



Pathways to Zero carbon: creating a community safe for our children to grow

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See also the separate Transport Report

Summary

The Bude Community Network Area has a strong identity and the Bude Climate Partnership aims to build on this to enable the development of a climate neutral community. This Energy based Carbon Action Plan has been developed to assist the area to make the necessary changes to the local energy system to reach Zero Carbon with the most effective community led process and actions. The Action Plan also aims to ensure that proposed actions are inline with the requirements of the equally urgent ecological emergency.

As well as the urgent necessity of addressing the climate and ecological emergency which is all around us, there are also other pressing issues which are beginning to severely impact the future for the Bude area and for other areas. Prominent issues include the rapidly rising Energy Cost of Energy for all fossil fuel energy in particular, as fossil fuel reserves are depleting and lower quality, smaller reserves are tapped.

The global finance system is actually an energy system, not a money system. This means that urgent attention is required to change the local energy system to rapidly reduce the demand for fossil fuel energy sources and to increase local resilience through energy demand reduction, reduction of demand for more goods and through local secure renewable energy supplies.

This Carbon Action Plan has been developed with the local community in mind, so that the plans proposed tackle local issues, to achieve social justice and to enable the community process to be integral to success in reaching Zero Carbon.

The tasks to be undertaken to succeed in the climate action aims are set within a systems framework with the permaculture approach to social justice and long term resilience. This ensures that the three principles of:-

- ◆ People care
- ◆ Earth care
- ◆ Fair share

The tasks needed are presented via the systems lens so that the points of highest leverage in changing the system are given due prominence and importance. At the heart of the system change actions is changing the **intent** of the local energy system to that of the local community interest and long term survival. This is firstly enabled via a range of “hearts and minds” activities to bring together the local communities in each town and village throughout the area. The actions proposed constitute a process whereby the local groups become knowledgeable and empowered to progress suitable strategy development and actions on carbon reduction.

Later proposed actions focus on the **design** and **feedback loops** of the local system and suggest methods of changing these to enable zero carbon to be achieved. Finally the **parameters** of the system are tackled to estimate the practical actions needed to reduce fossil fuel energy demand to zero or close to.

The purpose of the earlier noted approaches is to ensure that the local community is the driver for

this change, that changes made are appropriate for the local character and that the changes which occur are set up to benefit communities locally. This systems approach enables the latter proposed changes to be more achievable, as they are expected to be a result of the community deliberations, timetabling and strategy development. A key takeaway from this approach is the realisation that the system structure determines the behaviour of the system and the people in that system.

Behaviour follows system structure

This Action Plan goes a bit beyond the Scope 1 and 2 emissions with outline proposals for action on Scope 3 emissions. These are the greenhouse gas emissions associated with the local supply of goods and materials sourced from outside the local area. The reason for this is to enable a key element of resilience action. The key to increasing resilience is to reduce both carbon emissions and issues relating to materials depletion, rising Energy Cost of Energy and the presently rapidly rising world oil price. One basic principle is that of:-

- ◆ **Local supplies for local needs:** has the benefit of providing local community business opportunities, increases local renewable resource use and increases local economic activity, reduces supply chains.
 - Particularly relevant to the local farming community for food and relevant materials supplies
 - Enables high levels of local energy supplies with community ownership and the ability to tackle fuel poverty
 - Local anchor institutions to increase their local purchasing

The Action Plan proposes a wide range of community actions to reach carbon zero. The process is complex, given the embedded nature of energy requirements, and requires the involvement of most of the community, from householders to local businesses, the local farming community and transport operators and stakeholders.

The journey to Zero Carbon for local energy follows the energy hierarchy:-

- ◆ Reduce the need for energy and goods/services
- ◆ Use energy very efficiently
- ◆ Replace remaining demand with local renewable energy supplies

Outline of Actions Proposed

1 Community groups in each locality to develop their actions

Example actions include:-

- ◆ Develop local recycling and reuse actions via groups for secondhand sale, repairs, Library of Things, local support via a safe space to develop ideas and actions– all using local skills especially from the elder generation
- ◆ Develop their local strategy based on the regenerative community approach of permaculture and resilience
- ◆ Embark on local energy demand reduction actions such as LED light bulb campaigns, assessing the embedded carbon reduction from buying more local food
- ◆ Develop group purchase of fully renewable electricity for home use
- ◆ Collaborate with community members on local active transport options and take their findings and requests via BCP to Cornwall Council to push for faster active travel infrastructure investments
- ◆ Embark on the journey to increased local democracy by following the Flat Pack democracy options for the next round of Parish Council elections
- ◆ Save Our Sea Pool campaign

2 Reduce the need for energy

The first set of options is to ask questions about the real need for any proposed energy-using action -ie almost all actions. Given the dire situation in the world today, and to allow for world-wide equity it is important not to require energy for actions and goods which are not really a need. This approach also helps with the aim of encouraging a culture of wellbeing rather than a materialistic society.

3 Improve energy efficiency in buildings

The proposed overall programmes include the following:-

- ◆ Insulate local homes and businesses with local products
 - Use local sheep's fleeces to manufacture loft insulation and install in lofts throughout the area and increase the farming community resilience through increased value for the fleeces
 - Grow hemp on local farms to manufacture solid wall insulation with lime for high carbon sequestration and large reductions in energy demand for the one third of local homes with solid walls which are likely to be cold and damp
- ◆ Change local heating systems to non fossil fuel
 - Heat pump programme to significantly reduce the energy demand for heating in a high proportion of local homes as heat pumps use only one third or less electricity to operate compared to the fossil fuel systems being changed
 - Biomass heating systems using local wood from existing woodland or new coppice with wood pellets for ease of use or logs/chips for larger rural properties
 - Change electrically heated smaller properties to very efficient night storage radiators which are programmed for the local weather and home conditions required

Set up local business groups to work collaboratively on energy controls, joint purchase of solar systems and local delivery systems to reduce transport miles.

4 Improve energy efficiency of the transport system

- ◆ Local groups to collaborate in their communities to design and plan higher levels of active travel infrastructure via pathways and cycle paths which are effective and safe, including local pedestrianisation
- ◆ Work with the Council on the development of the proposed pathways
- ◆ Increase local cycling and ebike use via cycle clubs, the government backed employer cycle/ebike tax free purchase schemes and a local scheme for the non/self employed
- ◆ Collaboration locally on ecargo bike use and potential shared routes for vans and ecargo bikes
- ◆ Local community groups to collaborate on increasing local bus use
- ◆ Develop local EV purchase assistance scheme targeted at the long distance drivers who make up the highest proportion of mileage pa
- ◆ Increase local EV charging points for community income raising

5 Replace remaining fossil fuel demands with local renewable energy

- ◆ Set up increased woodland such as coppiced areas and bring unmanaged woodland back into production via a local community group to include farmers and landowners for mutual benefit
- ◆ Assess local hydropower sites from those listed in the main report
- ◆ Develop local wind energy to meet remaining winter electricity needs via the community energy group, once the journey to Zero Carbon is well understood and local identified sites have been assessed in detail
- ◆ Encourage the local tourist business community to install solar thermal to meet their summer hot water needs
- ◆ Local community groups to help the local householder community to install solar thermal and/or solar PV
- ◆ Develop a range of local land arrays of PV to meet the remaining summer electricity needs
- ◆ Assess in detail the energy storage requirements to enable more local control and economic benefits from the local RE demand

6 Finance and governance

Financing the activities and investment needed for the local area to achieve zero carbon will cost a significant amount of money, which means that suitable organisational structures need to be in place in order to borrow and otherwise raise the millions of pounds needed. One of the key parameters is to understand the costs of inaction. All the indications from the science, and explanations of those who understand these costs, are that it will be significantly cheaper to undertake this investment now, rather than later or not at all. With the local threat of sea level rise this should be clear in the wider Bude area. The table below indicates the approximate capital costs of achieving the zero carbon programme within a ten year programme. .

Approximate costs and potential sources of funds for the Action Programme

Tasks over ten year programme	Total capital		Potential funding sources
	£	£ pa	
Community action			
Local groups	£1m	£100k	Grant aid, various sources, potentially earnings from local community business activities
Energy demand reduction			
Insulation: Solid Wall hempcrete	£119m	£11.9m	Loans to beneficiaries
Insulation: loft sheeps wool	£5m	£500k	Loans to beneficiaries
Heating systems change			Loan system to beneficiaries
Ground source heat pumps	£53m	£3.5m	- after deduction of new grant
Air source heat pumps	£30m	£1.4m	- after deduction of new grant
Wood stoves	£8m	£0.8m	Loans to beneficiaries
Eco storage radiators	£1.5m	£150k	Loans to beneficiaries
Renewable energy generation			
Wind five turbines	£11.7m		Presumed commercial loans 75%+, plus 25% equity, crowdfunding, share issue, etc £3.5m
Solar PV arrays	£2.3m		
Transport			
Electric vehicles –cars	£1.5m	£500k	Loans above government grants of £2.5k each say £1-4k , & 2-3 yr loans
Electric vehicles- ebikes, ecargo bikes	£500k	£50k	Non-employer based loan scheme (<i>existing government backed loan scheme is only via employers</i>)
New cycle and footpaths	£1m	£100k	Work with Cornwall Council to speed up new active travel pathways - & increase capital from central government
Enabling community businesses using local supplies			
Farming community: woodland planting plus wood stove installation, maintenance	£90k		Community shares and local farming community investment, potential income from suitable ELMs payments?
Farming community: fleeces to loft insulation facility	£1.5m		Share issue in local community area
Farming community: hemp growing, harvesting , insulation preparation	£2.6m		Share issue in local community
Community including local building trades: set up to train & install SWI using local hempcrete	£250k		Potential shares, loans etc

However it needs to be recognised that some of the capital costs can be covered by lending schemes which allow for a lower starting level of capital requirements and lend to later beneficiaries from the repayments of earlier scheme participants. The actual capital needs therefore are lower than the table indicates. The present assumptions are based on a range of potential sources for the necessary finance to achieve carbon zero from energy demand.

The situation is complicated by the changing government financing and subsidy situation with grants becoming available to assist the installation of heat pumps, and towards the costs of electric vehicles and home chargers. In addition the government has stated that no new fossil fuel vehicles can be sold in the UK from 2030. However as the BCP aim is to reach zero carbon in ten years, the need for the EV transition to be increased at speed is apparent, which leads to the need for action locally.

There are several governance structures which potentially could be suitable for the tasks ahead for the local community of the wider Bude area. A key element is to take qualified advice in relation to the aims of the group and its proposed actions and methods of working. Once the overall programme is agreed in outline, the most appropriate governance structure can be developed from the range of option such as Coops, CIC, Community Land Trusts, etc

7 Zero Carbon Plan Actions and carbon reductions

The table below gives the outline of the actions proposed and their impact on reduced fossil fuel energy and carbon emissions reduction.

In outline the results are in line with the basic principles that firstly energy demand needs to be reduced to that actually needed, then the needs are met with highly efficient systems, which further reduces the demand for energy and the remaining energy demand is met with local renewable energy supplies.

The results show that the community can make large changes in the local energy system by coming together and working up the local actions for each topic.

The series of changes made, starting directly with community groups and leading on naturally to bringing together the different stakeholders in the community, show that there are many opportunities for local community businesses. In particular the aim of local supplies for local need brings about large reductions in fossil fuel energy demand.

Together the building energy demand reduction actions give an energy saving of 63% and a cut in greenhouse gas emissions of 93%.

The transport energy demand reduction actions lead to an 82% energy demand reduction in this sector and an equal cut in carbon emissions.

Local new renewable electricity supply options provide a replacement for 73% of the present fossil fuel electricity supply and a similar reduction in carbon emissions.

**When the Action Plan is complete the local area will have
over 90% local energy supply and a
carbon footprint for energy of – 14%**

Actions towards energy and carbon reduction for Zero Carbon Energy

Action	Installations number	Energy/ fossil fuel savings MWh pa	Carbon savings CO2e tonnes		
			Direct tpa @end programme	Total ten years tonnes	Embedded tpa
DEMAND REDUCTION					
Community groups					
Reducing new stuff	Five+ groups c.1,250 items pa				3,500
Electricity reduction	c.15% homes, 20%<	1,200	400	2,150	
LED lights campaign	80% of homes	1,700	520	3,640	
Ten Pledges	1,000 people pa	900	235	1,300	
Businesses					
Workshops, training	8%	4,200	1,100	5,500	
Controls, buying club	25%	12,000	3,500	15,750	
Local 2nd hand group	250 items pa				2,300
Local supplies					
Hemp insulation	2,750 solid wall	8,500	12,730 ¹	42,500 ²	
Fleece loft insulation	80% of 7,405	16,000	3,260	17,930	
Increased local food	50% fruit & veg, ++				2,600
Non fossil heating systems <i>assumes use renewable electricity sources</i>					
Homes - wood & pellet stoves	21% 1,844	12,900	4,200	23,100	
Heat pumps					
Ground source	3,031				
Air source	3,346	46,000	15,650	73,555	
Smart storage radiators	600 homes	1,800	550	3,300	
Total buildings demand reduction		105,200	42,145	188,725	8,400
% reduction on present energy & carbon demand		63%	93%		
TRANSPORT <i>assumes use renewable electricity sources</i>					
Increased walking, cycling, bus travel		1,000	250	1,250	
Ebikes		4,800	840	4,620	
Electric vehicles cars		5,000 cars	71,500	18,800	94,000
Ecargo bikes		500			
Electric vans		1,200	20,150	5,260	30,500
Total transport demand reduction		96,030	25,150	130,370	
% reduction on present energy & carbon demand		82%	82%		
NEW RENEWABLE ENERGY SUPPLY					
Hydropower		4 installations	300	100	350
Wind energy		five turbines	47,000	14,440	57,760
Solar thermal hot water		50% tourist cos.	1,600	500	2,750
Solar rooftop PV commerce		530 @ 7kW	3,900	1,200	6,600
Solar rooftop homes		450 @ 3kW	1,200	370	2,030
Solar PV land arrays		4.2MW c 14 ha	4,600	1,410	8,400
Energy storage systems		c18% stored elec.	-1,000	-300	-900
Total new renewable electricity supply		57,600	17,709	87,764	
% present fossil & carbon electricity supply		73%	73%		
Totals fossil demand reduction and new RE supply		258,830	85,004	396,085	
Percentage reductions in fossil energy & carbon		91%	114%		

1 Introduction

It is important to know why we aim to undertake the journey to Zero Carbon. There are many reasons, both global and local why this is imperative. This introduction indicates the main global and local reasons why this is both important and essential for the wider Bude area.

1.1 Climate change

Climate change is here now and is impacting more or less dramatically all around the world. Already many millions of people are affected: by fire and flood, by increased disease incidence and by crop failures from prolonged drought. The sea level is rising at an increasing rate as the ice at the poles melts.

The jetstream, which is the main determinant of our weather in Cornwall, is driven by the temperature differences between the tropics and the poles. As this difference has shrunk the jetstream now behaves very differently and we can see and feel this difference in the temperature, winds, rainfall changes and more frequent extreme weather events now being experienced. The rainfall in Cornwall has increased by 25% over the last 35 years, giving us increased flooding and higher farmland and soil water saturation levels.

Climate change is largely caused by the emissions of greenhouse gases from the burning of fossil fuels, which are the main energy supply for the world. Fossil fuels are oil, coal and gas, which emit mainly carbon dioxide and some other greenhouse gases. These gases add to the levels of carbon dioxide, and other greenhouse gases, in the atmosphere. This increases the “blanket effect” of CO₂, by reflecting more of the heat rays leaving the atmosphere, and reducing the outward flow of the sun’s energy which warms the planet, but

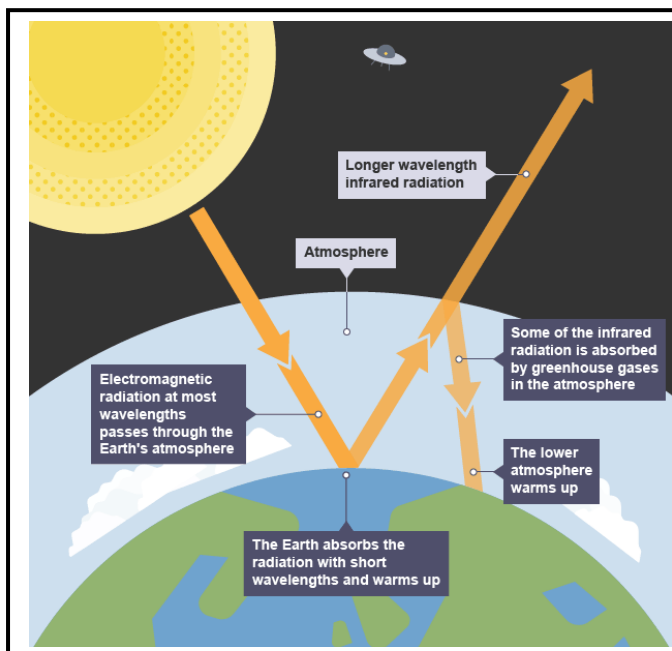


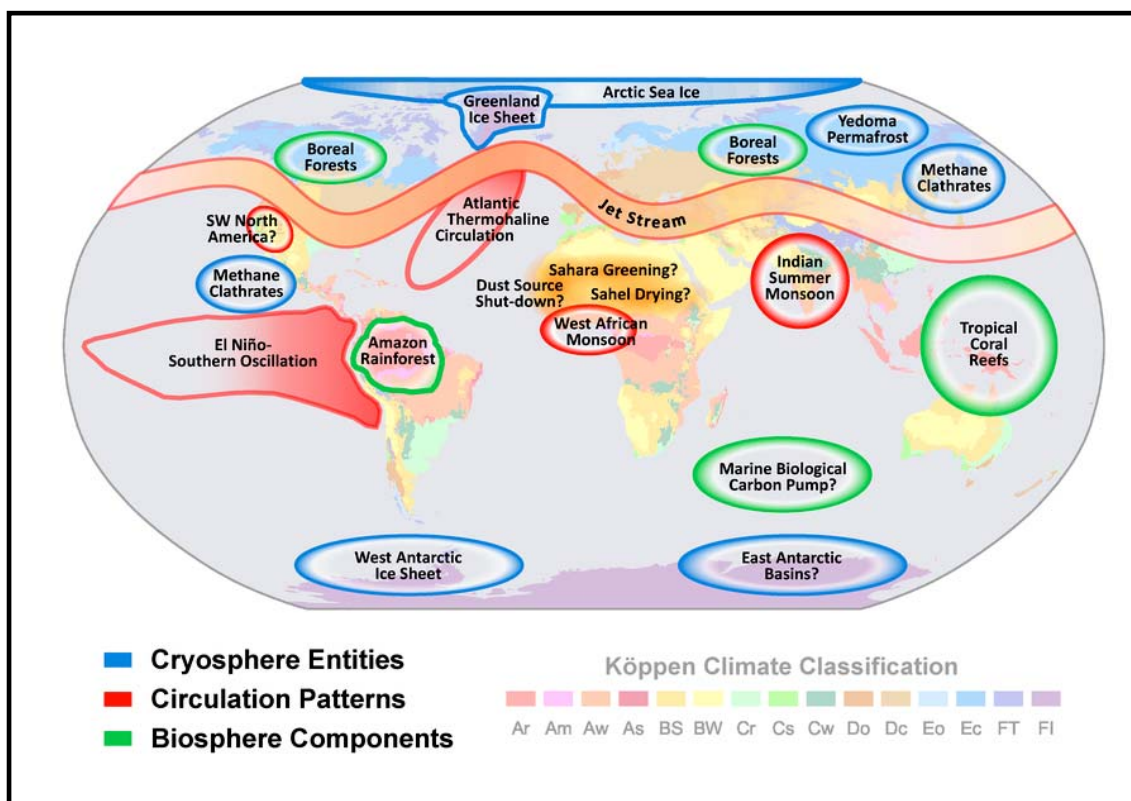
Diagram of the greenhouse gas effect

Would otherwise “bounce back” out into space. This reflected heat energy warms the lower atmosphere, leading to the observed temperature rise and now major climate disturbances.

