nationalgrid

Net zero community guide

Contents

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nationalgrid

What are 'net zero' carbon targets and how do we all play our part?

The Government, Cornwall Council and many Cornish town and parish councils have declared 'climate emergencies' and have set targets to achieve net zero carbon at various points between 2030 and 2050. What does this really mean?

Broadly, net zero means being as energy efficient as possible at home, work, school and when we are travelling, whilst maximising our use of renewable energy sources and off-setting or balancing any unavoidable emissions by measures that remove carbon dioxide (CO_2) from the atmosphere.

However, when you try to get into the detail, all sorts of questions and concerns arise, such as the potential costs of switching to low carbon heating and energy efficiency upgrades to your home, as well as challenges relating to encouraging societal shifts towards the use of low carbon transport and waste reduction behaviours.

Currently, as a community, we do not have all the answers, but through Net Zero Community (NZCom) we are working through these challenges together.

'We are all in a hurdle race to net zero.

We must not assume that every participant starts in the same place, nor that they are equally ready or equipped to join the race.

Some will hit hurdles early on and may quickly give up. Others will look at the challenge and not know where to start. Some may be prepared for a short sprint or geared up for a marathon.

Some people in your community will be able to move quickly and independently, but how can you really make sure no-one is left behind?

The NZCom project helps you to identify energy inequalities in your community and make a plan that can try to alleviate these in the journey to net zero.'

Dr Tim Jones,
CEO, Community Energy Plus

COMMUNITY ENERGY PLUS

The challenge

The Government has set ambitious targets for the UK to reach net zero carbon by 2050. Cornwall Council has declared a Climate Emergency and set a target for the Council to become carbon neutral by 2030. It is inevitable that to meet these targets, there will be a significant increase in electricity consumption within the community and across the UK, as we move from carbon intensive fuels such as gas, diesel and petrol to renewable electricity for heating and transport.

Moving away from carbon intensive energy sources such as coal, oil, and gas, has the potential to push more people into fuel poverty and negatively impact energy consumers who are already vulnerable.

Demand for electricity is likely to at least double by 2050.

The Climate Change Committee has recommended that all homes need to achieve an energy performance rating of level C by 2035; the energy efficiency of a property is shown on its Energy Performance Certificate (EPC), and it is an important guide to the actions needed to improve its thermal qualities and as a result reduce its CO_2 emissions.

Energy performance of homes can be improved by:

- **increasing insulation levels**
- **improving energy efficiency**
- **phasing out domestic gas supplies and other carbon intensive heating fuels.**

In addition, the Government plans to phase out the purchase of new diesel and petrol cars and encourage car owners to switch to electric vehicles.

Potentially, this will have a massive impact on rural communities with poor public transport links.

In 2021, 12.6% of Cornwall's households, 30,000 homes, were currently in or at risk of fuel poverty.

The cost-of-living crisis and the escalating cost of energy that has impacted households during 2021–22, has further increased the numbers of households struggling to afford to keep warm.

65% of Cornish homes are estimated to have an EPC rating of D or lower.

Affordability and availability of capital to invest in home improvements is a real concern for many people and it may mean that individuals may not be able to take the most energy efficient options to reduce their carbon consumption.

Energy Efficiency Rating	Current EPC rating of homes in Cornwall
A	<1%
B	11%
C	23%
D	29%
E	20%
F	11%
G	5%
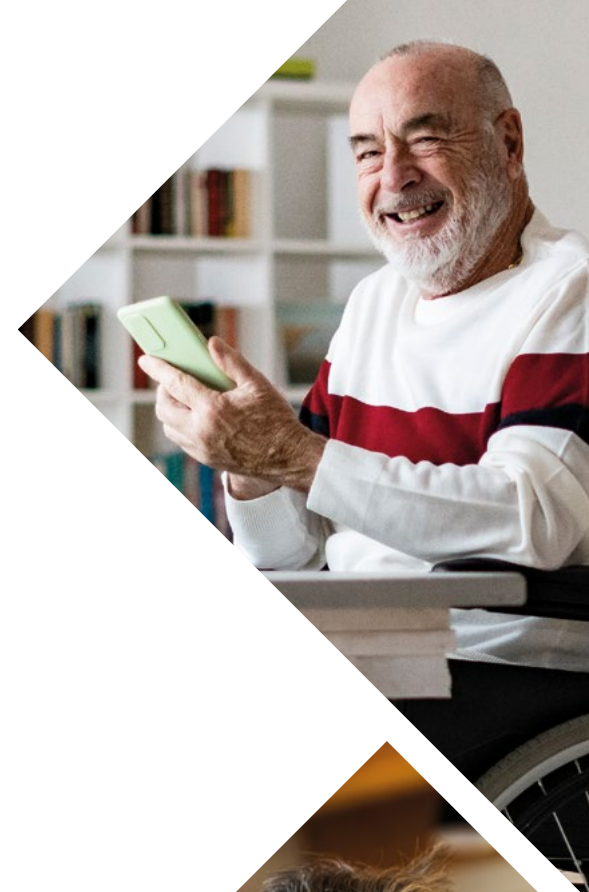
Purpose of this guide

This guide has been written to assist community groups interested in planning for net zero to answer:

- **how do we help our community make the transition to a low carbon future?**
- **what do we need to know and understand about our community?**
- **where are the most vulnerable members of our community and what help do they need?**

Each section in the guide covers the main workstreams of the project and tries to reflect our lessons learnt from the discussions and research produced in the context of the Wadebridge and Padstow Community Network Area. These are:

1. **What can a community do?**

2. **Leaving no-one behind**

3. **What pathway should you take?**

4. **If you can't measure it, you can't manage it**

5. **Technical solutions for a net zero future**

We recognise that many communities are at the start of their net zero journey, with a lot of questions, which will have different solutions in different communities.

We hope this guide will prompt local discussion amongst the groups and key stakeholders in your community.

We have provided links to the detail behind the research and other useful guidance that we have come across along the way.

There is no easy answer or one size that fits all, so we are always keen to receive feedback and understand where we can improve this guide or discuss other methodologies that can be considered.

Please feel free to email the WREN team at **nzcom@wren.uk.com**

NZCom Community Focus Group visit to the South West Climate Change Centre.

1. What can a community do?

How to engage your community

Whatever the size or expertise of your community group, volunteer-led or staffed, building a reputation with your community based on trust is vital to keeping people on board and engaged.

Remain visible and positive within your community, regular interactions build trust.

Take time to understand each indiviudal's energy issues.

Explore how to best link energy issues with wider issues that the community is concerned with, for example, health or poverty alleviation.

Provide honest, up to date and impartial advice.

Maintaining good relations with other local groups and organisations can extend your network reach into the community, often allowing reciprocal 'piggyback' opportunities at engagement events. Be willing to voice your project aims at local forums such as parish and town council or community network panel meetings, further establishing your credentials as a serious group.

It's impossible to know everything

There may be occasions where it is difficult for local community groups to provide immediate help through a lack of high-level expertise of the local energy system, or because of extreme and unique customer circumstances that fall outside of normal energy advice provision.

Flag any knowledge gaps that need to be filled by a specialist.

Signpost to relevant organisations that can provide additional support.

Be prepared to follow up and provide a helping hand to those wanting to take action.

People are your best assets

Community groups will often be led and structured by motivated people wanting to take action for the benefit of their neighbours, colleagues, friends and family.

Local knowledge and experience in other areas such as planning, transport, business, tourism, urban design, landscape and nature-based solutions can add depth to your group.

Leading by example and being seen to live by your values may attract members of the community to your group. People might not want to engage with you if they feel that they are being told what to do. Help community members come to their own conclusions by providing relevant information to them.

Be bold. Look to engage beyond the usual suspects of early adopters, climate activists and the energy literate. Seek out those who need the support most.

It is worth acknowledging that sometimes people who appear to disagree with some of your aims may have some valuable information. For example, how to link energy to what they are passionate about, or insights into gaps in your group's awareness.

