SEPTEMBER 2022

DEVON CARBON PLAN

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SECTION 1.

THE CHALLENGE & OPPORTUNITY OF CLIMATE CHANGE

Why do we need to act now?

1.1 GLOBAL EFFECTS AND IMPACTS

Our planet's climate is changing and warming is accelerating. Globally, 2010-2019 was the warmest decade since records began in 1850 and each decade since 1980 has been warmer than the preceding one.[1] 2020 and 2016 tie as the warmest years on record, which were 1.1°C above pre-industrial levels.[2]

The Intergovernmental Panel on Climate Change has concluded it is unequivocal that emissions of greenhouse gases (GHG) by humans has warmed the atmosphere.[3] The greenhouse effect occurs when GHGs in the atmosphere, such as carbon dioxide and methane, trap some of the sun's heat. This process makes Earth warmer and over the last 12,000 years has allowed humanity to thrive.

However, the burning of fossil fuels, deforestation and intensive agriculture have been changing the balance of the greenhouse effect. The increased levels of GHGs mean more heat is being trapped, causing our planet to warm at an unprecedented rate.[4]

This warming is causing more extreme storms, droughts, heat waves, melting ice, ocean acidification and rising sea levels. The impacts of these changes are widespread (see Figure 1.1).

Climate change is not simply an environmental problem. It has been described as "humanity's greatest threat" by Sir David Attenborough;[5] as the "biggest threat to the global economy" by the World Economic Forum;[6] as the "greatest threat to global security" by the UN Security Council;[7] and the "greatest ever threat to human rights" by the UN High Commissioner for Human Rights.[8]

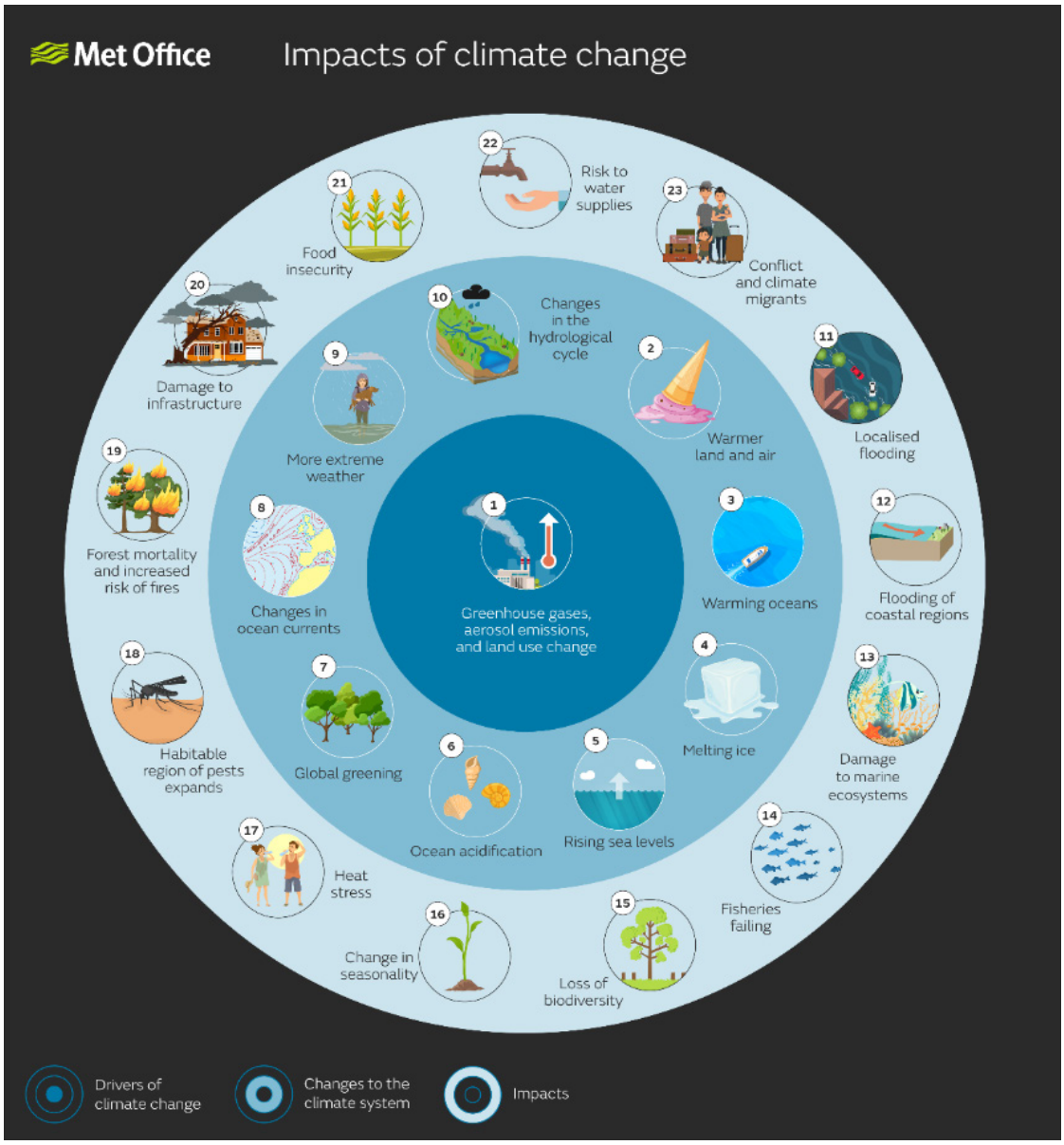


Figure 1.1 - Impacts of Climate Change, with permission of the Met Office.[9]

1.2 EVIDENCE OF CLIMATE CHANGE IN THE UK & DEVON

The UK's warmest ten years ever recorded have all been since 2002.[10] The hottest ever recorded temperature of 40.3°C occurred in July 2022, smashing the previous record of 38.7°C observed in 2019,[11] which also saw:

- The warmest winter temperature
- The warmest December temperature
- The warmest February temperature
- The highest minimum February temperature.[12]

The most recent decade (2012 -2021) has seen the UK experience 21% fewer days of air frost, 15% more summer rainfall, 26% more winter rainfall and 8% more annual sunshine than the 1961-1990 average. Five of the ten wettest years in the UK series from 1836 have occurred this century (2000, 2020, 2012, 2008 and 2014).[13] The first signs of spring are, on average, occurring 9 days earlier than they were in the first part of the 20th century.[14]

Exmouth has recorded a temperature increase of 1.05°C since 1900 and Ilfracombe 0.64°C.[15] In comparison to the 1961 – 1990 average, south west England now experiences almost 10% more rainfall each year. Winters have got wetter and summers have got drier; the South West receives 28% more precipitation in autumn, almost 16% more in winter and approaching 9% less in summer.[16]

Relative sea level in south west England has risen by 25cm since 1916.[17]

1.3 CLIMATE PROJECTIONS

If we continue emitting GHG emissions as if it's "business as usual", by the end of the 21st century the central estimate of change of Devon's average summer temperature is projected to increase by 5.6°C and average winter temperature by 3.4°C in comparison to the 1961-1990 average. Compared to the same period, average winter precipitation is projected to increase by 28% whereas average summer precipitation is forecast to decrease by 44%. Relative sea level is very likely to rise by more than 43cm but less than 90cm.[17]

Although these numbers may seem small, the knock-on effects from them will be substantially larger and disrupt our current quality of life. As the climate continues to change, the scale and frequency of impacts will increase. The science is clear: we are in a climate emergency and need to reduce carbon emissions rapidly to maximise the chance of keeping global temperature rise below 1.5°C.

1.4 CLIMATE JUSTICE

Developing countries and small island states will see the most severe effects and impacts because they are less able to adapt.[9] Warming of 2°C would put over half of Africa's population at risk of undernourishment which, at the current rate of global warming, could be reached as early as 2030.[19] This raises profound issues for global climate justice because it is the more developed countries, through earlier industrialisation, that have caused the climate emergency: countries such as ours have a moral duty to act. Limiting warming to 1.5°C, compared to 2°C, could reduce the number of people exposed to climate-related risks and poverty globally by several hundred million by 2050.[18]

These climate injustices are not just felt overseas. In the UK, disadvantaged and less affluent

groups are responsible for the least carbon emissions, yet they are most likely to be negatively affected by climate change. Indeed, the effects of climate change can make disadvantage worse, which in turn increases vulnerability to the impacts of climate change, such as flooding or heatwaves.

1.5 THE OPPORTUNITY

Addressing the climate and ecological emergency is an opportunity to **create a fairer, healthier, more resilient and more prosperous society.** Those most affected by climate change need more of a say in how we respond, and policy makers actions to mitigate climate change must be aligned with goals for public health improvement, green growth and the reduction of social vulnerability.[20]

Encouraging everyone to be more active by walking and cycling; improving air quality through the electrification of vehicles; insulating our homes to make them warmer; and eating more balanced diets will all **improve public health and reduce pressures on the NHS.**[21]

There is considerable potential for the transition to clean technologies to **create new jobs and skills** requirements, **improve energy security** and **increase economic prosperity.** Retrofitting energy efficiency measures into housing will **reduce fuel poverty** and illnesses associated with cold homes and subsequently provide enhanced opportunities for work and study.[21]

Enhancing the ability of habitats to store carbon offers tremendous opportunities to **reverse the decline of biodiversity** and restore the benefits healthy ecosystems provide. These include **reduced flood risk, improved water and air quality, nutritious food, timber and fuel, and accessible greenspace.**

1.6 REFERENCES

[1] World Meteorological Organisation (2020) WMO Statement on the State of the Global Climate in 2019, WMO, Geneva, Switzerland. Available at: https://library.wmo.int/doc_num.php?explnum_id=10211
[2] NASA (2021) 2020 Tied for Warmest Year on Record. https://www.nasa.gov/press-release/2020-tied-for-warmest-year-on-record-nasa-analysis-shows
[3] IPCC (2021) Summary for Policymakers. In: Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Masson-Delmotte, V. et al. (eds)] Available at: https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_SPM.pdf
[4] IPCC (2014) Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, R.K. Pachauri and L.A. Meyer (eds.)]. IPCC, Geneva, Switzerland, 151 pp. Available at: https://www.ipcc.ch/report/ar5/syr/

[5] BBC News (2018) Sir David Attenborough: Climate change 'our greatest threat'. Available at: https://www.bbc.co.uk/news/science-environment-46398057,
[6] UNFCC (2016), Climate Change is Biggest Threat to Global Economy. Available at: https://unfccc.int/news/climate-change-is-biggest-threat-to-global-economy
[7] Parry, E.J. (2007) The Greatest Threat to Global Security: Climate change is not merely an environmental problem, UN Chronicle. Available at: https://www.un.org/en/chronicle/article/greatest-threat-global-security-climate-change-not-merely-environmental-problem,
[8] The Guardian (2019), Climate crisis is greatest ever threat to human rights, UN warns. Available at: https://www.theguardian.com/law/2019/sep/09/climate-crisis-human-rights-un-michelle-bachelet-united-nations,
[9] Met Office (Unknown) Effects of Climate Change. Available at: https://www.metoffice.gov.uk/weather/climate-change/effects-of-climate-change
[10] Kendon, M. et al. (2019) State of the UK Climate 2018. International Journal of Climatology, 39 (S1), pp.1-55. Available at: https://doi.org/10.1002/joc.6213
[11] Met Office (2022) A milestone in UK climate history. Available at: https://www.metoffice.gov.uk/about-us/press-office/news/weather-and-climate/2022/july-heat-review
[12] Kendon, M. et al. (2020) State of the UK Climate 2020. International Journal of Climatology.40 (S1). Available at: https://doi.org/10.1002/joc.6726
[13] Kendon, M. et al. (2022) State of the UK Climate 2021. International Journal of Climatology. 42 (S1). Available at: https://doi.org/10.1002/joc.7787
[14] JNCC (2021) Spring Index Available at: https://jncc.gov.uk/our-work/ukbi-b4-spring-index/
[15] Devon Local Nature Partnership (2019) Climate Change and Energy. Available at: https://www.naturaldevon.org.uk/wp-content/uploads/2019/07/Climate-Change-and-Energy.pdf
[16] Jenkins, G.J. et al. (2008) The climate of the United Kingdom and recent trends. Met Office Hadley Centre, Exeter, UK. Available at: https://www.ukcip.org.uk/wp-content/PDFs/UKCP09_Trends.pdf
[17] UK Climate Impacts Programme (2018) UKCP2018. UKCIP. Available at: http://ukclimateprojections.metoffice.gov.uk/
[18] IPCC (2018): Summary for Policymakers. In: Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty [Masson-Delmotte, V. et al. (eds.)]. In Press. Available at: Summary for Policymakers — Global Warming of 1.5 °C (ipcc.ch) https://www.ipcc.ch/sr15/chapter/spm/
[19] United Nations (2019) Climate Justice. Available at: https://www.un.org/sustainabledevelopment/blog/2019/05/climate-justice/.
[20] Preston, I. et al. (2014) Climate Change and Social Justice: An Evidence Review. Joseph Rowntree Foundation. Available at: https://www.cse.org.uk/downloads/reports-and-publications/energy-justice/climate%20change%20and%20social%20justice%20evidence%20review.pdf
[21] Jennings, N. et al. (2019), Co-benefits of climate change mitigation in the UK: What issues are the UK public concerned about and how can action on climate change help to address them?, Grantham Institute Briefing Paper, 31, Grantham Institute, Imperial College, London. Available at: https://www.imperial.ac.uk/grantham/publications/2019/co-benefits-of-climate-change-mitigation-in-the-uk-what-issues-are-the-uk-public-concerned-about-and-how-can-action-on-climate-change-help-to-address-them.php

SECTION 2.

INTRODUCTION

2.1 BACKGROUND

In May 2019, the Devon Climate Emergency (DCE) partnership formed to respond to the climate and ecological emergency. Its partners represent public bodies, private sector interests, environmental organisations and academic institutions. Within the partnership, and this Plan, Devon refers to the areas administered by Devon County Council, Plymouth City Council and Torbay Council (see Figure 2.1).

LOCAL AUTHORITIES

Dartmoor National Park Authority

Devon Association of Local Councils

Devon County Council

East Devon District Council

Exeter City Council

Exmoor National Park Authority

Mid Devon District Council

North Devon District Council

Plymouth City Council

South Hams District Council

Teignbridge District Council

Torbay Council

Torridge District Council

West Devon Borough Council

ENVIRONMENT

Devon Wildlife Trust

Environment Agency

Natural Devon

RESEARCH INSTITUTIONS

Met Office

University of Exeter

University of Plymouth

HEALTH

Public Health England

Public Health Devon

Devon Clinical Commissioning Group

BUSINESS

Heart of the South West Local Enterprise Partnership

National Farmers Union

UTILITY OPERATORS

South West Water

Western Power Distribution

Figure 2.1 – The DCE partnership covers the areas administered by Devon County Council, Plymouth City Council and Torbay Council.

Initially the partnership prepared the Devon Climate Declaration which has resulted in a shared commitment to engage Devon's residents, businesses and visitors to develop and implement a plan to facilitate the reduction of Devon's emissions to net-zero. In addition, a separate Devon, Cornwall and Isles of Scilly Adaptation Plan, currently in development, will help prepare communities to live in a warmer and more resilient world.

As well as their contributions to the development of this Plan, DCE partners have been delivering immediate initiatives that are accelerating the reduction of Devon's carbon emissions. These include hiring new staff, creating a Nature Recovery Network, developing the Devon Food Partnership, building solar farms, installing electric vehicle charge points, delivering a bulk-purchase scheme for domestic solar panels. Also, many partners have already developed carbon plans to reduce their in-house emissions from their buildings, vehicle fleets and supply chains.

2.2 PURPOSE OF THIS PLAN

This Plan describes the changes needed to achieve net-zero emissions in Devon.

" 'Net-zero' emissions means that the total of active removals from the atmosphere offsets any remaining emissions from the rest of the economy".[1]

It introduces goals to overcome the barriers, followed by actions to make them happen.

Whilst the DCE partners will need to lead many of the actions, this is a Plan for everybody in Devon. Delivering net-zero will require all sectors of Devon's society to do their bit - every organisation and community have their own sphere of influence, capacity, know-how and opportunities to contribute to achieving the Plan's goals – and that's why the partners have been keen to offer opportunities for people to be involved in creating it. The Devon Carbon Plan has been co-produced using expert knowledge with the local experiences of Devon's citizens (see Section 2.3).

2.3 HOW THE PLAN WAS PRODUCED

2.3.1 The Net-Zero Task Force

Figure 2.2 - Members of the Net-Zero Task Force attending their first meeting.

The partnership convened a Net-Zero Task Force of 15 volunteer specialists in topics relevant to carbon reduction to steer the creation of this Devon Carbon Plan. They are drawn from business, community, environmental and academic organisations.

It is chaired by Professor Patrick Devine-Wright, at the University of Exeter and a United Nations Intergovernmental Panel on Climate Change author.

The partners are extremely grateful to the Task Force for the considerable time they have committed and the energy and challenge they have brought to the process.

2.3.2 Call for Evidence

A public call for evidence ran from October 2019 until January 2020 requesting ideas on how to achieve net-zero. There were 893 submissions, all of which were reviewed by the Net-Zero Task Force. You can view summaries of the submissions split by theme.

2.3.3 Thematic Hearings

Six half-day thematic hearings (meetings) ran during November and December 2019. The meetings gathered experts to contribute their thoughts on the barriers to reaching net-zero and what actions are necessary to overcome them. Each hearing focused on different parts of our society. The full hearings and summary documents can be viewed here.

The full hearings and summary documents can be viewed here:
https://devonclimateemergency.org.uk/devon-carbon-plan/call-for-evidence/

2.3.4 Youth Parliament

On the 29th November 2019, the Devon Youth Parliament hosted a climate summit attended by 75 students from 15 primary and secondary schools. This gathered their ideas and about how Devon and their schools could become net-zero.

Figure 2.3 - Devon's Youth Parliament Climate Summit.

2.3.5 Devon Climate Assembly

The initial expectation was to publish a single version of the Devon Carbon Plan following an opportunity for the more controversial issues for achieving net-zero to have been considered by a Devon Climate Assembly – a 70-strong panel of residents selected in order to be representative of Devon.

However, the Assembly was cancelled because of COVID-19 restrictions and so a new approach was needed. Instead, an Interim Carbon Plan was published for consultation which contained actions that are less difficult to deliver and are more publicly acceptable. This enabled the partners to start accelerating delivery together during the COVID-19 pandemic. The consultation was open for 10 weeks from the 7th December 2020. It received 1,322 responses which have been summarised in a Consultation Report.

Subsequently, the more challenging issues for achieving net-zero in Devon, were considered by the Assembly in summer 2021. A description of how the Assembly was designed, how it operated and what it recommended is online. Subsequently, the partners developed responses to the Assembly's recommendations and consulted on these with the public in Spring 2022. The findings of the consultations and the recommendations from the Assembly have been used to inform this updated Plan.

This process is shown in Figure 2.4.

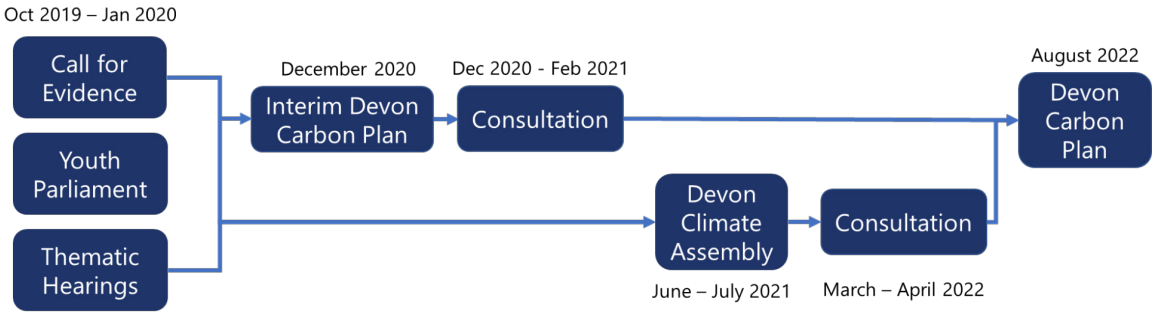


Figure 2.4 - Process for Developing the Devon Carbon Plan.

2.4 THE PLAN'S APPROACH

Each themed section of this Plan:

- Describes what needs to happen in Devon to achieve the Climate Change Committee's (CCC) Further Ambition Scenario for net-zero by 2050 – irrespective of the current legislative or financing environment. Note - the CCC has developed an updated scenario called the Balanced Pathway, which will be incorporated into this Plan at a later update.
- Displays the trajectory of production emissions to 2050. These CCC-based trajectories were apportioned to Devon, including Plymouth and Torbay, by the University of Exeter. The methodology is available online. (See Section 3.2 for an explanation of production emissions).
- Introduces a set of goals which need to be realised to overcome barriers to achieving the CCC net-zero scenario, identified from the Thematic Hearings and the public Call for Evidence.
- Proposes strategic-level actions to achieve the goals, identified by specialists, the public and the members of the Devon Climate Assembly. These are split into two categories – those that can be implemented locally and those that need action beyond Devon, generally by relevant organisations in Devon working with government on specific issues.

It has not been possible to calculate the effect of each action on Devon's GHG emissions to produce a 'bottom up' emissions trajectory. To do this would require assumptions to be made about the uptake and impact of each action, many of which are enabling actions, rather than actions that directly reduce emissions. For example, installing electric vehicle charging points doesn't reduce GHG emissions; the GHG emissions reductions arise from people subsequently feeling more confident in making the decision to switch to an electric vehicle.

All of the actions are collated in the Action Table that gives each action a prioritisation score and adds detail about who is most likely to help deliver each action, when it should happen, where the action should take place and the anticipated financial status.

Many of the resources required to deliver this Plan are yet to be identified and secured. Whilst the partners will need to be innovative in finding facilitation funding, the CCC expects the net-zero transition to be largely funded and delivered by private companies and individuals. For this to happen Devon needs to work towards developing self-financing models to provide investable and attractive opportunities.

2.5 HOW TO USE THE PLAN

There's an opportunity for everyone to get involved – no single organisation or group of organisations can make Devon net-zero.

Individuals reading this Plan can take a look at the Quick Read version, which translates the goals and strategic actions into activities that are more relevant to our everyday lives.

Organisations and communities are encouraged to join with the partners in reviewing the goals and actions to decide which are most relevant to their responsibilities and areas of influence and use these to create their own climate change action plan. Activity can be shared with the partnership and showcased on the website and the monthly newsletter via environmentalpolicy@devon.gov.uk, or find the Devon Climate Emergency on social media.

2.6 THE PLAN'S PRINCIPLES

In developing the Plan, the following principles have been applied. Many of these principles are based on key messages the Net-Zero Task Force heard in the Call for Evidence and the Thematic Hearings. These principles must also be considered when implementing each action.

1. Achieving net-zero is **not optional**, it is essential.
2. The role of this Plan is to **map out all of the change needed**, even if some are not possible yet.
3. The Plan needs to **reflect the specific qualities and characteristics of Devon** in planning for net-zero.
4. Although this is a Plan for Devon, it also **seeks common cause with other areas of the country facing similar challenges** to reach net-zero, and will seek to work with them to make finding the right solutions more efficient and effective.
5. All actions must deliver carbon reductions across their life cycle; cradle to grave.
6. Multiple benefits for health, well-being and resilience of communities and nature must be delivered.
7. The term 'emergency' should have due consideration given to it. Any activities incompatible with the net-zero target must be reconsidered.
8. The implementation of the plan must be democratic and involve communities, so not 'done to' people.
9. **A just and affordable transition** is required to ensure that:
    a. Vulnerable and low-income segments of society and rural communities are not disadvantaged.
    b. The differing impacts of climate change on different groups e.g. disabled, minorities, gender, are addressed.
    c. Actions to decarbonise Devon must not be at the expense of other communities or ecology globally.
10. Significant **behaviour change** must be recognised as a necessity.
11. We must reframe our **local economy to move beyond using growth** as the single measure of success.
12. The Plan must **recognise the varying geography of Devon**, including the importance of linkage and networks.
13. **Spatial planning has a clear role** to reorganise society towards net-zero living:
    a. Ensuring that new development strongly contributes to the transformation required to achieve Net-Zero.
    b. The importance of 'place' and people's connection to a location has to be a priority in all future development.
    c. Spatial planning and transport planning need to be better linked. Relocalisation should be an organising principle wherever it can assist achieving net-zero.
    d. A net-zero Devon needs to recognise the importance of rural areas in delivering net-zero not only for their communities, but also the growing importance of the resources and services they provide for larger towns and cities, including ecosystem services. Therefore, a more balanced emphasis is required between spatial planning for urban and rural areas.

14. **Resources,** energy, and mobility, should be considered in a **hierarchy:**
    1. Avoid where possible, reduce resource and energy consumption and the need to travel
    2. Improve the efficiency of our use of resources and energy, e.g. reusing, recycling, insulating buildings and active and shared travel modes
    3. Use renewable and low-carbon resources, e.g. timber, solar power and ultra-low emission vehicles.
15. We must be innovative and dynamic in our pursuit of a net-zero Devon, sometimes leading and steering policy and action ahead of national initiatives.
16. We must collaborate to make use of a range of financing opportunities, e.g.
    a. Find financially viable, self-sustaining solutions and work with the private sector to develop these.
    b. Work with national government to develop public-sector support.
    c. Community investment.
17. The implementation of this Plan will be monitored regularly, and a review will be triggered if carbon emissions are not reducing at the necessary pace.

2.7 REFERENCES

[1] Climate Change Committee (2019) Net Zero – The UK's Contribution to Stopping Global Warming. Available at: https://www.theccc.org.uk/publication/net-zero-the-uks-contribution-o-stopping-global-warming/

SECTION 3.

DEVON NOW

3.1 GEOGRAPHY AND ECONOMY

Devon has distinctive characteristics that provide the context for planning for net-zero emissions. Devon is the third largest English county, is generally rural in character and has over 200 miles of shoreline split between two coasts. Devon also has major urban centres, the largest of which - Plymouth, Torbay and Exeter - account for almost half of its population.

Devon is recognised for landscapes of national importance. Thirty-five percent of Devon's land area is within Dartmoor and Exmoor National Parks and five Areas of Outstanding Natural Beauty. There are also two World Heritage Sites (the Cornwall and West Devon Mining Landscape and Jurassic Coast) as well as the North Devon Biosphere Reserve and Exmoor's International Dark Skies Reserve.

The County's biological and geological diversity is illustrated by the presence of over 200 Sites of Special Scientific Interest (SSSI), 2,100 County Wildlife Sites and 360 County Geological Sites. However, Devon's habitats have become increasingly fragmented and are vulnerable to development pressures and the effects of climate change. More information about the health of Devon's environment is available in Devon's State of Environment Report.

Figure 3.1 illustrates the Gross Value Added (GVA) economic profile for the Devon, Plymouth and Torbay area compared to that of the UK. GVA is a measure of the increase in the value of the economy due to the production of goods and services. Devon has a slightly higher economic contribution from agriculture, construction, real estate and substantially more from the public sector than the UK as a whole.

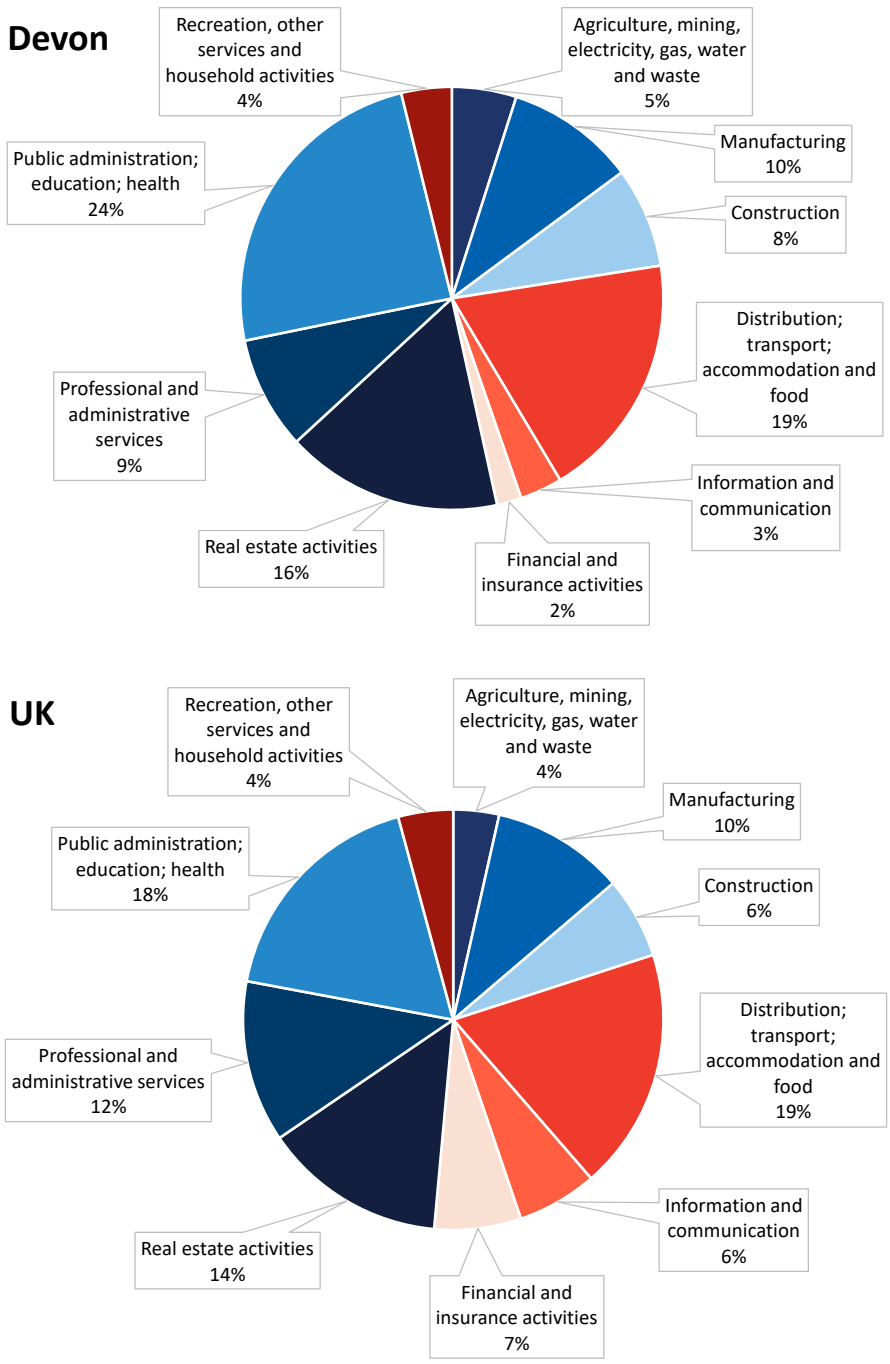


Figure 3.1 - Composition of the Devon (top) and UK (bottom) economies by Gross Value Added.

This diversity in geography and economic structure means that the challenges of reaching net-zero will vary between different parts of the County. For example, a net-zero future will look different in Plymouth compared to that of villages in Torridge or a coastal town in the South Hams. The challenges of decarbonisation vary and so do the opportunities, but all areas of Devon need to fully contribute, respecting their individual identities, to creating a resilient, net-zero carbon Devon where people and nature can thrive.

3.2 GREENHOUSE GAS EMISSIONS

3.2.1 Production Greenhouse Gas Emissions

Figure 3.2 shows Devon's production greenhouse gas (GHG) emissions in 2019, which is the latest available data, and the data used throughout this Plan. 'Production' means these data reflect the GHG emissions that arise from activity within the boundary of Devon. These totalled 7.6 million tonnes of carbon dioxide equivalent (CO_2e). This measure reflects the effect of a basket of six GHGs on global warming, converted into equivalent units of carbon dioxide so that they can be reported on a comparable basis. The most substantial emitters are Buildings (39%), On Road Transportation (30%) and Agriculture, Forestry and Other Land Use (17%).

