University of East Anglia
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COMMUNITY ENERGY IN THE UK

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3S Working Paper 2012-11

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KNOWLEDGES AND EXPERTISE
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SCIENCE, POLICY AND GOVERNANCE
TRANSITIONS TO SUSTAINABILITY
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ABSTRACT

Community energy has been proposed as a new policy tool to help achieve the transition to a low-carbon energy system, but the evidence base for this strategy is partial and fragmented. We therefore present new empirical evidence from the first independent UK-wide survey of community energy projects. Our survey investigates the objectives, origins and development of these groups across the UK, their activities and their networking activities as a sector. We also examine the strengths and weaknesses of these groups, along with the opportunities and threats presented by wider socioeconomic and political contexts, in order to improve understanding of the sector's potential and the challenges it faces. We highlight several key issues concerning the further development of the sector. First, this highly diverse sector is not reducible to a single entity; its multiple objectives need joined-up thinking among government departments. Second, its civil society basis is fundamental to its success at engaging local communities, and makes the sector quite distinct from the large energy companies these community groups are aiming to work alongside. There are inherent tensions and vulnerabilities in such a model, and limits to how much these groups can achieve on their own: consistent policy support is essential.

KEYWORDS:

community energy, sustainable energy, energy transitions, grassroots innovations, civil society

3S STRANDS: sustainability transitions; sustainable consumption

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Suggested citation:

Seyfang, G., Park, J. J. and Smith, A. (2012) *Community Energy In The UK* 3S Working Paper 2012-11 (Norwich: Science, Society and Sustainability Research Group)

INTRODUCTION

The twin sustainability challenges of climate change and energy security require fundamental shifts in the nature of large-scale energy systems (UKERC, 2009; Grin et al, 2010). The previous UK government's Low Carbon Transition Plan presents a national strategy for climate and energy which includes reducing energy consumption through conservation and efficiency measures, and the development of low-carbon electricity generation systems (HM Government, 2009). A key element of this plan is the role of households and communities, as "we often achieve more acting together than as individuals" (ibid p.92) and the government's task is to "create an environment where the innovation and ideas of communities [in response to climate change] can flourish" (p.92).

Community energy projects are one example of this type of grassroots-led innovation, which aim to create more sustainable energy systems. They encompass a wide range of initiatives such as locally-owned renewable energy generation, community hall refurbishments, collective behaviour change programmes, and so on, and are claimed to bring additional public engagement benefits to top-down policy initiatives. To this end, a range of government funding programmes and prize competitions have been instigated, to stimulate and support community-led sustainable energy initiatives.

Community energy has therefore been proposed as a new policy tool to help achieve the transition to a low-carbon energy system, but the evidence base for this strategy is partial and fragmented: existing research on community energy consists mostly of qualitative studies of small numbers of projects, and focusing on either renewable energy technologies or behaviour-change to reduce carbon emissions, rather than community energy per se. The few existing quantitative surveys of the community energy sector have been similarly limited by focusing on either supply *or* demand-side measures and have tended to be undertaken by NGOs with specific remits within the broader sector.

Consequently, there is no existing dataset providing an empirical overview of the whole community energy sector, addressing both supply and demand-side initiatives. There is a pressing need for independent, sector-wide data about the scope, scale and character of community energy in the UK, to provide evidence for policymakers to inform their decision-making about the sector, and to better inform practitioners and intermediary organisations about how to meet the needs of the sector and support it to achieve its potential.

We aim to address that knowledge deficit by presenting new empirical evidence from the first independent UK-wide survey of community energy projects. Our survey investigates the objectives, origins and development of these groups across the UK, their activities and their networking as a sector. We also examine the strengths and weaknesses of these groups, along with the opportunities and threats presented by wider contexts, in order to improve understanding of the sector's potential and the challenges it faces.

The paper proceeds with a review of the policy and research contexts of community energy in the UK, synthesising existing knowledge on the sector and identifying key issues from the literature which require further investigation. We then describe our research methodology, and reflect on the limitations of the data obtained. Next, we present our survey results and identify the most important findings in light of the previous review, and we discuss their significance for the transition to sustainable energy. We conclude by considering the implications of these findings for further research, and indicate some policy recommendations to support the sector to achieve its potential.

COMMUNITY ENERGY: THE POLICY AND RESEARCH CONTEXT

Introducing Community Energy

The last few years have seen a flourishing of community-led sustainable energy projects (hereafter 'community energy') in the UK, building on an historical foundation of alternative energy initiatives from the 1970s, and benefiting from recent policy measures to support the transition to a low-carbon economy. A recent study identified over 500 community 'renewable' energy projects alone (Walker et al, 2007) and demand-side initiatives are likely to be of a similar order. Community energy is a diverse field of activity, and includes both energy generation and conservation projects such as: village hall refurbishments introducing high levels of insulation and energy efficiency, combined with micro-generation technologies; collective behaviour change programmes such as Carbon Rationing Action Groups, Transition Streets or Student Switch-Off; community-owned wind turbines like those on the Scottish Isles of Eigg or Gigha; cooperatively-run small-scale energy systems, for example, Ouse Valley Energy Services Company (OVESCO) or Brighton Energy Cooperative. They are typically instigated or run by a diverse range of civil society groups, including voluntary organisations, cooperatives, informal associations etc, and partnerships with social enterprises, schools, businesses, faith groups, local government or utility companies (Clark and Chadwick, 2011; Adams, 2008).

Defining 'community energy' precisely is somewhat problematic: there is no consensus over the term, and policymakers, intermediary organisations, practitioners and academics infer varying degrees of community involvement (Muller et al., 2011; Hoffman and High-Pippert, 2010; Walker & Devine-Wright 2008). Walker et al (2007) reviewed a number of different community renewable energy projects to investigate the variations in community ownership and outcomes across the range, and to examine the diversity of interpretations of 'community energy' in use amongst different actors. While offering a slippery concept for analysis, the 'flexibility' of interpretations did work in favour of wide acceptability of the concept of community energy. For the purposes of this paper we follow Walker and Devine-Wright's (2008) lead and consider community energy to refer to those projects where communities (of place or interest) exhibit a high degree of ownership and control of the energy project, as well as benefiting collectively from the outcomes (either energy-saving or revenue-generation), and we include both supply- and demand-side sustainable energy initiatives. In the next section we describe a principally instrumental policy perspective on the sector which has been developed in government strategies for sustainable energy.

Policy Support for Community Energy

Community action has, for some time, been seen as a key part of government strategy for delivering sustainable development. The UK government has stated that:

> "Community groups can help tackle climate change, develop community energy and transport projects, help minimise waste, improve the quality of the local environment, and promote fair trade and sustainable consumption and production" (HM Government, 2005 p.27).

And within this context, community energy projects are deemed suitable vehicles for raising awareness of sustainable energy issues, improving public receptivity to renewable energy installations, increasing engagement in behaviour-change initiatives and reducing carbon emissions as a result. Thus, communities are seen as critical players in sustainable energy generation and energy saving efforts, in key polices of the previous New Labour UK and devolved governments (HM Government, 2005, 2010), and this has been reiterated by the UK's Conservative-Liberal Democrat coalition government: "Community energy is a perfect expression of the transformative power of the

Big Society" (DECC, 2010). To this end, several policy initiatives have explicitly aimed to catalyse increased community energy activity such as Scotland's Scottish Community and Householder Renewables Initiative (Scottish Executive, 2006), the Welsh Assembly's Community Scale Renewable Energy Programme (Welsh Government, 2010), Rural Community Renewable Energy Fund (DEFRA, 2012), the Local Energy Assessment Fund (Energy Saving Trust 2011), the Low Carbon Buildings Programme (BRE, 2011) and the Department for Energy and Climate Change (DECC)'s Community Energy Online information portal (http://ceo.decc.gov.uk). In addition, DECC's Low Carbon Communities Challenge (DECC, 2009) aimed to learn from a series of exemplar projects: what potential they have to contribute to a low-carbon energy transition, and how best to seed wider change at the community level. Alongside this latter intervention, the UK Research Councils partnered with DECC to fund a programme of research to evaluate and better understand the scope and potential of the sector by investigating appropriate ways to reduce energy demand and thereby help the UK to meet its energy and environment targets and policy goals (ESRC, 2010); these projects are ongoing and their findings are not yet available.