1. What can a community do?

Community engagement top tips

Where possible, build upon these community engagement values:

- **trust and honesty** - building a positive reputation
- **lead by example** - be seen to live by your values and others will follow
- **the gift of time** - often the greatest asset any community group can provide
- **follow up** - on all enquiries and see through actions to the end
- **understand the strengths and weaknesses of your group** - be realistic in what can be achieved
- **ask for help** – consider using interns or university students to plug expertise gaps
- **signpost** - to other networks and professional support
- **know who you're helping** - learn to identify between those who are vulnerable and those who are financially astute seeking funding
- **applaud the net zero heroes** - highlight local success stories of positive actions and behaviour change
- **share the success** - share insights with other community groups and learn from their achievements
- **be realistic** - identify pragmatic options and timescales for households to transition to net zero
- **accessible and inclusive** - consider how your community may find it easiest to engage
- **use your imagination** - try out new ways to engage from board games to EV test drives.

WREN playing an energy trading board game.

1. What can a community do?

The Role of Community Energy and Climate Action Groups

Community energy groups, local transition groups and climate action groups come in all shapes, sizes and capacities.

They reflect the interests, expertise and passions of their active members.

Some groups may have members who are well connected to academic and technical experts who can help inform and guide net zero plans and community led initiatives.

The principal areas of activity that local groups may wish to pursue fall into three categories: education, facilitation and action.

From the research undertaken in NZCom, several conclusions have been drawn about how a community could start to transition to net zero. These include:

- **retrofitting energy efficiency at scale**
- **greater penetration of rooftop solar PV, both domestic and commercial**
- **additional ground-mount solar PV and wind generation**
- **greater adoption of heat pump technologies for domestic heating**
- **greater use of EV with associated domestic and community-based charging infrastructure**
- **options for community scale battery storage.**

The types of initiatives that are considered will be informed by your local energy requirement and opportunity to increase renewable energy generation.

Education

To inform and educate their community about opportunities for action.

Although we may understand the challenge, the wider public are often unfamiliar with much of the language around net zero and low carbon technologies.

Community groups who can gain a reputation as a trusted source of impartial, accurate information are well placed to collaborate with their local authorities and others to educate their friends and neighbours.

Community Energy Communication Guide (Friends of the Earth)

Facilitation

To facilitate engagement and discussion by making connections across their community, linking with experts and suppliers and other key players within their community and wider network.

Engaging your community in a meaningful way (Locality)

Action

To make things happen. Many community energy groups have developed renewable energy projects and now manage local assets that can make a significant contribution to local net zero plans.

Community Energy Guide (Friends of the Earth)

1. What can a community do?

Community group activities

To start the transition to net zero the following areas are ones where community groups can help to educate, facilitate and act:

Promoting energy efficiency

Encouraging property owners to improve the thermal efficiency of their homes will make a significant difference to their energy costs and reducing their carbon footprint.

### Understanding what is available – signpost to support

Community groups have a critical role offering impartial information to their communities. Understanding and communicating what grant support is available, both nationally and through your local Council, and knowing who will qualify for help, is a key role for a group that is well-known and trusted.

Thermal imaging - "A picture is worth a thousand words"

Demonstrating to residents where the heat is escaping from their homes is a powerful way for a community group to start to engage with their neighbourhoods on the topic of energy and to help people see what actions they should further investigate

Low carbon whole house retrofit measures can be challenging but often there are small steps, like improving loft insulation, which are low cost and effective.

Using a thermal imaging camera and being able to interpret the results to provide advice is a skill that needs to be acquired, but even without this level of understanding and experience it is a good educational tool and provides a clear call for action.
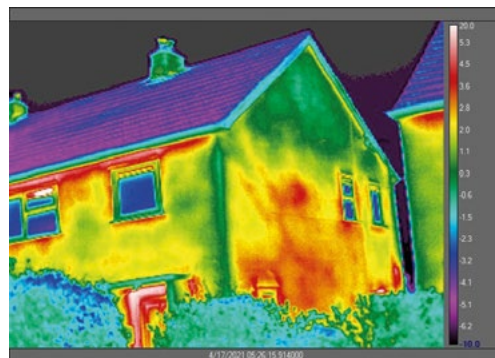
Thermal image of a local property
(red areas indicate poor levels of insulation)
Image credit: Plant A

Promoting low carbon alternatives

Encouraging the take-up of renewables

Community groups should look at the opportunities to promote and develop a range of renewable energy technologies (community owned or privately financed).

These could include:

- rooftop solar (PV and thermal) for both residential and commercial buildings
- ground mounted solar PV
- wind power, once the planning environment changes in its favour.

There are many examples of how local energy groups have developed renewable energy projects and secured additional benefit into their communities.

Examples of community energy projects

WREN and their Nanstallon solar project

Tackling community transport

In the transition to net zero how we move around is a big challenge. There is a lot of focus on the adoption of electric vehicles, especially cars. There is potential for community groups to widen the conversation and to consider car sharing clubs, campaigning for better public transport links, connected cycle routes and car-free zones.

Renewable heat

Gearing your community up to be well prepared and have a new heating system plan in place, will ensure they make the best decisions, both financially and environmentally.

Many people in your community will be wondering what they should do when their current heating system comes to the end of its life. It is not a decision anyone should rush and get wrong in the depths of winter. The ways to generate renewable electricity are now well established, but the technologies for creating renewable heat, both at a household and a community scale, are less well understood.

A key role for a community group is to explain and highlight renewable heat options like heat pumps, to help de-mystify and promote the technology.

One of WREN's Net Zero Heroes – domestic heat pump

1. What can a community do?

NZCom case study:
Business case for a low carbon energy adviser

During the delivery of the NZCom project, it had been evident that there is a significant need for quality advice and guidance on the challenges and opportunities in the transition to a net zero economy.

This challenge is not unique to a specific location, in fact, quality and trustworthy energy advice is an existing gap facing most communities and needs attention.

Educating all sections of our community and building confidence in low carbon technologies is a critical element in helping people make the right choices at the right time.

While there are a lot of resources accessible online to assist with making low carbon decisions, it is often difficult for people to translate generic information to their personal circumstances, their home, or their behaviours.

People prefer face-to-face support from trusted local agencies

To expand on the impacts of the NZCom project a business case for a dedicated **Low Carbon Energy Adviser** role for WREN was developed, along with a proposal on how to fund the role.

The purpose of the role is to tackle gaps in knowledge and build confidence within the local community. As well as widening engagement to those who have not considered the impacts of low carbon adoption on their lifestyle.

The proposal is being taken forward by WREN with the aim of achieving:

1. **demystifying the low carbon energy market and technologies**

2. **providing households with independent whole house assessments and advice to make informed choices**

3. **helping individuals reduce the cost of carbon reductions through access to grants and other support**.

NZCom team providing energy advice at the Royal Cornwall Show

Where to find out more

NZCom reports:

- **Establishing socioeconomic outcomes of community business models**
- **Community Business Models Options Paper**
- **Community Business Proposal**

Other useful resources about establishing and running community-led action:

- **The Community Hub Handbook (Locality)**
- **The Climate Emergency Centres Handbook**
- **Community Shares Handbook (Co-operatives UK)**
- **UK Internship and Placements**
- **Rough Guide to Community Energy (Rough Guides)**
- **mycommunity.org.uk**

2. Leaving no-one behind

Vulnerabilities and barriers to action

During the delivery of NZCom, the rapid rise in the cost of energy has been an issue that every household and business has had to face. It has bought into sharp focus the numbers of households that are struggling to afford to heat their homes properly, and equally, many small businesses have started to question their viability.

The rise in energy costs has prompted many people to look again at energy efficiency improvements and options for renewable energy generation.

When considering the transition to a net zero energy system it is important to distinguish between vulnerability to energy costs (i.e. fuel poverty) and wider vulnerabilities that may prevent households and businesses making the transition to net zero, such as poor physical and/or mental health, disabilities, or social isolation.

Financial concerns are not the only barrier to acting on the net zero challenge.

For those who can take early actions and make appropriate investments, does this create energy inequalities that give them advantages over those people who are unable to act at the same time? For instance, people who are privately renting are less able to act to improve the energy efficiency of their home.

