Policies to unleash UK community energy finance

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Abstract

For the past decade, the typical UK community energy project has delivered decentralised and democratically owned, renewable power generation. These have typically relied on state revenue payments schemes (e.g. Feed-in Tariff) to be financially viable. By stabilising revenues and de-risking projects, they've not only provided an income stream but also helped communities secure finance to cover capital costs.

However, since the Conservative majority government formed in 2015, community energy has faced a series of disruptive policy changes. The discontinuation of revenue payments, an effective ban on onshore wind and the removal of social investment tax breaks), have created turmoil. Alongside the continued scarcity of capital grants, these policy changes have meant that community energy finance has simultaneously become more important *and* harder to secure.

This paper draws together a national survey, expert interviews and four community energy case studies. It finds that some communities have responded to these policy shocks by implementing novel, service-based business models in an attempt to capture new revenue streams that replace these lost earnings. Even so, critical barriers to community energy finance persist for all types of business model including the: 1) poor connectedness of the UK's community energy finance supply chain; 2) poor community access to land and buildings; 3) limited time, skills and experience within communities; 4) limited opportunities to partner with local stakeholders; 5) poor access to wider energy markets; and 6) logic of institutional investors that prioritises scale and financial profit.

Policy action is therefore needed to address these barriers and to unleash new finance into the community energy sector. This paper presents eleven policy recommendations to achieve this aim, including but not limited to: 1) the provision of low-cost state community energy finance and a joined up finance chain; 2) grants and community benefit payments that support business model experimentation, especially in deprived areas; 3) minimum net-zero and just transition investment standards; 4) enforced partnerships with local authorities and NDPBs; 5) swift and affordable community access to under-utilised public land; and 6) a UK-wide community energy strategy and stand-alone delivery body.

1 Introduction

The UK pathway to net-zero requires a 78% reduction on greenhouse emissions versus 1990 levels by 2035, as legislated by the UK's sixth carbon budget. In addition, there is a growing pressure on government to ensure that the pathway to net-zero constitutes a 'just transition', where "*the benefits of climate change action are shared widely, while the costs do not unfairly burden those least able to pay, or whose livelihoods are directly or indirectly at risk as the economy shifts and changes*" [1 p.13].

Community energy is regularly cited as critical to delivering on both our net-zero and just transition objectives [2,3]. These arguments typically centre around its ability to: 1) unlock low-carbon energy projects that may have otherwise gone unrealised [4]; 2) improve citizen trust and understanding of low-carbon energy [2,4–6]; and 3) empower marginalised communities by providing them with greater control over energy infrastructure and the distribution of any financial surplus they generate [2,5,7].

Despite its promise, the growth in community energy has stalled lately. In 2019, investment into the community energy sector totalled £31.1m, which represented a drop of 22% versus 2018 [8]. This was in parallel with a fall in new additional generation capacity, dropping from 15.4 MW in 2019 to 8.2 MW in 2020. There was also a 13% drop in the number of UK community organisations installing renewable electricity projects during the same period [3]. The sector is in decline, with the absolute number of projects falling, as well as the overall scale of the sector [3,8].

The slowdown has largely been attributed to an unsupportive policy regime, especially the removal of key subsidies such as the UK's Feed-in-Tariff [2,3,8]. These policy changes have combined to make community energy projects higher risk and thus less attractive to investors; meaning finance has become harder to secure. At the same time, government grants for community energy are limited in number and scale, placing a greater emphasis on communities to secure finance to cover upfront capital costs of energy projects. In summary, project finance has become more important to community energy groups, whilst also simultaneously harder to secure.

Despite the finance gap facing UK community energy and the strong link that exists between government policy and how investable an energy project is seen to be, relatively little academic research has examined how government policy supports community energy finance[1]. Consequently, this paper answers the following questions:

1. Which factors are most critical to community energy's business model operations and its ability to secure investment?
2. Which policies could bolster the investment proposition of community energy projects and increase the flow of finance into the sector?

The paper is structured as follows. Section 2 reviews the extant literature, exploring the value of community energy, critical factors for success and potential policy solutions to support community energy finance. Section 3 presents the paper's analytical framework and Section 4 its methodology. Section 5 offers a brief overview of UK community energy finance policy. Section 6 presents the factors most critical to community energy groups securing finance. Section 7 presents policy recommendations to grow the flow of finance into community energy. Section 8 concludes.

[1] More attention has been given to the subject via non-academic research outlets [16,20].

2 Literature Review

In this section we review the relevant literature on community energy finance. Section 2.1 explores the value of community energy. Section 2.2 details the level and type of finance flowing into community energy. Section 2.3 considers the direct and indirect factors that dictate the success of securing community energy finance. Section 2.4 summarises the policy solutions that have been proposed to grow community energy finance.

For the purposes of this paper and literature review, we draw on Walker's [9] framing of community energy, to define community energy as follows:

> *An energy project initiated through grassroots and local stakeholder action, which is wholly- or partly-owned and democratically governed by a local community, and whose mission is to deliver a range of environmental, social and economic benefits for their local place.*

2.1 The value of community energy

What value does community energy offers us - and the wider energy system - in the context of a net-zero and just transition? A review of the literature identifies how community energy's value proposition is based upon the following core offerings:

- Provide unique sustainability education opportunities [2,4,5] that can help "*bring otherwise distant and ambiguous global environmental issues into the realm of 'conscious awareness' and every day practices*" [5 p.3409]. Community energy projects thus lay important foundations for driving behavioural change that supports sustainable development [4].
- Increase local support and trust for low-carbon energy projects [2,4–6], especially versus typical commercial arrangements [2]. In some cases this can improve chances of successful planning applications [6].
- Allow for surplus profits to be recycled back into the community, channelling additional investment into wider social and environmental community initiatives [2,5].
- Enable a more equitable distribution of renewable subsidy payments across deprived communities versus direct subsidy payments to households, which tend to benefit more affluent groups [7].
- Improve levels of local control and autonomy [4,6]; empowering communities to be involved in their own energy. This can in turn drive community cohesion and broader sense of community pride [10].
- Create benefits for marginalised regions or communities [2,4].
- Unlock latent knowledge, skills and capacities existing within communities [5] to deliver energy solutions that may have otherwise not taken place through the traditional energy market [4]
- Boost local jobs and economic activity [5].
- Provide opportunities to test new product-services and drive innovation [4]

Community energy is not however without its shortcomings. The most important is that not all communities are on a 'level playing field' when it comes to taking energy action. As Middlemiss and Parrish [11] explain, we cannot assume "*community groups have the capacity to instigate change in communities*" (p. 7560). This point is echoed by others [5,10,12,13], who explain how inequalities in communities' ability to deliver community energy projects in turn impacts upon their likelihood of benefitting from the financial surplus they can generate.

There is also the potential for unequal governance within the community, where the requisite capital, skills and knowledge to initiate and manage projects rests with just a handful of community members [5]. This is coupled with questions about whether community energy projects can bolster the degree of knowledge and skills within a given community [5]. There have also been concerns raised about the lack of robust arrangements being put in place to protect consumers and procedures to address customer problems, when something goes wrong [10].

2.2 Community energy finance

Community energy finance is defined here as the "*unearned flows of money into community energy groups*" [14 p.10] and typically takes the form of loans, bonds and shares, which are subject to repayment over time[2].

A study of community energy finance in the UK identified how loan finance accounted for 74% (£22.9m) of community energy finance in 2019, with community shares accounting for 16% (£4.9m), bonds 5% (£1.4m) and the remaining 6% from a combination of grants, self-funding and other sources [8]. We note that community shares – withdrawable (non-tradeable) shares - account for almost all the finance raised by small projects, i.e. those with a CAPEX of less than £200,000 [15]. Furthermore, we also find that the mean interest rate associated with community share finance – at 4.6% - is both competitive with other retail savings accounts but also still relatively affordable for community groups [15]. However, share finance becomes relatively less important the more expensive the project becomes. For those costing more than £1.5m, loan finance covers approximately 75% of capital costs [15]. Bonds remain relatively rare as a source of community energy finance [15].

Unfortunately, it is not uncommon for community energy projects to struggle to secure finance [4,8]. This is particularly concerning for communities where capital grants are now scarce (e.g. UK) (Section 5) and they have become highly reliant on securing finance to cover upfront capital project costs. In the following sub-section, we consider the direct and indirect factors that determine whether a community succeeds or not in raising finance.

2.3 Direct and indirect factors impacting the flow of community energy finance

Critical factors to success, or more specifically the drivers and barriers to community energy, is a well-researched space [4,5]. This research has covered many countries, typically in Western Europe and North America. Drawing on this literature we consider the factors most critical to the stimulating investment into community energy, dividing these between those that *directly* (Section 2.3.1) and *indirectly* (Section 2.3.2) impact the likelihood of securing community energy finance.

Direct factors may involve the cost and availability of finance or financial regulations, whilst *indirect* factors influence the strength of community energy's business case in the eyes of investors and include, for example, the depth and breadth of capacity in communities to deliver projects or the presence of supportive government subsidies for decentralised renewable power.

2.3.1 Direct factors impacting community energy finance

The first issue relates to community access to energy finance, to support project development and delivery. Communities tend not to have the funds in-house to cover earlier stage feasibility and project development. Consequently, they are typically looking to secure high-risk finance; at least initially

[2] Our definition of finance excludes government support in the form of grants, long-term revenue payments, loan guarantees etc., all of which are categorised as State Aid, i.e. where "*state resources are used to provide assistance that gives organisations an advantage over others*" [99 p.3].

[16,17]. Another issue is the small-scale associated with their projects, which attract a 'small project premium' that makes finance relatively expensive to secure [16,17]. This points to the mis-match between the small-scale of community energy projects and the large-scale projects that institutional investors typically desire [18]. For example, "*a £1 million deal is likely to have the same transaction costs as a £10 million deal*" [16 p.20], making them less attractive. Consequently, a finance gap exists, especially for smaller energy projects, typically below £20m [17,19]. Exacerbating this gap is a lack of government backed banks able to provide this funding [4].

The second issue is in-house business acumen and an understanding within community groups of what investors are looking for. Specifically, this relates to the type and detail of project information (e.g. technical, legal, financial and insurance) they require to convince them of an 'investment ready' proposition [16]. In part, this will involve providing evidence of a project's revenue generation potential, something Brummer [4] explains has proven difficult for community groups to do with energy efficiency projects that target behavioural change. Conversely, there is also the view that investors are not especially familiar with community energy [20], making its "*merits hard to assess*" [20 p.3], including its potential for a return on investment and wider sectoral growth:

> "*Banks and other companies cannot use their standard risk assessment to price the effects of community involvement and individual investors struggle to obtain financial advice with sufficient understanding of the different models, resulting in reluctance to finance these projects*." [20 p.3]

2.3.2 Indirect factors impacting community energy finance

We draw a distinction here between factors internal to the community energy organisation and its associated community (Section 2.3.2.1) and external factors (Section 2.3.2.2).

2.3.2.1 Internal factors

Human capital is critical to community energy projects and relates to possessing a sufficient resource of time, skills and knowledge within the local community to devote to the development and delivery of investable community energy projects [4,8,16,21], as well as the ability to assume the associated liabilities [6]. Naturally, one solution to this is to out-source tasks and responsibilities to professionals but his relies on funding to do so, and without it communities are highly reliant on volunteers [4,8,16]. A lack of human capital – either in-house or externally - undermines a community group's resilience, whereby the loss of a single staff member within the organisation can threaten its existence [4]. This in turn heightens their investment risk-profile.

This is where communities' ability to leverage professional knowledge and experience via intermediary organisations is critical, as well as intermediaries role in facilitating knowledge exchange between community groups, in order to share best practice [5]

Social capital, in the form of connectedness to social networks, is also considered critical [5], especially for communities' ability to 'scale-up' their activities, both within the community (e.g. households) and beyond (e.g. national policy makers and companies) [5]. As noted in Section 2.3.1, scale is desirable to most institutional investors. Access to natural capital, specifically land and buildings to host energy projects, is also critical to the viability of energy projects [8,21].

Finally, the type of legal structure a community group adopts has an important bearing the type and level of finance that can be raised [14], as well as the ways risk is managed, the organisation is governed and how profits are taxed [14,22].

2.3.2.2 External factors

Looking beyond the organisational boundaries of the community energy group, policy and regulation have a powerful influence over how investable community energy is perceived to be. As our country case, we unpack the UK's community energy policy landscape in Section 5. Therefore, speaking in general terms, the complexity and volatility of the policy landscape is also considered key to community energy project success [4,8] and communities' ability to develop an investable project.

More specifically, subsidies play a key role considering that capital costs remain too high for most communities to cover outright [8,21]. In particular, long-term revenue payments per unit of renewable energy generated have been critical to project delivery but their subsequent removal highly disruptive [2,4,8,21]. Social investment tax breaks are also considered critical to drawing in citizen finance for community energy [2,20].