The distribution of benefits (in terms of both cost savings and generated income) is a key element of government support for the sector: "we will encourage community-owned renewable energy schemes where local people benefit from the power produced. We will also allow communities that host renewable energy projects to keep the additional business rates they generate" (HM Government, 2010 p17; see also DECC 2011). Instrumental policy perspectives therefore see community projects as facilitating technological shifts to renewable technologies, promoting behavioural change, and embedding social acceptability for larger sustainable energy technologies (HM Government, 2005). This policy objective of enabling any community to engage in sustainable energy projects has resulted in a shift towards revenue-generating business models (theoretically, available to anyone), in place of grant-funded support (necessarily limited in scale).

Community Energy: the evidence base

The claims made for community energy are wide-ranging, and the policy initiatives to support the sector have been significant, but the extent to which this represents evidence-based policymaking is unclear. Here we review what is currently known about the UK community energy sector, and identify the limitations of current knowledge, and the evidence gaps that remain. To the best of our knowledge, there have been only three relevant surveys conducted in recent years which attempt to capture a representative picture of civil society action around sustainable energy, and address both energy generation and energy conservation across wide geographical areas: the UK Low Carbon Communities Network's annual membership surveys covering local action groups and supporting bodies (e.g 100 responses from 2012 survey, 12.5% of their members) (LCCN 2012); the (unpublished) Energy Saving Trust's Green Communities programme member survey gathering 304 responses (5% of their members) (Energy Saving Trust, 2010); and Friends of the Earth's study of 267 community climate action groups in south-west England (Grimes, 2007). These surveys reveal that although the surveys and groups had wider 'low carbon' or 'climate action' remits, sustainable energy is the primary objective in most of the cases. Furthermore, initiatives around energy conservation were more common than energy generation; they also demonstrate the strongly informal and grassroots basis of these initiatives, as 59%, 55% and 85% respectively of the groups were entirely volunteer-run. However, none of these surveys were specifically targeted at community energy groups, and neither were they conducted by an independent body.

In addition to these surveys, there are a number of networks with publically-available directories of community energy projects compiled by NGOs and organisations administering grant/funding programmes. These may under- or over- represent the sector, as they are sometimes focused on one particular type of activity, or are self-reported with no verification. Nevertheless, they give an indication of the general scale of the sector: the Transition Network lists 220 UK Transition Town groups (www.transitionnetwork.org); Community Energy Scotland has 302 projects (www.communityenergyscotland.org.uk); there were 24 Carbon Rationing Action Groups active in 2008 (Howell, 2012); Energyshare lists 1087 'groups' (www.energyshare.com; although as a self-reporting database this includes anyone who has registered as being interested in their work); the Buildings Research Establishment's Low Carbon Building Programme included 2480 non-domestic, not for profit, community based organisations (schools, social housing associations, churches, but not necessarily community energy groups) between 2006-2011 (www.bre.co.uk); and Keep Scotland Beautiful's Climate Challenge Fund made awards to 261 communities between 2008-11 (ccf.keepscotlandbeautiful.org).

We are also aware of two online databases of community energy projects which are relevant to this study, both compiled as part of UK Research Council-funded projects. Walker et al (2005)'s desk study of community renewable energy gathered information on 507 projects, and the authors highlight that this adopts a deliberately broad definition of community energy. It found that solar thermal projects were the most prominent (40% of projects), significantly more than the next most common technologies employed: wind, biomass and solar electricity (all at 17%). They reveal an uneven geographical distribution favouring England (66%), followed by Scotland (20%), Wales (10%) and Northern Ireland (4%). Complementing this is a Scotland-focused database compiled by the EnGAGE project (Bomberg and McEwen, 2012) of 135 grassroots energy groups working on reducing consumption and generating renewable energy. These databases are intended for identifying projects, rather than quantifying characteristics of the sector, and therefore while they indicate the size of the sector, they provide little empirical data. Furthermore, the quantitative surveys and databases are not precisely focused on community energy; they either consider only energy generation, or they target 'low carbon' and 'climate action' groups which overlap, but do not exactly coincide with community energy.

In contrast, previous qualitative research on community energy in the UK has much to say about the potential and challenges faced by community energy projects. This work tends to be in the form of in-depth qualitative case studies, examining one or a small number of initiatives in detail, and frequently investigates exemplar or 'successful' projects to understand their dynamics and impacts. These studies often focus on a particular technology e.g. rural Scottish hydro cases (Hain et al., 2005), community wind (Yin, 2012; Hinshelwood, 2001; Maruyama et al., 2007), community woodfuels (Rogers et al., 2012), hydrogen (Shaw and Mazzucchelli, 2010). Alternatively, research on energy saving tends to be within the context of low-carbon behaviour-change activities (eg Howell, 2012), and so sustainable energy agendas are not explicitly examined to the same extent; in addition, these tend to focus on either householders (Darby 2006) or 'group' actions, which are interpreted as 'low carbon community' activities (Middlemiss and Parrish, 2010; Baldwin, 2010; Heiskanen et al., 2010).

Hielscher et al (2013) identify three aspects of community energy which differentiate the sector from government- or business-led interventions. First, community energy projects are multi-faceted, and

rarely address only one technology or aspect of behaviour in isolation; more commonly, they combine behavioural initiatives with efficiency measures, and both of these with micro-generation, in holistic interventions (see for example Adams, 2008; DECC, 2010; Gardiner et al., 2011; Steward et al., 2009). Second, by bringing together groups of people with common purpose, they overcome the structural limitations of individualistic measures, by empowering and enabling communities to collectively change their social, economic and technical contexts to encourage more sustainable lives and practise their ideological commitment to sustainability (Mulugetta et al, 2011; Sustainable Development Commission, 2010; Walker, 2008; Seyfang and Haxeltine, 2012). Third, they enable citizen participation in addressing sustainable energy issues, building on local knowledge and networks, and developing solutions appropriate to local contexts (Walker et al, 2007). This can include community development (Gubbins 2007; Hain et al 2005; Hinshelwood 2001), addressing fuel poverty (Reeves 2011) and local economic development (Shaw and Mazzucchelli, 2010; Hoffman and High-Pippert, 2010; Rogers et al, 2012) and even emergent experiments in self-governance and participatory democracy (Hoffman and High-Pippert, 2009; Walker, 2008). The objectives of, and claims made for community energy therefore go far beyond policy-instrumental energy-generation, carbon-reduction and financial benefits (Hinshelwood 2003; St. Denis and Parker 2009), and incorporate a wider range of sustainability objectives.

Some common themes emerge from this body of qualitative research, about the internal and external success factors, and obstacles to be overcome, by community energy projects (see Table 1 for a summary). Critical success factors can be grouped into five different aspects of community energy, correlating with different levels of activity: group (having key committed individuals to drive a project forwards; an effective organising group capable of maintaining momentum and overcoming setbacks); project (having sufficient time, information, skills, money and material resources to carry out the project; financial viability (where relevant)); community (the project being designed to meet the community's needs; engaging with and developing trust with the community); network (forming supportive partnerships and information-sharing networks; sharing information with other groups); and policy (a supportive national policy context).

