Super Slow Way Linear Park:

Community and Local Energy Scoping Study

January 2023

Quality Assurance

CONFIDENTIALITY (Confidential / Not Confidential)	Not Confidential
Project name	Super Slow Way Linear Park Community & Local Energy Scoping Study
Project reference	SSWLP

UNIT APPROVAL	NAME	DATE
Written by	Gill Fenna	06/01/23
Checked by	Louise Marix Evans	06/01/23
Issued by	Quantum Strategy & Technology Ltd	15/01/23

Key Contact

Gill Fenna, Director

Tel: 07870 193053

Email: gill.fenna@quantumst.co.uk

www.quantumst.co.uk

Halton Mill, Mill Lane, Halton, Lancaster LA2 6ND

Company Registration Number 4682347

Executive Summary

The Super Slow Way Linear Park is an exciting programme that links culture, arts and regeneration to transform a 23 mile under-used and often unloved section of the Leeds and Liverpool Canal into a vibrant facility for the local community and visitors. One component of this initiative is to "green" the canal and surrounding areas, through improvements to the waterway and natural environment, but also by using the programme to initiate action on climate change, and improve active travel opportunities.

Climate change is one of the critical challenges of our time and the responsibility for addressing it lies across all sections of society and all organisations. The Arts and Culture sector has a vitally important role to play – not just in putting its own house in order, but in inspiring, educating and visualising a different, low carbon future, and in creatively sharing that vision to help engage people in coming up with their own actions and changes.

This scoping study investigates one part of that possible climate change initiative: the potential to increase renewable energy, specifically through local and community ownership, and other opportunities to reduce the carbon impact of the built environment along the canal.

Community and local energy refers to renewable energy systems that are owned by the local community collectively, or the public sector, local businesses and individuals, so that the benefits are retained within the local economy through lower energy bills and income from sales of the energy generated. It also includes locally developed and delivered energy efficiency programmes that reduce the demand for energy. As well as contributing to achieving the UK's Net Zero climate change target, community and local energy projects can help to involve people in climate action and contribute to addressing issues such as fuel poverty.

In 2020 there were over 28,000 households in fuel poverty in the Linear Park local authority areas or almost 16% of the population, compared with an average of 13% across England. Community energy will not solve fuel poverty, but local community action on energy generation and energy efficiency can have an impact on it, often through proving funding to organisations that can offer advice and support to vulnerable households.

There are over 300 community energy organisations in England. Community Energy England carries out an annual survey of the sector. Its 2022 State of the Sector report found that there are:

- 221 community owned generators supplying 331MW of electricity, frequently to schools, community buildings and businesses at below market rates.
- 28 community owned renewable heat projects.
- 90 community groups providing low carbon transport.
- 123 community organisations helping 57,600 people or organisations save an estimated £3.35m on energy bills.
- £15m of community energy income spent locally, boosting local economies.

Examples from other areas of the country, as well as within the locality, are given throughout the report, to provide insight and inspiration into what can be achieved. Community-based energy and climate initiatives are under-developed in Pennine Lancashire compared with many other areas of the UK, particularly cities such as Brighton, Plymouth, Oxford, London and Manchester, and some rural areas such as Cumbria. What those locations have in common are:

- Organisations that have grown the skills and knowledge to develop projects and to innovate

- Determined, knowledgeable, supportive local authorities and leadership
- Strong, motivated, active partnerships
- Access to relevant support and shared expertise.

The Super Slow Way Linear Park programme is funded by Arts Council England and overseen by a consortium of partners, including the four local authorities: Blackburn with Darwen, Hyndburn, Burnley and Pendle councils. These partners are key to supporting the development of any community and local energy project at sufficient scale to make a difference.

There are a huge number of buildings along this stretch of the canal, so the investigation has focussed on seven types of site for potential projects:

1. The four Strategic Hub Sites: Imperial Mill, Inn on the Wharf, Hargreaves Warehouse, Brierfield Gasometer
2. Heritage Buildings including those in the 18 "String of Pearls" sites: assets that could become valuable spaces for community, culture and leisure activities
3. Industrial and Business Parks
4. Regeneration Areas
5. Community Spaces and Buildings: Schools, Leisure Centres, Community Buildings and Cultural Centres
6. Housing
7. Land surrounding the Linear Park.

The main community energy opportunities that could be initiated immediately are:

- Imperial Mill: rooftop solar PV, and potentially ground source heating, linked to a Net Zero refurbishment programme – subject to agreement with Blackburn with Darwen Council.
- Industrial Estates: a collective programme to install solar PV, battery storage, and potentially wind turbines – ideally with the support of the BIDs and local authorities.
- Surrounding land: investigation of sites suitable for large-scale solar, wind or battery storage – ideally with links to a company or organisation able to purchase the energy and with the support of a specialist community energy company.

Opportunities for further consideration, but which require partnership development and leadership, particularly from the local authorities, and wider plans in place in order to achieve Net Zero over the medium-longer term are:

- Regeneration Areas and Heritage Buildings:
    - A programme of exemplar low carbon refurbishment local heritage buildings.
    - A programme to incorporate more renewable technologies on new and existing buildings within regeneration areas along the Linear Park, either owned by the building owner or through community ownership.
- Housing: identify areas to develop further Net Zero Streets, building on learning from the Rossendale project.
- A project involving a large number of community buildings (including local authority buildings) where agreement to develop a collective project can be reached with a group of building owners.

Alongside this physical infrastructure, the study highlights the organisations and people that could be assets for any community or local energy scheme. The Super Slow Way consortium of partners collectively have the potential to initiate some of the recommendations, and there are community

organisations, local businesses and support organisations that could provide valuable contributions, as well as sites for demonstration projects.

There are a large number of industrial, commercial and public buildings in Pennine Lancashire that date from the textile industry era and are particularly challenging for low carbon refurbishment and renewable energy, as well as the many areas of stone-built terraces. To tackle this challenge will require new skills in construction, engineering, energy auditing, advice, specification and procurement. But there are key organisations and businesses surrounding the Linear Park that together could solve this, by:

- Developing a regeneration and refurbishment programme that focusses on achieving zero carbon buildings, and
- A programme to provide the skills and technologies needed to retrofit typical Pennine Lancashire buildings and housing to be fit for a low carbon future.

But there are no quick wins, and developing any community based zero carbon projects will require vision, commitment and determination from all organisations involved. Lead organisations in particular will need to do all they can to facilitate the process and make it as easy as possible for the community, local businesses and other organisations to engage with this idea.

The key next steps are:

1. Find partners who are willing to make a commitment to developing a community or local energy programme:
    a. Gain the support of key organisations such as the business support organisations, UCLAN and the colleges, and ideally the four local authorities.
    b. Find individuals or community organisations that might be interested in getting involved.
    c. Identify a project lead.

2. Bring together people and groups in the community to gather input to inform potential projects, such as through:
    a. Mapping activities: what assets, knowledge, contacts and opportunities already exist, who knows who, what do they value, what do they want to change.
    b. Networking to find members of the public who are interested in getting involved.
    c. Outreach at community and cultural activities and events, especially through the Super Slow Way programme.
    d. Running Carbon Literacy training for groups and organisations.

3. Find and use all the resources available and any existing expertise, such as
    a. NW Net Zero Hub for more support once a possible project has been identified.
    b. Electricity NW Community Energy Manager.
    c. Local renewable energy suppliers and colleges.
    d. Links to and learning from other community energy organisations.

4. Start to develop a sustainable low carbon action plan for the Linear Park.

Everything that is proposed in this report is possible, and examples of similar projects and initiatives are in place all across the country. But nothing will happen without the will, vision and leadership to do so.

Contents

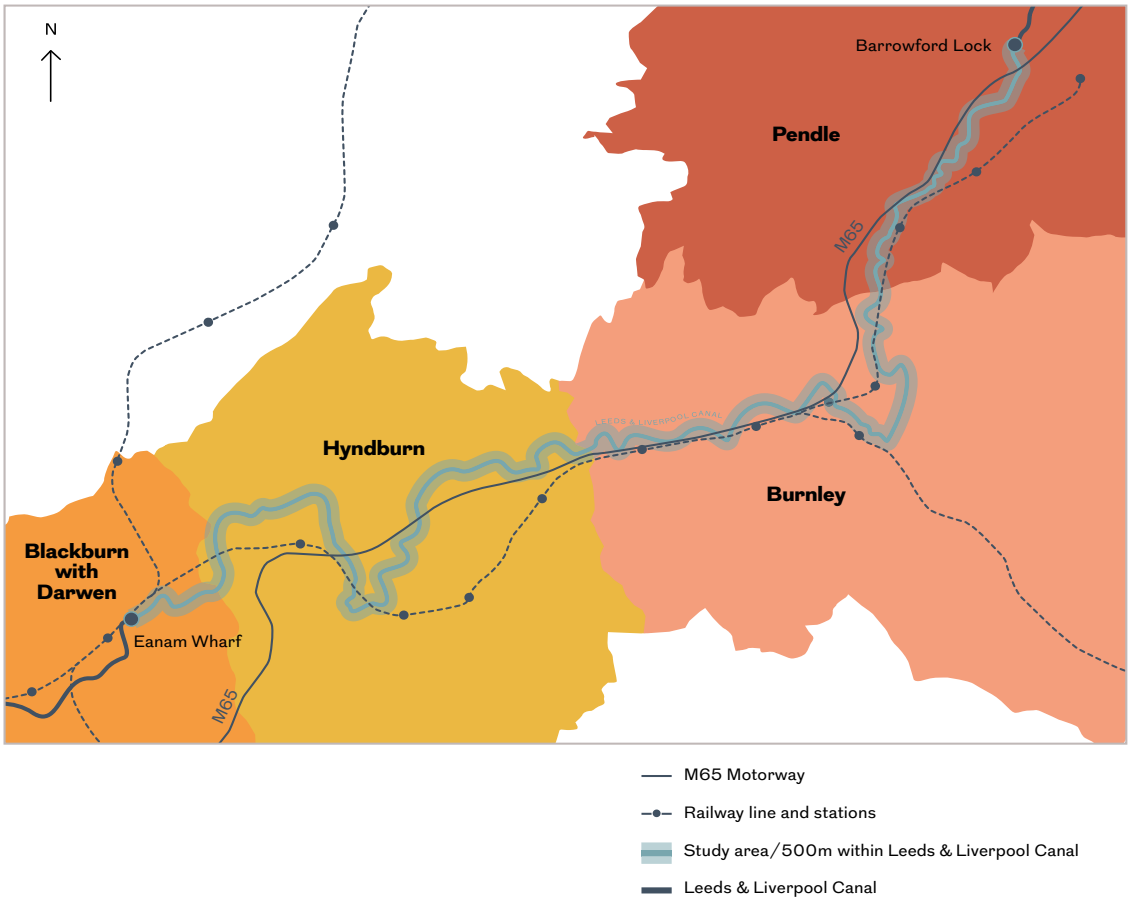
1 Introduction

Climate change is one of the critical challenges of our time and the responsibility for addressing it lies across all sections of society and all organisations: governments, international corporations, local authorities, public sector organisations, businesses, communities and individuals.