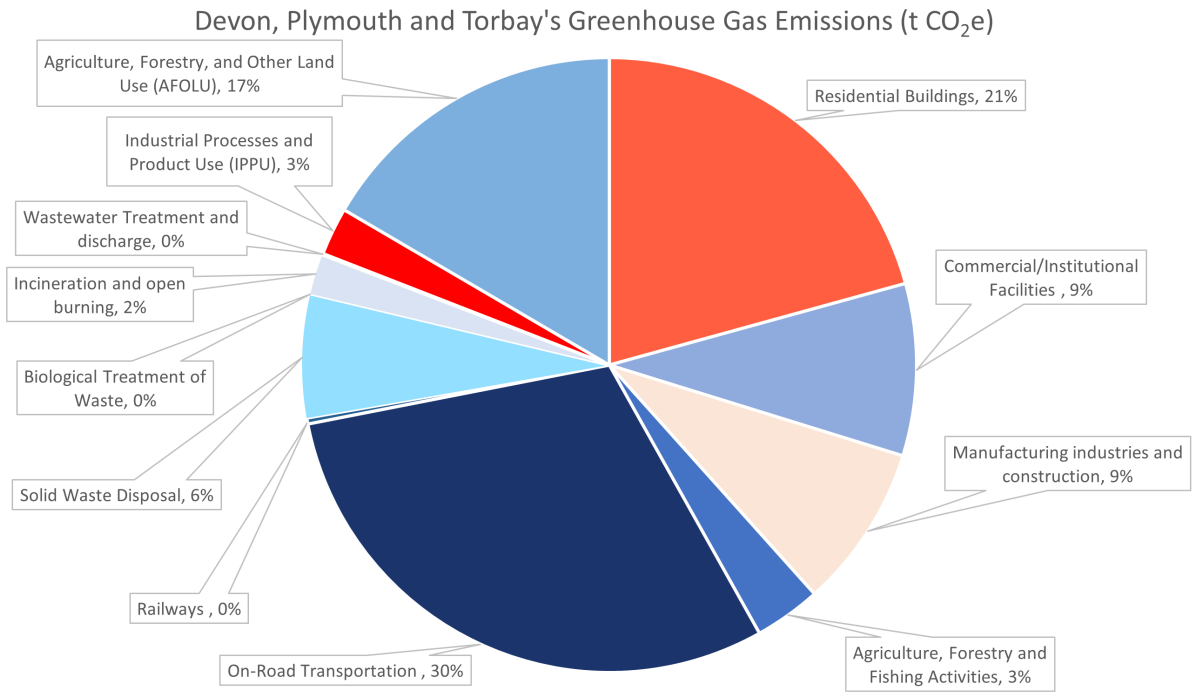


Figure 3.2 - Devon, Plymouth and Torbay's 2019 Greenhouse Gas Emissions by Sector.[1]

Aviation and marine emissions (estimated to be 3% and 0.3% respectively of the total) are not included in Figure 3.2 as data availability and quality is poor. Further details on the methodology used to produce this figure can be found here.
https://devonclimateemergency.org.uk/studies-and-data/devons-carbon-footprint/

The local authorities' geographical emissions vary depending on whether the location is predominately rural or urban. For example, Exeter, Plymouth and Torbay have lower transport emissions than more rural areas because urban residents tend to be closer to amenities and therefore can walk, cycle and use public transport for a higher proportion of journeys. Urban areas tend to be on the gas grid whereas dwellings in rural areas are more likely to rely on oil, and gas is a lower carbon fuel. Furthermore, rural areas have higher emissions from agriculture, which are the result of food production for local populations, including those in urban areas and national markets. These differences can be seen in Figure 3.3.

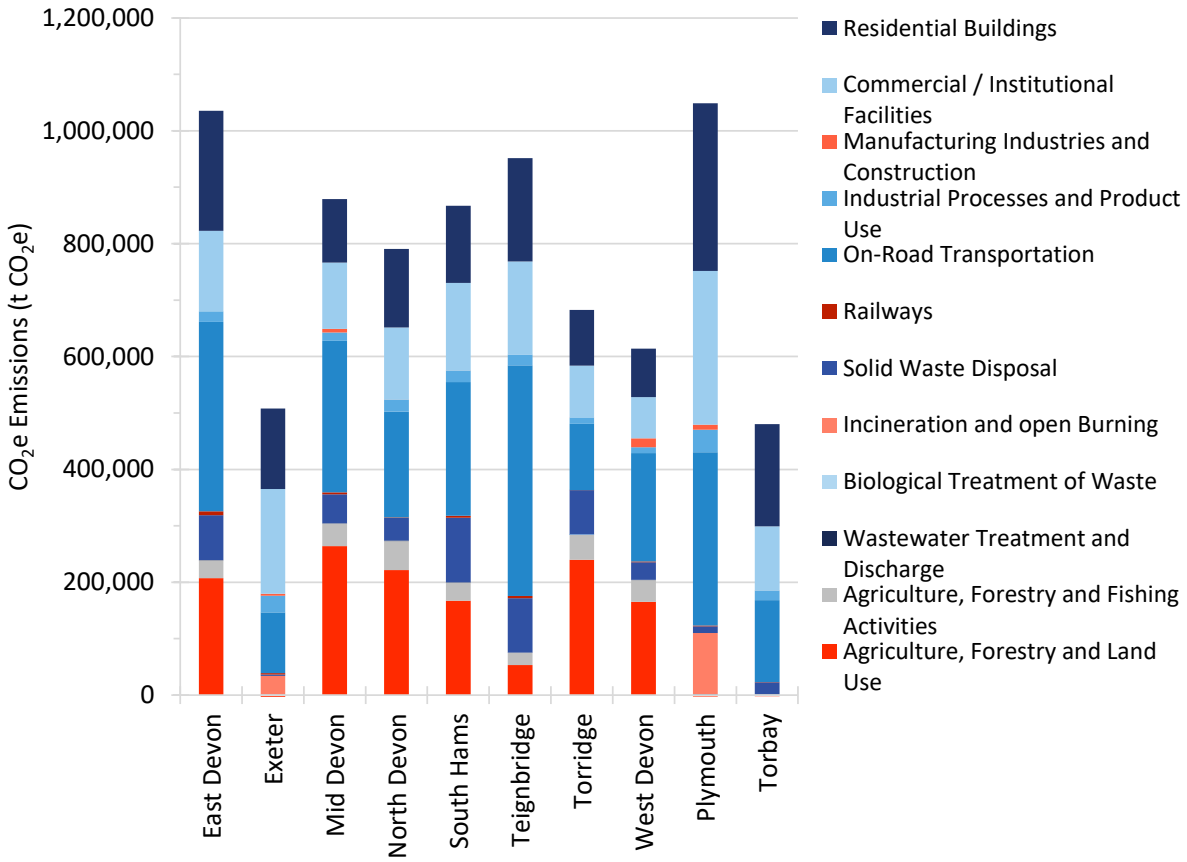


Figure 3.3 – Devon, Plymouth and Torbay's 2018 Greenhouse Gas Emissions by Local Authority Area and Sector.

3.2.2 We are Not Starting from Scratch

Between 1990 and 2019, the UK's production GHG emissions have reduced by 44% as a result of national policies to encourage decarbonisation[2] and the transition of the UK's economy away from domestic manufacturing towards the service sectors.

Figures over this duration are not available for Devon but it can be assumed that similar reductions have occurred locally. Between 2010 and 2019, Devon's production GHG emissions reduced by 22%.[3]

3.2.3 Consumption of Greenhouse Gas Emisions

International trade means that many of the GHG emissions associated with life in Devon are not emitted locally but instead occur elsewhere. For example, purchasing a mobile phone that is manufactured abroad using materials collected from across the globe and then transported to Devon causes 55kg CO_2e.[4] But only the emissions associated with the distribution activity within Devon appear in Devon's production GHG emissions figure.

When emissions are calculated on a consumption basis, the emissions occurring elsewhere are included and the emissions associated with goods and services produced locally but exported are excluded.

Monitoring emissions associated with goods and services that are imported to Devon can currently only be done by apportioning the UK estimates for imported emissions using a factor such as GVA. On this basis, the 2019 emissions arising overseas that are attributable to the people of Devon were 4.9Mt CO_2 e. Add this to the 7.6Mt CO_2e production emissions makes Devon's consumption GHG emissions 12.5Mt CO_2e,[5] of which overseas emissions account for 39%. Devon's true consumption GHG emissions will be lower than this because the partnership has not been able to remove the emissions associated with Devon's exports. Nonetheless, calculated on this basis Devon's consumption GHG emissions have reduced by 18% since 2010.

Emissions reported in the remainder of this Plan are production emissions because that is the internationally-agreed approach, but the partners want to see Devon act on overseas emissions, too.

3.3 REFERENCES

[1] Mitchell A. et al. (2020) Greenhouse Gas Emissions Report – Devon, Plymouth, Torbay 2019. Centre for Energy and Environment, University of Exeter. Available at: https://devonclimateemergency.org.uk/studies-and-data/devons-carbon-footprint/

[2] BEIS, (2021), Final UK greenhouse gas emissions national statistics: 1990 to 2019. Available at: https://www.gov.uk/government/statistics/final-uk-greenhouse-gas-emissions-national-statistics-1990-to-2019

[3] Lash, D. et al. (2020) Net Zero Devon, Plymouth and Torbay. Centre for Energy and the Environment, University of Exeter. Available at: https://www.devonclimateemergency.org.uk/wp-content/uploads/2021/11/DPT-net-zero-report-v1-140820.pdf

[4] Restart Project (2015) Mobiles: The Global Carbon Footprint. Available at: https://therestartproject.org/the-global-footprint-of-mobiles/

[5] Based on apportioning the UK imported consumption emissions in 2019 of 369 Mt CO2e by Devon's GVA share. UK total GVA of £1819.8 billion in 2017 and Devon's GVA of £24.2 billion in 2018. UK imported consumption emissions data is at: DEFRA (2022) Carbon footprint of the UK and England to 2019. Available at: https://www.gov.uk/government/statistics/uks-carbon-footprint/carbon-footprint-for-the-uk-and-england-to-2019

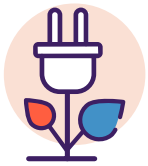
SECTION 4.

DEVON IN THE FUTURE

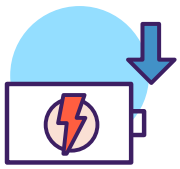
4.1 VISION AND OBJECTIVES

The vision is a resilient, net-zero carbon Devon where people and nature thrive.

A set of eight objectives demonstrates concisely what this Plan needs to achieve by 2050 at the latest to reduce emissions, alongside work to improve resilience to the changing climate through the Devon, Cornwall and Isles of Scilly Climate Adaptation Plan. These are shown below. Indicators to monitor progress towards achieving these are proposed at Section 12 of this Plan.



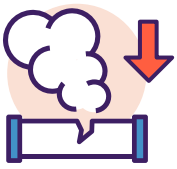
Fossil fuels phased out as an energy source



Minimise energy consumption

Engaged communities acting for resilience and a net-zero carbon Devon

Carbon captured and stored from the burning of fuels



Minimise fugitive greenhouse gas emissions

Resilient local economies with access to green finance

A circular use of resources

Maximise carbon storage in marine and terrestrial environments

The implementation of the vision and objectives brings opportunities to create a fairer, healthier, more resilient and more prosperous society. Some examples are described in Section 1.5 and further co-benefits of reducing carbon emissions are highlighted throughout this Plan.

4.2 A CHANCE TO BUILD BACK BETTER FROM COVID-19

In the most tragic of circumstances, the pandemic has shown what a more sustainable Devon might sound and feel like. The first lockdown in April 2020 resulted in a reduction in Devon's carbon emissions by almost a quarter (23%). Average traffic flows reduced by 60% and air quality improved. However, history indicates that after an economic downturn the rebound in emissions is often larger than the decline. There is every chance that this will happen again unless there is concerted action to build back better.

There is strong public support nationally for the recovery to align with the imperatives created by the climate emergency. Almost 80% of the National Climate Assembly members agreed that the "Steps taken by the government to help the economy recover should be designed to help achieve net-zero" and 93% agreed that, "...government, employers and/or others should ... encourage lifestyles to change to be more compatible with reaching net-zero."[1]

The chairman of the Climate Change Committee (CCC), Lord Deben, said:

> *"The UK is facing its biggest economic shock for a generation. Meanwhile, the global crisis of climate change is accelerating. We have a once-in-a-lifetime opportunity to address these urgent challenges together; it's there for the taking. The steps that the UK takes to rebuild from the COVID-19 pandemic can accelerate the transition to a successful and low-carbon economy and improve our climate resilience"*[2]

Devon is seizing this opportunity. The partnership has written to Boris Johnson endorsing the CCC's policy recommendations for building a resilient recovery from the COVID-19 crisis and highlighting aspects that are particularly pertinent to Devon. This plan lays a roadmap to building back better.

4.3 REFERENCES

[1] Climate Assembly UK (2020) Interim Briefing – COVID-19, Recovery and the Path To Net Zero Executive Summary. Available at: https://www.climateassembly.uk/documents/78/COVID_19_and_recovery_FINAL_w_links_003.pdf

[2] Climate Change Committee (2020) COVID-19 can be an historic turning point in tackling the global climate crisis. Available at: https://www.theccc.org.uk/2020/06/25/covid-19-can-be-an-historic-turning-point-in-tackling-the-global-climate-crisis/

SECTION 5.

NET-ZERO AMBITIONS

5.1 DEVON'S NET-ZERO TARGET

The Devon Climate Emergency partners are committed to achieving rapid and fair emissions reductions for Devon in the next 10 years of at least a 50% reduction in production and consumption emissions by 2030 below 2010 levels. The partners acknowledge there is a limit to the total amount of greenhouse gases emitted globally if dangerous climate change is to be avoided.

Partners will use their responsibilities and influencing opportunities as community leaders to help Devon's diverse communities, business sectors and environments as a whole achieve net-zero emissions as soon as possible and by 2050 at the latest, following the national ambition. The Plan is frontloaded with impactful actions to support the partners that have set earlier net-zero targets for their areas. Progress towards achieving the Plan's targets will be reviewed regularly so that the targets can be enhanced where delivery is better than expected, or so the Plan can be revised where emissions reductions are not moving at the required pace.

The Plan will ensure that preferred solutions for local carbon offsetting are in place by 2030 to enable individuals, organisations and local areas to net-off to zero their residual emissions ahead of the national timetable where this is desired. Carbon offsetting must only be used for emissions that are not viable to avoid.

Prominent policy scenarios for achieving net-zero emissions in the UK, such as those produced by the Climate Change Committee (CCC)[1] and The Centre for Alternative Technology[2] only address production emissions and so this commitment from local partners is ambitious. If UK's (including Devon's) production emissions are reduced to net-zero and UK trading partners reduce their emissions in line with the Paris Agreement, then the CCC estimates that consumption emissions would be around 90% below 1990 levels in 2050.3 This highlights the importance of organisations and individuals in Devon reducing, reusing, sharing and recycling goods and using their purchasing power to improve environmental practices in Devon and overseas if the net-zero target is to be met (discussed further in the Economy and Resources section, of this Plan).

5.2 CARBON BUDGETS

Carbon budgets (Table 5.1) for production emissions have been developed for Devon for five-year periods between now and 2050 based on the CCC's Further Ambition scenario. These budgets state a maximum amount of carbon dioxide equivalent that can be emitted within each five-year period. The purpose of using carbon budgets rather than annual targets is to allow for the effects of fluctuations in emissions due to factors such as short-term changes in economic activity or particularly cold winters.

Economy and Resources	2018-22	2023-27	2028-32	2033-37	2038-42	2043-47
Budget (kt CO_2e)	34,096	28,971	24,613	18,771	11,771	4,770

Table 5.1 - Total carbon budget per five-year period to achieve net-zero by 2050.

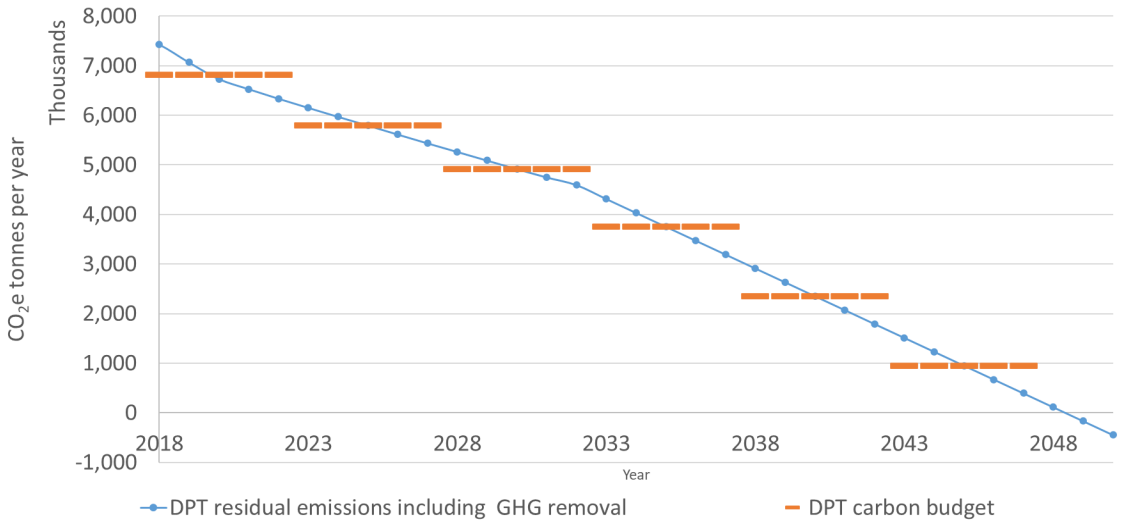


Figure 5.2 - Projected emissions reductions for Devon, Plymouth and Torbay (DPT) combined to achieve net-zero by 2050. The orange bars show the carbon budget per year average over the relevant five-year period. The blue line shows the necessary year on year reductions.

Actual production emissions in 2018 and 2019 (latest data available) totals 15,330kt CO_2e[4] This means the average annual emissions between 2020 and 2022 need to be 6,255kt not to exceed the budget.

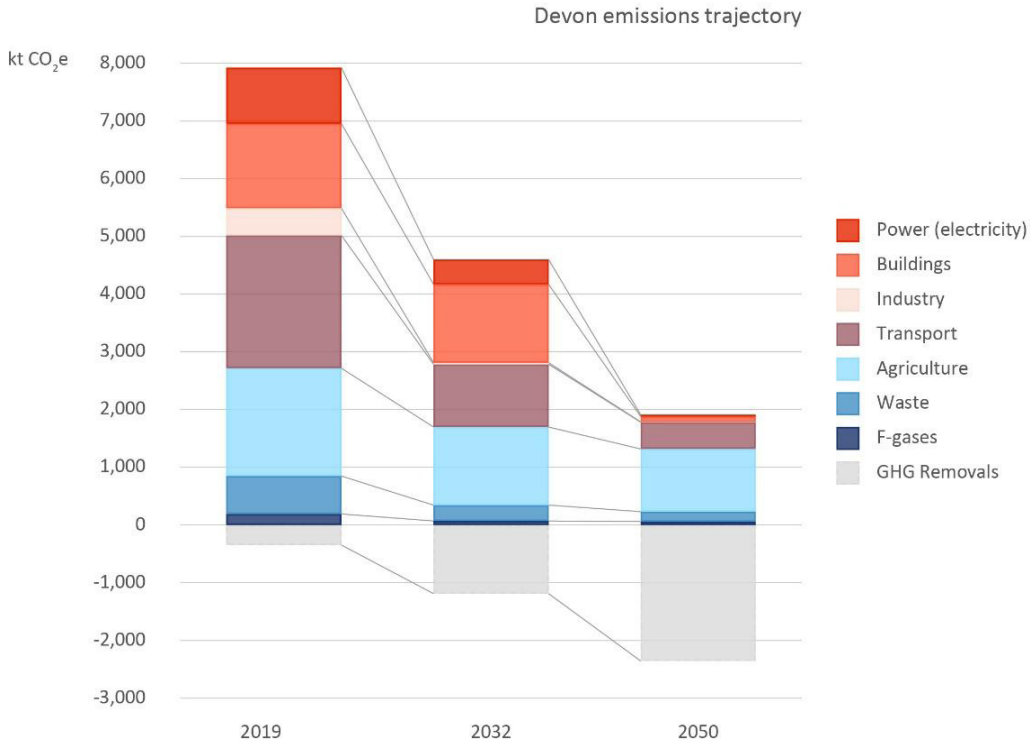


Figure 5.3 - Trajectory for Devon's production emissions by sector. F-gases refers to fluorinated gases, generally used as refrigerants. GHG Removals refers to approaches that remove carbon dioxide from the atmosphere.

Figure 5.2 shows the anticipated trajectory for the reduction of Devon's production greenhouse gases (GHG) emissions to 2050. Most of the savings come from the Power, Buildings and Transport sectors. By 2050 Devon's net emissions are projected to be -0.3Mt CO_2e.

5.3 ACHIEVING NET-ZERO SOONER

Bringing the latest date forward from 2050 to achieve net-zero ahead of the national timetable would be challenging and more costly.

Many policy aspects relevant to reducing GHG emissions and their associated funding are controlled nationally, such as energy, strategic transport, agricultural and waste policy and retrofitting buildings. Assuming the national target remains as 2050, for Devon to achieve net-zero sooner would require the emissions in Devon that result from activity over which there is little local control (such as whether somebody chooses to operate a petrol or diesel car rather than an electric alternative) to be offset using local schemes. But who will fund the offsetting? Devon's emissions are all attributable to individuals and organisations operating in and visiting Devon, yet there is no mechanism to force these emitters to buy carbon offsets ahead of the national timetable.

If such a policy was implemented, these emitters might move away from Devon or choose to visit other areas of the UK that do not require them to pay to offset their emissions.

However, challenges of achieving net-zero ahead of 2050 in Devon are less significant if the UK was to bring forward the national target. An interim target for the UK to achieve a 78% reduction in GHG emissions from 1990 levels by 2035 was set in 2021, but effective policy to deliver it has not yet been proposed.[5] The Devon Climate Emergency partners **strongly encourage national government to bring forward the net-zero carbon date for the UK,** which Devon is ready to implement locally given the necessary national support.

Devon-based organisations are encouraged to join the partners in endorsing the Devon Climate Declaration and reduce their direct emissions to net-zero by 2030. Organisations can follow the government's Environmental Reporting Guidelines to determine the scope of emissions to include in their commitments.

5.4 REFERENCES

[1] Climate Change Committee (2019) Net Zero – The UK's Contribution to Stopping Global Warming. Available at: https://www.theccc.org.uk/publication/net-zero-the-uks-contribution-to-stopping-global-warming/

[2] Centre for Alternative Technology (2019) Zero Carbon Britain: Rising to the Climate Emergency. Available at: https://www.cat.org.uk/info-resources/zero-carbon-britain/research-reports/zero-carbon-britain-rising-to-the-climate-emergency/

[3] Climate Change Committee (2020) The Sixth Carbon Budget: The UK's Path to Net-Zero. Available at: https://www.theccc.org.uk/wp-content/uploads/2020/12/The-Sixth-Carbon- Budget-The-UKs-path-to-Net-Zero.pdf

[4] Mitchell A. et al. (2020) Greenhouse Gas Emissions Report – Devon, Plymouth, Torbay 2018, 2019. Centre for Energy and Environment, University of Exeter. Available at: https://devonclimateemergency.org.uk/studies-and-data/devons-carbon-footprint/

[5] Climate Change Committee (2022) Current programmes will not deliver net-zero. Available at: https://www.theccc.org.uk/2022/06/29/current-programmes-will-not-deliver-net-zero/ global climate crisis. Available at: https://www.theccc.org.uk/2020/06/25/covid-19-can-be-an-historic-turning-point-in-tackling-the-global-climate-crisis/

SECTION 6.

CROSS CUTTING THEMES

6.1 INTRODUCTION

The Net-Zero Task Force has looked at the whole picture to see how Devon can cut its emissions to net-zero and avoid the pitfalls from thinking about sectors in isolation. For example, switching off streetlighting to save energy without community consultation may make walking and cycling less attractive.

This section explores the themes which are cross-cutting to all sections of the Plan and describes what needs to happen for those themes to achieve net-zero. It subsequently introduces a set of goals which need to be achieved to overcome issues that the Net-Zero Task Force has learned from the Thematic Hearings and the public Call for Evidence are barriers to achieving net-zero across all sectors. Actions are proposed to achieve the goals.

6.2 THE CHANGE NEEDED

The cross-cutting themes are:

1. **Behaviour change and community engagement**
2. **Knowledge sharing, skills and learning**
3. **Spatial planning**
4. **Finance, economy and resource access**
5. **Procurement and commissioning**

Each of these themes is described further below.

6.2.1 Behaviour Change and Community Engagement

Whilst Devon needs behaviour change and technological solutions for the Plan to be successful, just waiting for technology to mature, such as hydrogen vehicles or carbon capture and storage solutions, risks delaying action.

Within the next decade, the lives we lead and the way we behave need to be different. Here are just some of the ways our behaviour needs to change:

- how and when we use energy
- how we travel
- how and when we buy products and services
- what we do with products after we've bought them
- what we eat
- how we live in and use buildings
- our behaviour at work.

Behaviour change needs motivation, ability and reminders. For example, to cycle to work you need:

- to live close enough to work or have access to a park and ride/cycle service
- to be motivated to cycle, for example to get healthier, to save money or to enjoy the sunshine on the way to work
- to be able to ride a bike
- access to a working bike
- equipment like a helmet and waterproof
- to know of and have access to a safe route suitable for cycling
- a safe place for your bike at work
- reminders like seeing your helmet hanging by your coat, cycle routes near your house, obvious cycle parking at work and colleagues arriving by bike.

Large-scale, deep behavioural change is difficult and requires systemic changes, but it can be achieved with a combination of providing support to change certain behaviours alongside introducing new policies, technologies and infrastructure. Twenty-five percent of a population doing a behaviour is needed for it to become a social norm[1] The move to homeworking during the COVID-19 pandemic shows that we can achieve social tipping points quickly if we engage whole communities to change together.

Behaviours which reduce greenhouse gas emissions (GHGs) need to be easier to adopt and people need to understand and desire the benefits for their health, prosperity and quality of life. Everyone needs to feel they can be part of the solution. Community organisations are important in enabling behavioural change as they have strong networks, local and specialist knowledge and tend to be highly motivated.

6.2.2 Knowledge sharing, skills and learning

We each need the skills and knowledge to switch to net-zero lifestyles at work, at home and when taking leisure and recreation. A lack of people with the needed skills could limit how quickly we can install newer technologies, like heat pumps to houses.[2]

Equal opportunities for learning and skills sharing are critical to a fair transition to net-zero, so that no individual or community is left-behind. Devon's business support services, schools, colleges, universities and community groups have an important role in providing the training needed.

6.2.3 Spatial planning

A net-zero Devon will be different from how it is now. Where things are and how they connect affect GHG emissions. High car-based mobility in Devon has meant that many rural communities have lost local services.

We need to consider how to organise housing and employment space so that we can get to shops, workplaces and services by walking, cycling and on public transport more easily.

We can proactively and sensitively plan for changes needed within our rural and urban areas to achieve net-zero, such as through the Local Plans and Neighbourhood Plans we make together. Achieving net-zero can produce better places to live, work and relax, as well as cutting emissions.

6.2.4 Access to finance and resources

Innovative ways of funding and resourcing the actions in this Plan are needed. Some solutions are commercially viable and can be designed to generate income streams that can be re-circulated into further carbon-reduction activity and could subsidise loss-making actions. Others could make use of crowd-sourced funds, where members of the community have an opportunity to donate or invest. There is growing interest from institutional investors to put money into socially and environmentally ethical projects as these are seen as having lower investment risk and potential to generate stable investment returns in the long term.[3] In addition to this is the growing number of corporate organisations committing to achieve net-zero emissions from their own operations and needing to pay for carbon offsetting projects – this money could be attracted to Devon.

6.2.5 Procurement and commissioning

All organisations have influence on achieving net-zero through what they buy, who they buy it from and how they engage with their suppliers.

The NHS and councils are examples of anchor institutions, those organisations which are unlikely to relocate and are large employers in the County. Anchor institutions have an important leadership role in procurement as they can be a supplier's largest client.his means a supplier will often change its behaviour for all of its other clients to make life easier. Suppliers will also need to pass on the anchor institutions' requirements deeper into the supply chain, contributing to a trickle-down effect.

This is explored further in the rest of the Plan, particularly in the section on Economy & Resources and Food, Land & Sea.

6.2.6 Relationship with the Plan's Themes

These cross-cutting themes are delivered by actions throughout this Plan. Figure 6.1 shows how the actions arising in other sections of this Plan relate to the cross-cutting themes.

Primary Theme	Cross Cutting Theme	Access to finance and resources	Knowledge sharing, skills and learning	Behaviour transfor-mation and community engagement	Procurement & Commission-ing	Spatial Planning
Economy and Resources		R3, R5, R20, R25, R26, R27	R2, R21, R22, R23, R24	R1, R4, R6, R7, R8, R15, R17	R9, R10, R11, R19, R20	
Energy Supply		E3, E9, E10, E11		E5		E1.3, E1.7, E2, E4, E6
Built Environment		B4, B5, B9	B2, B7, B13, B15	B3, B6	B1	B8, B11, B12, B14
Transport		T14, T18, T20, T23	T4, T7, T37, T42	T1, T8, T15, T24, T26	T3, T16, T18	T2, T12, T28, T40
Food, Land and Sea		F1, F1.1, F1.2, F6, F11, F17, F18, F19, F25	F1.4, F7, F8, F9, F10, F23.1, F23.2, F23.3, F23.4	F1.3, F3, F23.6	F5, F6	F2, F12, F13, F14, F16, F22

Figure 6.1 - A Summary of the Actions relating to cross-cutting themes, by action number and section of the Devon Carbon Plan in which they appear.

6.3 OTHER OPPORTUNITIES AND BENEFITS

Cross sector collaboration to achieve a net-zero Devon can deliver multiple benefits on top of carbon savings, including:

- A culture of innovation
- New economic and employment opportunities
- Citizens feel part of creating the future of Devon
- Communities with shared visions of what their community could look like
- Revitalised, thriving communities with access to the things they need within local reach
- Landscapes which are more resilient to climate change.

6.4 DEVON'S GOALS TO MEET NET-ZERO

6.4.1 Goal CA - Devon Embraces Innovation to Achieve Net-Zero

Achieving net-zero will need innovation in technologies, institutions, business models, policy designs and approaches to encouraging and enabling behaviour change.[4]

Making It Happen

Organisations in Devon needs to monitor technological developments and assess and test their potential to help achieve net-zero in Devon.

We must also offer support for innovation, especially in sectors the Heart of the South West Local Economic Partnership identifies as high value with the potential to contribute to green growth. These include high-tech electronics and photonics, marine research, climate and environmental science expertise (including big data handling) and clean energy.[5]

The Actions

C1. Foster innovation in technologies, institutions, business models, policy design and behaviour to achieve net-zero.

Case Study

SETsquared Exeter

SETsquared Exeter[6] is a member of an inspiring enterprise partnership between six leading research-led UK universities: Bath, Bristol, Cardiff, Exeter, Southampton, and Surrey. It's a community of entrepreneurs who enable regional creators, innovators and disruptors to grow and develop business ideas. Based at the Exeter Science Park, it provides award-winning business support to help turn ideas into flourishing ventures. SETsquared Exeter offers specialist acceleration and incubation support for founders of high-growth, knowledge-based start-ups, provides programmes for students to explore entrepreneurial ideas, and initiatives to help researchers work more innovatively.

6.4.2 Goal CB - Devon's Communities Imagine and Deliver their Net-Zero Future

Imagining alternative, better futures for Devon can build public understanding of the crisis nature of the emergency, develop support for the change to net-zero and encourage us to risk doing radically different things.[7] Supporting communities to re-imagine themselves as net-zero increases local capacity for change.[8]

Making It Happen

Community groups need to be helped to work with Devon's creatives, such as artists, writers, and musicians to develop detailed, local net-zero visions. This work could build an evidence base for neighbourhood plans.

Communities also need to be supported to start delivering their visions, however small their initial steps are. Support programmes work best when they help a community deliver an initiative for which local enthusiasm already exists – this is the ethos of the Community Action Groups Devon project, which has helped communities establish Repair Cafes and Share Sheds, and the support that has been provided for communities to develop their own energy projects over the past decade.[9] Projects like these should be expanded.

The Actions

C2. Provide high quality, objective information and education for communities about the crisis nature of the climate emergency.

The Actions

C3. Support communities to develop local net-zero visions.

C4. Provide support to communities to deliver their low-carbon transformation.