The planning regime is also critical to success and regularly cited as a reason for project failure [6,8,17]. Reasons include planning restrictions on certain types of renewables (e.g. onshore wind) [23] and also the difficulty communities face in meeting the need for associated in-depth assessments (e.g. environmental impacts). Brummer [4] also points to the lack of nuance in planning guidelines how they regularly failure to represent "*a balance of interests between the stakeholders involved*" (p.193).

A major regulatory barrier is the difficulty communities face in selling energy locally [2,5]. Electricity supply licencing for smaller suppliers is regularly identified as the key issue here but so too are procurement rules, for example those dictating supply to local councils. Associated with this access to market, is access to the grid, where grid connection costs and access charges are highlighted as key issues [4,8,17,24,25].

Finally, a common pre-condition for the success of community energy projects is the capacity and willingness of potential partner organisations. Given their local focus, communities are often well placed to partner with Local Authorities but unfortunately councils often lack the capacity (e.g. resources, expertise) or regulatory incentives (e.g. performance indicators) to engage [2].

2.4 Policy solutions to support community energy finance

Machiba [26] explains how eco-business models, akin to community energy, face internal and external barriers to their operation and that these can be alleviated by policy instruments. These policy instruments or mechanisms can take many and varied forms but a commonly applied policy framework disaggregates thee into three main categories, which are expanded in Annex A:

- **Economic (*Carrot*):** Pecuniary (dis)incentives that support desirable behaviour.
- **Regulatory (*Stick*)**: A rule or guidance made and maintained by an authority.
- **Information (*Sermon*)**: Initiatives that support the dissemination of information that encourage desirable behaviour.

Drawing on this policy framework we outline the various policy solutions authors have identified to support growth of community energy and by extension attract finance into the sector (Table 8). Given this paper's explicit focus on community energy finance, we mirror Section 2.3 by making clear if these policies have a *direct* or *indirect* impact on community energy finance (see Table 1). Doing so helps to differentiated between those policies explicitly targeting community energy finance versus those that are designed to simply make community energy a more attractive proposal to customers and investors alike.

Table 1: Summary of government policies to (in)directly stimulate community energy finance

Type of policy instrument	Direct or indirect focus on finance	Policy type	Source
Carrot	Direct	Low-interest and junior lender government backed loans.	[17]
		Government-backed loan guarantees to reduce the impact of default on a commercial lender.	[17]
		Tax relief, including exemptions on interest generated from investments and savings associated with community investments (e.g. shares, loan notes, bonds).	[2,3,16,20]
	Indirect	Create a community energy export guarantee, which provides revenue certainty for community energy organisations. Similar provision made for renewable heat.	[2,3]
		Minimise connection charges for community projects and incentivise network operator partnerships that alleviate local grid pressure, as well as reduce emissions and promote social welfare.	[2,3,8,23]
Stick	Direct	State subsidy and finance awarded on basis of investability and wider community benefit.	[16]
	Indirect	Target for community and local ownership of new energy assets, as well as a shared ownership target.	[3,23,27]
		Public bodies committed to purchase a specific share of their energy supply from communities.	[3]
		Remove planning barriers to specific renewable technologies (e.g. onshore wind) and planning guidelines that prioritise community energy projects.	[2,3]
		Legislate for a 'right to local supply'[3] and similar easy access needed to flexibility and energy markets.	[2,3,23]
		Mandatory partnerships between local authorities and community groups, for example as part of local area energy planning.	[2,3,23]
Sermon	Direct	Provide best-practice on management of financial authority exempt withdrawable share finance, to maximize consumer protection.	[16]
		Provide guidance on type and quality of detail investors seek in business plans, via online portal[4]. Community energy advisers that meet this threshold are accredited.	[2,8,16]
	Indirect	Methods for quantifying and articulating the social value and impact of community energy.	[8]
		Capacity building grants for community organisations, covering training, knowledge exchange, expert consultancy etc.	[3,8]

3 Analytical framework

The literature review lays bare the relative lack of academic and up-to-date research that examines: a) the factors responsible for inhibiting or attracting community energy finance; and b) the types of

[3] Provision for this include in the UK's recent Local Electricity Bill and enacted through the EU Clean Energy Package [2].

[4] This can provide other important information, such as where finance might be sourced and other compliance issues (e.g. State Aid, procurement).

policy mechanisms that can directly or indirectly improve community energy groups' prospects of securing finance.

To help address these gaps in the literature we examine the case of UK community energy and employ an analytical framework that combines two stand-alone frameworks. The first is the business model canvas (BMC) [28] and the second is the policy instrument framework outlined in Annex A.

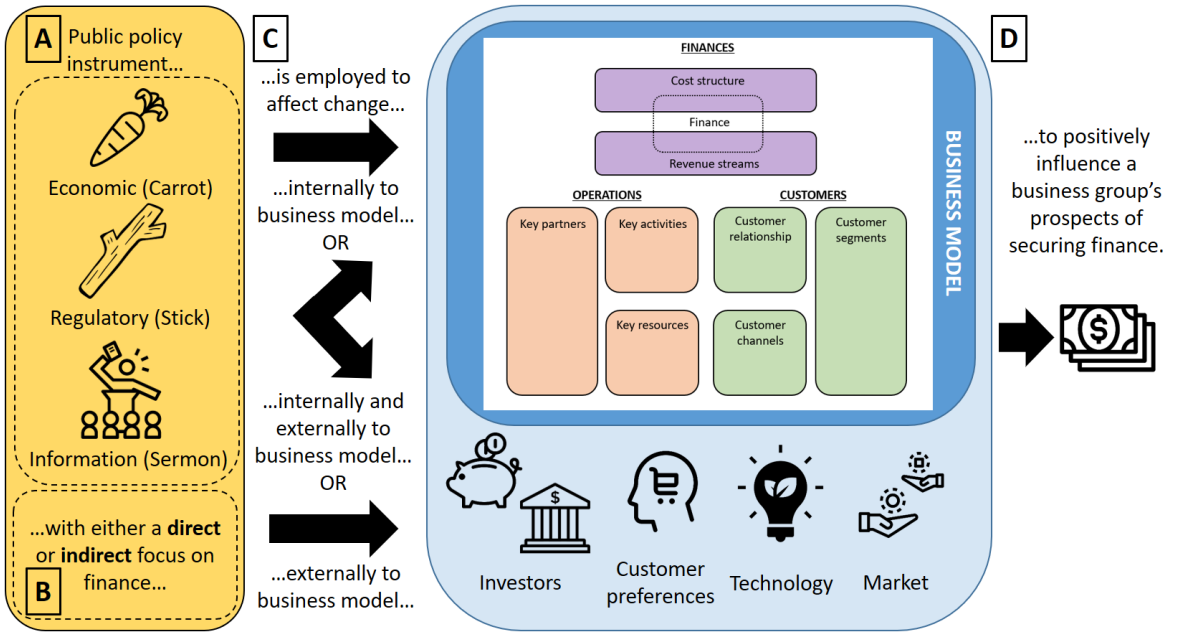
The BMC is used to identify the key building blocks of any business model. We use it as a lens to analyse the core functions of community energy businesses and the factors most critical to supporting these business model building blocks to function (e.g. key activities, revenues), which in turn inform how attractive these businesses are to investors. To organise these nine building blocks (see Figure 1) into three domains: 1) *Operations*; 2) *Customers* and 3) *Finances*. We omit the *Value Proposition* domain from our analysis considering that the core value proposition extended by community energy is covered in Section 2.1 and their core value proposition remains largely consistent. Finally, in the *Finances* domain, we include *finance* alongside *revenue* and *expenditure*; to account for the fact that finance is not normally accounted for in the BMC framework.

Figure 1 combines these two frameworks to offer a combined BMC and policy instrument framework that can be applied to the case of community energy to answer our research questions (Section 1). Reading it from left to right, the framework enables us to draw a clear connection between:

A. The choice of a specific policy instrument (i.e. carrot, stick, sermon);
B. That has a *direct* or *indirect* focus on community energy finance;
C. To affect change *internally* (i.e. bolster the functionality of one or more business model building blocks) or *externally* (i.e. re-shape elements of the external environment, such as customer and investor preference, market structures etc.);
D. To influence the community energy organisation's chances of securing finance.

Focusing on step B, a *direct* focus on finance implies the instrument is explicitly designed to increase the scale of finance flowing into community energy projects (e.g. investment tax break, low-interest loans), whilst an *indirect* focus implies the instrument is designed to broadly make community energy more attractive to customers and investors (e.g. greater market access, training grants).

Figure 1: Policy instruments to support business model financing



4 Methodology

This paper employs a mixed-methods approach. First, to obtain a broad picture of the sector, we undertook a UK-wide survey of 48 community energy organisations during 2017/18 and their 145 projects; providing data on project finances and business models [15].

Second, we undertook 14 in-depth semi-structured expert interviews focussing on sectoral level developments. These were built upon a further set of 18 interviews with individuals directly involved with establishing and running community energy organisations, as well as those playing a supporting role such as investors, policy makers, and NGOs (see Annex B). This results in 33 interviews in total and where these are referenced we cross-reference to Annex B (e.g. I5).

Third, these data were supplemented with sectoral level reports, produced by NGOs, government departments and CE intermediaries, such as company accounts, share offers, presentations, etc.

Drawing these different data streams together, we constructed four in-depth case studies of community energy finance, which we regularly cite in our results:

- Brighton and Hove Energy Services Company (BHESCo) [29];
- Edinburgh Community Solar Cooperative (ECSC) [30];
- Green Energy Mull (GEM) [31]; and
- Gwent Energy CIC [32]

5 A decade of UK community energy policy

To offer crucial context for our results, we offer a brief overview of how the UK's community energy policy landscape has evolved over the past decade.

The most significant policy development has been the focus on promoting decentralised renewable energy generation, achieved in large part through the introduction of long-term revenue payments. These help to cover operational costs but did not cover upfront capital costs, thus creating a demand for finance to cover these initial costs. Most notably these included the Renewables Obligation (2002-2017), the Feed-In Tariff (2010-2019) and the Renewable Heat Incentive (2014-2022) (Table 2). Community energy groups are among the organisations that have drawn down these subsidies (Section 6.3.1.2), driving a boom in community energy projects during the 2010s.

Table 2: Major UK renewable energy price guarantee policies for small-scale distributed generation.

Policy	**Key characteristics**	**Period**
Renewables obligation (RO)[5]	Guaranteed 20-year generation tariff period per MWh of renewable electricity.	2002–2017
Feed-in Tariff (FiT)	As above[6], plus an export tariff to supply any excess power to grid. Eligible for installations up to 5 MW.	2010–2019
Renewable heat incentive (RHI)	As above but no export tariff, seven year term and only for renewable heat.	2014–2021 (domestic RHI to close on 1st April 2022)

Recently however, these revenue payments have been weakened or discontinued. In particular, the Feed-in-Tariff was discontinued in the UK and replaced with the less lucrative Smart Export Guarantee, which covers only export and not generation, and offers "*no minimum export price[7], and no long-term certainty beyond 12-month periods*" [2 p.3].

These cuts to or discontinuation of subsidies sat alongside an effective ban on new onshore wind, a technology that was popular with communities. Onshore wind was excluded from the Contracts for Difference (CfD) auctions – designed to provide price certainty for larger renewable generation projects[8] – and was subject to stringent planning regulations in England[9]. The effect of this was to

[5] Operators awarded a certificate per MWh, which are traded with suppliers to cover their obligations.
[6] 25 years if you signed-up before August 2012.
[7] SEG offering tariffs between 2-5.6p per kWh [100] as of 11th May 2021.
[8] Normally, much larger than community groups have targeted to date.
[9] For example, the wind farm site must be in an area identified as suitable for wind energy development in a Local or Neighbourhood Plan. Furthermore, "*all planning impacts identified by local people must have been addressed and there must be community backing*" [34].

make it extremely difficult and expensive for onshore wind projects to proceed [33]. Whilst the CfD subsidy has since been reinstated, the planning barriers remain in place [33,34].

