A New Approach to Sustainability Marketing.” *Journal of Marketing Management* 28 (3–4): 420–44. https://doi.org/10.1080/0267257X.2012.658840.

Rogers, Jennifer C., Eunice A. Simmons, Ian Convery, and Andrew Weatherall. 2012. “Social Impacts of Community Renewable Energy Projects: Findings from a Woodfuel Case Study.” *Energy Policy* 42 (March): 239–47. https://doi.org/10.1016/j.enpol.2011.11.081.

Schoor, Tineke van der, and Bert Scholtens. 2015. “Power to the People: Local Community Initiatives and the Transition to Sustainable Energy.” *Renewable and Sustainable Energy Reviews* 43 (March): 666–75. https://doi.org/10.1016/j.rser.2014.10.089.

Seavers, Dean. 2017. “The Democratisation of Energy: Climate Change, Renewables, and Advancing the American Dream.” National Grid. http://3blmedia.com/News/Campaign/Democratisation-Energy-Climate-Change-Renewables-and-Advancing-American-Dream-eBook.

Seyfang, Gill, Sabine Hielscher, Tom Hargreaves, Mari Martiskainen, and Adrian Smith. 2014. “A Grassroots Sustainable Energy Niche? Reflections on Community Energy in the UK.” *Environmental Innovation and Societal Transitions* 13 (December): 21–44. https://doi.org/10.1016/j.eist.2014.04.004.

Timothy W. Luke. 2010. “Power Loss or Blackout: The Electricity Network Collapse of August 2003 in North America.” In *Disrupted Cities - When Infrastructure Fails*, edited by Stephen Graham, 1st ed., 55–68. New York and London: Routledge, Taylor & Francis Group.

Tomain, Joseph P. 2015. “The Democratisation of Energy.” *Vanderbilt Journal of Transnational Law.* 48: 1125.

Walker, Gordon, and Patrick Devine-Wright. 2008. “Community Renewable Energy: What Should It Mean?” *Energy Policy* 36 (2): 497–500. https://doi.org/10.1016/j.enpol.2007.10.019.

Walker, Gordon, Patrick Devine-Wright, Sue Hunter, Helen High, and Bob Evans. 2010. “Trust and Community: Exploring the Meanings, Contexts and Dynamics of Community Renewable Energy.” *Energy Policy* 38 (6): 2655–63. https://doi.org/10.1016/j.enpol.2009.05.055.

Walker, Gordon, Sue Hunter, Patrick Devine-Wright, Bob Evans, and Helen Fay. 2007. “Harnessing Community Energies: Explaining and Evaluating Community-Based Localism in Renewable Energy Policy in the UK.” *Global Environmental Politics* 7 (2): 64–82. https://doi.org/10.1162/glep.2007.7.2.64.

Watson, Jim, and Patrick Devine-Wright. 2011. “Centralization, Decentralization and the Scales in between: What Role Might They Play in the UK Energy System?” In *The Future of Electricity Demand*, edited by Tooraj Jamasb and Michael Pollitt, 280–97. Cambridge: Cambridge University Press. https://doi.org/10.1017/CBO9780511996191.017.

Webb, Janette, Margaret Tingey, and David Hawkey. 2017. “What We Know about Local Authority Engagement in UK Energy Systems - Ambitions, Activities, Business Structures & Ways Forward.” UKERC, Energy Techologies Institute and The University of Edinburgh. http://www.ukerc.ac.uk/publications/what-we-know-about-local-authority-engagement-in-uk-energy-systems.html.

Which?, 2017a. Energy Company Obligation (ECO). Which Online.

———. 2017b. “The Green Deal.” *Which? Online*, 2017. http://www.which.co.uk/reviews/home-grants/article/home-grants/the-green-deal 3/12.

White, Rebecca, and Andrew Stirling. 2013. “Sustaining Trajectories towards Sustainability: Dynamics and Diversity in UK Communal Growing Activities.” *Global Environmental Change* 23 (5): 838–46. https://doi.org/10.1016/j.gloenvcha.2013.06.004.

Wolfe, Philip. 2008. “The Implications of an Increasingly Decentralised Energy System.” *Energy Policy* 36 (12): 4509–13. https://doi.org/10.1016/j.enpol.2008.09.021.

Woodman, Bridget, and Philip Baker. 2008. “Regulatory Frameworks for Decentralised Energy.” *Energy Policy* 36 (12): 4527–31. https://doi.org/10.1016/j.enpol.2008.09.017.