Hard to heat, hard to treat

As a rural area that has a sizeable proportion of properties that are not connected to the mains gas grid, the Wadebridge and Padstow Community Network Area includes good examples of older properties that are harder to heat and potentially more difficult and expensive to retrofit with energy efficient and low carbon technologies.

The definition of **'vulnerability'** in energy terms includes any domestic energy users that may experience vulnerability over a prolonged period, or it may only occur in a particular instance, including people who are:

- **struggling to afford bills**
- **living in a cold, energy inefficient home**
- **in, or at risk of, fuel poverty**
- **facing pressure sales tactics**
- **struggling to understand and act upon information or choices (such as getting the best deal) or**
- **lacking the confidence or ability to pursue a query or complaint.**

Ofgem does not currently recognise that non-domestic energy consumers, for example small businesses, could also fit within this definition of 'vulnerability'.

This position is currently under review.

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2.   Leaving no-one behind

Reliable information and advice

Throughout the delivery of NZCom, at focus groups and community engagement events it was very apparent that there is a widespread lack of knowledge of the technology options to get to net zero.

People are familiar with the 'normal' means of heating their properties – i.e. gas or oil boilers, electric storage heaters etc., but they are less familiar with what heat pumps are, or how they work. Concerns about running costs and maintenance issues were regularly raised in group discussions.

This lack of knowledge and understanding means that people lack the confidence to take the necessary and appropriate actions towards net zero, and are uncertain about safety and costs if something goes wrong.

We met questions about where to get reliable advice, as there was some wariness about taking advice from installers and those with vested interests in specific products.

Concern was expressed about the prohibitive costs of actions, especially when thinking about decarbonised heat and the need for financial support. Comments were made in the focus groups on the recent Green Homes Grant scheme, indicating that there was interest but also frustration at how that scheme failed.

Seeking grants to partially, or fully fund energy efficiency measures was a trigger to find out what action could be taken.

It still appears that the key point to act (and where access to advice and information is essential) is when existing equipment needs to be upgraded, or when a notable change is being contemplated. For example, when moving into a new home or planning major home improvements.

Lack of advanced planning for future heating systems can mean that decisions are based on the urgency to have heat or hot water at home.

2.   Leaving no-one behind

Identifying vulnerable households in your community

There are numerous online resources that will help you to create a profile of the vulnerable members of your community.

For those communities within National Grid Electricity Distribution's network area (South West, East and West Midlands and Wales), the **Social Indicator Mapping tool** developed by the Centre for Sustainable Energy is a useful starting point to map your area.

This provides data either at Local Authority level or at Lower Super Output Area (LSOA), which is a commonly used geography for statistical reporting (used by the Census).

The UK Government publishes annual data on **rates of fuel poverty** (note that the latest release will cover data that is two years old) and different **indicators of deprivation**, covering: income, employment, health deprivation and disability, education and skills training, crime, barriers to housing and services, and living environment. This data is only published every 5 years or so.

Finally, the Census has a lot of useful data that will help you build a picture of your community and is equally useful for planning community engagement.

At the point of writing, not all the datasets from the **2021 Census** had been released, so periodic visits to the website are worthwhile to check on the latest releases

Where to find out more

NZCom reports:

- **Vulnerability of domestic consumers**
- **Working definition of vulnerability of non-domestic consumers**

Other useful resources about establishing and running community-led action:

- **Consumer vulnerability protections (Ofgem)**
- **Getting extra support from your energy supplier (Citizens Advice)**
- **The Commission for Customers in Vulnerable Circumstances (Energy UK)**
- **Project InvoLVe: How can innovation deliver a smart energy system that works for low income and vulnerable consumers? (Energy Systems Catapult)**
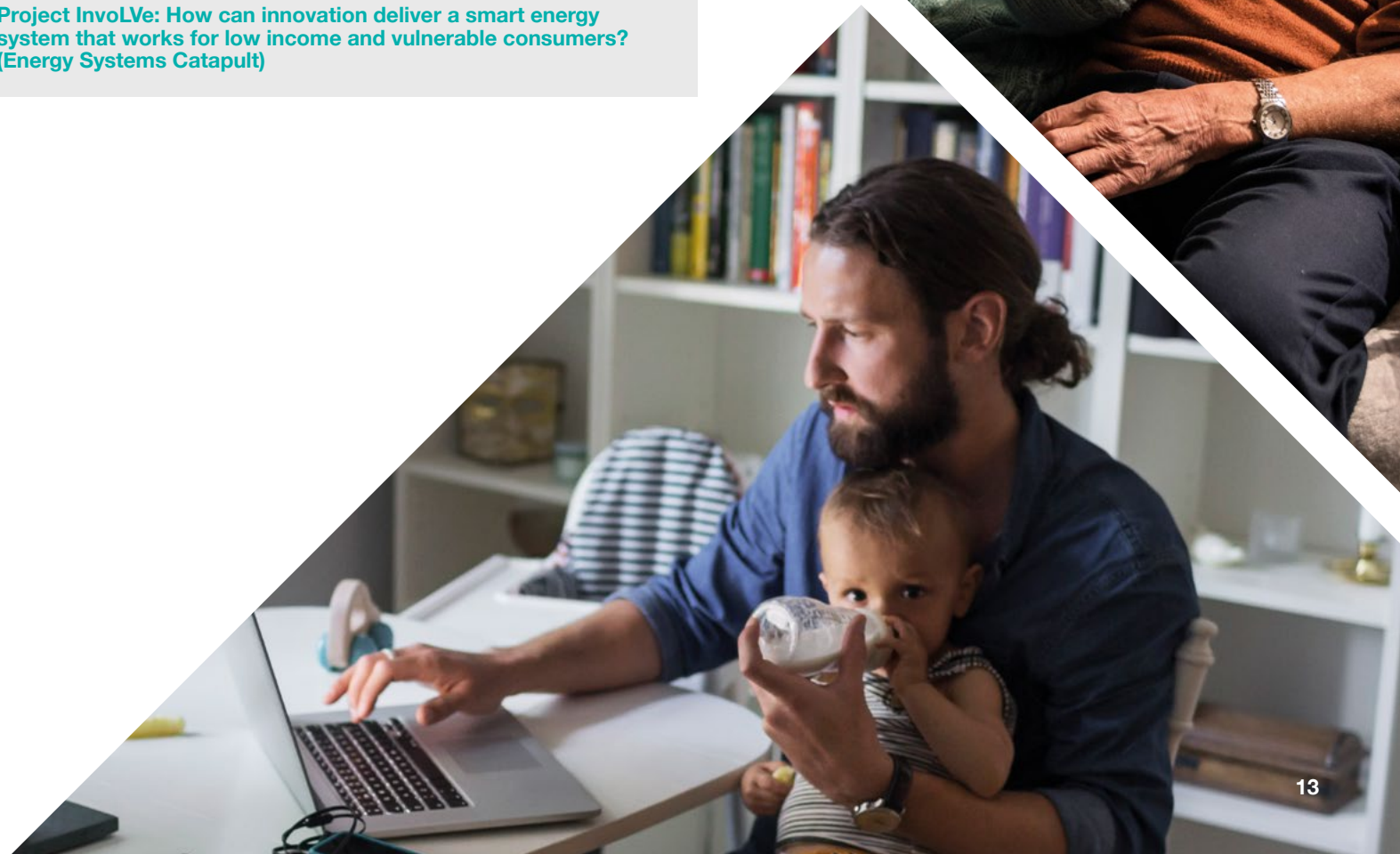
3. What pathway should you take?

Future energy scenarios for net zero

Scenarios are tools for exploring possible outcomes in the future in the context of complex and uncertain societal changes.

Scenarios are valuable tools to aid discussion and decision-making, but they are not value free. Top-down, national and international scale future energy scenarios insufficiently address:

- **social infrastructure** – such as the engagement necessary to support the transformations needed

- **equity and inclusion** - how transformations affect different sectors of the population

- **required interactions** - between actors responsible for promoting changes at the local and national scale.