Consequently, the most significant challenges identified in the literature are an absence of the success factors listed here, at the same different levels (see Table 1): group (lack of clear direction or management); project (a need for skills, information, financial and material resources); community (overcoming public disinterest and mistrust of new energy systems; tackling a sense of disempowerment in the public); network (the need to consolidate learning and skills so they can be transferred to others); and policy (a lack of policy support; inconsistent and hard-to-access grant funding; difficulties with planning and other legal issues (where relevant)).

While this knowledge is undeniably useful in uncovering the dynamics and processes experienced by community energy groups, and indicating possible policy recommendations to support the sector, it is nevertheless derived from small numbers of single-issue case studies. It cannot tell us how representative of the entire sector these findings are, nor the relative significance of different factors overall, nor anything about the geographical distribution of community energy and its scope and profile. We can see that despite considerable interest from academics and policymakers alike in community energy, there has to date been no quantitative survey of the UK's entire community energy sector. Our study is the first survey to investigate community energy in the UK and assess its scope, scale, character, activities, success factors and challenges faced. Our aim is to provide useful

insights for decision-makers seeking to support and harness the sector, as well as contributing to the literature by presenting a more representative picture than currently exists. In the next section we describe the methodology employed in our study.

Table 1 Success factors and obstacles facing community energy groups

	Success factors	**Obstacles**
Group	Key committed individuals effective organising group	Lack of clear direction or management
Project	Sufficient resources (time, money, information, people) Financial viability	Lack of skills, time, information, volunteers, material resources
Community	Meeting the community's needs Engaging local community	Public apathy, or disempowerment Mistrust in new energy systems
Partnerships/ Networking	Supportive partnerships Information-sharing networks Learning from other groups	Need to consolidate learning and skills, to pass it on
Policy	Supportive policy context	Lack of policy support Inconsistent / hard-to-access grant funding Difficulties with planning / other legal issues

METHODOLOGY

A web-based survey of community energy groups and projects was undertaken between June and October 2011. As there is no existing comprehensive database of such initiatives, a list of relevant UK support or network organisations was systematically collated from web-based searches, and snowballing from personal contacts. This included local, regional and national organisations working on climate change, sustainability and sustainable energy issues (such as the Low Carbon Communities Network and the Centre for Sustainable Energy). These organisations were asked to circulate a link to the web-survey to their members or other related organisations; 212 organisations were approached at least twice and 103 agreed to distribute the survey to their member groups. In addition, the survey link was sent directly to 234 communities involved in community energy projects, identified through online searches. In total, 354 responses were received.

After removing duplicated and abandoned responses, the rest of the responses were scrutinised by studying the organisations' websites or making enquires through emails. Only those which were directly involved in running community energy projects, and fitted our definition of community energy outlined previously, were included in the final sample of 190. This sample size compares very well with the similar surveys in recent years mentioned in the previous section. Although we cannot be sure we have a representative sample of UK community energy projects, we have achieved the maximum practicable response from the widest range of eligible organisations, and include a diverse set of organisations. We compare our findings to those of relevant surveys where possible, for triangulation, and have no reason not to believe our picture is broadly representative.

The questionnaire used closed-ended and open-ended questions to gather information about community energy, asking about community groups (e.g. members, locality, group structure) and

their sustainable energy projects (e.g. types of projects and activities, project progress, objectives), and about their successes and obstacles to be overcome. Simple descriptive quantitative analyses of closed-ended questions were conducted; responses to open-ended questions were coded using standard qualitative data analysis techniques (similar answers were first clustered together, and then grouped into higher-level theoretically-informed categories), and subsequently quantified. Given that over two-thirds of our respondents were involved in both types of community energy activity simultaneously (energy generation and energy conservation), a comparative analysis between projects in each activity area was not considered meaningful, and the dataset is analysed as a whole.

RESULTS: COMMUNITY ENERGY IN THE UK

In this section, we present our findings organised according to the themes identified earlier: i) Characteristics of Community Energy in the UK (who are they? what are they doing and why?); ii) Important factors influencing the success and growth of Community Energy.

i) **Characteristics of the sector**

Our survey respondents came from a wide variety of different types of community energy groups, including local civil society groups focusing on climate change, low carbon activities and general sustainability issues, eg Transition Towns, sustainable villages; renewable energy cooperatives, community interest companies and partnerships; related non-energy groups e.g. local conservation or allotment groups; local branches of national campaigns e.g. 10:10; groups or organisations who own or manage (or build) community buildings, such as church or faith groups, schools and colleges, village halls, social clubs, social housing; Statutory and non-statutory councils below the district level e.g. parish or town councils; Community Development Trusts and Community Associations or Trusts; projects set up by local authorities but mainly run by local communities e.g. Local Agenda 21 groups; and partnerships with public organisations with relatively strong community leadership. Table 2 presents quantitative data on the origins, character and structure of the groups.

While community energy projects can represent communities of place or interest, when asked which type of community they represented, we found that the vast majority (89%) identified as communities of *place*, indicating a strongly rooted context for most of these initiatives. We found a wide geographical distribution of projects across the UK, as shown in Figure 1. Overall, 75% were located in England, with 18% in Scotland, 4% in Wales, and 3% in Northern Ireland. Given this spread, and the nature of some of these projects, it is perhaps not surprising that almost two thirds of our respondents (65%) are rurally located, while 23% are in urban areas and 12% in suburbs. One respondent explained the relevance of community energy for their rural location: “Our primary purpose is to produce electricity as our community is not on the national grid” and another stated that “Our local geography in Cumbria has great renewable energy potential that has yet to be realised.”

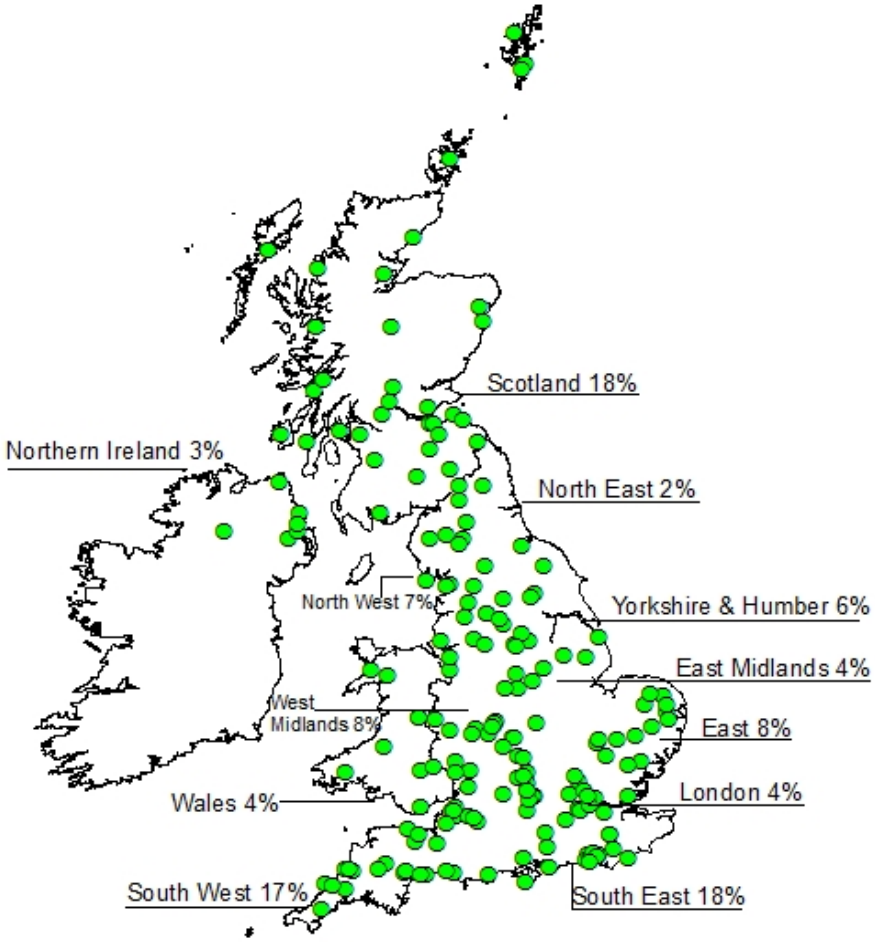

Figure 1 Map showing geographical location of UK community energy projects (Reproduced from Ordnance Survey map data by permission of the Ordnance Survey © Crown Copyright 2012)

Who sets up and runs community energy groups and projects?