Case Study

Net Zero Visions

Acclaimed professionals in animation, illustration, interactive games, and public murals worked with communities to produce positive 'Visions' of locations across Devon as carbon net-zero in 2050.[10] Individuals could submit their own visions online (See Figure 6.1).

Visions featured in an online gallery, as well as in a book to be published in November 2022. Public libraries across Devon will receive a free copy.

The visions have sparked public interest, for example, the mural in Tiverton has led to enquiries to councils about how they could work with the community to deliver elements of the visions. It is hoped that individuals and groups will take and adapt the 'Net-Zero Visions' idea to their own projects and purposes.

The project is led by Dr David Sergeant, Associate Professor in Twentieth and Twenty-First Century Literature and Dr Emma Whittaker, Creative Industries Industrial Research Fellow, Low Carbon Devon, University of Plymouth.

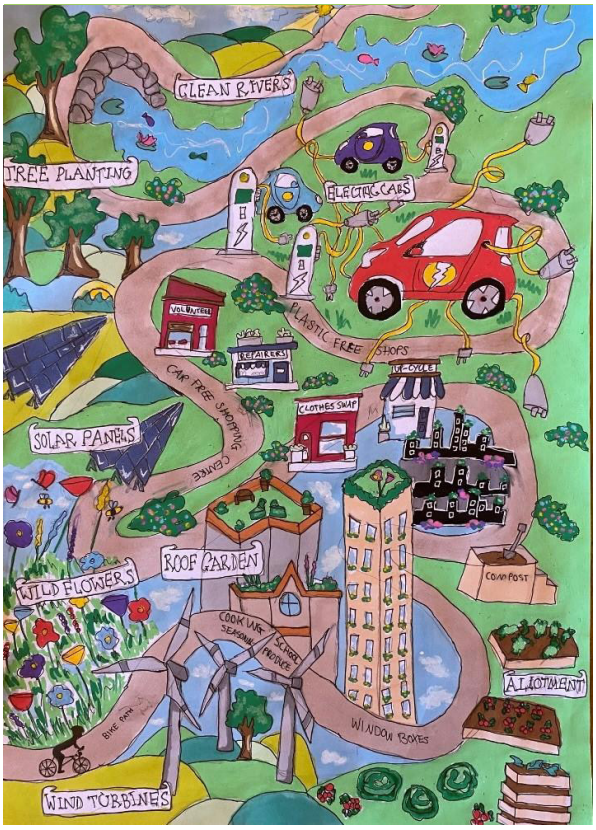


Figure 6.2 - "What might a net zero Tiverton look like?" A vision of the future by Emily Packham, aged 14.

Figure 6.3 - This winning mural design (June 2022) was created by Eleanor Croker BA (Hons) Illustration graduate and painted by Dr Kate Crawfurd at the University of Plymouth.

6.4.3 Goal CC - Devon's Citizens Shape the Transition to Net-Zero

The public have helped develop the Devon Carbon Plan through multiple opportunities to date: the Call for Evidence, a series of Thematic Hearings, a Youth Parliament workshop and the public consultation on the draft Interim Devon Carbon Plan.

The Devon Climate Assembly in the summer of 2021 provided a further opportunity for public participation through a 70-strong representative sample of Devon's population. There will be further challenges on the journey to net-zero that will benefit from involving Devon's citizens in finding the solutions.

Making It Happen

We need to understand the effectiveness of the Devon Climate Assembly. Then we can consider the appropriateness of using similar forums and existing best practice models around neighbourhood and community planning again in future, either to continue work on the Devon Carbon Plan or for other local issues.

The Actions

C5. Research the effectiveness of the Devon Climate Assembly to inform whether this approach could be applied to citizen participation in other decisions locally.

6.4.4 Goal CD - Spatial Planning Creates Places that Radically Reduce Greenhouse Gas Emissions

Relocalisation

We need thriving communities giving access to most of our everyday needs within a short and pleasant walk or cycle ride - sometimes called 'the 20-minute neighbourhood.'[11] This will substantially increase opportunities for active travel minimising car use. This re-localisation of employment, services, amenities and cultural spaces is key to reducing travel demand. Changes to the location of key facilities, and to the networks of paths and streets, could be modelled to predict how different interventions might improve the connectivity of the neighbourhood and to ensure that more people can easily access the facilities they need for their daily lives. There may be opportunities to increase the density of development by providing new homes and facilities.This in turn might make public transport, shops and other facilities more viable. Such modelling could guide long-term investment.

This is, of course, easier said than done, and so flexibility of this vision is required. Outside of Devon's main settlements, market towns and their surrounding villages can be planned to function as 'network neighbourhoods' providing most of the needs of residents. In more rural areas the combination of existing and new walking and cycling routes could create a close network of villages and hamlets functioning as one neighbourhood. Electric bikes are a breakthrough technology here – making longer journeys easy and low-carbon. Adding short public and shared transport trips to the travel modes can further help deliver this vision of re-localised communities providing themselves with the services they need.

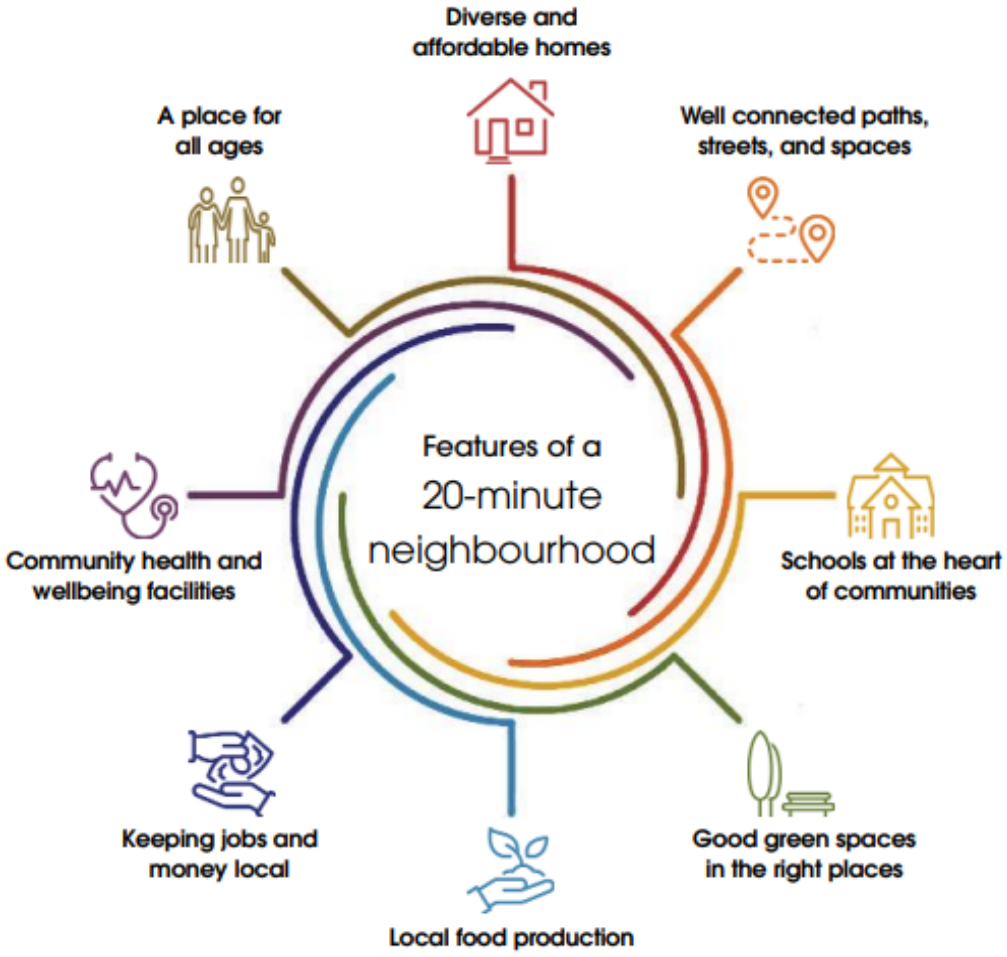


Figure 6.4 - Characteristics of a 20-minute neighbourhood.[11]

One Planet Development

If everybody on Earth lived the same lifestyle as we do in the UK, we would need 2.6 planets to provide enough resources.[12]

One Planet Development (OPD) is a forward-thinking planning policy adopted by the Welsh Government in 2011[13] It provides a genuinely affordable and sustainable way for people to live and work on their own land and achieve a true one planet footprint. It can work for rural and urban communities with residents contributing to local economies, providing fresh food and other produce, and opportunities for education and training about many aspects of zero carbon living.

OPD residents must achieve the target One Planet ecological footprint and meet their basic household needs (food, energy, water, waste processing, IT/communications, council tax, clothing,

and transport) from their land-based activity within 5 years. A robust management plan is required at planning application stage to show how these and other requirements will be achieved. Annual monitoring reports must be sent to the local authorities' Planning Departments.

One Planet homes are required to be zero carbon in construction and use. They are often self-built, sometimes using some volunteer labour, so are lower cost and educational.

Single household OPD may be a niche choice, but it is a way to live a true One Planet or zero carbon life and can inspire others to make changes to their lifestyles to assist the achievement of net-zero. Devon should support this approach.

At larger scale OPD also has potential to accelerate the creation of zero carbon 20-minute neighbourhoods as it focuses on a whole land use system rather than just proximity and transport, also reaping the carbon benefits of local food, energy production and work. It could be an innovative model for addressing the challenges of affordable housing and zero carbon communities together.

Making It Happen

A step-change in how we plan and what we plan for is required. The National Planning Policy Framework (NPPF) already provides local authorities with the mandate to "shape places in ways that contribute to radical reductions in greenhouse gas emissions".[14]

Development plans should include carbon reduction targets as a primary planning objective to encourage appropriate policy responses to deliver against that aim. This will be a mix of solutions that will vary between places drawing on the principles of 20-minute neighbourhoods and OPD to maximise the potential for all places to reach net-zero.

The Actions

C6. Development plans to demonstrate how they will shape places in ways that contribute to radical reductions in greenhouse gas emissions as a primary planning objective, including drawing on the principles of 20-minute neighbourhoods and One Planet Development.

6.4.5 Goal CE - Landscape Change Arising from the Net-Zero Challenge is Planned for Positively

The quality and character of Devon's landscape is one of the County's most important assets and is the reason why many people choose to visit and to live here. Devon's complex geology has created a

6.4.5 Goal CE - Landscape Change Arising from the Net-Zero Challenge is Planned for Positively

striking diversity of landscapes including windswept high moors of Dartmoor and Exmoor, heathlands, secluded valleys, rugged coastlines, sweeping bays and rolling farmland. Thirty-five percent of Devon is designated as one of two National Parks (Dartmoor and Exmoor) or as one of five Areas of Outstanding Natural Beauty (AONBs).

As through history, landscapes will evolve in response to the pressures put on them, such as the need to provide food, energy or mineral resources. Without positive interventions landscapes could change fundamentally in the future in response to the pressures from the changing climate. Yet responding to the net-zero challenge offers an opportunity to revitalise landscapes. Some features that will help meet net-zero may mimic the past, such as the expansion of carbon-rich, semi-natural habitats and in the re-emergence of market gardening. Others will be new, such as increased use of agroforestry which, nonetheless, may reflect the orcharding tradition in the County, and others may offer a new vernacular such as the greater use of timber in construction.

Making It Happen

Devon's Landscape Character Assessment is the tool to manage and guide changes. It describes the variations in character between different areas and types of landscape in the County. It provides an evidence base to inform decisions about spatial planning and other land use considerations, articulating what people see as distinctive and special about all landscapes in Devon. It also sets out strategies and guidelines for the protection, management and planning of the landscape.[15]

The NPPF contains both the imperative to 'shape places in ways that contribute to radical reductions in greenhouse gas emissions' as well as the need to conserve and enhance landscape and heritage assets[14]. The challenge that now needs to be addressed by all landscape character assessments is to identify what is the greatest benefit that individual landscapes can offer in terms of: (a) meeting net-zero; and (b) increasing the resilience of landscapes to climate change. Some people have concerns about tensions between the changes which need to occur to achieve net-zero and protecting our landscapes. It is therefore important that communities are involved in the evolution of landscape character assessments so that people have an opportunity to be engaged with how Devon will look and feel in the future.

The Actions

C7. Involve communities in an update to the landscape strategies and guidelines within Devon's Landscape Character Assessments to plan positively for achieving net-zero and the changes which climate change will bring.

6.5 SUMMARY OF THE ACTIONS

The diagram below, Figure 6.5, shows the reference number and text of each of the Cross Cutting Themes actions in this Plan. The anticipated start and duration of each action is shown on the right hand side of the diagram.

The action with its duration highlighted in red in Figure 6.5 below has been identified as a priority through two processes. Firstly, the Net Zero Task Force assessed the actions' potential to contribute to significant emissions reductions and the likelihood they can be implemented. Secondly, some actions were highlighted as being important by the respondents to the public consultation.

For more detail, including who can help to deliver these actions, see the full action table.

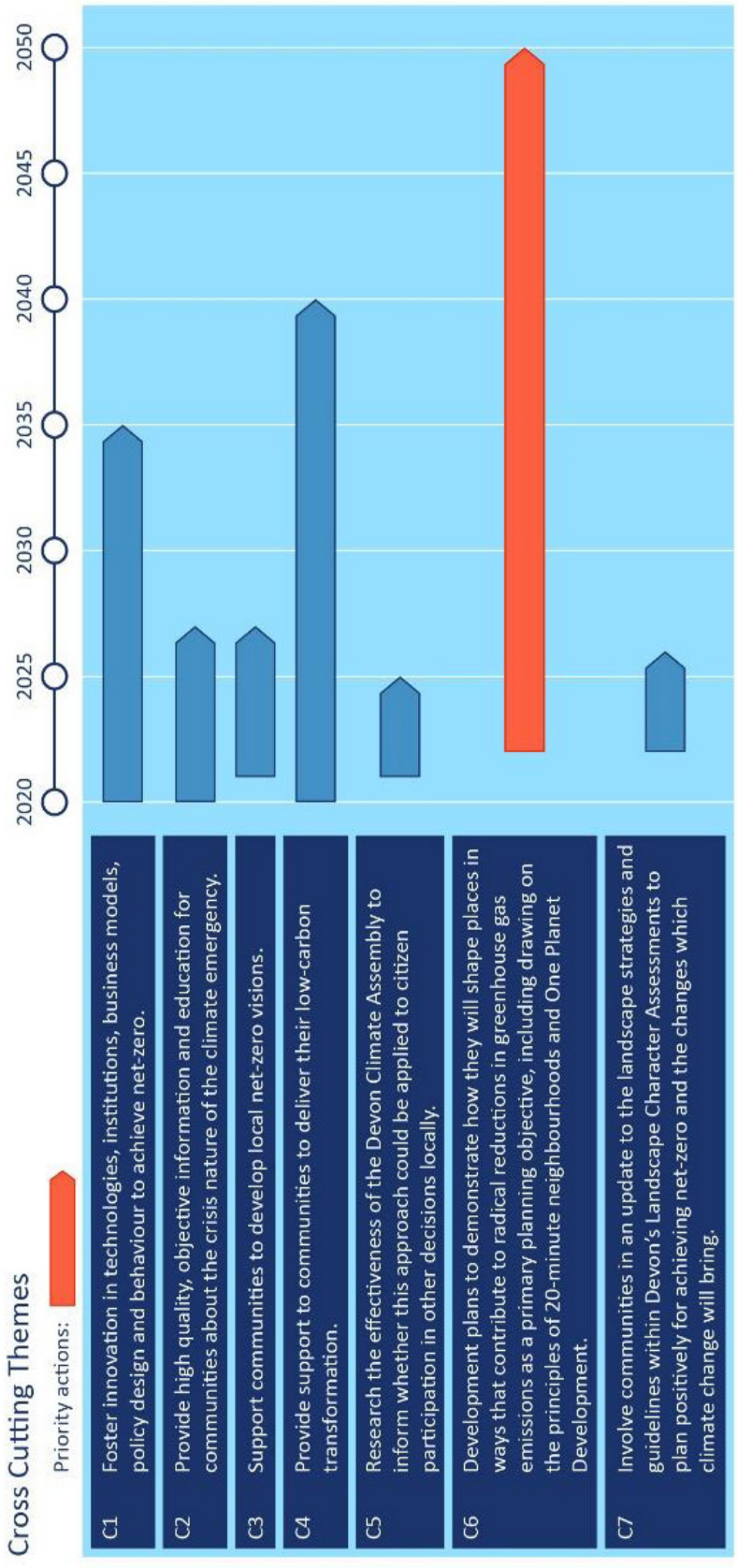


Figure 6.5 - This diagram shows the anticipated start and duration of the Cross Cutting Themes actions and the priority action.

6.6 REFERENCES

[1] World Resources Institute (2020) Expert Perspectives: Changing Behaviour to Help Meet Long Term Climate Targets, the necessity of behaviour change to meet climate targets. Available at: https://www.wri.org/climate/expert-perspective/changing-behavior-help-meet-long-term-climate-targets

[2] Committee on Climate Change (2019) Net Zero Technical Report. Available at: https://www.theccc.org.uk/publication/net-zero-technical-report/

[3] Landberg, R.et. al. (2019) Green Finance Is Now $31 Trillion and Growing, Bloomberg. Available at: https://www.bloomberg.com/graphics/2019-green-finance/

[4] Stark, C. et. al. (2019) Net Zero: The UK's contribution to stopping global warming. UK Committee on Climate Change. Available at: https://www.theccc.org.uk/publication/net-zero-the-uks-contribution-to-stopping-global-warming/

[5] Heart of the South West (2019) Local Industrial Strategy Progress Statement 2 . Available at: https://heartofswlep.co.uk/wp-content/uploads/2019/08/190807-Heart-of-the-SW-LIS-Progress-Statement-2.pdf

[6] SETsquared (Unknown) Home Page. Available at: https://setsquared.exeter.ac.uk/

[7] Sergeant, D. (2022). The Near Future in 21st Century Fiction: Climate, Retreat and Revolution (Cambridge Studies in Twenty-First Century Literature and Culture). Cambridge: Cambridge University Press.

[8] Hopkins, R. (2022) The Book 'From What is to What If': Unleashing the power of imagination to create the future we want'. Available at: https://www.robhopkins.net/the-book/

[9] CAG Devon (2022) CAG Devon Community Action Groups – Home. Available at: https://cagdevon.org.uk/?instance_id=674

[10] Devon Climate Emergency (2022) Net Zero Visions. Available at: https://devonclimateemergency.org.uk/net-zero-visions/

[11] Town and Country Planning Association March (2021) 20-Minute Neighbourhoods – Creating Healthier, Active, Prosperous Communities An Introduction for Council Planners in England. Available at: https://tcpa.org.uk/wp-content/uploads/2021/11/final_20mnguide-compressed.pdf

[12] Statista (2022) Earth Overshoot Day - The World is Not Enough. Available at: https://www.statista.com/chart/10569/number-of-earths-needed-if-the-worlds-population-lived-like-following-countries/

[13] One Planet Council (2019) One Planet Development. Available at: http://www.oneplanetcouncil.org.uk/wp-content/uploads/2019/09/One-Planet-Council-leaflet.pdf

[14] Ministry of Housing, Communities & Local Government (2019) National Planning Policy Framework. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/810197/NPPF_Feb_2019_revised.pdf

[15] Devon County Council (2020) Devon's landscape character assessment (DLCA), Available at: https://www.devon.gov.uk/planning/planning-policies/landscape/devons-landscape-character-assessment

SECTION 7.

ECONOMY AND RESOURCES

- Avoiding waste and creating a circular economy
- Reducing emissions from unavoidable biodegradable waste and wastewater treatment
- Using the purchasing power of Devon's organisations
- Supporting communities and businesses to transition to net-zero

7.1 INTRODUCTION

Historically we have made products, used them and then thrown them away. This behaviour, referred to as the linear economy, creates greenhouse gas (GHG) emissions during manufacturing, transportation to the customer and disposal. Emissions in Devon resulting from manufacturing and transport are reported in other sections of this Plan. Waste disposal contributes 9% of Devon's GHG emissions.[1] Our purchasing of goods produced abroad creates emissions overseas which represent 39% of the total emissions Devon is responsible for.

The linear economy is also ecologically damaging because the collection of raw materials harms habitats and is water and energy intensive, whilst the disposal of waste requires space and can pollute the environment. The environment's ability to produce resources and process waste has limits.[2] If the whole world lived like we do
in the UK, we would need four planets to provide the materials we use and to process the waste we discard to sustain our lifestyle indefinitely.[3]

This section of the Plan describes what needs to happen to achieve a socially-just and net-zero carbon economy that has the potential to create up to 700,000 jobs in low-carbon sectors across England by 2030.[4] It introduces goals for overcoming issues identified during the Thematic Hearings and the public Call for Evidence as barriers to achieving net-zero. Actions are then proposed to achieve the goals.

7.2 THE CHANGE NEEDED

Traditionally, the concept of sustainable development – activity that meets the needs of present generations without compromising the ability of future generations to meet their own need - has given equal weight to the economy, society and environment. Yet the economy must operate within environmental limits and meet everyone's needs more equally – otherwise sustainability cannot be achieved.

Doughnut Economics is a visual representation of a new way of thinking about sustainable development (Figure 7.1). The outer edge of the doughnut is the ecological ceiling – the environmental limit – split into nine categories. The inner edge of the doughnut is the social foundation – the limit above which our twelve needs are being met. The economy must function within the boundaries of the social foundation and the ecological ceiling to be environmentally safe and providing for everyone's needs. The goal of economies has been to continue growing, but when the goal is changed to *meeting the human rights of every person within the means of our life-giving planet*, economies can become agnostic about growth – what we need are economies that make us thrive, whether or not they grow.[5]

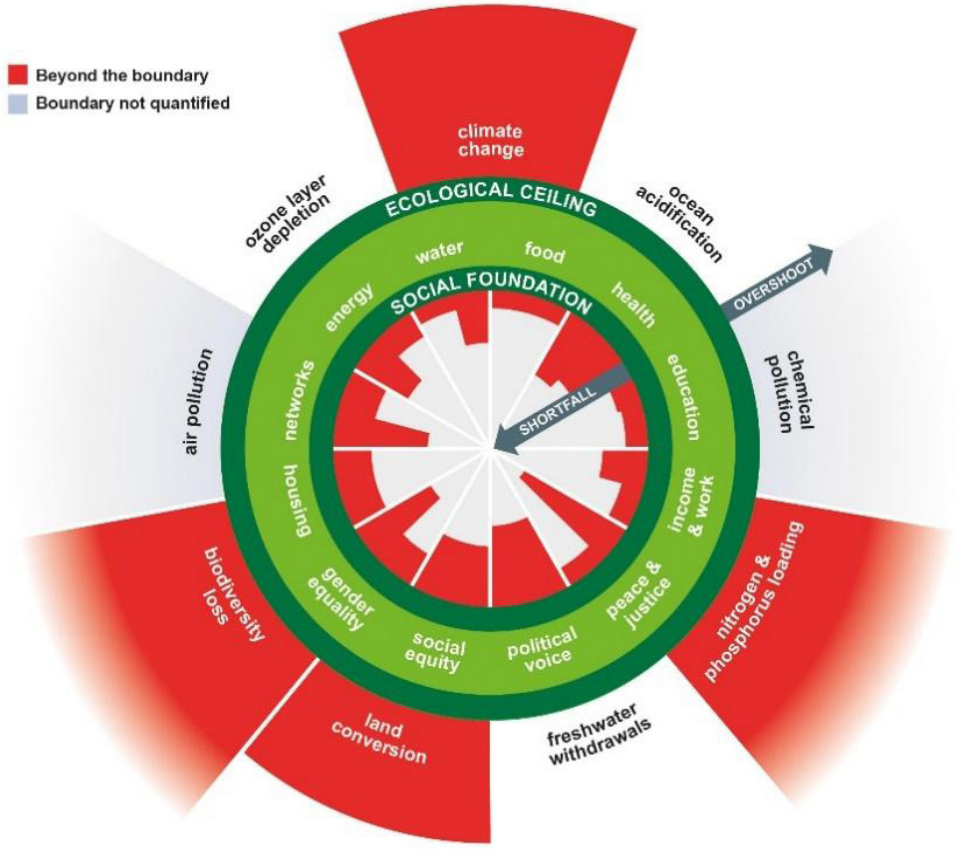


Figure 7.1 - Doughnut Economics.[6]

The creation of a sustainable economy will be complex, yet there are changes that can be prioritised to accelerate this transition.

We need to:

1. **Avoid waste and create a circular economy** though purchasing less, repairing, sharing, reusing, buying second hand, and recycling
2. **Reduce emissions from unavoidable biodegradable waste and wastewater treatment**
3. **Use the purchasing power of Devon's organisations** to benefit the environment and local communities
4. **Support communities and businesses to transition to net-zero.**

These are described in more detail below.

7.2.1 AVOID WASTE AND CREATE A CIRCULAR ECONOMY

Household waste collected in Devon in 2019/20 totalled 516kt.[10] The amount of commercial waste collected within the area administered by Devon County and Torbay councils is 560kt.[11] An estimate for construction, demolition and excavation waste within the same area is 1,206kt.[7]

We can minimise waste creation and keep resources in circulation in the economy for longer, by implementing the waste hierarchy (Figure 7.2) - purchasing less, reusing and repairing what we already have, and by recycling and recovering materials and energy.

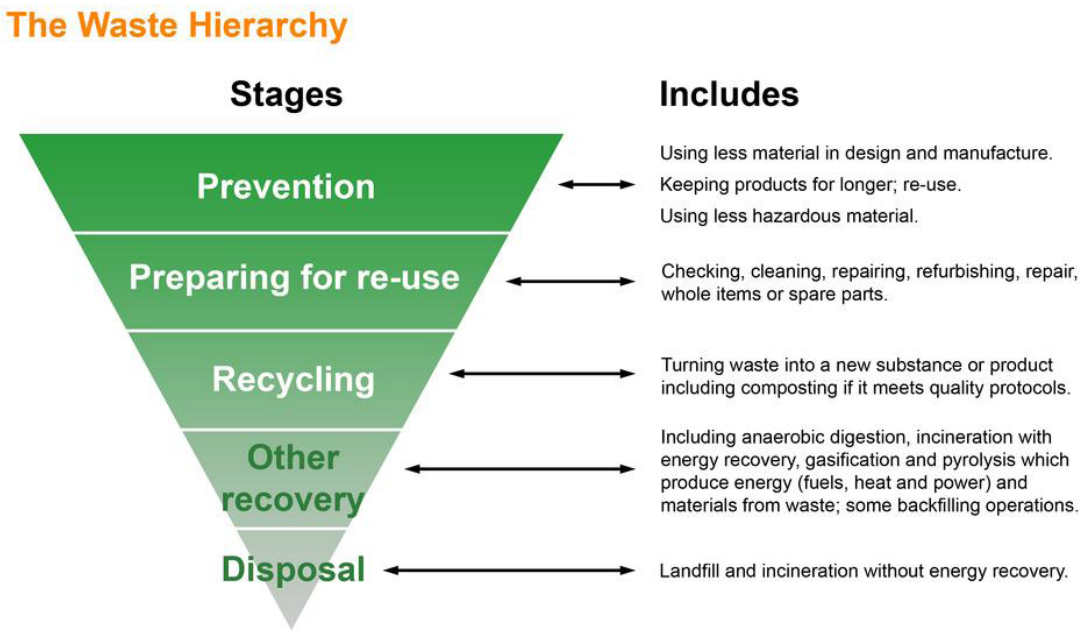


Figure 7.2 - The Waste Hierarchy.

Prevention

Reducing how many things we buy avoids the GHG emissions associated with their production and disposing of them. Repairing items rather than replacing them helps to extend their lifetime, which avoids the need to buy something new. Devon already has 14 community Repair Cafes which help people repair items.[8]

Many of us own items we rarely use, such as DIY tools, camping equipment and a car.[9] We would require fewer items if we shared more or transitioned from ownership to leasing for example by using libraries instead of buying a book or using a car club instead of owning a car. Devon already has good examples of sharing practices, such as The Share Shed in South Hams, which offers over 350 items to be borrowed, and car-sharing business Co Cars in Exeter.

Reuse

Buying second-hand goods reduces waste and also minimises costs. Online auction and trading platforms have become popular for selling-on unwanted items, as are second-hand stores and charity shops. Platforms such as Freecycle enable people to give away lower value items for free, and many of Devon's 22 Household Waste Recycling Centres have resale areas where unwanted items brought for disposal are rescued and offered for sale at minimal costs.

Recycling

Goods that are no longer required need to be recycled. The average recycling and composting rate of waste from households across the Devon County, Torbay and Plymouth City council areas in 2019/20 was 56%, 40% and 34% respectively. This makes Devon County Council's recycling performance the second-best of any county in England. [10]

Government estimates that the recycling rate of commercial waste is between 34 and 40%.[11] The latest estimates (2009) suggest that 87% of construction, demolition and excavation waste is recycled in the area administered by Devon County Council.[7]

There is a national ambition to recycle 65% of municipal waste by 2035 in England. Municipal waste refers to household waste, as well as waste generated by businesses that is similar in nature and composition. The latter will include a significant proportion of waste that is not collected by local authorities. However, the CCC suggests that 70% of municipal waste must be recycled by 2025.[21] To achieve 70%, Devon would need to recycle at least an additional 59,000 tonnes a year.[12] Given that new reprocessing facilities usually take about five years to become operational from securing funding, owing to the need to consult communities, obtain planning permission and receive environmental permits, 70% by 2025 is not achievable. Additionally, demand for recycled materials needs to increase to create a stronger market, otherwise stockpiling of the recyclable materials would occur. This will require national government intervention. Therefore, whilst Devon is ready for the challenge given government support, setting a target more ambitious than the national ambition for recycling is unrealistic.

The Devon Climate Emergency partnership accepts that adopting a later municipal waste recycling target than that proposed by the CCC means that the greenhouse gas emissions trajectory show in Figure 7.4 will be slightly delayed, the emissions from waste are small in the context of Devon's total emissions and the partnership is therefore optimistic that greenhouse gas reduction projections will be exceeded in other sectors to make-up the shortfall.

Other recovery

In 2019 Devon stopped landfilling all but a very small fraction of waste collected from households and businesses by local authorities. Waste is now either recycled, composted or used for energy recovery. Landfilling of some waste collected by commercial waste carriers from businesses does still occur.

Completing the circle

For the economy to become truly circular, products need to be designed and manufactured so that they can be easily repaired, reused and recycled into new products. But there's also a behaviour element - citizens and businesses need to implement circular economy principles otherwise recyclable or repairable items could always end up in the 'black bin' (Figure 7.3).