As part of NZCom, three scenarios were developed specifically for the Wadebridge and Padstow Community Network Area.

The aim was to produce scenarios that were relevant and detailed enough to be of use for decision-makers in the local area.

The framework in which these scenarios sit is based on National Grid's Future Energy Scenarios 2021, but with a new emphasis on societal engagement rather than societal change.

Other communities replicating this approach should consider the impacts of the rural nature of the community, and local context in terms of resources, infrastructure and demographics.
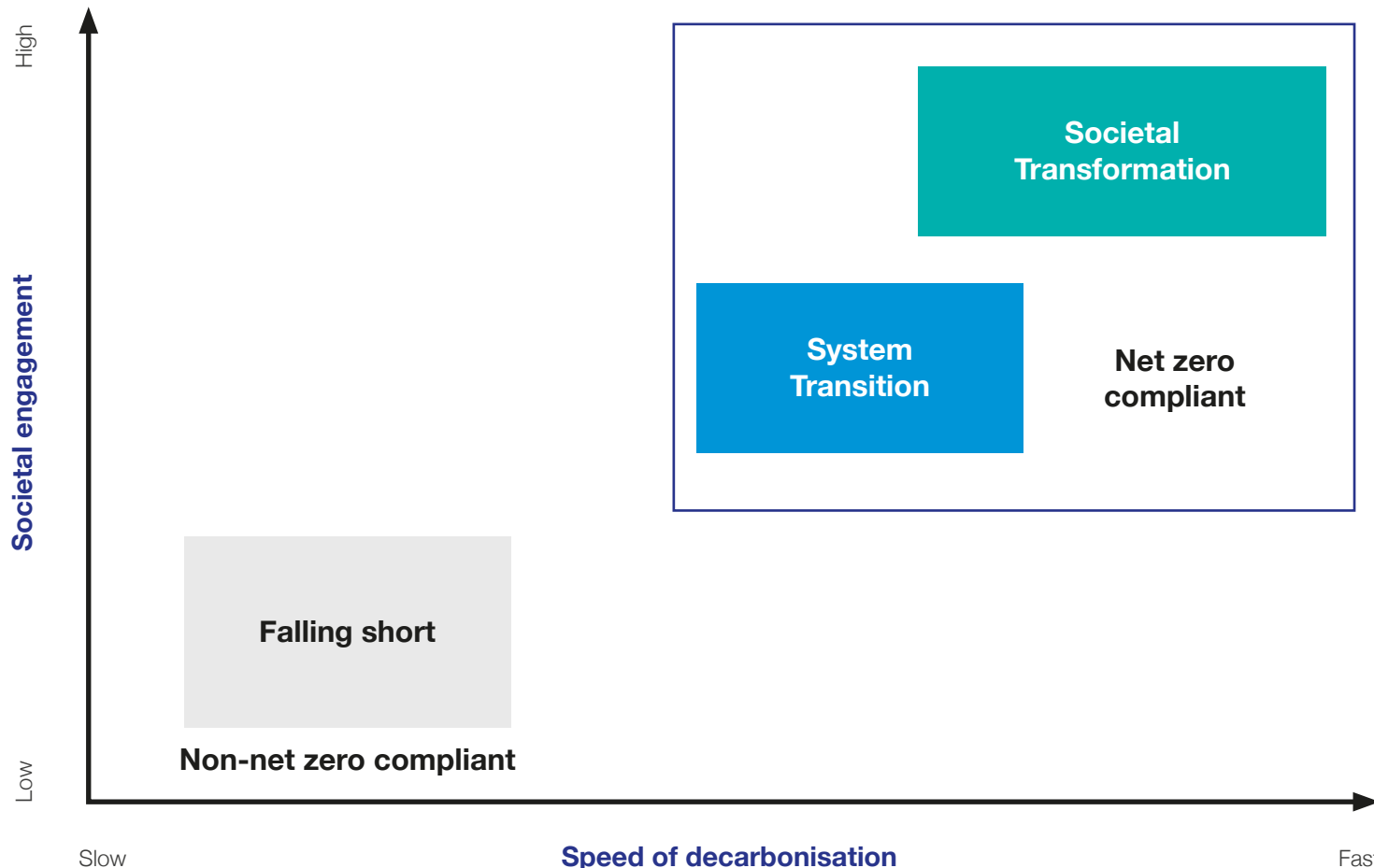
NZCom future energy scenarios framework

3.   What pathway should you take?

Achieving net zero by 2050 is not inevitable
Of the three scenarios developed, only two reach net zero.

Falling Short represents a baseline scenario in which low levels of ambition at national, regional, and local scales translate to poor progress towards decarbonisation and the 2050 net zero target is missed.

Some progress is achieved in the uptake of low carbon technologies although this is piecemeal and uncoordinated, appealing only to those willing and able to afford investments. Policy gaps remain, and momentum towards reducing emissions is lost.

The impacts of failing to address net zero and address vulnerabilities are felt through rising fuel bills, increasing inequalities and negatively impacting the most vulnerable members of the community.

System Transition represents a path to net zero which emphasises the deployment of large-scale interventions in the energy system. Achievable by conventional supply-side approaches to energy policy and infrastructure.

Engagement with society is understood as playing a role but is limited to broadcast-style information campaigns, and those customers least willing or able to participate are left out.

Societal Transformation emphasises a role for household and community-scale interventions as well as behavioural changes in energy consumption. National, regional and local ambition for net zero is high, and there are high levels of societal engagement.

While consumers are supported in decisions to adopt low carbon technologies, there is also targeted deployment of technologies across the community to ensure that no-one is left behind. Opportunities for local participation in decision making means that solutions are tailored to local challenges.

While net zero is theoretically possible through System Transition, it is likely to take longer and exacerbate vulnerabilities.

3.   What pathway should you take?

The no-regrets options

While there are multiple, plausible pathways to net zero for any community, there are several options that are consistent across all net zero pathways. These represent no-regrets options.

Accelerated society-wide domestic energy efficiency retrofit is critical to achieving net zero through a holistic approach.

Retrofitting energy efficiency measures in homes is central to Societal Transformation, but a step change is also required in System Transition.

Decarbonising all homes requires an integrated, holistic, and long-term approach, underpinned by national policy frameworks and regulations. This also requires new forms of governance and business models.

Societal engagement is an important aspect of reaching net zero.

Addressing energy equity and health equity together, can lock in the co-benefits of both, and help to increase a social mandate for net zero. Social learning and efficiencies are more likely to be achieved through coordinated engagement across different sectors, e.g. environment and health.

Comprehensive public engagement is also key to Societal Transformation, such as working with residents to make multiple technology decisions, opting to use flexible energy tariff options, and sequencing interventions to gain the most benefit. Engagement in the System Transition scenario is ad-hoc and uncoordinated.

Using NZCom scenarios as a proxy for other communities

The methods developed to establish the three scenarios for the Wadebridge and Padstow Community Network Area can be applied in full or in part by other communities.

By integrating a wealth of information relating to technological and societal change, scenarios can help to shape a framework for decision-making relating to housing, energy infrastructure, transport, and social engagement.

Considering what one or more future energy scenario might look like for your community can help:

- **support calls for action** - assisting the transition to net zero whilst addressing vulnerabilities, for example, by sharing the examples developed by NZCom.

- **challenge 'business as usual'** - the scenarios highlight the need for change, for example Falling Short fails to achieve net zero targets. Greater shifts away from business as usual will be necessary to unlock the many benefits of addressing net zero.

- **make the link between social infrastructure and net zero** - understanding how local decarbonisation and wider societal objectives (such as addressing health inequalities and digital inclusivity) are aligned could help decision making concerning resources, capacities and training needed.

Scenarios can be valuable tools for community groups and a range of other stakeholders, such as investors, parish or town councillors, and the public.

National Grid   **Net zero community guide**

3.   What pathway should you take?

Adopting general principles from the NZCom scenarios

- Multiple, plausible energy system futures exist, as does the possibility of not reaching net zero at all.