The origins of the groups are very strongly rooted in civil society, as shown in Table 2: well over half (59%) were set up by individuals, and a further third (34%) by pre-existing community groups. This indicates that the community energy sector is predominantly citizen-led and community-based from the outset. The number of UK community energy projects has risen rapidly in the last few years: Figure 2 shows the cumulative total of projects by year, revealing a sharp rise from the mid 2000s - 79% of the projects were less than five years old (formed 2007-11). The longest-standing project was instigated in 1996, and the groups' average age is 4.2 years.

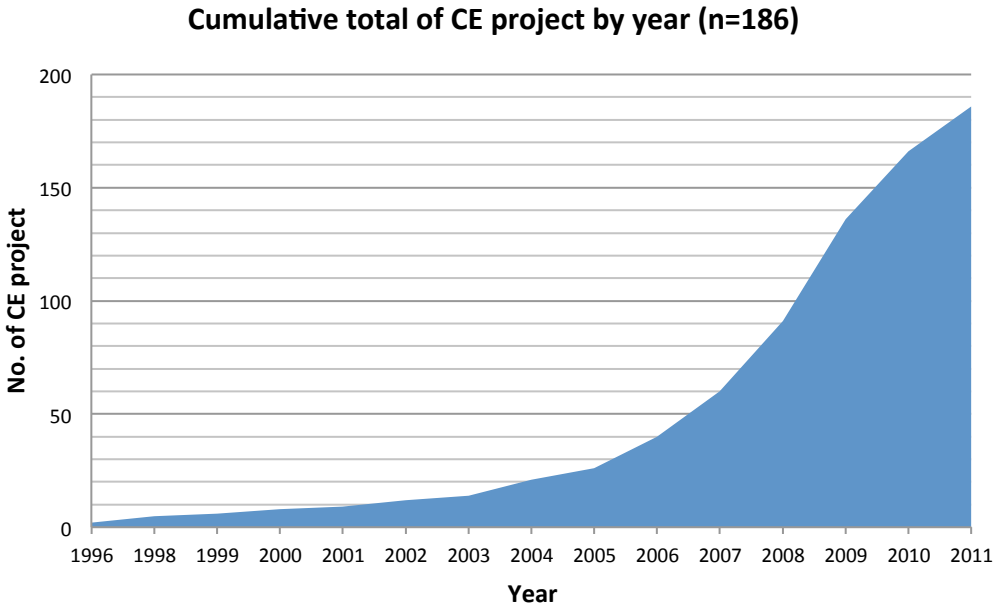

Figure 2. Number of communities working on sustainable energy

Table 2: Key Characteristics of UK Community Energy Groups (% of respondents)

Who set up the group?			**Income sources**	
An individual	6%		Grant funding	69%
Two or more individuals	53%		Income from energy generation	34%
A pre-existing community group	31%		Donations	23%
Two+ pre-existing community groups	3%		Loan	19%
A business	1%		Income from events/sales	15%
Local authority	6%		Share offer	14%
			Membership fees	7%
What types of partners are involved?			Commercial sponsorship	5%
Local authority	60%		Prizes	5%
Other community groups	53%		NONE	12%
Business	36%			
Schools	29%		**Applied for Grant Funding?**	
NGO/charity	26%		Yes, and were successful	52%
Government department	24%		Yes, both successfully and unsuccessfully	20%
Regional development agency	16%		Yes, but were unsuccessful	10%
Universities	13%		No, but plan to	7%
Faith organisations	12%		No, and don't plan to	10%
European agency	3%			
			What do they do with financial surplus?	
Group structure			No surplus	55%
Charitable incorporated organisation	23%		Tackle other issues in the community	32%
Independent informal group	20%		Develop and grow existing project	19%
Charitable social enterprise	18%		Begin a different type of energy project	13%
Limited company with a social purpose	16%		Support other community groups	5%
Informal group in larger formal org'n	15%			
Community Interest Company	13%			
Community Benefit Society	9%			
Unincorporated association	9%			
Incorporated body	7%			

Objectives of community energy projects

Our survey uncovered a wide range of goals from these community energy projects. From a list of possible options, respondents identified an average of 8 objectives per project (Table 3). The objectives are grouped into broad categories of economic (96%), environmental (88%), social (73%), political (73%) and infrastructural (68%) factors. This plurality of goals is summed up by these example statements of purpose: "To achieve financially viable energy projects which deliver social, environmental, sustainable and economic benefit to our parish and surrounding districts", "Helping people to save money on their energy bills and live more sustainable lives" and "To achieve resilient villages we believe we must develop sustainable strategies using renewable resources."

The most commonly cited single objective was saving money on energy bills (reported by 83% of projects), for instance one group elaborated "It appears to us that the source of interest in sustainable energy is 'saving money' rather than any real interest in climate change or reduced carbon footprint" and another remarked the income and savings are significant and have led to more householders in the village installing energy efficiency and energy generation systems." Other goals given by more than half the respondents were: reducing carbon dioxide emissions (cited by 80%, eg "although we don't push carbon emission reduction, it is clearly an important benefit of renewable energy generation"), improving local energy independence (60%), community empowerment (57%) and generating income for the community (52%). Substantial minorities also aimed to improve their local environment, tackle fuel poverty, influence wider sustainability and climate change policies, improve community health and wellbeing, etc.

Community Energy Activities

Given these multiple and plural objectives, how then do community energy groups aim to achieve their goals? Respondents' groups were involved in two distinct types of activity: sustainable energy generation (82%) and energy-conservation (86%). Two thirds (68%) of the groups are engaged in both domains, revealing again the holistic and multi-faceted nature of these community energy projects (see Table 2).

Turning first to a breakdown of the projects involved in *energy generation*, we found that projects were using an average of 1.9 renewable technologies each, and the field was clearly dominated by installations of solar photovoltaic renewable technologies (71%). The next most common types were solar thermal (23%), ground source heat pumps (22%), onshore wind (20%), air source heat pumps (16%), biomass (14%) and hydroelectric power (14%). Interestingly, previous work has highlighted solar thermal as the most common renewable energy technology employed by community energy groups (Walker et al, 2005), but it is clear that recent policy changes and financial incentives towards solar electricity (in particular, the Feed-In Tariff) has shaped the current market for community-based energy initiatives.