The Arts and Culture sector has a vitally important role to play – not just in putting its own house in order, but in inspiring, educating and visualising a different, low carbon future, and in creatively sharing that vision to help engage people in coming up with their own actions and changes.

The UK has committed to achieving Net Zero climate change emissions by 2050. This requires a major shift in our economy, our infrastructure, our buildings and our activities, underpinned by a change of mindset and priorities. Done well, it will also bring improvements in our quality of life, health and wellbeing and will bring economic benefits and jobs to all areas. Many local authorities, including the four involved in the Super Slow Way, have declared a Climate Emergency and some have committed to Net Zero emissions by 2030 – only seven years from now. To make this happen we need to put in place changes now. Changes in the way we plan our developments, buildings, public spaces and activities, in how we finance them and in how we work together in partnership.

The Linear Park is an initiative to transform an under-used and frequently unloved 23-mile stretch of the Leeds and Liverpool canal into a vibrant cultural asset for local people and visitors. The canal runs through four local authority areas in Pennine Lancashire: Blackburn with Darwen, Hyndburn, Burnley and Pendle.



Map: "Unlocking the Potential of the Leeds & Liverpool Canal: The Case for Change"

The Linear Park projects include creating a network of heritage sites, bringing vacant buildings and spaces back into use for leisure, arts and activity; developing urban green space for horticulture and community projects; supporting creative, green and digital industries; and developing green energy sources. Developed by the Super Slow Way consortium of partners and part-funded by Arts Council England, the Linear Park project harnesses the involvement of these partners as well as engaging the local community. Members of this partnership are also ideally placed to have a positive influence on climate change action in Pennine Lancashire, combining the local authorities who can determine development decisions and help access funding with grass-roots community organisations that can engage with local people. Together, the partners can create a leading example of creative regeneration that is truly sustainable and puts Pennine Lancashire on the map to deliver net zero, nature recovery, connections to nature and prosperity.

Environmental Responsibility is one of the four Investment Principles applied to Arts Council funding: *"We want cultural organisations to act as leaders within their communities in terms of taking an environmentally responsible approach to running businesses and buildings: by lowering carbon emissions, increasing levels of recycling, cutting their use of plastic and reducing water consumption. We also expect them to promote the need for environmental responsibility in the communities in which they work, through their partnerships and with their audiences.[1]"*

The Pennine Lancashire Linear Park Case for Change already recognises the potential for achieving broader environmental benefits through the project: *"The environmental benefits are also integral to this vision, with a multitude of opportunities to support low carbon and low resource, intensive growth. Green technologies and regenerative urban agriculture initiatives promoting circular economy frameworks will contribute to the county's 2030 carbon neutral target."*

This report has been commissioned by Super Slow Way to investigate the wider role that the Linear Park can play in reducing carbon emissions along the length of the scheme and surrounding areas, and the role that community energy can play in helping to deliver these reductions. It focusses mainly on carbon emissions from the built environment and low carbon energy supply. Sustainable transport and carbon capture through green infrastructure are being addressed in the Linear Park by creating a green movement corridor and growing projects, as well as being the subject of other work in the four local authority areas. As such, sustainable transport and green infrastructure are not the focus of this particular report.

The 23 mile stretch of land along the canal and its immediate surroundings have a large number of potential opportunities for carbon reduction and low carbon energy. This report provides an initial overview of opportunities to start the process of developing a sustainable low carbon action plan for the Linear Park.

The project aimed to provide information to Super Slow Way on:

- Potential low carbon solutions at the key development sites and for the park as a whole
- Benefits of integrating low carbon solutions with the wider project and activities
- Community involvement and benefits
- Suitable low and zero carbon energy technologies
- Ownership models: private, public, community, partnership
- Funding and finance options
- Technical, legal, construction and operational constraints
- Examples in other places.

[1] ACE Investment Principles https://www.artscouncil.org.uk/lets-create/investment-principles

At this current time of high energy bills and an economic crisis, it is fitting to remember that if these issues had been addressed 10 years ago, the impact of the crisis on people's lives and cost of living would have been greatly reduced. The business case is stronger than ever, and the time to act is still now.

Carbon emissions predominantly come from fossil fuel use, as energy to heat and power homes and businesses and to fuel our vehicles. (Also referred to as CO2 emissions.) Greenhouse gas emissions include other gases such as methane and nitrous oxides and are important in sectors such as agriculture and transport.

Net Zero is a phrase used to describe the reduction in greenhouse gas emissions, coupled with increased absorption of carbon through, for example, tree planting and better land use, so that the net effect is zero emissions.

The Transition to Net Zero involves changing our energy sources to renewables – mainly electricity as the simplest replacement fuel – and vastly reducing our demand through improving energy efficiency, especially of buildings and industrial processes. In order to make this transition, we need to invest in energy infrastructure: both renewable energy supply and networks to distribute that energy (in the way that the UK invested in a gas network in the 1970s, or broadband infrastructure since the early 2000's), and technologies and supply chains to enable us to make our buildings more efficient.

Just Transition is a concept describing how to make sure that the transition to net zero is equitable and doesn't leave out or harm the poorer sections of society. A significant concern about the energy transition is that at an individual level, it is the more affluent households that can afford to invest in low carbon technologies, and there is a fear that poorer households will be disadvantaged.

Renewable energy is energy generated entirely from renewable sources such as the sun, wind, water flow, waves and tides. Low carbon energy comes from sources that have carbon emissions but are lower than the traditional fossil fuel alternatives, such as heat pumps which run on electricity but are extremely efficient.

The main body of this report provides an overview of community energy and community-based action on climate change before going on to identify the opportunities for such projects in the Linear Park area.

The Appendices give more detailed information on energy and carbon emissions, renewable technologies and low carbon solutions, ownership and financial models for projects, and challenges, risks and constraints. For those at the start of their learning curve on energy, carbon emissions and community energy, these appendices provide useful background information on issues relevant to the potential projects identified for the Linear Park.

2 Community Based Carbon Reduction

The communities around the Linear Park are powered by energy – both the energy they use to heat and power homes and businesses, and to travel around, and the energy people bring to their local area. The community infrastructure provides a framework to support action on climate change, and the physical infrastructure offers places where those actions can have an impact.

Community infrastructure

- Friendship groups, families, neighbours
- Social groups, sports clubs, faith groups
- Communities of interest: people fired up by wanting to do the same things or change the world
- Organisations rooted in the local area
- Activities available: sports and social clubs, cultural events, things to do
- Organisations making things possible: funders, support/information/knowledge networks, local authorities.

Physical infrastructure

- Buildings and spaces in which things happen
- Spaces for informal gatherings: outdoor spaces, parks, pubs, libraries
- Transport and communications networks
- Energy supply networks.

The Linear Park brings together community action and physical infrastructure. This can be harnessed to build low carbon infrastructure, creating wider benefits than just carbon reductions:

- Healthy places to live and work
- Low carbon jobs with opportunities for innovation and new skills fit for the future
- Vibrant communities engaged in developing facilities and activities in their local areas
- Opportunities to get involved
- Local pride in achievements
- Increasing community wealth
- Resilience to future energy crises.

The Linear Park projects can be designed to catalyse these benefits for the local communities.

2.1 Community and Local Energy

Community Energy describes activities to tackle carbon emissions through local investment in renewable energy or energy efficiency, typically based on concerns about climate change and just transition. Community energy can be a mechanism to devolve control of energy systems to local people and keep the profits generated from energy generation and supply within the local economy. Most community energy organisations are set up to put the community benefit at the heart of what they do: as co-operatives, community benefits societies or community interest companies. They can work alongside both charitable organisations and the private sector to finance investment in energy projects.

Community energy fits with the ethos of Super Slow Way: bringing together communities to improve their local area and supporting organisations that can help make those things happen.

There are over 300 community energy organisations in England. Community Energy England carries out an annual survey of the sector. Its 2022 State of the Sector report found that there are:

- 221 community owned generators supplying 331MW of electricity, frequently to schools, community buildings and businesses at below market rates.
- 28 community owned renewable heat projects.
- 90 community groups providing low carbon transport.
- 123 community organisations helping 57,600 people or organisations save an estimated £3.35m on energy bills.
- £15m of community energy income spent locally, boosting local economies.

Most community energy organisations make their money from the sale of energy, or energy-related services, and spend a proportion of this on activities that help people within their community to reduce energy use and develop other environmental projects. They are also able to obtain grants for development costs, innovation projects and some activities such as helping to reduce fuel poverty. As with any community business, they need to be financially sustainable, so the projects they take on must be economically viable.

Community energy organisations frequently use their surpluses to provide key services in supporting local climate action, through community activities, providing energy advice, developing skills, running training, providing educational materials for schools etc. This work typically involves a range of partner organisations.

MORE Renewables in Lancaster uses its community benefit fund to support the work of Green Rose CIC, a social enterprise providing energy advice across Lancashire. This has helped Green Rose to advise 250 more people than it would have done in the last two years.

Plymouth Energy Community provides energy advice for householders through home visits and community events, as well as support in understanding bills and dealing with energy companies. They also provide advice and training for businesses and landlords, and a mentoring service for local authorities. PEC was initially set up with the support of the local authority, becoming a separate entity offering a range of services as well as installing renewable systems funded by community share offers.

Grimsby Community Energy partnered with Energy Heroes to deliver assemblies and lessons on climate change and energy in five local primary schools.

Energy Garden is a London-based organisation that supports communities to install and maintain community gardens on or near train stations, involving over 300 volunteers. They have raised £1,000,000 share capital to pay for 1MW solar PV, and use the income generated to run their programmes, which now include a Youth Training Programme and workshops for schools. They plan to install 20MW of PV by the end of 2025 to allow them to expand their community projects.

Local energy is a wider term covering energy projects that are also locally owned, typically by the local authority or other public sector organisation, which may also serve other buildings or people in the locality, such as a district heat network or electric vehicle charging network.

In the North West, the community and local energy sector is supported with funding and advice by the NW Net Zero Hub and Electricity North West, the electricity network operator, which recognises the importance of local generation and demand reduction projects.

2.2 Localising Energy Spending

Homes, businesses and other organisations in the four local authority areas around the Linear Park together spend around £800 million on energy per year (2022 prices). The vast majority of this spending leaves the local area: to oil and gas companies, and the major energy suppliers. But spending within a community has a multiplier effect as the money is retained and recirculated within the local economy. Local ownership of 10% of the energy spend in Pennine Lancashire would keep an extra £80 million per year in the local economy.

In 2020 there were over 28,000 households in fuel poverty in the Linear Park local authority areas or almost 16% of the population, compared with an average of 13% across England. The energy and economic crises of 2022 will have considerably increased this figure. Community energy will not solve fuel poverty, but local community action on energy generation and energy efficiency can have an impact on it, often through proving funding to organisations that can offer advice and support to vulnerable households.

As well as being based on local ownership of energy generation assets, community energy projects tend to use local tradespeople to build and maintain the equipment. This then helps to retain the money invested within the local economy. It can also attract inward investment in renewable energy generation, such as from social investment funds.