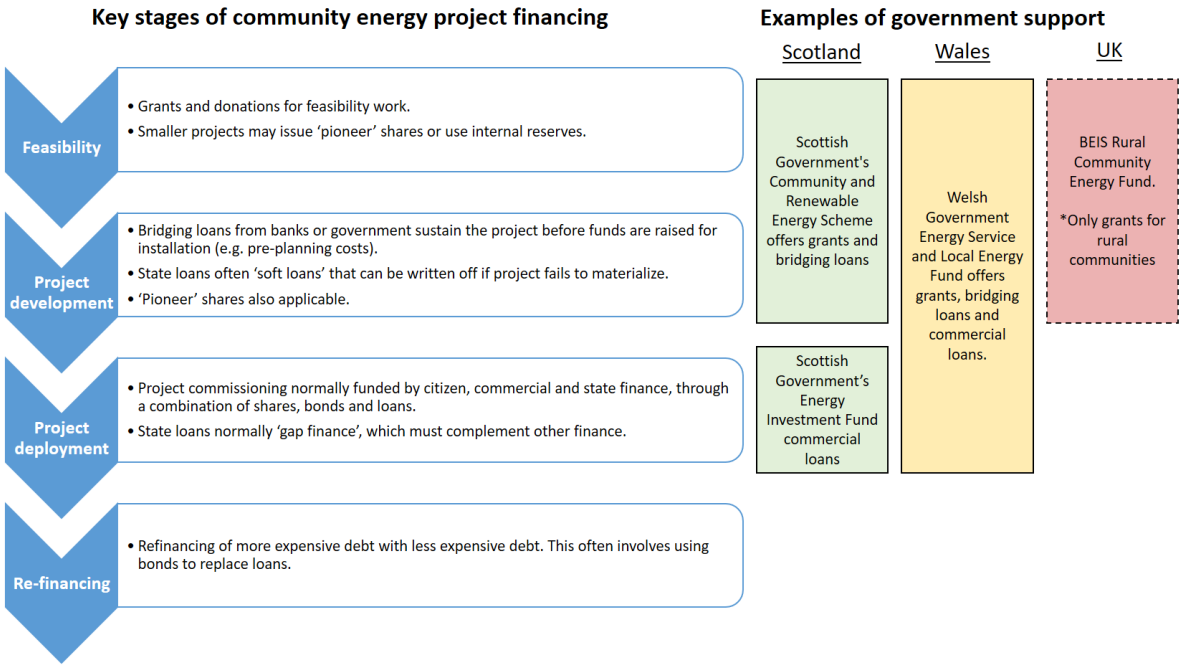
Community energy groups have also faced changes to social investment tax break policies. Under the Enterprise Investment Scheme (EIS) and Seed Enterprise Investment Scheme (SEIS), investors in community energy project could reduce their tax liability by between 30% and 50% of the value of the shares they buy; up to a total investment of £150,000 [35]. However, in April 2015 government announced community energy cooperatives would no longer be eligible for these investment tax breaks and in October 2015 announced it would be ineligible for support under its successor, the Social Investment Tax Relief (SITR) [36]. The rationale behind its removal was that community energy was already receiving ample subsidy via the FiT and that "*commercial developers were gaming the system by pretending to be 'community' in order to get the tax relief*" [36 p.2].

Grants and finance from government for community energy remain available but this varies dramatically across the UK's Home Nations[10] [2]. We outline key policies below and highlight how this impacts the community energy finance chain in Figure 2:

- **Scotland:** Scottish Government have two key policies. The first is the Community and Renewable Energy Scheme (CARES), which offers a combination of feasibility study grants and soft loans for project development. Both are designed to de-risk projects at their earliest and riskiest stage of development. Combining this with the EIF project deployment loans, we note a well joined-up state finance chain available in Scotland (Figure 2).
- **Wales:** Welsh Government offer a similar suite of support. The Welsh Energy Service offers technical advice and early stage project development grants, whilst the Development Bank of Wales also offers loans up to £5m (up to 20 years) via its Local Energy Fund, for the construction phase for small renewable energy projects that have been unable to access commercial funding. They must also demonstrate long term environmental, social and economic benefit [37].
- **England:** No devolved government means England is entirely governed by UK government and here financial support is much less joined-up than in Wales or Scotland. UK government does not offer state loans for any stage of community energy project development. Only the £10m Rural Community Energy Fund remains of central government funding, whilst the £10m Urban Community Energy Fund that supported community energy schemes in England's most deprived urban neighbourhoods was discontinued in 2016.

[10] There is very little community energy in Northern Ireland (NI) at present – two organisations and 1.5 MW of installed capacity [3]. We struggled to identify any stand-alone community energy policies in NI.

Figure 2: Community energy finance chain and associated government support



Finally, government policy also exists to help communities to access land. Scottish Government is far more progressed than the UK Government on this front and is channelled through two main instruments.

The first is *legislation* to facilitate community right to buy land, which is either listed on the market or via compulsory purchase. For example, Scotland's Community Right to Buy[11] gives the community the right of first refusal to buy private land when it comes up for sale, providing community has pre-registered interest, and gets 10% resident support in a ballot [38]. The legislation was amended in 2016 to allow communities to force the sale of neglected or mis-managed land that is causing the community harm [39]. Importantly for energy groups, the Community Right to Buy to Further Sustainable Development was introduced in 2020 and allows the community to force the sale of land if it meets a number of sustainability and community value criteria [40,41]. Finally, Community Asset Transfer legislation means public bodies must publish a register of their land and buildings, and communities can apply to buy, lease or manage this property. Public bodies must assess these requests against a transparent list of criteria and there is the presumption that a 'reasonable request' will not be refused. The key differences versus the right to buy, is that asset transfers are limited to public land, potentially a less than market value and a voluntary process [42].

The second are *funds* for communities to exercise these legal rights by covering some of the cost of acquiring land or property, such as the Scottish Land Fund. This has facilitated a number of major 'community buy-outs' over the years (e.g. Langholm) [43] and at present offers grants up to £1m, as well as practical support to develop projects [44].

6 Functionality of community energy business models and critical factors for success

This section use the BMC framework to outline how community energy business models typically function and the factors most critical to their functionality. The connection with finance is that

[11] Part 2 of the Land Reform (Scotland) Act 2003. Amended in 2016 to extend to urban areas.

investors are looking for highly functional business models able to deliver on their value proposition. This provides the basis for the policy recommendations outlined in Section 7, in terms of what policy should be serving to protect or solve.

6.1 Operations

6.1.1 Key activities

6.1.1.1 Renewable energy generation

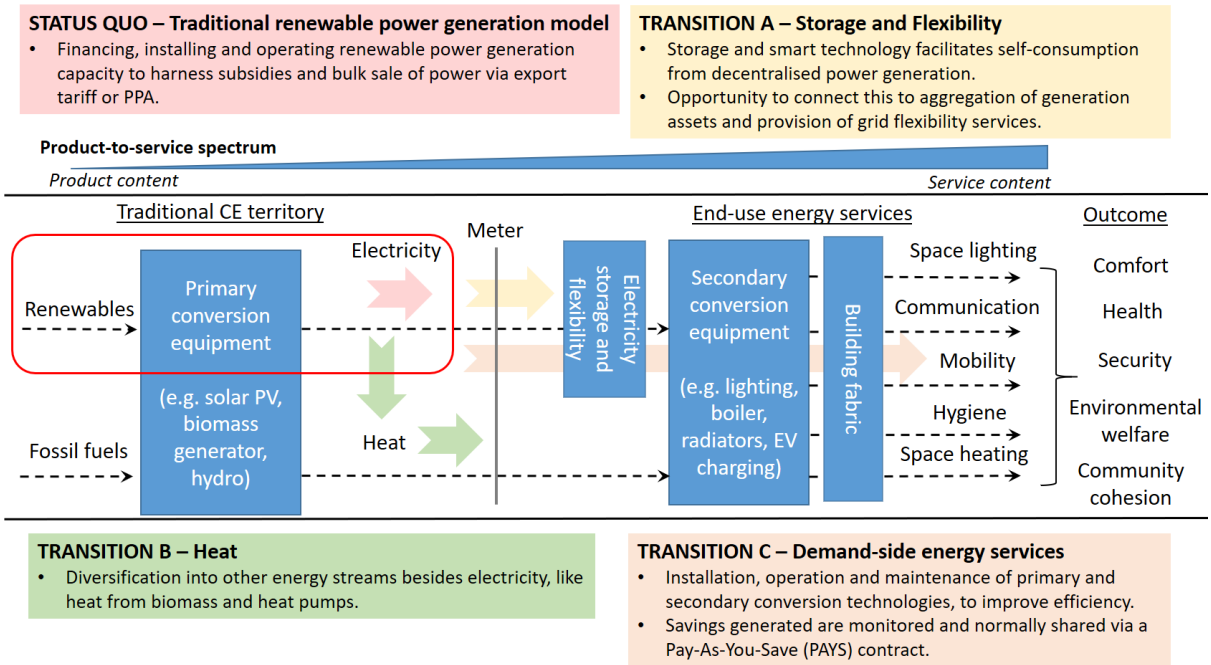
Traditionally, UK community energy organisations have focused revenue generation on the supply of decentralised renewable power generation. In 2018, we identified that 88% of the 119 projects we surveyed were focused on renewable energy generation [15]. As outlined in Section 6.3.1.2.1, significant cuts to subsidies for decentralised generation of renewable electricity and heat have meant communities groups have looked to new activities and business models.

6.1.1.2 Energy services

The reaction of many community groups has been to explore alternative business models, characterised by an active shift away from 'pure' power generation models, towards those with a stronger focus on customer engagement and demand-side management (I9), i.e. 'beyond the meter'. As one respondent explained, traditional power generation projects "*couldn't see a way of funding [our projects] anymore, [so] we looked at other options*" (I15). Essentially, they are preparing for "*life after the feed-in-tariff*" [45].

This finding is echoed by the recent 2021 CE State of the Sector report, where around half of survey respondents were working on low carbon transport, heat, retrofit, flexibility and innovation projects in 2020 [3]. Specifically, the focus has been on diversification along the lines of three transitions (Figure 3).

Figure 3: Evolution of community energy business model (adapted from [46,47])



Naturally, a benefit of these more complex and multi-faceted business models is that they are less dependent on any singular technology for revenue. This insulates the business from the risk of unexpected changes to technology or feedstock costs, as well as technology-specific subsidies. However, the *quid pro quo* is that this transition 'beyond the meter' has created the need for a much

broader set of skills associated with developing more complex service-oriented energy business models (Section 6.1.2.1). This is especially the case with Pay-As-You-Save (PAYS) contracts, whereby energy savings are monitored and split between the company and its customer. We unpack some of the costs and revenue streams associated with these new activities in Sections 6.3.2 and 6.3.1.1.

Interestingly, we find that our case study organisations are all in receipt of long-term revenue streams. This puts these organisations in a strong position to pivot to a new business model because their old business model is still generating revenue through state subsidy. This has offered them sufficient financial security to enable them to make the necessary investment and assume the necessary risk to diversify their business model. For example, Gwent was able to fund the installation of its EV charging points through "*surplus income from earlier solar systems*" [48 p.2], i.e. from the revenue Gwent Energy has generated from other work, for which it receives the FiT. This brings into question whether new entrants can enter the community energy sector with new business models, without the security of FiT payments (or other available finances) to de-risk their projects.

Another associated challenge here is that these emergent community energy business models have little track record in this space, potentially undermining investors' confidence:

> *"[I]f you go out to them saying, we're gonna stick a battery in, and we don't really know how long it's gonna last…we don't know definitely what we're gonna get and for how long…Who's gonna invest in that?" (I1).*

6.1.2 Key resources

6.1.2.1 Time, knowledge and skills

A key issue for CE organisations, like most grassroots initiatives, is their high dependency on a very small number of individuals, who possess the appropriate levels of time, skills and experience to deliver projects that generate social and environmental benefits. Consequently, this means these organisations are vulnerable to skill-shortages, following unexpected staff changes.

The case of Gwent Energy illustrates this, which is almost exclusively managed by its key founder and director; who contributes over 50 hours per week (I16). A retired electrical engineer with considerable experience, they are responsible for generating sales, securing finance, and undertaking some installations without taking a wage. A similar situation was found with BHESCo where the founder and CEO is a qualified accountant, who has extensive experience of working in accountancy firms and energy companies. They also worked for two years without taking a wage.

Looking forward, the importance of human capital and skills is likely to become even more pronounced as CE groups experiment with new business models to manage a withdrawal of renewable generation subsidies (see Section 6.3.1.1), seeing them engage with technologies and services as yet unfamiliar to them. For instance, BHESCo describes its offering as a 'turnkey service' which delivers benefits from "*the initial energy survey, to post installation monitoring of the system*" (BHESCo, 2019a: 5). It is a model which is, as BHESCo's CEO admits, is labour-intensive (I25) and going to require "*more technical expertise, more complex business planning"* (I13), as well as clearer understanding of the wider regulatory environment (I13) versus the traditional focus on power-generation.

The depth and breadth of time, skills and experience is also important at the board-room level, i.e. directors and trustees. Our research points to how our community case studies were well catered for in this regard, with a wealth of highly skilled and well-connected professionals, bringing with them social, political and even financial capital. In the case of BHESCo, they have two former CEOs of major energy companies and third sector organisations, alongside wider board expertise in financial services, waste management and project development. ECSC's board includes a former councillor of 33 years,

three current councillors, two civil servants, a law firm partner and no fewer than three PhDs among them. Finally, the case of Green Energy Mull points to a similar situation with the chair possessing a "*background in mechanical engineering, construction and project management and design*" (I22).

