Community Energy Cumbria: Killington Hydro Scheme

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Community Energy in Cumbria

Towards Zero Carbon Cumbria

CAfS Cumbria Action for Sustainability

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Community Energy in Cumbria

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Community Energy in Cumbria

Community Energy
The delivery of community-led renewable energy, energy demand reduction and energy supply projects, whether wholly owned and/or controlled by communities or through a partnership with commercial or public sector partners.
Community Energy England

1 Introduction

This report explores the development of community energy in Cumbria. Although community energy encompasses projects concerned with reducing demand for energy as well as those concerned with the supply of clean energy, this document focuses primarily on energy supply.

For a project to be counted as a community energy project, it has to do one or more of the following:

- Be led or co-led by a community organisation of some kind
- Be owned wholly or in part by members of the community
- Benefit a community by:
    - Supplying clean electricity to community members
    - Supporting a community benefit fund to fund local community projects, or
    - Supplying clean energy to a community facility

The report covers:

- Renewable energy sources
- Community energy models
- Key issues and barriers

See Appendix A for a list of key online community energy resources.

2 Renewable Energy Sources

Community energy projects can be based on various sources of renewable energy, including:

- **Ambient energy**: Heat pumps (air source, ground source and water source) can be used to transfer and intensify heat from an extensive low temperature source (such as the air, the ground or water[1]) to a lower volume medium (usually water) at a significantly higher temperature. This can be used to heat buildings and other facilities (eg water in swimming pools) and provide hot water for washing and cleaning.
- **Biomass**: Energy can be derived from plant-based material (eg crops, manure/slurry, crop waste, food waste and other waste). This can be done using an incinerator to produce heat or an anaerobic digestor to produce methane or biogas which can then be burnt to produce heat or electricity.
- **Geothermal energy**: Heat can be obtained from rocks and aquifers deep below the Earth's surface. This can be used for space and water heating or (in the case of deeper boreholes that tap into hotter strata) for electricity generation. There is no need for heat pumps to intensify the heat with this energy source, because the boreholes reach down to strata that are already very hot.
- **Hydro power**: This can be used to generate electricity via turbines powered by the flow of water taken from rivers (run of river hydropower) and lakes/reservoirs (storage hydropower).
- **Solar power**: This can be used for producing heat (using solar thermal panels) or electricity (using photo-voltaic or PV panels). Panels can be mounted on buildings (eg roofs and walls) or ground-mounted (eg in fields).
- **Tidal power**: Electrical energy can be produced from the ebb and flow of tides using turbines. This can involve building tidal barrages and lagoons to generate higher flow rates or siting turbines in the natural tidal flow.
- **Wave power**: Electrical energy can be produced from ocean waves using a variety of technologies.
- **Wind power**: This can be used to generate electricity via turbines situated onshore or offshore. Onshore turbines are generally sited well away from settlements, but smaller turbines can be sited close to or even on buildings.

[1] Including warm water in abandoned mine shafts.

3 Community Energy Models (Power)

This section summarises some of the models that have been used for developing community energy projects that generate electricity. It is divided into two subsections:

- **Direct consumption models** – in which the majority of the power generated is consumed by one or more consumers (onsite or very close to the site) who are connected directly to the installation, with surplus electricity exported to the National Grid via the Smart Export Guarantee (SEG) scheme[2]
- **Export models** – in which all of the power generated is exported to the National Grid

3.1 Direct Consumption Models

3.1.1 New Community Energy Company

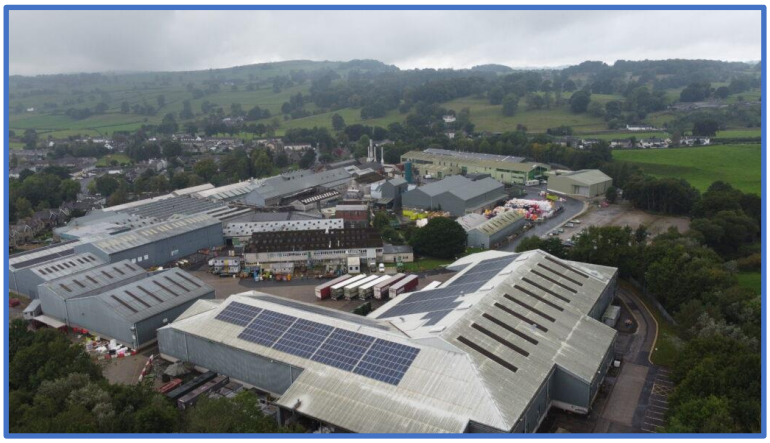
In this model, a group of people set up a bespoke community energy company to manage their community energy project. To do this, they generally:

- Get together with the idea of setting up a new community energy project – typically a hydro, solar PV or wind turbine installation for producing electricity
- Explore opportunities and priorities for doing so in their local area – generally in consultation with local people and organisations
- Carry out initial research on technologies, finances, legal issues and so on
- Commission a detailed feasibility study
- Set up a community energy company – usually in the form of a co-operative (see Appendix B), although other legal structures can be used (eg community interest company)
- Produce a business plan for the project

[2] Up until 1 April 2019, individuals and organisations (including community energy companies) were able to receive generous 'feed-in tariff' payments from the UK government (via electricity suppliers) that were intended to promote uptake of renewables. This scheme has now been replaced by the Smart Export Guarantee scheme.

- Issue a community share offer to raise the necessary investment capital – usually targeting people in the local community in the first instance
- Buy, install and commission the installation
- Sell the majority of the clean electricity to a consumer on or adjacent to the site via a long-term (eg 20-25 year) Power Purchase Agreement (PPA)
- Sell surplus electricity to the National Grid via the Smart Export Guarantee scheme
- Use the income generated by the scheme to:
    - Finance a community benefit fund to support good causes in the local area
    - Pay shareholders (the members of the co-op who invested in the scheme) interest payments on their investments – typically in the region of 4-5% per year
    - Progressively re-pay shareholders over the lifetime of the project to reduce the scale of interest payments and maximise the funds available for the community benefit fund

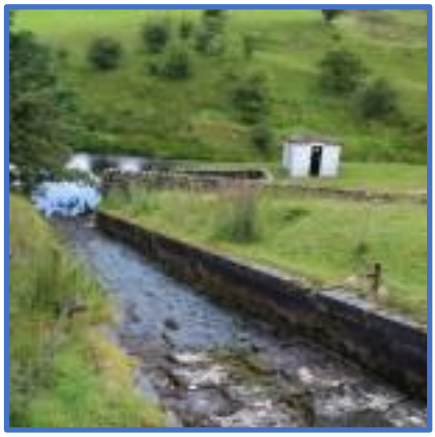
This is the model followed by Burneside Community Energy (BCE) near Kendal.



Burneside Community Energy

BCE was set up in 2015 and installed a 250kW solar PV system on factory roofs owned by James Cropper plc. The scheme has been extended twice since then, with the result that the total installed capacity is now nearly 1MW. James Cropper plc buys all of the clean electricity generated by BCE, so there is never any surplus to be sold back to the National Grid. The BCE community benefit fund has been used to fund numerous local projects including the installation of a 20kW solar PV system on the roof of the local primary school.

Community Energy Cumbria (CEC) also followed this model – except that it developed two completely separate schemes at the same time. One is a 30kW hydro scheme at Killington reservoir, between Kendal and Sedbergh. The other is a 30kW solar PV system on the roof of the headquarters of the Lake District National Park Authority in Kendal.



CEC @ Killington Hydro

CEC @ LDNPA Solar

In the classic model, the installation itself is owned by the members of the new community energy company that was established to develop the project. Although these members tend to be local to the community in which the installation is located, they do not generally own or operate the property on which the installation is located. Thus, in the examples given above:

- Burneside Community Energy leases the roof space on which their panels are mounted from the property owner, James Cropper plc.
- Community Energy Cumbria has entered into leases with the:
    - The Canal and Rivers Trust, who own the land on which the Killington hydro scheme is located.
    - The Lake District National Park Authority, who own the building on which the Kendal solar PV system is located.

See Appendix C for details of other community energy companies in Cumbria.

3.1.2 Existing Community Organisation

It is possible for an existing organisation that is not primarily a community energy company to develop a community energy project. This can be done on property that the organisation already owns or rents, or on property acquired specifically for the community energy project.

This can be done by an organisation (usually public or third sector) that owns or runs a community facility such as:

- Arts/heritage centre
- Church
- Community centre
- Leisure centre
- Library
- Reading room
- School
- Swimming pool
- Village hall

An example of this in Cumbria is Skelton Toppin Memorial Hall near Penrith.