Community Wealth Building is an approach to developing local economies to serve the needs of local people, built around the principles of inclusion and fairness. This approach has been adopted by numerous local authorities across the UK.

Far from delivering on the promise of prosperity for all, our economic model too often leaves many people less secure and worse off – serving to enrich the already wealthy few and doing little to address climate emergency. In the face of unprecedented economic challenge, we need to reset and build a new economy: one in which wellbeing stands above economic growth[2].

The Preston Model was an early example in the UK. Locally rooted organisations pledged to support the local economy, through changes to employment, procurement and development practices, with the aim of creating more opportunities for local small businesses and ensuring their organisations and suppliers pay the Living Wage. As a result, Preston was named 'Most Improved City in the United Kingdom' in 'Good Growth for Cities 2018'. This local procurement from institutions rooted in Preston increased the money recirculating within the city threefold since 2012/13.

Community Wealth Building and Climate Response are mutually supportive approaches – putting the long-term sustainable future of local people at the heart of development decisions and investment. Community Energy is based on the same principles as Community Wealth Building – retaining local wealth in the local economy for the benefit of local people.

Anchor organisations – those that are rooted in the local area and cannot easily relocate elsewhere – are critical to community wealth building, and similarly critical to community energy. Examples around the Linear Park are public sector organisations such as the local authorities, hospitals, schools, colleges and universities, housing providers, large employers and community and voluntary organisations.

The Linear Park has key ingredients and the anchor organisations to implement some creative, well-supported community and local energy schemes, if these were seen as a priority.

[2] "Owning the Economy: Community Wealth Building 2020", Centre for Local Economic Studies

3 Community Energy and Net Zero Carbon Opportunity Areas

This scoping study has investigated the potential for renewable energy and other carbon reduction projects along the length of the Linear Park. 23 miles of canalside land is a long stretch with many different building types, so we have categorised these into groups that could form the basis of a project:

1. The four **Strategic Hub Sites**: Imperial Mill, Inn on the Wharf, Hargreaves Warehouse, Brierfield Gasometer
2. **Heritage Buildings** including those in the 18 "String of Pearls" sites: assets that could become valuable spaces for community, culture and leisure activities
3. **Industrial and Business Parks**
4. **Regeneration** Areas
5. **Community Spaces and Buildings**: Schools, Leisure Centres, Community Buildings and Cultural Centres
6. **Housing**
7. **Surrounding Land**

3.1 Strategic Hub Sites

The initial outline case for the Linear Park identified four "hub sites" for more detailed strategic business case development:

- Imperial Mill, Blackburn
- Inn on the Wharf, Weavers' Triangle, Burnley
- Gasometer, Brierfield, Pendle
- Hargreaves Warehouse, Hyndburn

Hargreaves warehouse has since burnt down so has not been considered in this study.

3.1.1 Imperial Mill

Photo: Chris Allen

Imperial Mill is a large Grade II listed red brick building on the banks of the canal. It was originally a textile mill and is currently used by the Lancashire Saw Company who manufacture saw blades. Blackburn with Darwen Council is in the process of acquiring the building which will require a significant investment, first to make it weatherproof and then for refurbishment. The Lancashire Saw Company (LSC) will remain in the building for the immediate future.

A low carbon, low energy refurbishment would protect any future building users from high energy costs and helping, businesses in the building to flourish by providing low cost, high specification premises.

Opportunities for low carbon refurbishment include:

Rooftop solar PV: the roof has the space to hold between 800-900 panels, which would equate to around 400kW capacity providing 360 MWh/year: enough electricity to power 18 small businesses or 124 homes. This electricity could be sold to occupants of the building. At 2022 electricity prices for businesses this would be worth over £70,000 per year. The cost of such a system would be around £250,000-£300,000. In the short term the electricity could supply the LSC, provided a supply contract can be agreed with them. The system could either be installed by the council or a community energy company. It may be worth investigating battery storage as well if the building was used at night and the daytime energy demand of the occupants was lower than the system output – but this can be determined later when it has been decided how the building will be used.

Heating: the main low carbon heating option for a building of this size is a heat pump, ideally ground source, which could be installed underneath car parking areas or on surrounding land. For a heat pump to work effectively, a low temperature distribution system will need to be designed in at an early stage. Water source heat pumps using the canal have been mentioned, however these rely on water flow and there is no evidence that the Leeds and Liverpool Canal has sufficient flow at this point to provide heat for a building of this size[3].

Net Zero refurbishment: energy and carbon emissions should be considered at the very first stage of refurbishment design. The argument is often put forward that energy efficiency measures conflict with conservation aims, but there are many examples across the UK of low carbon retrofit in historic buildings, including the National Trust's buildings, and a growing body of guidance to support this[4].

In order to take advantages of these opportunities it is essential that they are designed into the refurbishment project immediately. This will require active engagement with any architects or consultants engaged and specification of the work required to enable Net Zero refurbishment. In particular in the early stages this includes:

- Ensuring the roof is structurally capable of bearing the weight of the solar system, and wind loading. Currently systems weigh between 10-20kg/m2 depending on the support structure used, but panel design is developing and lower weight systems are becoming available.
- Ensuring the roof surface weather-proofing material would not be compromised by the installation of a solar system on top: rooftop solar is a standard technology so manufacturers of weatherproofing materials are able to meet this requirement if it is specified.
- Ensuring sufficient insulation is installed in the roof as part of the weatherproofing process – considering the energy performance of a Net Zero building rather than one refurbished to the less stringent current Building Regulations.
- Employing an architect with detailed knowledge of Net Zero building refurbishment, specifically in historic buildings, and ideally Passivhaus or EnerPHit accreditation[5].

[3] See Appendix for more detail

[4] https://www.historicenvironment.scot/archives-and-research/publications/?curPage=2&publication_type=30
https://www.sustainabilityexchange.ac.uk/files/heritage_and_carbon.pdf

[5] https://www.passivhaustrust.org.uk/members/architects_and_designers/ https://energiesprong.org

Devon Mill, Hollinwood, Oldham, is a Grade II listed building owned by Baum Trading Ltd and now let out to other small businesses. It had over 600 solar panels installed on its flat roof in 2012. The building is a very similar design to Imperial Mill.

Photos: Chris Allen

Sunnybank Mills, Leeds, a 1912 former textile mill and now a business, artistic and heritage centre, has 137 solar panels installed on the traditional northlight construction roof. The building hosts a textile archive, arts spaces, and over 70 small companies employing 350 people. It has been the location for filming shows such as Emmerdale, Heartbeat and The Great British Sewing Bee, and runs community arts projects.

Photos: Sunnybank Mills

Manor Mill, Oldham, the Grade II listed head office of Ultimate Products Group installed 1150 panels covering 85% of the roof of the building. The company has said that these will supply 40% of their electricity demand and payback the investment in around three years, allowing them to make considerable savings on their energy costs[6].

Photo: Oldham Chronicle

3.1.2 Inn on the Wharf

Inn on the Wharf is a relatively small building within the Weavers' Triangle regeneration area. The pub has been closed since 2017. The building is a traditional stone built canalside warehouse with a footprint of approximately 400m2. If the building were to be refurbished, it would be worth the owners investigating the following options:

Photo: Tim Green

[6] https://www.oldham-chronicle.co.uk/news-features/140/business-news/147146/up-install-solar-panels-at-manor-mill-site

- Internal insulation – walls, floor, roof to high standards and attention to detail to avoid cold bridges
- Double or triple glazed windows
- Air or potentially water source heat pump – the latter would require an assessment of the impact on water temperature in the canal.
- Solar panels or integrated solar tiles on the SW (canal) side of the roof, subject to a structural survey.

These measures are best undertaken by the building owners. It is too small a site to consider for community energy in isolation, but could form part of a collective project addressing heritage buildings (see 4.2 below).

Solar PV panels can be installed on heritage buildings, including pubs, as shown on the building below, in Halifax, which was installed by a local specialist heritage roofing company.

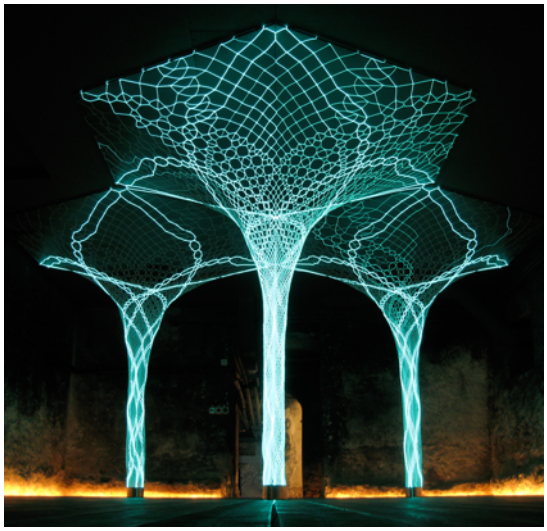
Photo: Green & Heritage Roofing Ltd, Halifax

3.1.3 Brierfield Gasometer

The Gasometer is metal cage-like structure: it is not a building with an energy use and has no carbon footprint in itself. The structure could potentially be used as a framework for solar panels with battery storage to, for example, provide electricity for any lighting of the structure, artwork and associated nearby cultural events. This would be a small-scale system which could be included in the project ideas for the site and installed at relatively low cost. It could be used to demonstrate the Linear Park's stance on climate change. However, if this were the only element of the programme that incorporated renewable energy, it would likely receive criticism for tokenism or greenwashing.

Photo: Gill Fenna

Solar Art is a growing artform using the solar PV cells integrated into light sculptures to provide the energy for the work itself and occasionally to supply other users.

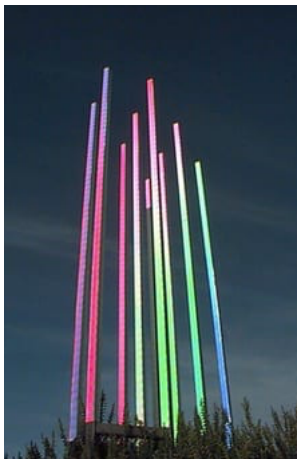


Sonumbra de Vincy is a textile and solar sculpture representing the changing climate in Madrid, Geneva, and London. Each "tree" responds to real-time climate information from each of the three cities. Designers and Photo: Loop.pH

Solar Trees designed for the German Pavilion at Expo 2015, now standing in Darmstadt

Solar Bloom, Seattle, Dan Corson

Solar Tree, Ross Ludgrove, Vienna



Solar Intersections, Robert Behrens, Davis, California

Visible electricity generation at the site could be increased by the use of solar footpaths and cycle lanes, which are starting to be installed in many cities in Germany and the Netherlands.