6.1.2.2 Access to land and buildings

A critical factor to CE action is the easy and affordable access to land and buildings to deliver energy projects:

> *"If you are the owner of land, you get quite a lot of say…when it comes to crucial decisions when building a local bit of energy apparatus. The actual proactive decision to do something is often the landowner's. It gives you the whip hand to act in a certain way"* (I33)

The overwhelmingly majority of CE projects involve some directly involvement in the installation of energy generation, storage or efficiency technology, which by extension demands access to land and/or buildings [8].

Outright ownership is the simplest means of communities gaining access to development sites (pending planning) but is challenging when land costs are high and CE financial reserves are normally very limited. It also relies on the right type of land, being made available for purchase at the right time and in the right place. Consequently, many opt to lease the land from landowners or enter into some form of access agreement.

Where there are cases of successful access to land and buildings, this has typically stemmed from strategic partnerships with (quasi-)public bodies, which has had some type of leasing arrangement. For example, GEM worked with the Forestry and Land Scotland (FLS) to secure a 40-year lease forestry land to operate its hydro scheme. FLS was not obligated to lease the land to GEM to install a hydro scheme. Its decision to lease the land was in large part because FLS's strategic objectives include ensuring community access to land, promoting sustainability and maximising rural economic potential [49]. Consequently, FLS and GEM shared an agenda, and worked together for a jointly beneficial solution (I21).

Councils are normally the most important to community access to land and buildings, as demonstrated by the case of both ECSC and BHESCo. The former installed rooftop solar power on council buildings (e.g. schools, community centres, etc.) and the latter doing the same but combining this with efficiency measures (e.g. LED lighting). Finally, Gwent Energy's local council helped them deliver a fleet of EV charging points by permitting some of these to be installed at council car parks. Ultimately, however, community access to council land and buildings relies on the appetite from the local authority to partner with the community (Section 6.1.3.1).

Access to buildings was also cited as a critical factor, as evidenced by BHESCo's access to a combination of private dwellings and commercial properties. It was however considered especially problematic for tenant occupiers, whose landlord who may or may be interested in investing in energy saving or generating measures (I25).

Links with local community organisations have also provided community groups with access to land and buildings. Gwent Energy with sites for nine EV charging points, across four locations, including community hubs, village halls etc. They have also been able to install a 100kW biomass boiler at a local church, from which it draws down the Renewable Heat Incentive (RHI). A similar approach has been taken by Gwent to installing rooftop solar PV, covering a similar mix of community groups (e.g. community hubs, churches), plus a local lifeboat station.

6.1.3 Key partnerships

6.1.3.1 Strategic partnerships with councils and local stakeholders

Given their lack of resources (Section 6.1.1) community groups rely heavily on partnerships with local stakeholders to deliver their projects; none more so that Local Authorities. They have been critical to the provision of custom (Section 6.3.1.1) and land/building space (Section 6.1.2.2). For example, ECSC entered a service contract arrangement[12], to situate solar PV on a host of council buildings (e.g. schools). In turn, the council was able to satisfy its political objectives and enjoy fixed-price power supply, which was less than the market rate [50].

Strategic partnerships with local councils are not however guaranteed. The issue of national and local politics is very important and can influence the willingness of local authorities to forge partnerships with CE groups: this "*will very much depend on the politics of local councils*" (I13). In the case of ECSC: "*the only reason why Edinburgh Solar worked is because a couple of leading politicians thought it was a good idea [and] that's the truth*" (I4). Importantly, the Labour Party campaigned in the 2012 local election to make Edinburgh a Cooperative City (I18, I20). Once in power, an energy cooperative satisfied this agenda (I17) and shortly after this ECSC was formed, with the cooperative model fitting with the political milieu of that time.

Turning away from politics, one respondent explained they often simply didn't have the motivation to act (I8), as evidenced by the removal of statutory obligations to support low-carbon power generation since 2010 (Section 7.2.2). The resources at the disposal of the council is also influential. Between 2010 and 2019, local authority 'spending power' in England – i.e. the amount of money they have to spend from government grants, council tax, and business rates – has fallen by 18% [51]. These long-run council cuts have had a conflicting effect on council-community energy partnerships. On the one hand, this downward pressure on council funding and services has led councils cuts, including for sustainable development initiatives: *"[T]he central funding of government to local authorities has reduced massively, giving [the local authority] much less flexibility to make grants and support"* (I26). Consequently, some councils have looked to community groups to fill this void, because they simply do not have the capacity to do so 'in-house' (I20). On the other hand, cuts have meant that councils rarely have the in-house capacity to build and maintain meaningful relationships with community groups (I17, I20).

Other local stakeholder partnerships, especially with other community groups, play a key role. For example, Gwent Energy has seen other community groups host assets (e.g. solar PV on a lifeboat station and a biomass boiler in a church) and marketing events. Furthermore, the cases of Gwent and ECSC point to how existing community organisations (e.g. Transition Chepstow, Changeworks) acted as the foundation and springboard for their establishment.

6.1.3.2 Intermediaries

Intermediaries, like Energy4All and Communities for Renewables, are critical to the design, delivery, management and financing of community energy projects.

First and foremost, these intermediaries draw down their prior expertise to help communities co-develop a credible business plan, normally based on a common template focused on renewable electricity generation and capture of FiTs. In the case of ECSC, Energy4All was instrumental in drawing upon a wealth of experience in the design and delivery of over 20 comparable cooperative projects, to help ECSC design a viable business plan (I19). In effect, ECSC adopted the 'E4A model'. This in turn lent ECSC a greater degree of legitimacy and meant it was able to draw in partners and customers in

[12] This meant ECSC didn't have to compete with larger rivals via public tender.

a way that may not have otherwise been possible, enabling it to forge a key partnership with Edinburgh City Council to situated solar PV on the council's properties (I17).

Second, intermediaries help communities secure finance through a combination of avenues, acting as a gatekeeper to an investor community (I10). Their most common approach was to raise community shares and we find that community groups on average source twice the amount of finance through these intermediary platforms versus their own local marketing strategy [15]. They also facilitate bridging loans between its member cooperatives, as well as loan from its own investment arm - Energy Prospects Cooperative - as well as the issuance of public loan notes. In combination, these approaches mean that E4A can quickly and reliably source the necessary funds to deliver community energy projects (I4).

Third, given the relative lack time and skills communities possess to operate their projects (Section 6.1.1), the intermediary can assume control of day-to-day operations. This was the case for ECSC, partly in a bid to save money by harnessing the economies of scale of a single organisation, which manages multiple community energy projects, across multiple community organisations. As one interviewee explained, hiring a member of staff to manage the project would have depleted the community benefit fund (I20). Intermediaries can play an important 'match-making' service too, connecting CE groups with skilled companies (e.g. energy efficiency installers), who bid for that work in the local area (e.g. Retrofitworks).

There is however a *quid pro quo* for these intermediary services. First, they carry a cost. ECSC for example have a ten-year contract with E4A, which carries an annual fee of 9% of turnover for its management, administration and secretarial services [50]. Second, community groups can become reliant on a third-party to deliver its services, undermining their long-term independence. Associated with this is how these intermediaries often adopt a formal role in the governance of these organisations. For example, Energy4All also has a place reserved on the board of directors for ECSC, meaning it exerts some influence over its strategic direction. Third, intermediary support for raising finance often relies on promotion via nationwide platforms (e.g. Ethex). Whilst these typically raise significantly larger sums of finance per share offer [15] by drawing in investment from far and wide, doing so could dilute the degree of local ownership and control.

6.2 Customers

In broad terms, community groups' customer base is split into: 1) business to business (B2B) and 2) business to consumer (B2C).

6.2.1 Customer segments

6.2.1.1 B2B: Local authorities, SMEs and community groups

Typically, community energy groups have focused on installing decentralised energy generation (e.g. solar PV) and demand-side technologies on the premises of public or non-for-profit community organisations. These present a range of benefits versus household customers, including lower transaction costs, larger demand profiles and an appetite to present themselves as promoting sustainable and local economic development: they "*cost less to develop and the installations are larger*" [52 p.5]. Community groups typically supply power directly to these organisations (either for free or at low cost) (Section 6.3.1.1) and capture any subsidies generated from these installations (Section 6.3.1).

As one interviewee explains, increasingly *"[y]ou've got local authorities becoming users of the energy*" (I8). For example, Edinburgh City Council act as ECSC's primary customer, to off-take power generated from the solar panels located on their roofs. The council enjoys several direct benefits from their

arrangement with ECSC: (1) electricity price fixed for 20 years at 2015 prices; (2) 100% renewable power to support their environmental goals; (3) they take ownership of the panels after 20 years; and (4) council buildings eligible to apply for ESCS's community benefit fund. In the case of ECSC, the PPA it holds with the council accounts for 40% of its income, raising £85,000 per annum from selling power at a rate of 10.6p/kWh. Critical to this was ECSC being able to enter into a service agreement with Edinburgh council rather than having to enter a competitive tender with much larger private companies, who would likely out-compete them on price alone, on the grounds of being a new group with no track record and relatively little financial resource (I17).

Where community groups do not sell directly to local organisations, they typically sell their power to utilities via a Power Purchase Agreement (PPA) at a much lower rate. For example, GEM's agreement with Solarplicity was roughly half (5.5p per kWh) (I22) what ECSC was getting via the council. Some community groups also generate income from selling services other than power to local organisations, such as energy demand management PAYS contracts (Section 6.3.1.1).

6.2.1.2 B2C: Local citizens

As in the case of Gwent Energy CIC and BHESCo, B2C services take a similar form to B2B services but at a smaller scale. For instance, BHESCo's has installed measures across 420 households (BHESCo, 2018a, 2019a), although these largely constituted minor interventions such as energy efficient lighting technologies, although it has signed PAYS contracts with some of these customers. Gwent has also actively engaged with the B2C market, installing a wide range of measures, including solar PV in combination with smart storage[13].

6.2.2 Customer channels

Our case study organisations relied heavily on word-of-mouth and local events to attract customers and investors alike. Gwent Energy pointed to how representation at a stall for a local energy event was likely to "*generate six orders for PV with batteries and two orders for batteries alone*" [53 p.6]. Online marketing has also been critical. For example, BHESCo uses social media to raise awareness, as well as creating online content, such as regular blogs on its activities and on energy-related issues. BHESCo has also leveraged local media outlets (e.g. newspaper, radio) to promote its projects.

6.2.3 Customer relationships

As outlined in Sections 6.1.1 and 6.3.1.1, customer relationships with commercial customers have often revolved around the sale of renewable power. However, for residential customers and some commercial, the relationship has typically been more involved with community groups owning and maintaining generation capacity on their properties (Section 6.1.1.1). As subsidy cuts push communities into energy services (Section 6.1.1.2), these customer relationships will become even more 'hands on' and complex, as community groups actively manage customers' energy demand. It's also important to note that many customers will also be shareholders or investors, meaning they are more involved in the organisation's governance (e.g. voting on business decisions) than they may typically do with more traditional companies.

[13] If the user generates 100 W more energy than they consume, the excess power is diverted to their immersion heater to provide hot water.

6.3 Finances

6.3.1 Revenue

6.3.1.1 Sales

6.3.1.1.1 Renewable energy

A CE group may choose to become a licenced supplier themselves but this is not normally achievable for small CE groups because as one respondent explained "*in order to become [a supplier] we would need a whole different level of expertise that we don't have, and we need money, because you've actually got to put a lot of money upfront to register as a supplier of electricity, so we can't do that*" (I4). Consequently, communities have traditionally engaged in two types of sales: 1) sale of own-branded energy tariffs via a licenced supplier; and 2) sale of power direct to the customer via a Power Purchase Agreement (PPA), typically businesses (Section 6.2.1.1).

The first requires CE groups tend to partner with licenced suppliers, as part of a 'white label' arrangement whereby the CE group offers a tariff under their own brand but the licenced supplier meets the requirements of metering, balancing and will comply with industry codes [54]. For example, BHESCo partnered with OurPower to offer its +IMPACT tariff, where BHESCo received a donation of £36 for each referral, which it channelled into its fuel poverty alleviation programme [55].

The second is were community groups supply power to a customer via a PPA. As noted in Section 6.2.1.1, ECSC supplied Edinburgh council via this route and GEM supplies Good Energy (formerly Solarplicity) via a PPA. The latter however drew concerns about the low cost received for their power at approximately 5.5p per kWh), whereby the typical customer pays for the same volume of electricity (around 15p p/kW) (I22).

Another popular model has been championed by Solar for Schools Community Benefit Society Ltd (S4S). They have entered into agreement or lease, alongside a PPA with schools, which commits "*the school to purchasing electricity at an agreed price specific to each school and to provide sufficient roof space for the panels to operate during the 25 year agreement period*" [56 p.20]. Alongside the sale of any surplus power to the grid (approx. 4 pence per kWh), the PPA with the schools "*results in more than double the income vs. selling to the grid*" [56 p.20]. The school essentially benefits from cheaper electricity and a share of any surplus profits [57].