Table 3: The Objectives and Activities of UK Community Energy (CE) Groups

Objectives of Community Energy Projects	% of CE		**Activities undertaken**	
Economic	**96%**		**Energy generation (% of the respondents active in this area** who gave details**)**	
Saving money on energy bills	83%		Solar PV	71%
Generating income for community	52%		Solar thermal	23%
Tackling fuel poverty	47%		Ground source heat pumps	22%
Improving local economy	36%		Onshore Wind	20%
Skills development	31%		Air source heat pumps	16%
Local job creation	27%		Biomass	14%
Environmental	**88%**		Hydro	14%
Reducing carbon dioxide emissions	80%		Combined heat and power	3%
Improving local environment	48%		Energy from waste	2%
Social	**73%**		Tidal	1%
Community wellbeing and health	43%		Wave	1%
Improving education	40%			
Social cohesion	39%		**Energy conservation (% of respondents active in this area who gave details)**	
Social inclusion	37%		Newsletters	66%
Creating volunteering opportunities	29%		Public meetings	65%
Political	**73%**		Using energy efficient appliances	61%
Community empowerment	57%		Stall at events	55%
Influencing sustain'y/energy policy	44%		Wall/loft insulation	55%
Community leadership	27%		Community notice boards	53%
Infrastructural	**68%**		Engaging with schools	53%
Improving energy independence	60%		Leaflets media coverage	52%
Community building refurbishment	33%		Energy monitors	35%
			Auditing/footprint approaches	35%
			Giving out freebies	34%
How well have you achieved objectives?			Discussion groups	30%
Very well	22%		Training sessions/seminars	29%
Quite well	53%		Film showings	27%
Neither well nor poorly	19%		Thermal imaging	26%
Quite poorly	5%		Educational visits	23%
Very poorly	2%		Award/incentive schemes	15%
			Pledges	14%
How successful do you expect to be?				
Very successful	38%		**What is the group's future plans?**	
Successful	39%		Focus on project, don't want to grow	19%
Not sure	15%		Expand existing activities	29%
Unsuccessful	1%		Try out other CE projects	52%
Very unsuccessful	8%			
Which stage is the group at?				
Considering taking part in community energy for the first time				10%
In the process of setting up our first community energy project				25%
We worked on a project but had to abandon it uncompleted				4%
We successfully set up a community energy project				41%
We set up one project and are now working on another				21%

In contrast, the projects working on *energy saving* demonstrated a more diverse set of activities, with an average 7.3 measures each. Among these projects, the two most common initiatives were newsletters (66%) and public meetings (65%), followed by using energy efficient appliances (61%), stalls at events (57%) and wall/loft insulation (55%). Many of these activities are concerned with information-provision, presumably adopting an information-deficit approach to behaviour change and energy conservation. Such awareness-raising activities are perhaps less tangible and demanding than other activities requiring installation of new technologies, or learning new skills. Such technological solutions were less popular, for example, energy monitors (36%), energy auditing or carbon footprint approaches (36%) and thermal imaging approaches (27%).

How successful are community energy projects?

Encouragingly, over three quarters of the respondents (75%) felt that they were achieving their objectives quite well or very well, and only 7% felt they were not meeting their aims. Similarly, 77% felt positive that their projects would be successful or very successful, while only 8% felt they would not succeed. Indicating the tangible achievements of the sector, and the experiences of our respondents, 61% of our respondents had successfully set up projects (including 21% who had gone on to a subsequent community energy project). A quarter (25%) were in the middle of setting up their projects, and 10% were at the stage of considering a community energy initiative. Looking forward, of the respondents who had 'future plans' in terms of sustainable energy, 52% planned to try out other energy-saving approaches or sustainable energy technologies, and a further 29% planned to expand their existing activities. A fifth (19%) just wanted to focus on consolidating their current activities.

Ii) **Factors Influencing The Development Of Community Energy**

In order to grasp the range and extent of key factors and issues that have influenced the development of community energy sector, we undertook a SWOT (strengths, weaknesses, opportunities and threats) analysis, asking groups to identify the key internal and external factors, which had both positive and negative impacts on their projects. These results are shown in Table 4 and are discussed in the following sections, relating them to the five thematic sets of critical issues identified in the community energy literature which we discussed earlier (group, project, community, networks/partnerships, and policy issues).

Group factors

As shown above, UK community energy groups are predominantly set up by individuals and existing groups coming together around specific sustainable energy-related objectives. Almost half our survey respondents (48%) reported that the qualities of the group itself were critical strengths, making this the most important success factor overall. Within this, the main aspect cited (by 37%) was the characteristics of the group and its members (eg determination and commitment of key individuals to drive the project forwards), followed by 17 % who mentioned particular skills held by group members (negotiation, accountancy, engineering, planning); a shared group vision was important to a few respondents. In contrast, very few problems with the group's composition and character were listed as weaknesses, with only 3% identifying issues such as poor group management or lack of direction. To some extent this is unsurprising, as presumably groups that had real difficulties forming and working together would not be operational, and so the survey has an inherent bias towards successful groups.

Given the largely informal origins of many of these groups, what resulting group structures are adopted? We found that a third of our respondents (35%) were operating as informal groups (comprising 20% working independently and 15% working as part of a large formal initiatives or programmes). Other common structures were charitable incorporated organisations (23%), charitable social enterprises (18%) and limited companies with social purposes (16%) – see Table 2. Some indicated that they were in the process of registration or planning to get registered as a group. This suggests that having formal organisational structure is a part of development processes, for example, for funding or tax purposes, all of which would be a sign of the institutionalisation which may be required to progress the objectives of the group.

Table 4 Success factors and obstacles facing community energy groups

	Success Factors		Obstacles	
Internal to the group	**STRENGTHS**		**WEAKNESSES**	
	all group factors	**48%**	**Group management, direction**	**3%**
	qualities of group	37%		
	skills among group	17%	**all project obstacles**	**71%**
	group vision	4%	need time/volunteers	18%
			need funding/access to finance	31%
	all project factors	**19%**	need expertise/tech advice	8%
	project management	10%	specific issues to their project	17%
	specific/technical aspects	7%	engaging with community	2%
	community engagement	5%		
External to the group	**OPPORTUNITIES**		**THREATS**	
	all local external factors	**4%**	**all external obstacles**	**33%**
	alternative culture/social capital	3%	government policy/changes	14%
	geographical location	2%	planning restrictions/hurdles	10%
			other bureaucracy	8%
	all support factors	**42%**	lack of support from others	4%
	parent/linked org support	6%	public apathy/attitudes/NIMBYs	26%
	community support	9%		
	local organisations' support	9%		
	local authorities' support	4%		
	network organisations' support	15%		
	consultants' support	6%		
	all policy factors	**30%**		
	funding/grants	24%		
	policy support e.g. FITs/RHI	10%		
	all wider contextual factors	**10%**		
	rising energy prices/recession	8%		
	awareness of CC/energy issues	4%		

Project factors

In contrast with the preceding section, we found that success factors relating to the projects themselves were only moderately important (reported by 19%), and tending to focus on aspects of project management, dealing with specific technical issues and so on. However, project-related obstacles were by far the most significant group of negative influences facing the groups (71%). Principal among these is a need for funding or access to finance (31% identified this weakness). We found that the vast majority of our survey respondents (88%) had one or more sources of income (see Table 2). Two thirds received grant funding (69%), and other significant sources were income from energy generation (34%), and donations (23%). It is noteworthy that many of these income streams are intermittent (e.g. funding, sales income, sponsorship, prizes) or represent sums that need repaying (e.g. share offer, loans), and some respondents indicated that they were relying on the generosity of core members and parent organisations: "Group members are paying small costs like venue hire and print costs at present out of their own pockets." This indicates that groups are demonstrating resilience and adaptability in the face of changing external conditions and opportunity structures.