3.1.4 Challenges and Risks

Community energy investments need to be financially viable and therefore generate an income. The Imperial Mill roof would be a large enough PV scheme to be viable, but Inn on the Wharf would not be as a stand-alone project. Imperial Mill may also be suitable for a community-owned renewable heating system, subject to a more detailed feasibility study. Community energy schemes need to be based on a partnership arrangement with the building owner, and the initial legal agreement (Heads of Terms) would have to be agreed at an early stage, covering, for example:

- How the sale of electricity from the community energy company to occupants of the Mill can be set up and managed: ideally this would be via an agreement with the building owner to purchase the electricity generated who then passes on to tenants the combined costs of PV generation and any electricity imported from the electricity supplier.
- How the sale of heat to building occupants can be set up and managed, again ideally through a single contract with the building owner to be passed on to tenants.
- The agreement to lease the roofspace of the building for the lifetime of the PV system, and any land or building space required for the heating system.

There are standard contracts that have been developed by community energy sector lawyers which can be used.

In the case of Imperial Mill, the building owner will be Blackburn with Darwen Council, so an early engagement with them prior to work on the building envelope will be essential.

The major risks for a community energy project at Imperial Mill are:

- The Council is unwilling or unable to agree to a community energy lease and work in partnership with a community energy organisation throughout the project
- The Council cannot agree to an electricity price structure for the electricity generated
- The work to make the roof watertight does not allow for the weight of the PV system
- It is difficult to predict the energy demand of the building after refurbishment, leading to over- or under-specifying the heating system
- Conservation officers object to the measures proposed.

All of these issues have been solved by numerous existing community energy organisations across the UK, and, as the ethos of the sector is openness, their solutions can be easily shared with this project.

3.2 Heritage Buildings

The Pennine Lancashire Linear Park: Case for Change identifies Heritage and Development as a project area where the strategic vision for the Linear Park can make a difference to the quality of the surrounding buildings and environment, stating:

"*The Lancashire Textile Mills Survey from Historic England shows that Pennine Lancashire contains 424 of Lancashire's 540 surviving textile mills. A number of sites along the canal have been restored and developed in recent years—most notably the mixed-use developments at Weavers' Triangle in Burnley and Northlight in Nelson, with residential, office, education and sports facilities, and these are testament to the impact that the sensitive and imaginative re-use of heritage sites can have, socially and economically as well as aesthetically. However, as a consequence of decades of under-investment, many other sites in this post-industrial landscape lie underused, vacant, or in a state of dereliction.*"

Although heritage buildings are subject to conservation criteria, there is no reason that they cannot be transformed into highly energy efficient buildings with their own energy supply. While refurbishing old buildings has carbon benefits over demolition and rebuilding, in many cases, carbon reduction is typically not considered early enough in the redevelopment or refurbishment process, and opportunities to minimise energy bills for occupants are lost. Quality design should be based on the long-term sustainability of the building including its carbon footprint and running costs, and the use of sustainable building materials, as well as the visual aesthetic.

Heritage buildings individually present viability challenges for community energy, as they require highly bespoke solutions that are difficult to aggregate into a collective project, and there is a lack of skills available for this work. There may be an opportunity to develop and obtain funding for an innovative Linear Park Heritage Buildings programme in partnership with other organisations, with some community energy involvement. This could incorporate other strands of work such as:

- Developing skills for bespoke energy auditing and retrofit specification for these building types
- Research and monitoring of heating systems and insulation suitable for local heritage building types
- Developing local construction sector skills for net zero refurbishment of these building types
- Collective purchasing or development of more bespoke equipment needed.

There are eleven heritage buildings or groups of buildings listed as "String of Pearls" sites, that could provide a contribution to carbon reduction. The potential for carbon reduction depends on how much the sites have already been developed. More recently developed sites are less likely to undertake deep refurbishment or replacement of the heating system, but may be suitable for a bolt-on technology such as solar PV. An initial review of the String of Pearls sites suggested the following:

Sites with Potential for Zero Carbon Regeneration/Retrofit

- **Eanam Wharf** – good south-facing roof with potential for PV, subject to conservation area planning
- **Enfield Wharf and canalside buildings** - a semi-derelict site with heritage buildings, currently used as a garage. The buildings offer potential for a Zero Carbon refurbishment exemplar site.
- **Trafalgar Mill** – within the Burnley Canalside West Intervention Area and close to the UCLAN campus, the mill has a very large SE facing roof suitable for PV and potential for a heat pump.
- **Weavers Triangle** – partly redeveloped and home to the UCLAN campus, the area has potential to be an exemplar Net Zero site with a mix of old and new buildings.

Already developed sites with some potential for additional rooftop solar PV

- **Northlight** (former Brierfield Mill) - roof appears to have potential for PV.
- **Eastern Gateway**, Burnley – large roofs on more modern buildings adjacent to the Gateway which may have potential for PV, e.g. St Peter's Centre, Bus Station, Burnley FC as well as some of the new developments proposed along Centenary Way
- **Cathedral Quarter**, Blackburn – some rooftop solar already installed.

Sites with less potential

- **Nova Scotia Wharf** – in use as offices, with a large number of rooflights, making the roof difficult to use for PV. Not large enough for a community energy scheme on its own.
- **Dugdale Wharf** – Canal and Rivers Trust building. Small site with little potential for community energy but could be an exemplar Net Zero project for the owner.

- **Finsley Gate Wharf** – in use as a pub. Potential for renewable heating and possibly solar PV but ideally installed by the site owners.
- **St James' Church, Altham** – without a regular daily energy demand, it is unlikely to be a viable site for community energy, but the Church of England has committed to achieving Net Zero carbon emissions by 2030.

Morden Hall Park Stable Yard, south London, is an example of the National Trust's zero carbon programme. The refurbished stable block is carbon neutral and achieved a BREEAM Excellent rating. Insulation materials such as sheep's wool and hemp were chosen to suit the fabric of the building. Heat is provided by an air-source heat pump and a wood-burning stove linked to heat stores, using wood from the park. Electricity comes from solar slates, PV and Photovoltaic-Thermal panels on the roofs, so that the building runs entirely on its own energy supply.

Photo: National Trust

Edinburgh Climate Change Institute was the first listed building to achieve a BREEAM Outstanding award for its refurbishment, while adding a modern extension to the 18th century building. The renovation achieved very high levels of airtightness while allowing the fabric of the old building to breathe through its ventilation system. It is linked to the Edinburgh University district heating network and makes use of an air source heat pump and solar roofs.

Photo: Fraser Livingston Architects

3.3 Industrial Buildings and Business Parks

The Leeds and Liverpool canal was built as an industrial transport route. Although no longer used for transport, the industrial heritage remains, with the majority of the route in urban areas lined with industrial buildings of different ages and in varying states of repair. The proximity of the M65 means that many newer industrial areas are also close to the canal, including:

- Glenfield Business Park & Whitebirk Industrial Estate, east Blackburn
- Junction 7 Business Park, Clayton-le-Moors
- Huncoat Business Park, Accrington
- Altham Industrial Estate
- Network 65 Business Park, Burnley
- Farrington Road Industrial Park, Burnley
- Lomeshaye Industrial Park, Nelson
- Whitewalls Industrial Estate, Colne.

Industrial roofs are often ideally suited to solar PV, particularly the large metal roofs of newer buildings. Systems can be scaled to suit the size of the building and the daytime electricity demand of the business. PV combined with battery storage could provide the whole electricity needs of some businesses during the summer months.

Manor Royal Local Energy Community, (MRLEC) West Sussex. Manor Royal is one of the largest industrial parks in the country. The Manor Royal BID, together with West Sussex County Council, Crawley Borough Council and expert input from Brighton Energy Co-operative, is developing a local energy project to supply businesses on the park from a network of locally generated renewable energy technologies. Feasibility work is being carried out on rooftop solar PV, battery storage, ground source heat pumps and a district heating network. MRLEC will be a not-for-profit organisation that will sell the energy to local businesses. It will contribute to reducing the businesses' carbon emissions and provide stable energy prices over the long term.

Burneside Community Energy, based just outside Kendal in a village of around 3,000 people, was set up in 2015. They have raised over £760,000 from people in their local area of Cumbria to install almost 1MW of solar panels on the roofs of James Cropper's paper mill, the major employer in their village. As well as providing that company with renewable electricity at a competitive price, the project has been able to pay for 20kW of solar panels on the roof of the local primary school, reducing their energy bills and providing a live example to educate the children about climate change. Other community projects supported include an allotment project, a clean up campaign and facilities such as a village defibrillator and bench.

Photo: Burneside Community Energy

Industrial estates can also be ideal locations for a wind turbine supplying one or more businesses, and the visual impact of a single or small cluster of turbines is in keeping with the industrial nature of the surrounding area. Although onshore wind turbines in England have been effectively banned since 2014, the government is currently consulting on changes to planning guidance which will allow wind turbines if they can demonstrate local support.

Ambition Community Energy in Bristol, is installing the first wind turbine in England to be awarded planning permission since 2014, due to the overwhelming support they were able to demonstrate from local people. The 4.2MW turbine will be operational in spring 2023 and will produce more electricity than is used by the 3,200 homes on the Lawrence Weston estate. The community energy company was set up by **Ambition Lawrence Weston,** the local community centre which offers a wide range of support for local people, such as training, help into work, a community shop, events and activities for all ages.

A further option could be a large scale battery storage facility, either as a stand-alone asset to provide grid balancing and flexibility services, or linked to a renewable energy system to optimise the potential to use the electricity generated locally.

South Somerset District Council has invested £43.5 million in two battery storage facilities: 30MW installed in 2020 on the outskirts of Taunton (within their district), and 60MW near Fareham in Hampshire. The two facilities are owned by a joint venture company, SSDC Opium Power Ltd. The council expects to achieve an IRR of 14% on the projects.

Photo: South Somerset DC

Finally, employments sites are ideal locations for electric vehicle charging, which can be installed and owned privately or through a community energy organisation. EV charging can also profitably be linked to renewable energy generation.

Charge My Street is a community energy company providing EV charging points across the north of England, funded through community share offers. One of their first installations in 2018 was at Lancaster Boys and Girls Club, where the electricity is supplied from a PV system owned by another co-operative Morecambe Bay Community Renewables. Since then, they have installed over 100 chargepoints across Lancashire, Cumbria and the North East, in partnership with the local authorities and community organisations.

Photo: Charge My Street

There has previously been a proposal to investigate the potential for a community energy scheme based around Altham Industrial Estate, but we understand this wasn't taken forward. However, **the industrial estates could be an ideal opportunity for a community energy project, with the potential to start in one location and expand to other sites.**

Nelson Town Deal includes the potential for businesses to apply for up to £100,000 grants including initiatives to lower CO2 emissions or energy consumption. This could be used to install renewable energy systems in eligible areas such as Lomeshaye and Whitewalls industrial estates. There may be an opportunity for a centrally organised scheme to promote renewable energy in this area and potentially to combine this with a form of community energy or collective purchasing scheme.

3.4 Regeneration Areas

The four local authorities all have regeneration and investment plans for their areas, particularly for their town centres (including linkages to the canal area), and have a considerable degree of influence over projects within these areas. The plans focus on economic regeneration, and include interventions to improve the public realm, improve transport links, refurbish or redevelop buildings, but very few reference how regeneration can be a driver to make substantial carbon reductions.

There is an opportunity to re-evaluate these plans through a climate change lens and identify sites where buildings could be made zero carbon, and could be used to generate renewable energy.