A new, and relatively untested alternative, is where community groups have looked to leverage smart technologies and work with energy suppliers to offer smart local energy tariffs[14], such as Smart Fintry's partnership with Good Energy. Here, electricity supply and demand is balanced locally with a view to reduce cost to the consumer by reducing network charges [57]. It too involves PPAs with local renewable generators, consumer contracts with local households and relying on Good Energy as the licenced supplier [57]. Our case of BHESCo is one that is actively exploring this arrangement.

6.3.1.1.2 Energy services

There is however a push away from sales of renewable energy due to subsidy cuts and a move towards alternative, more service-based business models (Section 6.1.1.2 and Figure 3). No single example illustrates how revenue can be generated through these new service-based business models. At its most basic this category may include the provision of pay-as-you-go EV charging, as evidenced by Gwent Energy CIC, where they installed and own nine chargers across four sites, where customers can

[14] "*The supplier provides customers with smart meters to measure their real-time use of power and virtually pools and shares the local generation between all customers using power at the time of generation. The supplier provides a local generation tariff, often set lower than the going rate, to incentivise customers to match their consumption to times of local generation.*" [57 p.13]

charge at 25p/kWh. Income from these sites was approximately £1,500 from August 2018 to August 2019, with a targeted 7-year payback[15] (I15) [48]. Other basic services include the installation of energy solutions, with some basic level of maintenance contract. In the case of Gwent, these installations are "*not big money earners … our basic philosophy is we charge cost of the materials and labour, and then 10% for our overheads*" (I15).

At the other end of the spectrum are much more comprehensive PAYS energy service contracts, as employed by BHESCo, whereby energy saving solutions are installed and maintained, with any savings split between the consumer and the community group.

6.3.1.2 Subsidies

6.3.1.2.1 Long-term revenue payments

Revenue payments, in the form of the FiT, RO and RHI (Section 5), have been highly lucrative for some community groups. Across our four case studies we find that revenue payments accounted for between 10% and 79% of their revenue during the financial year 2017/18 (Table 3).

Table 3: Case study revenue payment income as a share of turnover for financial year 2017/18

Organisation	Revenue payment subsidy income	Turnover (year end 2018)	Share of revenue	Source
GEM	£191,252 (FiT)	£242,366	79%	[58]
ECSC	£129,242 (FiT)	£215,474	60%	Survey
Gwent Energy CIC	£40,000 (FiT and RHI)	£100,000	40%	I15
BHESCo	£27,625 (FiT and RHI)	£281,146	10%	[59]

The removal of these subsidies was highlighted as a major barrier to future community energy projects (I5, 15, 19). As per our nationwide survey we found that for the 101 projects in our survey that received a price guarantee, we found that removing these guarantees entirely would see only 22% continue to generate a surplus, versus 92% of projects in 2018 [15].

The security and longevity of these government backed revenue payments has however provided more than just income. By de-risking these projects with a stable and guaranteed revenue stream, community groups have been able to raise capital finance that would have otherwise unlikely been available or affordable without it. As one expert involved in GEM explained, without pre-accreditation for the FiT payments, the "*banks wouldn't touch us*" (I21). The discontinuation of the RO in 2017, FiT in 2019[16] and RHI in 2021 (commercial), and its replacement with the far less lucrative SEG (Section 5), has thus presented communities with a major challenge in securing finance, as they now pose a higher risk investment (I12-13). With a less secure revenue stream "*it's obviously going to be harder for them to get good value capital*" (I13). This investment risk profile has been compounded further by the removal of tax relief for investments into community energy schemes (I15; I31) (Section 5).

Our case of GEM points to the direct link between CE project finance and subsidy. Their modelling of a 4% return on their share offer was only made financially viable through the FiT (I22). Consequently, some CE groups are being driven to reduce the rate of return they are offering to investors via community share offers, negatively impacting their chances of securing the funds they need: "*they're offering probably a two a three per cent return but it's quite a difficult model to bring forward really*" (I12).

[15] Gwent Energy keeps the cost of operations down by sourcing electricity via their own generation assets.
[16] Significant decline in tariff value during the 2010s prior to scrapping in 2019.

Similarly, the removal of the FiT has meant that the project pay-back period has become longer, so the time when the community is "*actually going to really start benefitting from it has gone probably from 12 years to over 30*" (I21). This makes the 'sales pitch' to investors – especially community investors - less attractive if they wanting to see community benefit sooner rather than later.

The removal of these subsidies has not however derailed all projects. For example, the Solar for Schools model exists without the FiT or any other subsidy guaranteed exported price. This has been mirrored by the Low Carbon Hub (via Ethex) successfully raising its target of £3m in community shares for the 19 MW ground mount solar park Ray Valley Solar [60], alongside loans from Triodos and Oxford City Council. The projects targets an attractive 5% rate of return on investment; not dissimilar to share offers that previously incorporate revenue payments. Some respondents expressed hope that in the medium-term, the plummeting prices of renewables, as well as battery storage meant that more community energy projects could become viable without subsidies (I1, 7-8).

Even so, LowCarbonHub explains that the removal of the FiT has "*significantly reduced the number of rooftop projects that we are able to deliver with our operating model*" [61 p.34]. This view is mirrored by the halving of the installed capacity of renewable electricity and heat generation between 2019 and 2020 [3].

6.3.1.2.2 Innovation demonstration funding

By partnering with technology demonstration projects, some community groups have been able to secure a new subsidy stream. GEM on the Isle of Mull offers a good example of this. GEM was a key partner of the £2.5m grant funded[17] Assisting Communities to Connect to Electrical Sustainable Sources (ACCESS) project. The objective of ACCESS was to overcome the island's grid constraints, which limit the installation of new generation capacity, by creating new sources of flexible electricity demand that could provide 'headroom' for the network link to the mainland grid. By using smart network monitoring systems and storage heaters, the system channelled power from the hydro - that could not be exported to the grid due to constraints - towards households to provide electric heating.

The project benefitted partner Scottish and Southern Electricity Networks (SSEN) by allowing them to demonstrate how they could offer non-firm grid connections for decentralised power generation, via the installation of a "repeater" and an "intertrip" at the substation Mull[18]. This means allowing them to connect more decentralised generation without the need for network upgrades. This solution has since been replicated "*probably half a dozen or more*" times across Scotland since (I24).

GEM sadly enjoyed less long-term benefit. Whilst the storage heaters were left in situ after the project came to an end, the smart network controls were disabled, meaning the issue of grid constraint re-emerged. It also eliminated Garmony Hydro's direct route to supply electricity for heat.

6.3.2 Costs

6.3.2.1 Capital and operational

The major costs a community energy organisation has to bear are not dissimilar from other companies; primarily labour, equipment and interest payments. Gwent spent approximately two thirds of its turnover on labour (in-house and contracted), whilst BHESCo committed just over half (56%)[19]. Staff

[17] Mainly funded through two grants: (1) Scottish Government's Local Energy Challenge Fund (£1.8m) and (2) Ofgem's Electricity Network Innovation Allowance via Scottish and Southern Electricty Networks (£0.3m) [101].
[18] These could signal if there was a local imbalance in supply and demand, and whether a fault condition was likely, meaning generation assets like Garmony Hydro could be disconnected.
[19] GEM's labour costs were low given it's the hydro project requires little ongoing management. ECSC is also hard to determine, given they out-source most activities to E4A.

costs were also considered higher for more service-based business models (e.g. PAYS), which tended to be more bespoke and complex versus the traditional 'rent-a-roof' solar PV model (I28).

The cost of equipment (e.g. solar PV, efficiency technology etc.) is also a major cost and in the period 2017/18 BHESCo spent roughly half of its revenue on finished good purchases[20]. The nature of the projects under GEM and ECSC saw each major costs capital cost of their technologies paid up front, which was covered by large share raises.

The ongoing costs of decentralised energy technologies (e.g. heat pumps, storage (etc.) was highlighted as a concern, even though costs are falling rapidly (I15). As too was the cost of feedstocks, such as biomass (I15). The affordability of these technologies does however have to be considered alongside the market cost of energy, which self-consumption displaces. Gwent Energy pointed to how a combination of the falling cost of technologies and rising energy prices, had meant the payback period for solar PV and storage had fallen by about 50% between 2016 and 2018.

Where access to land and buildings came at a cost, this was substantial. For example, GEM pays rent of £16,000 paid to FLS to lease the forestry site that Garmony Hydro is located on. Finally, a significant proportion of income is normally channelled into community benefit funds, to support a wide range of community projects in the local area. Three of our four case studies made payments ranging between £5,000 and £35,000 per annum to such funds.

6.3.2.2 Cost of finance

The cost of finance is also significant, and again in the case of Gwent Energy, it pays about £10,000 interest per annum on the loans and bonds it has issued. Similarly, ECSC paid £80,000 in 2017/2018 and in the same year, GEM had to service £76,000 of finance interest, including £57,000 of loan interest and £19,000 of community share interest.

6.3.3 Finance

Most of the costs of community renewables projects are met today by raising repayable finance and the main instruments for doing this are *community shares*, *loans* and *bonds* (Table 4).

Table 4: Overview of community energy finance mechanisms

Mechanism	**Total finance raised**	**Average finance raised per project**	**Average finance raised per organisation**	**Average interest rate of finance per instrument[1]**	**Mean interest rate weighted by size[2]**
Loans	£21,139,575	£556,304	£1,006,646 (n=21)	4.2% (n=38)[3]	6.1%
Community shares	£13,657,284	£158,806	£620,786 (n=22)	4.8% (n=86)	4.9%
Bonds and Debentures	£2,769,000	£923,000	£923,000 (n=3)	5% (n=3)	4.9%

[20] BHESCo ran at a loss £33,432 in 2017/18.

[1] Data extracted from survey presented in Braunholtz-Speight et al. [15]

[2] Calculation for weighting: [(size of loan 1 * interest rate of loan 1) + (size of loan 2 * interest rate of loan 2) etc. to loan n] ÷ [sum of sizes of all loans]

[3] Number of loans we know the interest rate of, from our survey.

6.3.3.1 Community shares

Community shares are the most frequently used form of community energy finance, largely because they're relatively reliable means of raising low cost finance, especially for smaller projects [15] and when comparing against loans if the mean interest rate is weighted by size of investment (Table 6). They are generally long-term and offer some financial flexibility, as repayments are subject to approval by the members. Furthermore, only cooperatives or community benefit societies ('BenComs') can issue them and their 'one shareholder one vote' structure typically fits the democratic ethos of community energy. In addition, as they cannot be sold on, community energy coops and BenComs cannot be 'taken over' and remain with the community.

Community shares are not without drawbacks, however. We split these from the perspective of the lender and the investor:

Table 5: Drawbacks of community shares from perspective of community group and investors

Drawbacks from community energy group's perspective	**Drawbacks from investor's perspective**
Share finance can be difficult to raise in low-income communities (I10).	Offer little to investors looking for capital gains, as they are not permitted to sell their shares for more than they paid for them [62].
Larger share offers typically demand national investment platform (e.g. Ethex or Energy4All) [15] but can result in a higher proportion of shareholders are not local people (I4; I31).	Withdrawable shares illiquid and less desirable to investors seeking flexibility (I7).
Unclear whether commercial firms are able to invest in withdrawable shares whatsoever because of their fiduciary duty[21] to shareholders [63].	Payments to investors at the discretion of the issuer (I15).
Legal cap of £100,000 of investment from any single community shareholder [64], potentially limiting its potential to fund larger projects.	Not regulated like ordinary shares, with no external auditing or oversight from a financial ombudsman (I18) [65].
	Shares are not secured against assets of the company. If company became insolvent, the shareholders would have no claim to the assets of the issuing organisation.

Table 5 raises the question of how local community shares are. The case of GEM is relevant here, where "*two thirds of those investors are pretty much from on the island or from people with close associations with the island*" (I21), suggesting the remaining investment came from outside the 'community'. This potentially relinquishes control of community assets to those outside the locality, which may be undesirable: "*you just don't want the majority of your shareholders in your Welsh Valleys windfarm to be based in London…to be making votes on what you can do in a community benefit fund*" (I10).

6.3.3.2 Loans

Community shares are the most frequently used financial instrument in UK community renewables but are typically insufficient on their own to raise funds for larger-scale projects like wind, ground

[21] Fiduciary duty is commonly understood to refer to the obligation on investors to maximise returns for their shareholders. That means that a company couldn't knowingly invest in a venture, for example a community energy co-operative, if it would result in a lower return on investment versus a more commercial venture; even if it was more ethical [63].

mounted solar and hydro [15]. These larger projects normally source a combination of shares, loans and bonds. Importantly, loans can be drawn from a wide range of sources, each providing a very different scale and interest rate (Table 6). Of the commercial loans, three were made from institutional investors (Santander; Close Brothers; Bank of Scotland), whilst five were from ethical lenders and the remaining two loans were from customers i.e., businesses who were going to be buying some of the energy generated by the project.