Fossil fuel burning is the main source of climate change emissions

The existential imperative to reduce global carbon emissions to zero very rapidly, as shown by the scientific understanding of the climate system as it approaches several tipping points, is outlined in the map below.

Map of climate tipping points ¹



The only uncertainty here is the timing and conditions for reaching these tipping points when it will no longer be possible to stop climate chaos. Even the most cautious policies therefore indicate that every effort should be made to rapidly reduce our climate emissions to zero.

¹ [Tipping Elements - the Achilles Heels of the Earth System — Potsdam Institute for Climate Impact Research \(pik-potsdam.de\)](https://www.pik-potsdam.de/en/tipping-elements)

Consequent action to stop climate chaos

A recent report from the International Panel on Climate Change states that the world needs to meet the target of 27GJ per person for all our energy needs worldwide. This translates to 7.5MWh pa per person.

The Bude area direct energy use as estimated in the Carbon Audit part 1 is 15.7MWh per person, using the latest population figure of 18,225.

However the total energy footprint per person including UK and imported food and material goods is around 45MWh pa for each inhabitant of the wider Bude area². This suggests that more food should be locally grown and processed and that reduced new material goods should be bought in the area if a serious aim is to reduce emissions to zero.

These figures suggest that direct energy demand urgently needs to be reduced by half and if new goods are included a reduction of over 80% of consumption derived carbon emissions of needed. Once world carbon budgets are included in the calculation, ie the total amount of carbon which can be emitted into the atmosphere and still have a liveable climate, it is clear that we all must aim for zero carbon from all sources with the next decade.

Earth from space showing our thin protective atmosphere³



1.2 Energy Cost of Energy

A second major reason for reducing our energy demand is that the Energy Cost of Energy for developed economies is now so high that it has stopped economic growth. It is not often recognised that our economy is not a earth money driven economy but an energy driven one.

² Derived from University of Leeds UK Footprint results; data download 1990-2017

³ https://www.greenpolicy360.net/mw/images/Earth-Thin_Blue_Atmosphere-Moon_image_-_NASA.jpg

All economic growth since the Industrial Revolution has exactly matched the increasing use of fossil fuels, with recessions occurring when energy supply/price problems occur. As energy is invisible it tends to be ignored and not taken into account in forward planning.

Dr Tim Morgan Surplus Energy Economics June 2021

An energy-based interpretation of the economy is founded on three principles, each of which is validated both by logic and observation.

The first is that the economy is an energy system, because nothing that has any economic utility (value) at all can be supplied without the use of energy.

The second is that, whenever energy is accessed for our use, some of that energy is always consumed in the access process. This 'consumed in access' component is known here as ECoE (the Energy Cost of Energy).

The third principle is that money has no intrinsic worth, but commands value only as a 'claim' on the output of the energy economy.

Each of these principles seems incapable of refutation.

We know, for example, that an economy deprived of energy would grind to a halt within days, and would collapse within months.

We know that we can't drill an oil well, manufacture a wind turbine or a solar panel, or build an electricity grid without using the products of energy. We know that no amount of money will help someone adrift in a lifeboat, lost in a desert, or in any other way cut off from the process of exchange.

The situation now, though, is that the trends for Energy Cost of Energy (ECoEs) are rising rapidly, which has two adverse consequences for prosperity. The first is that rising ECoEs reduce the economic value obtained from each unit of energy consumed.

The second is that growth in energy supply is likely to cease, because producer costs are rising just as the prosperity of consumers is being undermined. ...

This means that, for the first time since the start of the Industrial Age, energy use per person is falling. The deterioration is set to be even more marked at the level of surplus (ex-ECoE) energy per capita, which is the real driver of prosperity. ... ⁴

The Energy Cost of Energy (ECoE) is rising rapidly as the easiest sources of fossil fuels have been used and more difficult, smaller, finds in more dangerous locations are being tapped for fossil fuels. Some supplies such as the tar sands in Canada take one third of the energy supplied for the material to be dug out of the ground, steam separated from the source rock/sand and treated to suitable levels for customer use. This means a very high ECoE, leaving little surplus energy for the economy or for prosperity.

The key problem of the future of the economy is therefore reinforced by the imminent failure of the present structure of the capitalist/growth economy due to the lack of availability of low energy cost fossil fuel supplies. Part of the problem with real economic growth (or increasing prosperity as Dr Tim explains) ending is that the structure of our financial system requires growth.

It is patently obvious that, even leaving aside energy supply issues, economic growth cannot continue indefinitely on a finite planet. Logic therefore dictates

⁴ <https://surplusenergyeconomics.wordpress.com/2021/06/23/203-surplus-energy-economics/>

that any society which wishes to increase local wellbeing and prosper through the upcoming resource depletion issues, financial problems and climate heating must aim for a less material culture.

1.3 Local issues

There are many local issues which it is important to address as part of the Climate Action Plan, as making system changes locally which improve these issues will not only help reduce emissions but also help increase local success and improve social justice.

Key issues include:-

- Community feeling of isolation, geographical and in governance terms
- Hugely high house prices/nothing to rent – all going to airbnb & holiday rentals
- Young families having to move away
- Higher than average older population (28% over 65)
- Higher than average car ownership and use, few buses
- Rising sea levels due to flood central Bude within a few years
- High medical needs, partly due to aging population and long distance to main medical services
- Rural locations with low public transport
- Low levels of local skilled and secure employment available
- Agriculture appears to be mainly dairy led, with consequent squeezing of local incomes
- High seasonal employment, with tourism being the main economic driver

For these and other reasons relating both to social justice and to resource depletion it is vital to undertake the journey to carbon zero with increasing urgency.

Bude Sea Pool



Photograph by Tim Martindale, from Friends of Bude Sea Pool

2 The Task

Given the notes above it is clear that the local community will need to reassess what community means in the present and uncertain future. Some certainties include the reality of the global issues and that they are, and will impact severely on Bude and the local area.

The task of achieving Zero Carbon for all local activities is not easy as it requires a complete rethink and paradigm shift for the local community as a whole and for almost everyone in the community. Every action requires energy, which generally is a hidden part of modern life. Now that climate change impacts have forced us to change how we demand and supply energy: more and more people and organisations are realising how our systems are completely dependent on high fossil fuel energy supplies.

The Partnership aim for Zero Carbon Bude and local area can therefore be most successfully met if the task is framed as a move to a relatively non-material culture where well-being and relationships are the measures of success. This approach increases social justice, reducing the local issues noted above.

This approach allows us to plan for a future safe for our children. Acting in concert with others to reduce the threat of climate chaos and reducing energy needs to free the next generation from energy collapse is the best way to create a safe future.

Zero Carbon can be achieved and enable activity to continue in the face of the increasing Energy Cost of Energy, by dramatically reducing energy demands, localising activity and becoming more responsible locally for the major needs in society such as food, energy, caring and some materials supplies.

Beyond the limits placed by accepting One Planet living there are many ways to enhance local wellbeing and community resilience. Following the insight of Kate Raworth in the Doughnut Economy is one valuable approach to actions. This necessary approach requires the development of a new Bude Culture- with local developments to suit the local people and environment.

2.1 Example cultural principles

Such a culture is likely to be based on the following permaculture principles which are summarised as:-

People care: high levels of:-

- Health and nutrition
- Strong local communities and family relationships
- Education and skills
- Appropriate housing
- Community space
- Local services

- Education in our present predicament & local adaptation and localising pathways

Earth care: focus on:-

- Regenerative agriculture
- Local organic food and materials supplies
- Renewable energy supplies
- High levels of environmental regeneration

Fair share: principles for transactions:-

- Local businesses using local renewable resources
- Community ownership of goods and services
- Wide local share ownership of local services
- Social justice as a local principle
- Increasing local regenerative skills base
- Increasing local markets with local supplies

2.2 Systems approaches

The local community and energy system is complex and as such deserves a systems approach to solving the both the local problems troubling many people in the area as well as moving the local energy and food systems towards resilience and a higher caring community.

Systems thinkers including Donella Meadows, of “Limits to Growth” fame, have shown that there are several ways to make successful changes in any system.

Donella Meadows	
Leverage Points: places to intervene in a system	
-in increasing order of effectiveness	
Parameters	
12	<i>constants, parameters, numbers</i>
11	<i>stocks and buffers – size relative to their change rates</i>
10	<i>structure of material stocks and flows</i>
Feedbacks	
9	<i>length of delays relative to rate of change</i>
8	<i>regulating negative feedback loops</i>
7	<i>driving positive feedback loops</i>
Design	
6	<i>information flows</i>
5	<i>rules of the system (incentives, laws, constraints)</i>
4	<i>power to change or self organise the system structure</i>
Intent	
3	<i>goals of the system</i>
2	<i>mindset or paradigm out of which the system arises</i>
1	<i>the power to transcend paradigms</i>

The box above indicates the key leverage points for effective action. The leverage points which are most effective are those later in the list above; in particular the goals of the system, the intent, and the mindset which drives the system. For the local community and energy system these are the key parameters to tackle.

Key system level interventions

Intent points 2 and 3

- Raising community understanding of the
 - interlinked nature of issues
 - urgency of required action
 - benefits of the changes needed
- Working towards a locally diverse & resilient supply system for important needs being accepted as the local goal

Design points 4, 5 and 6

- Increasing local democracy and citizen panels for local action
- Developing local rules for actions towards zero carbon
- Increasing local decisions on aims & information flows needed

These systems level actions also need to be supplemented by actions across the technical choices being made, which are at the Points 9 to 12 levels (**Parameters**). These actions have lower direct success in changing the local system, but to meet the Zero Carbon goal need to happen in any case.

The aim of the systems approach with its emphasis on local cultural change is to enable the technical actions to take place faster and with higher acceptance and welcome by local communities. Working together at the local level is shown to foster local confidence and resilience, to create change locally and to begin to shift the system⁵.

⁵ [The importance of the local in today's context - Resilience](#)

3 Climate Action Plan: methods

Changing intent

3.1 Action for hearts and minds-

This is work on **Leverage Point 2**: changing the mindset/paradigm of local people regarding local systems. Locally this will entail projects which:-

- Raise community understanding of the
 - interlinked nature of issues
 - urgency of required action
 - scale of the challenges
 - benefits of the changes needed

Whilst this can seem abstract in relation to the major task of achieving carbon zero for the local area, there is significant benefit to be gained from this approach. It is essential to enable and empower other local actions required to make the changes for zero carbon energy locally.

Whilst each individual project may be small, a key lesson is that success breeds success. This can lead to escalating changes in attitudes to carbon reduction, to awareness of climate impacts and willingness to participate in meaningful change. Successful action pulls in the same direction as other local initiatives and delivers co-benefits to the community like cleaner, safer streets, local training, jobs, improved green spaces, etc.

The work of the Older Gens Research Group shows that hearts and minds are best included by local action within each community. This found four main topics relevant to this issue. Together the research and conversations with older people enabled key “takeaways” to be developed, which are vital to the design and focus for local “hearts and minds” actions.

Cultural narratives and relevant approaches for action planning

Main topic	Takeaway
Our way of life	Promote community through practical, purposeful and integrate past and new solutions
Make do and mend	Frame as elders with expertise in sustainability & key knowledge to impart
Unheard	Need safe spaces to voice opinions, need to create dialogue between generations and locals vs non very locals
Resilience and action	Frame climate change around local impacts, create an active role for community resilience

The “Engagement lever of influence” can be used by the Partnership and its constituent members – ie their “trusted brand”, to raise householder awareness of these issues and what needs to be done, eg domestic retrofit, more active travel.

The Partnership might consider how they can support the development of local supply chains for retrofit, using for example ideas presented later in this report. This can be reinforced in community action by celebrating and publicising what can be done to celebrate great work in this area. Bringing in local politicians into this process helps communities build a mandate for a broader approach.

Good examples of local energy systems with local communities can be seen in the July 2021 webinar:-

[Local energy systems for local communities and consumers what works on Vimeo](#)

This outlines several projects which focus on cultural change and what is important for the local community.

3.2 Developing a locally resilient set of goals for the Bude area

This addresses **Leverage Point 3**, which relates to the goals of the system. The boundaries of the system being changed need to be agreed by the stakeholders. However within the context of the aim to achieve zero carbon emissions for the wider Bude area, the carbon system- with an energy focus- is the system where change is to be achieved.

One way of increasing the attractiveness of the goal setting process is for the groups to think about their vision of local society in ten years time.

This vision could well be the idea of a local world fit for our children: where children are safe, have play and local green space fit for running around, have safe active travel ways of travelling to school and grow up understanding the challenges of the present climate emergency and extinction crisis before us now. The vision could also include the idea that all local citizens are included in the work to change the local situation to meet these challenges with purpose and resilient communities.

For the purpose of this report the goal is taken as zero carbon energy.

This aim can be met in a variety of ways, some with high local economic and environmental benefits and others with less. This report assumes the general aim of working towards a locally diverse and resilient supply system for important needs as the local goal. This way of getting to zero carbon has the following advantages:-

- does not rely on new technology not yet developed or economic
- can be largely implemented locally
- provides increased local employment and skills development
- enables higher biodiversity gains than some zero carbon options
- no reliance on offsetting in other places, as an excuse for inaction now

- integrates several social and economic aims for the area
- reduces local pollution

Suggested goals

- for everyone to see/help create the future Vision & wish to be included
- zero carbon energy
- increase local food production and processing by 40%
- triple regenerative agriculture area
- introduce new crops for food, fibre and building materials
- set up local resilience skills training
- each Parish and Town to have its own committee/group working up local carbon reduction actions
- increase local wind energy and solar power to meet local energy needs
- reduce local miles travelled by car an agreed percentage
- every child to be well versed in carbon, climate action and biodiversity issues

It is recognised that whilst local people can do a lot to improve their climate performance in many ways, there are larger systems within which we are operating and over which there is little opportunity for local control or influence. A major advantage of the local scale approach is that actions can be undertaken and impacts achieved much quicker than say at regional or national level scales of action. It is however important to include in the local goals those actions needed to change and remove barriers to local effective action.

Example wider system actions to be addressed

County – Climate Emergency Development Plan Document – in process at present and for example is structured to stand in the way of local action for more renewables at the levels needed to meet carbon neutrality for Cornwall, and there is no high level standard for carbon neutral new buildings.

National – still no standard for all new build to be climate neutral, or for large scale funds for more cycleways or increasing buses to the levels needed.

For both of these levels, the local action could be to join with others to multiply the pressure for positive action on climate.

Influencing design

3.3 Increasing local democracy for local resilience

Leverage Point 4 is about power over the rules of the system. Whilst many rules are set in place by central government and by the structure of our capitalist/neo-liberal society, there is still significant power at the local level. Traditionally this has been wielded by local government, but local organisations and individual opinion leaders are also important in actions and attitude formation.

Bude-Stratton Town Council has already taken major steps towards increasing local power over the journey to zero carbon with the recent local council elections producing a high proportion of councillors with a keen interest in increasing local resilience and majoring on the journey to zero carbon.

Actions addressing this leverage point need to address increasing local democracy in the other local councils throughout the CNA. Flat Pack Democracy is a vital tool for action here, and the beliefs of the Bude Stratton Community Alliance have well illustrated success in the elections. Their statement of beliefs is an important step forward for local democracy and resilience.

Bude-Stratton Community Alliance Beliefs

Our top priority is to listen to the community and prioritise measures that will support its health, wellbeing and happiness.

- The town council must prioritise its own response to the climate crisis and work with the community to achieve its target of a carbon-neutral Bude-Stratton by 2030
- There must be democratic participation in decision-making
- Meeting the needs of future generations will be accorded equal importance to those of the current generation

An early task is to help develop similar initiatives in the remainder of the Bude CNA, so that each Parish Council has a vibrant and relevant set of Parish Councillors working on local goals for zero carbon. This could start with local Parishes where there are vacancies for councillors. For example Morwenstow has four vacancies, and North Tamerton and Whitstone have one vacancy each. With local co-ordination these Parishes could be encouraged to bring

younger people and climate aware folk on board as councillors to help kick start more local democratic action.

With all the Parishes acting in concert on this important issue, the voice of the wider Bude area becomes stronger in relation to actions requested of Cornwall Council.

Other actions to increase local democracy for the local rules of the system would be to include training for all Parish and Town Councillors in climate change, its local impacts and what can be undertaken locally to mitigate and adapt to this major threat.

Proposal

Draw together the Bude- Stratton Town Council and all the Parish Councils to discuss and agree a funding request for local carbon action training for all Clerks and Councillors

3.4 Developing local strategies

Leverage Point 5: covers the rules of the system including rules, incentives, constraints. Developing the local strategies for the zero carbon energy system: local self organising

The following points, box below, indicate the directions the local energy system needs to take to reach zero carbon within a reasonable timeframe.