Grant funding is clearly the major source of financial support of these projects, and of the whole sample, 72% had been successful in winning grant funding, while a further 10% had applied but been unsuccessful (this might indicate a bias towards 'winners' in our sample, and highlight the need to study more failed projects to understand their struggles). Seven per cent were planning to apply for funding, and only 11% had not done so, and had no plans to in the future. This finding reflects the timing of our survey, as while grant-winners feature heavily in our sample, the future of community energy seems to be moving away from a grant-funded model, towards economically sustainable business models involving revenue-generation (the majority listed income generation as an objective), but success at achieving this source of income is perhaps only starting to be evident. Park (2012) argued that a shift in the form of governmental financial support, from grants for the capital costs of installing equipment to clean energy cash back schemes (e.g. the Feed in Tariffs for low carbon electricity and the Renewable Heat Incentive for renewable heat payments) would reduced one of key funding opportunities for community energy projects. At the same time, this change emerged with other innovative support measures, for example, providing loans towards the high-risk, pre-planning consent stages of renewable energy projects, or companies installing renewable technologies for free in return for tariff payments. Thus, the clean energy cash back schemes seem to offer a long-term incentive for some communities to establish revenue generating sustainable energy projects. Yet, it would be premature to assume that such emerging opportunities are equally open to all interested communities.

On the other hand, we found that over half the projects (55%) did not have any financial surplus, which may reflect the fact that not all community energy projects require income or a trading surplus to operate. A third of our respondents (32%) said that they used their surplus to tackle other social, economic and environmental issues within the community. For instance, one organiser reported "We intend to use the income from the hydro scheme to fund 'greening' measures in the community, initially through grants for which parishioners can apply to improve the energy-efficiency of their homes" and another said "We are working towards generating a financial surplus from community owned renewables to invest in creating the low carbon infrastructure required locally and specifically to allow us to implement our fifteen year local resilience community action plan." Others spent their

surplus further developing and growing their existing energy project (19%), instigating a different type of sustainable energy project (13%) or supporting other community energy groups (5%).

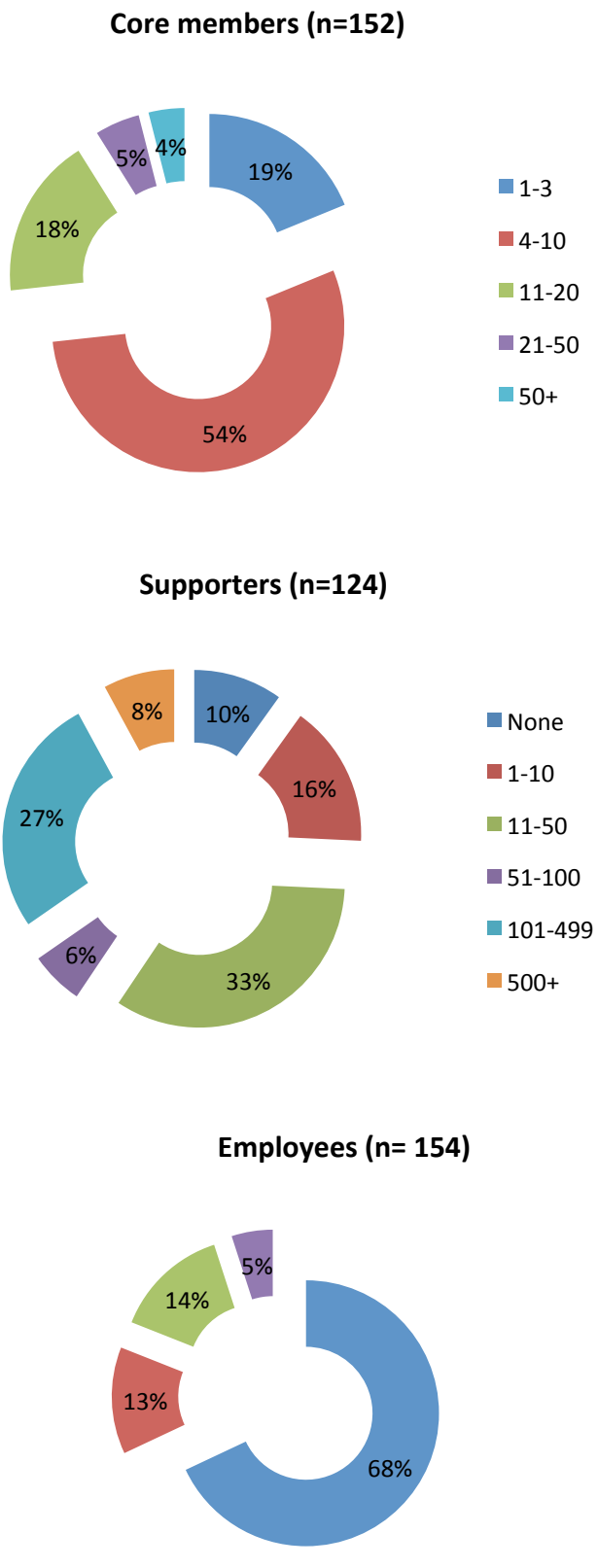

Figure 3 No. of core members, employees and supporters

The second most-cited weakness (18.4%) was a lack of time and/or volunteers to carry out the project work. Since these projects are community-based initiatives, we seek to understand their scale in terms of three dimensions of participation: active core members, employees and wider supporters in the community – illustrated in Figure 3 (this latter dimension in the following section). Survey respondents reported having between 1 and 200 *active core members* (committed individuals - people who spend time, and share their experience, skills and expertise to run their community energy projects), with a mean of 13.0 and a median of 6.0. Reflecting the highly voluntary nature of this sector, the number of *employees* these projects has was far smaller: this ranged from none to 250, with a mean of 3.6 – although as 68% reported no employees at all, the data is clearly skewed towards a small number of large organisations. Encouragingly for the sector, a third of the groups (32%) had grown over the last year, and over half (57%) have remained stable. Only 11% reported their groups declining. Other project-related obstacles were very specific to particular projects such as technical problems, siting issues and so on (reported by 17%), and a need for technical expertise and advice to fill skills and knowledge gaps in the group (8%).

Community factors

This set of issues overlaps somewhat with the previous section, and focuses on two separate but overlapping aspects relating to community. The first is the role of project-level activities to specifically engage with local communities, which were seen as a relatively minor strength or weakness, depending on how well these activities were deemed to have been carried out.

The second relates to wider (external) community support and engagement, which was held to be a success factor (opportunity) for 9% of projects, but a lack of this public engagement and interest was a significant threat reported by 26 % of respondents. When considering the *support from wider communities*, overall our respondents reported having between zero and 2,000 supporters, with a mean of 168.1 and a median of 37.5. (Figure 3) This result may be due to our respondents including those in partnership with other agencies and organisations, or who were part of institutes with a large number of members (e.g. schools, churches, development associations). Activities relating to profile-raising and face-to-face community engagement are discussed in the next section.

Networking and partnership factors

The importance of forging supportive partnerships and networking links with external organisations is highlighted by the 41.9% of the groups who gave this as a success factor, making it the second-largest opportunity (in contrast, the lack of this support was only mentioned as a threat by 4.0%). Community energy groups often work in partnership with other organisations, averaging 2.7 partners per project (see Table 2 for a full breakdown). These partnerships were most prominently with Local Authorities (60%), and other community groups (53%), but also with businesses (36%), schools (29%), NGOs/charities (26%), and national government departments (24%). The majority (88%) of respondent groups were leading their sustainable energy projects within these partnerships.