Skelton Toppin Memorial Hall

The village hall is 100 years old and is owned and run by an unincorporated charity. The trustees applied for and received a grant from the Low Carbon Lake District Fund. This grant, together with the hall's own funds, paid for the installation of a 60 panel, 19.5kW solar PV system on the hall roof with battery storage capacity of about 35.8kWh. The panels can produce up to 140kWh of electricity a day in clear summer weather. The trustees plan a phased refurbishment programme which includes retrofitting insulation to the roof and walls, rewiring, and replacing the oil fired boiler with infrared heaters. They aim to electric vehicle (EV) install charge points in their car park.

It can also be done by residential accommodation providers (public, private or third sector) and other properties occupied by tenants or long-term leaseholders.

3.1.3 Existing Community Energy Company

This model is similar to the classic model but involves an existing community energy company instead of a new one set up specifically for the project in question. In this model, an existing community energy company:

- Buys, installs, commissions, maintains and retains ownership of the installation on property owned by a public, private or third sector organisation.
- Sells the majority of the clean electricity to a consumer on or adjacent to the site via a long-term (eg 20-year) Power Purchase Agreement (PPA) – at a price that should be significantly lower than that for mains electricity
- Sells surplus electricity to the National Grid via the Smart Export Guarantee scheme
- Retains the income generated by the scheme for its own use, which could involve:
    - Making interest payments to its members/shareholders
    - Funding its community benefit fund
    - Repaying shareholder investments

Examples of existing community energy companies that use this model include:

- Baywind Energy Co-operative (based in Cumbria)
- Big Solar Co-op
- Schools' Energy Co-operative
- Solar for Schools

3.1.4 Commercial Developer

This model is similar to the model described above, except that it involves a commercial developer rather than an existing community energy company. This can still be classed as a community energy project provided that there is a clear community benefit - for example, the installation provides clean electricity for a community facility or because a

significant proportion of the income from selling the electricity is set aside for a community benefit fund.

Examples of commercial developers that use this model include:

- Ortus Energy
- SMS – who have developed an approach called Solopower for community energy projects in social housing, working in partnership with local authorities and housing associations.

3.1.5 Shared Ownership

In this model, a renewable energy project is developed by a partnership consisting of a commercial energy company and a community 'shared ownership' (SO) organisation. The project could be a new installation or an extension of an existing installation. Similarly, the SO organisation could be a new organisation set up specifically for the project or an existing community organisation.

Local Energy Scotland describe the three most common models for shared ownership as follows[3]:

- ***Joint ventures*** *– where a commercial operator and legally-constituted community organisation work together to create a joint venture to develop, own and manage a project. The company may be referred to as a Special Purpose Vehicle[4].*
- ***Shared revenue*** *– in which a legally-constituted community organisation buys the rights to a future virtual revenue stream which will be calculated on the basis of a specified proportion of the output of an installation, less agreed operating costs and generally less virtual debt service. This is calculated as if the community had acquired the underlying infrastructure.*
- ***Split ownership*** *– in which a legally-constituted community organisation owns a proportion of a development's physical assets, for example, the community organisation owns one wind turbine in a development of 20 turbines being installed by a commercial developer.*

[3] See CARES Toolkit: Shared Ownership

[4] An SPV is a distinct company with its own assets/liabilities and legal status. Usually, an SPV is created for a specific purpose, eg to own one wind farm and to isolate risk.

Shared ownership models are being actively promoted by the Scottish and Welsh Governments[5]. Most examples of such projects are to be found in Scotland[6]. However, there is no reason why such projects couldn't also be developed in England.

3.1.6 Multi-Occupancy Properties

In principle, it should be possible to develop community energy projects in properties (eg tower blocks and warehouse conversions) with multiple occupants (residential and/or commercial) – for example, by installing solar panels on the roof and sharing the clean electricity between a building's occupants.

In practice, this is not straightforward. The main barrier has been that it is very costly to install multiple, independent (and relatively small) PV systems on a single roof, each with its own cabling and associated equipment connecting it to an individual property within the building.

This problem has been addressed by a company called Allume Energy that has developed a system called SolShare. This involves:

- Installing a single PV system on a shared roof.[7]
- Connecting the solar PV system to a SolShare unit via a single cable and inverter.
- Distributing clean electricity to multiple consumers[8] by connecting the SolShare unit to each property's metered supply point.
- Allocating each consumer an agreed monthly share of clean electricity.
- Consumers buying additional energy from the grid and selling any of their unused share of clean energy into the grid via the SEG scheme.