Whilst on the one hand this report is presenting an Energy Carbon Zero Action Plan, of itself this does not ensure success in implementing the Plan.

Therefore it is important that local citizens and groups drive the process within the framework laid out in this report. This can be achieved by involving local communities in the details which are best worked up locally by those who will be involved, with help from energy and climate specialists as needed. In particular different sections of the local community may choose to focus on different aspects of the zero carbon journey.

Outline of local strategy development process

- 1 develop strategy involving the local population, groups & businesses*
- 2 reduce the demand for energy and new goods/services to actual needs (rather than nice to haves)*
- 3 determine the lowest energy demand method of meeting the remaining needs*
- 4 replace remaining demand with renewable energy sources*
- 5 wherever possible ensure the renewable energy sources are local- to capture more local environmental and economic benefits*
- 6 Develop local supplies for local markets to capture reduced carbon and increased local economic benefits*
- 7 improve the local environment through land management for carbon sequestration*
- 8 set up milestones and review points to assess progress, rework plans and show successes*

This detailed strategy development allows for local creativity, within the complexities of the systems we live in and the need to plan for survival in the place of this existential threat. This requires that we cast off one-dimensional thinking and action, reframing everything in terms of a whole and healthy life for the local community, and creating the safe future we want for our children. Creativity and developing local imaginations will help that process.

Backcasting

One successful method of creating the local vision or strategy is to use backcasting. This starts with the vision of the end of the process and an outline of life in the proposed new reality. The participants then think back to how the region will have achieved this reality and what had to be done to do so.

New thinking is needed to enable local people to develop the recognition that we all need to do more locally to meet our own individual and community needs. That we especially need to carry out the tasks that meet our daily needs. The pandemic has shown the importance of all these daily tasks and supplies, and the dangers in relying on fragile and long supply chains.

This may be a difficult task to accomplish, but successful interventions on these lines are being made through the medium of Citizen Assemblies. The local self organising principle suggested here is vital to allow the local culture to develop towards the Zero Carbon journey.

This is the place to:-

Let a Thousand Flowers Bloom

Proposal

- Develop a series of Citizen Assemblies/Parishioner Assemblies starting with say Bude and two Parishes.
- Use other Citizen or People's Assembly successes as models and adapt to local conditions
- Use local skills and expertise wherever possible
- Ensure a semi formal and focussed process
- Include a wide range of local people and opinions
- Create locally self organised relevant action programmes

Margaret Mead: - Well known quote

'Never doubt that a small group of thoughtful, committed citizens can change the world. Indeed, it is the only thing that ever has.'

3.5 Information flows

Information flows (**Leverage Point 6**) are vital to know and understand progress or lack of it with any strategy or plan. It is important to also understand the links between each area and part the local system. For example the local carbon footprint strictly includes the fossil fuel used in the production of food in other places and bringing it to the wider Bude area for local consumption (Scope 3 emissions). As part of reducing the carbon footprint of the area it is therefore essential to be able to devise effective actions to grow and process more food for local consumption, to reduce the massive fossil fuel requirements known as food miles.

Equally we need to understand the local farming community and the pressures on farmers when considering local production of renewable energy sources such as solar PV arrays, wood fuel and hemp as a fuel and insulation crop.

It is proposed that the area set up suitable monitoring of several energy and environmental parameters to both direct strategies and measure their success.

Example monitoring information to assist strategy progress

- **Energy**
 - Local electricity substation data, realtime data (as per OpenLV)
 - Sample electricity use data of local households in each community, including a range of local rooftop PV outputs
 - Output of local renewable electricity production installations
 - Yields of local wood fuel and biomass production
 - Gas metering main points – weekly data proposed: if achievable
 - Local petrol station sales in litres per day/week (excluding finance)
 - Local deliveries of LPG, heating oils, coal etc

- **Environment**
 - Wind speeds at relevant locations
 - Sunshine energy
 - Rainfall
 - Soil conditions
 - River flows
 - Pollution counts
 - Water supply and sewage treatment
- **Food**
 - Indicators for local food production, processing and sales

When the information on progress, or lack of it, is available it can galvanise local action, as many polluters have found when their emissions were made public.

System feedbacks

3.6 Developing actions for positive progress

In systems terms this is ***Leverage Point 7: driving positive feedback loops***. The actions needed here are those which provide action to reduce carbon emissions and which also provide other benefits to the local community.

Once these actions are set up, then success breeds success.

Small victories have a major psychological impact on people: they show that we can make cracks in the system, even if we cannot break it. And if this phenomenon gains momentum, it begins to thaw the pessimism and apathy which can take hold of us. Success has the ability to gradually infect more and more people. For example in Barcelona, the efforts to stop evictions gave way to the forming of Barcelona en Comú, a citizen platform, which in 2014 won the city elections and went on to implement progressive housing policies. Despite the harsh crisis context of the city at that time, the ideas spread, snowballing, joining other movements, and, somewhere along the line, it proved unstoppable. The city council set up a public renewable energy as a direct result of the work of the citizen platform. This company, Barcelona Energia, which became the largest public power company in Spain, shows how local action pushes the boundaries of the possible.

This example success, whilst on a larger scale than the Bude area, speaks to the recent election success for the Flat Pack Democracy group on Bude-Stratton Town Council and envisages future successes this could lead to.

The kinds of actions needed to drive these positive feedback loops are generally businesses which use sustainable local resources to produce materials and activities to meet real local needs, such as for food, energy, clothes and building materials.

3.6.1 Developing local businesses for local supplies

The change to a zero carbon society in the wider Bude area creates many business opportunities and so more local employment and skills development options. In particular it is very likely that tourism will decrease as the UK and other countries move to cut carbon use, as travel will be reduced. Increasing locally relevant businesses for the new reality provides opportunities to enable reduced unemployment as the transition takes place.

The basic principle is:-

Local supplies for local needs

The new business areas which will increase in this transition are those related to local needs such as:-

- Local food supplies and processing
- Local energy supplies and maintenance
- Development of local fibre and other materials supply and processing
- Increasing building insulation and energy efficiency
- Increasing installations of conservatories (not on home heating systems)
- Developing local electric vehicle rental and purchase options for cars, cycles, vans and cargo bikes etc
- Developing local composting other organic wastes soil improvers

Each of these areas of local economic activity increase local wealth. Local research has shown that a Cornish organic grower/farm shop has a multiplier of 2.59 for money circulating in the local economy compared to a "local" supermarket.⁶

3.7 Regulating negative feedback loops

Leverage Point 8 is about the strength of negative feedback loops, relative to the impacts they are meant to correct. Nature has many negative feedback loops, such as predator and prey relationships where the predator population will drop if too many prey are consumed and their numbers reduce. In market systems the price will go up when supplies are limited which reduces the number of purchasers, provided the market gives clear information on prices and their direction.

In the local energy and carbon system it is important to have clear unambiguous information so that local people can react appropriately to the reality of now.

3.8 Length of delays in the system

Leverage Point 9 is about the length of delays in a system in relation to the rate of system change. Locally this could relate to for example how quickly it is

⁶ [localmarkets vs supermarkets: Case Study: Cusgarne Organic Farm \(localmarkets-vs-supermarkets.blogspot.com\)](http://localmarkets-vs-supermarkets.blogspot.com)

feasible to set up local supply businesses compared to the potential increase in demand for their products or services.

Changing system parameters

3.9 Physical structures of the local system

Leverage Point 10 is about material flows and locations of material intersections. The structure of the local energy system determines a lot about how it works. For example the local electricity grid was built when power stations were large centrally located fossil fuel burners and the local area was demand only. Now the system is in flux as more local renewable electricity generating plant is installed, but the power flows going the “wrong” way cause problems because of the initial system design. Changing this is not under local control, meaning that the installation of an increased local production of renewable electricity will likely have to allow extra costs for local storage to overcome the grid constraints over the next few years, while the grid is updated to catch up with the need to meet zero carbon targets.

This structural issue drives some major elements of how to progress the journey to zero carbon. Alongside the general principle of reducing energy and materials demand and being as efficient as possible, the electricity grid issues also require that local renewables can only be used in enough quantity when the demand is reduced.

The demand for electricity locally will be increased by changing to electrically driven heat pumps for heating, and the increased use of electric vehicles. Although this means that more electricity is needed, the demand for energy as a whole for this purpose drops by two thirds, saving large quantities of fossil fuels, and hence dramatically reducing carbon emissions.

3.10 Changing the numbers

Leverage Point 12 covers the constants, parameters and numbers for the local system. Whilst these are the parameters which have the least impact when aiming to move the local system towards zero carbon, they are still important as this is where most people think about the system. This section is where work to change the actual numbers such as number of people travelling by bus and the energy efficiency of each home is assessed and which needs to change to achieve zero carbon.

When making the journey to zero carbon the general rule of thumb is to use the following order of decision making:-

- Does this need to happen?
- If so can it be done more efficiently or in a lower energy/carbon way?
- Change remaining demand to renewable energy sources
- Work to ensure renewable installations are local and community owned

Reducing demand for energy

3.10.1 Demand reduction options

Does this need to happen- questions such as:-

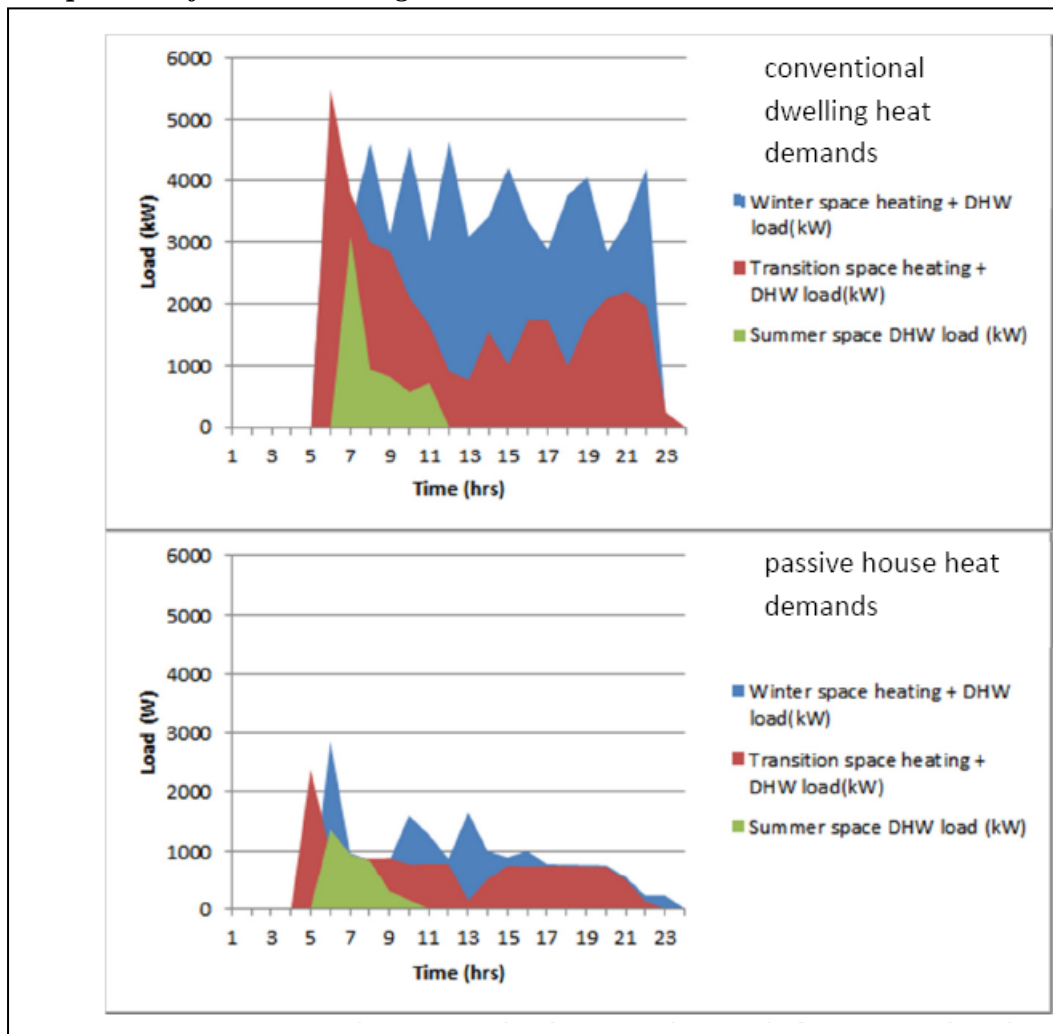
- Do I really need a new car, would a secondhand one be okay?
- Do I really need a trip to town for this small errand?
- Do I really need new jeans just yet?
- Do I really need a long distance holiday- could I be less stressed with a more local holiday?
- Can I get the bus or cycle rather than use the car?
- Could we obtain this from local production?

These are key elements for demand reduction actions. Other examples include simple actions such as closing curtains on winter evenings (do I need the curtains open at night?), and switching off lights in unoccupied rooms (do I need the lights on when no one is there?)

3.10.2 Efficiency improvements: buildings

Reducing energy demand through increased energy efficiency includes many tasks such as insulation of buildings, hot water tanks and people (ie put on more clothes in winter- so that reduced indoor temperatures are comfortable), alongside better controls for appliances and heating systems. Highly insulated homes with appropriate windows on the south side require little extra heating, and conservatories can reduce the heating season by a month each in spring and autumn – provided they are not themselves heated. Equally porches cut heat loss in winter, particularly in windy areas of the local area- ie most of it.

Comparison of standard vs high insulation home



Source: *Future energy demand in the domestic sector: report for EP 1031707/1 Nick Kelly et al University of Strathclyde 2012*

As the diagrams above show full insulation and passive house standard detailing reduces the demand for heating to less than one third of present standard homes and more compared to most Cornish and local homes which are not well insulated.

A programme to reach Zero Carbon will therefore need to address full house retrofit as well as major behaviour change programmes. This is likely to be high capital cost as around one third of homes in the area are older solid wall houses with very low insulation values and no cavities available to insulate. Solid wall insulation is expensive, and may be best tackled through programmes to insulate many homes at once to reduce individual householder costs.

See Section 3.7.1 Developing local businesses

Solid wall insulation, loft insulation

Lighting

Research for the government indicates that changing lighting in homes from incandescent and halogen bulbs to LEDs can save around 250 kWh/home pa. A major programme of LED fitting could if 80% of homes participated therefore save around 1,700 MWh pa with two thirds of that in the winter period⁷.

Heating: heat pumps

One of the two main methods of reducing total energy demand is to change fossil fuel heating in buildings to renewable energy supply either via electricity or wood fuel.

When changing space and water heating from fossil fuels to electricity, the most effective method of reducing demand is a change to heat pumps. There are several sources of ambient energy which can be used by a heat pump, with an electrically driven system to supply heat from the environment to the building. The heat sources in common use are air, water and the ground.

On average these heat pumps will supply as heat, three times the electricity used as the other two thirds is heat from the local environment, thus reducing energy demand by approximately two thirds, depending on the efficiency of the replaced system.

Commercial energy use

Heating

There are around 1,400 local businesses in the wider Bude area of which up to 150 are larger electricity users, though this will include the School as well as non-domestic half hourly metered electricity users, such as larger hotels.

Estimate of commercial heat demand by fuel source 2018

Energy source	% of demand	Demand MWh
gas	52%	8,237
oil	18%	2,798
LPG	6%	926
LPG for cooking	3%	400
electricity	22%	3,464
Total heating and cooking		15,826

Suitable programmes need to be developed with this sector to determine the most cost effective and possible routes to carbon zero with the non domestic sector.

⁷ Further analysis of the household electricity survey: lighting study final report May 2013. Nicola Terry et al Cambridge Architectural Survey and Loughborough University.

3.10.3 Efficiency improvements: transport

At over 99% of local travel is by fossil fuel vehicles, with some 51 million miles of car travel amassed each year collectively by residents. However internal combustion engines are extremely inefficient and only use about 25% of the fuel

tank energy to move the vehicle, with the rest lost as heat. An immediate reduction in energy demand occurs when vehicles are changed to electric, as electric motors and batteries are much more efficient with a system efficiency of around 77%⁸. This therefore saves two thirds of the transport energy needed.

At present the transport energy demand is around 117,300 MWh pa, so a complete changeover to EVs would reduce demand for oil by 117,300 MWh pa, but also increase electricity demand by some 39,100 MWh pa, without any changes in transport miles.

As this demand is still requiring installations to provide renewable electricity all year round it also makes sense to focus efforts on reducing the demand for travel. In addition, given the high mineral resource implications⁹ of a full battery driven EV transport fleet, it is important to reduce the local demand for individual powered vehicles for daily living. Basically the worldwide reserves of the minerals needed are not large enough for everyone to run a battery driven car.

The government announced in February 2021 a further £20m to assist local authorities in the development of more public EV charging points. This provides the potential to increase local charging points within the wider Bude area. At present there are very few charging points in the area, with only one publicly available point – at the Bude Tourist Information Centre. Other local points are all in businesses providing a service for their customers. More charge points are in process though not publicised as yet.

[Electric car match maker to boost second hand EVs - Energy Saving Trust](#)

Gives information on grants available from central government

There are many methods of reducing the demand for car travel. Other areas worth investigating are changing the mode of transport to walking, cycling and public transport. A programme of suitable footpath and cycle path construction avoiding the dangerous local narrow lanes in the rural area would be beneficial to achieving this aim.

Bowden, A. 'National Trust to trial e-bikes and e-cargo bikes in bid to reach net zero carbon emissions'. 2021. Ebike Tips <https://ebiketips.road.cc/content/news/national-trust-to-trial-e-bikes-and-e-cargo-bikes-in-bid-to-reach-net-zero-carbon>

⁸ See government fuel efficiency tables for cars standard fossil fuel vs electric vehicles, same type.

⁹ [The Role of Critical Minerals in Clean Energy Transitions \(windows.net\)](#)

Changing remaining demand to renewable energy supplies

3.10.4 Renewable energy: wood heat

Any assessment of wood energy shows the energy supply from woodland is most efficiently used via modern wood or pellet stoves which can be 90% efficient. If such stoves and boilers are used in place of older fossil fuel systems, which potentially have an average efficiency of around 75-80%, then substantial fossil fuel demand is replaced with a lower renewable heat demand.