- Change is systemic, and which pathways are realised will be influenced by a large number of interconnected technological, economic, behavioural, and political factors. These factors can align to support decarbonisation, but they can also align to frustrate net zero ambitions.

- Improvements to thermal efficiency of existing buildings is universally accepted as a no-regrets option. Failing to upgrade buildings will mean net zero targets are missed.

- Some progress towards decarbonisation may be made with minimal societal engagement. However, the question remains as to how more controversial/ disruptive forms of change could be achieved without meaningful societal engagement.

- It is possible to address decarbonisation, to an extent, without addressing vulnerabilities. However, progress towards decarbonisation will be frustrated if we fail to obtain a broad social mandate for net zero, and/or existing vulnerabilities are neglected.

- A plausible scenario exists in which decarbonisation is aligned with environmental, societal, and economic co-benefits. This will require societal engagement across and beyond the energy system, tailoring engagement to specific technologies and sectors of society, and coordination of energy system actors.

Where to find out more

NZCom reports:

- **Review of future energy scenarios and associated methodologies**
- **High level net zero scenarios developed for the Wadebridge and Padstow Community Network Area**
- **Methodology for communities developing local net zero scenarios**

Other useful resources about establishing and running community-led action:

- **Future Energy Scenarios (National Grid)**
- **Distribution Future Energy Scenarios (Regen/NGED)**

To help you start a discussion with your community around what the transition to net zero might mean for your community and how you might go about achieving it in a desirable timescale, a list of questions have been developed by NZCom.

Download the NZCom Questions for Communities

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4. If you can't measure it, you can't manage it

Carbon Modelling

It is likely that many of the people reading this guide know about, and have used, online carbon foot-printing tools to help understand their own contributions to the climate change problem. To bring about lasting change, it is critical that we understand where we currently are with regards to carbon expenditure, and that we measure the impact we are currently having on the planet.
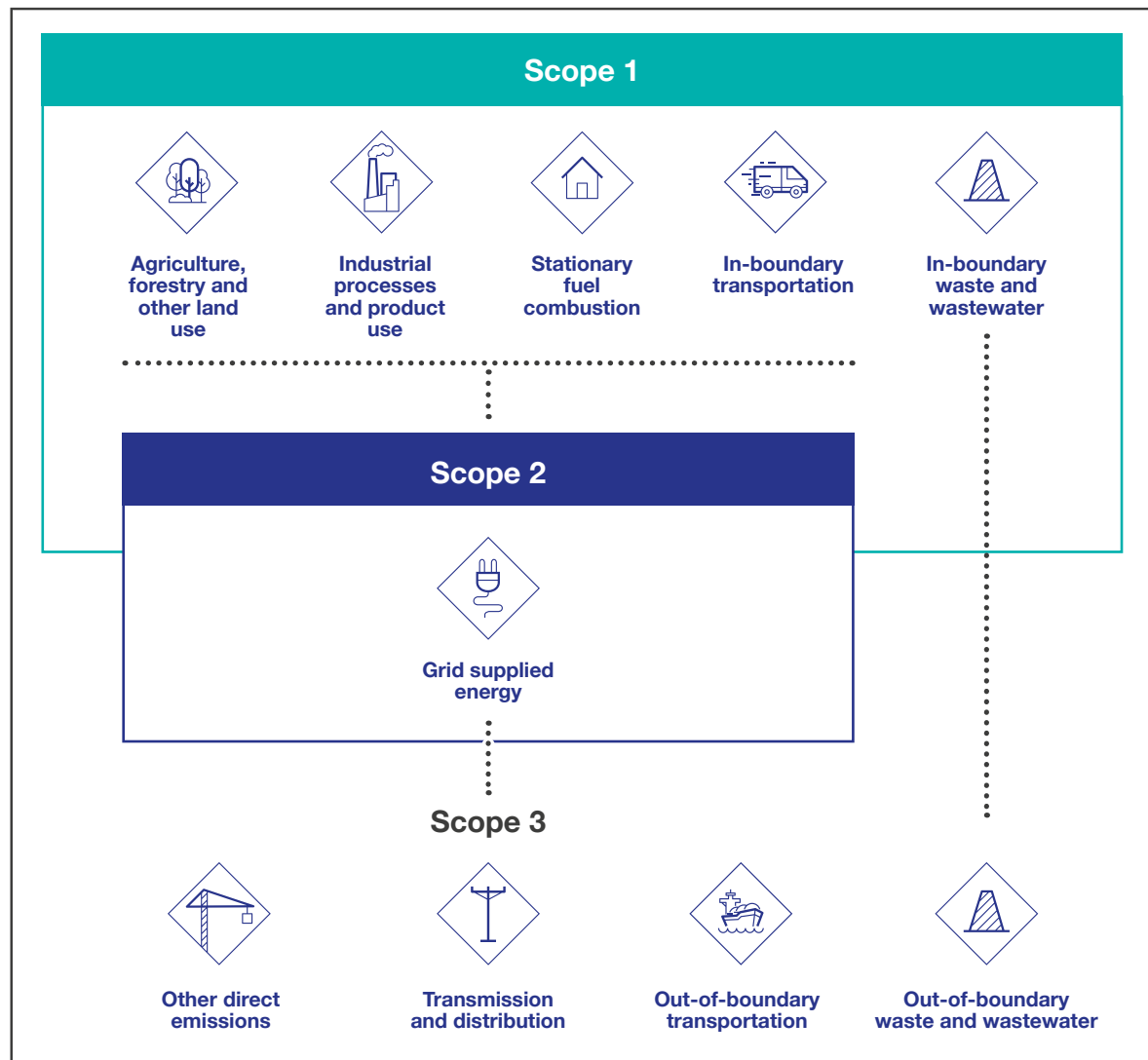
A key step in starting the transition to net zero is to understand where we start from. This is where carbon modelling is a valuable tool.

Greenhouse Gas (GHG) accounting can be done at various levels. Looking at products or technology, individuals and households, organisations, or working at a community, city, or regional scale. All levels have value, but they each have a distinct purpose and set of challenges.

There are two different perspectives for GHG accounting, production based (also known as territorial), and consumption based. These are further categorised by Scope.

Scope	Categories of emissions by scope	Description
1	Direct GHG emissions	Occur from sources owned or controlled by the household/ organisation, e.g. emissions from combustion of fuels for home heating or transport.
2	Electricity indirect GHG emissions	Emissions from the generation of electricity consumed by a household/organisation. These physically occur at the facility where the electricity is generated, i.e. power plant.
3	Other indirect GHG emissions	These are a consequence of the activities of individuals/households/organisations and occur at a source not owned or controlled by them, i.e. the extraction and production of materials for goods or transportation of goods.

Starting to think about emissions in this way is helpful to working out what can be changed at a community level, and what changes need the contributions of other organisations and decision makers, up and down the supply chain.

Scope 1

Agriculture, forestry and other land use | Industrial processes and product use | Stationary fuel combustion | In-boundary transportation | In-boundary waste and wastewater

Scope 2

Grid supplied energy

Scope 3

Other direct emissions | Transmission and distribution | Out-of-boundary transportation | Out-of-boundary waste and wastewater

— Inventory boundary (including scopes 1,2 and 3)　　— Geographic city boundary (including scope 1)　　— Grid supplied energy from a regional grid (scope 2)

4.   If you can't measure it, you can't manage it

Future Energy Tool for Communities

NZCom has produced a carbon accounting tool to assist communities to establish and quantify different approaches to reaching net zero by 2050.

The first step of understanding how to achieve net zero in your community is to define the mix of buildings in your community and their energy requirements. **The Future Energy Tool** will help you to complete this process for associated emissions from domestic properties energy usage and transport.

The tool will provide a community scale picture of domestic energy usage, carbon emissions and energy costs out to 2050.

A step-by-step guide has been produced to help community groups navigate their way through the different stages of creating a model of their specific community. The guide covers what information you need to input about your community and where to find.

Heating represents approximately 17% of domestic carbon emissions. It is important that information on heating system types is determined as accurately as possible for your community, to ensure that the tool produces valid information.