Allume Energy claim that the SolShare system results in a much higher proportion of clean energy being used onsite (rather than exported) and that installation costs are generally in the region of £2-4k per household.

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[5] For example, see the Scottish Government's Onshore Wind Policy Statement 2022 and Local and Shared Ownership of Energy Projects in Wales.
[6] See here for case studies of Scottish shared ownership renewable energy projects.
[7] Allume Energy are currently exploring the potential for deploying this system on terraced houses.
[8] Each SolShare unit can supply up to 15 different consumers. However, the system is modular and scalable, which means multiple units can be used to supply clean electricity to a much higher number of individual consumers.

The SolShare system can be used in social housing (where Allume Energy works in partnership with a local authority or housing association), as well as buildings owned by a private landlord or a management company co-owned by the leaseholders.

3.2 Export Models

3.2.1 Energy Local Model

A community interest company called Energy Local has developed a model in which a renewable electricity generator can sell the clean electricity it produces to consumers in the same local area. This involves:

- A group of local people and a local renewable electricity generator[9] setting up a new organisation called an Energy Local Club (ELC)[10]
- Members of the ELC agreeing a tariff for the electricity supplied to club members by the renewable electricity generator
- The ELC choosing a single mains electricity supplier (eg Octopus Energy) to supply club members with electricity when their demand exceeds supply from the local renewable electricity generator
- The renewable electricity generator selling clean electricity to the mains electricity supplier who, in turn, sells it to club members
- The mains electricity supplier sending a single electricity bill to each club member, charging them for their share of the renewable electricity and any additional mains electricity they have used

In this model, it is possible that the renewable electricity generator is owned by members of the ELC who consume the electricity. But this isn't a requirement of the model. For example, the generator could also be owned by:

- People who live in the same community but aren't members of the club
- People who live elsewhere
- A community energy company (based in the local area or elsewhere)

[9] In this context, 'local' generally means people who are connected to the same electricity substation.
[10] Each ELC is set up as co-operative whose members include the local people and the local renewable electricity supplier.

- Some other organisation (eg the owner of the property where the generator is based)

This model is based on the scheme established for Bethesda Energy Local project in North Wales.

At present, there are two potential ELCs in Cumbria:

- Rainepower: This is a hydro scheme on the river Lune near Sedbergh. The scheme has been operational for some years but has experienced a series of technical problems that has restricted energy production. It currently exports electricity to the National Grid but the directors of Rainepower are working with Energy Local to explore the viability for converting it into an Energy Local scheme.
- Duddon Valley: This is a hydro scheme in development in the southwest of the county supported by CAfS and funded by Electricity North West. It is currently seeking expressions of interest from residents in the local area.

3.2.2 Ripple Energy Model

A co-operative called Ripple Energy has developed a model in which consumers anywhere in the country can buy clean energy produced by one of their renewable energy schemes (eg solar farm or wind farm). In this model:

- Consumers buy shares in a new solar/wind farm being developed by Ripple.
- Ripple builds the solar/wind farm (which is owned by the consumers who have bought shares).
- Consumers buy clean electricity produced by the solar/wind farm via their electricity supply company[11].
- The tariff consumers pay is generally significantly cheaper than conventional tariffs because they are buying from a scheme they co-own.
- The amount of low-cost, clean electricity consumers can buy is proportional to the amount they invest in shares when the scheme is being developed.

[11] Consumers have to get their electricity from one of Ripple's supply partners (E.ON Next, Your Co-op Energy, Octopus Energy, So Energy). If they are not already with one of those companies, they have to switch to one in order to buy electricity from Ripple.

- Electricity supply companies buy enough clean electricity from Ripple to meet the needs of their customers who have shares in the Ripple scheme.

Ripple Energy currently has three schemes. The first (share offer now closed) is a wind farm in South Wales which has been operational since 2022. The second (share offer now closed) is a wind farm in southern Scotland which is due to be commissioned in 2024. The third (share offer now open) is a solar farm to be developed at an as yet undisclosed site in England.