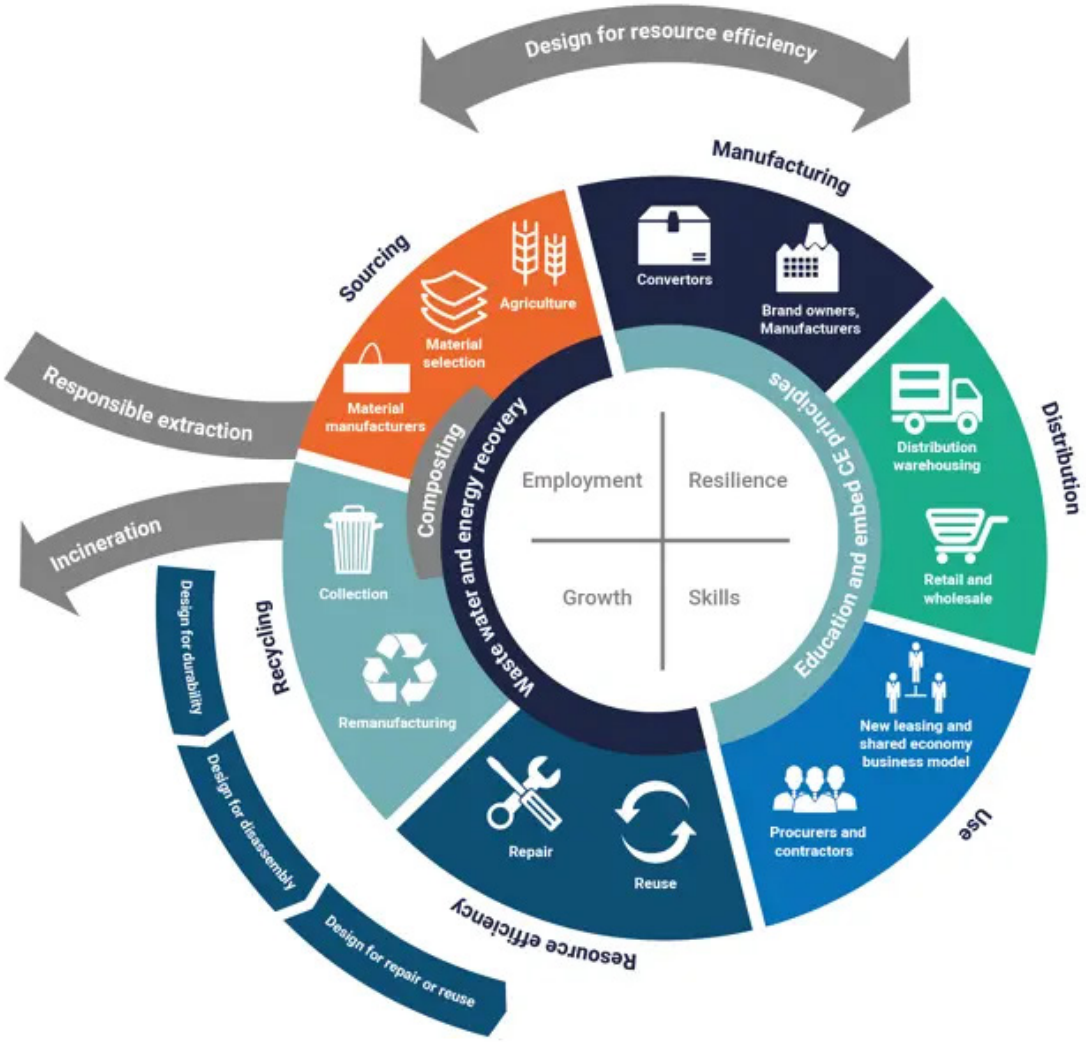


Figure 7.3 - Resource flow in a circular economy.[11]

7.2.2 Reduce emissions from unavoidable biodegradable waste and wastewater treatment

Biodegradable wastes, such as food and sewage, produce methane when they break down in lower oxygen conditions, as is usually the case in landfill and wastewater treatment plants. Methane is a greenhouse gas that contributes to climate change. For net-zero emissions to be achieved by 2050, the CCC recommend that avoidable food waste must be reduced by 20% by 2025, relative to 1990, and no biodegradable wastes should enter landfill after 2025.[21] The CCC also recommends that wastewater treatment plants achieve a reduction in methane and nitrous oxide (a further greenhouse gas released from some biological treatments of wastewater) emissions of least 20% by 2050.

7.2.3 Use the purchasing power of Devon's organisations

Anchor institutions (organisations that can't relocate, such as councils, hospitals and educational establishments) need to nurture local, sustainable supply chains by placing higher value on the carbon and social impact of procurement decisions. This needs to include implementing the principles of the waste hierarchy and the circular economy.

7.2.4 Support communities and businesses to transition to net-zero

All businesses will need to change their behaviours to reduce their emissions. Furthermore, some sectors will shrink whilst others will have the opportunity to grow and new sectors will emerge. Devon will need to support its citizens to learn the skills needed for a net-zero economy and ensure the transition to new industries is socially inclusive.

Households, businesses and public organisations will need to access finance to invest in the changes required for the transition to a net-zero Devon. A large, sustained low-carbon investment of £50 billion annually will be required between 2030 and 2050 across the UK, up from £10 billion in 2020. That compares to total investment in the UK of around
£390 billion in 2019.[13] New innovations in business models must be encouraged alongside green finance products, municipal bonds, crowd funding, and community investment opportunities.

7.3 GREENHOUSE GAS OUTCOMES

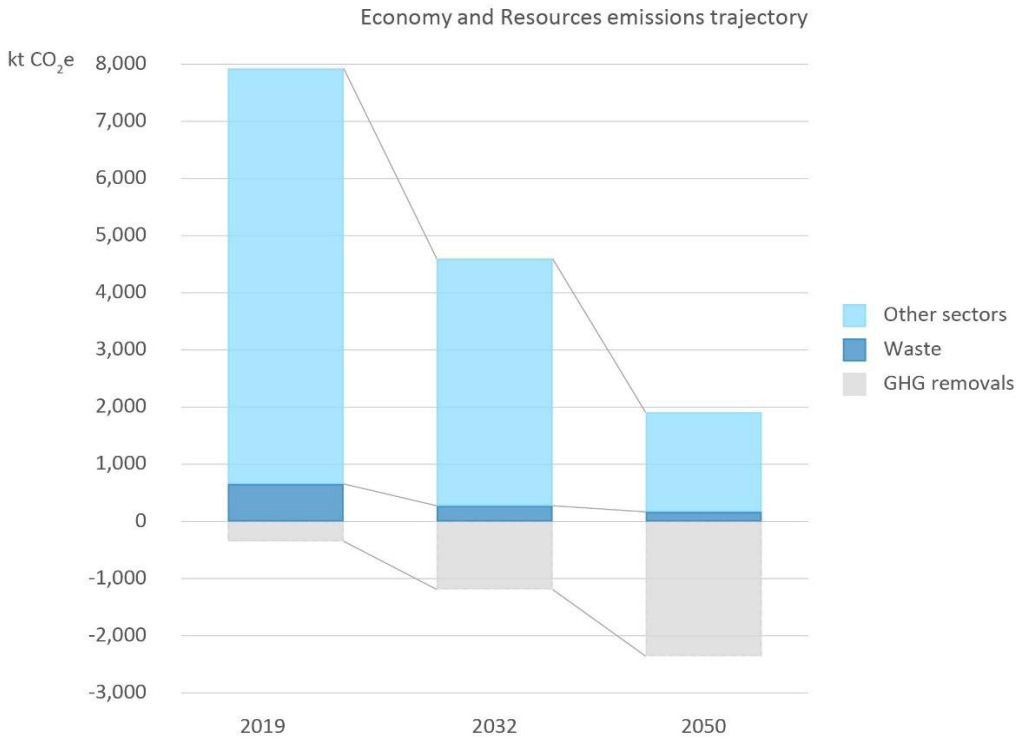


Figure 7.4 - Trajectory for Devon's production emissions, highlighting those from the waste sector. GHG removals refers to approaches that remove carbon dioxide from the atmosphere.

Figure 7.4 shows Devon's net GHG emissions arising from the waste sector in the context of Devon's total GHG emissions. Only the waste emissions are shown as the actions relating to the decarbonisation of the wider economy relate to emissions arising within other sections of this Plan (e.g. transport, buildings and agriculture). Net-emissions from waste in 2019 were 0.6Mt CO_2e. The Figure also shows the projected reduction trajectories for these to 2050 as a result of the delivery of the CCC's Further Ambition Scenario aided by the actions in this Plan. **Through the activities identified in this Plan, by 2050, Devon's emissions from waste are expected to fall to 0.2Mt CO_2e per year. These will become net-zero through activities that remove CO_2 from the atmosphere.**

7.4 OTHER OPPORTUNITIES AND BENEFITS

- Community initiatives to improve resource efficiency, such as Repair Cafes, can help boost community cohesion and reduce social isolation.
- Will position the UK to better address resource security issues in the future.

- More efficient resource use will save Devon's businesses money, allowing them to invest further in staff or technology.
- More value retained in local communities.
- Employee turnover reduced - employees prefer to work for socially and ecologically responsible companies with ethical practices.[14]
- The net-zero carbon economy across Dorset, Somerset, Devon and Cornwall (The Great South West) is expected to deliver a £45 billion boost to the economy and create 190,000 jobs by 2035.

7.5 DEVON'S GOALS TO MEET NET-ZERO

7.5.1 Goal EA – A Culture of 'Enoughness' is Created

Purchasing new goods is encouraged by advertising and engrained in our economic system. There is a deep cultural shift required to move away from buying things out of want towards only purchasing items when we truly need to.

We need to create a culture of "enoughness" which makes it normal to share resources, lease instead of own, swap, repair, buy second hand, reuse and recycle.

Making it Happen

Empowering citizens and businesses

We all need to become 'citizen-consumers', who demand more sustainable goods and services, thus sending strong signals to producers to change their practices. This must also include a transition towards people prioritising the enjoyment of experiences, such as the arts, time in nature, continuing education, community celebrations and self-care, over material consumption as a route to happiness. These experiences and services are an economic opportunity for Devon and the partnership must facilitate this.

Enabling community action

An important part of enabling waste reduction and reuse is empowering communities with skills to repair, share and swap items themselves.

Devon's Community Action Group (CAG) Network supports communities to develop projects and organise events to reduce waste and promote sustainable living, such as repair cafes, food surplus cafes, refill campaigns, community food larders, community composting and clothes swaps.[15] Groups receive training on health and safety, managing volunteers and communicating effectively. CAG is currently focused in Mid Devon and Teignbridge and projects like this should be extended across Devon.

Nineteen of the 22 Household Waste Recycling Centres put aside some items for reuse in the on-site shops. There is scope to improve the reuse opportunities through:

- Portable Appliance Testing electrical goods and offering them for sale
- Installing donation stations/drop off points
- Increasing the reuse target at each site
- Working with the operating contractor to improve the quantity and quality of reused items
- Assisting contractor's staff to recognise sellable goods
- Providing larger shops
- Allowing items to be taken away for repair and onward sale
- Considering online sales

These initiatives are described in the Resource and Waste Management Strategy for Devon and Torbay 2020 – 2030, and the partnership must support the delivery of these ideas.

Support for new models

New business models are being offered to encourage better stewardship of resources. Innovative clothing companies are incentivising end-of-life recycling by offering discounts on subsequent purchases when garments are returned. Others operate leasing arrangements rather than expecting customers to own their products to help the business retain control over materials which can be refurbished or recycled on an ongoing basis to create new products. Electric vehicle manufacturers are offering similar arrangements for battery packs. This demonstrates the principle of the circular economy. We need to help such initiatives spread.

The Actions

R1. Deliver targeted communication to empower people and businesses to adopt more sustainable consumption habits, prevent waste and shift to a culture of sharing, reusing and recycling.

R2. Support communities to establish waste and resources projects.

R3. Improve the reuse facilities at Household Waste Recycling Centres.

R4. Encourage the enjoyment of low-carbon experiences rather than material consumption.

R5. Support immature industries and new models that have the potential to contribute to delivering net-zero.

Case Study

Proper Job Community Reuse Centre

The charity aims to keep reusable items from being disposed of by putting them on sale in an "Aladdin's cave of pre-loved treasures".

Everything from baths, crockery and clothes to garden furniture and building materials is on sale, often at a fraction of their original cost, helping people to reduce their carbon footprints, by buying second-hand goods rather than new, and to save money at the same time.

Proper Job also offers training and skill sharing sessions to promote the benefits of reusing, recycling and reducing, such as composting workshops.

They also help and encourage other communities to follow their lead.

7.5.2 Goal EB - Most Materials are Recycled

Eliminating GHG emissions from waste by operating a circular economy will require most materials to be recycled.

Making it Happen

Household kerbside collections

Some kerbside recycling collections in Devon offer a less comprehensive service than others, resulting in recyclable materials not being captured and confusion over what can be recycled. Forty-one percent of waste in household black bins in Devon could be recycled through existing kerbside recycling systems.[11] Consistent collection services are needed across the County[16] Since 2016, Devon County Council, as the Waste Disposal Authority, has shared 50:50 with the district councils any savings made on waste disposal because of changes made by them to waste collection services. This is helping to bring greater consistency to kerbside collections in Devon. increased recycling rates[11]

Five of the eight district authorities and Torbay Council now operate an aligned collection, leaving Exeter, East Devon, Mid Devon and Plymouth operating different regimes. These and achievements have led to reduced waste arisings and increased recycling rates[11]

Restricting residual waste (black bin) capacity by reducing the frequency of collection or bin size, or both, stimulate greater uptake of recycling services. East Devon District Council introduced three-weekly collections in 2017 and now has the highest recycling rate and lowest weight of residual waste per household in Devon.[16] Other Waste Collection Authorities in Devon should consider this.

Commercial waste

The management of commercial waste is less regulated than household waste nationally and a significant volume is still sent to landfill, having been collected by an unknown number of private waste contractors.[16] This results in the carbon footprint of commercial waste being worse than household waste.[16]

Decisions about what to do with waste are taken by individual businesses, while commercial waste collectors offer services based on demand and profitability. Data on the volume and composition of commercial waste is lacking, which partners should work with government to rectify to aid better management.

The Environment Act (2021) has introduced the requirement for recyclable waste from businesses to be collected separately unless it is not technically or economically viable or would have no environmental benefit. Generally, businesses will reduce costs by recycling more. Waste Collection Authorities are not obliged to provide collection of commercial waste, although some do voluntarily. Waste collection authorities that currently offer commercial waste services should engage with their clients and review their service offering to boost recycling and seek to promote a recycling focused service in order to attract new customers. Additionally, more waste collection authorities in Devon could offer high-performing commercial waste services.[16]

Business Improvement Districts (BIDS) in Bath, Bristol, Leeds and Aberdeen have established collaborative commercial waste contracts that have increased recycling, reduced waste vehicle movements and minimised costs for businesses through economies of scale. BIDs in Devon (currently Exeter, Plymouth, Tavistock and Torquay) and Chambers of Commerce could replicate this approach.[16]

Changing the priority from weight to GHGs

The national target for the amount of municipal waste recycled is based on weight. This leads to decisions by local authorities to prioritise the heaviest wastes for recycling which may not be the most carbon intensive. There is an opportunity for partners in Devon to work with government to target the recycling of materials that achieve the greatest GHG saving.[17]

Encouraging the use of recycled materials

Without a larger market for recycled materials, it will be challenging to increase the recycling rate. Citizens and decision makers in businesses need to choose to purchase recycled goods whenever possible to stimulate demand for, and to increase the financial viability of, recycled materials. But legislation is also driving this change. The Plastic Packaging Tax, which came into force in 2022, applies to the manufacturers and importers of more than 10 tonnes of plastic packaging each year that does not contain at least 30% recycled plastic.[18]

Design for material recovery

Manufacturers need to take greater responsibility for designing products that support a circular economy by enabling easy disassembly of components and separation of materials for recycling. There is also a need for better information systems to track the materials in use so that they can be recycled and reused at the end of product and service life.
who uses non-recyclable materials in their packaging.[19] EPR schemes for Waste Electrical and Electronic Equipment

Government intends to introduce Extended Producer Responsibility (EPR) schemes to make the producers of goods responsible for 100% of the cost of managing the waste arising at the end of the products' life. This will drive a shift in the market towards the production of products that last longer, which can be re-used and repaired more easily, and can be recycled. In 2024 a first phase will focus on packaging. Initially, local authorities will recover their full disposal costs of packaging waste produced by households. Packaging waste from businesses will be incorporated in later phases. From 2025 a producer using easily recycled packaging can expect to pay a lower fee than a producer (WEEE), batteries and vehicles are expected next. Government will also consider EPR schemes for textiles, mattresses, furniture, some construction and demolition wastes, tyres and fishing gear.[20]

We must engage positively with government to help ensure the design of the EPR schemes, and similar policy measures, are effective.

The Actions

R6. Align Devon's household waste collection services as far as viable.

R7. Consider reducing the frequency or volume of black bin collections.

R8. Commercial waste services to collect a wider variety of separated materials for recycling.

R9. Waste Collection Authorities that do not collect commercial waste to consider offering a high-quality service.

R10. Business Improvement Districts and Chambers of Commerce to consider offering commercial waste management solutions for local businesses.

R11. Raise awareness of the opportunity and benefits from specifying reclaimed and recycled materials.

Needing action beyond Devon

R12. Work with government to incentivise the recycling of materials based on their carbon intensity as well as weight.

R13. Continue to engage with government on the design of the Extended Producer Responsibility schemes.

R14. Work with government to improve commercial waste data.

7.5.3 Goal EC - The Management of Biodegradable Waste Minimises Greenhouse Gas Emissions

Nationally, emissions from waste have fallen by 69% since 1990, due to the UK's landfill tax (which reduced the amount of biodegradable waste going to landfill) and an increase in methane captured at landfill sites.[21] Emissions, principally methane, from biodegradable waste in landfill were 6.7% of Devon's GHG emissions in 2018.[1]

For net-zero emissions to be achieved by 2050, the CCC recommends that methane must continue to be captured, avoidable food waste must be reduced by 20% by 2025 relative to 1990, and no biodegradable wastes, including food waste, should enter landfill after 2025.[21] Unavoidable food waste must become a resource for other industries - for example, waste cooking oil can be used as transport fuel and unwanted bread can be used for brewing.

Wastewater treatment accounts for 0.5% of Devon's GHG emissions, and just 15% of these are fugitive emissions, mostly methane and nitrous oxide, that escape from pipe connections or manholes.[22] The remaining 85% are associated with the electricity used to power the treatment processes, which is

Making it Happen

Food waste

Thirty percent of waste in household residual bins in the Devon County Council area is food waste.[11]

We all need to act on avoidable and unavoidable food waste. Devon has considerable expertise in programmes to target and reduce food waste. The Devon Authorities Recycling Partnership runs the Love Food, Hate Waste campaign, and the Devon Waste Education Programme offers visits and workshops to schools to address all aspects of waste in school. The County also participates in collaboration projects to find new uses for food waste, such as ECOWASTE4FOOD[24], Food and the Circular Economy South West[25] and Food Rescue.[26] This important work to reduce food waste across the food supply chain needs to continue and be expanded.

Collecting food waste separately from other wastes stops it entering landfill and allows it to be turned into compost, or anaerobically digestated to produce biomethane (that can be used for energy generation, injected directly into the gas grid or used as a vehicle fuel - this could be an important fuel for vehicles that are more difficult to electrify, such as tractors and lorries), and a rich digestate that can be used as a fertilizer. These processes result in lower GHG emissions than landfill and produce useful by-products. All of the waste collection authorities in Devon except Exeter and Plymouth already collect food waste separately. Exeter City Council is in the process of rolling-out a service, which started in November 2021. Government is expected to provide funding for local authorities to develop plans for providing separate collection of food waste for households from 2025.[32]

The Courtauld Commitment 2030 is a voluntary agreement that enables collaborative action across the entire UK food chain (retailers, hospitality, manufacturers and growers) to deliver farm-to-fork reductions in food waste, water use, and a 50% reduction in GHG emissions against a 2015 baseline.[27] We need every food supply-chain business in Devon to sign-up and use the tools available for signatories to act.

In the meantime, communities must be supported to act. They can follow the likes of South Molton and Chudleigh that have set up community fridges to redistribute unwanted food from households and businesses to enable it to be used before it becomes waste, and Devon and Cornwall Food Action and Exeter Food Action that are working to address food waste from local supermarkets. People can use apps like Good to Go, Olio and Karma to save food from becoming waste.

Wastewater treatment

The water sector has committed to reach net-zero by 2030 which will involve reducing fugitive emissions from waste water processing by 60% by 2030 (from a 2018/19 baseline) – well ahead of the CCC's recommendation of 16% by 2050.[28] South West Water already captures biomethane from anaerobic digestion associated with its treatment processes but will be looking to enhance this and the control of nitrous oxide.[29]

The Actions

R1. *Deliver targeted communication to empower people and businesses to adopt more sustainable consumption habits, prevent waste and shift to a culture of sharing, reusing and recycling.*

R2. *Support communities to establish waste and resources projects.*

R15. Encourage commercial and household waste collections to consider collecting food waste separately

R16. Help find opportunities for unavoidable wastes within the food supply chain to be used as a resource by others

R17. Encourage food supply-chain businesses to implement the Courtauld Commitment using the free toolkit

R18. Enhance the capture of emissions from waste-water treatment

Case Study

Countess Wear Wastewater Treatment Works, Exeter

Countess Wear Wastewater Treatment Works treats Exeter's sewage and wastewater and is one of South West Water's largest treatment works. The site consumes 8.5 GWh of electricity per year in treating 22,500 m3 of wastewater per day. Most of the electricity consumed by the site is imported via the electricity grid, however 30% of the site's power needs is supplied by renewable energy embedded on the site itself.

Sewage sludge, which is separated from the liquid wastewater, is fed through an anaerobic digestion process producing methane gas which is used as the fuel for the site's four 'combined heat and power' (CHP) engines. Electricity generated by this process is fed back into the treatment process. The heat is to keep the anaerobic digestion process at a steady 37°C, as well as being used for the site's hot water needs.

The site also has a 50 kW roof-mounted solar PV array and all this generated power is used by the site.

The anaerobic digestion with CHP and the solar PV array are reducing the site's carbon emissions by 650 tCO_2e per year in comparison to using electricity from the grid.

7.5.4 Goal ED - Procurement by Anchor Institutions Contributes to Net-Zero

Anchor institutions in Devon collectively manage billion-pound budgets and employ a significant proportion of Devon's population.[30] The spending of these organisations and the provision of their services needs to deliver maximum social and environmental benefit to Devon – this concept is known as community wealth building.

Anchor Institutions

Organisations which have an important presence in a place, usually because they are large-scale employers, the largest purchasers of goods and services in the locality, and have relatively fixed assets. Examples include local authorities, health services, government agencies, emergency services, higher education providers and utility operators.

Making it Happen

Whilst anchor institutions already aim to get the most value financially, socially and environmentally from their procurement, there are often budget constraints pushing them to put the up-front financial cost first. This can lead to using larger providers based outside the area. Whilst larger providers may be able to offer lower prices, their employment activity and reinvestment of profits happens elsewhere and therefore the contract represents a financial leak from the local economy. The long supply chains can also be carbon intensive. But with concerted effort, change is possible. Anchor institutions in Lancashire increased spending with local firms by £74m in Preston between 2013 and 2017 and £200m across Lancashire.[31]

Working with locally-owned companies can achieve economic multiplier effects, as wages and profits are more likely to be spent within Devon by resident employees and shareholders, and supply chains are shortened, which reduces greenhouse gas emissions. Furthermore, community organisations, cooperatives and forms of municipal ownership are more economically generative for the local economy than large or public limited companies. Anchor institutions can help establish new, democratically-operated businesses to provide local services, particularly where the local supply market is limited. In Preston this approach has been used in the catering, digital and tech sectors. [31]

There is significant interest from community organisations in Devon in this approach. For example: Local Spark Torbay and New Prosperity Devon are already encouraging community wealth building approaches with some anchor institutions; Supply Devon is creating an online system to help Devon organisations find local suppliers to buy better, support the local economy and reduce carbon emissions; and various community energy companies are selling electricity to anchor institutions, having received assistance with start-up funding since 2011.

Whilst there are excellent examples of innovation already in Devon, anchor institutions should be more proactive in nurturing local, sustainable service and product supply chains and placing higher value on the carbon and social impact of procurement decisions that support the circular economy and build community wealth.

The Actions

R19. Anchor institutions to embed local social and environmental value further into tendering procedures.

R20. Anchor institutions to support community-owned companies to provide goods and services back to those institutions

7.5.5 Goal EE - Devon's Economy Seizes the Net-Zero Opportunity

New industries will be needed to meet net-zero, as recognised by government's ambition for the UK to be the birthplace of the Green Industrial Revolution.[32] Devon has world-class expertise in environment and green technologies to facilitate the transition and benefit from the opportunity to create new jobs and local value. The Heart of the South West Local Enterprise Partnership (HotSW), which covers Devon and Somerset, has put clean and inclusive growth opportunities at the centre of its Local Industrial

These include:

- A high-tech electronic and photonics cluster around Torbay and engineering in Plymouth
- A marine cluster within Plymouth including specialist research organisations
- A cluster of climate and environmental science expertise in Exeter including Europe's most powerful supercomputer at the Met Office
- Clean energy associated with technical development for offshore renewables

In addition to these high-profile opportunities, Devon's entrepreneurial business community needs to be supported to innovate and develop new low-carbon products and services across all sectors.

Making It Happen

Start-ups and immature industries will need support for research and development, to bring their ideas to market and to grow their enterprises to a sustainable level. Offers of finance, training and external expertise are required on aspects such as legal matters, marketing, procurement and finding premises and land.

The continuation and extension of existing programmes, such as the HotSW Growth Hub[34] and the Environmental Futures & Big Data Impact Lab,[35] will be important. Just as necessary will be local economy support networks, such as Local Spark Torbay and Totnes' REconomy Centre, which runs an annual Local Economic Forum, with investment-raising "community of dragons" events, inspired by Dragon's Den.

The Actions

R5. *Support immature industries and new models that have the potential to contribute to delivering net-zero.*

7.5.6 Goal EF - Devon has the Skills to Meet Net-Zero

The CCC identifies the availability of skills as a limiting factor to the rate of decarbonisation.[21] As we

move towards net-zero, all businesses will need to change their operations and behaviours so that they become net-zero businesses, including traditional sectors such as farming and tourism. For some this will mean an evolution of existing activities and for others the change may be more pronounced. Furthermore, carbon-intensive sectors will shrink, whilst sectors that can help Devon meet net-zero will grow.

The CCC identified the need to enhance skills specifically in the following areas:

The Built Environment

- The design and build of low carbon homes
- The supply and use of timber in construction
- Hydrogen and carbon capture and storage
- Renewable energy development and construction
- Electricity system infrastructure
- Installation of measures to retrofit buildings to reduce their energy demand and increase their ability to generate their own electricity

Transport

- Battery cell manufacture
- Transport innovation and manufacture
- Retrofitting ships to run on ammonia and new ship building skills.

Agriculture and Land Use

- Skills for land managers to transition to new low carbon management techniques
- Crop and livestock research and development
- Forestry.

Making It Happen

Devon will need to support its workforce to learn new skills to equip them for the future. It will be important to ensure no one is left behind and that the transition to net-zero is socially inclusive.

Devon's education providers, from primary schools through to universities, will need to continue to evolve their curriculums and training offers so that Devon can develop the workforce and community skills it needs to meet the net-zero challenge. Working with schools to prepare children for the future is essential as attitudes, values and many skills are developed at a young age.

Businesses will need support to develop their workforce to keep up with the transition and to take advantage of emerging sectors and legislative changes on the horizon – such as the switch to electric vehicles and the move away from gas boilers.

An immediate upskilling opportunity is to provide support to businesses to reduce the carbon-intensity of their operations and culture through hands-on assistance in their workplaces.

The Low Carbon Devon project and the Make It Net Zero initiative already offer limited support and these types of programme need to be expanded. Where businesses have a legal incentive to improve their practices, for example in managing their waste appropriately, a modest 'non-profit' charge could be levied for this service by local authorities or community organisations.

Individuals in carbon-intensive sectors which shrink because of legislative and technological developments may need a support service to help them redeploy their skills or develop new skills.

The Actions

R21. Provide schools with curriculum support on net-zero issues.

R22. Provide net-zero training and reskilling opportunities.

R23. Provide a net-zero-transition support service to businesses.

R24. Provide support for individuals experiencing career difficulties due to the transition to net-zero.

7.5.7 Goal EG - Devon has Access to the Finance Needed for Net-Zero

Following the launch of the UK's Green Finance Strategy in 2019, the government-owned UK Infrastructure Bank was launched in 2021. This is providing investment to support businesses and local authorities to deliver low-carbon infrastructure projects individually exceeding £5m. It is also developing an expert advisory service to help find the right financing for projects. [36]

Homeowners could benefit from green mortgages that offer favourable interest rates for people who choose to purchase an energy efficient home or commit to upgrading its energy performance. These are new products, which 72% of the Devon Climate Assembly thought should be developed further.[37]

These are the subject of the government's Green Home-Finance Accelerator, launching in Autumn 2022, that is designed to overcome the high initial-development costs for lenders entering this market to make more products available.[38]

However, businesses and organisations will need to access finance for all-scales of project in order to invest in the changes required for the transition to a net-zero Devon. Multiple channels of finance will be needed and we must be innovative in how we finance the net-zero transition.

Making It Happen

Finance for business

The Thematic Hearing on Cross Cutting Themes heard that 60% of businesses in Devon are sole traders and can struggle with access to finance. This is not helped by the UK's lack of local and regional banking.[39] The New Economics Foundation accuses the major banks of "failing to provide loans to small business" and puts this down to the replacement of local bank managers and their knowledge, by credit scoring software.[39]

We ought to support the creation of regional banks that will be able to support small businesses. A regional bank is already in development - South West Mutual. Several of Devon's local authorities have already invested and its continuing development should be supported.

Finance for the public sector

It is extremely unlikely that enough funding for local authorities will come from national government. A decade of austerity measures has constrained access to public finance and made investing in public infrastructure challenging.[41] However, there is growing interest in community municipal bonds – these are loans that local people and businesses make to local governments and pay back interest. Municipal bonds can lead to the cost of borrowing being cheaper than government's Public Works Loan Board and create a powerful opportunity for local authorities to rebuild trust by engaging with citizens as investors. [40]

Swindon Borough Council[41] and West Berkshire Council have used this model.[42] We need to learn from their experience and consider implementing this model in Devon.

Investment-based finance may not be appropriate for all institutions, for example schools and hospitals which do not have the profit earning potential of transport and energy schemes to repay investors. However, donation-based crowdfunding and other less profit-motivated mechanisms may be possible.

Finance for communities

As well as institutions, we must ensure citizens and organisations are also aware of innovative finance approaches. Crowd-sourced funds are an opportunity for community-led initiatives. For example, community energy organisations in Devon have raised over £5.5m through securities-based crowdfunding to fund the delivery of renewable energy schemes, whilst local authorities in Devon have helped community projects raise donation-based crowdfunding from local donors wanting to see specific low-carbon projects succeed. We should share good practice about the use of crowd-sourced funds in Devon to help more communities do the same.

The Actions

R25. Support the development of regional banks

R26. Consider using municipal bonds to raise finance for municipal infrastructure

R27. Share community crowd-funding case studies and good practice.

7.6 SUMMARY OF THE ACTIONS

Figure 7.5 shows the reference number and text of each of the Economy and Resources actions in this Plan. The anticipated start and duration of each action is shown on the right hand side of the diagram.

The actions with their duration highlighted in red in Figure 7.5 have been identified as a priority through two processes. Firstly, the Net Zero Task Force assessed each action's potential to contribute to significant emissions reductions and the likelihood they can be implemented in a timely fashion. Secondly, some actions were highlighted as being important by the respondents to the public

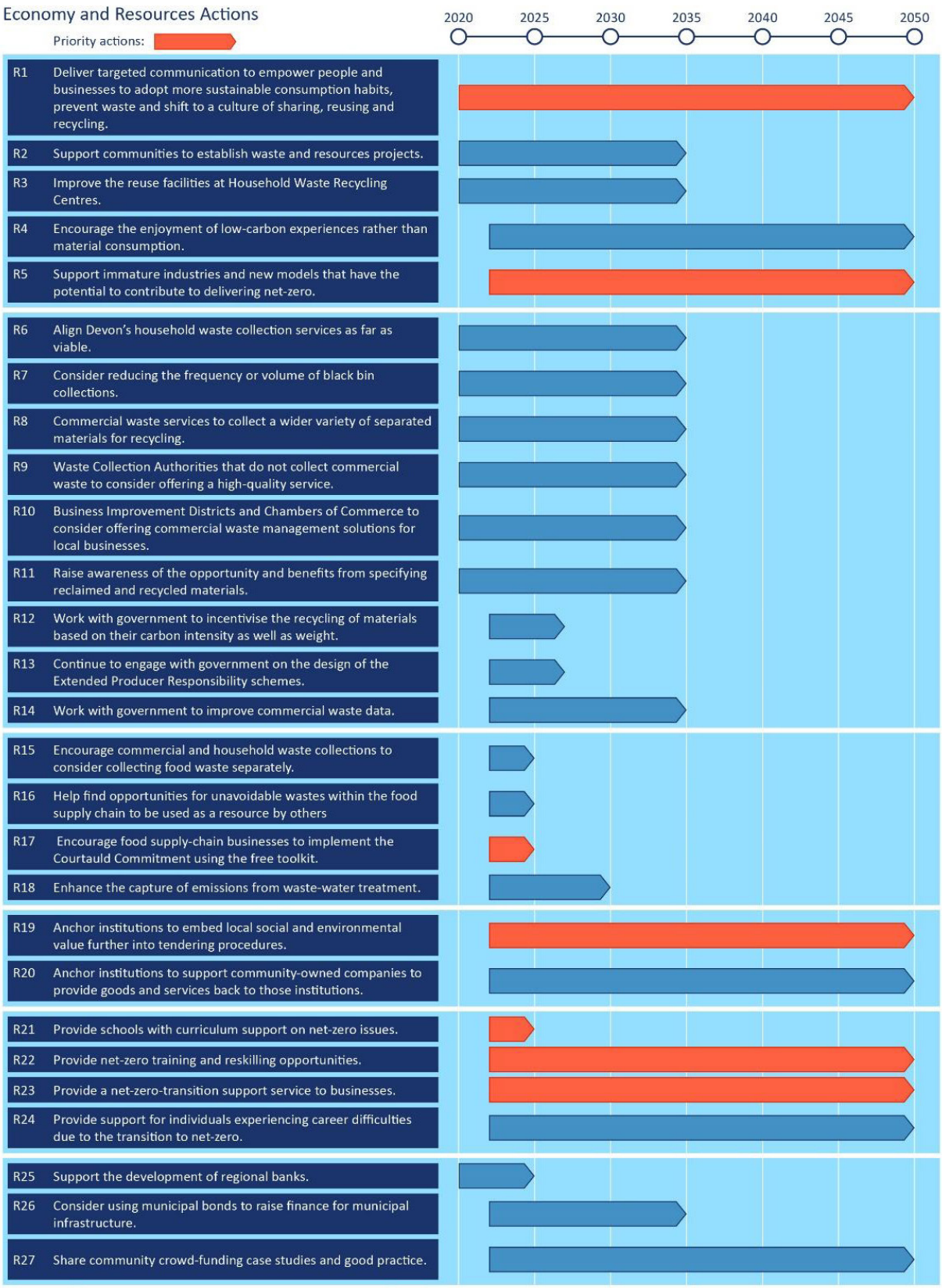


Figure 7.5 - This diagram shows the anticipated start and duration of the Economy and Resources actions and the priority actions.