If say 20% of local homes were to be heated this way, this would over time increase local business and part time employment. This approach requires about 2% of local permanent grassland and the management of around 25% of existing woodland, to provide c.3,200 tonnes pa wood to local homes. This would necessitate 300-400 ha of new coppice, depending on the level of new management of existing woodland achieved. Such an approach also increases local biodiversity and has other significant nature benefits. If a wood stove/furnace/boiler path was taken this would reduce the need for heat pumps and hence for some of the winter electricity needed to operate them.

Coppice woodland



From primecoppice.com

3.10.5 Renewable energy: hydro electricity

The CNA boundaries are largely the local streams and rivers, which are short and mainly flashy. The potential for small scale hydro electricity in Cornwall has been assessed a number of times from 1989 onwards. The most detailed study was carried out by Rupert Armstrong Evans for the Cornwall Energy Project. Rupert is based in Cornwall and has manufactured small scale hydro power plant for many years.

Potential hydropower sites in Bude area

Location		Full river information					Potential sites	
Name	GR exit	catch-ment km ²	fall m	length km	old mills	potential sites*	kW	MWh pa
Hallagather	SX143968	7	185	3		D1 L	70	294
Crackington	SX144969	7	150		1	D 1H, D2 L	70	294
Cox	SX216969						5	21
Millook	SS184001	7	150	4	1	D2L	15	63
Wanson Water	SS195011	4	120	3		D 1L	5	21
Neet	SS206063	31	150	10	1	D6 L	30	126
Langford	SS215036	50	120	9	2	D 6L	35	147
Northcott	SS203086	5	120	3		D 2L	10	42
Combe Valley	SS202116	20	185	6		D 4L	40	168
Tidna	SS196148	3	115	2		D 1H	30	126
Morwenstow	SS198156	2	150	2		D 1H	22	92
Cornakey	SS207170	2	150	2		D 1L	8	34
Marsland	SS212174	6	200	5	2	D 3L	24	101
Lamberat Water	SS283086	12	75	7		D 3L	36	151
Balsdon	SX292999	4	75	3		D 2H	32	135
Eastcott	SX 326956	8	75	5		D 2L	20	84
Tala	SX343890	13	105	8		D 3L	39	164
Ottery nr Bude	SX 347868	29	100	9			20	90
Totals							511	2,153

* D – domestic scale c5-7kW, H -high head, L -low head

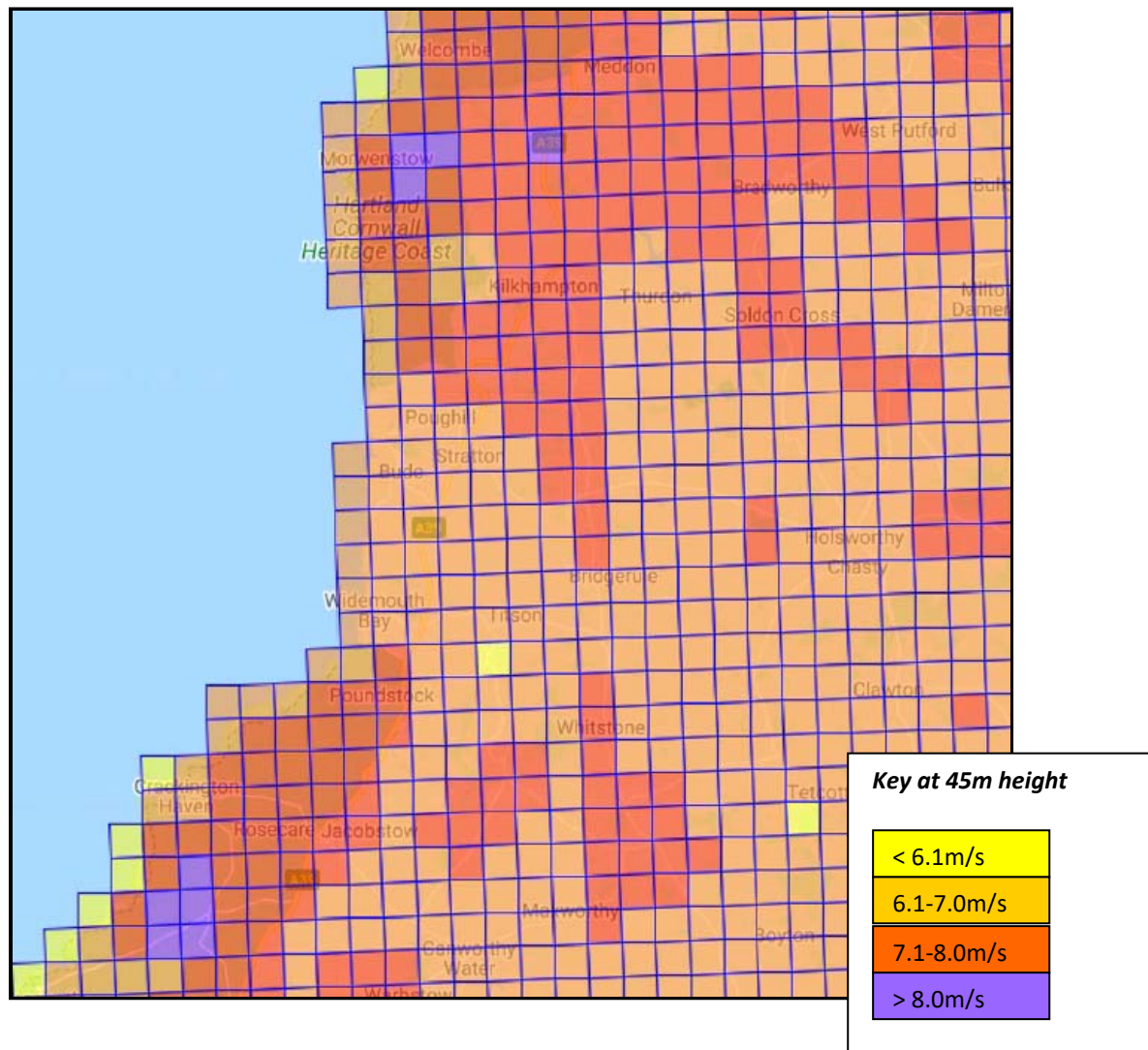


Hydroelectric powerhouse near Helston, buried to reduce impact 145kW

3.10.6 Renewable energy: wind

This area has high windspeeds, which is important for employing wind turbines to harvest this energy source. The energy available from the wind increases with the cube of the windspeed, which means that even a small increase in windspeed can dramatically increase the amount of electricity generated by a wind turbine. This explains why wind turbines are generally on tall towers on open hills – in order to catch the higher windspeeds available at higher altitude on hills and open country.

Approximate average wind speeds at 45m from NOABL database¹⁰



The map shows the areas with the higher windspeeds and hence those areas best suited to local winter electricity supply. This map is based on a relatively simple model of wind flows and gives only a rough guide to actual windspeeds. There are of course numerous other issues to be resolved before any new wind turbines could provide electricity for the local area.

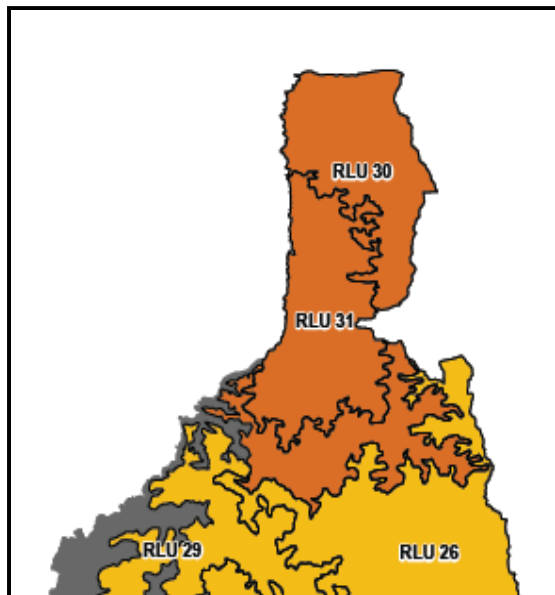
¹⁰ <https://www.rensmart.com/Maps#NOABL>

Whilst the government has expressed doubt about the need for onshore wind energy, it does provide the opportunity for community ownership of a local resource and provides winter electricity to balance supplies from the existing PV installations providing electricity mainly from summer sunshine.

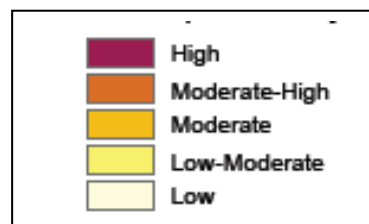
Government doubts about onshore wind energy are expressed through the National Planning Policy Framework document which makes it hard to achieve planning permission for new wind turbines, even at a domestic scale, if the actual proposed sites/fields are not in the local Neighbourhood Development Plan. Cornwall Council has started to try and improve this situation via their Climate Emergency Development Plan Document. However their landscape assessment did not take account of the climate emergency and hence has an out of date view of what is important in landscape assessments. This assessment was also out of date in its views on what scales of wind turbines are actually on the market these days, not recognising that modern wind turbines are generally larger than the assessment scales covered. Despite this there is now a precedent in Cornwall for single larger turbines, in an area without an applicable NDP.¹¹

Cornwall Council Climate Emergency Landscape Sensitivity Assessment¹²

750-900kW wind turbines



Key to DPD landscape sensitivity



This map shows moderate-high as the main landscape sensitivity in the north of the local area with some moderate landscape sensitive areas to the south for 61-91m to blade tip height. The detailed assessment does look at larger wind turbines, as well as noting the presence of numbers of turbines already operating locally at various scales from domestic to smaller commercial and one or two larger scale turbines. Their contribution to local electricity supplies was included in the Part 1 Carbon assessment report, May 2021: except for the

¹¹ [PA20/09318 | Proposed single wind turbine with a maximum blade tip height of 135m, with a 3-bladed rotor design and associated infrastructure including a crane pad, access track, and electrical housing. | Land At Lower Longstones Greensplat St Mewan St Austell \(cornwall.gov.uk\)](#)

¹² [Cornwall Council Climate DPD: review of the Cornish renewable energy landscape sensitivity assessment opportunity-maps-for-wind-energy.pdf \(cornwall.gov.uk\)](#) [Renewable Energy Landscape Study - Renewable Landscape Units 17-33 \(cornwall.gov.uk\)](#)

domestic and farm scale turbines which occur only as negative load in the local statistics in the same way as domestic PV.

Combining the higher windspeed areas with the lower sensitivity areas indicates which areas could be the best for local community owned winter electricity production via wind turbines.

Market availability of commercial scale wind turbines

An assessment of two of the major wind turbine manufacturers, and one of the smaller ones, gives the following information on availability.

Example commercial turbines availability

Turbine	Size kW	Rotor diameter	Hub	Tip	Example output MWh pa	Units equiv to one 4MW
Enercon: smallest	800kW	48m	75m	99m	2,600	6
Direct Wind	900kW	54m	75m	102m	3,000	5
Vestas: smallest	2,000 kW	90m	80m	125m	7,600	2
Enercon	2,000-2,300kW	82m	84m	125m	7,900	2
Vestas	4,000	117m	84m	142m	14,000	1

A key factor here when deciding on wind power for local electricity demand is that the bigger wind turbines produce significantly more electricity over the year. The last column in the table above indicates the numbers of each size of turbine needed to reach the output of one of the larger 4MW machines listed.

This shows that the landscape impacts can be lower with larger turbines as many fewer are needed for local resilience.

The draft Climate Emergency DPD map of draft areas suitable for wind energy excludes most of the Bude CNA but the reasons are unclear. The logic of the end result of the map above is not entirely clear in the reports available via the Council website.¹³ The University of Exeter report on constraints to local renewable energy supply, does indicate that the landscape assessment parameters need to change to meet the Council's zero carbon requirements.¹⁴

Given the new UN IPCC report in August 2021 which shows how close the world is to major climate chaos it is important that every region works to overcome this kind of obstacle to reaching local carbon zero.

A survey of potential sites for wind turbines indicates that, at the 2MW scale there is potentially room for around 30 turbines. This assumes that no new turbines are placed in the AONB areas, that all the coastline, low lying valleys and woodland are avoided and all homes have a 500m exclusion zone to avoid both noise nuisance and any visually dominating impacts.

¹³ [Cornwall Renewable Energy Landscape Sensitivity Assessment Draft Report, December 2020.](https://www.cornwall.gov.uk/old/cornwall.gov.uk)(now on Old.Cornwall.gov.uk website)

¹⁴ [Constraints and Opportunities mapping for large scale renewables \(cornwall.gov.uk\)](https://www.cornwall.gov.uk/constraints-and-opportunities-mapping-for-large-scale-renewables)

Generally the potential sites have room for 1-3 turbines and are spread mainly in the north with some potential in the south, including one area with room for several wind turbines. There is no suggestion that anything approaching a high number of new wind turbines would be appropriate for this area, only that there are choices about locations.

A key element to obtaining planning permission for new wind turbines in the area is to ensure that the developing organisation is the local community, so that all can see that local benefits will be maximised. The structure of any such organisation is outlined later in this report.

It is also important to be aware that as the UK moves towards higher percentages of renewable sourced electricity, wind energy becomes more valuable as winter electricity supply compared to the higher installed capacity of PV generation, which produces less than one quarter of its output in the colder six months of the year.

It will not be feasible to reach zero carbon for local area energy without the use of more wind turbines.

Given the sensitivity to changes in the landscape, it is vital to first address **Leverage Point 2** –changing the local mindset and paradigms regarding the future, climate change and living locally in a resilient society, well before any action on wind energy development. A recent public opinion survey shows the importance of localness both for the technology and for the allocation of benefits¹⁵.

3.10.7 Renewable energy: solar thermal

Solar thermal installations are an efficient way of heating water and can provide most of the hot water for household use during the summer, depending on how hot the household demands that its water needs to be. However during the winter when the sky is cloudier and the sun is lower in the sky, this method is not reliable. As solar thermal panels capture around 80% of the sun's energy compared to the under 20% efficiency of PV or solar electric panels, there are obvious advantages to solar thermal.

The major sector where solar thermal installations can prove their worth quickly is in the tourist trade as demand is much higher in the summer, and this sector should be encouraged to install much higher levels.

¹⁵ P. Devine-Wright SLES seminar [Local energy systems for local communities and consumers what works on Vimeo](#)

Evacuated tube solar thermal commercial water heating system



3.10.8 Renewable energy: solar PV

The local area already has a significant percentage of local photovoltaic solar arrays producing electricity from both rooftop domestic and some commercial installations as well as commercial scale panel arrays in local fields. There is still high potential to introduce higher levels of installations throughout the local area. The amount to encourage will depend on the successes achieved in energy demand reduction as well as the approach taken in local understanding of the local energy system.

Solar array with sheep near Newquay



There have been some dissenting voices around a few solar arrays as they create a change in the local landscape. Therefore it will be important in the design of new installations on to integrate them into the local landscape and ensure that other land use continues around and under the panels. This can be nature

benefits and organic food production such as free range birds, sheep or row cropping any of which can be successfully incorporated amongst land arrays.

Whilst individual households and businesses can reduce their grid demands by installing rooftop based PV systems, this is likely to only produce around 10% of the area electricity demand, with many buildings already showing PV panel systems installed.

3.11 Energy storage

A key element of the change to 100% renewable energy supply is the increased need for energy storage. This enables a secure supply to even out the peaks and troughs of intermittent supplies vs variable demand. At present in the UK electricity is “stored” in battery banks for short term grid supply or in pumped storage systems using large altitude differences between lakes to pump water uphill when excess electricity is available, and run down when demand exceeds supply.

As part of reaching 100% renewable energy supply it will be important to ensure local storage of the types of renewable energy being relied on in the future.

Examples include:-

- Wood stored under cover, field sides etc
- Prepared wood as pellets or chips stored in barns or tanks
- Biomethane stored at anaerobic digesters in tanks
- Electricity stored as kinetic energy in pumped storage top lakes or reservoirs

Other methods worth investigating for the local area include agreements with large power users to reduce their demand for electricity when local demands are high and supplies are low. Examples include the fridges at large supermarkets which can be switched off with no loss of service for agreed periods of time to assist balancing the local grid. This would be the storage of “coolth”, rather than heat.

Pumped storage

The local demand for longer term storage for electricity production could be met via one or two small scale pumped storage locations where the lower lake is the sea. This would require a flat area of say 20+ acres close to a clifftop at least 50m high where the drop is mainly vertical to the sea, rather than onto a wide area of rocks.

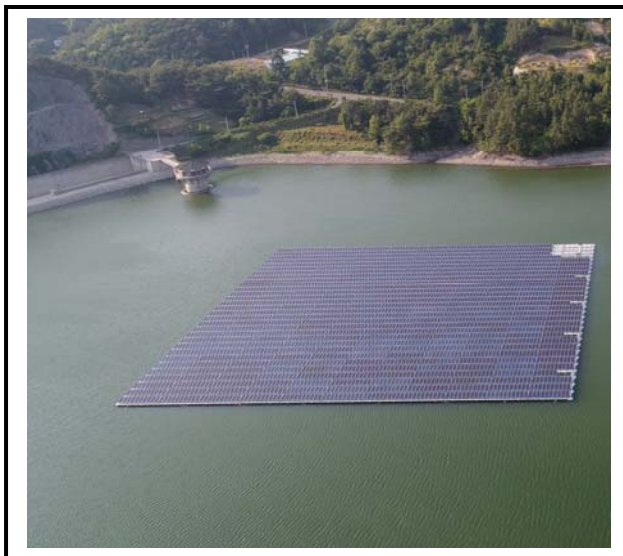
There are two potential sites which theoretically be used for this purpose and would provide enough backup for around five days each of very low supply in either winter or summer. These potential small lakes could also host floating PV panels which would be able to increase the availability from the sites by using PV

electricity to pump water up the hill when supplies are high and demand low, to then let the water down to generate electricity when local supply is low and demand high.

Pumped hydropower storage system in Japan



Floating PV on reservoir lake



4 Climate Action Plan: projects

4.1 *Hearts and Minds community projects*

These are the projects which bring communities together to tackle local issues and provide an opening for awareness raising alongside practical action to help the journey to zero carbon. Local action can be inspired through examples from other areas, where local councils have developed citizen engagement strategies and successful actions through working on the co-benefits of climate actions, such as more employment, quieter streets, lower noise, more child friendly spaces, etc.¹⁶

This section outlines a range of community drive actions which can be taken and are likely to lead to success in raising awareness and driving future action.