We found that networking is a key activity for the UK's community energy sector: almost three quarters of our survey respondents (73%) were engaged in some form of networking with other community energy groups and/or with organisations and networks. We discuss these two types of networking in turn. First, interactions with other community initiatives were significant. Overall, 40%

of our sample had received help from other community groups (averaging 1.9 sources of help), and 38% had provided help to other community groups (averaging 2.2 recipients). An analysis of the geographical proximity of the other communities involved reveals that networking with others within their localities (i.e. villages, towns, cities) and county is the most significant for the sector, compared with national or UK-wide networking. As shown in Table 5, more than 80% of our respondents' networking activities (both giving and receiving help) occurred within their own counties. Three community groups were mentioned by more than two respondents as a provider of help: OVESCO (3 times), Low Carbon Oxford North (4 times) and Low Carbon West Oxford (6 times).

Table 5: Geographical location of communities providing help to, and receiving help from community energy groups

	Location of communities from whom help was received % (147 network ties)	Location of communities to whom help was given % (157 network ties)
Local	34%	30%
Within County	52%	55%
Other Counties within Country	14%	13%
Other Countries within UK	0%	2%
Outside UK	1%	0%

The kinds of help exchanged between communities were both practical and inspirational. For example, respondents indicated that they shared useful contacts, lease documents, grant application forms, equipment and office space, all of which could have had immediate and tangible impacts to set up and develop projects. In addition, communities shared ideas and gained inspiration from each other.

Second, and in addition to these reciprocally supportive links between community energy projects, links with intermediary organisations and networks were also important. More than half the respondents (58%) reported active networking with such organisations (averaging 2.9 each). We coded the named organisations into three categories: regional, country-level and the UK-wide depending on their geographical coverage and remit. Regional organisations operate in sub-national areas within a country, such as local authorities, county-level networks (e.g. Action with Communities in Cumbria), branches of national organisations (e.g. Friends of the Earth Birmingham). Country-level organisations were those which aimed to cover their respective countries (e.g. Locality (England), Energy Saving Scotland Advice Centre, Environment Wales). UK-wide organisations and networks cover all countries in the UK; in addition to the public sector and third sector organisations operating throughout the whole UK (e.g. the Energy Saving Trust, Transition Network), this category includes private sector businesses (installers and consultants), whose customer base is not limited by geography. The types of organisations and networks named were very diverse, including those which are needed to set up and run a project (e.g. British Hydro Association, Climate Challenge Fund Programmes), and those which involve shared interests other than sustainable energy (e.g. Christian Ecology Link, Community Composting Network). Respondents were engaged with the named organisations as members and/or partners, or as subjects of case studies written by the organisations and receivers of grants or awards. In addition to receiving technical advice, respondents were

involved in lobbying, campaigning, networking and various publicity activities through the organisations.

Due to the widely dispersed nature of our sample, our network analysis found that out of 130 named *regional* organisations, only two were named three or more times: Community Action Groups Oxfordshire (6 times) and Oxfordshire Climate Xchange (4 times). At country-level and UK-wide, where key groups and organisations were mentioned more frequently (due to their wider coverage), we identify the significant network hubs (those with the greatest number of network connections), and these are presented in a sociogram (Figure 4).

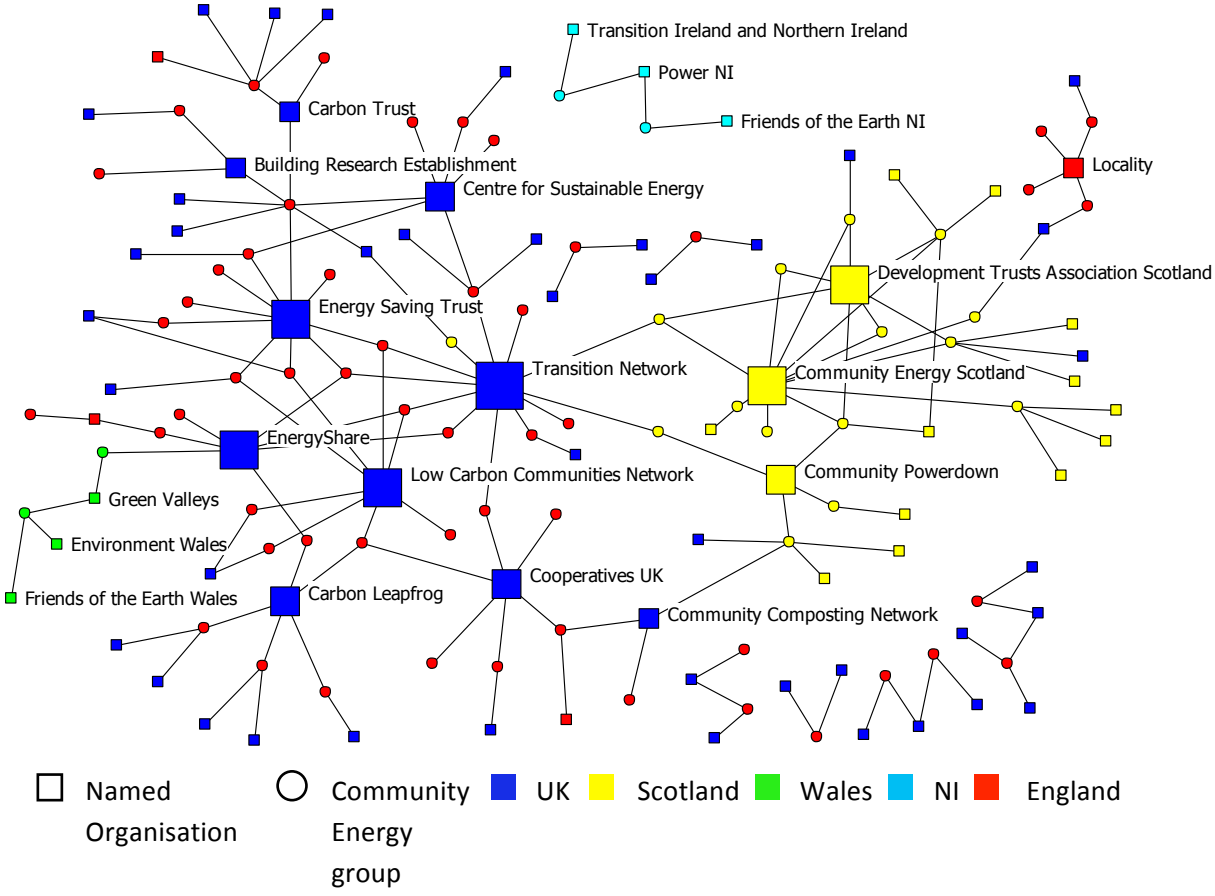

Figure 4. Sociogram of UK community energy groups networking with country-level and the UK-wide organisations

The Transition Network was the most commonly named organisation (named by 12 respondents) followed by Community Energy Scotland (11) and the Energy Saving Trust (10). Others which were named more than three times included the Low Carbon Communities Network (8), Energyshare (7), the Development Trusts Association Scotland (7), the Centre for Sustainable Energy (6), Co-operatives UK (6), Carbon Leapfrog (5), Community Powerdown Scotland (4) and Locality (4). Whilst six of these organisations specialise in sustainable energy, it is notable that alternative (e.g. Transition Network) and conventional (e.g. Development Trusts Association Scotland, Locality)

community development organisations, and business associations (e.g. Cooperatives UK) also played a key role.

The sociogram shows that communities in Scotland, Wales and Northern Ireland tend to work with organisations based in their own country, whereas communities in England appeared to be engaged with the UK-wide organisations (which tend to be located in England) as well as organisations operating only in England. This tendency was also found in networking between community groups and organisations at all levels including regional bodies, as shown in Table 6. This reveals that while 41% of the networking ties from English community energy groups were with UK-wide organisations, the figure is only 15% for Scottish groups, 7% for Welsh groups, and none at all for the Northern Irish groups. Unsurprisingly, groups in each country have no network ties with organisations whose remit is a different country, but the over-reliance on country-specific organisations suggests that there is some isolation of community energy groups in Scotland, Northern Ireland and Wales from organisations whose remit is to support community energy UK-wide. This may reflect greater convenience and better support from nationally-focused organisations which are better connected with local policy domains, and perhaps a redundancy of provision from UK-wide organisations.