For more detail, including who can help to deliver these actions, see the full action table.

7.7 MILESTONES

Delivering the actions in this section of the Plan will help to achieve the milestones in Figure 7.6. These milestones reflect the Climate Change Committee's Further Ambition Scenario.

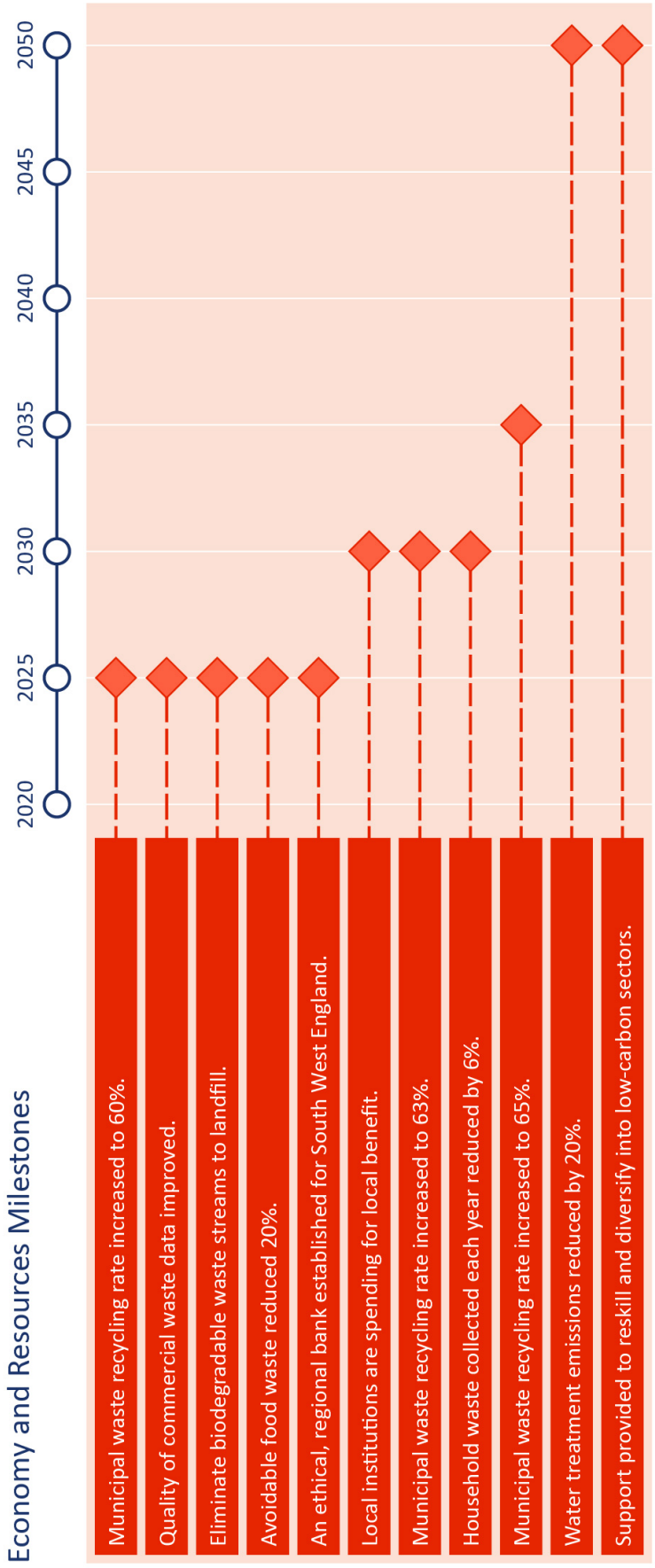


Figure 7.6 - This diagram shows the milestones which the actions in this section of the plan will help achieve.

7.8 REFERENCES

[1] Mitchell A. et al. (2020) Greenhouse Gas Emissions Report – Devon, Plymouth, Torbay 2018. Centre for Energy and Environment, University of Exeter. Available at: https://devonclimateemergency.org.uk/studies-and-data/devons-carbon-footprint/

[2] Rockström, J. et al. (2009) Planetary boundaries :Exploring the safe operating space for humanity. Ecology and Society 14(2): 32 Available at: http://www.ecologyandsociety.org/vol14/iss2/art32/

[3] WWF (2021) The UK's Global Footprint. Available at: https://www.wwf.org.uk/what-we-do/uk-global footprint

[4] Local Government Association (2020), Over a million new green jobs could be created. Available at: https://www.local.gov.uk/lga-over-million-new-green-jobs-could-be-created-2050 [Members only]

[5] Raworth, K. (2017) Doughnut Economics, Seven Ways to Think Like a 21 st Century Economist, Penguin

[6] Raworth, K. (2017) What on Earth is the Doughnut? Available at: https://www.kateraworth.com/doughnut/

[7] Devon County Council (2014) Devon Waste Plan. Available at: https://www.devon.gov.uk/planning/planning-policies/minerals-and-waste- policy/devon-waste-plan

[8] Recycle Devon (2020) Repair Café. Available at: https://www.recycledevon.org/reuse/repair-cafe

[9] Yeo, S. (2017) The sharing economy helps fight climate change, but not as much as you think. The Washington Post. Available at: https://www.washingtonpost.com/news/energy-environment/wp/2017/09/18/the-sharing-economy-helps-fight-climate-change-but-not-as-much-as-you-think/

[10] Defra (2021) Local authority collected waste generation from April 2000 to March 2021 (England and regions) and local authority data April 2020 to March 2021. Available at: https://www.gov.uk/government/statistical-data-sets/env18-local-authority-collected-waste-annual-results-tables

[11] Devon County Council and Torbay Council (2020) Resource and Waste Management Strategy for Devon and Torbay, 2020-2030. Available at: https://www.devon.gov.uk/wasteandrecycling/document/resource-and-waste-management-strategy-for-devon-and-torbay

[12] Calculated from figures provided in Devon County Council and Torbay Council (2020) Resource and Waste Management Strategy for Devon and Torbay, 2020-2030, which states "For Devon to reach the 2035 65% target for municipal waste (including business waste) an extra 38,000 or so tonnes more recycling will be required". Devon currently recycles 56%. So if a 9% increase requires 38,000 tonnes more recycling, that means 1% requires 4,222 tonnes. To reach 70% is a 14% increase. 14 x 4,222 = 59,108 tonnes.

[13] Climate Change Committee (2020) The Sixth Carbon Budget. Available at: https://www.theccc.org.uk/wp-content/uploads/2020/12/The-Sixth-Carbon-Budget- The-UKs-path-to-Net-Zero.pdf

[14] Lindzon, J.(2015) How Corporate Responsibility Affects Recruiting and Retention, Fast Company. Available at:https://www.fastcompany.com/3052763/how-corporate-responsibility-affects-recruiting-and-retention

[15] CAG Devon Community Action Groups (2020) Impact Report 2019-2020. Available at: https://cagdevon.org.uk/impact

[16] Ballinger, A. et al. (2020) The Carbon Impacts of Waste Management in DevonCounty: Analysis and Recommendations for Devon County Council. Eunomia.

[17] Environmental Services Association (2018) Why Wait? Weight isn't working. Available at: http://www.esauk.org/application/files/3215/3589/6450/20180820_Why_Wait_Weight_isnt_working_Smarter_measures_for_the_circular_economy.pdf

[18] HM Revenue & Customs (2020) Policy paper - Plastic packaging tax. Available at: https://www.gov.uk/government/publications/introduction-of-plastic-packaging-tax/plastic-packaging-tax
[19] Osborne Clarke (2022) Defra publishes proposal to reform the UK packaging waste regime. Available at: https://www.osborneclarke.com/insights/defra-publishes-proposal-reform-uk-packaging-waste-regime
[20] HM Government (2018) Our Waste, Our resources: A Strategy for England. Available at: https://www.gov.uk/government/publications/resources-and-waste-strategy-for-england
[21] Climate Change Committee (2019) Net Zero – The UK's contribution to stopping global warming. https://www.theccc.org.uk/publication/net-zero-the-uks-contribution-to-stopping-global-warming/.
[22] Data provided by South West Water
[23] Climate Change Committee (2019) Net Zero Technical Report. Net-Zero Exhibits – Waste. Available at: https://www.theccc.org.uk/wp-content/uploads/2019/04/08-Net-Zero-TR-Exhibits-Waste.xlsx
[24] ECOWASTE4FOOD Interreg Europe (2020) Project Summary. Available at: https://www.interregeurope.eu/ecowaste4food/
[25] Food and the Circular Economy – South West (2020) The Project. Available at: https://www.circularfood.net/the-project.html
[26] Devon Communities Together (2022) Food Rescue. Available at: https://www.devoncommunities.org.uk/projects/devon-food-rescue
[27] WRAP (2022) The Courtauld Commitment 2030. Available at: https://wrap.org.uk/taking-action/food-drink/initiatives/courtauld-commitment
[28] Water UK (2020) Net-Zero 2030 Routemap. Available at: https://www.water.org.uk/routemap2030/
[29] South West Water (2021) Our Promise to the Planet – Carbon Busting Net-Zero Plan. Available at: https://www.southwestwater.co.uk/about-us/sustainability/net-zero-plan/
[30] Local Spark Torbay (Unknown) The role of 'anchor institutions' – Unlocking potential through local employment and procurement. Available at: https://localsparktorbay.org/anchor/
[31] Preston City Council (2019) How we built community wealth in Preston, Available at: https://www.preston.gov.uk/media/1792/How-we-built-community-wealth-in-Preston/pdf/CLES_Preston_Document_WEB_AW.pdf?m=636994067328930000
[32] BEIS (2021) Net Zero Strategy: Build Back Greener. Available at: https://www.gov.uk/government/publications/net-zero-strategy
[33] Heart of the South West (2019) Local Industrial Strategy Progress Statement 2. Available at: https://heartofswlep.co.uk/wp-content/uploads/2019/08/190807-Heart-of-the-SW-LIS-Progress-Statement-2.pdf
[34] HotSW Growth Hub (Unknown) Homepage. Available at: https://www.heartofswgrowthhub.co.uk/
[35] Impact Lab (Unknown) Homepage. Available at: https://www.impactlab.org.uk/
[36] UK Infrastructure Bank (2021) Homepage. Available at: https://www.ukib.org.uk/
[37] Scott, K. and Ward, D. (2021) Devon Climate Assembly - "How should Devon meet the big challenges of climate change?". Available at: https://www.devonclimateemergency.org.uk/devon-climate-assembly/devon-climate-assembly-report/
[38] Department for Business, Energy and Industrial Strategy (2022) Information about the Green Home Finance Accelerator. Available at: https://www.gov.uk/government/publications/green-home-finance-accelerator/information-about-the-green-home-finance-accelerator
[39] New Economics Foundation (2011) A Local Banking System, The urgent need to reinvigorate UK high street banking. Available at: https://neweconomics.org/uploads/files/46fc770bd9488eeb31_q6m6ibhi5.pdf

[40] Abundance (2020) Crowdfunding for Local Authorities. Available at: https://issuers.abundanceinvestment.com/local-authorities

[41] Davis, M. and Cartwright, L. (2019) Financing for Society: Assessing the Suitability of Crowdfunding for the Public Sector, The University of Leeds. Available at: https://baumaninstitute.leeds.ac.uk/research/financing-for-society/

[42] Abundance Investment (2020) Helping West Berkshire Build Back Better. Available at: https://www.abundanceinvestment.com/west-berkshire

[43] Regen (2018) Devon Community Energy Impact Report. Available at: https://www.regen.co.uk/publications/devon-community-energy-impact-report-2018/

SECTION 8.

ENERGY SUPPLY

- Using less energy
- Transitioning to renewables
- Increasing flexibility and storage
- Developing carbon capture and storage

8.1 INTRODUCTION

In 2019, 72% of Devon's greenhouse gas (GHG) emissions related to energy use. This energy is used as electricity (13%) and the burning of fossil fuel in buildings for heat (19%), transport (30%), manufacturing and construction (6%), and agricultural, forestry and fishing machinery (4%)[1]

Spend on energy in the County is estimated to be £3.4 billion each year, the majority of which leaves the area because Devon imports most of its energy requirements.[16]

This section describes what needs to happen to achieve net-zero energy supply based on the Climate Change Committee's Further Ambition Scenario. It then introduces goals for overcoming issues identified during the Thematic Hearings and the public Call for Evidence as barriers to achieving net-zero in Devon. Actions are then proposed to achieve the goals.

8.2 THE CHANGE NEEDED

Four main changes are needed to decarbonise the energy we all use:

1. **Use less energy.** We need to reduce demand for energy and use energy as efficiently as possible to minimise the need for new generating capacity.
2. **Transition to renewables.** The energy used needs to be from renewable sources.
3. **Increase flexibility and storage.** We need to store energy and use it more flexibly.
4. **Develop carbon capture and storage.** Where small amounts of fossil fuels continue to be used, the carbon emitted needs to be captured and permanently stored to prevent it from reaching the atmosphere.

These are described in more detail below.

8.2.1 Use Less Energy

Using only the energy we need will reduce the amount of new energy infrastructure required to meet net-zero. This will keep the cost of transition down and with less development there will be less potential for negative effects to the environment and our wellbeing. By keeping the need for new energy infrastructure to a minimum we can meet our energy needs whilst creating places where people and nature thrive.

Buildings

A high take-up of energy-efficiency measures is needed across our 581,000 homes and 53,000 commercial and industrial premises. These technological changes must be combined with enhancing awareness and understanding of energy issues so that our behaviour avoids wasting energy and uses it more efficiently. These measures are discussed in detail in the Built Environment section of this Plan.

Transport

Using less energy to meet our transport requirements starts with reducing the need to travel. For essential journeys we should consider using active travel (walking and cycling), buses and trains, or shared mobility schemes including car share. Due to Devon's low population density, private vehicle use will continue, especially for journeys within rural areas and between rural areas and towns. For these, electric vehicles will reduce energy demand as they are over four times more efficient than a petrol or diesel car.[2] However, it is important that petrol and diesel vehicles are not just swapped for electric vehicles without considering alternatives because electric vehicles still place demands on natural resources (such as cobalt in battery production), contribute to micro plastics (e.g. from tyre dust) and miss the opportunity to make us more active.[3] These measures are discussed in detail in the Transport section of this Plan.

8.2.2 Transition to Renewables

In 2018, 32% of Devon's electricity was provided from renewable sources within the County. This is equal to just 7% of the total energy we used in Devon[4] The CCC recommend this rises to 80% by 2030 and 100% by 2050. Under the government's Energy Security Strategy, published in 2022, 95% of UK electricity will come from 'low-carbon sources' by 2030. This includes plans to increase wind, hydrogen and solar energy production[5]

The Climate Change Committee's Further Ambition Scenario for 2050[6] principally advocates the electrification of our energy needs for low-level heat and transport. This includes removing existing petrol and diesel cars and vans from the roads, and using heat pumps for heating buildings (instead of natural gas or oil). Hydrogen is expected to heat some homes and contribute to powering heavy goods vehicles, off-road and agricultural machinery and some industrial processes. It will be important to focus innovation on the production of so-called 'green hydrogen', produced by

a process called electrolysis powered by renewable electricity, rather than 'blue hydrogen' which involves reacting natural gas with steam and subsequently relies on carbon capture and storage technology to make it low carbon.

This transition to electrification is estimated to grow Devon's electricity consumption by around 2.5 times 2018 levels. If Devon were to generate all this demand within its boundary then approximately eight times[7] more renewable electricity generating capacity would need to be installed on buildings and through field-scale projects if this demand were to be met from solar photovoltaics (PV) and onshore wind.

In reality this increased need for new electricity capacity will be met in part through nationally significant infrastructure, such as offshore wind farms. Upscaling innovative technologies, such as wave and tidal power, could help in the future and we should be ambitious for their deployment, but they are not developed enough to help address climate change in the short and medium term. Devon is a maritime county and shipyards at Appledore and Plymouth offer marine engineering capabilities and skills that are readily transferable into offshore wind and marine-energy technologies.[8] Floating Offshore Wind in the Celtic Sea has the potential to create 3,000 jobs and £682m in supply chain opportunities for Wales and the South West of England by 2030, but this will only be fully realised if local companies are involved at the early stages of project development. The Devon Climate Emergency partners can raise awareness of supply opportunities amongst local businesses, facilitate the provision of onshore infrastructure (such as enhanced port facilities, cable landings and electricity distribution equipment) and by continuing and extending regional partnerships innovating in this sector to ensure the South West has a strong voice in key decisions with national policy makers.[9]

In the case of buildings, the use of heat pumps will not be appropriate for all building types and they operate best in buildings with high levels of energy efficiency and air tightness. Some buildings, such as heritage homes, will be difficult to upgrade. Low carbon alternatives to heat pumps are available; biomass boilers using wood chips or wood pellets as fuel can be suitable for buildings not connected to the natural gas network, and a hybrid heating system could be suitable for buildings on the natural gas network[10] Hybrid heating systems use a combination of a heat pump with a gas boiler. In this setup the heat pump provides the bulk of the base load while the gas boiler tops-up the heat requirement. There is a further opportunity for the gas to be derived from the anaerobic digestion (AD) of agricultural wastes and injected straight into the gas network – known as biogas. AD needs to be pursued carefully to ensure a strong focus on environmental benefits. The cultivation of maize, a popular energy crop, can displace food production, contribute to soil erosion, cause localised flooding issues and can require heavy doses of agro-chemicals when best practice is not followed. [11] The priority must be to use local agricultural and food wastes that are unfit for human or animal consumption and do not require long distance haulage.

Beyond 2030 the UK Government indicates that hydrogen delivered through the existing natural gas network could become an alternative for buildings currently heated by natural gas from the grid.

Further testing during the 2020s will establish the costs, benefits, safety, feasibility, air quality impacts and consumer experience of using hydrogen for heating.[12]

District heating (systems that distribute hot water, heated by centralised power plants, in a network of highly-insulated pipes to a collection of buildings) supplied by renewable energy will also be a helpful tool for achieving net-zero. These must be considered for large-scale new developments, designed from the outset, or retrofitted in areas of high heat density, such as industrial estates or urban centres.

8.2.3 Increase Flexibility and Electricity Storage

Some renewable energy technologies depend on weather and the seasons – most notably solar PV and wind turbines. Solar PV generates electricity during daylight hours and provides greater amounts of energy in the middle of the day and summer. Wind turbines generate electricity whenever the wind is blowing and generally more in autumn and winter. These periods of generation do not necessarily match times of higher demand for electricity, creating new challenges for distribution system operators.[13]

Making best use of renewable resources requires (a) matching the natural variability of renewable energy output with demand by creating smarter and more flexible generation and consumption, combined with (b) the ability to store more energy. The first solution is to offer new generators flexible connections that require generators to reduce their output at certain times of day when demand might be low or when other generators are already providing sufficient supply. A further solution is the roll out of smart meters that communicate real-time consumption to households and allow the introduction of flexible, real-time tariffs that (a) encourage changes in behaviour to use less energy, (b) improve efficiency and (c) use electricity when energy supply is higher and demand is lower.

Storage solutions store energy when supply exceeds demand so that we can use it when we need it. Such storage solutions include (a) use of batteries connected to the electricity grid (which include 'vehicle to grid' whereby electric vehicles can be used to supply electricity back into the grid during times of high demand) and (b) the conversion of electrical energy into hydrogen.

Deploying flexibility services and storage technologies will reduce the amount of new renewable energy capacity required. This will make best use of the resource, reduce investment costs and avoid the need for fossil-fuel powered peaking plants to generate power when demand outstrips

8.2.4 Develop Carbon Capture and Storage

The Committee on Climate Change believes that using carbon capture and storage (CCS) technology will be necessary for the UK to reach net-zero carbon.[6] CCS technology captures carbon dioxide from the burning of fossil fuels before it enters the atmosphere. It is compressed into a liquid for transportation and then stored in depleted oil and natural gas fields or suitable, deep geology. Large manufacturing and construction industries will need to switch their processes to low-carbon energy sources or make use of CCS technology wherever possible, although these industries only account for less than 1% of the County's emissions. The Energy from Waste facilities in Devon (which emit 2% of Devon's emissions) will also need to make use of CCS to decarbonise the electricity and heat they currently provide.

CCS can also be used to remove carbon dioxide from the atmosphere by capturing the carbon dioxide emitted from using biomass (e.g. maize or willow) for energy. By doing so, between 70% and 100% (dependent on the type of feedstock) of the carbon dioxide that was absorbed from the atmosphere when the biofuel was growing is permanently captured to achieve net negative emissions. This 'bioenergy with CCS' is one of the pillars of the National Farmers' Union's net-zero goal for 2040[15] for agriculture. This approach can be used to offset emissions from other economic sectors that will find it very challenging to decarbonise, too.

8.3 GREENHOUSE GAS OUTCOMES

Figure 8.1 shows Devon's GHG emissions arising from fossil fuels used by buildings, manufacturing and construction, transport and electricity consumption in the context of Devon's total GHG emissions. The Figure also shows the projected reduction trajectory for these to 2050 as a result of the delivery of the CCC's Further Ambition Scenario aided by the actions in this Plan. Emissions from these sectors in 2019 were 5.2Mt CO_2e**. Through the activities in this Plan, by 2050, the emissions from energy are expected to fall to 0.6Mt CO_2e.** These will become net-zero through activities that remove CO_2 from the atmosphere. The emissions from the energy used for agriculture, forestry and fishing are reported in the Food, Land and Sea section of this Plan to align with how the CCC report emissions data.

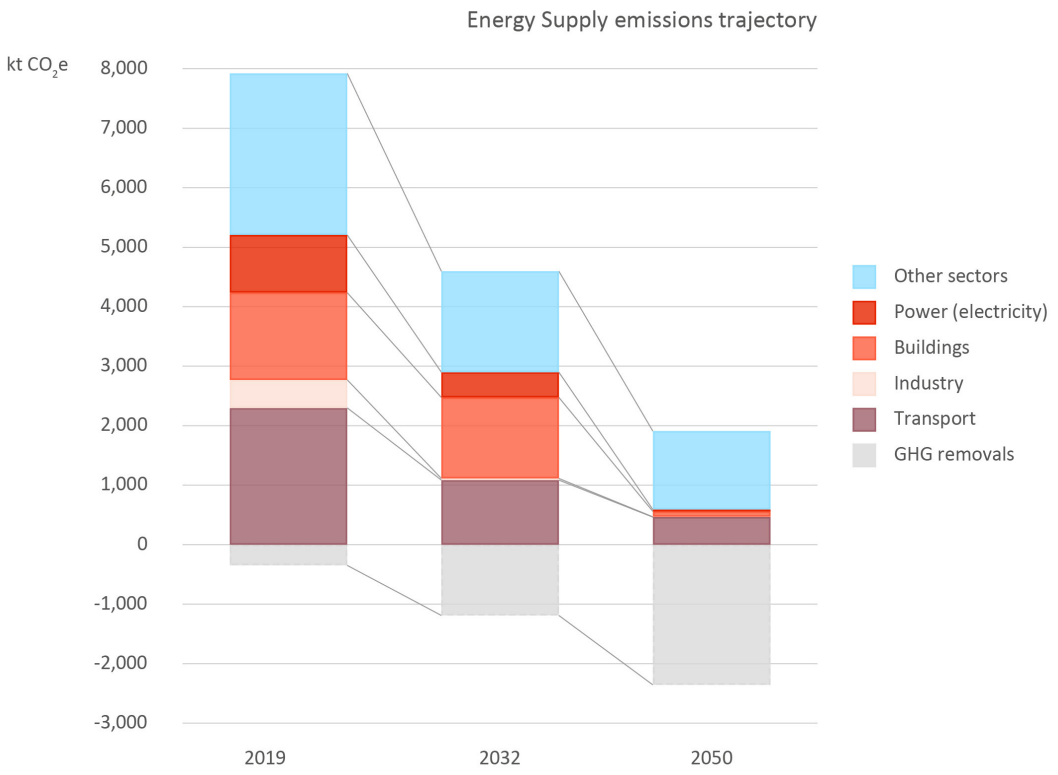


Figure 8.1 - Trajectory for Devon's production emissions, highlighting those from the Power, Buildings, Industry (manufacturing and construction) and Transport sectors. GHG removals refers to approaches that remove carbon dioxide from the atmosphere.

8.4 OTHER OPPORTUNITIES AND BENEFITS

- Profits from renewable energy schemes owned by Devon Climate Emergency partners and communities can be invested in other local carbon reducing activities e.g. domestic retrofit, electric vehicle charging points, habitat management for carbon sinks or tackling fuel poverty and supporting vibrant communities.
- Cohesive communities owning key infrastructure will become more self-sufficient with greater resilience.
- Innovation opportunities to make a more prosperous economy are available from offshore technologies (such as floating offshore wind) green hydrogen infrastructure and carbon capture and storage.
- The transition away from fossil fuels will support up to 192,000 jobs across Devon, Cornwall, Dorset and Somerset and provides an opportunity for skills development[16]
- The increased use of smart energy systems could lead to lower bills for consumers who shift their consumption to cheaper times of day.
- The retention of spending on energy within Devon will avoid up to £3.4 billion each year leaving the local economy.[16]
- Reduced air pollution, levels of fuel poverty and greater use of active travel will bring public health benefits.[3]

8.5 DEVON'S GOALS TO MEET NET-ZERO

8.5.1 Goal EA - A Shared Ambition For a Net-Zero-Carbon Energy System Is Agreed

The Joint LEP Energy Strategy[16] prepared by the three Local Enterprise Partnerships (LEP) covering Cornwall, Devon, Somerset and Dorset sets a target for the percentage of the areas' electricity consumption sourced from renewable technologies to rise to 80% by 2030 (in 2018 it was 32%) but acknowledges that social and political support provides localised challenges to deploying projects to meet this target.

Estimates of renewable energy generation potential in Devon suggest that the County has suitable land available (away from sensitive and protected areas) to meet its requirements and export to other areas.[17] Becoming a green energy powerhouse and an exporter of clean energy is an aspiration for Devon and Somerset set by the Heart of the South West LEP in its Blueprint for Clean Growth.[18]

Currently, onshore wind farms and large-scale solar farms are the most affordable way to meet future demand for electricity.[19] Onshore wind farms are the most efficient onshore renewable energy technology (due to their relatively small land footprint and their average generating hours). 89% of the Devon Climate Assembly members were supportive of more renewable energy generation in Devon, including onshore wind.

As shown in Section 8.2, the route to achieve a net-zero-carbon energy system is complex. The potential pathways need to be explored and tested with stakeholders and communities to identify the most appropriate and cost-effective preferred pathway and sequenced plan of proposed actions to achieve Devon's net-zero goal.

Making It Happen

A Devon Energy Plan is needed to model Devon's future energy system. This will guide and deploy low-carbon energy generation to transition 100% of energy needs away from fossil fuels, accounting for the energy efficiency and technological changes described in the other sections of this Carbon Plan (particularly Built Environment and Transport). It will signal to businesses and financial markets that Devon is ready to facilitate investment and will empower organisations, communities and individuals to be part of the transformation. It will show how Devon can contribute to implementing the Joint LEP Energy Strategy.

The preparation of the Energy Plan will involve a county-wide review of the potential renewable energy resource available for a variety of renewable electricity and heat technologies at different scales, including onshore wind. It will consider how the technologies might develop over the period to 2050. This resource potential would then be compared with the future energy consumption and demand requirements of Devon taking account of: population growth and the likely success of nationally significant energy projects, energy efficiency upgrades, electric-vehicle charging requirements, flexibility markets, storage technologies, longer-term green hydrogen opportunities, the opportunity for district heating to provide combined heat and

to new development, and relevant government incentives. The Energy Plan will need to be developed in partnership with the network operators.

The Actions

E1. Develop an Energy Plan for Devon to deploy renewable energy generation to meet future energy needs. This must:

E1.1. Update assessments of the accessible renewable energy resources available in Devon.

E1.2. Identify opportunities for renewable energy and storage deployment on land owned or managed by Devon Climate Emergency partners.

E1.3. Identify locations for renewable energy and energy storage informed by the emerging Land Use Framework and environmental and social sensitivities.

E1.4. Explore opportunities to create economic benefit from offshore technologies along Devon's two coastlines.

E1.5. Consider the role of nationally significant energy infrastructure (including that developed outside Devon), flexibility markets, and storage technologies, and how these could change the total energy required to be generated in Devon.

E1.6. Consider the potential role and feasibility of a green-hydrogen industrial cluster.

E1.7. Appraise the potential for low carbon heat networks in new development to make best use of existing heat producers e.g. the Energy from Waste facility in Exeter, and as a retrofit opportunity in off-gas areas.

E2. Look to allocate locations for renewable and low-carbon energy initiatives in Local Plans and Neighbourhood Plans, ensuring community involvement.

8.5.2 Goal EB - Communities are Driving the Energy Transition

The Devon Climate Assembly emphasised the need for community benefit from energy projects. The vision and determination of trail-blazing communities has led to there being more community energy organisations in Devon than any other county in the UK.[20] Offers of start-up funding and skills support since 2011 from Devon Climate Emergency partners has played its part, too. These organisations are generating enough electricity to power over 1,100 homes, have invested more than £14m and created 33 full time jobs.[21]

They own and operate various sizes of installation, from building to field scale, and have ambitions to expand. Some are also involved in offering local energy advice services. Community-owned electricity generation helps communities actively participate in the drive to net-zero, share in the benefits and guide how profits are reinvested. In turn, community ownership can drive support for local projects and the scale of change needed to achieve net-zero.

Individuals, organisations and businesses can help with the transition by using less energy and improving the efficiency of buildings (to reduce the amount of new renewable energy generation required), moving from fossil fuels towards lower carbon heating and installing renewable electricity generation. They can also stimulate demand for new renewable energy projects by investing in community energy projects and switching to green electricity and gas tariffs.

Making It Happen

Communities must be closely involved in the development of the Devon Energy Plan and community ownership opportunities should be prioritised in its delivery.

The National Planning Policy Framework only allows wind development: (i) in areas identified as suitable within a Local or Neighbourhood Plan; and (ii) if, following consultation, local impacts have been fully addressed and the proposals have community backing. This has made it challenging to build new wind turbines - even those that would be community owned. Previous experience in Devon has shown that the planning system enables vocal minority opposition to dictate decisions, despite evidence of wider public support, which cannot continue in a climate emergency where urgent action is required. 87% of the Devon Climate Assembly supported Devon working with government to amend national planning legislation to remove the requirement for complete community support for development planning applications for onshore wind turbines, particularly where these projects are community led.