4.1.1 **Cut carbon emissions through community action**

Electricity

This work needs to be set in the context of both the climate emergency (empowering the individual) and local community priorities, which is where successful action starts. This project can be framed to enable the older generation experience and needs to be used and valued with specific electricity demand reduction actions which draw on past experience.

Work with WPD to encourage local communities to embrace lower electricity use through a range of guided and assisted methods which work at the street level to remove barriers, engage actions which can be “catching”. This will require local people to engage on assistance for actions such as:-

- **Remove barriers**
 - Reduce use of tumble dryers by giving washing lines, pegs and peg bags and advice, joining a local “Rainwatch group”
 - LED light to replace old incandescents and older fluorescents – needs step ladder experienced help and knowledge of the different fixings
 - Groups to show others how to change electricity supplier and to help choose a real renewable electricity provider
 - Groups to share tips on cutting electricity and other energy demand through simple effective measures
- **Use local network data (OpenLV)**

Using local network data could provide village or street level information to start conversations with people who are interested in their local community, but not specifically interested in energy. In some communities, conversations centred on local profiles of usage (when peak demand might typically occur) and interesting facts about the

¹⁶ [CAC-TOOLKIT-CHAPTER-6.pdf \(ashden.org\)](#) Climate Action Co-Benefits ch6 citizen engagement

community (who is connected to which substation and how this might reflect the historic building pattern of the neighbourhood) is often a valuable way into thinking about climate change, as a precursor to action.

4.1.2 Targeted action on carbon savings

The strength of community led climate action is as much about its ability to enthuse and engage hearts and minds in the topic as it is about reducing emissions directly. The context and “localness” is therefore an important element in project design and leading.

Example Actions to take

- ***Measure local imported food carbon footprint and act to reduce it***
 - The community group could engage with their neighbours and local friends to count the amount of food imported from far flung places, investigate the carbon footprint (and other attributes which matter to them) and work out ways to replace those foods with locally sourced supplies. Over time the group could measure how much carbon has been saved and assess how this action leads on to other climate saving actions and how it contributes to local community resilience.
 - This activity could catch on in other local communities and potentially lead to friendly competition to determine who gets better faster on this
 - Important to have some measurable success and to be able to communicate this to others within the group and to the wider locality.
 - Finding out the carbon cost of imported fruits, imported meat or wine/beer could be younger people’s contribution and the elders could advise on local replacement options, preparation and recipes
 - Problems and issues raised would need careful assistance to enable appropriate actions to continue. This would need trusted local intermediaries
 - Potentially a new local cookbook could emerge- with stalls at local markets and fairs, once they reopen, for others locally to tryout the new foodstuffs/recipes
 - Local food growing groups could help with information and enthusiasm on the benefits of local food and the local allotment options, potential local employment, suggestions on protected cropping etc
 - Set up community cooking groups to pass on local recipes/ supplies and try new ideas, especially using local older generation expertise¹⁷
 - Brings in Parish Councils and their duty to provide allotments

¹⁷ See the successes of this approach in Brighton <https://bhfood.org.uk/sustainable-food-cities/>

- ***Reduce the purchase of new goods and create locations for action***
 - Local Libraries of Things, to enable borrowing of less used appliances – such as lawn scarifier, sewing machine, leaf blower, apple juice presser, projector, wildlife camera, camping equipment, carpet cleaner, pressure washer, tea urn, gazebo.
 - Repair cafes, provides skilled people to help repair household items from smaller appliances to clothes etc – reducing the need for new
 - Digital second hand marketplace links (& maybe a pick up and drop off point), brings in younger people who are more likely to use this medium to save money and get rid of unwanted items- especially young mothers
 - These three actions can reinforce each other and enhance a local repair culture, increase social cohesion and provide a forum for discussion of climate and other important local issues.
 - Software, insurance etc are already available to assist these approaches
 - Records can show how much carbon has been saved over time through reduced new purchases

4.1.3 Climate awareness raising/education projects

Projects with schools, trusted local opinion leaders and intermediaries, WI and other voluntary organisations

It is important that the local awareness raising is with local groups which are trusted, representative of a cross-section of the local community and which recognise climate justice issues especially in low income or housing deprived areas. Each community can develop meaningful goals and the Climate Partnership then supports the groups in meeting their goals. Creating safe places to speak on climate helps with the older generation's need to be heard.

- One proven method for people to start this journey and engage more than they imagined is through the Ten Pledges
See [Top Ten Pledges - Climate \(climatevision.co.uk\)](http://climatevision.co.uk) This works well when those pledging write three sentences on each pledge, how and why they did it, and then publicly show how they managed each pledge. Good examples for opinion leaders to follow and talk about their experiences.
- Collate local skills, and set up skills and relevant educational activities such as repair and maintenance, food growing and processing, seed saving and skills in local landrace cultivar developments to cope with local climate change.

4.1.4 Save our Sea Pool

Create a local organisation to raise awareness of the threat to the Bude Sea Pool from the expected sea level rise which will severely damage the Pool. Set up a series of events, celebrations of the local cultural importance of the Pool and the threats to its survival. Draw the parallels with the local community resilience. The recognition of a threat to something locally important, such as the Pool, can be a powerful motivator to action and community cohesion.

4.2 Local supplies for local needs

Local community operations

This section outlines community and local business ideas which reduce carbon and increase local economic activity, providing employment, increasing local skills and major co-benefits depending on the individual activities. An example research report in Cornwall calculated that a local organic grower with a farm shop had a local multiplier of 2.59, compared to the local supermarket. This means that for every pound spent in the farm shop around £2.59 was spent in the locality, compared to the £1 return in the supermarket. This indicates some of the value of local supplies to local markets as a strategy, with its significant increase in local economic value.¹⁸

Local potential anchor and community institutions

Organisations such as Budehaven School, with a turnover of £6m pa, non staff costs £1m pa, have a potential for local supplies of potentially £250,000 pa. Equally Bude-Stratton Town Council with an income of some £1.3m pa, mainly staff costs and potentially could be making more local purchases of possibly £90,000 pa.

Large hotels and restaurants also have high potential to increase their local purchasing and to be part of a local “*Anchor institution local purchase group*” Local supplies to be encouraged, especially where the products and services are genuinely local:-

- Locally produced and processed food& drink
- Energy produced locally
- Computer and web services
- Catering supplies
- Housekeeping supplies and services
- Repair, maintenance services and reclaiming goods and materials
- Craft work

Local food supplies to pubs and restaurants could be worth about one million pounds per annum, against an expected total food costs to this sector of

¹⁸ [NEF pdf final copy \(neweconomics.org\)](http://neweconomics.org) The money trail: measuring your impact on the local economy using LM3. New Economics Foundation

potentially £5.5m pa. If local food supplies are increased to 45%, this would increase local value by around £1.3m pa. Such an increase would require

significant increases in communications and local produce planning to be successful. Anchor institutions can start this process through increased local purchases and by bringing together suppliers, producers and potential local suppliers for seasonal discussions well in advance of purchasing need. These activities will save significant embedded carbon in reduced transport and imported embedded energy costs.

4.2.1 Local insulation production and use

Growing hemp locally for hempcrete to insulate local solid wall homes

This would:-

- ❖ Help local farming community
 - High value crop, good margins and many co-products
 - If in rotation before wheat increases wheat yield by 10-20%
 - Needs no fertiliser or pesticides, shades out all weeds
 - 700 ha would provide local needs for insulation
- ❖ Provides the farming/community business opportunity for local processing
 - Wide range of co-products in expanding markets
 - Investment costs pay back within normal business practise
 - Provides the opportunity for group machinery buying and insulating homes as an investment club or other community ownership
- ❖ Insulating local solid wall homes provides the following benefits
 - Local jobs
 - Increasing local skills
 - Significantly drier, warmer and even temperature homes of the 34% of homes with solid walls in the area
 - Reduces local domestic heating demands by c. 10%, some 8,000 MWh pa
- ❖ Saves significant carbon emissions from reduced heat loss and carbon sequestration in the new insulation material (the lime absorbs CO₂ as it dries)
 - some 32,000 t CO₂e over a ten year programme with homes
 - plus 10,500 tpa CO₂e sequestered as the crop grows
 - **builds up to around 18% of local carbon emissions from energy use for ten years**

Proposal

Undertake a feasibility study to determine the issues around developing a community and farmer CIC including:

- growing hemp in quantity,
- integrating with local arable farming rotations,
- scale business and determine supply needs for machinery for harvesting and processing to produce shiv and a range of co-products
- determining a potential site for processing machinery
- developing business plan for finance raising
- estimating costs for solid wall insulation
- developing financing mechanisms to achieve the scale of solid wall insulation action needed
- developing marketing plans to rollout insulating local solid wall homes
- developing governance through the local community and farming communities getting together to agree structures and governance appropriate to the tasks

Hempcrete internal solid wall insulation Cardinham



Hempcrete external solid wall insulation on Listed Building



Increasing the local value of sheep by using their wool for insulation

Whilst there are some uncertainties in statistics on local sheep numbers, it is thought that there may be some 130,000 sheep kept on local farms. This gives rise to over 100 tonnes pa of fleeces, which under the present market have very little value. A recent market price for fleeces at the end of July 2020 was 67p/kg, yielding significantly less than it costs to shear each animal, or even the cost of fleece transport to market. This can result in farmers ploughing the wool into the fields as fertiliser.

Providing a local long term market for fleeces will enable a better long term pricing to be provided to local farmers. The fleeces would need to be sorted, scoured, bathed in borax – or similar (to prevent moths damaging the insulation) and then dried, carded and layered. There are already a few companies in Britain producing sheeps' wool insulation.

The Welsh government has committed to using more British wool as insulation in public buildings following a UK-wide campaign. Campaigners have been calling for wool to be made mandatory for insulating in the UK government's new home insulation scheme. A new, long-term market for the fibre is being sought as wool prices have fallen substantially below the price of shearing for many producers. The campaigners say wool is 'sustainable, fire-retardant, bio-degradable, and the most efficient form of insulation'.

A ten year programme to insulate the lofts of the wider Bude area would provide the following benefits:-

- ❖ Helps local sheep farmers
 - with regular guaranteed fair fleece price
 - keeps up the value of local sheep
- ❖ Provides the farming and local community with the opportunity for local processing
 - Liaison with local textile and fibre businesses to mutual benefit
 - Investment costs pay back within normal business practise
 - Provides the opportunity for group machinery buying and insulating homes as an investment club or other community ownership
- ❖ Insulating local lofts provides the following benefits
 - Local all year round employment
 - Increasing local skills
 - Significantly warmer homes for a high proportion of local properties
 - Reduced fuel bills
 - Reduces local domestic heating demands by c. 20% some 18,000 MWh pa
 - Saves significant carbon emissions from reduced heat loss some 23,000 tonnes CO₂e over a ten year programme with homes

Proposal

Undertake a feasibility study to determine the issues around developing a farming community business including:

- Buying fleeces in quantity, contracts, quality, pricing mechanism, etc
- Finalising machinery and equipment needs
- Determining potential site for processing machinery
- Developing business plan for finance raising
- Estimating costs for insulation installation
- Developing financing mechanisms to achieve the scale of insulation action needed
- Developing marketing plans to rollout insulating local lofts
- Liaising with community groups in awareness raising of the benefits
- Developing governance through the local community and farming communities getting together to agree structures and governance appropriate to the tasks



4.2.2 Local Food

Imported food amounts to approximately 15% of the embedded carbon emissions related to imports into the UK. Imported carbon was around 246 million tonnes of CO₂e in 2018¹⁹. This means that imported goods including food amounts to around 3.7 tpa per person, of which food is about 0.6 tpa. Thus the Bude area with a population of 18,225 has an imported food carbon cost of about 10,500 tpa CO₂e.

This points directly to local action which can benefit the global climate emissions and towards local policies for the production and importantly eating, of more locally produced food. The Cornwall Sustainable Food Strategy Partnership soon to be formally created is working towards more local food supplies for several reasons including reducing food poverty, increased resilience and increased local activity as well as improved food standards and increased soil carbon. The local Bude area activity as part of the BCP work is helping in this regard.

The research carried out by the Sustainable Food Strategy team found that around £978 million is spent on food in Cornwall for home consumption²⁰. On a population basis this suggests about £31.5 million is spent in the Bude area. Of

¹⁹ University of Leeds UK footprint results 1990-2018

²⁰ ONS statistics Household food expenditure SW region/per capita/home consumption 2018/19

this possibly 12% is spent outside supermarkets in a range of local outlets. Higher sales by the locally owned outlets would have significant impacts on local food freshness, and potentially on increased local economic activity. Reducing food imports and a change towards eating seasonally would also increase local health and create more local employment.

The notes below indicate various methods of increasing locally grown food supplies. At a rough calculation using these approaches around 1,400 tpa CO₂e could be saved by increasing local fruit and veg supplies to 50% and more CO₂e could be saved by supplying more local meat and dairy produce.

The local milk supplies to the nearby cheese factory have not been included in this calculation on local supplies as it is not feasible to estimate the amount of this cheese bought locally as a percentage of all the milk delivered to the factory.

As food production, processing, marketing and sales can all be successful at a range of scales and involves many different skills this is a major area for the local community to come together to increase local connections, health and local economic activity.

❖ **Food hubs**

One food hub has been operating for some time in the local area and could usefully be expanded and/or replicated in the area. The North Cornwall Food Hub at Jacobstow uses generic software to enable local people to place an order for their weekly choices with the central hub, co-ordinates local suppliers to bring the supplies to the local hub location for packing and then collection by customers. There are derivations of this idea successfully in use throughout the country.

❖ **Local supplies**

Local food supplies can be increased by increasing the number of allotments available to local residents. Parish and Town Councils have a legal duty to provide suitable spaces when enough residents request them. As the price of food and energy is rapidly increasing and more people are suffering higher levels of poverty, the ability to grow some of your own food is an essential element of helping locally. This also has the impact of reducing the local imported food carbon footprint.

Local supplies can also be increased through policy assistance and information/training etc for local growers and producers.

❖ **Local protected growing**

North Cornwall is well known for being windswept, which can make those contemplating growing more wind sensitive crops cautious. There is now a well developed long lasting polytunnel system which was first used in the Shetland Islands and other Scottish islands – which have extreme winds. The Polycrub is a successful design which withstands hurricane force winds and so will be secure

in the Bude area, even near the coast and on the hills. The Shetland system includes recycled fishfarm pipes, so another source of thick plastic piping would be needed in Cornwall, with polycarbonate sheets fixed over the frame.

This system has enabled the successful growing of lemons in the Hebrides, and grapes in Shetland.

Proposal

Feasibility study for locally made Polycrub variations which would be long lasting and sized for local community and professional growers. The design could then be the basis for a new community company, mirroring the start up of the Polycrub company, to install these protected cropping spaces wherever needed in the local area.



If protected cropping, with relatively low capital cost, is taken up this could make significant inroads into local supplies for crops more often imported into Britain. With nearly £6.5 million spent locally on fruit and vegetables including £1.2million on potatoes there is major scope for protected growing of more valuable crops such as early and late season potatoes, peppers, lemons, winter and spring lettuce varieties, grapes, etc

If around 50% of the local purchase of fruit and vegetables is locally sourced this could increase local economic activity by over three million pounds pa and save potentially 1,300 tpa of greenhouse gas emissions from imported food.

4.3 Local infrastructure development

System behaviour follows system structure

A key understanding when contemplating the system changes needed to reach zero carbon for any region is to recognise that the behaviour of a system and the people in that system follow the structure of the system. It is therefore vital to change the structure of the system to enable and encourage the types of behaviour needed to reach zero carbon. As noted earlier a key element of system change is to change the hearts and minds of those in the local system. This too is important for the physical system changes which need to be achieved to meet the overall aims.

The overarching aim of energy behaviour change is to deliver 'non-consumption'. This is the most important first element in the 'energy hierarchy' of 'Lean to Clean to Green' as it avoids energy being used in the first place. This ambition needs to be exciting for people to challenge the norm, and to encourage mass adoption of energy efficiency good practice through more energy efficient behaviour. Joining community actions and groups can be a very valuable way of rapidly increasing local action to the benefit of all involved.

4.3.1 Energy demand reduction

❖ Insulation programme

Insulation is a major task for the present buildings in the Bude area, which has many homes and commercial buildings with low or now insulation levels, leading to cold damp homes and high carbon emissions. The local supplies for local markets section indicates the opportunity of using local renewable resources, in this case hemp and sheep's wool for insulating homes and commercial buildings in the area.

Loft insulation programme

The proposed programme suggests that a ten year target of fully insulating just under 600 lofts pa would enable 80% of homes with lofts to be insulated to present day standards. Once completed, this would save around 20% of the total domestic heating energy and hence some 426 tpa CO₂e. This would total about 23,400 tonnes CO₂e over the ten year programme and enable around 5,700 homes to have lower energy bills.

Rough estimate of costs for ten year loft insulation programme

Fleece requirements		Loft insulation requirements	
Bude sheep	c. 130,000	Homes with lofts	7,405
Weight sheared	c. 265 tpa	Assume insulate	c. 80% 572 lofts pa
Present value	< shearing cost, often dumped	Programme costs	c. 580,000 £pa
Sheep needed	c. 60,000	Cost per house	c.£600-1,100
Value for insulation	say 4-5 times present sale price	Local jobs created	
		Insulation processing	2-4
		Loft insulation	5-8
Fleece needed	c. 111 tpa	Savings	
Total costs incl. processing	c. £400,000 pa	After ten years	c.18,000 MWh pa c.£1.9 million pa
* before recent energy price rises		Av household savings*	c. £337 pa
		Carbon after 10yrs pa	4,258 tpa CO2e
		Total Carbon savings	23,420 t CO2e

This outline programme shows good value for money and the householder has around 2-3 year payback on the costs of the local loft insulation, at today's energy prices. As the cost of energy is likely to increase over the next three years or more, this is likely to increase local energy bill reductions. Recent energy market disruptions indicate the value of insulation measures being implemented urgently.

Proposal

Integrate this programme proposal into the earlier local business feasibility study, to include methods of financing the upfront costs of the insulation with an example loan scheme, to payback over the energy bill payback period of 2-3 years, where needed.

Solid wall insulation programme

Some areas of Bude and surrounding parishes have high percentages of older solid wall homes. Bude has around 54%, Flexbury West 44%, Week St Mary has 41%, Marhamchurch & Widemouth Bay has 38%, and Kilkhampton & Morwenstow together have 36%. In total, approaching 3,000 homes in the area have solid walls. This makes these homes hard to heat and often they are damp as well, with the local driving rain penetrating the single skin stone walls. Such homes can be hard to insulate well and require special attention to enable them to be dry, comfortable and warm. This problem also provides the opportunity outlined earlier to develop a local business network to grow hemp to provide suitable insulation material for this high number of solid wall homes.