3.2.3 Younity Energy Model

Younity Energy is the trading name of Co-op Community Energy Ltd, a private company limited by shares that is jointly (50%) owned by Midcounties Co-op and Octopus Energy. The company has developed a model in which it buys electricity from community energy projects via a PPA[12]. Key features of the model include:

- PPAs run from 1 month to 3 years, with options to extend the agreement repeatedly.
- Buying electricity from any size of community energy scheme from 10kW peak upwards[13].
- Buying electricity from privately owned businesses provided that there is a genuine community element to the project (eg 20-30% of profits being paid into a community benefit fund.
- Offering a Kickstart bridging loan[14] to help groups progress their schemes while they are still raising the necessary capital.
- Offering grants through their Powering Communities Fund to help groups start or improve their community energy project.

[12] A few years ago they had 40 PPAs in place; now it's 230 (enough to power 60,000 homes).
[13] This means it could be suitable for schemes on the roof of buildings such as village halls, community centres, churches.
[14] They currently charge 6-7% pa interest.

4 Community Energy Models (Heat)

This section summarises some of the models that have been used for developing community energy projects that generate heat.

4.1 Existing Community Organisation

This is the same as the community power model described in Section 3.2.1 above. The only difference is that the organisation uses a renewable energy source to generate heat for hot water and/or heating. Examples in Cumbria include:

- **Blencathra Centre:** This is located in Threlkeld, near Keswick and is run by the Field Studies Council. It uses a woodchip boiler to produce hot water and space heating for the centre (as well as a small hydro turbine to provide most of the electricity used by the centre).
- **Freshwater Biological Association:** The FBA uses a woodchip boiler to produce hot water and space heating for its premises in Far Sawrey on the western shore of Windermere.
- **Lazonby Swimming Pool:** A water source heat pump is used to extract energy from the adjacent River Eden to heat the open-air pool.
- **Skelton Toppin Memorial Hall:** This village hall near Penrith is planning the installation of electric infrared heaters which will be powered primarily by solar panels on the roof and battery storage (see Section 3.2.1 for further details of the wider project to decarbonise the hall.)

4.2 Multi-Occupancy Properties

In this model, low carbon heat is delivered to properties with multiple occupants (residential and/or commercial). The properties could be:

- Flats/units in a single building (eg block of flats, warehouse conversions)
- Occupied by freeholders, leaseholders or tenants
- Owned by individual freeholders, management company owned by leaseholders, housing association, local authority (eg council owned social housing) or commercial landlord

The low carbon heat can come from various sources, including:

- Air source heat pumps: For example, Glasgow Housing Association has installed a 400kW heat pump (called a Neatpump) that provides heat for seven existing high-rise blocks (a total of 350 social homes) in Hillpark Drive, Glasgow.
- Ground source heat pumps: For example, Kensa Contracting has recently installed a system that provides heat for 183 flats owned by Together Housing at Daiseyfields in Blackburn. Heat is extracted from the ground via 84 boreholes around the base of the three high-rise blocks and distributed to the flats via a 'shared loop' of pipes. Heat is then transferred to each flat via one of Kensa's 'shoebox' heat pumps (one per flat).
- Mine water heat pumps: For example, the Coal Authority is working with various partners to develop schemes in Seaham and Gateshead in the NE, and a group in West Cumbria has had discussions with the Coal Authority about developing a scheme in their area.

4.3 Villages/Communities

In this emerging model, low carbon heat is delivered to multiple properties in the same geographical area such as a village or a community within a larger urban area. Examples include:

- **Chipping Community Energy**: CCE aims to develop community energy projects in the village of Chipping in Lancashire. CCE has commissioned Prospus Group to investigate and progress an innovative solution of capturing ground source heat in localised shared cluster energy networks operating at ground (ambient) temperature. The shared ambient loop will be connected to ground source heat pumps in the individual dwellings, and where appropriate supported by solar generation.
- **Decarbonising Rossendale**: A community energy company called Rossendale Valley Energy (RVE) has established a project called Decarbonising Rossendale which aims to help communities in the Rossendale Valley reach net zero. This includes the Net-Zero Terrace Street Project in the town of Bacup. This project aims to install a shared loop ground source heat pump system in terraced properties in a conversation area with mixed tenure and residents in fuel poverty.

5 Key Issues and Barriers

The sections below summarise some of the key issues and barriers associated with developing a community energy project.

5.1 Distance between Installation and Consumer

As noted above, some community energy projects supply electricity to a single consumer via a Power Purchase Agreement. Where the consumer is co-located with the installation (as is the case, for example, in the example of Burneside Community Energy given above), this is relatively straightforward.