The tool can be run multiple times to explore what impact different decisions will have and the importance of the timing of those decisions.

Once you have established the pathway that your community wants to take, you can share the bespoke model with members of your community, so they can plan their own individual journey to net zero.
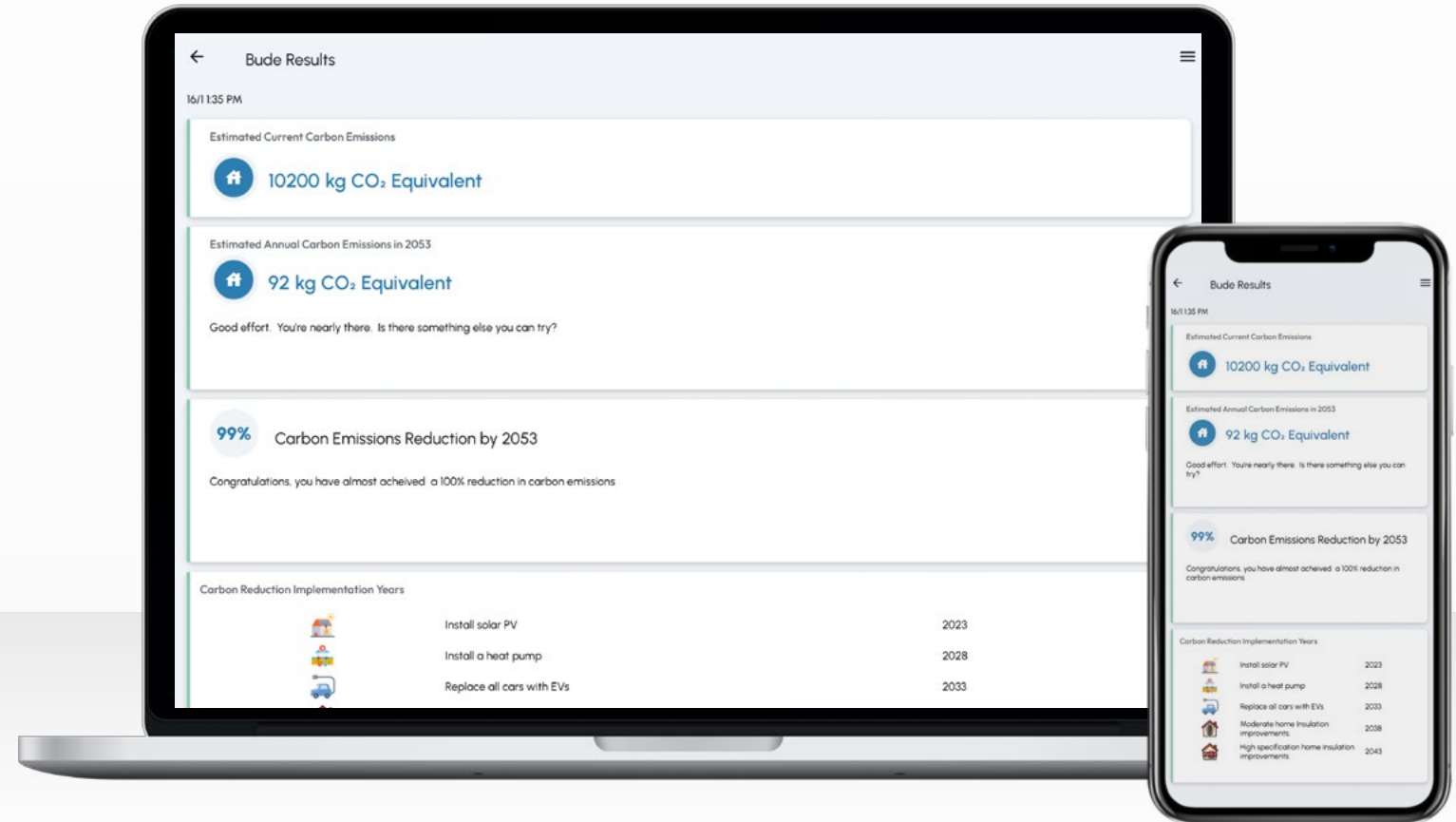
The tool is as much about engaging your community about net zero and energy efficiency as it is about setting ambitions and proposing collective actions.
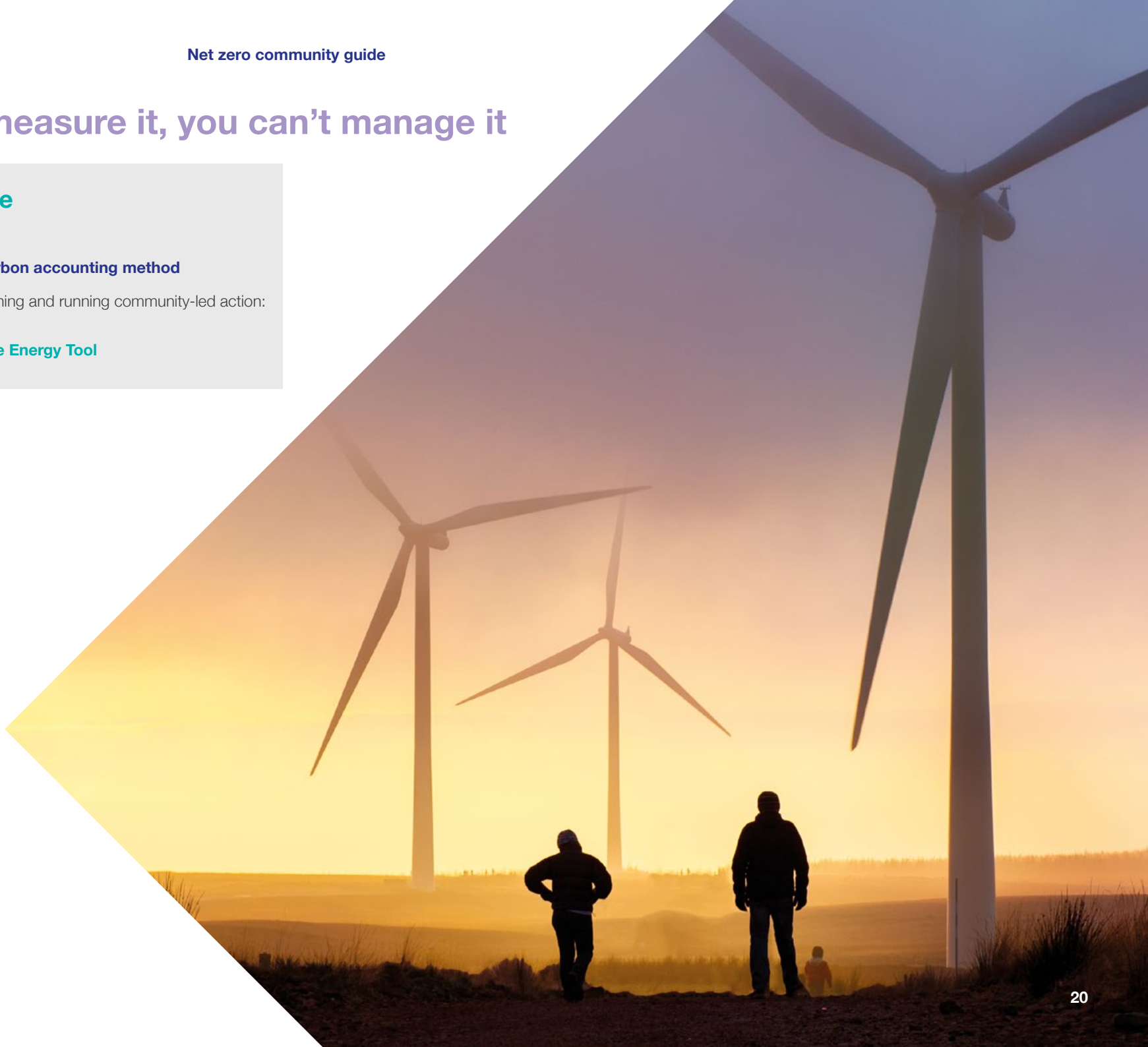
4. If you can't measure it, you can't manage it