Around 54% of the solid wall homes are detached and 29% are semi-detached. A ten year programme to insulate these solid walls would require around 275 homes each year to be insulated.

As this is a more expensive and less common process than loft insulation, though with high benefits, it is proposed that the programme should start with some example demonstration homes of each type and in several areas be chosen for action first.

The demonstration homes would then serve as good local examples for the new employees to hone their skills and for local suppliers to be organised, while the programme as a whole is developed.

Proposal

Arrange a series of appropriate demonstration homes to have solid wall insulation to show local people the benefits and how it is done.

Set up this short programme as part of the main programme development, using imported skills and hemp supplies first of all.

Integrate this action with the feasibility study for the total community business solution, including local skills training. Increasing local awareness and knowledge of the benefits is vital as part of this study.

❖ Non fossil heating systems

Heat pump programme

As noted in the notes regarding actions which need to be taken to reduce carbon emissions, a key action is to change heating systems to non fossil options. The main one tends to be heat pumps which use energy from the local environment driven by a smaller amount of electricity to heat homes and hot water.

The government is rumoured to be increasing the potential incentives to encourage householders to install heat pump systems, with a grant being considered, of at least £7,000 per household. This would make a significant cut in the installation costs of heat pump systems which can be £7,000-£14,000 for air source systems and £15,000-£35,000 for the more efficient ground source systems. It is not clear as yet how much ramping up demand would reduce the costs of these installations from heat pump supply costs reducing and local skills increasing on installation efficiency.

Installing heat pumps in large numbers in the local area is the main task involved in reducing the carbon emissions from heating local buildings, and hence is a vital tool in the zero carbon project plan.

The proposed ten year programme involves the installation of over 600 heat pumps a year in local housing. This is complemented by a range of wood stove and wood furnace systems and eco-controlled modern storage radiators.

An outline programme has been calculated to change each type of house to heat pump (air or ground source) wood stove/boiler or eco-controlled storage radiators.

Energy savings from heat pump programme

Fuel source	MWh	Number homes	Change to heat pump	Ground source	Air source	MWh saved
gas	52,021	4,688	100%	40%	60%	36,160
oil	19,112	1,593	50%	100%	0%	7,725
LPG	3,927	327	50%	100%	0%	900
coal/wood	929	309	25%	0%	100%	550
electricity	11,169	1,862	35%	30%	70%	2,600
total	88,087	8,779		3,031	3,346	47,935

As the table shows this reduces the energy demand for domestic heating by over 50%, with a commensurate carbon savings over the programme, assuming that the new electricity demand is met from renewable sources.

Proposal

Set up full feasibility for the financing and work programme, including and most importantly how to ensure the programme is operated via a community owned entity.

See later finance section for development of suitable governance arrangements and potential costings.

Domestic air source heat pump



Commercial ground source heat pump near Newquay: plant room



At present it is difficult to provide accurate estimates of installation costs as the cost of heat pumps is likely to reduce as demand ramps up, but suppliers are not able at this stage to be able to estimate likely cost reductions. The government recently announced that an upfront grant will be available soon, though it is likely to be not be enough to enable many sections of local residents to choose this option. The first stages for this programme locally will be to prepare to roll out a programme as soon as the government system is in place, which will require survey, feasibility, market testing and governance structures to be ready in advance.

Biomass heating systems programme

The region already has some biomass systems installed under the government’s Renewable Heat Incentive scheme, which provides a grant for each kWh of heat produced by installations installed under this scheme. This grant aims to reduce the extra capital cost of installation to more usual payback times by providing an income on heat produced over seven years.

Modern biomass heating systems can use one of three types of wood fuel, logs, chips or pellets. Pellets are the easiest to use and pellet stoves can heat a room or home with via a hopper on the top with attention and refuelling only every few days to weekly. However the fuel is more expensive as it requires more processing. Ease of use is likely to be an important consideration for older customers.

Pellet room heater



Pellet central heating cooking stove



Cheaper fuel is available as chips, for larger commercial systems, and as logs for rural homes where there is room for storage. If log stoves, boilers or furnaces are chosen, then local wood can be used, providing more local resilience.

A programme of pellet stoves and log furnaces is suggested which would meet a range of local requirements as well as providing carbon neutral heating.

Estimate of wood fuel heating programme potential

fuel source	present			new wood		
	MWh	homes	%	homes	fossil fuel saved MWh	CO2e saved tpa
gas	52,021	4,688		0	0	0
oil	19,112	1,593	50%	796	9,556	2,610
LPG	3,927	327	50%	164	1,964	452
coal/wood	1,857	309	75%	232	696	505
electricity	11,169	1,862	35%	652	3,909	1,201
total	88,087	8,779		1,844	16,822	4,769

Installing the proposed over 1,800 wood heat systems would provide local employment, for installation, maintenance and fuel supply. If the systems

replacing electricity and coal were pellet stoves with the rest being log/chip systems this would create the demand for around 4,000 tpa of dry wood. See the notes later on supplies of local wood fuel.

It is understood that the RHI- Renewable Heat Incentive- is due to close at the end of March 2022, but there are some indications that it will continue: though for how long is not known. Once the government subsidy position is clear, local action plans can be finalised.

Proposal

Set up a feasibility study for the community/farming community to set up an appropriate enterprise to install and manage a range of local wood heat installations in both domestic and commercial premises. This should include the supply of systems, installation, maintenance, skills training, financing programmes and the contracting for a suitable supply of local wood. The feasibility study should also investigate the potential for both solar drying of local wood, at the wood edge, and the preparation of around 1,500+ tpa of local wood pellets.

Eco-efficient storage radiators programme

Homes which are already using electricity for their heating often have Economy 7 night storage radiators. These are usually old and extremely inefficient as they require the home owner to know in advance the temperature of the next evening, which is hard to achieve in our variable weather systems. However the new Eco/Smart night store heaters are well controlled and insulated. They only produce heat when programmed to and when the external temperature is low enough. This new approach yields more comfort and reduces electricity use. In addition this technology can be installed with little disruption to the household and one room at a time as finance becomes available.

Around 7,260 MWh pa is used at present in electrically heated homes for night store heaters and direct electrical heaters. If the 65% of such homes not suggested for heat pump systems were changed to smart night storage radiators this would save around 25% of the energy used now, some 1,800 MWh pa and 550 tpa CO₂e.

Smart night storage radiator



❖ **Lighting – LED programme**

As noted earlier in this report, changing lighting in homes from incandescent and halogen bulbs to LEDs can save around 250 kWh/home pa. A major programme of LED fitting could if 80% of homes participated therefore save around 1,700 MWh pa with two thirds of that in the winter period²¹.

Proposal

Set up a Low Carbon Lighting Group in each community as part of the hearts and minds activities suggested earlier in 4.1.2. Make available a range of suitable LED bulbs either free or at low cost for local volunteers (when trained) to install in homes with the residents.

❖ **Controls and energy demand reduction – business and homes**

Significant savings can usually be made when trained observers work with residents and businesses to assess their heating and electricity use systems. Controls are an important part of reducing carbon emissions, energy wastage and high energy bills. This particularly important this winter with the rapidly increasing cost of fossil fuel supplies.

Proposal

Set up a Low Carbon Energy Group with local businesses as part of the hearts and minds activities for the business sector. This group would employ suitable consultants to run workshops for groups of businesses and visit premises to advice on best practice.

The Bude Community Programme could usefully include advice surgeries showcasing local suppliers and building local skills for appropriate control systems, lighting systems, heating replacement options etc.

Around 25% of total energy in business buildings could be saved through this kind of targeted activity. This would save some 12,000 MWh pa and around 3,500 tpa CO₂e. If achieved over a ten year programme this would save nearly 16,000 tonnes CO₂e. However, as most measures identified would have short payback periods, this should be achievable within five years.

❖ **Building up secondhand business supplies**

It is possible to significantly reduce embedded carbon in new goods, appliances etc by running businesses to specialise in secondhand goods such as clothes, furniture, appliances, specialist machines, etc. There is already a range of charities and businesses carrying out these businesses, but judging by the local

²¹ Further analysis of the household electricity survey: lighting study final report May 2013. Nicola Terry et al Cambridge Architectural Survey and Loughborough University.

waste arisings there is still a major opportunity to reduce new embedded carbon with local businesses.

Proposal

Once the local community hearts and minds local groups are up and running, feasibility work can begin for either local volunteer/charity or business feasibility for increasing the market for secondhand goods. This would be on a more organised basis than the expected local community hub activities encouraging local digital market place actions, and could include business supplies as well as home and garden goods.

A key element of this activity is to ensure that existing sellers of new stuff are part of the transition to reducing new purchases. This could be a difficult process, and will require local knowledge and expertise to reduce opposition from those who fear this change. A lot will depend on local options for staff of retailers and whether they are employed by national entities or are local companies.

4.3.2 Renewable energy supply and storage

The infrastructure needed to achieve the major goal of reaching zero carbon includes the financial and governance structures which are outlined in Section 5 Finance below, as well as the physical structures needed.

This section focuses on what is needed in new supply to meet the reduced demand for local energy once the major demand reduction actions have been undertaken. In practice the new supply and the demand reduction actions are likely to be undertaken over the same time period.

The first steps for action on new renewable energy supplies are the undertaking of several detailed studies into feasibility and the financing of specific renewable energy technologies and the balancing storage to reach local resilience.

❖ Individual business and household solar energy supplies

The Solar Together website is a group buying club which allows individuals to sign up to get a significant group discount in a region for solar panels. See [Home | iChoosr](#)

Proposal

Investigate the potential locally for the PV group buying option and advertise this widely to ensure many households and businesses become aware of this opportunity and are encouraged to investigate. The installation of rooftop PV could be important for reducing home and business electricity bills with prices climbing rapidly at present. This could be a useful adjunct to the community climate awareness and local repair/skills hub activities.

❖ Wood

The earlier section on wood heat for local buildings indicated that around 4,000 tpa dry wood is needed to meet the proposed level of home heating using local biomass. This could include over 1,500 tpa of pellet supplies for those needing an ease of use system.

The present area of woodland in the local area is around 2,300 ha. If 25% of this is to be managed for wood fuel and some other wood products this would yield around 1,100 tpa of dry wood, as well as creating local employment.

The wood heat programme would therefore require an extra 2,900 dry tpa of wood supply from local new coppice woodland. Such a supply needs under 400 ha which could be from 2.4% of local grassland being planted to a range of locally appropriate tree species.

Proposal

Gather local farmers and landowners for a working group on Regenerative Agriculture for the area and work into this which areas would be suitable and potentially available for development of new coppice woodland, including liaison with Westcountry Rivers Trust.

Develop feasibility study to include all co-benefits including new employment, increased biodiversity, how landowners can benefit from the new ELM Scheme and how this works together with the Zero Carbon aims of the area, what skills and infrastructure are needed including wood drying (solar driers), pellet manufacture, wood and pellet pricing etc.

❖ Hydropower

The local potential for hydropower is only around 500kW at the most with a potential output of about 2,000 MWh pa or some 2.5% of present electricity demand. Whilst this is a small fraction of local electricity use, hydro can be a useful resource for specific locations. For example the flowing water can be used as the heat source for heat pump installations with the power being used to drive the heat pump.

Old water mills were around 5-7kW in scale and their infrastructure may still be in evidence to some extent.

Proposal

Undertake a feasibility study to update the data presented here from the earlier Cornwall hydro assessment. This should include visits to each location and determine the present viability of the sites, including potential grid connections or private wire options for selling electricity, Environment Agency abstraction licensing and the planning and civil engineering issues.

This study could potentially yield up to around 100kW of viable sites, producing over 300 MWh pa. This would save around 100 tpa CO₂e, and provide some part time local employment and local skills development. The feasibility study needs to be carried out in close liaison with the Environment Agency and the Westcountry Rivers Trust with its local expertise on the nature issues around each river catchment.

❖ **Wind energy**

An increase in local wind electricity is an important element of increasing local resilience and significantly reducing local greenhouse gas emissions from energy demand in the area. More wind energy is also needed as a reliable supply for the winter to balance the predominantly summer supply from solar PV, as noted in Section 3 above.

Assuming that the overall energy demand reduction programmes and proposals meet their aims, the necessity for new wind energy is around 47,000 MWh pa. This level of demand can be met by five 2.3 MW wind turbines, or sixteen 850kW turbines. Replacing present electricity with this level of wind energy would save around 14,440 tpa CO₂e.

As sixteen turbines would have a higher landscape impact than five, it is assumed that the programme should work on the assumption of a smaller number of full scale turbines, which in any case would be more cost-effective.

Proposal

Carry out a feasibility study for local wind to include:-

- integration with other new renewables supplies and storage needs
- detailed assessment of the potential sites to determine the most appropriate sites for landowner, landscape, planning, grid connection viewpoints
- develop local community approaches and involvement in site choices and locations
- develop planning strategy
- develop local community governance and ownership strategy (see Section 5)

❖ **Solar thermal**

Appropriately sized solar thermal installations can provide around 75+ % of summer hot water for homes and businesses. Solar thermal systems are significantly more efficient than solar PV systems and have the advantage of allowing hot water storage until needed, with well insulated modern tanks. In

businesses with food/restaurant sales, or visitors staying overnight it is likely that nearly 20% of their energy needs are for hot water. Assuming that say 45% of local businesses are focussed towards the visitor economy this could amount to about 680 businesses.

A suitable target for local solar thermal installations would be around 50% of local tourism related businesses, particularly as these have their highest demand in the summer. This would be around could save 1,600 MWh pa over 340 businesses. A three year programme of 100-115 installations a year would yield high returns for these local businesses, with most local businesses using mainly increasingly expensive electricity for their energy needs.

This rate of installation would provide some local employment, and save around 500 tpa of greenhouse gas emissions.

❖ **Solar PV**

If a business programme included 35% of local businesses installing 5-10kW of PV panels this would provide around 10% of the present non domestic electricity demand and would be a useful contribution to local fossil fuel demands, by displacing some 3,900 MWh pa saving 1,200 tpa CO₂e. This can be achieved through the group buying scheme noted earlier and through significant awareness raising as well as local business leaders showing the way.

The household installation of solar PV panels could be increased from the present level of 600 domestic rooftop installations on 7% of homes, to potentially 12% of local homes this would represent an increase of 450 systems. At 3kW each this would add 1.35 MW to local PV supplies and increase local PV output by around 1,200 MWh pa or some 4% of present domestic electricity supplies.

❖ **Energy storage**

Energy storage will be needed as part of addressing the grid constraints in the local area and over all of Cornwall. Upstream of Cornwall there are major scale issues for exporting power at peak solar generation times, as well as some constraints on exporting power at peak wind supply if the temperatures are not low. The requirement for storage therefore depends on the assessment of the grid and power flows at seasonal peaks vs the demand for local supply at those times.

Alongside energy storage it is important to understand what can be achieved by simultaneous control of demand – known as Demand Side Management. This can be via controls on business electricity demand eg for large freezers/fridges in supermarkets and meat, vegetable and flower/bulb processing/storage locations, or for the timing of EV charging at agreed home or business locations.

Proposal

Set up feasibility study including local power flow modelling on a half hour basis to assess the very local and overall new renewable electricity supply and demand reduction programmes and determine details of the grid constraints for the Bude area, against realistic constraints. Develop actions needed in conjunction with Western Power Development to progress the local electricity system with appropriate large scale storage and DSM measures, with Dynamic Voltage Regulation as appropriate. Assess the need for any synchronous generation and other technical measures to enable the Zero Carbon aim to be realised with local resilience.

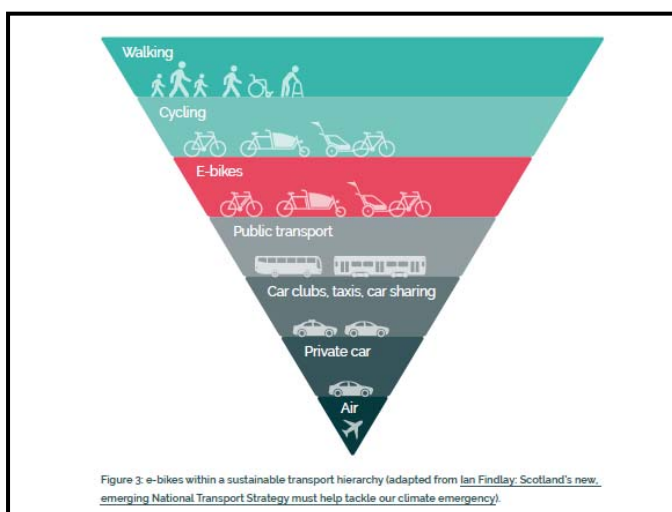
Proposal

Set up feasibility study, in conjunction with the local power flow modelling, to assess the potential for the identified pumped storage locations including land owner discussions, planning issues, civils and grid issues, fitting into the landscape appropriately for the area, and outline costs, efficiencies and technical timetable. Assess how to implement together with new local renewable electricity supply and prepare outline business plan with governance appropriate for local community ownership.

4.3.3 Transport

❖ Transport hierarchy

The transport hierarchy indicates the order in which decisions should be made for preference to increase the sustainability of the transport system.



It is clear that the present transport system is the inverse of this, with the car taking the most investment, road space, energy and creating the most environmental damage.

This report aims to propose methods to start reversing the present pyramid towards the inverted pyramid of the Transport Hierarchy as seen in the diagram.

❖ **Local travel surveys**

The Bude Travel survey carried out in September 2021 has yielded valuable information on a representative sample of the local population. Details of the questionnaire and its method of sampling are given in the reports which are in the Appendices to the detailed transport report

Full survey report BCP Appendix to separate Transport report
Transport report – available separately
School transport survey report – Appendix to Transport report

The lessons learnt for strategy and action development are included here with the emphasis being on how to move towards zero carbon for transport and what infrastructure is needed to achieve this aim.

Travel survey findings

The main reasons for travelling are food shopping and work with seeing friends and family also a high priority. Close to 10% of journeys taken are for sports and social activities and entertainment. One unexpected finding is that around 40% of journeys are for more than one reason. This will tend to reduce the amount of fuel needed for travelling in the local area. A concern for many has been the high number of older people in the local population and their potentially high medical needs, but this survey found that only 3% of journeys were for medical or health reasons, which augers well for the present health of local people. This is backed up by the Cornwall-wide travel survey which found that medical appointments are occurring at much the same rate for Cornwall as for Bude, potentially suggesting that the older population around Bude may be healthier than expected from their chronological ages.