Where the consumer is located at some distance from the installation, it is necessary to install a 'private wire' connecting the installation to the consumer. This is relatively expensive, with the costs increasing as the distance increases. This can result in a scheme becoming unaffordable, especially where the distance involved is more than a few hundred metres.

There is, however, at least one scheme in Cumbria where the distance between installation and consumer is well over a kilometre. The Field Studies Council (FSC) has a property called the Blencathra Centre near Threlkeld. This gets most of its electricity from a hydro scheme that is installed in Roughten Gill that feeds into the Glenderaterra Beck between the mountains of Blencathra and Lonscale Fell. The turbine is connected to the Blencathra Centre via a cable approximately 3km long that had to be buried under the bridleway that goes up the Glenderaterra valley.

5.2 Funding

Community energy projects are relatively expensive – typically costing tens of thousands of pounds and sometimes hundreds of thousands or even millions of pounds.

Smaller schemes can sometimes be funded via an organisation's existing reserves. But schemes generally require additional funding. This can be secured from a variety of sources, such as:

- **Community share offers** (for an explanation of how community share offers work, see guidance published by Co-operatives UK).
- **Donations** – including donations secured via online **crowdfunding** campaigns (for an explanation of how crowdfunding works, see

guidance provided by the UK Crowdfunding Association and the Financial Conduct Authority).

- **Grants** – often from a combination of funders, such as:
    - Baywind Energy Community Trust[15]
    - Boiler Upgrade Scheme (Government grants for households and organisations to incentivise replacing fossil-fuel heating systems with low carbon heating systems)
    - Copeland Community Fund[16]
    - Cumbria Community Foundation
    - Electricity North West Powering our Communities Fund
    - Frieda Scott Charitable Trust
    - Hadfield Trust
    - MCS Charitable Foundation
    - National Lottery Community Fund
    - National Lottery Heritage Fund
    - Public Sector Decarbonisation Scheme (Government grants for public sector bodies to fund heat decarbonisation, clean electricity and energy efficiency measures.)
    - Sir John Fisher Foundation[17]
    - Younity Powering Communities Fund [18]
    - Zero Carbon Cumbria

  Advice on applying for grants can be obtained from Cumbria CVS (who run regular funding fairs at different locations across Cumbria) and (for projects involving village halls) Action with Communities in Cumbria.

  Further information on grants can be found on the Community Energy England website.

- **Loans** – eg from funders such as:
    - Charity Bank
    - Co-op and Community Finance
    - Co-operative Bank (Renewable Energy Funding Scheme)

[15] South Cumbria only
[16] Only in the area formerly known as Copeland, as defined by the former Borough Council's boundary in South Cumberland,
[17] Barrow-in-Furness / Furness Peninsula only
[18] Applicant must be an affiliate of Your Co-op Energy or have already entered into a PPA with Younity Energy.

- Francis C Scott Charitable Trust (Social Investment Fund[19])
- Lendology (not currently available in Cumbria)
- Triodos Bank

Further information on loans can be found on the Community Energy England website.

- **Third party developers** – as explained in section 3, there are a number of community energy companies and commercial operators who will fund (but retain ownership of) community energy projects. The companies listed in section 3 are all power generation companies. There is also a company called Kensa Utilities (part of the Kensa Group[20]) that does a similar thing for community heat projects. More specifically:
  - Kensa Utilities pays for, installs and owns the shared ground source heat pump network
  - The customer:
    - Purchases the ground source heat pump and plugs into the Ground Source Network
    - Pays a connection fee
    - Pays a small annual standing charge to access the heat network

5.3 Permissions (Landowner and Legal)

A community energy project can only be developed at a particular site if:

- The landowner agrees to it.
- There are no insurmountable legal barriers (eg environmental protections relating to protected species or habitats; planning controls on permitted land use at the site).

[19] Details not yet available on charity website but expected soon.
[20] Kensa is a British company that manufactures and installs heat pumps and heat networks.