Table 6: Community energy loans finance by source, size and interest rate

Source of loan	Count	Amount	Average raised per loan	Mean interest rate per loan (unweighted)	Mean interest rate weighted by size of loan
public	7	£4,827,000	£689,571	7.9%	7.9%
commercial[22]	10	£14,624,800	£1,462,480	4.3%	5.8%
third sector[23]	6	£1,060,000	£176,666	3.7%	5.5%
citizen	9	£174,925	£19,436	4.2%	5.2%
directors	6	£452,850	£75,475	0%	0%
total	**38**	**£21,139,575**	**£556,304**	4.2%	6.1%

6.3.3.2.1 Institutional investors

The bulk (69%) of community energy loan finance was provided through commercial loans, although these loans accounted for just 26% of all loans. Importantly, at 4.3% (or 5.8% when weighted by project size) this finance was cheaper on average than loans offered by state (Table 6), albeit more expensive than other sources (such as from citizens or trustees). This points to how commercial finance was just about affordable for communities when we consider that "*these projects are not working with bank finance at six, seven, eight per cent*" (I2).

Loan finance from institutional investors was particularly difficult to attain. The first issue these investors do not target community energy because they are not familiar with it: "*it takes a lot of work with the loan financer to get them to understand how […] community interest companies and community benefit societies work*" (I12). Similarly, communities were equally unfamiliar with the commercial finance sector: "*[it was] certainly something that was alien to the community trust*" (I21).

Second, communities tend to operate at *"a scale that's not interesting to the banks"* (I1), with the average capacity in our survey for ground-mounted solar PV scheme just 3.4 MW and wind 1.8 MW. As one respondent explained, *"they're interested in low transaction costs - so big returns for big projects. They're not interested in our business model"* (I25). This view was echoed by the former Chief Executive of the GIB: "*It is very difficult to do that in chunks of £1 million or £2 million for a community project; we have to invest that in chunks of £25 million and above*" [66 p.27].

Finally, community groups typically covet democratic governance and prefer the 'one member, one vote' model. This is not normally desirable to commercial investors, who expect their degree of control to be proportional to their investment (I11).

[22] Ethical lenders like Triodos, Charity Bank etc. are included in 'commercial'.

[23] The majority of these funds relate to charitable foundations making soft loans (e.g. lending to cover early project development costs, only have to repay if project gets built).

6.3.3.2.2 Ethical investors

Half of all commercial loans were from "*a very limited pool of lenders*" (I12), who understand the sector. Our survey identified five loans, one from each of Charity Bank, Coop Bank, Pure Leapfrog, Resonance and the Robert Owen Community Bank. These are described as "*ethically focussed*" lenders (I12), who concentrate investment in projects with clear ethical and/or environmental goals. For example, GEM secured a £500,000 variable rate loan from the ethical lender Charity Bank at 5.25% to deliver its 400 kW hydro scheme.

Several interviewees indicate that CE is becoming a beneficiary of a burgeoning ethical finance sector, driven by an appetite from organisations to invest in schemes that align with their own sustainable development objectives (I7). Importantly however, our case studies of BHESCo and Green Energy Mull revealed how most ethical investors shared a similar appetite for scale compared to the larger institutional lenders (I21, I28): "*we were actually too small for Triodos. They were looking at £2m plus schemes*" (I21). There was also a concern that these ethical lenders still operated a traditional commercial ethos, which undermined their community's autonomy (I25). Examples of included these lenders' preference for debt seniority, using community assets as collateral and the diversion of surplus revenue away from the community, as interest payments (I17; I29).

6.3.3.2.3 Community and third sector

Community loans, i.e. loans from individuals or organisations from the local community, are a very important source of loan finance. Loans made by community group directors account for £452,850 of investment, averaging £75,475 per investor and all were zero interest loans (Table 6). Citizen loans and those from the third sectors (e.g. charities) were also an important source, together accounting for £1.2m of finance, at over 5% interest rate[24].

Gwent Energy has been a major beneficiary of citizen loans, raising at least £170,000 in investment to date across 40 investors; approximately £4,250 per investor. This came about in a bid to secure additional funds to install a larger solar PV array on a local building: "*We decided to have a meeting of people that use the [community] hall, and see if they would loan us some money … it took us about 15 seconds…to lend us about £15,000*" (I15).

6.3.3.2.4 State

The state provided seven loans, worth £4.8m in total, and £0.69m per loan, at 7.9% size weighted interest rate. State loans were therefore of a significant size – albeit half the size of commercial loans – but were relatively expensive. A good example of this is Scotland's Renewable Energy Investment Funds (~7%): *"[Whilst] interest rates have dropped massively…EIF is offering you…around about 7-8% over a 10 year period*" (I11). The case of GEM illustrates how the community were able to access a £434,000 fixed-rate loan from Scottish Government at 7% but were also successful in securing a variable rate loan of £500,000 from the Charity Bank at 5.25%[25]. It is however important to note that there are important reasons for the relatively small size and high cost of these state loans versus commercial loans.

The first is because these state loans are typically made for earlier stage and thus smaller and riskier projects. So, the key value proposition of state finance is that the state exhibits a greater investment risk appetite, enabling projects to happen that may otherwise go unsupported, as they would be viewed as too high-risk.

[24] Weighted by size of loan.

[25] We acknowledge that fixed rate loans tend to be associated with higher interest rates as they offer less uncertainty.

Second, these state loans normally must comply with State Aid rules. If an organisation receives a state loan that is compliant with State Aid and offered on commercial terms, it means that the loan does not 'eat in' to the total amount of subsidy they are permitted to receive[26]. The *quid pro quo* is that the loan is offered at an interest rate commensurate with that being offered on the 'open market'. It also means that the state must also act as the minority lender, normally meaning that the project already has secured more than half the required investment from a private company. Consequently, their role is to "help de-risk" projects for the senior lender (I2) because they can only "*invest where there is a demonstrable funding gap in a project's funding package*" [67].

Whilst these loans might be relatively expensive versus other sources, the state often provides 'soft loans' for earlier stage project development, which can be 'written off' if it fails, such as it "*doesn't gain the planning consent or the landowner backs down*" (I5). For example, Scotland's CARES programmes offer a soft loan of up to £150,000 that can cover up to 95% of project costs, at an interest rate of 10%. We find that BHESCo, ECSC and GEM all used soft loans and as one interviewee explains: "*even a high interest loan that could be written off was a much better risk profile than taking out a loan of their own at 5%*" (I5). We also noted that in the instance of GEM, they found the state loan but quicker and easier to organise versus their commercial loan with Charity Bank[27] (I21).

6.3.3.3 Bonds

Although mostly used for re-financing projects to date, bonds can raise larger sums of finance per offering versus shares or loans at a similar interest rate (Table 1). For community group's they're attractive in terms of fund raising, in that there is no cap on the amount that can be held by an individual investor. Also, unlike shares, they can offer a form of short-term, time-limited debt, by enabling them to restrict the company's liabilities over a specific period.

From an investor's perspective, they offer quicker, fixed repayment schedules versus community shares, bonds can be more attractive to more financially motivated investors (I15), and thus appeal to a broader audience as a result (I9). Furthermore, bonds differ from community shares in that they are transferable, providing investors with greater liquidity, although neither the sale nor price are guaranteed. One trade-off is that bond investors do not become members of the organisation, thus providing them with no voting rights. Therefore, some community energy groups have combined raising finance through community shares and bonds, to offer them some degree of control.

Bonds are increasingly being marketed by online platforms such as Ethex and Triodos, with a strong emphasis on a provision made in 2016, which makes crowdfunded bonds eligible for Innovative Finance Individual Savings Accounts (IFISAs)[28] (I31). Citizen investors can invest up to £20,000 of tax-free savings per tax year, providing investors with an additional boost to their return on investment. A good example of such an offer is from S4S (Section 6.3.1.1.1), which has issued several bond offers via Ethex. It's most recent saw 100% of its target £950,000 raised in 2021 at 2% plus rate of inflation set by RPI, with a maximum 5% total interest per year [56].

[26] State aid is defined "*whenever state resources are used to provide assistance that gives organisations an advantage over others*" [99 p.3]. "*De Minimis Regulation allows small amounts of aid – less than €200,000 over 3 rolling years – to be given to an undertaking for a wide range of purposes*" (ibid p.8).

[27] This was mainly due to complications around the different legal jurisdictions of the project, with GEM based in Scotland and the Charity Bank registered in England.

[28] Unlike traditional ISAs, there are fewer protections and IFISAs are not protected by the Financial Services Compensation Scheme should they collapse [102].

7 Policies to support UK community energy financing

This section outlines eleven policy recommendations to support UK community energy finance. These are summarised in Table 7, where policy solutions are and linked to specific business model domains and building blocks, as well as their targeted impact.

Table 7: Summary of policy recommendations

POLICY SOLUTION			BUSINESS MODEL IMPACT			
Policy instrument type	**Policy recommendation**	**Policy actor responsibility**	**Direct or indirect focus on finance**	**Targeting barriers internal or external to business model**	**Business model domain and build block impacted**	**Impact**
Carrot	Low-cost state community energy finance and a joined up finance chain	• HM Treasury • BEIS • Devolved Admins	Direct	Internal	Finances (*Finance*)	Project finance more affordable and available.
	Reduce tax burden on community energy groups (e.g., investment tax relief, VAT cut)	HM Treasury	Direct/Indirect	Internal	Finances (*Costs/Finance*)	Cost of project goods, services and investment made cheaper.
	Revenue payments for community energy generation and efficiency	• BEIS • HM Treasury	Indirect	Internal	Finances (*Revenue*)	Greater confidence in the price of energy generated and/or saved.
	Grants and community benefit payments that support business model experimentation, especially in deprived areas.	• BEIS • DNOs (via Ofgem price control) • Devolved Admins	Indirect	Internal	Finances (*Revenue*)	Funds to enable the transition to new, more investable business models.
Stick	Minimum net-zero and just transition investment standards	HM Treasury	Direct	External	Finances (*Finance*)	Project finance more affordable and available.
	Enforced partnerships with local authorities and NDPBs	• Ministry of Housing, Communities & Local Government • Non-departmental public bodies • Local Authorities	Indirect	Internal/external	Operations and Custom (*Key partnerships, Customer segments*)	Creates a platform for local stakeholders to engage more closely with community energy projects; as partner and/or customer.
	Facilitate swift and affordable community access to under-utilised public land	• Ministry of Housing, Communities & Local Government • Devolved Admins	Indirect	Internal	Operations (*Key resources*)	Project feasibility improved, with affordable access to land and/or buildings.

		• Loack Authorities				
	Expand market opportunities for local energy supply and grid services	BEIS and Ofgem	Indirect	Internal/external	Operations and Custom (*Key activities; Customer channels and segments*)	Opportunities to engage in new energy activities, which reach (new) customers via new market channels.
Sermon	UK-wide community energy strategy and a stand-alone delivery body	• BEIS • Devolved Admins	Indirect	Internal/external	All	Provides a specific and quantifiable role for community energy, providing it with legitimacy and investors with confidence.
	National Community Energy Hub for skills training and knowledge exchange	• BEIS • Devolved Admins	Indirect	Internal	Operations (*Key resources*)	Broadens community group's resource base, expanding or deepening their activities, to bolster their case for investment.
	A framework for defining and evidencing the value of community energy	• BEIS • Devolved Admins	Indirect	Internal/external	All	Investors become clearer about what community energy is and the value it offers.

7.1 Economic (Carrot)

7.1.1 Low cost state finance and a joined up finance chain

State-backed finance, particularly in Scotland, has proven critical to supporting community energy, although this not same support is not reflected across the entire UK (Section 5) (Figure 2). Even so, where state-finance was available to communities, the interest-rate of these loans was often considered high. This is largely a function of the need to offer these at commercial rates to avoid being counted as State Aid. Additionally, due to State Aid rules, the state would not typically supply all of the finance required for larger projects. This meant that securing state finance was contingent on the bulk of the project's costs being covered by private finance; very challenging in the current climate of uncertainty associated with COVID-19 and Brexit. In light of these issues, we make several recommendations on state finance.

First, we recommend a detailed review of community energy State Aid. With the removal of revenue payments (e.g. FiT) and the scarcity of grants, we would suggest that most community energy groups possess substantial 'headroom' against the permitted limit of State Aid. This opens up opportunity for low- or zero-cost finance to be provided, which might be counted as a form of subsidy. The Salix loan scheme for public bodies offers an interesting template, where interest-free loans are made for energy efficiency projects, to be repaid normally within five years and funds recycled into future projects [68].

Second, echoing Nolden [17], the state can assume further risk and drawn in additional private investment by through the provision of a junior debt facility, whereby the state is lower priority when recouping the debt versus the senior private lender. They can also achieve this aim through loan guarantees, where the state effectively "*underwrites a loan, so that it's not expensive for local people*" (I10) or private investors, essentially making the finance more affordable for communities.