The survey also shows that nearly everyone socialises with friends/family at least monthly and three quarters meet up daily or weekly. This suggests a close knit community, with only some 6% not meeting regularly with family or friends. How this correlates or not with the lower than expected medical appointment needs of older people in the area is not known, but could be an important factor in local general health.

The Cornwall-wide survey found that people generally travel shorter distances for shopping than for work and mainly to the nearest major town, with 80% travelling less than ten miles.

On the plus side there is a good understanding that reducing car travel benefits climate change, that bus travel is good value for money and is safe & secure.

Bus travel

The relatively high proportion, over one third, who would consider using the bus for their transport needs, is helpful for designing suitable action strategies, though the main car using reason appears to relate strongly to convenience. The main reasons being convenience, carrying packages/shopping and organisation. This high figure shows that other low carbon transport needs to be convenient and flexible, with packages/shopping etc easily incorporated. It also indicates that if car travel becomes less convenient then other transport methods would increase

Q9 on reasons for not using buses more often, mainly focus on bus frequency, their relationship to destinations and difficulty with complex journeys. Given that many journeys (40%) are for more than one reason, the difficulty with bus journeys is understandable. That still leaves 60% of journeys which appear to have one focus, and hence could be addressed by increasing bus frequency and determining the most important destination locations to increase passenger use. The Department for Transport has a “golden question” around attitudes and the Cornwall survey found that 68% of Cornish residents agreed, strongly or slightly, with the suggestion that “successful people travel by car rather than by bus”. This could be a major stumbling block on the journey to zero carbon.

Cycling and walking

The answers to the Bude survey on cycling clearly show that the following are major blocks:-

- Too far or too hilly
- Not safe, too much traffic
- Unfitness
- Cycle paths not good enough.

The two main methods of reducing these impediments:-

- Quality cycle paths separate from roads (not safe, paths no good)
- Electric bikes (too far, too hilly, not fit)

Once good quality and safe cycle paths are available the distance problem reduces significantly with the use of ebikes. In the Cornwall-wide survey one third of people were willing to cycle more if there were more dedicated cycle paths.

The main blocks to walking reported are:-

- Too much traffic, noise and congestion
- Weather
- Unfitness
- Too far or too hilly

Other transport surveys indicate that a major impediment to walking is the lack of suitable footpaths. It is also clear that the availability of seats and toilets at regular intervals would enable less fit people to walk further and more regularly. Possibly some seats could be under cover to reduce the unreliable weather problem, rain generally being the main deterrent to walking.

Dual use segregated footpath & cycleway



Electric vehicles

The two main strategies to the change to EVs appear to be:-

- enable affordable financing
- increasing the number of charge points and information on their locations

❖ Development of strategy for carbon reduction

There are two main elements to increasing low carbon travel and reducing fossil fuel car travel. These are the physical infrastructure development and the organisational structure in the local region.

The distance and frequency of travel is a key determinant of the methods to reduce the use of fossil fuels for this purpose. The data for the table below is from the Travel to Work Survey analysed in the Carbon Audit, the Cornwall Travel Survey and the Bude Travel Survey

Estimate of approaches to low carbon travel from present fossil fuel car use

% of trips/people	Distance per journey retn.	% of total distances by car	Options for low/zero carbon travel				
			Walk	Cycle	Ebike	Bus	EV
Work --daily							
44%	< 10km	5%	✓	✓	✓	✓	
21%	10-30km	19%			✓	✓	✓
18%	c. 70km	49%				✓	✓
17%	varies c.50km	27%					✓
Shopping – weekly 76%, monthly 7%, daily 7%							
68%	< 5km	23%	✓	✓	✓	✓	
16%	5- 8km	19%		✓	✓	✓	✓
6%	8- 16 km	13%			✓	✓	✓
10%	>16km	45%				✓	✓

A key takeaway from this analysis is that the smaller proportion of longer distances travelled entails by far the highest percentage of mileage driven. Some 18% of workers are travelling around 70km a day and racking up nearly half the work related mileage and the 10% of shopping trips over 10 miles (16km) use 45% of the shopping mileage. The shopping mileage to more distant shops is around two million miles a year.

A major strategy point for the reduction of shopping car trip miles each year would be to enable local residents to achieve more of their food shopping closer to home. As nearly 70% of food shopping trips are less than three miles, it appears there is potential for this approach to succeed in conjunction with the development of the local food strategy.

It is also clear from the Bude travel survey that people are willing to walk, cycle and catch the bus for short trips. This indicates that in some circumstances the bus is convenient. This willingness of people to travel by bus for shorter trips indicates that the obstacles to much higher proportions of longer journeys being taken by bus are higher. It is important to determine methods to achieve this convenience over longer distances in the local circumstances of the wider Bude area.

The high proportion of mileage driven by the regular long distance journeys indicates the importance of low carbon journeys by bus or electric vehicles, as these journeys are more susceptible to weather disturbance for ebikes for example.

Proposal

Carry out survey work with the bus companies/Cornwall Council to determine details of the bus timetables and their constraints. Work with the residents who have expressed a willingness to help with the transport strategy to determine the best times and destinations for increased regular bus travel. Talk with local employers about their staff travel plans. Key issues include timetables, destinations, types of bus – including ease of entry and exit with children, shopping etc. Local community groups could also help with local knowledge and survey work for local travel needs.

As the highest proportion of car travel is longer distances, it is clear that the best return on efforts to reduce carbon in this largely rural area is to target the implementation of a high electric vehicle fleet focused on longer distance workers.

Large increases in walking and cycling, including with ebikes will help improve the town and village experience through a reduction in noise, pollution and traffic volumes but will only bring about small reductions in carbon emissions.

Other benefits still make this worthwhile and have positive health impacts as well as benefiting town and village trade and communities. It is also possible that increasing local active travel will encourage local action towards low carbon travel for longer distances.²² This recent research found that cycling and ebikes can be 30 times lower in emissions compared to fossil cars or 10 times lower than EVs.

Proposal

Once the local community action groups are set up and flexing their “community muscles”, suggest carrying out very local travel needs surveys and use the results in an iterative way to help plan walking and cycling routes in conjunction with BCP for the main destinations. Local people will be able to suggest suitable routes, potentially talk with landowners and gain local support. Keen cyclists and walkers can be brought in to provide expertise and advise on route technical requirements and on suitable clothing, walking boots/shoes and appropriate bicycles and ebikes, etc.

The community groups could also ask local businesses to demonstrate suitable bicycles and ebikes, including ecargo bikes to show how cycling can be managed with young children and/or shopping.

If the local community is leading the demand for more and better paths and cycle tracks, this increases the chances of the changes being made in a reasonable timeframe. **See also** the proposal in the Transport Infrastructure section below.

Target mode changes for main reasons for personal journeys

Trip type and distance		Targets for low/zero carbon travel					fossil miles remaining
		Walk	Cycle	Ebike	Bus	EV	
Work	<i>present mode</i>	17%	20%	0%	2%	0%	
% of trips	distance band						2.1%
44%	<10km 5%	29%	35%	15%	10%	11%	0%
21%	10-30km 19%		15%	25%	12%	35%	2.5%
18%	>30km 49%				10%	80%	4.9%
17%	Varies 27%					90%	2.7%
Shopping	<i>present mode</i>	24%	5%	0%	7%	0%	
% of trips	distance band						4.7%
68%	< 5km 23%	35%	10%	15%	12%	15%	3.0%
16%	5-8km 19%		8%	12%	10%	50%	3.8%
6%	8-16km 13%			10%	10%	65%	2.0%
10%	>16km 45%				5%	80%	6.8%

The table above takes forward the understanding gained in the previous table “Estimate of approaches to low carbon travel from present fossil fuel car use” which shows the relative number of trips vs distance for the two main reasons

²² [The climate change mitigation effects of daily active travel in cities | Elsevier Enhanced Reader](#)

for travel ie work and food shopping. The figures in *italics* are the best estimates for the present mode for all distance band for these two purposes. Using the proposed new modes of transport for each distance band and purpose, an estimate is made here for the % change feasible to achieve with strong community programmes for each new travel mode. The last column indicates the remaining percentages of fossil fuel miles. This programme reduces work mileage using fossil fuel cars to 2.1% of the present mileage and shopping miles to under 5%.

If similar programme is followed for the remaining car travel journeys, the expected fossil fuel car travel will be reduced to 3% of the present level. This means that around 1.5 million miles would continue as fossil fuel, compared to the present 51 million miles pa in the local area.

Thus the carbon emissions for personal transport drop from nearly 20,000 tpa CO₂e to around 600tpa CO₂e.

Another thread to the reduction of travel needs and hence reducing the carbon emissions relates to the high percentage of people who work from home in this area. In the Travel to Work Survey in the last Census in 2011 this was 23% of those who were in work. The recent pandemic and supply chain shortages, with the trend away from in-office working and more people refusing to work in poor conditions or for very long shifts there is undoubtedly a trend to more home-working. Some will be continuing to work from home, even after Covid restrictions cease. However there is so far only anecdotal information on the scale of this trend, so it has not been possible to assess its impact on carbon emissions or the programme strategy on travel.

New cycle track in Poland c €50k/km



Electric cars

It is clear from the tables above that even with encouragement to take to the walking shoes, ebike or bus, for many people this will not be a feasible option. This is thought to be mainly due to the rural nature of the local area and hence even with extra help the buses will not suffice and the distances are too great for regular cycling.

The government has stated several times that its intention is to ban the sale of fossil fuel cars by 2030. It is not certain when this ban will actually be made a legal mandate, so for now it is assumed that no new fossil fuel cars will be sold in the UK from 2030.

As the BCP aim is to be carbon free by about then, this means taking action to speed up the change to EVs in the local fleet. As the local fleet of cars is mainly some 10-15 years old, without local action it could take until 2045 for all local vehicles to be fossil fuel free. This means that the local strategy needs to include positive action towards increasing local use of EVs.

It is therefore proposed that a local loan scheme be introduced by the Partnership to speed up local change to EVs. Once people are familiar with EVs and how cheap and easy they are to run, there is “no going back”-as nearly everyone becomes a convert.

The focus needs to be on the drivers who travel the furthest – those travelling longer distances for work or for food shopping for example. The Bude travel survey, when analysed in conjunction with the earlier Travel to Work statistics shows that around one third of work drivers are travelling for two thirds of the local mileage.

A wider spread of distances is shown for the food shopping analysis, but still it was found that one quarter of drivers cover nearly half the food shopping miles. As noted above, local action to help residents obtain more of their food from local sources would cut this mileage demand.

The action on EVs is therefore to enable a change to EVs at speed, by focussing the proposed loan or other scheme on longer distance local drivers in the first instance. They have the most to save from lower fuel bills and the environment has the most to gain from faster carbon emission reductions.

Proposal

The community group/BCP to confer with central government representatives, via the SW Energy Hub which aims to help the SW move towards zero carbon energy. The transition to EVs is one of its Strategic Priorities.
Develop an action plan to speed the uptake of EVs, possibly via a loan scheme to reduce the upfront cost which is often prohibitive locally.

Freight transport

About one third of local transport fuels are for freight transport. HGVs make up around 47% of the freight energy costs and LGVs 53%. The combine mileage in the local area is around 13 million miles. As the larger proportion is LGVs, which tend to be more locally based than the larger HGVs, it may be possible to encourage local businesses to move to electric vans for freight transport.

The Cornwall level HGV and LGV registration data suggests that *pro rata* there may be around 2,000 LGVs in the local area, indicating that most businesses will have access to a van for collection and delivery purposes. These vehicles may be covering an average of 5,000 miles a year, though this is an estimate only, and some will be used considerably less than this.

At present there is little information about the routes and delivery journeys taken by local freight lorries, making it difficult to suggest methods of reducing this source of ghg emissions.

Proposal

The Partnership to collaborate with local businesses in investigating the local deliveries to and exports from the local area of goods/materials. This is to determine patterns which could help design low carbon alternatives. Carry out hyper local traffic surveys to determine the numbers of larger vehicles. Particular attention to be paid to options for Last Mile Deliveries and for electric cargo bikes. These options can reduce the use of larger delivery vehicles for local deliveries where they have a disproportionately large impact. Investigate this approach in conjunction with Pedestrianisation and major traffic calming measures.

See also below for community group working with business re ecargo bike options.

Ecargo bikes may also prove useful for local deliveries for the lower mileage vehicles in particular.

Proposal

BCP to work with the local business community to encourage new delivery vehicles to be electric LGVs. Local businesses groups to investigate the potential for ecargo bikes for very local deliveries. There may be potential for a community owned business in the direct rental and the development of managed ecargo bike deliveries in specific local areas.

Example ecargo bikes



Ecargo bikes are generally a good business decision for local deliveries. They are priced at £4,500 upwards and cost little to power. They are available on bike purchase schemes and so can save tax, as well as being convenient and flexible. The battery assist system effectively “flattens the hills” making this approach a suitable one even in hilly Cornwall.

Transport physical infrastructure development

It is vital to recognise that behaviour follows structure. Therefore the aim of zero carbon transport can only be met if the local transport infrastructure allows and encourages appropriate travel patterns.

Whilst the Bude Climate Partnership is not directly responsible for the siting, development or maintenance of the local transport infrastructure, the time has come for the local area Council and residents to combine in pushing for local action on the following infrastructure issues:-

❖ Cycle path development

Cornwall Council’s company, Cormac, carried out a feasibility study in 2019 with the aim of increasing local cycle and footpaths around Bude. However the study appears to be a minimal approach with many shared paths proposed. This approach, whilst increasing the pathways available is not fit for the

purpose of rapidly increasing the number of local cycling and walking journeys. Most of the proposed paths are shared or are cycle lanes on the roads with no separation from traffic.

For cycle paths to be well used and encouraging cyclists of all ages and fitness, they must be:-

- Separate from traffic
- At least two metres wide to allow overtaking
- Separate from walkers or at least 2.6m wide to allow safe distances between cyclists and walkers
- Well lit
- Smooth surfaces to allow all bicycle types to use them
- With ease of access for entering and leaving the cycle path, and a smooth transition to roads or other paths
- Well signposted
- Investigation for showers at key destination points eg for workplaces

❖ **Footpath development**

It is clear from the Bude transport survey and from other transport surveys that many more people would walk if the footpaths were appropriate and more suited to the less able in society. Therefore the local footpaths need to be:-

- Separate from traffic and preferably from cyclists
- Smooth surfaces, well maintained & suitable for wheelchairs, buggies, shopping trolleys etc
- With suitable seating at regular intervals
- Sheltered spots to allow respite from the rain
- Well signposted and lit
- Lead to appropriate facilities such as toilets, parks and shops etc
- Co-designed and sited with the local people who will use them

Proposal

Work with Cornwall Council and local communities to develop a large community awareness raising and pathway co-design and development process. This should include local cycling clubs, local mums and toddler groups, the older generation – possibly via the community hub groups once they are gaining strength. This process would be a natural development – particularly if the local hubs had included cycle repair workshops in their activities. **See also** above for local community group actions proposed.

Community pedal power: Truro Safe Cycling Campaign



❖ Pedestrianisation

With many people both attached to their cars and unwilling to walk because of the traffic safety and noise issues, one step towards more walking is to close town and village centres to motor vehicles. Places which have achieved this have found significant increases in local footfall and increased attraction to the local centre.

Where the only road goes through the village centre a key starting point is to make it impossible for cars to go fast by installing large planters etc to provide effective traffic calming.

It can be successful to close the area only on one day a week to show the local people what it feels like to be traffic and noise free. Often this is a Sunday when fewer people are going out to work and are more likely to be able to venture out on foot.

❖ Electric vehicle charging infrastructure

As the Bude area only has one public charging point it is important to install more charging points in locations where EV users will need to use a public charging point. The new sites in development will need to be publicised soon. Those with off-road parking are most likely to install their own private charge point, which is low cost if slow.

However for those with no off-road parking, public high speed charge points are needed, which are more capital intensive. The government has made available the Charging Infrastructure Investment Fund. This Fund installs EV charging points for public use throughout the towns and cities of the country, via a private sector company.

[Workplace Charging Scheme: guidance for applicants, chargepoint installers and manufacturers - GOV.UK \(www.gov.uk\)](https://www.gov.uk/government/workplace-charging-scheme)

Proposal

Contact the CIIF for further details. Investigate other options for local charge point installations which would provide more local benefit, such as low cost options for village halls, schools etc and work with Cornwall Council on carpark options. Work locally with community groups, large shops, car park owners, the Cricket Club etc to determine the best locations and potential use levels for EV charge points.

Develop a community business plan for installations including fund raising, expected income etc to raise the capital and then install the charge points. This work could be in conjunction with site assessments for the potential for PV canopies to provide some local electricity to the charge point, where higher prices than home electricity are charged. Charge point electricity sales would be a valuable source of income for a community group

Example EV charging in a Cornish tourist business

Watergate Bay Hotel, needed advice on a new EV charging solution flexible enough to meet this growing demand. Over several months, we worked with the hotel to develop a bespoke solution. This included investigating the whole EV technology market to define our recommended offering: a network of four smart chargers.

Our research also highlighted a potential grid capacity issue, which would be expensive to fix. After liaising with the local Distribution Network Operator (DNO) we installed power management software specifically engineered to the hotel's needs. To further increase the adaptability of the system, the smart chargers came with a dashboard allowing the hotel to monitor how guests use them and set charging prices if required in the future." Good Energy

Transport organisation infrastructure

❖ Cycling

The following organisational activities are needed to help the process of getting more people cycling more often:-

- Cycle training clubs
- Cycling clubs
- Cycle repair workshops – possibly in the local community hubs
- Cyclescheme - cycle leasing scheme saving money for participants- *see box below*
- Set up businesses and organisations group with aims and actions for local transport improvements
- Individual businesses can encourage and help their staff, directors , shareholders and supplies delivery to improve their environmental footprint by for example
 - Help improve individual travel choices both for work and personal travel
 - Install local showers and changing rooms

- Public transport annual season ticket loans
- Green car leasing scheme
- Install EV charge points at business premises

Cycle Freedom to Ride The Department for Transport has a cycle to work scheme guidance, enabling you to save money and spread the cost on cycle to work packages worth more than £1,000. This means savings on everything needed to cycle to work-including bike and cycle accessories such as helmets, padlocks etc. This is particularly advantageous for e-bikes and cargo bikes as they tend to cost over £1,000.