5.4 Project Team Capacity

Developing a community energy project can be very demanding in terms of:

- **Time**: It usually takes over a year to get from the initial discussions to an installation being commissioned – and can take much longer than this.
- **Commitment**: A dedicated core team of volunteers generally devotes a considerable amount of time developing initial ideas, researching options, consulting key stakeholders, investigating the feasibility of likely options, producing plans and budgets, fundraising, and so on. For those who set up community energy companies, they then need to manage the projects over their lifetimes, including general business management (eg holding regular board meetings and an annual AGM, and producing annual accounts and reports), maintaining the equipment, dealing with any issues arising from the lease and/or PPA, and repaying shareholders.
- **Expertise**: Successful projects depend on expertise in a wide range of areas including business planning, community engagement, engineering, finances and fundraising, legal requirements and project management. Members of the project team might have some of the required knowledge, skills, etc at the outset, or acquire it as the project develops. But it is likely that they will have to buy in at least some of it from consultants and/or contractors.

5.5 Site Selection

A community energy project needs a suitable site on which to be developed. For example:

- **Hydro schemes** need to be sited in water courses where there is either a good 'head' (ie height of drop between where water is taken into the system and the turbine lower down) or reliable flow volume.
- **Solar PV schemes** need to be sited on roofs or open land that is well-orientated[21] and relatively unshaded for most of the year.
- **Wind turbines** need to be sited on land that has a good 'wind resource' (generally higher ground that is not sheltered by nearby hills, woodland, buildings, etc).

[21] Panels work best when facing south and tilted at an angle of 30-40 degrees, but can work quite well (albeit less efficiently) at other orientations and angles.

5.6 Smart Meters and Mobile Signal

All community energy projects that are connected to the grid require that a smart (electricity) meter is installed. Smart meters can only operate in areas where there is a mobile phone signal. This means it is not possible to set up a grid-connected community energy project in an area where there is no mobile phone coverage.

5.7 System Size and Grid Connection

Small renewable energy systems (up to 3.6kW peak for single phase supplies) do not require permission from the local Distribution Network Operator (DNO) before they can connect to the National Grid (although the owner of the system is required to notify the DNO when the system is connected to the grid). This applies to most domestic systems.

Most community energy systems are larger than this (often considerably larger) and do therefore require permission from the DNO before they can connect to the grid. Permission will only be granted if the grid has the capacity to receive electricity exported to it from the installation. If the grid does not have the required capacity, it has to be 'reinforced'. The applicant has to pay for the reinforcement works to be carried out. This can be very expensive and time consuming, and it can result in the scheme becoming unaffordable.

This is particularly a problem in rural areas. This is because of the highly centralised nature of the National Grid, which is designed to deliver electricity from a relatively small number of large power stations to consumers across the network. It is not designed to accept power from small- to medium-sized generators located at the periphery of the network.

The 6 DNOs in the UK are currently working to reinforce the grid across the UK, but this is a slow and expensive process.

Appendix A: Key Online Resources

The table below lists some of key sources of information on community energy on the internet.

Organisation	Notes

Centre for Alternative Technology	• Extensive resources relating to the climate emergency and measures to achieve Zero Carbon Britain
	• Lots of information on clean energy and energy efficiency/conservation
	• Relatively little on community energy, but does include link to downloadable e-book, *The Rough Guide to Community Energy* (2010), which includes chapters on:
	  ○ Community energy
	  ○ Energy in the UK
	  ○ Getting together
	  ○ Energy saving home by home
	  ○ Community generation: renewables
	  ○ Making it happen

Centre for Sustainably Energy	• Extensive resources containing advice leaflets, reports, toolkits etc covering a wide range of topics, including community energy

Community Energy England	• Aims to be the voice of the sector, clear obstacles, create connections between practitioners and stakeholders, and facilitate the work of community energy organisations
	• Extensive 'how to' section on website:
	  ○ Understanding community energy – providing background information
	  ○ Getting started with community energy
	  ○ Operating a community energy organisation
	  ○ Technologies, innovation and new business models
	• Publication of annual *Community Energy State of the Sector* reports

Community Energy London	• Established to help support groups in London to share experience, resources and learning – as well as to inspire new groups and lobby government to favour community energy
	• Lots of resources on community energy, including:
	  ○ 10-Step Guide: Set up a Community Energy Group in your area
	  ○ Step by Step Project Guide

Organisation	Notes
Community Energy South	• Umbrella organisation and regional hub enabling members (local community energy groups and community organisations) to grow as sustainable low carbon businesses in the South East of England • Lots of webinars, presentations, reports and links on various aspects of community energy