For example:

- Large scale PV on the roof of a redeveloped Pendle Rise Centre in Nelson
- Canalside East housing development in Burnley could incorporate a shared ground loop heating system.

These regeneration projects will necessarily be local authority led, but could be developed in partnership with a community energy organisation and other community partners.

Bristol One City Economic Renewal and Recovery Strategy has the ambition to achieve Net Zero status at its heart, rather than considering it as a separate area or an afterthought to regeneration. Community involvement is also central to this strategy. In October 2020, the Community Climate Action project was launched with support from the National Lottery's Climate Action Fund. The project sees six Bristol community organisations (Ambition Lawrence Weston, ACH, Bristol Disability Equality Forum, Heart of BS13, Lockleaze Neighbourhood Trust, and Eastside Community Trust) play a leading role in shaping Bristol's transition to a low carbon and climate resilient city, with the support of Bristol City Council and the Centre for Sustainable Energy. These organisations help to ground the city's renewal strategy in local action and respond to local needs. Several of the community organisations run their own climate change initiatives in their part of the city.

Oldham Energy Futures is a framework to involve local people in shaping their neighbourhoods to supply low carbon energy and transport solutions. It is developing a community-focussed local area energy plan, that will lock in community ownership of energy infrastructure. The programme brings together community members and technical experts to plan and set up three initial pilot projects:

- Upgrade local buildings, creating warmer, health and low carbon homes.
- Develop an Electric Vehicle and e-bikes local mobility project.
- Install new renewable energy generation.

3.5 Community Spaces and Buildings

Community energy's roots are in providing renewable energy for local schools, leisure centres and community buildings, primarily through rooftop solar PV schemes. This was mainly driven by the Feed-In-Tariffs which guaranteed a long-term income for the project, giving confidence to investors and making even small systems viable. Other technologies installed by community energy organisations include LED lighting, electric vehicle charging and, to a lesser extent, renewable heating projects.

There is still a role for this type of community energy project, but a viable scheme would need to aggregate a fairly large number of systems to spread the operating costs. For the Linear Park, this will require co-operation across the local authorities and multiple different organisations that own the buildings.

A community energy project could either be developed:

- By an existing local community energy group such as Prospects Community Energy in Hyndburn
- By setting up a new community energy organisation
- Through collaboration in a national initiative such as the Big Solar Co-op, which will take on the project management and share costs across a large number of schemes, but invest any surplus locally.

In purely financial terms however, it can be better for the building owners to install the schemes themselves if they can access the initial capital to do so.

Greater Manchester Community Renewables have installed solar PV on eight schools and a community centre, with a total capacity of 350kW. The projects have generated over 1,000 MWh of clean electricity and saved the schools and community centre around £35,000.

Chester Community Energy installed 50kW PV on the roof of Northgate Leisure Centre, owned by Cheshire West & Chester Council but operated by a separate organisation, Brio Leisure. A further

50kW owned by the council was installed at the same time. CCE has since installed 120kW on two other sports centres and LED lighting in two community centres.

Bradford Community Energy helps community run buildings to be more sustainable. They provide energy and carbon reduction advice to the voluntary and community sector and social enterprises in the city. Set up in 2020, they raised £60,000 to install solar PV on two community buildings.

CREW Energy, South London, runs a range of energy and climate change projects in community buildings and schools. In 2022 they installed solar PV, LED lighting and an energy management system in Polka Theatre, as part of a wider refurbishment programme.

3.6 Housing

Housing along the canal is typified by the standard form of worker housing from the late industrial era – stone terraces. The vast majority of these have an Energy Performance Certificate rating of D, E or F (poor). Newer developments and social housing perform better, but few new homes are built to very high energy standards. Almost all homes along the canal area will need retrofitting with high quality insulation and new low carbon heating systems at some point in order to reach the country's Net Zero targets.

Retrofitting housing is difficult and expensive. Government support programmes have largely failed to make significant inroads into the work required and have typically been unable to come up with useful solutions for individual "hard-to-treat" homes. Stone terraced housing is a typical example of hard-to-treat homes, for example:

- The walls are often damp but being stone, need to "breathe", so not suitable for some wall insulation technologies
- Heat pumps (the government's preferred heating technology) are often not suitable in terraces of small houses due to noise issues, and lack of space internally for the hot water tank and larger radiators needed.

Tackling the carbon footprint of homes will require action and significant funding from government, and in local areas will need to involve local authorities, social housing providers, the construction sector, skills and training providers and the supply chain to ensure the right products are available and affordable. Community energy will not be able to make significant inroads into reducing the carbon footprint of all homes, but a few exemplar projects are in development that might provide a model for future schemes. Again, a key factor is a partnership approach, bringing in expertise and funding from different organisations.

Decarbonising Rossendale. Valley Heritage has obtained funding from the Community Renewal Fund to carry out three projects, including a feasibility study on how terraced streets in a conservation area in Bacup can become Net Zero. The project is investigating a range of technologies including a shared ground loop heating system with thermal batteries, shared rooftop PV with shared electricity batteries and energy efficiency measures. It will provide a blueprint for retrofitting similar streets across Lancashire and beyond. The project has set up a community benefit society to manage the energy project, Rossendale Valley Energy. It is being run in partnership with a wide range of organisations and is bringing expertise from both commercial companies and other community energy businesses.

Chipping Community Energy is developing a renewable heating system suitable for a village of mainly stone housing in Lancashire. The village of around 1000 people is off the gas grid so homes mainly use expensive oil or LPG for heating. The project will install hybrid heat pump system, using a shared

ground loop to extract ambient heat from the ground combined with individual heat pumps in homes to raise this heat up to the required temperature.

Homes as Energy Systems Manchester, a partnership of organisations in Manchester are installing a range of energy efficient technologies in 700 homes alongside renewable electricity generation and storage, which aggregated together will form a virtual power plant across the homes. The partnership is managed by Procure Plus and involves local authorities, Northwards Housing, Stockport Homes, University of Salford, Kraken and Retrofit Works, a social enterprise.

Levenshulme Area Based Retrofit Scheme. Carbon Co-op, a cooperative specialising in energy efficiency improvements in hard-to-treat homes, is developing a street-by-street retrofit programme for typical brick terraced houses in south east Manchester. A package of energy measures will be developed specifically for those building types and offered to the homeowners funded by a combination of grants and 0% interest loans.

Craghead Whole Street Retrofit A similar area-based approach has been taken in County Durham, where the local authority organised a retrofit programme across over 200 homes in six streets, The houses had external wall insulation, loft insulation, double-glazing installed and most had PV panels fitted to the roofs, alongside public realm improvements in the area.

3.7 Surrounding Land

Land in the vicinity of the Linear Park could be used for large scale renewable energy generation, such as a solar farm, wind farm or single wind turbine, or battery storage scheme. Ideally any of these would be located near to an industrial site or business park, so that the electricity generated could be used locally. Further investigation will be needed to identify suitable sites, but it may be possible to obtain funding for this investigation and specialist input from a community energy expert organisation such as Energy4All or Sharenergy.

Coach Road Solar Meadow is a project in Oswaldtwistle under development by Prospects Community Energy Ltd, an offshoot of the Prospects Foundation environmental charity based in Accrington. It will install around 2MW of solar panels and the electricity will supply a local business. The scheme will be funded through a community share issue and any surplus will be used to support further community projects in the area. The development is being managed by Sharenergy, an experienced community energy organisation based in Shrewsbury. Alongside the solar farm, the project will also manage the site to improve the wildlife in existing woodland, pond, hedgerows and grassland.

Energy4All is a Cumbria-based co-operative that helps to develop large scale community owned wind and solar farms, and set up the first community owned wind farm in the UK. They typically take on the entire development of the project and work with local people to set up a community energy company to raise the finances and then take over the project. This takes much of the risk out of the project for a local group and helps to grow local skills in community energy.

3.8 Opportunity Areas Summary

There are numerous opportunities to increase the generation of renewable energy along the Linear Park and surrounding area, as well as considerable potential to plan zero carbon refurbishment and regeneration of the often derelict and under-used heritage buildings around the canal. Some of these

opportunities could be suitable for community energy projects, while others will require a partnership approach and, significantly, the full support of the local authorities.

In many instances, the most sensible option for renewable energy systems is for the building owner to install it themselves. Community energy can step in where that is not likely to happen, for example where the building owner cannot access the capital for investment.

The main community energy opportunities that could be initiated immediately are:

- Imperial Mill: rooftop solar PV, and potentially ground source heating, linked to a Net Zero refurbishment programme – subject to agreement with Blackburn with Darwen Council.
- Industrial Estates: a collective programme to install solar PV, battery storage, and potentially wind turbines – ideally with the support of the BIDs and local authorities.
- Surrounding land: investigation of sites suitable for large-scale solar, wind or battery storage – ideally with links to a company or organisation able to purchase the energy and with the support of a specialist community energy company.

Opportunities that require further consideration, but require partnership development and leadership, particularly from the local authorities, and wider plans in place in order to achieve Net Zero over the medium-longer term are:

- Regeneration Areas and Heritage Buildings:
    - A programme of exemplar low carbon refurbishment local heritage buildings.
    - A programme to incorporate more renewable technologies on new and existing buildings within regeneration areas along the Linear Park, either owned by the building owner or through community ownership.
- Housing: identify areas to develop further Net Zero Streets, building on learning from the Rossendale project.
- A project involving a large number of community buildings (including local authority buildings) where agreement to develop a collective project can be reached with a group of building owners.

The first steps in all of these would be to

- Identify a lead organisation to manage the project
- Identify specific locations for more detailed investigation
- Make contact with the NW Net Zero Hub to gain support for further development work.

4 Challenges and Constraints

Many investments in renewable energy and low carbon projects face similar challenges. Community energy can overcome some of the challenges of private or public investment, but also faces its own specific issues and risks.

The two major constraints faced by renewable and low carbon projects are:

- Organisations not giving priority to tackling climate change and investing in carbon reduction measures, when faced with competing demands on time and resources.
- A lack of skills and capacity to develop and deliver projects.

4.1 Prioritising Climate Action

Climate change has been recognised as a significant issue and risk to society both nationally and internationally for over 30 years. However, very little has actually been done to tackle it. One reason for this is that the risks have been seen as long term rather than immediate, and other actions and investments seem more pressing. However, we are now starting to see evidence that this mindset is changing. It is worth repeating that if measures to tackle climate change by improving the energy efficiency of buildings which were due to be put in place 10 years ago had actually been carried out, many people and businesses would not now be suffering the extremely high costs of the energy crisis.

This is a failure of prioritisation that is particularly acute at national and local government level, which has led to a lack of infrastructure to support individuals and businesses to take their own climate change measures. Despite many local authorities declaring a Climate Emergency in the last five years, and setting targets to achieve Net Zero, there is little evidence that most are putting in place plans that are sufficiently ambitious to achieve this. Climate change is barely mentioned in most Pennine Lancashire strategies relating to regeneration or investment in heritage buildings, and planning policy mostly does not require low carbon buildings or actively support renewable energy in developments. Herein lies a major problem.