In the meantime, communities must continue to be supported with offers of training and resources to develop more locally-owned energy schemes, and the local planning system should be encouraging. Devon Climate Emergency partners and other large energy users can support the viability of community-owned energy schemes by offering favourable land and rooftop leases to community energy organisations and by committing to purchase community-generated electricity and heat. The Devon Energy Collective, an umbrella company operated by the town-based community energy organisations, has been established to facilitate this.

For people looking to switch to a renewable energy tariff, it can be difficult to understand which tariffs are having most effect at creating demand for more renewable energy and so advice on selecting a tariff is required.

The Actions

E3. Provide support for communities wishing to develop their own energy infrastructure.

E4. Local Plan updates will look to include policies that give positive weight to renewable and low-carbon energy initiatives which have clear evidence of local community involvement and leadership.

E5. Provide advice on choosing genuine renewable-energy tariffs.

Needing action beyond Devon:

E6. Work with government to enable timely and cost-effective grid upgrades.

Case Study

Yealm Community Energy

Based in South Devon and a member of the Devon Community Energy Network, Yealm Community Energy (YCE) is a not-for-profit social enterprise, run by local people. It is working to offer the opportunity to invest in locally generated, clean electricity, with profits going to a Community Fund. YCE is looking to acquire one and perhaps two solar farms in its locality by securing loans and offering community shares to raise the necessary funds.

Newton Downs is the first community solar farm and it generates enough renewable electricity to power the equivalent of 2,000 homes. The project was developed by Good Energy with the understanding that it would be offered for sale to YCE. YCE is now part-owner with Community Owned Renewable Energy (CORE). With local support YCE hope to own it completely in 2021.

The second solar farm at Creacombe generates enough power for the equivalent of 2,500 homes. The solar farm will be managed to encourage wildlife, with the creation of species-rich wildflower meadows around the panels and associated beehives.

Financial surpluses from the solar farms will be paid annually to the Community Fund to benefit the five local parishes bordering the Yealm and Erme estuaries and is being used to fund local environmental improvements and low carbon energy projects. The value of the community fund may reach £45,000 per year with the overall monetary benefit to the community over the two projects' lifetimes of up to £3 million. In 2020 the Fund provided £10,000 for coronavirus relief.

8.5.3 Goal EC - Constraints on the Electricity Grid are Overcome

The electricity grid was designed for centralised power stations that deliver electricity into the national grid for direct distribution to consumers. Over the past decade, the way the grid is used has started to change reflecting the increased amount of decentralised electricity generation. This has been brought about by hundreds of thousands of renewable energy installations. At present, there can be more renewable electricity being supplied to the grid from solar PV farms in the middle of the day during the summer than there is local demand for the electricity.

The changing use of the network means that parts of the grid often require upgrading when new projects connect. These upgrades add to project costs and can cause queues for new connections. Such costs are shared between Western Power Distribution (the network operator in the South West of England) and the developer of the new energy installation. Upgrades will enable multiple new projects to connect in the same location but the cost burden falls most heavily on the first project. This potentially undermines financial viability, deterring investment.[22] Western Power Distribution has an online register for developers to log their interest in working with other developers to share costs but take-up has been mixed because of the challenges in aligning the

Making It Happen

Using the grid smartly and flexibly can alleviate some constraint issues while providing other benefits. Options described in section 8.2.3 include offering new generators flexible connections; encouraging us as energy users to change when we use power; and by incorporating storage technology into the grid. These initiatives are still in their infancy but there are examples of flexibility and storage services already operating in the South West, the expansion of which offers investable business opportunities.

Western Power Distribution is working with the regulator, Ofgem, to examine the regulatory changes needed to allow generators to share the upgrade costs. Regional partners are engaged in conversations with government through the Joint LEP Energy Strategy and the Heart of the South West LEP Blueprint for Clean Growth. Longer-term, the government has expressed its intention to establish a new Future System Operator - a public corporation as an expert, impartial body with an important duty to facilitate net zero whilst also maintaining a resilient, and affordable system.[23]

Devon Climate Emergency partners must continue to engage with government on addressing this issue.

The Actions

E7. Test approaches to making the energy system smarter and more flexible.

Needing action beyond Devon:

E8. Work with government to amend national planning legislation to make it more straightforward for onshore wind developments to get planning consent, especially those that are community owned.

8.5.4 Goal ED - Low Carbon Energy Becomes Affordable and is Attractive for Investors

Making It Happen

Renewable Heat

The CCC has highlighted that progress on low-carbon heating has been slow nationally.[6] Until March 2022, subsidy support for renewable heat was provided by national government under the Renewable Heat Incentive (RHI). By 2019 the RHI had only supported 18% of the new heat capacity it was designed to facilitate by 2020, and the installer network has contracted by 16% since its launch in 2011.[24] The Net-Zero Task Force learned from the Thematic Hearing on Energy and Waste that air source heat pumps never attracted sufficient support from the RHI to make them financially competitive against natural gas boilers. This has meant that households contemplating replacing an ageing gas boiler had limited financial incentive to invest in air source heat pumps. In 2022, the RHI was replaced by the Boiler Upgrade Scheme (this offers financial incentives to switch a natural gas or oil boiler to a low-carbon alternative), and a Green Gas Support Scheme (to incentivise the injection of biomethane into the existing gas grid, which will provide a low-carbon heating option for households on the gas grid).

District heating can enable developers of larger housing and commercial sites to meet the energy and carbon requirements of building regulations at a lower cost than installing boilers or heat pumps in individual buildings.[25] The investment opportunity for district heating schemes nevertheless needs to be attractive enough to developers to balance against the perceived risks, such as: whether building occupants will accept communal heat; uncertainty over the reliability of heat sources; and the new contracting mechanisms with which the developer may have little experience.[26] District heating networks have been deployed in new developments to the east of Exeter at Monkerton and Cranbrook. Other opportunities southwest of Exeter and in the city centre are being explored. Viability issues still need to be overcome for the technology to be used more

Government's Heat Networks Investment Project that has offered support to heat networks since 2018 will be replaced by the Heat Network Transformation Programme from 2022. This will include the opportunity to make use of waste-heat from industrial installations, such as Devon's energy from waste facilities.

The new government schemes to support renewable heat are welcomed but continued dialogue with government will be necessary to feedback local experience of accessing grants to ensure they are appropriate and effective. Ensuring people are aware of the schemes and have the opportunity to apply them to their own buildings will be a critical role for the Devon Climate Emergency partners and community energy organisations.

Smaller-Scale Renewable Electricity

Since the closure of the Feed-in Tariff (FiT) scheme in April 2019, there has been no subsidy for small-scale renewable electricity schemes (under 5 Mega-Watts (MW) in capacity). The Net-Zero Task Force heard from the Thematic Hearing on Energy and Waste that the minimum acceptable rate of return for investors is rarely met either for domestic rooftop solar PV, smaller solar farms, hydro and anaerobic digestion. This has meant that there has been little addition to renewable energy capacity in Devon recently. In fact, the growth rate of renewable energy capacity in the County has been declining since 2015, when the FiT began to be reduced (Figure 8.2).

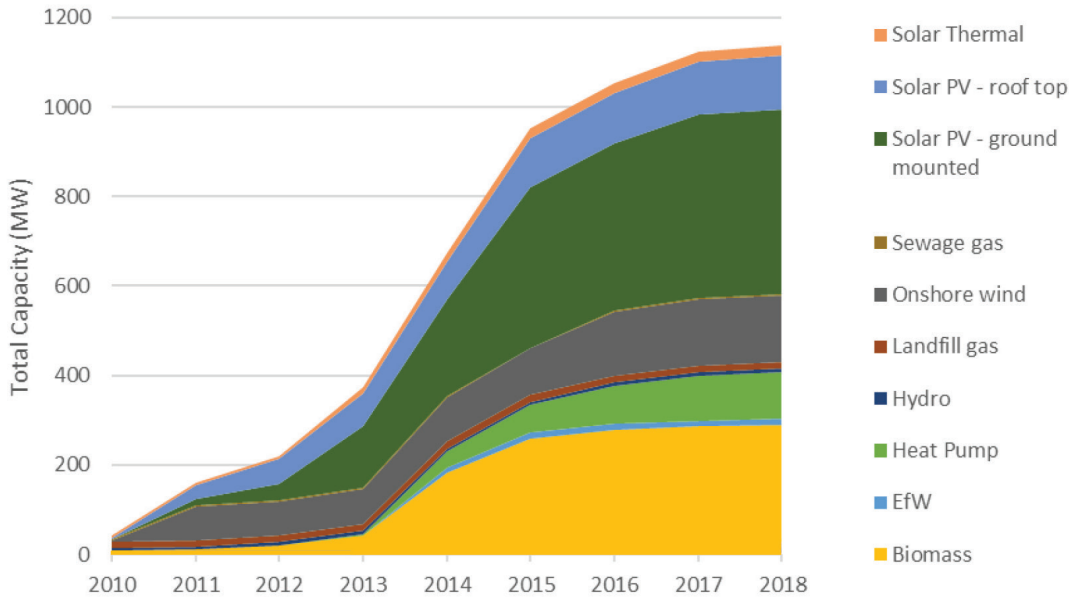


Figure 8.2 - Renewable Energy Capacity in Devon[4] (EfW = Energy from Waste.)

Large-scale schemes over 5MW in capacity can access an alternative subsidy scheme called Contracts for Difference but the large size of these developments is not always suitable. This is a particular issue within Devon because of its large areas of valued and protected landscapes.

National support mechanisms for renewable electricity projects under 5MW need to be reintroduced to return to the growth rates in renewable energy capacity in Devon seen before the demise of the FiT.

The Actions

Needing Action Beyond Devon:

E9. Work with government to ensure effective incentives are available for the use of renewable heat and waste heat from industrial and commercial facilities, including waste Energy Recovery Facilities.

E10. Work with government to reintroduce support mechanisms for smaller-scale renewable electricity generation.

8.5.5 Goal EE - Carbon Capture and Storage (CCS) is Piloted on Industrial Facilities

The first large-scale CCS plant was opened in 1996 in Norway and there are now 18 facilities in operation globally, but the technology is yet to be proven in the UK.[27] National government has committed to deploy CCS in at least two sites by 2030, most likely in coordinated clusters around centres of cement, chemicals, steel and iron manufacturing.[28]

Making It Happen

Devon does not have clusters of the industry types the government is targeting for the first phases of CCS deployment, so piloting of CCS is unlikely to occur in the County over the next decade. However, longer-term, the Devon Climate Emergency partners should ensure that the government is aware of Devon's ambition to see CCS technology fitted to appropriate installations in the County, such as Energy Recovery Facilities.

The Actions

Needing Action Beyond Devon:

E11. Remain engaged with government funding opportunities to pilot carbon capture and storage technology on industrial facilities in Devon.

8.6 SUMMARY OF THE ACTIONS

Figure 8.3 shows the reference number and text of each of the Energy Supply actions in this Plan. The anticipated start and duration of each action is shown on the right hand side of the diagram.

The actions with their duration highlighted in red in Figure 8.3 have been identified as a priority through two processes. Firstly, the Net Zero Task Force assessed each action's potential to contribute to significant emissions reductions and the likelihood they can be implemented in a timely fashion. Secondly, some actions were highlighted as being important by the respondents to the public consultation.

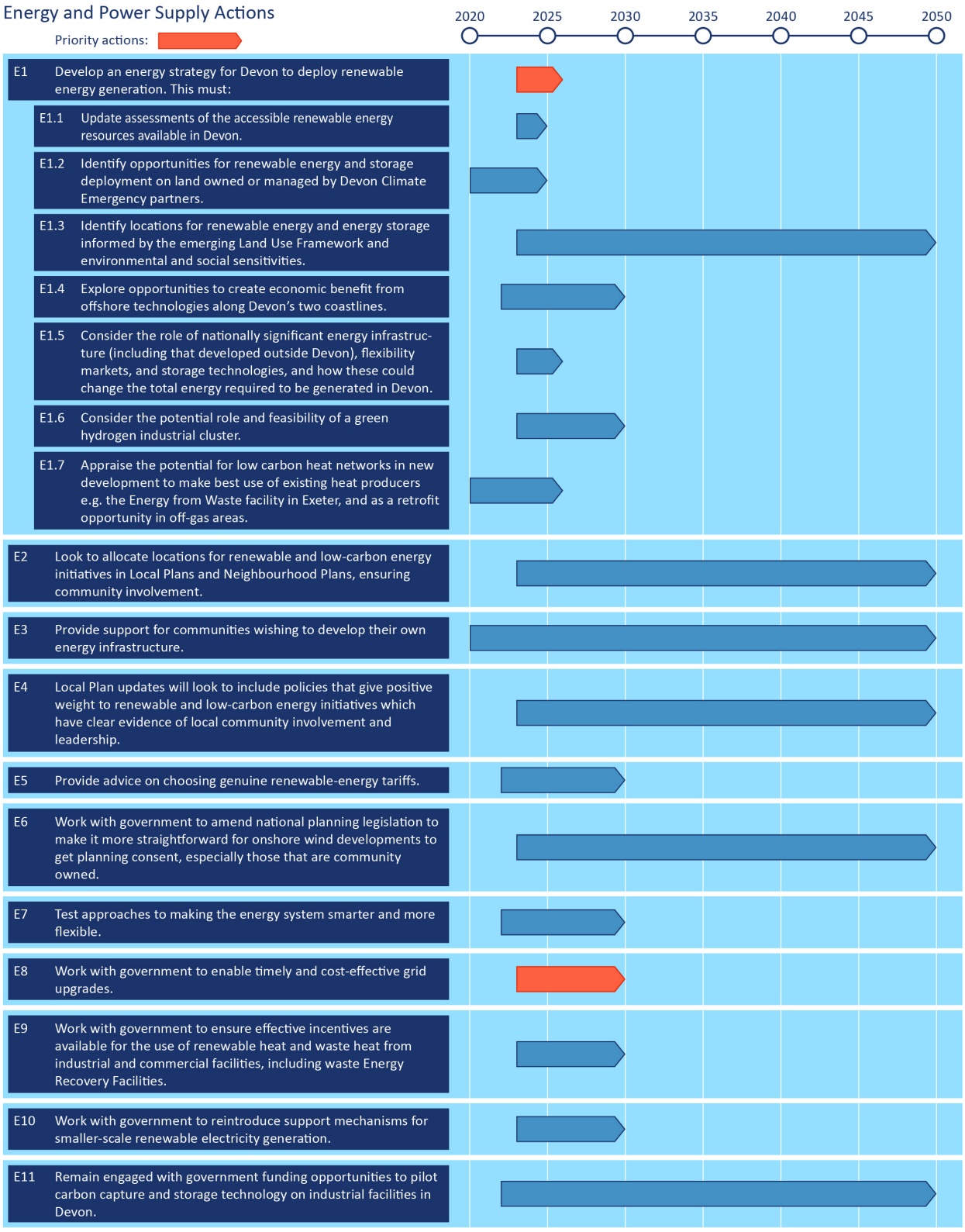


Figure 8.3 - This diagram shows the anticipated start and duration of the Energy Supply actions and the priority actions.

For more detail, including who can help to deliver these actions, see the full action table.

8.7 MILESTONES

Delivering the actions in this section of the Plan will help to achieve the milestones in Figure 8.4 below. These milestones reflect the Climate Change Committee's Further Ambition Scenario.

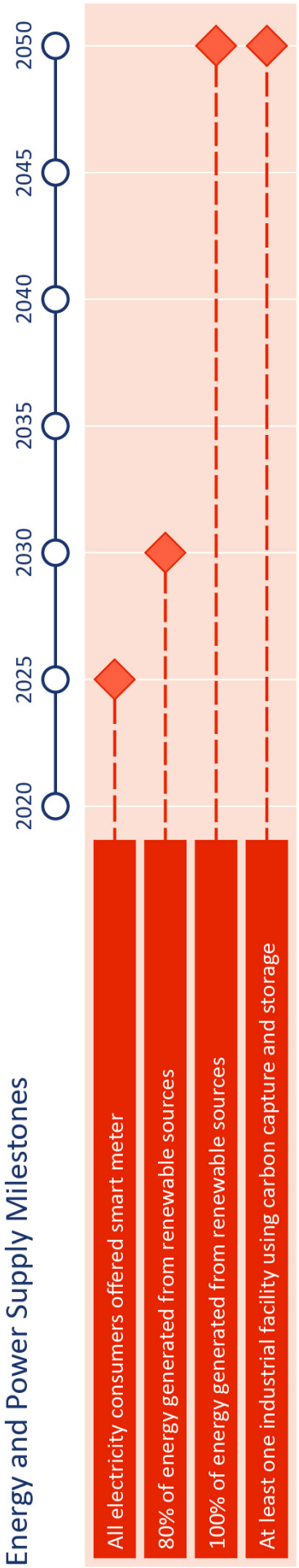


Figure 8.4 - This diagram shows the milestones which the actions in this section of the plan will help achieve.

8.8 REFERENCES

[1] Mitchell A. et al. (2020) Greenhouse Gas Emissions Report – Devon, Plymouth, Torbay 2019. Centre for Energy and Environment, University of Exeter. Available at: https://devonclimateemergency.org.uk/studies-and-data/devons-carbon-footprint/

[2] US Department of Energy (Unknown), Where the Energy Goes: Electric Cars. Available at: https://www.fueleconomy.gov/feg/atv-ev.shtml and Where the Energy Goes: Gasoline Vehicles. Available at: https://www.fueleconomy.gov/feg/atv.shtml, Accessed 30 th August 2020

[3] Morgan,J. (2020) Electric vehicles: the future we made and the problem of unmaking it, Cambridge Journal of Economics, 44 (4), pp953–977. Available at: https://doi.org/10.1093/cje/beaa022

[4] Data calculated by the Net Zero Task Force based on Regen (2019) Renewable Energy Progress Report for Devon 2017 to 2018. Available at: https://www.devon.gov.uk/energyandclimatechange/renewable-energy and BEIS (2019) Total final energy consumption at regional and local authority level 2005 to 2017. Available at: https://www.gov.uk/government/statistical-data-sets/total-final-energy-consumption-at-regional-and-local-authority-level

[5] BEIS (2022) British Energy Security Strategy. Available at: https://www.gov.uk/government/publications/british-energy-security-strategy/british-energy-security-strategy

[6] Climate Change Committee (2019), Net-Zero – The UK's Contribution to Stopping Global Warming. Available at https://www.theccc.org.uk/publication/net-zero-the-uks contribution-to-stopping-global-warming/

[7] Preliminary calculations by the Net-Zero Task Force

[8] Cornwall and Isles of Scilly Local Enterprise Partnership (2018) Floating Offshore Wind in the Great South West

[9] Regen (2022) Floating Offshore Wind Opportunity Study for the Heart of the South West. Available at: https://heartofswlep.co.uk/understanding-our-economy/flow/

[10] Navigant (2020), Benefits of Hybrid Heat Systems in a Low Carbon Energy System. Reference No. 214662. Available at: https://www.wwutilities.co.uk/media/3858/benefits-of-hybrid-heating-systems.pdf

[11] Soil Association (2015), Runaway Maize – Subsidised Soil Destruction. Available at: https://www.soilassociation.org/media/4671/runaway-maize-june-2015.pdf

[12] BEIS (2021), UK Hydrogen Strategy. Available at: https://www.gov.uk/government/publications/uk-hydrogen-strategy County: Analysis and Recommendations for Devon County Council. Eunomia.

[13] Western Power (2018), The Future of Our Electricity Network – Consultation to Engage Communities in Future DSO Strategy. Available at: https://www.westernpower.co.uk/downloads/5369

[14] Fajardy, M. et al. (2019), BECCS Deployment: A Reality Check. Grantham Institute, Imperial College, London. Available at https://www.imperial.ac.uk/media/imperial-college/grantham-institute/public/publications/briefing-papers/BECCS-deployment---a-reality-check.pdf

[15] NFU (2019) Achieving Net-Zero, Farming's 2040 Goal. Available at: https://www.nfuonline.com/nfu-online/business/regulation/achieving-net-zero-farmings-2040-goal/

[16] Carbon Trust (2019), Cornwall and Isles of Scilly, Dorset and Heart of the South West Local Enterprise Partnership's Joint LEP Energy Strategy Framework. Available at https://dorsetlep.s3.amazonaws.com/Strategic%20Sites/HotSW,%20Dorset,%20CIoS%20Joint%20LEP%20Energy%20Strategy%20Framework.pdf

[17] Lash, D. et al. (2020) Net Zero Devon, Plymouth and Torbay. Centre for Energy and the Environment, University of Exeter. Available at: https://www.devonclimateemergency.org.uk/wp-content/uploads/2021/11/DPT-net-zero-report-v1-140820.pdf

[18] Heart of the South West LEP (2021), Blueprint for Clean Growth, Available at: https://heartofswlep.co.uk/wp-content/uploads/2021/05/HotSW-LEP-Blueprint-for-Clean-Growth-Final.pdf
[19] BEIS (2020), Electricity Generation Costs 2020. Available at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/911817/electricity-generation-cost-report-2020.pdf
[20] Regen (2018), Devon Community Energy Impact Report, Regen, commissioned by Devon County Council. Available at: https://www.regen.co.uk/publications/devon-community- energy-impact-report-2018/
[21] The average UK home uses 12,000kWh of gas and 2,900kWh of electricity. This totals 14,900kWh of energy. Community energy organisations in Devon generate 17,431 MWh of electricity. 17,431/14,900 = 1170 houses.
[22] Ofgem (2016) Unlocking the Capacity of the Electricity Networks. Available at: https://www.ofgem.gov.uk/ofgem-publications/111164
[23] Ofgem (Unknown) Future System Operation. https://www.ofgem.gov.uk/energy-policy-and-regulation/policy-and-regulatory-programmes/future-system-operation-fso
[24] Regen (2019), Decade to Make a Difference Series: The Decarbonisation of Heat. Available at: https://www.regen.co.uk/publications/decarbonisation-of-heat/
[25] A. Rowson and A. Norton (2015), Wolborough Urban Extension Newton Abbot – An Initial Feasibility Assessment of Site Wide District Heating and Combined Heat and Power, Centre for Energy and the Environment, Internal Document 900
[26] Department for Energy and Climate Change (2013), Research into Barriers to Deployment of District Heating Networks. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/191542/Barriers_to_deployment_of_district_heating_networks_2204.pdf
[27] Grantham Research Institute (2018), What is Carbon Capture and Storage and What Role
Can it Play in Tackling Climate Change? Available at:https://www.lse.ac.uk/granthaminstitute/explainers/what-is-carbon-capture-and-storage-and-what-role-can-it-play-in-tackling-climate-change/
[28] BEIS (2020), Carbon Capture, Usage and Storage. A Government Response on Potential Business Models for Carbon Capture, Usage and Storage. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/909706/CCUS-government-response-business-models.pdf

SECTION 9.

BUILT ENVIRONMENT

- Retrofitting existing houses
- Retrofitting existing commercial and industrial premises
- Making new buildings net-zero
- Minimising energy use by amenity lighting

9.1 INTRODUCTION

Buildings and lighting outdoor spaces produced 38% of Devon's greenhouse gas (GHG) emissions in 2019, shared equally between residential and commercial/industrial buildings. Burning fossil fuels for heating and manufacturing processes are responsible for 19% and 6% respectively. The remaining 13% is from the consumption of grid-supplied electricity.[1]

This section focusses on how we can achieve net-zero buildings based on the Climate Change Committee's (CCC) Further Ambition Scenario.[2] It then introduces goals for overcoming issues identified during the Thematic Hearings and the public Call for Evidence as barriers to achieving net-zero in Devon. Actions are then proposed to achieve the goals.

The Energy Supply section of the Plan explores decarbonising the electricity supply, including support for building-scale renewable electricity and energy storage. The Economy and Resources section of the Plan discusses how we can ensure we have the necessary skills in Devon to achieve net-zero, including the skills needed to upgrade buildings.

9.2 THE CHANGE NEEDED

Four main changes are needed to achieve net-zero in our built environment:

1. **Retrofit existing houses,** We need a high take-up of energy-efficiency measures, renewable energy, and low-carbon heating technologies in every one of our 581,000 homes.

2. **Retrofit existing commercial and industrial premises.** Just like our homes, the 53,000 non-domestic buildings in Devon need upgrading too.

3. **New buildings need to be net-zero as soon as possible.** We need to be constructing new buildings using low-carbon materials and ensuring they won't need retrofitting in the future.

4. **Minimise energy use by amenity lighting.** Lighting in public areas needs to be efficient and used only when required.

These are described in more detail below.

9.2.1 Retrofit Existing Houses

Figure 9.1 shows the Energy Performance Certificate (EPC) rating of Devon's homes. Government's target is for as many houses as possible to be band C by 2035[3] In Devon this means upgrading two thirds of our homes (383,000) over the next 15 years, which is 25,500 homes per year - five times faster than Devon is currently installing cavity wall insulation.[4]

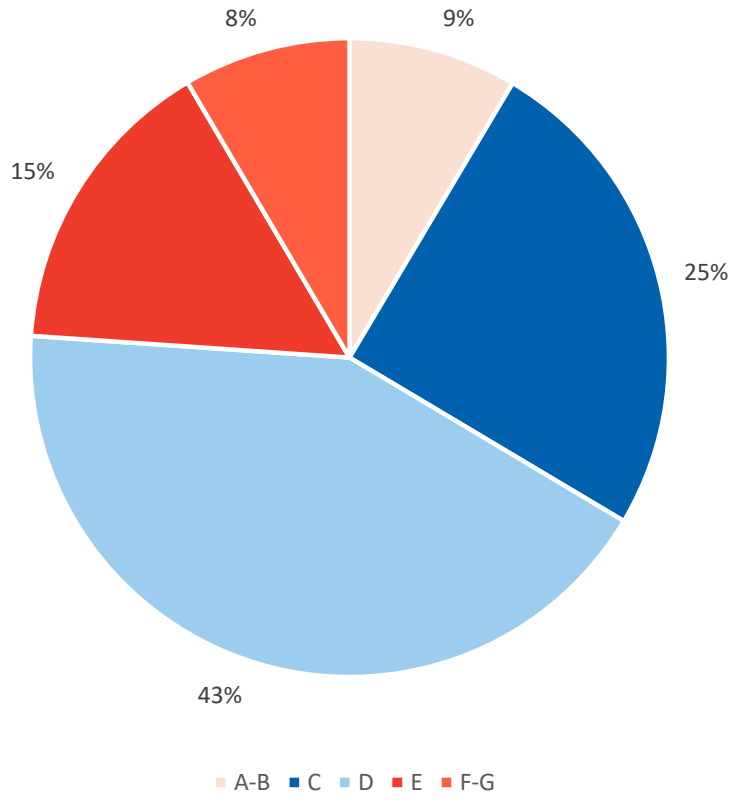


Figure 9.1 - Energy Performance Certificate Rating of Devon's Residential Buildings[5]

We need to go beyond the Government's target and aim to retrofit every home to as close to Band A as possible by 2050. To achieve whole-house retrofit cost-effectively will require new approaches.[6]

The Committee on Climate Change (CCC) Further Ambition scenario for net-zero in 2050 requires a 25% reduction in energy demand in homes from insulation measures. Taking this fabric-first approach will facilitate the installation of heat pumps which, to be affordable to operate, need the

- All practicable lofts by 2022.
- All cavity walls, where appropriate, by 2030.
- 36,000 solid walls by 2030 and 109,000 by 2050.

Once homes have been made more efficient, we need to eliminate GHG emissions from their heating systems. Applying the CCC Further Ambition scenario to Devon will require:[4]

- 18,100 heat pumps in existing homes by 2030 and 344,000 by 2050.
- 91,000 homes connected to retrofitted district heating. This distributes hot water, heated by centralised power plants, in a network of highly-insulated pipes to a collection of buildings. The heat source will be either large heat pumps or green hydrogen. This will be challenging due to the trenching required for the pipes and the high proportion of households needing to connect to the system to make schemes financially viable.
- The remaining houses (146,000) to be switched to either:
    - Green hydrogen (requiring the installation of hydrogen-ready boilers and national distribution infrastructure);
    - hybrid heat pumps (these could be appropriate for buildings on the gas network[7] Hybrid heating systems use a combination of a heat pump with a gas boiler. In this setup the heat pump provides the bulk of the base load while the gas boiler tops-up the heat requirement when demand is high);
    - or biomass boilers.
- A small number of homes using direct electric heating (just 1,000 nationally, such as heritage homes unable to use heat pumps or hydrogen).
- All cooker replacements to be electric from 2030.

Nineteen percent of Devon's homes are off-gas, compared to 16% nationally.[4] Off-gas buildings with oil or liquified petroleum gas central heating can have a heat pump installed if the building has been made more efficient to heat. If this is not possible, a biomass boiler may be appropriate if there is space. Off-gas buildings without pre-existing central heating will either need to install radiators or warm air distribution systems to make use of a biomass boiler or a heat pump. Alternatively they could use direct electric heaters, but these are expensive to run as they have just 1/3 the efficiency of a heat pump.

Heritage buildings present a particular challenge due to the need for continuous ventilation to reduce moisture build-up inside and to be sympathetic to any listed status or conservation area. Eliminating GHG emissions from these properties is possible but more costly. Given these challenges, the CCC's Further Ambition scenario acknowledges that these buildings may not reach zero emissions until 2060. Whilst these buildings will be challenging to retrofit, when emissions are considered across the life of the building, retrofitting a heritage building will emit fewer GHGs than demolishing it and building a new one.[8] But greater support for retrofit of heritage buildings is needed.

The materials and technologies required for retrofit produce GHGs in their manufacture and transportation but the resulting energy and GHG savings over the lifetime of the products results in an overall reduction[9]

9.2.2 Retrofitting Existing Commercial and Industrial Premises

The CCC Further Ambition scenario for net-zero in 2050 requires energy efficiency upgrades to achieve a 20% reduction in energy demand by 2030 and a 25% reduction by 2050. The technologies are not specified but Government is introducing a minimum efficiency standard of EPC band B by 2030 for privately-rented commercial buildings.[18]

It is assumed there will be 11,200 heat pumps in Devon's non-residential buildings by 2030 and that heat pumps will meet 45% of heat demand by 2050.[4] The rest will be met by low carbon district heating (particularly well suited to industrial estates where heat demand may be high), hydrogen and biomass. Roofs can also be used for solar photovoltaic panels.

9.2.3 New Buildings

Making best use of existing buildings and remodelling them where they are not suitable for modern needs must be favoured over demolition and new construction. Where they are necessary, the construction and operation of new buildings need to be net-zero as soon as possible. They need to be highly energy-efficient and use low-carbon heat sources from the outset to avoid a costly retrofit later - making a new home zero-carbon is around five times cheaper than retrofitting it later.[10] We must consider district heating for new developments where the distribution pipes and energy centre can be designed in from the outset, particularly in locations where waste heat is available from industrial processes.

But, just because the buildings are energy efficient does not mean that they will be used in an energy efficient manner. Building occupants must be supported to use new buildings and technologies properly.

About 10% of the UK's GHG emissions are from the material extraction, manufacturing, transportation and end-of-life decommissioning of products required for new construction (referred to as embodied carbon)[11] and these make up 35-51% of a building's total emissions over its lifetime.[12] New buildings need to be net-zero not only in operation, but also in construction.

9.2.3 Amenity Lighting

We can make energy savings in public and shared spaces through rationalising existing lighting and converting to LED technology. Progress has been made, but more can be done and faster.