Electricity North West	• Distribution Network Operator (DNO), responsible for maintaining and upgrading 13,000 km of overhead power lines and more than 44,000 km of underground electricity cables
	• Lots of resources on how the NW can move towards net zero
	• Includes section on community and local energy, covering:
	  ○ What is community and local energy?
	  ○ Setting up your project
	  ○ Apply for funding
	  ○ Case studies
	  ○ Resources – including *Community and Local Energy Strategy 2020-23*, *Community and Local Energy Annual Reports* and *State of the Sector Annual Reports*
	• Also includes short downloadable e-book, *An Introduction to Community Energy* (2018)

Energy Savings Trust	• Promotes energy efficiency and clean energy • Focuses on home energy, travel and businesses • Lots of useful information on renewable energy technologies and energy saving measures and technologies • Relatively little information on community energy

Local Energy Scotland	• Manages the Scottish Government's Community and Renewable Energy Scheme (CARES), which supports communities to engage with, participate in, and benefit from the transition to net zero emissions.
	• Resources include toolkits on:
	  ○ Business planning
	  ○ Community benefits
	  ○ Developing a local energy plan
	  ○ Project development
	  ○ Setting up an organisation
	  ○ Technology options

Appendix B: Co-operatives

Co-operatives UK define a co-op as:

> *a business or organisation that's owned and controlled by its members, to meet their shared needs. The members can be its customers, employees, residents or suppliers, who have a say in how the co-op is run.*

All co-ops share the same co-operative principles and values:

1. *A co-op is **owned and controlled by its members**. It exists for the benefit of its members, who may be customers, workers, suppliers or the wider community.*
2. *A co-op is **democratic** – this means every member has an equal say in how it's run and how profits are used.*
3. ***Every member contributes financially** in some way – from buying products, working for the co-op, investing in it or deciding how to spend its profits**.***
4. *A co-op is an **independent** business, owned and controlled by its members.*
5. *It offers **education and training** to everyone involved, so they can develop the co-op and promote the benefits of co-operation.*
6. *It **co-operates,** works with and supports other co-ops.*
7. *A co-op supports the **communities** it works with.*

Appendix C: Community Energy Companies in Cumbria

Examples of community energy companies in Cumbria:

- **Alston Moor Community Energy**: AMCE ran a successful crowdfunding campaign to raise £22,300 to install a 27kW solar PV system on the roof of Samuel King's School in Alston.
- **Baywind Energy Co-op**: Baywind was the first UK co-operative to own wind turbines, after raising £2 million through share offers in 1997 to install 6 wind turbines (totalling 2.5MW) in southwest Cumbria. In 2016, 5 of its turbines were decommissioned and replaced by 2 new high-powered turbines belonging to a spin-off community energy company called High Winds Community Energy Society. In 2020 it sold its remaining turbine Thrive Renewables. In recent years Baywind has installed roof-top solar on 8 buildings in the Furness area. It is currently looking for new opportunities to develop community energy projects, funded by the sale of its original wind turbines.
- **Burneside Community Energy**: BCE operates a 1MW solar PV scheme on roofs at James Cropper plc in Burneside.
- **Community Energy Cumbria**: CEC operates two community energy schemes: a 30kW hydro scheme at Killington reservoir and a 30kW solar PV scheme on the roof of the Lake District National Park Authority's offices in Kendal.
- **Energy4All**: E4A is a community energy company based in Barrow. It was set up by Baywind in 2002 and now supports a family of 33 independent renewable energy co-operatives, which collectively have 17,308 individual members. These co-operatives are spread throughout England and Scotland, and include biomass, hydro, solar PV and wind power projects.
- **High Winds Community Energy Society**: High Winds owns and operates the 2 new turbines (totalling 4.6MW) that replaced the 5 original Baywind turbines at Harlock Hill near Ulverston in SW Cumbria. In 2017, High Winds became the first community energy company to take over a 100% commercial wind farm when it acquired the 6.9MW Mean Moor windfarm.
- **M&S Energy Society**: M&S Energy Society is the trading name of Two Rivers Community Energy Society Limited. It is based in Barrow and administered by E4A. Members of the public can apply to invest in a fund from which M&S will install and maintain solar panels on up to 9 M&S store roofs. M&S will buy the electricity generated by the panels from M&S Energy Society. The Society aims to pay its investors (Members) into the fund a return on their investment and to benefit the local community through money allocated for a community fund.
- **Rainepower Community Energy Society**: RainePower owns and operates a 35kW hydro scheme on the river Lune near Sedbergh. RainePower is a member of the E4A family of co-operatives.