Leading, forward thinking and innovative Local Authorities are now embedding Net Zero into their economic growth strategies, alongside Community Wealth Building principles. National funding for regeneration is starting to require at least a nod to tackling climate change which should increase its visibility in local strategies, and future funding from HM Treasury is likely to be linked to meeting Net Zero targets. At the same time, more and more investors have Environmental and Social funds to invest but do not see the ambitious Net Zero schemes coming forward that meet their criteria. So, there is an opportunity to significantly raise the bar for investment and regeneration schemes and specify for very high quality Net Zero development.

Businesses and householders typically have a shorter-term timeframe for investment decisions than the public sector, so long-term investment is frequently not a priority, especially if they do not foresee staying in their building for the lifetime of the investment. However, the current high cost of energy is generating a significant increase in businesses and households interested in reducing energy demand and investment in renewable energy.

4.2 Skills & Capacity

Although the low carbon industry has been growing for the last 20 years, there are areas where a lack of skills and capacity pose significant challenges to widespread investment in low carbon technologies:

- Skilled suppliers: there are well documented skills shortages in some areas of low carbon technologies, particularly low carbon heating, building insulation (especially traditional older buildings that are the main building type across Pennine Lancashire), technology integration, controls and management, and, importantly, assessors, specifiers and providers of independent advice.
- Supply chain capacity: most renewable energy equipment is imported and there have been considerable delays reported in the last couple of years and especially since demand has increased due to high energy prices.
- Local authority capacity: to develop plans for low carbon infrastructure and to finance and deliver them.
- Procurement skills and knowledge: to accurately specify low carbon requirements.

Within organisations that want to invest in energy measures, there is also frequently a lack of knowledge to be able to confidently define the project, and a lack of capacity to manage work that is not part of the day job.

This lack of capacity is recognised at a national level and there are a range of organisations leading work to overcome this, such as the engineering and construction industry training boards, Energy Systems Catapult, Innovate UK as well as networks of support for public sector organisation such as UK100. The Carbon Literacy Project, based in Manchester, is leading the way in helping whole organisations raise awareness and action on climate change.

4.3 Renewable Energy Generation Challenges

Challenges specific to renewable energy generation projects are:

- Financing
- Obtaining planning permission
- Accessing a grid connection for electricity generation or storage
- Site specific technical constraints.

Each of these is explained in more detail in the Appendix.

These challenges can appear so large that they are used as an excuse not to initiate projects. But they have all been overcome by numerous organisations across the UK. The fact that the private sector and major financial organisations are now the main players in the renewable energy market demonstrate a level of confidence in the returns on investment available from renewable energy.

For community energy, specifically where the community energy organisation does not own the land or buildings on which a scheme is installed, there are also challenges around contracts with the landowner, and these need to be agreed very early in the process to avoid project failure.

The key feedback from the community energy sector and other local climate change projects is that most of these issues can be overcome through:

- Determined and knowledgeable leadership
- Strong, motivated, active partnerships
- Access to relevant support and shared expertise.

5 Linear Park Assets: People & Organisations

5.1 The Super Slow Way Consortium

The Super Slow Way consortium organisations have important roles to play in developing low carbon projects, both in:

- Advocacy: engaging and enthusing other people and organisations and providing the framework to support development of a programme of actions
- Hosting projects: either through their own investment or in partnership with a community energy organisation.

The key consortium members are:

- **Four Local Authorities** (Blackburn with Darwen, Hyndburn and Burnley and Pendle) who have a huge influence over regeneration projects, planning, conservation and can be potential host organisations for community energy schemes. They also have access to national funding for carbon reduction projects and regeneration.
- **UCLAN,** who are developing their Burnley campus, including the refurbishment of canalside heritage buildings and have a major role to play in developing low carbon skills in Lancashire.
- **Newground CIC,** specialists in the environmental field with many years' experience in low carbon projects, skills development and working with volunteers.
- **Canal & Rivers Trust** who control access to canal water which might provide some small-scale renewable heating and have their own building which could exemplify low carbon refurbishment.
- **Creative Lancashire** and **Arts Partners in Pennine Lancashire**, whose network of arts and cultural organisations have buildings that could host renewable energy schemes, and a major role in telling the stories about climate change and community action to tackle it.
- **Lancashire BME Network,** whose links into the community could be used to spread knowledge of how to tackle climate change, gather support for projects and help to involve community volunteers
- **Incredible Edible,** already heavily involved in community action on climate change through their growing projects with expertise in engaging people in the issues and developing projects.

Alongside these, many other local organisations have experience in community engagement and project development, and some are specifically working on climate change issues.

5.2 Community Action on Climate Change

People and businesses are increasingly concerned about climate change. Community action can bring people together to talk about these issues and increase the impact of their individual actions. Cultural and community events are a good focus point to develop wider initiatives.

Climate Juries are a route to engage with people about ways to tackle climate change at the local level. In autumn 2022, Blackburn with Darwen Council ran a People's Jury on Climate Change programme, in which 32 members of the public representative of the local population heard from expert commentators on different areas of interest, and then focussed on three specific areas for further investigation: communication and education, buildings and transport. Their recommendations are due to be published in January 2023.

Burnley Boys and Girls Club ran an Eco Warriors programme to help develop the young people's knowledge and skills to reduce the carbon footprint of their homes, but importantly, to become climate ambassadors within their communities. The scheme ran training and role play exercises to help give the young people confidence to be able to talk about climate change and share their knowledge with friends, families and the wider community.

In Bristol, **Lockleaze Neighbourhood Trust** runs a community centre, and has also developed a Climate Action Plan for the local area, involving local people through a Festival of Solutions with activities such as a "cycle ride to local food producers, film screenings by Local Down to Earth film collective, Wildlife Wonders, Walk on the Wild Side with Steve England, community cooking lessons, Love Your Lungs banner workshops, upcycle events (clothes repair and renew), FutureProof Your Home, a community feast, Talking about Transport, a clothes swap and the 'No Music on a Dead Planet' gig."

Heart of B13 another Bristol community organisation, set up a Climate Action Hub which organises arts and theatre performances to get their climate messages across as well as running a city farm and community kitchen.

There is a real opportunity to develop and expand this type of activity in Pennine Lancashire, involving both cultural organisations and energy/climate specialists such as Newground CIC, Prospects Foundation and Green Rose CIC.

There are also two new community energy companies in Pennine Lancashire, that have been set up to deliver specific projects:

- Prospects Community Energy: developing the Coach Road solar farm
- Rossendale Valley Energy: developing the Net Zero Terraced Streets project in Bacup.

Although both of these organisations are in the early stages of their community energy development, Prospects Foundation has indicated that they may be interested in taking on further projects.

5.3 Businesses and Business Support Organisations

The area surrounding the Linear Park is a long-standing industrial heartland, with key engineering skills that are needed to grow the low carbon economy. Businesses could both benefit from a community and local energy programme, and contribute to delivering it.

- The large number of **Business and Industrial Parks** could form hubs for collective renewable energy schemes.
- There are over 30 **MCS Accredited renewable energy installers** within 30 miles of the Linear Park that can provide the skills and technologies needed
- The four **Higher Education Colleges and UCLAN** can provide the training and skills needed in both energy technologies and the construction skills needed to effectively retrofit the building types prevalent around the Linear Park, with potential markets across the north of England and beyond.
- There are active **Business Support Organisations** in each of the local authority areas as well as Business Improvement Districts and county-wide support such as Boost Business Lancashire.

All of these could contribute to business partnerships to deliver community and local energy projects.

5.4 Community Energy Support Organisations

Specific support to help develop low carbon projects is available from the following organisations.

North West Net Zero Hub works with local authorities, businesses and community energy organisations to help develop and access funding for projects including renewable energy generation, heating and district heating schemes, energy efficiency measures and housing retrofit. This support includes helping to set up community energy organisations as well as technical advice and raising finance. In Pennine Lancashire they are supporting the development of the Net Zero Terrace project in Rossendale and Coach Road Solar Meadow.

Electricity North West Ltd has a dedicated Community Energy Manager whose role is to provide advice and assistance to community energy organisations to help move projects forward, and also manages the Powering Up Communities Fund to provide development funding. ENWL has supported the Burnley Boys and Girls Club Eco Warriors Programme and Green Rose Energy Ambassadors as well as the two local community energy projects listed above.

Community Energy England and their practitioners' group as well as the local north west group of community energy organisations offer help with setting up and running a community energy project. They can provide access to people who have done it before and are happy to share their knowledge and learning.

Power to Change provides funding and support to community businesses, and in 2022/3 have had a specific theme to provide support with climate change issues and initiatives.

5.5 Linear Park Assets Summary

There are people and organisations within the Linear Park and surrounding areas that have skills and potential to develop a viable and important programme of community and local energy projects. These would help Pennine Lancashire achieve the targets set in the four local authorities' Climate Emergency Declarations.

In order to make the most of the technical opportunities outlined in Chapter 3, it will be necessary to bring together partnerships to:

- Develop a regeneration and refurbishment programme that focusses on achieving zero carbon buildings, and
- Deliver a programme to provide the skills and technologies needed to retrofit typical Pennine Lancashire buildings and housing to be fit for a low carbon future.

6 Summary and Next Steps

Community-based energy and climate initiatives are under-developed in Pennine Lancashire compared with many other areas of the UK, particularly cities such as Brighton, Plymouth, Oxford, London and Manchester, and some rural areas such as Cumbria. What those locations have in common are:

- Organisations that have grown the skills and knowledge to develop projects and to innovate
- Supportive local authorities and leaders.

The Linear Park regeneration and cultural programme provides an opportunity to address this, and there are sites along the Linear Park where projects could be initiated, such as:

- Large scale collaborative renewable energy projects in clusters such as industrial parks and regeneration areas
- Individual community energy or local authority owned renewable energy installations such as Imperial Mill
- Building the skills and technologies needed to retrofit typical Pennine Lancashire buildings and housing to be fit for a low carbon future.

But there are no quick wins, and developing any community based zero carbon projects will require vision, commitment and determination from all organisations involved. Lead organisations in particular will need to do all they can to facilitate the process and make it as easy as possible for the community to engage with this idea.

The key next steps are:

1. Find partners who are willing to make a commitment to developing a community or local energy programme:
   a. Gain the support of key organisations such as the business support organisations, UCLAN and the colleges, and crucially the four local authorities.
   b. Find individuals or community organisations that might be interested in getting involved.
   c. Identify a project lead.

2. Bring together people and groups in the community to gather input to inform potential projects, such as through:
   a. Mapping activities: what assets, knowledge, contacts and opportunities already exist, who knows who, what do they value, what do they want to change.
   b. Networking to find members of the public who are interested in getting involved.
   c. Outreach at community and cultural activities and events, especially through the Super Slow Way programme.
   d. Running Carbon Literacy training for groups and organisations.

3. Find and use all the resources available and any existing expertise, such as
   a. NW Net Zero Hub for more support once a possible project has been identified.
   b. Electricity NW Community Energy Manager.
   c. Local renewable energy suppliers and colleges.
   d. Links to and learning from other community energy organisations.