Where to find out more

NZCom reports:

• **Community scale NZC 2050 carbon accounting method**

Other useful resources about establishing and running community-led action:

• **Future Energy Tool**
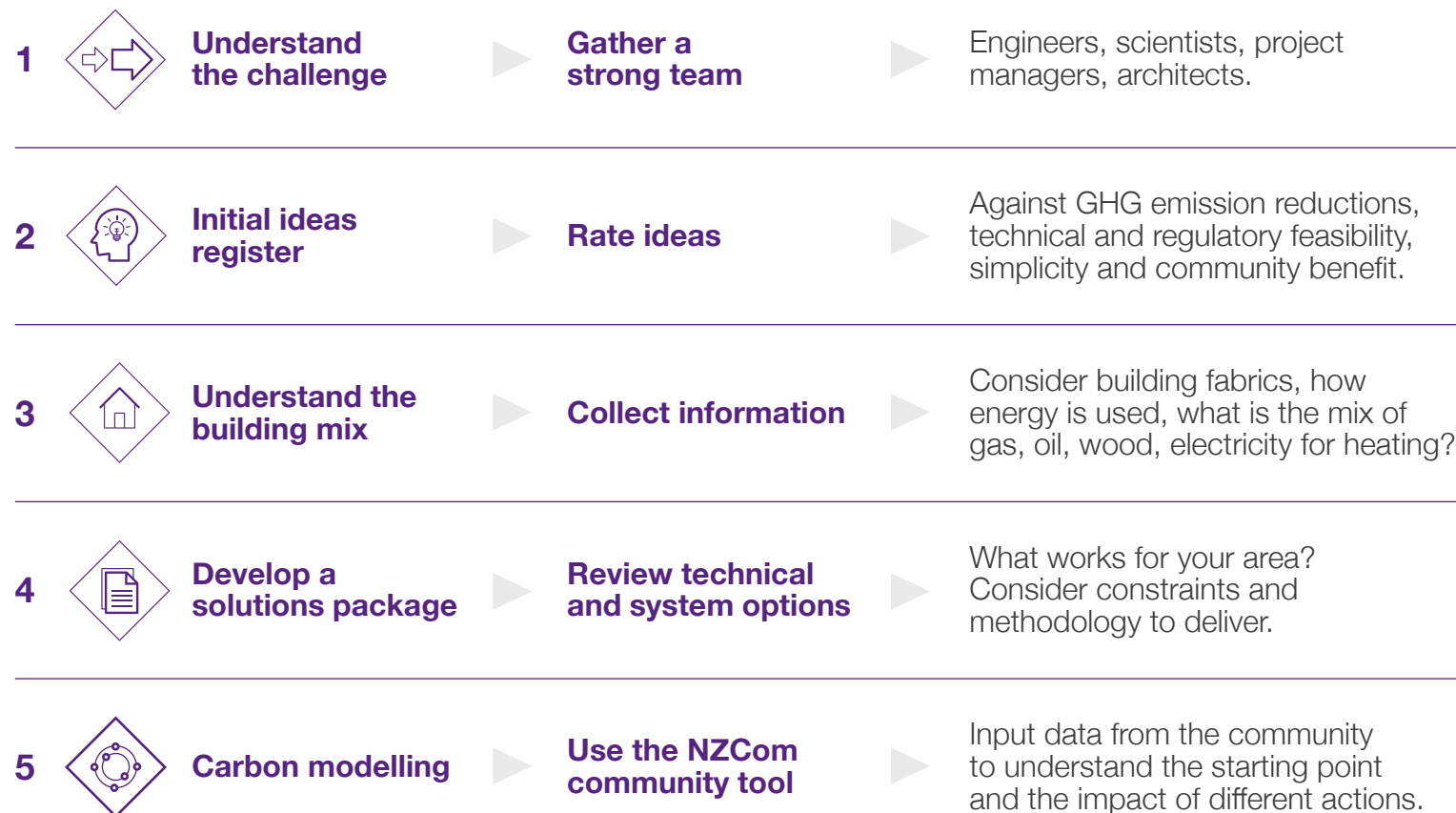• **Step by step guide to the Future Energy Tool**

5. Technical solutions for a net zero future

What is achievable?

Technical solutions for delivering net zero are specific to the location and needs of a community.

For NZCom and the Wadebridge and Padstow Community Network Area, solutions were based on the Societal Transformation scenario and guided by the carbon accounting methodology.

The following steps can be taken to work through the process to shortlist appropriate and viable technical solutions to achieve net zero.

1 Understand the challenge ▷ Gather a strong team ▷ Engineers, scientists, project managers, architects.

2 Initial ideas register ▷ Rate ideas ▷ Against GHG emission reductions, technical and regulatory feasibility, simplicity and community benefit.

3 Understand the building mix ▷ Collect information ▷ Consider building fabrics, how energy is used, what is the mix of gas, oil, wood, electricity for heating?

4 Develop a solutions package ▷ Review technical and system options ▷ What works for your area? Consider constraints and methodology to deliver.

5 Carbon modelling ▷ Use the NZCom community tool ▷ Input data from the community to understand the starting point and the impact of different actions.

The following tables list some of the technical solutions considered in NZCom and that may be suitable for a community looking to reduce their carbon footprint.

Also provided are links to more information about each solution, the benefits which may result from implementation, the reasoning for implementation, and the potential to achieve net zero -

Red (not within the scope of community-led action)

Amber (plausible community-led action)

Green (achievable community-led action).

The solutions have been split up into three key areas in which carbon can be reduced: heat, transport and power.

It is assumed that reducing energy consumption in homes (i.e. through improving insulation levels, switching off unnecessary loads and using energy efficient appliances and lighting) is considered before all other solutions.

5. Technical solutions for a net zero future

Decarbonising heat

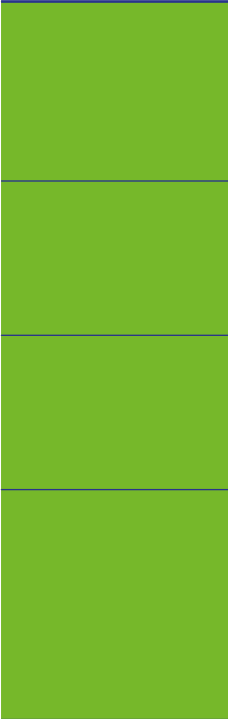| Solution	Community benefit	Reasoning	Potential to achieve net zero
Electrification of heat	The electrification of heat (primarily using heat pumps) should also include measures to properly insulate buildings to minimise running costs. Net zero can be achieved by replacing fossil fuels as the primary heating fuel.	The UK Government has committed to decarbonising the electricity system by 2035, making it the cleanest available source of energy.	🟩
Solid fuel upgrade to Biomass	Allows homeowners to retain the popular wood stove option for additional heat. Local air quality will improve with the upgrade of appliances.	Wood is usually considered carbon neutral as it absorbs carbon during its lifecycle. It is not considered to be viable for mainstream heat across the country as the UK's biomass resource is not sufficient.	🟩
District Heat Networks (DHN)	DHN and community heat schemes theoretically make the electrification of heat cheaper. Achieved by connecting households to a large centralised heat source. This implies a reduction in the overall capital cost of an installation and, in the case of heat pump systems, gives a better performance efficiency.	Sharing resources within a community for a localised heat network can be advantageous in terms of costs, efficiency, and maintenance.	🟩
Combined Heat and Power (CHP)	Typically, CHP works well for businesses with big heat requirements, such as hotels with swimming pools or nursing homes. This is achieved by burning gas more efficiently and simultaneously generating electricity for use on site.	CHP systems rely on a gas connection and may only be beneficial in the short term unless replaced with a green gas alternative.	🟧
Upgrading gas boilers	There is scope for the decarbonisation of the mains gas pipeline through injection of biomethane and/or hydrogen. Improved and efficient heating systems for homes with old gas boilers will result in direct savings on heating bills.	This is a short-term solution only. Ideally, mains gas will be removed or substituted for heating, with either electricity or a green gas supply.	🟧

Click on the name of the solution to access more information about the technology.