Table 6: Geographical analysis of networking between community energy groups and networks/organisations operating at regional, country and UK-wide levels

	Geographical area covered by the named networks/organisations (% of ties from communities in each country)				
Country of community energy group (total number of ties)	England	Scotland	Wales	Northern Ireland	UK
England (241)	58%	0	0	0	42%*
Scotland (59)	0	85%	0	0	15%
Wales (14)	0	0	93%	0	7%
Northern Ireland (5)	0	0	0	100%	0

* includes 0.4% international outside UK

Given that networking and mutual support is such an important factor for many community energy groups, it is unsurprising that the majority of our respondents (71%) undertook activities to raise their profile and share their experiences, often through a variety of channels (see Table 6). Of those who gave further details, the most common activity was gaining publicity through the networks they were involved with (26%), followed by local media and press (25%), giving talks at seminars and actively participating in events (23%), their own website (20%), national press/media (16%) and coverage on others' websites (10%). Some of them promoted their groups through personal visits, publishing their own newsletters and leaflets, were featured in case studies or using their own mailing list and press releases. Typically, a variety of profile-raising strategies is employed, and one group explained their promotional activities in this way: "We led a tour of local homes with solar PV and solar thermal panels a fortnight ago. I would hope to see us expanding this, publishing (paper and online) a booklet with people's solar panel experiences and publishing a booklet for local

homes on how best they can save energy." These kinds of activities indicate that face-to-face contact and direct community engagement is important to community energy projects, and a key element of what they do, reiterating claims that local knowledge and networking is crucial for the success of these projects. However, indirect contacts such as media and websites were more commonly used (79% of those engaged in publicity) than direct person-to-person approaches (28%). It is striking that of our *whole* sample, less than half (46%) are publicising themselves through the media (all forms) and only 36% are using the internet to promote their activities.

Table 7: Engagement in activities to raise profile of community energy and influence policy

Activities to publicise the group (of the 71% who undertook such activities)	
In-person	**28%**
giving talks at seminars and actively participating in events	23%
personal visits	9%
Indirectly	**79%**
gaining publicity through the networks they were involved with	26%
local media and press	25%
their own website	20%
national press/media	16%
coverage on others' websites	10%
publishing their own newsletters and leaflets	7%
were featured in case studies	6%
using their own mailing list and press releases	6%
internet-based social networking	5%
specialist media	5%
producing films about their projects	3%
Activities to influence wider policy context (of the 45% who were involved)	
Membership of an organisation or network	33%
involvement in Local Authority planning and development plans	28%
responding to government consultations or being involved with a government department	23%
lobbying MPs and MEPs	15%
attending events or campaign meetings in support of sustainability policies	14%
carrying out the project has an influence on policy	13%
Education	3%

Policy factors

The final set of issues we consider relate to policy frameworks and wider regulatory contexts, which were reported by 30% of respondents as important external opportunities for community energy. This primarily related to grant funding structures (24%), and secondarily to financial incentive policies such as the Feed-in Tariff and Renewable Heat Incentive (10%). Clearly, some groups were able to take good advantage of the opportunities afforded by current policies. On the other hand, a significant number (14%) found that policy and regulatory threats were a real problem to the projects. This related mainly to recent changes in government renewable energy incentive structures which caught several groups unawares and undermined their efforts; other problems came from planning hurdles (10%) and other bureaucracy which was perceived to block efforts to develop community energy.

We explored whether and how the community energy sector was active in trying to influence wider sustainability or climate change policies (see Table 7). Almost half the survey respondents (45%) stated that they were indeed engaging with policy either directly or indirectly. A third of these reported that they did this by being a member of an organisation or network (thereby demonstrating the importance of intermediary organisations for the sector (Hargreaves et al, 2012), and a quarter cited involvement in Local Authority planning and development plans, and responding to government consultations or being involved with a government department. Others were lobbying MPs and MEPs, or attending events or campaign meetings in support of sustainability policies. Finally, we note that some projects identified wider social factors as opportunities for community energy, such as energy price rises and growing concern about climate change, indicating that broad social trends may be pointing in the direction of a growing community energy sector.

CONCLUSIONS

Community energy has been supported by successive UK governments aiming to harness its potential to support sustainable energy transitions. Our survey of UK community energy groups has sought to provide robust evidence of the scope, scale, character, activities and challenges faced by the sector, to support such policymaking. This quantitative, UK-wide study has confirmed the findings of previous qualitative research, and brought an additional distributional perspective on the specific characteristics, and the relative importance of particular factors influencing the sector's development. Our research has revealed several key issues to be addressed when considering the further development of the sector.

First, this is a highly diverse sector representing many types of actor and organisational forms, multiple sets of objectives (not all of which relate to energy), holistic and multi-faceted repertoires of action, and many different practical strategies and technologies to achieve their goals. It is therefore exceedingly difficult to pinpoint specific features of the sector as a whole, or to aggregate these diverse groups and their activities into simple categories. Community energy is not reducible to a single entity. This key observation has several ramifications for governing the sector, not least because although some groups do have ambitions to expand and grow, others are simply providing local solutions to local needs as an end in itself, and have no desire to expand in the way that policymakers might hope. Community energy is not necessarily a tool to be wielded by energy ministers aiming for widespread change; some of the sector is content to remain small and self-contained. The multiplicity of the sector's objectives highlights the need for joined-up thinking among government departments; the community energy sector addresses policy goals covering a number of different government departments, not solely energy and climate change. There is a challenge here for government and the sector to relate to each other more effectively to best achieve the sustainability goals (including but extending beyond energy) of these groups. Performance measurement and project monitoring must acknowledge multiple sets of objectives, for example, and avoid using single-dimensional criteria (such as carbon dioxide emissions reduced or kilowatt hours of energy produced) when multi-criteria appraisals would be more appropriate to capture the full range of outcomes.

Secondly, the civil society basis of the sector is fundamental to its character and to its success at engaging with local communities, and makes the sector quite distinct from the large energy companies these community groups are aiming to work alongside. This uneven playing field points to

vulnerabilities and tensions inherent in this model – the growth potential of voluntary associations is uncertain, and hurdles to be overcome in becoming more businesslike and commercial. The relative balance of internal and external success factors and obstacles is such that while a good strong group is a major strength, there are project-related weaknesses (time, volunteers, money, material resources) that are difficult to meet internally. There is a limit to how much groups can achieve on their own. Instead, external sources of support are required to succeed and this indicates the strong need for consistent policy support, as well as intermediary networks, to ensure community energy projects have the resources they need to progress and achieve their objectives. Furthermore, the policy shift from grant-funded projects to a more broad-based revenue-generating business model will have serious implications for projects in the sector, not all of whom will be able to adapt to the new policy regime.

To conclude, our research has revealed a wealth of civil society activity in the field of sustainable energy, tackling a wide range of sustainable energy and related issues, and growing as a sector. With appropriate policy support and clear funding streams, and robust intermediary organisations to share learning, we are cautiously optimistic that community energy can continue to grow and achieve its potential as a key player in the transition to a sustainable energy system.

ACKNOWLEDGEMENTS

This research would not have been possible without the generous assistance of the survey respondents or of the Engineering and Physical Sciences Research Council and EDF Energy-funded 'Community Innovation for Sustainable Energy' project (Grant ref: F/00 204/AM), and we thank our colleagues on this project for comments on previous versions of this article.

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