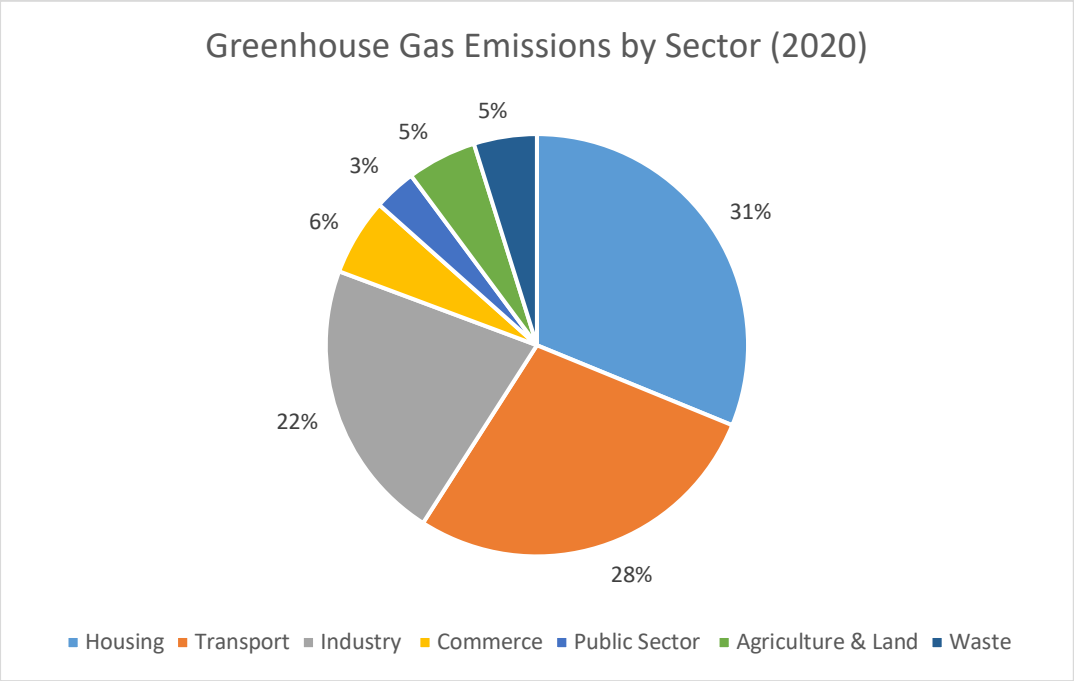
4. Start to develop a sustainable low carbon action plan for the Linear Park.

APPENDICES

A.1. Carbon Emissions and Low Carbon Solutions

Carbon emissions come from burning of fossil fuels (gas, coal, diesel and petrol) either directly for heat or transport, or indirectly through the use of electricity from gas or coal fired power stations. Greenhouse gas emissions are largely carbon, but also include emissions of methane and other gases, mainly from agricultural and some industrial processes. The latest local data is for 2020 which was in total around 9% lower than previously due to the pandemic, with transport emissions reducing more significantly than other sectors. These emissions will have risen in 2021 and 2022.

Greenhouse Gas Emissions for the four Local Authority Areas along the Linear Park



The majority of emissions are due to energy use in three categories: Housing, Transport and Industry.

Low Carbon Solutions

The energy system of the future is mainly based on renewable electricity. In 2022, renewable technologies produced 38% of the UK's electricity, with wind power alone contributing almost 27%. But when heating and transport are added in, only 20% of the country's energy needs are met by renewables.

The main technologies available to help reduce energy-related carbon emissions are:

Electricity:

- Wind power (onshore and offshore)
- Solar photovoltaic panels (PV)
- Hydro (power from flowing water)
- Nuclear
- Demand reduction through more efficient lighting and equipment, and just turning things off.
- Battery storage and hydrogen production to help maximise the benefits of renewable generation by storing the electricity for when the wind isn't blowing or the sun shining and flexibility services to improve the performance of the electricity supply network.

Heating:

- Building efficiency measures such as insulation, improved glazing, damp reduction, draught reduction. Retrofitting is the term used to cover installing these measures in existing buildings.
- Heat pumps - using renewable electricity to provide heat very efficiently from the air, water or the ground.
- Underground heat occurring in certain ground types or, for example, disused mines.
- Biomass – burning wood or other plant material that absorbs carbon emissions during its growing period, although this has air quality issues, especially in urban areas.
- Solar hot water – where there is a high daily demand for hot water.
- District heating – supplying centrally-generated heat to buildings through hot water pipes, provided that the heat is generated using renewable sources.

Transport:

- Electric vehicles – using renewable electricity.
- Hydrogen – ideally for heavy goods transport and provided the hydrogen is made using renewable electricity (green hydrogen).
- Reducing car use through provision of public or shared transport, as well as increasing cycling and walking.
- Digital infrastructure to reduce the need to travel.

Some of these technologies are suitable for urban areas, while others are ideally placed in rural or industrial areas.

In practice the most effective carbon reduction is through a combined programme integrating different technologies, control systems, energy efficiency measures, infrastructure and enabling people to easily and affordably change habits.

Carbon can also be absorbed through natural processes, and a small proportion of remaining carbon emissions can be “offset” through improvements to agricultural practices, renovation of land that captures carbon such as in our peat moors, and increasing the number of trees. However, the impact of off-setting is tiny compared with the reductions we need to achieve through reducing demand and low carbon technologies, and cannot be relied upon to achieve Net Zero.

Energy Technologies for the Linear Park

For the area along the Linear Park, the most suitable renewable energy supply technologies are:

- Solar PV - for rooftops and as solar farms
- Wind power – on industrial estates or rural areas
- Battery storage – either in combination with renewable electricity generation to provide more on-site demand, or large-scale storage systems to provide grid flexibility and balancing
- Heat pump based district heating systems
- Individual heat pumps
- Electric vehicle (EV) charge-points.

Alongside these energy generation technologies, there is an urgent need to reduce energy demand, through retrofitting existing buildings and ensuring that new and refurbished buildings are designed to Net Zero standards.

The canal itself has been suggested as a source of renewable energy, however there is very limited technical potential:

- To generate hydro electricity: this technology requires a high head of water and fast flow, neither of which are available from the canal. There are actually almost no sites in Pennine Lancashire that would provide sufficient water flow for a hydro electricity scheme.
- For water source heat pumps: these require sufficient water flow to replace the heat extracted from the water and avoid turning areas of the canal into extremely cold spots. A study by the Canal and Rivers Trust showed that canals have very little capacity to provide heat, so a detailed investigation would be needed before this could be proposed as an option, and it is likely to be viable only for buildings with a low heat demand.

The area around the canal has a mining heritage. Using the heat from minewater for district heating is a technology under investigation in some areas of the country and could be a viable option for large-scale district heating in some parts of Pennine Lancashire. At the moment it is too big a project and too innovative for community energy, but could be a future local energy project which the local authorities would be best placed to lead, with support from the government's Heat Network Delivery Unit.

A.2. Ownership and Financing Models

Renewable energy is an asset that brings in an income both from sale of the energy and the incentives available for renewable energy. Therefore, it is not something that always relies on grant funding for survival, but funding may be necessary to kickstart an investment project and provide development costs. Private sector finance is behind the majority of investment in renewable energy.

Income is generated from renewable energy schemes by either:

- Selling energy directly to the end user such as the owner of the building hosting solar panels or the household or business connected to the heat network. Typically for electricity this will be at a price lower than the market rate for the consumer but higher than selling to the grid, because it is more valuable to end users who may be paying 20-30p/kWh for their electricity from their supplier.
- Selling electricity to the national grid so that it is generally available as part of the national supply. This is typically the case for larger scale schemes such as wind and solar farms. Prices for electricity sold to the grid are lower than that sold to individual customers (previously 5p/kWh would be a good estimate but in the current energy prices this as risen as high as 15p/kWh for the short term).

Many small scale renewable energy schemes benefited from government support such as the Feed In Tariff and Renewable Heat Incentive which paid a guaranteed amount for energy generated over a long time period. This support is almost entirely gone now, apart from a smaller amount paid for larger stand-alone schemes such as windfarms and solar farms.

Financial viability is only one factor in determining whether to invest in renewable energy. Two other critically important factors are:

- Reducing fossil fuel use to tackle climate change
- Energy security and reducing reliance on imported fuels.

These latter two are difficult to cost into a decision to invest for an individual or organisation but do have an influence on that decision.

A key consideration is who owns the renewable energy asset: and therefore who retains the income and other benefits.

Community Energy Ownership

Community energy organisations are businesses that are typically set up for the benefit of the community, often using a structure such as a Community Benefit Society. This means they can raise funds through a share offer, but any surplus must be used for the benefit of the community rather than the investors.

As a community business, any investment must be financially viable, and the board of directors are accountable to their members for financial performance, in the same way as companies are. However, they usually take a long term view and as such are able to invest on the basis of lifetime costing and low returns, rather than requiring a fast payback.

Community energy organisations typically raise finance through a community share offer. This allows individuals to own a share of the organisation and have a say in how it is managed. Investments can be from around £200 but the average investment is around £1,000-£2,000. Interest is paid on

investments, typically around 2-5% over 20-25 years, so the effective cost of capital is lower than might be available from private sector lenders.

Importantly the investment is not supported by any form of guarantee and investors must be made aware that their money is at risk. Most community energy companies aim to repay the capital regularly over the duration of the project.

Shares cannot be traded on the open market although some community energy companies offer an internal share trading scheme. Unlike most shares, they do not change value over time: £1 invested will always only be worth a maximum of £1. Shares will usually be repaid at the amount invested unless the project has performed significantly worse than predicted.

Shares can be preferentially offered to people who live or work within the local area. There is also a national community of individual investors who are often willing to invest in projects outside their local area in support of their climate change concerns, who may pick up a proportion of the shares if there are insufficient local investors.

There are around 58,000 share owning members of community energy organisations in the UK. The typical investor is concerned about the environment and wishes to put their money into schemes that provide environmental and social benefits. The vast majority are over 50 and live in the area local to the community energy organisation. Community energy share offers have historically seen a high level of interest and often been over-subscribed. For example, Burneside Community Energy raised £250,000 in less than a week for its first share offer in November 2015.

Large scale schemes also typically use loan finance for part of the investment, sourced from the usual lending market or social investors.

Local Authority, Housing Associations & Other Public Sector Ownership

Local Authorities and other public sector organisations have been investing in renewable energy for many years, particularly on their own buildings. This investment was often initiated due to climate concerns, but also had to meet the normal public sector business case requirements. Early adopters of solar PV for example were able to benefit from the very high levels of Feed In Tariff which effectively covered the cost of the scheme and generated free electricity for the organisation.

Public sector finance is usually available at lower than market rates, which improves the viability of investments. Local Authorities in particular have been encouraged to make commercial-style investments in order to generate income to make up for reduced government funding. More recently, the Public Sector Decarbonisation Fund is supporting investment in energy projects. Some Local Authorities are also issuing Climate Bonds, for example in partnership with Abundance Investment.