9.3 GREENHOUSE GAS OUTCOMES

Figure 9.2 shows Devon's GHG emissions arising from fossil fuels used by buildings in the context of Devon's total GHG emissions. Emissions from this sector in 2019 were 2.9Mt CO_2e. The Figure also shows the projected reduction trajectory to 2050 as a result of the delivery of the CCC's Further Ambition Scenario aided by the actions in this Plan. **Through the activities identified in this Plan, by 2050, the emissions are expected to fall to 0.1Mt CO_2e. These will become net-zero through activities that remove CO_2 from the atmosphere.**

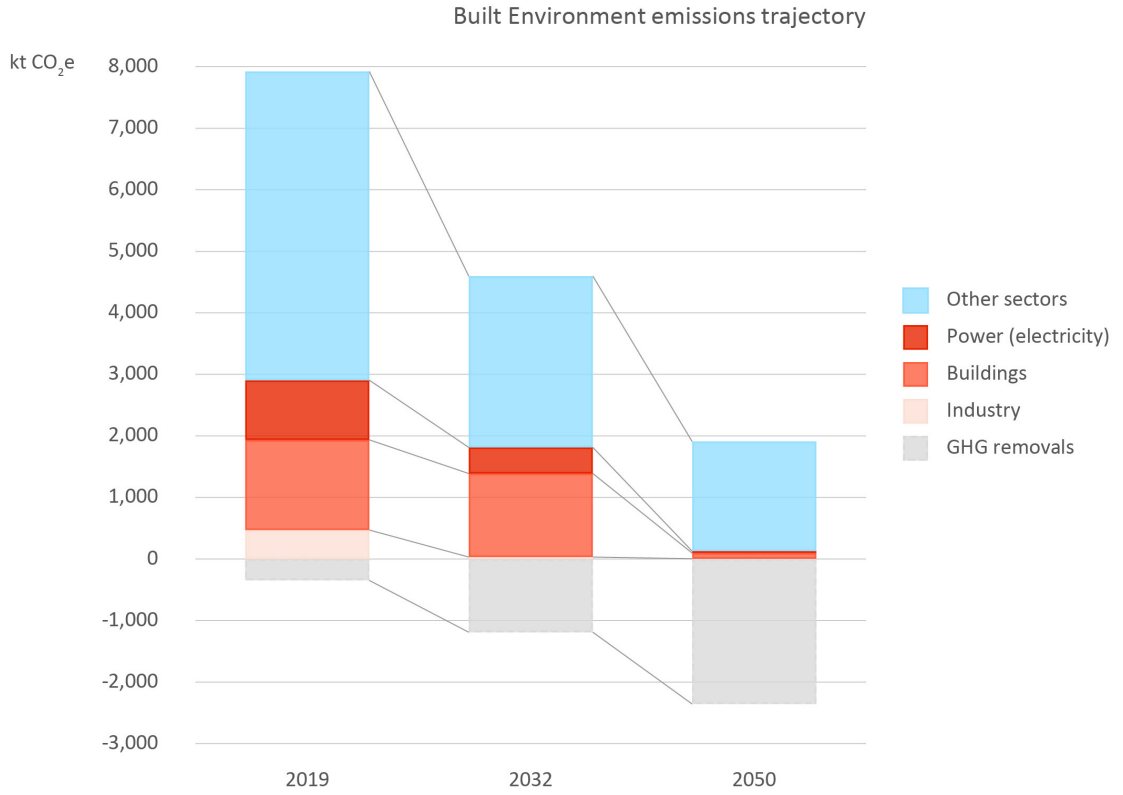


Figure 9.2 - Trajectory for Devon's production emissions, highlighting Power, Buildings and Industry (manufacturing and construction). GHG removals refers to approaches that remove carbon dioxide from the atmosphere.

9.4 OTHER OPPORTUNITIES AND BENEFITS

- Devon and the Greater South West develops its reputation as a centre of excellence in low carbon buildings.
- Retrofitting buildings generates 108,000 new, skilled jobs per year across the UK between 2020 and 2030 - such as energy assessors, heating engineers and electricians, and in manufacturing and distribution.[13]
- Business models and supply chains have developed to deliver the upgrades.
- Reduced amenity lighting provides a greater opportunity to see the stars, causes less disturbance for wildlife, reconnects people with nature and improve people's sleep.[14]
- Between December 2017 and March 2018 there were 914 excess winter deaths in Devon.[15] Excess winter deaths are three times higher in the coldest quarter of homes compared to the warmest quarter, and children living in inadequately heated homes were found to be more than twice as likely to suffer from conditions like asthma and bronchitis than those living in warm homes. There is also evidence that cold homes contribute to poorer mental health. Nationally, the cost of cold homes to the NHS is estimated to be up to £2.5bn/year, which implies that improving the thermal comfort of Devon's homes could deliver year on year savings for the NHS and improve health.[13]
- 12.3% of Devon's population are in fuel poverty.[16] Improving the energy efficiency of Devon's homes can reduce inequality, improve the productivity of the workforce and improve children's educational attainment.[13]
- Twenty percent of low-income households regularly go without food to ensure that their children have enough to eat. Minimising expenditure on energy can therefore improve nutrition and household relationships.[13]

9.5 DEVON'S GOALS TO MEET NET-ZERO

9.5.1 Goal BA - Self-Financing Retrofit Has Been Delivered at Scale

Retrofitting a building with all the energy efficiency and low-carbon technology to achieve net-zero has high upfront costs (between £32k and £60k for a house depending upon house type)[17] and can be disruptive, making it unattractive despite evidence that a home with an EPC band C is worth 5% more than a D-rated property.[18] Retrofitting property needs to appeal to people so that social norms are changed and living and working in net-zero buildings becomes desirable. Tenants can be reluctant to carry out building improvements as they will not benefit from increases in value to the property, whilst landlords can be reluctant to act as they will not benefit from energy cost savings.

Making It Happen

An industry capable of delivering self-financing retrofit needs to be developed – whereby the costs are affordable and balanced by the benefits to the building occupants and/or owners – at scale to achieve the installation rate required.

Innovation

New models and technologies need to be nurtured. The Government is investing in heat pump innovation to make them smaller and easier to install so that by 2030 they will cost the same as a gas boiler. There will also be national trials of hydrogen heating ahead of Government decisions on its future role in net-zero in 2026.[18] Government will be undertaking further testing during the 2020s to establish the costs, benefits, safety, feasibility, air quality impacts and consumer experience of using hydrogen for heating.[19]

By using off-site manufacturing technology to produce a bespoke air-tight and insulated shell and energy upgrades for a specific building, the Energiesprong model minimises disruption and costs. This Dutch approach is being trialled in Devon by the Zero Energy Buildings Catalyst focussing on social housing where the volume of houses under the same ownership provides economies of scale to kick-start skills and the supply chain to drive down costs in future years. Energiepsrong uses the long-term energy and maintenance cost savings to repay the initial costs of the retrofit. [20]

Finance

Greater financial incentives for retrofit are needed to encourage uptake.

In 2020, the government funded research in East Devon, in partnership with the District Council, into how effective rebates on council tax and business rates would be on incentivising energy efficiency.[21] A 50% subsidy towards energy efficiency installation, refunded over three years via tax rebates, was attractive to East Devon home owners and businesses and was supported by 71% of the Devon Climate Assembly (so long as there would be a simple and consistent way for the effect of energy efficiency improvements to be verified).[22] The scheme delivery in East Devon alone would cost the UK tax payer £11.5m and would deliver £23m of installed measures. Piloting this approach needs further collaboration with government and the promotion of such a scheme could be implemented by the Devon Energy Efficiency Advice Service if it were deemed appropriate.

Green mortgages offer favourable interest rates for people who choose to purchase an energy efficient home or commit to upgrading its energy performance. These are new products, which 72% of the Devon Climate Assembly thought should be developed further.[22]

These are the subject of the government's Green Home-Finance Accelerator, launching in Autumn 2022, that is designed to overcome the high initial-development costs for lenders to make more products available.[23]

Collective purchasing can also bring down costs – in 2021, Devon Solar Together bulk-ordered solar photovoltaic panels for domestic properties and achieved a cost-reduction of about 30%.

The net-zero commitments of organisations, which will require carbon offset credits to achieve, could be used to fund retrofit activity. For example, a payment for carbon offsetting could fund the installation of insulation or a heat pump into a building, with the resulting carbon savings being owned by the organisation that funded the measure. The energy savings would benefit the bill payer. There are companies in Devon looking to setup this model.

Sell the Benefits

We don't always expect an investment to pay for itself purely financially. For example, installing double glazing doesn't pay back its purchase price in energy cost savings alone but is purchased at great expense to achieve the benefits of thermal comfort, reduced maintenance, security and noise insulation. The health and wellbeing benefits of living in a warm and net-zero carbon home need to be better communicated so that it becomes a social norm. Opening up the homes of those who have already installed new measures to show the benefits to others in a credible way can be a role for community organisations to help raise awareness locally.

The Actions

B1. Expand whole-house retrofit by working with social landlords to aggregate their housing stock and collectively procure retrofit.

B2. Take opportunities to enhance and raise awareness about financial support available for people and organisations to retrofit their properties.

B3. Raise awareness of the co-benefits of living in net-zero homes.

Needing action beyond Devon

B4. Work with Government to encourage VAT breaks on retrofit activity and products.

B5. Work with government to continue exploring the use of Council Tax and Business Rates to encourage energy efficiency upgrades of buildings.

9.5.2 Goal BB - Independent and Trusted Advice and Support on Retrofit is Available

Cosy Devon, the County's home energy-efficiency partnership, has previously offered insulation for free, but found this did not increase take-up; non-financial support is also necessary. For example, the hassle of clearing out the loft deterred some from installing insulation, and households sometimes didn't trust available support mechanisms. This issue becomes even more significant when it is applied to a whole-house retrofit that needs to involve designers and different trades people installing more invasive measures to a building. Commercial buildings are particularly problematic because there are many different types of construction and therefore require a tailored approach.

Making It Happen

There is no central provision of advice and support in Devon to those that want to make building improvements to either homes or business premises. Government's 'Boosting Access for Small and Medium-sized Enterprises (SMEs) to Energy Efficiency Competition' is finding innovative solutions to increase retrofit activity in business premises, which may develop approaches suitable for Devon.

A county-wide energy advice

Devon needs an energy advice service to increase confidence in building retrofit and make it easier. The service would:

1. Build on the services provided by community energy companies
2. Provide people with an independent, whole-building energy assessment to make bespoke recommendations
3. Encourage building improvements at trigger points e.g. kitchen, bathroom or workspace remodelling
4. Offer do-it-yourself guidance
5. Signpost to market offers of finance
6. Provide training to installers
7. Recommend trusted retrofit installers
8. Coordinate the works
9. Undertake quality inspections of work completed
10. Keep abreast of innovative solutions emerging for SMEs

Sharing best practice for organisations

Devon Climate Emergency partners are reducing their emissions which includes retrofitting their buildings. The partnership should ensure experience is being shared with other large energy consumers in the County.

The Actions

B6. Establish a Devon-wide energy advice service.

B7. Keep abreast of innovative retrofit solutions emerging for businesses, pilot promising approaches and share experience with others.

Case Study

RetrofitWorks

RetrofitWorks offers a 'one-stop-shop' retrofit design and installation service. It is a co-operative which matches homeowners who want to retrofit their homes with local, quality-assured energy assessors and installers. It brings together three groups of stakeholders:

1. **RetrofitWorks Advocates** – organisations that represent a constituency of potential customers, acting as trusted advisers on their behalf, such as community groups and local authorities.
2. **RetrofitWorks Practioners** – accredited small and medium-sized enterprises (SME) wishing to carry out retrofit advice, assessment, design, coordination, and installation.
3. **RetrofitWorks Associates** – open to any organisation that wishes to formally support the co-operative.

The RetrofitWorks' approach ensures value for money for the property owner by creating competition amongst its practitioner members, and through economies of scale. Profits are returned to the cooperative membership, for example by providing discounted training programmes or funding for fuel poor households.[24]

9.5.3 Goal BC - Effective Regulations Require Energy Efficiency Improvements to Homes

The Devon Climate Assembly considered ways of encouraging or requiring people to retrofit their homes, properties or business premises to reduce carbon emissions. Sixty-two percent of the Assembly were in favour of using regulation to require the upgrading of homes so long as: 1) There is recognition that buildings are not all the same; 2) the requirements target the poorest rated buildings first; and 3) their implementation does not increase inequality.[22]

Making It Happen

The Minimum Energy Efficiency Standard

Energy-inefficient housing puts residents at risk of fuel poverty due to the increased costs of staying warm. The Government brought in the Domestic Minimum Energy Efficiency Standard (MEES) Regulations to prohibit landlords from leasing property with an EPC below an E. Enforcement is the responsibility of local authorities' Trading Standards services but no additional funding has been provided to do so. Furthermore, the cap on the financial contribution expected from landlords to improve the property is set too low to deliver meaningful energy efficiency measures.[25] These issues mean the MEES Regulations are not working effectively.[26]

The majority of the Devon Climate Assembly (85%)[22] were in favour of government making changes to the MEES Regulations to improve their effectiveness and making resources available to local authorities to enforce them. However, this needs care because a poorly designed scheme could increase rent payments and contribute to increasing existing inequalities. In 2021, government ran the Private Rented Sector MEES Compliance and Enforcement Funding Competition, which provided assistance to local authorities to build compliance and enforcement capacity and capability.[27] Exeter City Council and Teignbridge District Council were among the local authorities to win funding.

Similar effectiveness and enforcement issues may apply to Government's plans for privately-rented commercial premises to achieve EPC band B from 2030[18]

Planning Permission

The Devon Climate Assembly (71%) supported using the development control system to require energy efficiency upgrades to the whole house at the time of adding an extension (including conservatories where these are not classed as permitted development). The Assembly stressed that the extent of the retrofitting should be proportionate to the size of the house and the extension.[22]

Such measures have been used before elsewhere, most notably by Uttlesford District Council in

Essex, in the mid-2000s but are no longer.[28] Introducing such a system in Devon may require national changes to legislation, which has evolved since Uttlesford's pioneering example.

The Actions

B8. Evaluate the use of planning conditions to require energy-efficiency upgrades at the time of extending a home, and any other local regulatory opportunities that arise.

Needing action beyond Devon:

B9. Work with Government to ensure effective minimum energy efficiency standards and that resources are available to enforce non-compliance.

B10. Work with government to explore additional mechanisms to require energy-efficiency upgrades.

9.5.4 Goal BD - New Buildings are High Quality and Net-Zero

Minimum standards for new buildings

The national Future Homes Standard will be introduced in 2025. This will ensure new homes produce 75-80% lower CO_2 emissions from their operational phase than required by 2013 Building Regulations. These homes will be "zero carbon ready" with high levels of energy efficiency and low-carbon heating so that as the electricity grid decarbonises they will achieve net-zero emissions. An interim uplift to the Building Regulations in 2021, to be implemented in 2022, will expect a 31% reduction in CO_2 emissions over current standards and will require rooftop solar photovoltaic panels covering 40% of the footprint of the home.[29]

Government has acknowledged that planning policy and its own communications has caused uncertainty about whether local planning authorities can request that new homes exceed the minimum energy efficiency requirements of the Building Regulations. Helpfully, Government confirmed in 2021 that local planning authorities retain powers to set local energy efficiency standards for new homes.[29]

In parallel, Government proposes to introduce the Future Buildings Standard from 2025 which will apply to the operation of non-domestic buildings. The specifications of this are still under development but the intention is to deliver highly efficient buildings using low-carbon heat. An interim uplift to standards in 2021 proposes a 27% CO_2 reduction over 2013 Building Regulations to help the industry prepare.[30]

Often the real-life performance of a building does not meet its expected energy performance, meaning that buildings we believe are efficient, are not. Reasons include inadequate knowledge

within design teams, poor installation of materials and inconsistencies within the design standards. themselves.[31] The Government has said it will reduce the performance gap by improving the accuracy of 'as-built energy calculations' and provide clearer information to building control bodies to encourage the right design choices.[29]

There are no Government requirements to minimise embodied carbon emissions from new buildings but the CCC has made recommendations. The CCC expects 40% of new homes to be built with a timber frame (up from 30% in 2018) by 2050[2], which has less embodied carbon than brick and block. Indeed timber frames manufactured from trees sourced from sustainable forests provides an opportunity for storing carbon in buildings that has been removed from the atmosphere while the tree was growing. This would mean the frame of the building becomes carbon negative. The CCC further anticipates buildings to be designed better so that they need fewer materials; more materials to be reused within the construction industry; and increased use of natural and industrial-waste products to replace clinker in cement production.

This increased efficiency of material use means that significant reductions in embodied carbon can be achieved at no net additional cost and future targets for 2030 advocated by the Royal Institute of British Architects are achievable with a cost uplift of 7 – 15% depending on building type.[32] Longer term, the GHGs associated with manufacturing construction products will reduce through the decarbonisation of the energy sources these industries use and carbon capture and storage equipment fitted to the manufacturing facilities.

Whilst both the Future Homes Standard and Future Buildings Standard will reduce GHG emissions associated with the operation of new buildings, the technical standards are only notional and may be changed, or the timeline may slip.[32] Local Plan reviews should implement zero-carbon buildings in operation and set embodied carbon targets as soon as possible where viable.

Making It Happen

Viability of net-zero homes

In the experience of local authorities, large-volume housing developers can argue successfully that the costs associated with building to high energy efficiency standards means that other social and environmental benefits of development, such as the provision of affordable housing for local people, has to be reduced. However, Cornwall Council has shown the additional cost of building a home to net-zero standards in comparison to those to be implemented from 2022 to be no more than 2.2%.[33] We must collectively work on demonstrating that it is financially viable to build quality, net-zero carbon homes.

First, by maintaining a county-wide evidence base about the costs of developing net-zero carbon homes to assist each planning authority in evaluating the viability of mandating net-zero standards in their area ahead of 2025. Assessments of viability need to be bespoke to each planning authority because these reports have to reflect local issues, such as land prices, housing availability and build costs. Yet there are shared issues between areas and therefore it would be beneficial to produce a shared resource.

Second, Devon Climate Emergency partners with land assets with the potential for housing development should work with developers to move away from traditional construction approaches, which struggle to achieve the high-performance standards required for net-zero.[34] Instead the viability of delivering net-zero homes using modern construction techniques, such as off-site pre-fabricated timber frames, should be demonstrated. Land owners taking the lead on setting higher standards can help develop the economies of scale required to up-skill the workforce, establish supply chains, lower costs and increase the energy performance of the final build.

Urban Cooling

Vegetation, including trees, green walls and green spaces, should be incorporated into new development to help conserve energy[35] by providing shading and cooling of the local area through evapotranspiration.

Setting an example

As anchor institutions the Devon Climate Emergency partners must implement net-zero standards for their new buildings to demonstrate leadership to encourage all organisations in Devon to do the same. There is already precedent for low-carbon public buildings in Devon, such as Loddiswell Primary School, which generates more energy in a year than it consumes, Montgomery Primary School which is Europe's first Passivhaus School,[36] and Exeter's Passivhaus leisure centre.[37] This will encourage the supply chain to respond to the challenge and establish Devon's as a centre of low-carbon building expertise.

The Actions

B11. Produce a regularly-updated Devon-wide evidence base on the costs of developing net-zero carbon homes for use in Local Plan viability appraisals.

B12. Local Plan reviews to implement zero-carbon buildings in operation and set embodied carbon targets as soon as possible where viable.

B13. Demonstrate the viability of building net-zero carbon homes using modern construction techniques by reviewing the opportunity for local authorities to use their own land in partnership with a developer.

B14. Planning authorities to ensure vegetation, and the necessary arrangements for maintenance, is included within new development to aid building energy efficiency.

B15. Anchor institutions to deliver net-zero new build to set an example to other regional organisations and establish the South West as a leading region for low-carbon buildings.

Case Study

Plymouth Energy Community Homes: affordable net-zero homes

Plymouth Energy Community (PEC) Homes is building 38 net-zero new build homes in Kings Tamerton, Plymouth, supported by Homes England and in partnership with Plymouth City Council. It is the first development in a pipeline of locally owned net-zero affordable housing in the area. These will offer local people comfortable homes with low bills, due to reduced energy needs and a fair rent.

PEC believe that delivering affordable net-zero homes requires market innovation. Their model offers community shares so that the housing will be cooperatively owned and run, just like their solar installations. PEC Homes intends to demonstrate a model that can be replicated without ongoing Government support.

To do this, PEC Homes are using approaches to delivering net-zero housing developed by the Dutch Government in 2010, known as 'Energiesprong'. A key element of the approach includes performance guarantees for the tenant, such as thermal comfort levels and annual net-zero energy. The long-term reduced energy and maintenance costs enable PEC Homes to finance higher initial investment costs. The approach also uses off-site manufacture of building components to achieve higher quality performance at reduced costs through economies of scale.[38]

9.5.5 Goal BE - The Use of Energy for Lighting is Minimised in Public Spaces

The streetlights in the Devon County Council area are switched off between 00:30 and 05:30 in quieter locations and in areas of high night-time activity, such as town centres, the lights remain lit but are dimmed. The authority is converting all 79,000 streetlights to LEDs by 2023; this will reduce the carbon emissions generated by its street lighting each year by 75%.[39] Plymouth City Council is replacing all of its streetlights with LEDs to achieve a 70% carbon saving,[40] as is Torbay Council which has already replaced 70% of its lamps with LED alternatives.[41]

Highways England, which manages lighting on the A38 and M5, has plans to switch 70% of its lighting to LEDs by 2027 and all of it by 2030.[42]

Making It Happen

Given the imperative to reduce energy demand, highways authorities must revisit opportunities to switch off street lighting. It is important that lighting is not rationalised where it would reduce take-up of active travel and must be done in consultation with local councils.

Managers of property that has external lighting should look for opportunities to rationalise lighting provision and convert lamps to LED.

The Actions

B16. All organisations to review external lighting provision and switch to LED technology.

Needing action beyond Devon

B17. Work with Highways England to review opportunities for rationalisation of streetlight provision on its Devon network.

9.6 SUMMARY OF THE ACTIONS

Figure 9.3 shows the reference number and text of each of the Built Environment actions in this Plan. The anticipated start and duration of each action is shown on the right hand side of the diagram.

The actions with their duration highlighted in red in Figure 9.3 have been identified as a priority through two processes. Firstly, the Net Zero Task Force assessed each action's potential to contribute to significant emissions reductions and the likelihood they can be implemented in a timely fashion. Secondly, some actions were highlighted as being important by the respondents to the public consultation.

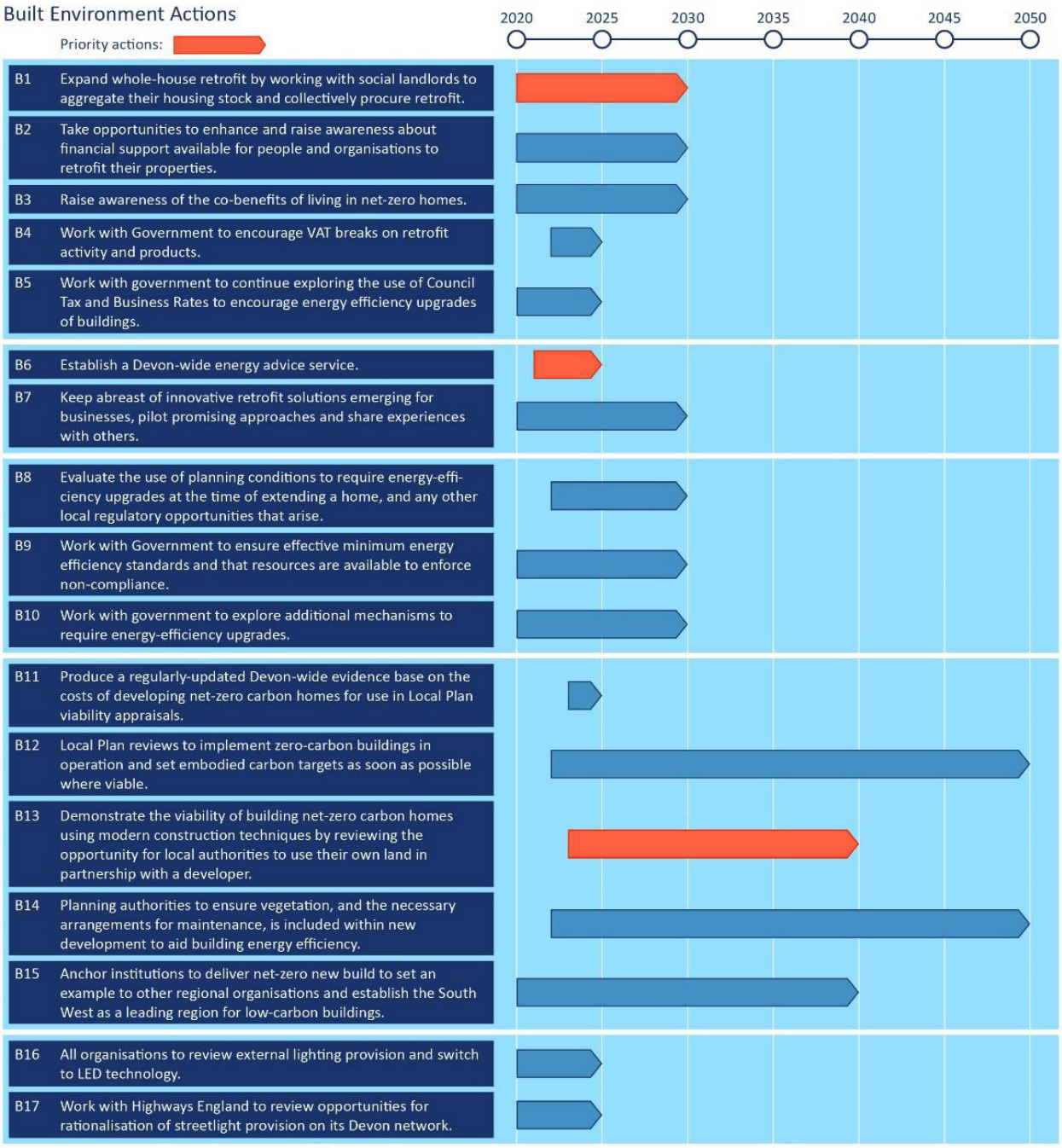


Figure 9.3 This diagram shows the anticipated start and duration of the Built Environment actions and the priority actions.

For more detail, including who can help to deliver these actions, see the full action table.

9.7 MILESTONES

Delivering the actions in this section of the Plan will help to achieve the milestones in Figure 9.4 below. These milestones reflect the Climate Change Committee's Further Ambition Scenario.

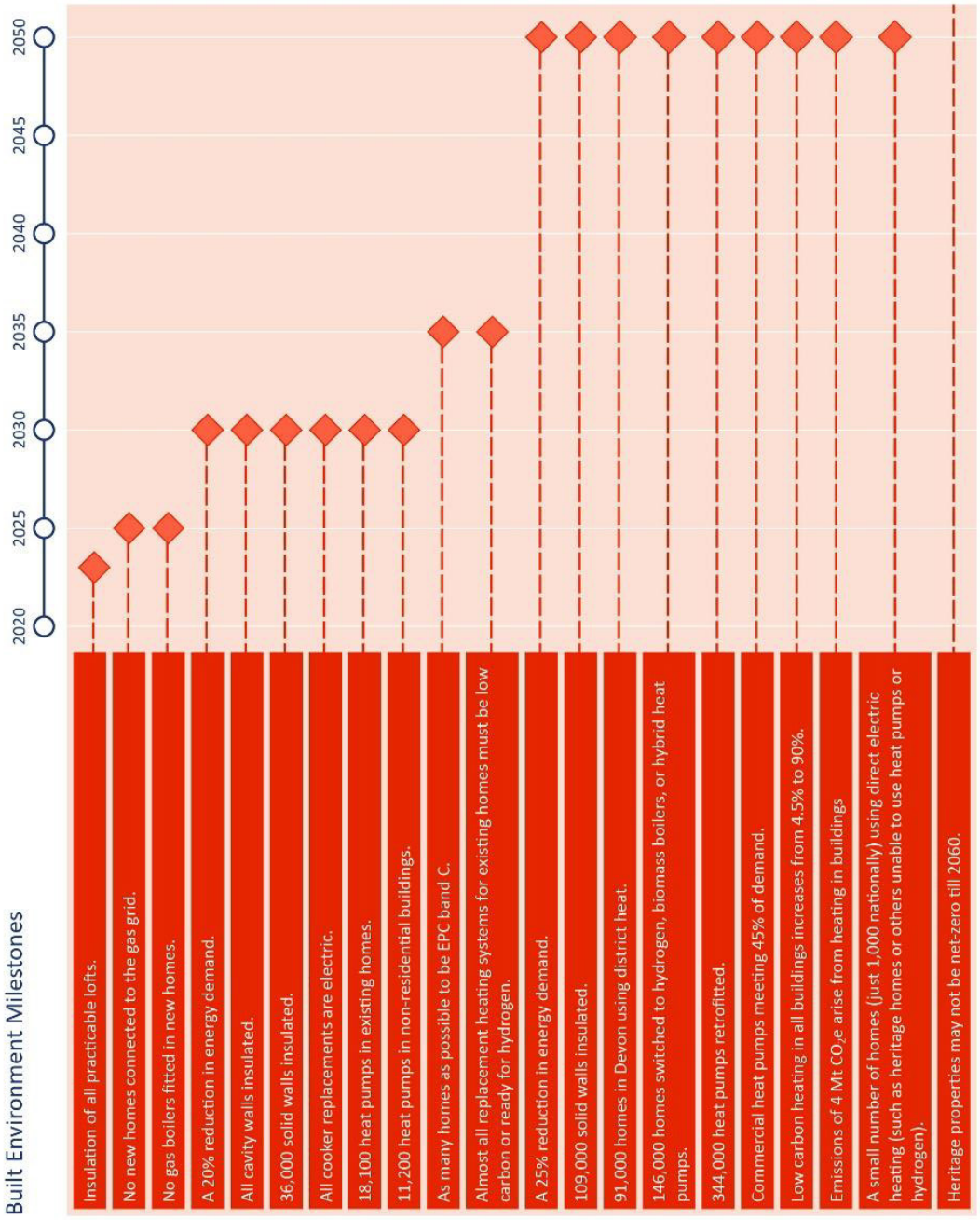


Figure 9.4 - This diagram shows the milestones which the actions in this section of the plan will help achieve.

9.8 REFERENCES

[1] Mitchell A. et al. (2020) Greenhouse Gas Emissions Report – Devon, Plymouth, Torbay 2019. Centre for Energy and Environment, University of Exeter. Available at: https://www.devonclimateemergency.org.uk/studies-and-data/devons-carbon- footprint/

[2] Climate Change Committee (2019) Net-zero: The UK's contribution to stopping global warming. Available at: https://www.theccc.org.uk/publication/net-zero-the-uks- contribution-to-stopping-global-warming/

[3] BEIS (2018) Clean Growth Strategy. Available at: https://www.gov.uk/Government/publications/clean-growth-strategy

[4] Lash, D. et al. (2020) Net Zero Devon, Plymouth and Torbay. Centre for Energy and the Environment, University of Exeter. Available at: https://www.devonclimateemergency.org.uk/wp-content/uploads/2021/11/DPT-net

[5] Energy Saving Trust (2019), Home Analytics Database.