Third, state finance must be 'joined up' and ensure – alongside citizen and private finance – that community energy finance can be accessed at each stage of the project's lifecycle. This is much more joined up in Scotland and Wales versus England[29] (Figure 2). A glut of early-stage finance and a lack of later-stage finance - and vice versa – is of little use to communities unless they can self-finance their projects. Under the auspices of the recommend community energy strategy, coordinated via the community energy delivery body (Section 7.3.1), a review of the current community energy finance supply chain is needed to identify gaps in the finance chain. A public-private-civic community energy finance taskforce should then established to deliver targeted solutions to fill these finance gaps, building on and updating the work of the Community Energy Finance Roundtable [16].

Finally, in the interests of a Just Transition, state finance should target community projects in high-deprivation communities that are struggling to crowd-source citizen finance from within their own community. These communities are at a natural disadvantage to self-finance their own projects and required targeted support.

7.1.2 Reduce tax burden on community energy projects

A major blow to community energy finance has been the removal of social investment tax relief (Section 5). Initially this was removed because government considered its provision, alongside the FiT, "*as sort of like a double subsidy*" (I28), however the removal of the FiT and RHI means the logic of this argument is now potentially flawed (I7, I28) and State Aid 'headroom' may now exist for community

[29] UK Government has committed to issuing Sovereign Green Bond (or 'Green Gilt'), largely for institutional investors and Green Savings Bonds via NS&I, the first standalone retail savings product tied these sovereign bonds and backed by the Treasury [103]. Whilst they target the UN's Sustainable Development Goals, it remains to be seen how well placed they might be to plug gaps in the UK's community energy finance chain.

energy groups (Section 7.1.1). The simple solution would be to reinstate this tax relief, by enabling community energy groups to apply for the SITR, which has now been extended to 2023 [69].

Community energy costs could also be usefully minimised by cutting or removing VAT on decentralised low-carbon energy technologies and services, for example solar PV modules and their installation. This would acknowledge the poorer economies of scale for small-scale, bespoke energy projects versus larger, replicable projects (e.g. offshore wind).

7.1.3 Revenue payments for community energy generation and efficiency

The withdrawal of subsidies – especially the FiT and RHI – has reduced the security of revenue for communities generating renewable heat and/or power. This has in turn raised the risk profile of these projects and the potential cost and availability of project finance, often making projects unviable. This is a major issue considering the wider absence of major community energy capital grants to cover upfront costs and by extension, the need for project finance.

Reinstating these subsidies in some form or other would help, once again, de-risk community energy. However, a more targeted solution would be a *Community Renewable Energy Revenue Payment (CRERP)*, which provides a minimum term and index-linked tariff per kWh of low-carbon power and heat to community organisations [2]. This would be set at a level that accounts for the difference in project costs between small-scale community projects, versus large-scale commercial projects, which enjoy stronger economies of scale. Continued receipt of CRERP be contingent on a demonstrable evidence of long-term community benefit and meaningful community ownership. Finally, the scheme should be sensitive to how community groups "*cannot make decisions and invest money at the pace a commercial developer can*", ensuring the scheme gives them ample time and support to make applications (I11).

A similar approach could be taken to support community energy demand-side energy services, like BHESCo's PAYS model. Currently, the relatively low cost of energy and high transaction costs associated with PAYS contracts means it is difficult to generate profit, and so operations are often cross-subsidised via income from surpluses generated by renewables, as is the case with BHESCo. To grow this market, the cost of energy – and by extension energy savings – must be sufficiently high to stimulate demand reduction. Rather than increasing energy prices, which would negatively impact fuel poor homes, an *Energy Saving FiT (ESFiT)* could be introduced to offer a fixed price subsidy for each unit of energy saved [70,71]. This is akin to the strike-price[30] offered by the UK's Contracts for Difference and creates certainty around the value of energy savings.

Unfortunately, the PAYS model is not easily applicable to fuel poor households, given that it is neither practical, nor ethical, for the community group to share the income from their energy savings. Fuel poor customers are also more likely to be in tenants [72] and impacted by the 'split incentives' issues, whereby landlords are uninterested in investing in energy savings they will not directly benefit from. A combination of fuel poor energy efficiency grants and stricter regulation on landlords to meet minimum energy efficiency standards could stimulate the market for community energy efficiency [73].

7.1.4 Grants and community benefit payments to support business model experimentation

Our research also points to how the removal of the FiT and RHI has forced communities to experiment with new energy business models, in a bid to secure new revenue streams (I15). Ironically, however, it is the groups that are already in receipt of long-term revenue payments that are best placed to

[30] The cost of the per unit energy saving is topped up by the state if it falls below the strike price but the community group pays the state back if the cost of the per unit energy saving rises above the strike price.

experiment, given they possess the funds and security to do so. This gives them an advantage over new entrants in terms of entering new energy markets (e.g., grid services, demand reduction etc.). Consequently, it is important new entrant community groups are supported.

Grants were considered critical to enabling community-level experimentation, allowing communities to "*play about with those sorts of things… to explore how they can move forward and explore how they can create value…[and] get us to that stage where we can be invested in*" (I13). Furthermore, these grants not only support knowledge development but offer the foundation for knowledge exchange, strengthening the capability of the community energy groups to share insights across their network (I13).

Unlike in Scotland and Wales, community energy grants are very limited in England (I13) (Section 5), where the only flagship scheme is the Rural Community Energy Fund, which is due to end 2022. It is essential these grants are offered UK-wide and particularly target feasibility scoping and project development activities. It is also critical that these grants target the most deprived communities, which are not in receipt of long-term revenue payments (e.g. FiT), as these are likely to be least able to draw on either existing reserves and/or local citizen investment to launch new community energy projects.

One interesting alternative option to direct state grant funding, is to channel donations from community benefit funds linked to commercial onshore wind farms [74]. Here, government guidance is that an annual payment of £5,000 per MW per year into a 'Community Benefit Fund', to support community projects [74,75]. This would mean that a typical 30 MW onshore wind farm would pay £150,000 per year to local projects [76]. Interestingly, very few of these community benefit funds have targeted support for community energy groups [77]. Mandating that a specific share of these funds to support community energy would help to support development of early-stage projects.

Finally, innovation grants are primarily designed to support technology and business model demonstration. Communities can become partners due to their in-depth understanding of the local area and connections with local stakeholders (Section 6.3.1.2.2), allowing for 'in the field' experimentation. It is important however that the terms of these grants both insulate communities from undue levels of risk and ensure long-term benefits. This aligns with the broader and growing debate around responsible innovation [78], especially in low-carbon contexts [79]. Importantly, some of the DNOs draft business plans for Ofgem's RIIO-ED2 price control have a strong community energy focus, aimed at funding supporting new community energy projects that deliver community benefit [80].

7.2 Regulation (Stick)

7.2.1 Minimum net-zero and just transition investment standards

Our research finds that the ethical finance sector has had some, albeit limited, engagement with the community energy sector thus far (Section 6.3.3.2.2). Even so, there remains significant scope to regulate the finance sector to channel more of its capital into sustainable and socially equitable projects. As one respondent explained, "*the banks don't take you seriously, and perhaps government ought to do something to make banks take community organisations more seriously*" (I4). This is often linked to the lack of awareness of the value community energy projects offers and more broadly, how this maps on to wider social, environmental, and economic agenda, which extend far beyond rate of return.

The Green Finance Education Charter [81] is an important step forward in educating financial actors in climate-related risks and opportunities, as well as sharing best practice in green finance. However,

this would usefully be coupled with stricter financial sector regulation. The UK Chancellor of the Exchequer set out some encouraging commitments in late 2020, including a green taxonomy – a common framework for determining the activities that can be defined as environmentally sustainable - and mandatory environmental financial disclosures that make clear the climate impact and risks associated with investment [82].

What is not on the horizon however are mandatory top-down divestment targets into low-carbon and/or just transition compatible projects. It is important that pressure is applied on institutional investors to evidence how their investment portfolio maps onto these wider objectives, which will likely benefit community energy too.

7.2.2 Enforced partnerships with local authorities and non-departmental public bodies

Given the limited key resources that communities have at their disposal, such as land, skills (e.g. legal, planning), financial capital etc., partnerships with local stakeholders are extremely valuable to community organisations, helping to fill resource and capability gaps they might face. Our case studies point to a number of examples of successful partnership working with councils, community groups, NDPBs etc. (Section 6.1.3.1) that have helped our case study organisations flourish.

However, these partnerships face various barriers to partnerships, including: 1) a lack of internal capacity to build and maintain these partnerships, largely attributable to a decade of local authority cuts [51]; and 2) a lack of any government mandate on councils to deliver on sustainability objectives [83], largely attributable to the removal of Local Authority National Indicators to tackle carbon emissions (N186) and fuel poverty (N187) were removed in 2010 [84]. Reinstating lost funding and these sustainability performance indicators is an obvious first step. A bolder move would be to index-link council funding with performance against sustainability performance indicators and ensure these indicators become more comprehensive than before, such as inclusion of measures for community benefit, air pollution etc. Finally, a publicly available league table of council performance against these indicators would create a further 'public relations' incentive and help evidence their progress against the council's own net-zero targets.

Beyond performance indicators, councils could also be mandated to source a minimum share of their energy supply (e.g., 20%) via community sources by a specific date (e.g. 2030), assuming this meets strict affordability criteria to avoid spiralling costs. This would encourage councils to both use their powers (e.g. planning) to facilitate community energy projects and also become customers, such as via a long-term PPA. A similar 'local content' requirement could be imposed on other non-departmental public bodies and charities like the Forestry Commission, Crown Estate and National Trust. Procurement rules would need to be adapted in line with these requirements, ensuring that the council weight social and environmental outcomes of energy tenders, alongside the financial costs.

Finally, as in Wales [85], mandating that renewable energy projects have a meaningful degree of local ownership will mobilise a wide range of partnerships, not just with local authorities. Whilst local ownership must be clearly defined if it is in line with community ownership (Section 7.3.3) then this will offer a sound foundation for partnerships.

7.2.3 Facilitate swift and affordable community access to under-utilised public land

Whilst much of the UK sits in the hands of private individuals, companies, charities, the Crown and Church – roughly 74% in England – 8.5% is owned by the public sector[31] [86]. The state effectively operates not-for-profit, and its remit stretches far beyond simple revenue generation, often with a

[31] 17% of land in England remains unaccounted for by ownership.

strong focus on generation social and environmental value. Arguably most important to community groups is the 4% of land that Local Authorities own in England and Wales. However, as one respondent explained, whilst local authorities ultimately control much of the land that could be used by community projects for energy projects, they are not developing these sites *"because it doesn't have any resource itself*" (I8). Community groups regularly face challenges with regards to access to land and buildings to deliver energy projects (Section 6.1.2.2). Consequently, partnerships with public sector organisations are an important means of addressing this shortcoming but where local partnerships fail to provide the necessary space to deliver projects, community energy projects suffer.

Mechanisms exist for community to take control of appropriate land for the generation of community benefit, such as community 'right to buy', asset transfers etc. (Section 5). Where these powers to exist (e.g. Scotland), it is essential that communities are made aware of them and provided technical support to make the necessary applications.

However, these community powers are much less developed in other parts of the UK (e.g. England). The first step here should be to extend these additional powers to empower community organisations across the whole UK to adopt council land to: a) develop projects that promote sustainability and social welfare, and b) where the council has demonstrably failed to act. The second is that access to this land should be made as affordable as possible considering that community groups will not be able to compete with institutional landowners on price alone (I8-9; I19). Where communities can evidence that the energy projects will help the council meet its net-zero and just transition objectives, the community should be afforded the right to trigger the option to buy/lease the land at below market-value or at least offered funding to make it affordable (e.g. Scottish Land Fund).

Finally, a supportive planning regime is essential to make use of this land once access is granted. Until recently, community groups were facing a *de facto* ban on onshore wind. It is essential these planning barriers do not return (I7), alongside a prioritisation of community owned energy projects by the planning regime and community support to navigate the complex planning regime.

7.2.4 Expand market opportunities for local energy supply and grid services

Community project access to established energy markets was regularly highlighted as a key barrier (Section 6.3.1.1), especially the costs and capabilities associated with becoming a licenced supplier (I4; 23-24). Consequently, community groups are heavily reliant on licenced suppliers to access the wider energy market. However, these sees potential value being lost by communities. For example, the case of GEM points to a "*gap … of ten pence a kilowatt*" between what it sells its electricity to its energy supplier agreement versus what the typical customer pays (I22).

There is therefore a critical need for regulation to help 'level the playing field' for communities by affording them a 'right to local supply', whereby they can "*sell their energy to their own community and accommodate local demand*" [2]. Here local generators could become licenced local suppliers and would "*face set-up costs and complexity proportionate to the scale of their operations*" [87 p.3]. However, it remains unclear how small-scale and poorly resourced community groups can realistically meet the complex requirements imposed on licenced energy suppliers, beyond local suppliers experimenting in conjunction with Ofgem to identify an appropriate regulatory balance that opens up local supply, whilst protecting consumers and the grid [88].