Warrington Borough Council has invested in two solar farms with battery storage outside of their area, in Yorkshire and Humberside, totalling 60MW. These are 100% owned by the council through a Special Purpose Vehicle and generate more than double the electricity used in council operations. The income is used to fund essential services and invest in other environmental projects.

Lancaster University owns two wind turbines and a district heating network to supply their campus. They have just received planning permission for a 16.5MW solar farm which will reduce energy-related emissions by a further 40%.

Berwickshire Housing Association owns a two-thirds share in a small wind farm, using the income to support its investment in additional social housing.

Private Sector Ownership

The vast majority of investment in low carbon technologies in the UK is from the private sector:

- Large-scale finance for wind farms, solar farms, battery storage systems etc where the return on investment is made by selling the energy generated plus government support mechanisms such as the Feed In Tariff, Renewable Heat incentive and Renewable Obligation Certificates.
- Smaller scale investment in renewable technologies and energy efficiency measures where the return on investment is made by reducing energy bills of the household or organisation, plus income from some of the government support mechanisms.

Finance for investment in large scale schemes is increasingly available due to demands on funders to divest from fossil fuel investment and demonstrate their sustainability credentials, an acknowledgement that renewable energy is now a good long term investment, as well as government recognition that energy security and renewable energy are essential components of a strong national energy strategy.

Private funding of energy measures is increasing as energy prices are rising, and also as people and organisations are recognising their ability to contribute to tackling climate change.

Comparison of Different Ownership Models

From a purely economic perspective, it is usually more financially sensible for individuals or organisations to invest in a project themselves if they have the capital available, and the opportunity cost of that capital is lower than community energy interest rates (e.g. it is sitting in a bank account earning 0.5% interest and not likely to be needed for something else more urgently.)

Community energy ownership involves a third party organisation in the project, so incurs costs that would not be required otherwise, such as legal fees for contracts to be drawn up. The income received also needs to cover the administrative costs of the organisation, plus maintenance and insurance of the project. Insurance of a third party owned asset is frequently higher than the additional insurance required by a building owner. These additional costs need to be balanced against the long-term and sometimes cheaper cost of capital of community energy, to determine whether a project is viable. When energy prices were at the levels seen prior to 2022, only large scale schemes, or a good collection of smaller schemes would be viable for community energy. Investments based on current energy prices may offer a better business casein the short term but face the risk of lower incomes in future.

Community energy takes on the majority of the project risk and development costs, and can often access funding to cover those costs, so can be an interesting option for organisations that do not want to carry that risk themselves.

A.3. Challenges and Constraints

This section outlines some of the generic challenges faced by renewable energy projects and those specific to community energy projects.

Planning

Planning permission is often a barrier to projects. Local interpretation of national guidance can cause similar schemes to be approved in some areas and not in others.

All wind turbines, large-scale ground mounted solar PV systems and large-scale battery storage systems will require planning permission. National guidelines have until very recently almost entirely prohibited onshore wind turbines since 2014, and even as these guidelines are changing, it is likely that planning authorities are reluctant to support proposals for wind. Large-scale solar is typically more acceptable, except where there is a significant cumulative effect across several sites, or significant wildlife-related concerns. Community support for any large-scale scheme can be critical to its acceptability for planning.

Rooftop solar systems are typically permitted development except in conservation areas or on listed buildings. There are many examples of PV installations on heritage buildings but local conservation or planning officers may not be aware of them. Large scale rooftop solar under 1MW, typically on industrial roofs, is permitted development subject to certain conditions, but will normally require a Certificate of Lawful Development from the planning authority.

Some renewable heat systems will also require planning permission. The first installation of a heat pump on domestic premises is generally permitted development except on listed buildings or scheduled monuments, or if a wind turbine is already installed at the premises, and subject to conditions on sizing and location. Multiple heat pumps on one building require planning permission. For non-domestic premises, water source or ground source heat pumps are permitted development, subject to size limits, but air source heat pumps require planning permission.

Heritage buildings, listed buildings and those in conservation areas can have renewable energy systems installed but these require sensitive design. In practice, the acceptability of a proposal is also determined by the level of knowledge of Planning and Conservation Officers and understanding of how such systems have been treated in other areas. Holding early discussions and developing a good relationship with the local Planning Authority is a sensible start.

Grid Connection

Any electricity generation project will require a connection to the national grid in order to sell excess electricity and import from an electricity supply company when the solar panels or wind turbine are not generating. This connection capacity must match the maximum output of the system. Very small systems (under 3.7kW for a single-phase supply or 11kW for a 3-phase supply) do not need permission to connect. Everything else does. In many areas there is very little grid capacity available, so a grid connection agreement can be very expensive, or not possible.

There is currently spare generation capacity on most of Electricity North West's 33kV substations (the network for large scale projects), except for the Nelson area and east of Burnley. The smaller scale 6.6kV network also has adequate capacity to connect renewable generation apart from around Nelson.

Electricity North West are very supportive of community energy and keen to find solutions to grid connection constraints for such projects.

Technical Limitations

Wind and solar electricity are proven technologies, widely installed across the UK. Heat technologies are also proven technically but have some additional complexities in installation and operation. There are a few technical limitations on project, such as:

Solar PV: for roof-mounted systems the structural integrity and strength of the roof is the main technical consideration that could cause a project to be stopped or become much more expensive.

Wind turbines: location is the most important consideration, requiring a site with good wind speed, no barriers that cause turbulence (trees or buildings) and sufficiently far from housing or protected landscapes to avoid being refused on the grounds of visual impact.

Heat Pumps tend to work most effectively at lower temperatures than a gas boiler, so in an uninsulated building will be more expensive to run. They also require space for the heat pump itself and for hot water tanks However one of the main issues with heat pumps is how well the user understands how to run it and that it is best managed differently from a gas boiler.

District Heating is a complex technology and the technical limitations are highly site specific. Ideally they need sufficient heating demand in a concentrated area to justify the investment and minimise system losses.

Finance

The most significant difference between renewable energy systems and fossil fuels is the financing mechanism. Renewable electricity generation requires very high upfront capital and thereafter the ongoing costs of the energy are only for maintenance (which is very low for technologies such as PV). However there is also the ongoing cost of finance, either the cost of borrowing or the lost income from capital invested. (Renewable heating and electric vehicles will continue to need to pay for the electricity they use.)

For fossil fuel energy, the upfront capital is much lower (partly due to the fact that the market is long established and large) but there are much higher ongoing costs for buying the fuel.

Therefore the economic case for investment is affected by access to capital and the difference between borrowing costs and ongoing fossil fuel costs. When energy prices are high and borrowing costs relatively low, the return on investment improves.

Who owns the building also has an influence on the financial case for investment. Tenants are less likely to invest in someone else's building unless they plan to be in the same building for a long period and can install energy equipment or efficiency measures, either under the terms of their lease or with the agreement of the landlord. Conversely as landlords tend not to benefit from the savings, they are less likely to invest. However, the Minimum Energy Efficiency Standards coming into force for rented buildings will slowly address this problem.

One of the barriers to accessing capital for renewable energy is the investment mindset or established procedures for justifying expenditure which do not consider the lifetime costs of the investment.

The other financial issue that is a considerable risk and barrier for renewable energy projects is development funding: covering the time and any external work required such as planning reports and

legal fees before it is certain that the project will go ahead. For community energy there is some grant funding available for this.

Legal Issues

There are few legal issues with installing renewable energy systems or energy efficiency measures except where the owner of the system does not own the property on which the system is installed, or wishes to sell to energy to one or more third parties.

Community energy projects almost always involve installing energy technologies in or on buildings or land owned by other organisations. The biggest hurdle to turning an idea into a project is getting the agreement of the site owner to work in partnership with the community energy organisation over the lifetime of the technology, which might be a period of 20 years. This agreement typically also includes a contract for the site owner to buy the energy generated, generally at below market rates.

Partnership with a large organisation with multiple sites is ideal, and preferably one that is confident that it will continue to own those buildings for the lifetime of the energy technology. Hence, the most successful community energy companies typically started out by partnering with the local authority to install solar panels on schools and leisure centres.

Any collective programme involving different buildings will also be limited by the willingness of the owners to get involved and commit to a long term project.

Land leases for solar, wind or battery storage are similar to other forms of land lease. But leasing roofspace or building space for solar PV or heating systems face a number of different challenges around responsibility, insurance, access, maintenance and business interruption. This is a particular issue for community energy and several projects have fallen apart when the building owner cannot agree to a long term lease. To succeed, this type of project should be seen by both parties as a long term partnership rather than just a commercial transaction.

Selling Energy

Electricity sales are governed by Ofgem regulations. Electricity can only be sold by the generator directly to consumers under certain conditions:

- The wires connecting the generation to the user are owned by the generator or the user or another private third party i.e. not owned by National Grid. This is known as “behind-the-meter” sales. In effect it reduces the amount of electricity the customer has to buy from their supplier to top-up their electricity needs.
- *On-site supply* allows self-generated power to be supplied at the same site as generation occurs. No more than 1MW of power can be supplied to domestic consumers, however additional power may still be provided to the premises by a licensed supplier. This equates to around 200-500 homes depending on whether electricity is used for heating, and the energy performance of the homes. There is no limitation on capacity for non-domestic customers.
- *Off-site supply*. Supplying only self-generated electricity from a different site to that of the customer is limited to 5MW of power at any time, of which no more 2.5MW is supplied to domestic customers.
- Customers may retain the right to switch energy supplier with 28 days’ notice, so must have access to alternatives if their supply is via a private wire network.

Electricity used for vehicle charging is not classed as domestic use so not covered by these regulations.

Heat sales through a district heating network are covered by the Heat Network Metering and Billing Regulations 2020. Any organization or individual can supply heat, without needing to be a registered supplier (unlike electricity or gas). In practice, the metering and billing requirements should ensure that all heat suppliers treat customers as if they were covered by the regulations on customer service applicable to registered energy suppliers.

A.4. Funding Sources

Grant funding for community and local energy schemes is available, although in the early stages of development, projects often need to piece together funding from different sources, presenting difficulties in meeting different criteria and deadlines. A frequent criticism of the UK's net zero funding landscape is that support schemes are short-term, competitive and regularly changing, creating difficulties for long-term planning. Some of the sources are only available to community energy groups, other to local authorities, and some for individuals.

The list below gives some examples of funding sources: it is indicative, not comprehensive, and subject to change.

Community Energy

Community Energy England – support and information on a range of funding sources

Electricity North West Ltd Powering Communities Fund – specific to Lancashire, Cumbria and Greater Manchester

Co-operatives UK – funding and organisation development support

Energy Redress Scheme – for innovative projects or supporting vulnerable people

Naturesave Trust

Local Authorities, Businesses and Larger Partnerships

Towns Fund Net Zero Heritage Buildings Programme

Green Heat Networks Fund

Energy Catalyst – Business Innovation Funds

Community Action

Power to Change – support for community businesses

National Lottery Community Funds – various types of community support

National Lottery Climate Action Fund – but focus mainly on nature-based climate action

Community Ownership Fund – support to take over assets at risk

Patagonia