5. Technical solutions for a net zero future

Decarbonising electricity

Solution	Community benefit	Reasoning	Potential to achieve net zero
Smart tariffs	The carbon footprint of a community will be reduced if the electricity used is from a certified 'green energy' supplier. Suppliers may offer 'time of use' tariffs to coordinate electricity consumption with renewable energy generation. Saving homes and businesses money.	Some energy suppliers, such as Octopus, use smart tariffs to enhance the benefit from local renewable energy generation. A smart meter is required to be able to sign up to smart tariffs. Does not require any investment.	■
Utilise existing renewable energy generation locally	Utilising existing renewable energy generation locally will reduce the carbon footprint of businesses. Care is needed not to double count the carbon benefit of existing generation.	The energy generator may benefit from receiving a better rate by selling electricity directly to a local energy consumer rather than exporting electricity to the grid via a Power Purchase Arrangement (PPA).	■
Onsite renewable energy generation	This is connected to the home/ business side of the electricity meter. When renewable electricity is generated, i.e. when the sun is shining for solar PV, the connected home or business can use it for free.	Renewable energy generation offers a reasonable payback on investment and the benefit lasts more than 20 years. Renewable energy generation is clean and free from greenhouse gases.	■
Community owned solar PV generation	Benefit may be shared by way of a reduced cost of electricity to local users (via Energy Local or other community tariff structures), or by a return on investment through a community share scheme. Carbon reduction may be counted towards the community footprint. Energy generation may not be well coordinated with energy demand.	Community owned solar PV is an assured way of generating clean electricity locally. This is a mature market. There are clear community benefits in offsetting grid electricity with clean zero carbon electricity. May be difficult/ expensive to connect larger schemes to the electricity network.	■
Small-scale Hydropower	Where feasible, micro-hydro can provide a continuous supply of electricity (more so in winter when rainfall is higher). Community scale hydropower can make a significant contribution to reducing carbon emissions where the geography allows. Hydropower also provides interest to an area and attracts visitors.	Hydropower is a fantastic resource but geographically limited. Regulatory and cost barriers may exist. It is best suited to rivers and streams flowing fast downhill.	■

5.   Technical solutions for a net zero future

Decarbonising electricity

Solution	Community benefit	Reasoning	Potential to achieve net zero
Community owned wind generation	Benefit may be shared by way of a reduced cost of electricity to local users (via Energy Local or other community tariff structures), or by a return on investment through a community share scheme. Carbon reduction may be counted towards the community footprint.	Wind energy generation is a mature market though planning constraints exist. Offers seasonal (year-round) electricity generation. There are clear community benefit in offsetting grid electricity with clean zero carbon electricity. May be difficult/expensive to connect larger schemes to the electricity network.	■
Community owned Anaerobic Digestion (AD)	Provides additional power as green gas. The benefit is more likely shared as renewable electricity (generated via a gas turbine), used as a road transport fuel, or used directly for heating. Additional benefits include waste to power and minimising waste removal costs.	AD is only suitable for certain waste chains, for example animal slurry. Generally required at scale and with careful planning. Biomethane is considered to be carbon neutral.	■
Pseudo-microgrid connected to the low voltage (LV) distribution network	Reduced energy costs can be achieved by connecting communities into a 'pseudo-microgrid' at the LV network level. Any connected renewable energy generation within the pseudo-microgrid is distributed equally and fairly throughout the community, benefiting all.	This is an innovation developed by NZCom and is not yet available as a solution.	■
Pseudo-microgrid connected to the high voltage (HV) distribution network	Economies of scale and cost reductions to the consumer can be achieved by connecting communities into a pseudo-microgrid at the HV network level. Extending the area of benefit and increasing the scale of renewable energy generation that can be connected.	This is an innovation developed by NZCom and is not yet available as a solution.	■

5. Technical solutions for a net zero future

Decarbonising transport

Solution	Community benefit	Reasoning	Potential to achieve net zero
Clean Air Zones	Restricts traffic through towns or near schools. Incentivise walking, cycling and use of public transport.	Reduction in car usage and improvement in health.	🟩
Electric Vehicles (EVs)	Zero emission when charged with green electricity.	Requires capital to purchase or lease. Small second-hand market. Direct benefit to local air quality and noise pollution.	🟩
EV car share schemes	Zero emission when charged with green electricity. Low-cost option that increases accessibility to communities. Car parking and road usage can be prioritised for car sharers.	Works well in urban areas. Insurance can be difficult to arrange.	🟩
EV car hire for tourism	Zero emission when charged with green electricity. Reduces road traffic in peak seasons.	Encourages tourists to leave cars at home and hire an EV locally on arrival. Revenue generating business model that feeds back to community.	🟩
EV charging and solar carports	Combination of EV charging and solar PV generation (with optional energy storage). Zero emission. Incentivises park and ride arrangements.	Straight forward for town planning. May be difficult/ expensive to connect larger schemes to the electricity network.	🟩
Hydrated Vegetable Oil (HVO) fuelling stations	HVO provides a safe and easy direct fuel replacement for existing diesel vehicles. HVO benefits can only be realised if sustainably sourced with minimal associated transport emissions.	Typically does not require engine adaptations or filter cleaning, but may require re-calibration of systems for efficient operation. Currently only available for bulk delivery to refuelling tanks.	🟧
Biogas for transport	Produced by AD, biogas/biomethane can be used as a transport fuel (typically for heavy vehicles). Cross vector low carbon solution.	High capital costs. Complex planning and infrastructure requirement.	🟧
Hydrogen for transport	Excess renewable energy generation is diverted to generate hydrogen as a transport fuel (typically for heavy vehicles). Cross vector solution with revenue streams attached. Opens up transport link corridors for hydrogen fuelled freight.	High capital costs. Complex for a community undertaking.	🟧

5.　Technical solutions for a net zero future

Analysis of net zero solutions

To ensure that the most appropriate methods of delivering net zero are considered for your community, a high-level assessment should be made in relation to the following characterisations:

- **technical feasibility:** to understand the suitability of a solution, potential locations, resource availability and technology readiness.

- **regulatory feasibility:** to identify any regulatory barriers to the solution. For example, the development of a pseudo microgrid challenges conventional energy regulations.

- **GHG reduction impact:** to assess how much emissions can be saved by employing one solution as opposed to another.

- **community benefit:** to establish what the potential financial, social or other benefit that may be of value to the community? Taking into consideration how inclusive a solution might be or whether it has the potential to reduce vulnerability within the community.

- **simplicity:** to ascertain how challenging the solution will be to implement. Considering what skills are required to ensure the solution is planned, delivered and managed effectively.

Not all, or indeed any, interventions may be appropriate for your community and technical knowledge will be required to assess each option.

Where to find out more

NZCom reports:

- **Review of Technical and System Options**

- **Characterisation of confining factors to meet net zero**

- **Net Zero 2050 Report: Wadebridge and Padstow Community Network Area**

Other useful resources about establishing and running community-led action:

- **Low carbon heat and rural fuel poverty, lessons from across Europe (CEP)**

- **The future of heating in the UK, heat pumps or hydrogen (Energy Savings Trust)**

- **Energy equality - Peer to peer energy trading (WREN)**

Acknowledgements

For more information about the NZCom project including details of the research completed and the reports produced visit:
wren.uk.com/nzcom/introduction

This community guide reflects all the work completed in the Net Zero Community work package of Network Innovation Allowance (NIA) funded Project Vulnerability and Energy Networks, Identification and Consumption Evaluation (VENICE), National Grid Electricity Distribution's first innovation project focussed wholly on customers, and in particular those with vulnerabilities.

This guide is intended to provide all communities access to the research and tools developed in this project, helping to facilitate the transition to a just and fair net zero energy system.

For more information about Project VENICE visit:
nationalgrid.co.uk/innovation/projects/vulnerability-and-energy-networks-identification-and-consumption-evaluation-venice

Smart meter and environmental monitor optimising home energy usage.