In the absence of local supply licences, smart local energy tariffs (Section 6.3.1.1.1), as demonstrated by the Smart Fintry project [57,89], which see "*customers allow their load to be controlled in return for cheaper energy … which creates a portfolio of flexible load*" [90 p.60], offer communities an important marketplace. This flexibility and balancing could also provide communities with an

opportunity to benefit from the provision of grid services. To maximize communities' opportunity to engage with this market, they will likely require low volume thresholds and technical standards that keep energy data systems open and accessible to smaller actors [73](I23-24).

7.3 Information (Sermon)

7.3.1 UK-wide community energy strategy and body

A number of respondents lamented the lack of any kind of over-arching UK community energy strategy, since the launch of their last strategy in 2014 [91](I1, 8, 15, 30). As one respondent explained, government is quick to "*give it a role but they never quantify it. So you're never really sure how big they want it to be*" (I8). This has a negative impact on potential investment as it undermines confidence in the size and longevity of the sector. As one respondent explained, it is essential government creates stability by ensuring people became "*more confident that things aren't going to change in the blink of an eye…aren't going to disappear*" (I30).

This will require a long-term UK government strategy for the role of community energy in delivering just, net-zero transition and crucially, one that unites the UK's devolved administrations too. Devolution has meant that the UK energy policy regime is more fractured across the Home Nations today than it has ever been, creating confusion for investors. For example, devolved powers in Scotland have resulted in key supportive policies for community energy (e.g. community land buy-out, soft loans for community energy etc.) but the bulk of energy sector powers remain reserved to UK government [92,93], leading to wider systemic barriers.

A joined-up approach is therefore needed, requiring a shared strategy across central and devolved governments, associated with a UK community energy taskforce, which regularly meets to update it. An important missing element, which would help undermine a nationwide community energy strategy, would be sub-regional energy and carbon emissions targets, outlining clear target for community ownership (see Wales) and supply of energy to local government (Section 7.2.2). These would 'aggregate up' to deliver against the UK's carbon budgets and send a clear signal to local and regional energy stakeholders (e.g. DNOs, local authorities) that local and regional climate action is needed (I8, 10).

Finally, to ensure this strategy is resilient to government and policy change, it requires an 'arm's length', independent delivery body, akin to the Energy Savings Trust. This would be home to the Community Energy Hub (Section 7.3.2), to provide communities, investors and the wider supply chain with project support.

7.3.2 National Community Energy Hub for skills training and knowledge exchange

We note in Section 6.1.2.1 how community groups are rarely home to the full suite of skills and knowledge required to deliver energy projects; raising the risk profile of investment in the eyes of investors. They also rely heavily on paying intermediaries to make-up for this shortfall in skills, experience and track record (Section 6.1.3.2). Developing the requisite project skills in-house is expensive in terms of both time and money but necessary for these communities to grow their resilience and maximize community benefit (e.g. up-skilling the community, avoiding costly sub-contracting). Furthermore, skills training is becoming even more critical as communities shift outside the community energy sector' typical marked of decentralised energy generation and into new areas (e.g. demand management, flexibility services etc.): *"[there] needs to be a lot more work done to support community energy in understanding what those business models are, what the risks are within them and what are the best models to use to exploit them*" (I8).

A national Community Energy Hub – funded as part of a national Community Energy Strategy delivery body (Section 7.3.1) - could serve to address these issues and help communities become 'investment ready', by delivering the following services:

- Free or heavily subsidies skills training, covering energy and non-energy applications (e.g. finance, law). Where skills are too specialised, a funding pot to afford these from the market.
- Curate a free-to-access library that evidences best-practice community energy guidelines, explainers on emerging business models, finance etc. and detailed toolkits[32] to help communities navigate complex issues (e.g. policy, regulation, finance and legal).
- A properly resourced and UK-wide knowledge exchange platform, which allows easy exchange of best-practice. Communities should also be paid for time and expenses to share their experiences. As one respondent explained a *"handful of experienced groups are going to be so influential on the rest of the sector…so it's how we enable them to share their learning and to help with the other projects coming through*" (I9).
- An outward facing 'guide to community energy' for those unfamiliar with the sector - which evidences its value, challenges, opportunities etc. to institutional and citizen investors - will help build familiarity and confidence.
- Establish 'coalitions of the willing' of community stakeholders, by providing the space and funds for local communities to bring local stakeholders (e.g. council, church, charities) together to lay the foundations for a community energy group.

7.3.3 Framework for defining and evidencing the value of community energy

A perennial issue for community energy, is defining exactly what we mean by it. In Section 2 we provide a working definition, which builds upon the literature and has been co-developed by stakeholders. Any future community energy strategy must adopt a definition of community energy, built on a broad consensus.

This is critical to finance in three ways. Firstly, it can serve to demystify community energy for those looking to invest in or design policy to support it. Second, a robust definition will help to ensure that communities legitimately delivering their own community projects become eligible for investment or subsidy that explicitly targets community energy. Third, a tighter definition of community energy affords us a clearer opportunity of measuring *what community energy does,* and the value is creates (see Section 2.1) (I9, 13).

It is essential that any definition of community energy is sensitive and resilient to scale, meaning that it remains functional for a small-scale project or sector, as much as it does at a large-scale. As one respondent explained: "*if we're going to scale what we do…how do we do that but not lose that community ethos, that community value?*" (I9). Further research is required to understand if and how community energy's value proposition can be retained, regardless of scale.

With a definition in place, there is a clear need for government to support, potentially via funding of our proposed delivery body, to undertake a UK-wide detailed state-of-the-sector assessment. The first of these was undertaken by the UK's various community energy associations [3], and whilst offering valuable insights, it does not provide raw, time series data relating to project finance. Consequently, it is extremely difficult to understand how the community energy finance is evolving year-on-year, for example in terms of the type and scale of finance. Similarly, it is not clear what impact community

[32] See Scottish and Welsh Government's community energy toolkits.

energy is having and there is a need for a robust methodology to measure the 'triple bottom line' impacts and co-benefits community energy has had each year in the UK. This could usefully stretch beyond energy-specific benefits (e.g. carbon emissions reduction) to incorporate wider benefit (e.g. health and well-being). One example given was a community energy active travel project that reduces air pollution and increases levels of exercise, translating into a demonstrable benefit to the NHS (I26).

8 Conclusions

Until recently, community energy had enjoyed a period of growth. The revenue payments that emerged in 2010s, such as the Feed-in Tariff (FiT) and Renewable Heat Incentive (RHI), offered communities a long-term and guaranteed income, heralding a glut of new projects. These revenue payments provided more than just income too. By serving to stabilise revenues and de-risk projects these policies unleashed capital finance, enabling community groups to cover capital costs in the absence of government grants.

Their subsequent removal has however has plunged community energy into turmoil, making small-scale renewable energy projects riskier and thus less attractive to commercial and citizen investors. Alongside the parallel decline of capital grants for community energy, communities are struggling to secure project finance. In this sense, community energy finance has never been more important, nor harder to secure.

Whilst there are some important examples of subsidy-free projects raising finance – centred on PPA-based community renewables - policy changes have called into question the viability of the traditional community energy business model of small-scale renewable electricity generation. Some communities have reacted through innovation, shifting towards deploying more service-based offerings and formulating a portfolio approach to 'stack' revenue streams and insulate themselves from external shocks. However, communities and investors remain unfamiliar with these new models and technologies, and alongside their greater complexity, investor finance has yet to flow into these new ventures.

Importantly, the communities that have had most success with these have tended to be those already in receipt of revenue payments. This has provided them with the income to cross-subsidise their experimentation, as well as the security to assume the risk of innovation. This begs the question of how new entrants can enter this sector without targeted support. A similar market entry problem is faced by the most deprived communities, who are least able to raise the community shares and citizen loans necessary to kick-start their energy projects. This has important ramifications for the role community energy can play in a just transition.

Critical barriers to community energy finance exist today, both for traditional and emergent energy business models. These include but are not limited to the: 1) poor connectedness and coverage of the UK's community energy finance supply chain; 2) poor community access to land and buildings; 3) limited time, skills and experience within communities; 4) limited opportunities to partner with local stakeholders; 5) poor access to wider energy markets and 6) limited growth of ethical finance, which is still dwarfed by institutional investors who target large, replicable and low-risk investments.

New policies are needed to support community energy finance, including those that *directly* target finance availability and affordability, as well as those that *indirectly* support finance, by improving business model functionality and making them more attractive to investors. A complementary policy mix is needed to, which includes economic (i.e. *carrot*), regulatory (i.e. *stick*) and information (i.e. *sermon*) policies. These solutions are identified by employing an adapted version of the business

model canvas, to connect policy measures with their desired direct or indirect impact on community energy finance following impacts internal and/or external to the community energy group's business.

Economic (*carrot*) policy recommendations include: 1) the provision of low-cost state community energy finance and a joined up finance chain; 2) a reduced tax burden on community energy groups (e.g., investment tax relief, VAT cut); 3) revenue payments for community energy generation and efficiency; 4) grants and price guarantees to enable business model experimentation, particularly in deprived areas.

Regulatory (*stick*) recommendations include: 1) minimum net-zero and just transition investment standards; 2) enforced partnerships with local authorities and NDPBs; 3) swift and affordable community access to under-utilised public land; and 4) expanded market opportunities for local energy supply and grid services.

Information (sermon) policy recommendations include: 1) establishing a UK-wide community energy strategy and stand-alone delivery body; 2) a national Community Energy Hub for skills training and knowledge exchange; and 3) a framework for defining and evidencing the value of community energy.

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Annex A

Table 8: Choice of policy instruments [adapted from: ,94–98]

Type	Aim	Sub-category	Specific demand pull policy
Economic (i.e. Carrot)	Pecuniary (dis)incentives that support desirable behaviour.	Incentives	Grants, revenue-payments, loan guarantee, finance (debt, equity etc.), public procurement, public-private partnerships, tax breaks, tradeable certificates, output based incentives.
		Disincentives	Taxes, levies, fines, charges, penalties, fees, tariffs, output based disincentives.
Regulation (i.e. Stick)	A rule or guidance made and maintained by an authority.	'Hard' regulatory (i.e. Big Stick) - Legally binding rules that obligate desirable behaviour.	Laws, regulations, directives, standards, quotas, bans, permits/licence, principles, statutory requirements.
		'Soft' regulatory (i.e. Little Stick) - Voluntary and non-coercive measures that encourage desirable behaviour.	Self-regulation, technical standards, certification, voluntary agreements, non-binding rules, coordination, recommendations.
Information (i.e. Sermon)	Initiatives that support the dissemination of information that encourage desirable behaviour	Education	Public awareness campaigns, training, best-practice guidelines, toolkits, consultancy/advice, labelling schemes
		Knowledge exchange	Networks, knowledge brokerage, intermediaries.
		Foresighting	Strategies, roadmaps, scenarios.

Annex B

Code	Position	Type of org.	Date
I1	Renewables manager	Energy supplier	30.7.18
I2	Manager	Government energy department	30.8.18
I3	Independent consultant	Energy consultancy	26.7.18
I4	Project Officer	Community energy intermediary	20.7.18
I5	Energy Systems Manager	Delivery body for government funds	2.8.18
I6	Energy Specialist	Non-departmental public body for enterprise	2.8.18
I7	Investment Manager	Social investment organisation	9.8.18
I8	Director	Social investment company	9.8.18
I9	Director	Community energy association	10.8.18
I10	Political advisor / CE campaigner	Environmental charity	13.8.18
I11	Director	Renewable energy developer	17.8.18
I12	Partner in law firm	Law firm	30.8.18
I13	CE campaigner	Environmental charity	4.9.18
I14	Director	Government energy specialist	18.9.18
I15	Director	Community energy organisation	7.9.18
I16	Environmental activist	Environmental community organisation	29.9.18
I17	Project Officer	Community energy intermediary	11.9.18
I18	Board member / former councillor	Community energy organisation	3.10.18
I19	Board member	Community energy organisation	23.10.18
I20	Manager	Environmental community organisation	19.11.18
I21	Director	Community energy organisation	11.10.18
I22	Director	Community organisation	18.10.18
I23	Research and Development Engineer	Distribution Network Operator	1.11.18
I24	Energy Strategy Manager	Distribution Network Operator	1.11.18
I25	Director	Community energy organisation	12.10.18
I26	Non-executive director	Community energy organisation	25.10.18
I27	Director	Community energy intermediary	26.8.18
I28	Director	Social investment platform	6.11.18
I29	Director	Community energy organisation	3.9.18
I30	Project Officer	Community energy organisation	8.10.18
I31	Business Development Manager	Social investment platform	27.9.18
I32	Project manager	Community energy organisation	8.10.18
I33	Senior law academic	University	17.7.21