What is the cycle to work benefit? - Cyclescheme

This scheme requires employers to join and then employees can lease bicycles, ebikes and cargo bikes from the scheme for up to four years with significant financial savings to the employee and at no cost to the employer.

Ebike library and sales

As Ebikes are relatively new and cost over £1,000 for any quality ebike, it is valuable to have local access to an ebike “library” or hire system so that the usefulness can be assessed by anyone potentially interested in this option. Each community group could determine whether this would increase the takeup of ebikes in their local area.

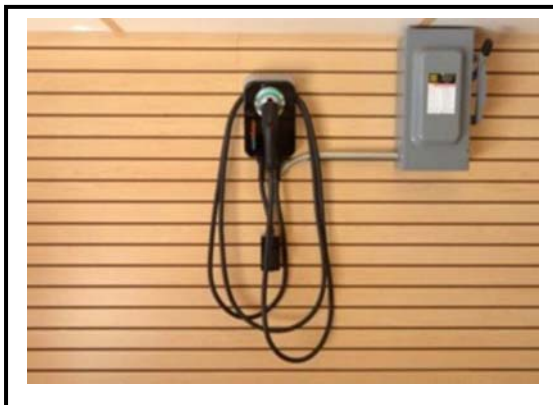
[On demand electric bike hire in Exeter | Co Bikes \(co-bikes.co.uk\)](http://co-bikes.co.uk)

There already ebike sales outlets online and two outlets at Barnstable open for business.

Car sharing schemes

These schemes reduce the number of cars in the area as fewer are needed. Of particular interest are the new schemes for EVs Co-Cars – with several sites around Cornwall now are providing EVs

Home EV charger



Public twin EV charger



5 Finance

Financing the large amount of activity and investment needed for the local area to achieve zero carbon within a short time frame will cost a significant amount of money, which means that suitable organisational structures need to be in place in order to borrow and otherwise raise the millions of pounds needed. This can be offset against the costs which would be incurred for “normal” replacement costs of equipment etc.

Although the amounts needed are high, one of the key parameters is to understand the costs of inaction. All the indications from the science and explanations of those who understand these costs are that it will be significantly cheaper to undertake this investment now, rather than later or not at all. With the local threat of sea level rise this should be clear in the wider Bude area.

5.1 *Example programme finance requirements*

The types of funding needed split into three main areas depending on the reason for the investment:-

- Community and business set ups and running for local engaging of hearts and minds with wide awareness aims
- Community businesses set up to deliver the new technology installations and local supplies required
- Investment in technologies to reduce emissions
- Investment in technologies to generate local renewable energy supplies

All of these approaches are needed for the programme to succeed.

The options, often classified as “revenue funded” are the community and business awareness raising actions. Whilst essential to enable the rest of the programme to take place, the direct energy and carbon savings are not clear or easily measured from these community awareness building activities.

The table below indicates the levels of capital and revenue funding which are likely to be needed to achieve the Zero Carbon target set by the Bude Climate Partnership. However it needs to be recognised that some of the capital costs can be covered by lending schemes which allow for a lower starting level of capital requirements and lend to later beneficiaries from the repayments of earlier scheme participants.

Approximate costs and potential sources of funding for the Action Programme

Tasks over ten year programme		Total capital		Potential funding sources
		£	£ pa	
Community action				
	Local groups	£1m	£100k	Grant aid, various sources, potentially earnings from local community business activities
Energy demand reduction				
	Insulation: Solid Wall hempcrete	£119m	£11.9m	Loans to beneficiaries
	Insulation: loft sheeps wool	£5m	£500k	Loans to beneficiaries
	Heating systems change			Loan system to beneficiaries
	Ground source heat pumps	£53m	£3.5m	- after deduction of new grant
	Air source heat pumps	£30m	£1.4m	- after deduction of new grant
	Wood stoves	£8m	£0.8m	Loans to beneficiaries
	Eco storage radiators	£1.5m	£150k	Loans to beneficiaries
Renewable energy generation				
	Wind five turbines	£11.7m		Presumed commercial loans 75%+, plus 25% equity, crowdfunding, share issue, etc £3.5m
	Solar PV arrays	£2.3m		
Transport				
	Electric vehicles –cars	£1.5m	£500k	Loans above government grants of £2.5k each say £1-4k , & 2-3 yr loans
	Electric vehicles- ebikes, ecargo bikes	£500k	£50k	Non-employer based loan scheme (<i>existing government backed loan scheme is only via employers</i>)
	New cycle and footpaths	£1m	£100k	Work with Cornwall Council to speed up new active travel pathways - & increase capital from central government
Enabling community businesses using local supplies				
	Farming community: woodland planting plus wood stove installation, maintenance	£90k		Community shares and local farming community investment, potential income from suitable ELMs payments?
	Farming community: fleeces to loft insulation facility	£1.5m		Share issue in local community area
	Farming community: hemp growing, harvesting , insulation preparation	£2.6m		Share issue in local community
	Community including local building trades: set up to train & install SWI using local hempcrete	£250k		Potential shares, loans etc

The actual capital needs therefore are lower than the table indicates. The present assumptions are based on a range of potential sources for the necessary finance to achieve carbon zero from energy demand.

The situation is complicated by the changing government financing and subsidy situation with grants available to assist the installation of heat pumps, and towards the costs of electric vehicles and home chargers.

The lending schemes proposed cover the following activities:-

Up to Five year loans to include:-

- ◆ Loft insulation
- ◆ Ebikes
- ◆ EVs
- ◆ Eco-storage rads

Total capital required around £12.7 million with cash input of about £9 million plus the cost of money.

Up to Ten year loans to include:-

- ◆ Solid Wall Insulation
- ◆ Wood stoves
- ◆ Heat pumps

Total capital cost for these longer term investments is around £21.2 million with a cash input of around £11million plus the cost of money.

5.2 Potential financing methods

5.2.1 Grant funding for “revenue” activities

There are several grant schemes available which could fund the community and hearts and minds activities outlined in Section 4.1. Once the local renewable energy installations are operating, it will be possible to use some of the net income from them to fund the community development and hearts and minds activities.

Apart from the Lottery funding with which BCP is familiar, there are also some charity funds which support the kinds of initiative proposed in this Action Plan.

5.2.2 Investment programme: energy and carbon reduction

This element of the investment programme is likely to require a range of funding sources, depending on the activity to be funded.

Transport infrastructure such as suitable cycling and walking paths and their integration into the local transport network are normally funded by Cornwall Council. However unless they can fund at the level of urgency required for this activity, it may be advisable to work with the Town and Parish Councils and Cornwall Council to find a system for faster access to the investment needed.

Energy demand reduction and energy efficiency action and investments are likely to require a different set of routes to funding. Potential routes include:-

- Loan schemes eg via local authority UK Infrastructure Bank
- Grant aid via central government – with local action to ensure good progress
- Use of funds from community owned renewable energy generation schemes net income
- Partnerships with the private sector
- Share issues for community owned/operated schemes

UK Infrastructure Bank

The UK Infrastructure Bank (UKIB) has recently been set up by central government to lend to local authorities for strategic and high value projects and invest in projects alongside the private sector. It has the twin objectives of helping to tackle climate change, particularly meeting the UK’s net zero emissions targets and helping to support regional and local economic growth across the UK. The UKIB will offer loans to local authorities for high value and strategic projects of at least £5 million. To complement this investment activity, over time, the UKIB will develop an expert advisory service to help local authorities develop and finance projects. The UKIB will build partnerships across the UK including with government departments, government sponsored bodies, local authorities and relevant representative organisations to foster collaboration and drive value for money. *From UKIB website*

The Autumn Budget and Spending Review indicates that UKIB will be lending at gilts plus 60bps. This is expected to be under, or approaching, 2%, which would enable relatively low interest rate loans for the Zero Carbon journey for the Bude area.

Proposal

Develop suitable applications with Cornwall Council with an emphasis on the strategic nature of this Action Plan to show the way for the whole of Cornwall. The proposal should also indicate the number of jobs which would be created and supported by the activities funded. It may be possible to access this funding via a “relevant representative organisation”.

Treasury Debt Management Office managing PWLB

This is a method of obtaining low cost long term lending for Town and Parish Councils as well as Unitary etc Councils. The system requires approval by DLUHC. Local community not-for-profit organisations can also access this funding for capital expenditure.

Applications need to have public support and robust plans to pay off loans which are automatically secured on general revenues of the authority. The funds can be use for capital expenditure and cannot be lent to another entity

Steps – speak to CALC, engage with community to explain plans, apply to CALC for checking submit to DCLG early response. Application needs budget, business

plan, resolution from the Council, repayment plans, any impact on precept, public survey on precept and public consultation response on plans.

The eligible activities relevant to this Action Plan are:-

- ◆ **Regeneration** – Activity that addresses an economic or social market failure, improves or changes the use of an existing asset, generates additional jobs/economic value that would not happen without Local Authority intervention.
- ◆ **Preventative** – Activity that prevents a negative outcome, eg preventing disrepair of an asset of community value, or providing support to maintain economic activity, for which no other source of funding or support is available.

Proposal

Investigate the potential for joint applications with Bude-Stratton Town Council and all the surrounding Parish Councils in the Bude CNA. This could potentially be a series of smaller applications to cover each individual council area, or a joint one which would reduce the business plan process time, but increase the consultation activities required.

5.2.3 Investment programme: renewable energy supplies

The proposed new renewable electricity installations are the kind of investment which can obtain long term sales contracts for all output with reputable counterparties. This enables non-recourse loan finance of various types to be obtained at reasonable rates. The community energy sector has experience in this kind of finance: provided the corporate structure of the borrowing organisation has an asset lock, and secure contracts for a wide range of project elements, the lenders are secure.

This part of the capital finance can be obtained from commercial sources, provided it is complemented by equity finance of an agreed percentage of the total required.

Example commercial bank offering

NatWest Bank The Climate and Sustainable Funding and Financing provided includes financing for various low carbon generation and energy efficiency technologies, low carbon vehicles and enables customers to raise funds through green bonds, loans and green private placements. New £100 billion Climate and Sustainable Funding and Financing target will continue to support UK decarbonisation and the Government's Net Zero Strategy, in-line with the 10-point plan for a Green Industrial Revolution.

The remainder of the capital would need to be via a share offer or bond, which is a recognised method of raising funds for community energy projects.



**Reading Community
Hydro:** £1million
community finance
raised via share offer:
Archimedes screw
46kW

5.3 Organisational structure

The structure needs to enable the purpose of meeting community aims and financing a range of potential corporate structures to meet the local need for investment to reach zero carbon. As one aim is to ensure as much local economic and community benefit as possible it is important to develop suitable community financial structures.

Other aims which need to be taken into account include the Fair Share elements of the work to be done, (see pages 10-11). This includes cultural embedding of :-

Fair share: principles for transactions:-

- Local businesses using local renewable resources
- Community ownership of goods and services
- Wide local share ownership of local services
- Social justice as a local principle
- Increasing local regenerative skills base
- Increasing local markets with local supplies

Advice from organisations such as Power to Change²³, which works in this field, is to include the following:-

Work that is decent and fair is crucial to creating a motivated and skilled workforce who are empowered to deliver high quality services and to innovate. Community organisations are already delivering on many aspects of good work. These elements help organisations understand what good work is and improve existing practices by focusing on seven key dimensions:

²³ [Locality](#)

- ◆ *Meaningful work has a sense of social purpose and value, as well as being engaging and stimulating*
- ◆ *Voice, democratic governance and inclusive culture: includes open communications, peer support and collaborative decision making*
- ◆ *Contracts and job design: certainty around conditions wherever possible*
- ◆ *Pay and benefits: become Living Wage Employer, transparent pay structure*
- ◆ *Skills and development: formal & informal, variety,*
- ◆ *Flexible working, work-life balance and family-friendly support*
- ◆ *Health and wellbeing: recognition of health issues, increased support for health initiatives*

The organisational structure and governance will have a major impact on what finance is it feasible to arrange and the conditions under which it can be used. It is therefore vital to enable a period of time to discuss and evolve the aims, strategy and finances required, as well as the long term plans and their finance and operational issues. Then it is feasible to determine the appropriate governance structure within the community framework required.

Locations for advice on different aspects of this governance process include:-

- ◆ **Coops share issues** [Community Shares Standard Mark | Co-operatives UK handbook](#) , practitioners directory

Community shares have raised £155 million since 2012, and increasing ²⁴



- ◆ **Social entrepreneurs advice** [The Angelfish Community](#)
- ◆ **Community Interest Companies advice** [Governance for Community Interest Companies - A Practical Framework | Voscur](#)

²⁴ [Raise finance with community shares | Co-operatives UK](#)

Example Devon Energy CIC is developing a portfolio of 100MW of community renewable energy projects. It aims to deliver the profits back to Devon communities to fund further low carbon projects. The CIC was founded and is owned by the local level community energy groups throughout Devon, which share the ethos of delivering the transition to carbon neutrality whilst tackling fuel poverty and assisting Devon communities.

Good governance: CIC model



◆ **Community Land Trust** [Community Land Trust Network | Homepage \(communitylandtrusts.org.uk\)](http://communitylandtrusts.org.uk)

Set up originally to help communities obtain secure affordable housing, this model of community action governance has evolved to enable the setting up of village pubs, community energy generation and food growing schemes. CLTs can take many legal forms, but must adhere to certain rules on their aims and governance. Cornwall Community Land Trust is the local hub for advice- with housing specialist and ex local MP Andrew George as the contact. <http://www.cornwallclt.org/>

Proposal

The board of BCP to work through the aims of the next stage of the Carbon Action Plan to determine the key issues relating to community and governance in relation to the actions the group wishes to undertake. This process will need to include local community groups, to ensure that a wide variety of views and ideas are contributing to the essence of the planned actions.

- ❖ Set up local community energy company, of the appropriate form to develop local demand reduction programmes and local new RE supply, along with financing options

6 Conclusions

A wide range of actions is proposed to achieve the Action Plan target of Zero Carbon. The table below indicates the main actions and the carbon reduction expected from each action/programme.

Example community energy building: Reading Hydro



The costs of achieving this can be met via a range of opportunities, most of which can be achieved by community led groups with appropriate governance. Specialist professional advice needs to be taken in the decision process for the community corporate structure.

Once suitable governance is in place and the legal structure has been formed, the Partnership and participating community groups can begin the Action Plan process.

The local area is blessed with a coherent community and many organisations with an environmental background and local expertise, which augers well for successful application of the principles for action outlined in this report.

The table below outlines the proposed community led actions for a ten year programme towards zero carbon for energy.

Actions leading to energy and carbon reduction and Zero Carbon energy

Action	Installations number	Energy/ fossil fuel savings MWh pa	Carbon savings CO2e tonnes		
			Direct tpa @end programme	Total ten years tonnes	Embedded tpa
DEMAND REDUCTION					
Community groups	Five+ groups				
Reducing new stuff	c.1,250 items pa				3,500
Electricity reduction	c.15% homes, 20%<	1,200	400	2,150	
LED lights campaign	80% of homes	1,700	520	3,640	
Ten Pledges	1,000 people pa	900	235	1,300	
Businesses					
Workshops, training	8%	4,200	1,100	5,500	
Controls, buying club	25%	12,000	3,500	15,750	
Local 2nd hand group	250 items pa				2,300
Local supplies					
Hemp insulation	2,750 solid wall	8,500	12,730 ¹	42,500 ²	
Fleece loft insulation	80% of 7,405	16,000	3,260	17,930	
Increased local food	50% fruit & veg, ++				2,600
Non fossil heating systems <i>assumes use renewable electricity sources</i>					
Homes - wood & pellet stoves	21% 1,844	12,900	4,200	23,100	
Heat pumps					
Ground source	3,031				
Air source	3,346	46,000	15,650	73,555	
Smart storage radiators	600 homes	1,800	550	3,300	
Total buildings demand reduction		105,200	42,145	188,725	8,400
% reduction on present energy & carbon demand		63%	93%		
TRANSPORT <i>assumes use renewable electricity sources</i>					
Increased walking, cycling, bus travel		1,000	250	1,250	
Ebikes	4,800	3,380	840	4,620	
Electric vehicles cars	5,000 cars	71,500	18,800	94,000	
Ecargo bikes	500				
Electric vans	1,200	20,150	5,260	30,500	
Total transport demand reduction		96,030	25,150	130,370	
% reduction on present energy & carbon demand		82%	82%		
NEW RENEWABLE ENERGY SUPPLY					
Hydropower	4 installations	300	100	350	
Wind energy	five turbines	47,000	14,440	57,760	
Solar thermal hot water	50% tourist cos.	1,600	500	2,750	
Solar rooftop PV commerce	530 @ 7kW	3,900	1,200	6,600	
Solar rooftop homes	450 @ 3kW	1,200	370	2,030	
Solar PV land arrays	4.2MW c 14 ha	4,600	1,410	8,400	
Energy storage systems	c18% stored elec.	-1,000	-300	-900	
Total new renewable electricity supply		57,600	17,709	87,764	
% present fossil & carbon electricity supply		73%	73%		
Totals fossil demand reduction and new RE supply		258,830	85,004	396,085	
Percentage reductions in fossil energy & carbon		91%	114%		

1 includes annual hemp sequestration from growing

2 includes one off carbon sequestration from lime absorption of CO2e as the insulation cures

In outline, these results are in line with the basic principles that firstly energy demand needs to be reduced to that actually needed, secondly the needs are met with highly efficient systems, which further reduces the demand for energy and thirdly the remaining energy demand is met with local renewable energy supplies.

The results show that the community can make large changes in the local energy system by coming together and working up the local actions for each topic.

The series of changes made, starting directly with community groups and leading on naturally to bringing together the different stakeholders in the community, show that there are many opportunities for local community businesses. In particular the aim of local supplies for local need brings about large reductions in fossil fuel energy demand.

Together the building energy demand reduction actions give an energy saving of 63% and a cut in greenhouse gas emissions of 93%.

The transport energy demand reduction actions lead to an 82% energy demand reduction in this sector and an equal cut in carbon emissions.

Local new renewable electricity supply options provide a replacement for 73% of the present fossil fuel electricity supply and a similar reduction in carbon emissions.

**When the Action Plan is complete the local area will have
over 90% local energy supply and a
carbon footprint for energy of – 14%**