[6] Green Alliance (2020) Reinventing Retrofit: How to Scale Up Home Energy Efficiency in the UK. Available at: https://www.green-alliance.org.uk/resources/reinventing_retrofit.pdf

[7] Navigant (2020) Benefits of Hybrid Heat Systems in a Low Carbon Energy System. Reference No. 214662. Available at: https://www.wwutilities.co.uk/media/3858/benefits-of-hybrid-heating-systems.pdf

[8] AECOM (Unknown) The Carbon and Business Case for Choosing Refurbishment Over New Build. Available at https://aecom.com/without-limits/article/refurbishment-vs-new-build-the-carbon-and-business-case/

[9] McGrath, T. et al. (2012) Retrofit versus new-build house using life-cycle assessment. Proceedings of the ICE - Engineering Sustainability. 166. 122-137. Available at: https://doi.org/10.1680/ensu.11.00026

[10] Climate Change Committee (2020) Future Homes Standard and proposals for tightening Part L in 2020. Available at: https://www.theccc.org.uk/wp-content/uploads/2020/02/Committee on Climate Change-to-MHCLG-Feb-2020.pdf

[11] LETI (2020) Embodied Carbon Primer. Available at: https://b80d7a04-1c28-45e2-b904-e0715cface93.filesusr.com/ugd/252d09_8ceffcbcafdb43cf8a19ab9af5073b92.pdf

[12] RICS (2017) Whole Life Carbon Assessment for the Built Environment. Available at: https://www.rics.org/globalassets/rics-website/media/news/whole-life-carbon-assessment-for-the--built-environment-november-2017.pdf

[13] Jennings, N et al. (2019) Co-benefits of climate change mitigation in the UK: What issues are the UK public concerned about and how can action on climate change help to address them?, Grantham Research Institute, London. Available at: https://www.imperial.ac.uk/media/imperial-college/grantham-institute/public/publications/briefing-papers/Co-benefits-of-climate-change-mitigation-in-the-UK.pdf

[14] Walker, M. (2017) Why We Sleep, Penguin

[15] Public Health England, Local Authority Health Profiles 19-20. Available at: https://fingertips.phe.org.uk/profile/health-profiles/data#page/1/gid/1938132701/pat/6/par/E12000009/ati/202/are/E10000008/cid/4

[16] BEIS (2022) Sub-Regional Fuel Poverty data 2022. Available at: https://www.gov.uk/government/statistics/sub-regional-fuel-poverty-data-2022

[17] Evidence presented to the Devon Climate Assembly (2021) by Kate Royston of Tamar Energy Community and Dan Lash of the Centre for Energy and Environment, University of Exeter. Available at https://www.devonclimateemergency.org.uk/retrofit/

[18] BEIS (2021) Heat and Buildings Strategy. Available at: https://www.gov.uk/Government/publications/heat-and-buildings-strategy

[19] BEIS (2021) UK Hydrogen Strategy. Available at https://www.gov.uk/government/publications/uk hydrogen-strategy
[20] Green Alliance (2020) Reinventing Retrofit, How to Scale-Up Retrofit in the UK. Available at: https://www regen.co.uk/wp-content/uploads/reinventing_retrofit.pdf
[21] Rowsen, A.T. et al. (2020) Council Tax and Business Rate Incentive Feasibility and Design Studies in East Devon. Centre for Energy and the Environment, University of Exeter
[22] Scott, K. and Ward, D. (2021) Devon Climate Assembly – "How should Devon meet the big challenges of climate change?". Available at: https://www.devonclimateemergency.org.uk/devon-climate-assembly/devon-climate-assembly-report/
[23] Department for Business, Energy and Industrial Strategy (2022) Information about the Green Home Finance Accelerator. Available at: https://www.gov.uk/government/publications/green-home-finance-accelerator/information-about-the-green-home-finance-accelerator
[24] RetrofitWorks (Unknown) Our Story. Available at: https://retrofitworks.co.uk/our-story/
[25] Mayor of London London Assembly (2020) Minimum Energy Efficiency Standard (MEES) enforcement. Available at: https://www.london.gov.uk/questions/2020/1000
[26] Tomusk, K. (2019) MEES one year on: no enforcement proceedings in first 12 months, EGI. Available at: https://www.egi.co.uk/news/mees-one-year-on-no-enforcement-proceedings-in-first-12-months/
[27] BEIS (2021) Private Rented Sector Minimum Energy Efficiency Standard (MEES) Compliance and Enforcement Funding Competition (closed). Available at: https://www.gov.uk/government/publications/apply-for-private-rented-sector-minimum-energy-efficiency-standard-mees-compliance-and-enforcement-funding
[28] Correspondence between Devon County Council and Uttlesford District Council, June 2021
[29] MHCLG (2021) The Future Homes Standard, 2019 Consultation on changes to Part L (conservation of fuel and power) and Part F (ventilation) of the Building Regulations for new dwellings. Available at: https://www.gov.uk/Government/consultations/the-future-homes-standard-changes-to-part-l-and-part-f-of-the-building-regulations-for-new-dwellings
[30] MHCLG (2021) The Future Buildings Standard, Consultation on changes to Part L (conservation of fuel and power) and Part F (ventilation) of the Building Regulations for non-domestic buildings and dwellings; and overheating in new residential buildings. Available at: https://www.gov.uk/Government/consultations/the-future-buildings-standard
[31] Zero Carbon Hub (2013) Closing the Gap Between Design and As-Built Performance. Zero Carbon Hub. Available at: http://www.zerocarbonhub.org/sites/default/files/resources/reports/Closing_the_Gap_Between_Design_and_As-Built_Performance-Evidence_Review_Report_0.pdf
[32] South West Energy Hub (2021) Net Zero New Buildings, Evidence and Guidance to Inform Planning Policy. Available at: https://www.swenergyhub.org.uk/wp-content/uploads/2021/12/WoE-net-zero-new-build-policy-evidence-_1.3.pdf
[33] Cornwall Council (2021) Technical Evidence Base for Policy SEC-1 – New Housing. Available at: https://www.swenergyhub.org.uk/wp-content/uploads/2021/09/20200359-Climate-Emergency-DPD-Technical-evidence-base-Rev-G.pdf
[34] Farmer, M. (2016) The Farmer Review of the UK Construction Labour Model. Construction Leadership Council. Available at: https://www.constructionleadershipcouncil.co.uk/wp-content/uploads/2016/10/Farmer-Review.pdf
[35] The Optimist Daily (2020) This is how trees make urban areas cooler. Available at: https://www.optimistdaily.com/2020/07/this-is-how-trees-make-urban-areas-cooler/

[36] NPS (Unknown), Montgomery Primary School. Available at: [h]ttps://www.nps.co.uk/whatwedo/22/projectgallery/35.

[37] ICIBSE Journal (2019) Testing the water – designing the UK's first passivhaus swimming pool. Available at: https://www.cibsejournal.com/technical/testing-the-water-designing-the-uks-first-passivhaus-swimming-pool/

[38] Plymouth Energy Community (2020) About PEC Homes. Available at: https://plymouthenergycommunity.com/about/about-pec-homes

[39] Devon County Council (2020) New streetlighting contract will reduce carbon emissions. Available at: https://www.devon.gov.uk/news/new-streetlight-contract-will-reduce-carbon-emissions/

[40] Plymouth City Council (Unknown) Street Lights. Available at: https://www.plymouth.gov.uk/roadsandpavements/streetlights

[41] Torbay Council (2021) Improving lighting in Torbay's parks, promenades and car parks. Available at: https://www.torbay.gov.uk/news/pr8488/

[42] Highways England (2021) Net-Zero Highways: Our 2030, 2040, 2050 Plan. Available at: https://nationalhighways.co.uk/netzerohighways/

SECTION 10.

TRANSPORT

- Reducing the need to travel
- Shifting to sustainable transport options
- Using technology to reduce emissions from vehicles

10.1 INTRODUCTION

Transport accounts for 30% of Devon's greenhouse gas (GHG) emissions. The overwhelming majority of these (98%) is from road transport. The remaining 2% is from rail. The sector is the second-largest emitter of GHG in the County and the UK behind buildings.[1]

Devon's aviation and shipping emissions are not included in the transport footprint due to the incomplete nature of the emissions data and high levels of uncertainty. Estimates of emissions for flights departing from Exeter Airport would add 9% to Devon's transport emissions (3% of total emissions). Estimated emissions from fishing vessels would add 1% to Devon's transport emissions (0.3% of total emissions).[1]

Reducing emissions from our transport needs is key to reaching net-zero. Addressing this challenge will require a combination of changing our behaviour, legislation and technology. Our personal travel, as opposed to goods, accounts for around two-thirds of all transport emissions. Transforming how we travel provides the opportunity to create wider benefits for our health, safety, finances and enjoyment of public space.

This section describes what needs to happen to achieve a net-zero transport system in Devon based mainly on the Climate Change Committee's Further Ambition Scenario. It subsequently introduces a set of goals which need to be achieved to overcome issues that the Net-Zero Task Force has learned from the Thematic Hearings and the Public Call for Evidence are barriers to achieving net-zero. Actions are proposed to achieve the goals.

10.2 THE CHANGE NEEDED

We need to implement the following hierarchy of actions to reduce GHG emissions from transport:[2]

1. **Reduce the need to travel.** Avoiding the need to travel is the most effective way to minimise GHG emissions.

2. **Shift to sustainable transport options.** These themselves have a hierarchy of active travel (e.g. walking and cycling), followed by public and shared vehicles, and then taxi.

3. **Use technology to reduce emissions from vehicles.** Even once high levels of modal shift have been achieved, there will still be a need for motorised transport. Private vehicles will remain part of ensuring we can travel around Devon, and commercial vehicles will also remain a necessity.

These are described in more detail below.

10.2.1 Reduce the need to travel

Where available we should choose to use local amenities and services and support them so that they remain part of our communities. We can also make use of the internet to work flexibly to avoid regular commuting, and to access digital services.

We must also plan our settlements so that they provide and sustain local employment, amenities and services. Creating thriving and more self-reliant rural communities through mixed-use development is important to address the causes of travel to create '20-minute neighbourhoods'. This is discussed further in Section 6 – Cross Cutting Themes and Issues.

10.2.2 Shift to sustainable transport options

If we just substituted existing vehicles with electric and hydrogen alternatives and maintained our current behaviours, we would miss a once-in-a-generational opportunity to achieve the health and wellbeing benefits and transformational changes to our town and city centres that an increased use of active and public transport could bring. By making it easier and more attractive for everybody to use sustainable transport we will we be more active, which will help address the obesity crisis, and air quality will be improved, helping reduce rates of respiratory and cardiovascular disease.[3]

The Committee on Climate Change (CCC) expects 5% of car journeys by distance to shift to walking and cycling by 2035 and 10% by 2050.[4] The UK government has set a target of half of all journeys in towns and cities will be cycled or walked by 2030.[5] This will be challenging, particularly due to Devon's dispersed geography of market and coastal towns and rural villages meaning there is

often a need to visit larger settlements to access services. Further consideration will be needed on how best to deliver active travel opportunities, improved public transport and shared mobility facilities for our rural communities. Affordability of public transport is still a public concern and low concentrations of passengers in rural areas pose viability challenges. There is a further role for the planning system to ensure settlements are designed to make sustainable travel the most attractive option.

10.2.3 Use technology to reduce emissions from vehicles

Smaller vehicles are likely to become electric. Whilst electric vehicles (EVs) may seem like the 'silver bullet', there are environmental and resource issues, therefore they are positioned at the bottom of the hierarchy. Firstly, the electricity used to charge the vehicles needs to be from renewable sources of energy. Moving our transport energy requirement from fossil fuels to electricity, alongside electrifying heating in our buildings, is estimated to increase Devon's 2018 electricity consumption by about two and a half times. If this demand was generated solely in Devon, we will need to install approximately eight times more renewable electricity generating capacity than is currently available.[6]

Secondly, large quantities of rare-earth minerals will be required to manufacture batteries and indeed renewable electricity technologies. Concerns have been raised about the future availability of these minerals and the ecological cost of mining them.[7]

Reducing emissions from larger vehicles, including trains, ships and planes, poses distinct challenges in comparison to smaller vehicles due to their power requirements being so much greater. Electrification of larger vehicles is likely to require an extensive and dependable network of extremely-fast charging facilities or overhead cables, as routinely used by electric trains and previously by various UK cities to operate trolleybuses up until the 1970s.

Whilst alternative solutions exist, the technology is less advanced and it's not expected that opportunities for rapid decarbonisation for some of these vehicles will be available before 2030. Technologies likely to be used are biomethane, synthetic fuels, hydrogen and ammonia.

Synthetic fuel is a generic term for any manufactured liquid fuel that is not derived from crude oil but has the same properties as fossil fuels.[8] Whilst fossil fuels are formed over millions of years underground from organic matter that is turned into coal, natural gas, or oil, synthetic fuels are produced by mimicking these natural processes using renewable resources. They can be manufactured from biomass, electricity or direct solar energy. These fuels can be distributed through existing infrastructure and can be used in conventional engines[9] Care is needed to ensure their manufacture does not harm the environment, particularly where feedstocks are from crops grown specifically for this purpose, which may have caused the removal of a higher-value habitat such as a forest.

Hydrogen fuel can be produced through electrolysis using renewable electricity (green hydrogen). But predictions suggest that 84% of hydrogen in 2050 will be produced by reforming natural gas into hydrogen and CO_2 (blue hydrogen), which will need to be accompanied by carbon capture and storage tehnology.[30] Ammonia, like hydrogen, can be manufactured through electrolysis,[10] but at the moment is a by-product of the carbon-intensive fertilizer industry.[11]

10.3 GREENHOUSE GAS OUTCOMES

Figure 10.1 shows Devon's transport GHG emissions in the context of Devon's total GHG emissions. Emissions from transport in 2019 were 2.3Mt CO_2e. The Figure also shows the projected reduction trajectory for these to 2050 as a result of the delivery of the CCC's Further Ambition Scenario aided by the actions in this Plan. **Through the activities identified in this Plan, by 2050, the emissions are expected to fall to 0.45 Mt CO_2e. These will be become net-zero through activities that remove CO_2 from the atmosphere.**

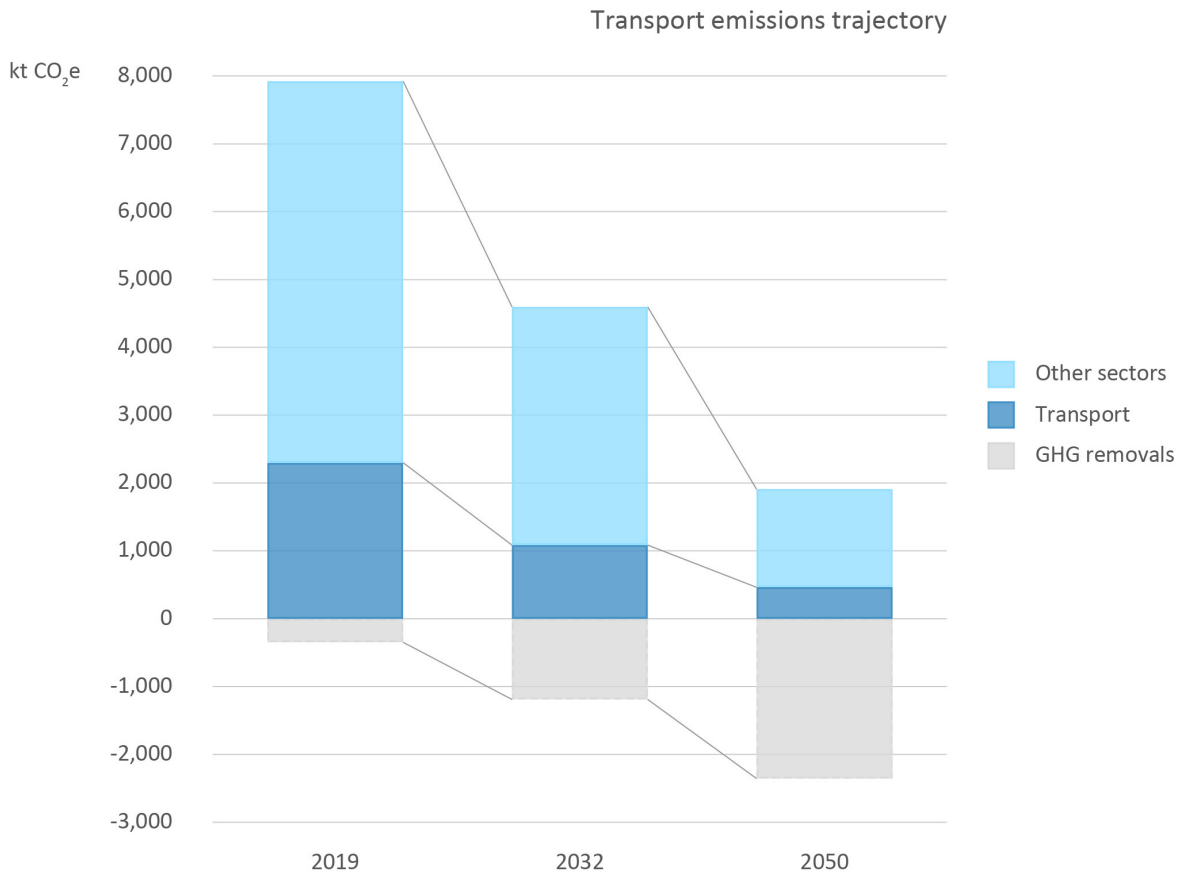


Figure 10.1 - Trajectory for Devon's production emissions, highlighting those from the Transport sector. GHG removals refers to approaches that remove carbon dioxide from the atmosphere.

10.4 OTHER OPPORTUNITIES AND BENEFITS

Improved health:

- An increase in physical activity through more use of active travel could save the NHS £17bn nationally over 20 years due to disease reduction and lead to improved mental health and wellbeing.[12]
- Enhanced air quality from the switch to active travel and EVs can reduce the risk of heart attacks, strokes, asthma and various types of cancer.12 sustainable travel choice.[12]

Levelling-up society:

- Vulnerable and disadvantaged groups are more likely to rely on walking, cycling and public transport, including people with disabilities, lower wage earners, ethnic minorities, women and younger and older people. Improving access to active and sustainable travel will help these groups.[12]
- Transport is a large expenditure for households, particularly those in rural areas, and therefore reducing the need to travel can help to alleviate poverty.

- Relocalising services and providing digital connectivity will help rural communities access the support and services they need, especially those without a car.

Economic prosperity:

- Our reliance on fossil-fuel powered transport imposes significant economic costs and risks on society. These include pollution damage to buildings, ecosystems, agriculture and our health (see above); time lost through traffic congestion; and geopolitical risk of maintaining fossil-fuel supplies.[13]
- Investment in better streets and public spaces for pedestrians can boost footfall and trading by up to 40%.[14]
- Enhancing active travel in Devon could boost walking and cycle tourism.[13]
- Devon's leading aerospace and marine sectors are contributing to the development of zero-carbon technology.

10.5 DEVON'S GOALS TO MEET NET-ZERO

10.5.1 Goal TA – Relocalisation and Technology Reduces Our Need to Travel

Making It Happen

Create thriving communities

The Thematic Hearing on Mobility heard that high car-based mobility has meant that many communities have lost local services. There is potential through an emphasis on relocalisation - development meeting local needs and creating opportunities to live, work and use services locally – to minimise the need to travel, reduce spend on transport requirements and reinvigorate communities. Organisations must consider the distribution and accessibility of their services and the travel and carbon implications for people needing to access them, particularly when planning changes. Public bodies should continue to strive to distribute economic and community redevelopment opportunities, as and when they arise, across Devon.

Enhance communications technology

The Thematic Hearings and Call for Evidence identified the need for enhanced digital connectivity to promote flexible and remote working patterns to reduce our need to travel. The response to the Covid-19 pandemic has accelerated the adoption of flexible working practices, which reduce GHG emissions in most cases.[15]

The Connecting Devon and Somerset Programme has made superfast broadband accessible to over 290,000 homes and businesses in the region. Phase 2 will deliver this to remaining hard to reach premises such as those on Dartmoor and Exmoor. This additional coverage means that 96% of Devon's homes and businesses will have access to superfast-broadband by the end of 2024.[16]

We must enhance broadband access and speed that will enable people to work flexibly and access services remotely.

The Actions

T1. Continue the roll out of the Connecting Devon and Somerset programme.

T2. Continue to provide employment and community assets across Devon in order to minimise the need to travel.

T3. Consider the carbon implications when making changes to community services.

10.5.2 Goal TB - Using Active, Shared and Public Transport is Safe, Efficient and Affordable

Making It Happen

Advice

Residents and visitors can be unsure of the options for travel around the County and often lack confidence walking and cycling due to safety concerns. It must become easier to access information on travel options and how to get started with active travel. Travel Devon and Sustrans are just two of the organisations already contributing to this.

Making Devon more active-travel friendly

Our settlements feel vehicle-dominated and the majority of our communities lack dedicated space for walking and cycling. There are significant benefits to reallocating road space to active travel (supported by 74% of the Devon Climate Assembly)[17] - for example, the benefit-to-cost ratio of investing in cycling and walking schemes is 13:1 due to the public health and congestion benefits, plus cyclists' shopping expenditure is on average greater than visitors by car because they tend to visit the shops more often.[13]

We must be able to walk and cycle safely and conveniently between and within settlements. This will require further improvements to the layout, linkages and maintenance of routes, and this provision must be planned for strategically at community level through Local Cycling and Walking Infrastructure Plans (LCWIPs). These will:[18]

- Provide a network plan for walking and cycling which identifies preferred routes and core zones for further development
- Design a prioritised programme of infrastructure improvements for future investment over the short, medium and long term.

- Ensure that consideration is given to cycling and walking within local and neighbourhood plans and transport policies and strategies.
- Make the case to government for future funding for walking and cycling infrastructure.

Whist Devon's geography of dispersed towns and villages may seem a barrier to improving cycling infrastructure, in rural areas the idea of allocating some single-track lanes as 'quiet ways', that would prioritise active travel, along with electric bicycle schemes, have been popular in our consultations. The appropriateness of these can be considered in the LCWIPs.

Since the publication of the Interim Devon Carbon Plan, LCWIPs are being prepared for Plymouth, Torbay, Barnstaple and Bideford, Heart of Teignbridge and Exeter.

Shared transport

Most cars are only used for a small proportion of the day, with the average car parked for 80% of the time.[19] Sharing vehicles frees-up road space for active and public transport modes. The expansion of car clubs must be supported and carsharing platforms, such as Carshare Devon, and taxis must be promoted as being part of the solution to low carbon travel.

Buses

Bus is the main form of public transport in Devon.[20] Approximately 80% of the local bus network is commercially operated, meaning the passenger numbers provide enough income to cover the costs of running the service. However, geographically the 80/20 proportions are reversed – without financial support, almost 80% of the County would be wholly or substantially without a bus service. To illustrate this, the extent of bus subsidisation by Devon County Council is shown in

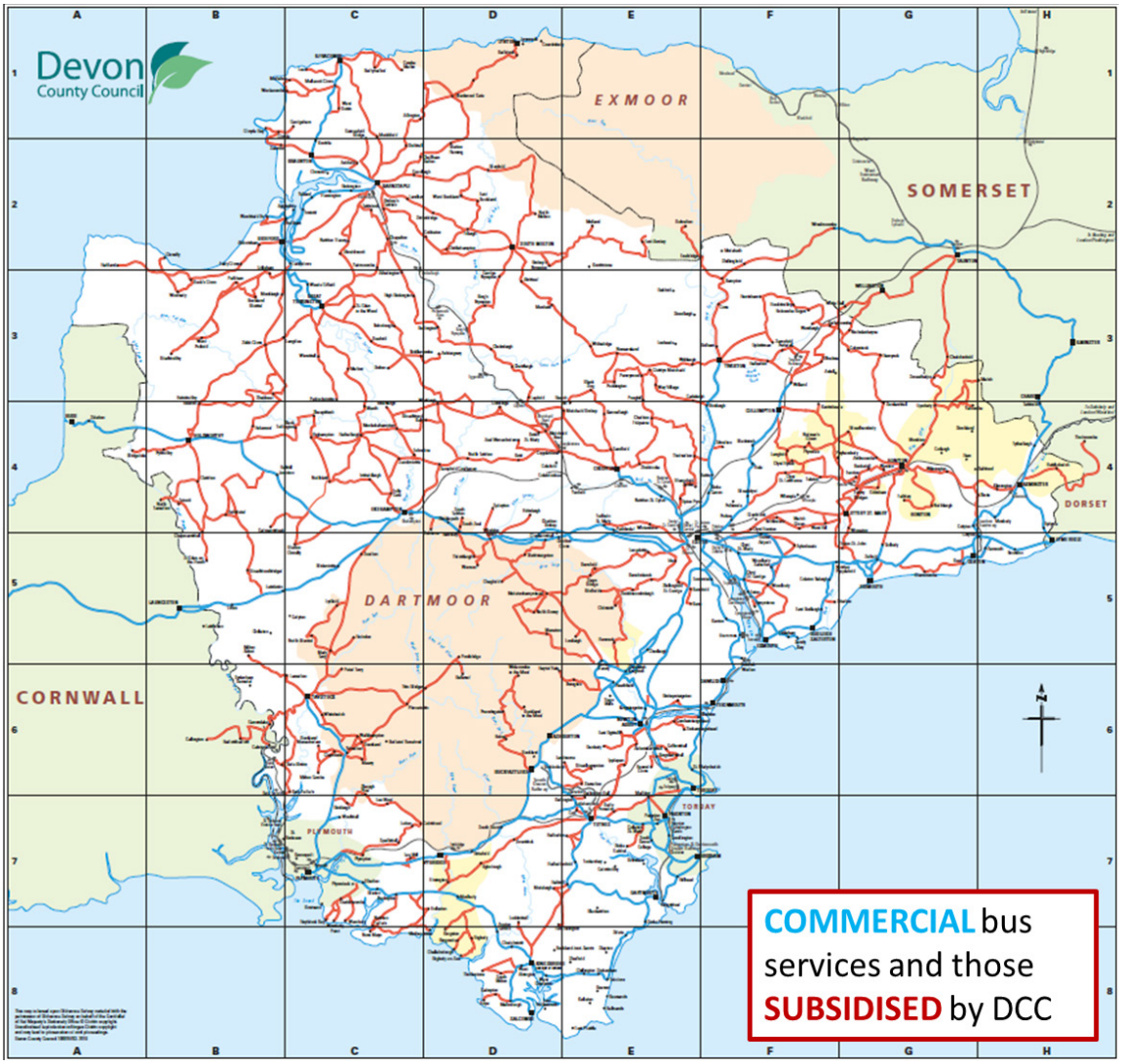


Figure 10.2 - Support provided to bus services in Devon by Devon County Council.

Through the National Bus Strategy for England, the government aims to increase the importance of local bus services by making them more frequent, more reliable, easier to understand and use, better co-ordinated and cheaper.[21] Lower fares are important to help provide equal opportunities to mobility for everyone.

Since the publication of the Devon Carbon Plan, the three transport authorities in Devon have published Bus Service Improvement Plans (links to Plymouth City Council's, Torbay Council's and Devon County Council's) in partnership with local bus operators. These reflect the National Bus Strategy and set out ambitions, plans and policies to improve bus services to achieve increased patronage.

It is vital that the existing level of service is maintained and opportunities for additional funding are seized to provide additional services and increase the frequency of existing routes.

The speed and reliability of services is also a deterrent, particularly during 'rush hours' when additional journey times are built into current timetables to reflect the higher levels of congestion.[20] This situation can be improved by ensuring true bus priority on highways using bus lanes, bus-only streets and signalling.

Innovative models will be needed in rural areas to improve services. These include community-operated and voluntary sector transport, demand responsive transport (where vehicles alter their routes each journey based on particular transport demand without using a fixed route or timetabled journeys) and fare cars (a shared public transport service operated by Private Hire cars. This enables passengers to book and pay separately but share the advertised timetabled journeys). To be most effective, these need to be integrated into the public transport system to ensure they connect with other services.

Trains

Work on improving rail in the region is led by the Strategic Rail Sub Group of Peninsula Transport - a joint initiative by the five county and unitary local authorities in the area (Cornwall, Devon, Plymouth, Somerset and Torbay). It has identified three priorities:[22]

- **A resilient and reliable railway:** Protecting the coastal mainline is a top priority. Greater track capacity between Castle Cary and Exeter and along the Exeter to Waterloo line are also needed. This will facilitate trains being diverted in the event of line blockades on the main line via Taunton, and enable frequency increases serving Honiton and Cranbrook.

- **Reducing journey times and better connectivity** between London, the Midlands and the North. There needs to be infrastructure improvements and an introduction of modern rolling stock to replace the Cross Country Voyager fleet. In addition, there needs to be an increase in frequency of trains to a two-hourly semi-fast service from Paddington to Exeter initially, and then increased to hourly and extended from Exeter to Plymouth.

- **Increasing capacity and comfort** will transform the service for passengers. There needs to be an increase in the frequency of trains and the number of seats must meet forecasted passenger growth. There must be continuous, reliable and quality Wifi and mobile signal allowing users to be productive. Mainline services need to offer high-quality catering and increased luggage capacity.

Enabling more people to access the rail network is also important. New stations have been opened at Newcourt and Cranbrook in 2015. A further new station at Marsh Barton is under construction and a station for Edginswell was granted funding by government's New Stations Fund in 2020. Daily passenger services returned to Okehampton in 2021 after nearly 50 years and plans are being explored through the Restoring Your Railway Fund to re-open Cullompton and Tavistock stations.

Further opportunities must be taken to work with government to reopen and provide new stations and infrastructure as demand for sustainable travel options grows.

The Actions:

Travel Advice

T4. Provide up-to-date information and advice about reducing the need to travel and the most sustainable travel choices.

T5. Implement car-free days in Devon's urban areas.

Walking and Cycling

T6. Develop Local Cycling and Walking Infrastructure Plans.

T7. Provide more cycle confidence and maintenance training.

T8. Support community bike rental schemes.

T9. Where possible, design pavements and junctions to prioritise pedestrians and cyclists.

T10. Introduce reduced speed limits where appropriate.

T11. Reallocate road capacity to sustainable modes.

T12. Local Plans to ensure new developments are designed with filtered permeability to promote sustainable travel.

T13. Reduce the space available for parking where appropriate.

Shared and Public Transport

T14. Support car clubs.

T15. Promote car-sharing technology to link drivers with passengers.

T16. Support innovative transport solutions in rural areas, including long-term options for community and voluntary sector transport.

T17. Enhance bus priority measures.

T18. Protect and enhance funding for local bus routes, to ensure people can access services, employment and events without requiring a car.

T19. Explore opportunities to set fares to support equal opportunities to access mobility for all.

Needing Action Beyond Devon

T20. Encourage national government to remove VAT from cycles and e-cycles.

T21. Work with government to improve strategic and branch-line rail infrastructure and services, including reviewing the reopening of lines.

T22. Take advantage of opportunities arising from the National Bus Strategy to deliver long-term, sustained improvements in bus services.

Case Study

Travel and Covid-19

During March to May 2020, significant increases in active travel were observed. Cycle flows increased more than 25% across Devon and by 50% at leisure orientated sites in Exeter when compared to 2019. These increases were largely sustained through June and July, despite the relaxation of 'lockdown rules'.

In an attempt to maintain this trend and speed up progress in delivering strategic cycle routes in Exeter, Devon County Council used money made available through the Department for Transport's Emergency Active Travel Fund to deliver several temporary improvements. These included modal filters (which closed roads to car/van traffic, but remained open to pedestrians, cyclists and buses), widened footways, and helped establish quieter and safer corridors along cycle routes. In addition, pedestrianisation schemes, parking suspensions and new cycle parking were delivered in several locations across the County.

Following public consultation and the announcement of a second instalment of funding, work has continued to refine and build upon these improvements.

Measures that received a negative response will be removed, and other temporary measures will be made permanent or trialled for an extended period, allowing further consultation and monitoring.

10.5.3 Goal TC - Alternatives to Private Car Use Are Available Alongside Measures to Make Car-Use Less Attractive

A majority of the Devon Climate Assembly (74%) supported reducing traffic emissions by making car use less attractive, while maintaining mobility. Furthermore, 90% of the Assembly said that significant progress should be made on the provision of active and public transport infrastructure before proposals to discourage car use are introduced.[17] However, this will be difficult to achieve. This is because new funding is required to put the active and public transport measures in place and many of the opportunities to discourage car use offer an opportunity to raise these funds. Therefore, measures to make car-use less attractive will be delivered alongside the alternatives.

Making It Happen

The Assembly (68%) suggested using a Tourist Levy – a common charge abroad paid by tourists - to raise funds to deliver sustainable transport initiatives. Any use of such charges will need careful consultation with the tourism sector and analysis of its likely effectiveness.

Under half of the Assembly said that parking charges (46%) and workplace parking levies (45%) – charges paid by businesses for each employee parking space they provide - should be used. Parking charges are already used to encourage active and public transport in Devon, with the money raised from on-street parking being ring-fenced by law for investment in further transport projects. This will continue. Whilst workplace parking levies were not favoured, employers should continue to be supported to encourage their employees to reduce car use, such as by promoting the existing Travel Devon Toolkit more widely.

Congestion charging (where drivers pay a fee to enter a congestion zone) and low emission zones (that restrict access to the most polluting vehicles) – received higher support (62%). Assembly members were concerned about how these could be implemented fairly across Devon in ways that would not disadvantage people living in rural areas who had a greater reliance on private cars for mobility. Many members also suggested that the focus for generating funds should be from tourist users rather than locals who, they believed, already supported significant infrastructure for visitors.

The Actions:

T23. Investigate the concept and mechanisms of a Tourist Levy, including careful consideration of its impact on local businesses.

T24. Review the potential for congestion charges and low emission zones in appropriate areas across Devon on a place-by-place basis, giving consideration to local impacts and likely effectiveness.

T25. Use car park pricing to balance the needs of vehicle access to rural and urban areas with those of reducing car use.

T26. Employers to be encouraged and supported to make commuting by active, shared and public transport more attractive.

10.5.4 Goal TD - It is Easy to Transition Between Different Types of Travel and Transport

Cycling and walking is not feasible for all journeys, but can be made more viable when combined with public transport. The limited capacity of public transport to take bikes and the need to book a bike space ahead of a journey deter uptake, as does the lack of secure cycle storage at interchanges. The Thematic Hearing on Mobility heard that these multi-modal journeys are further frustrated by the need for multiple tickets, the risk of delays in one part of the journey making cheaper 'advance' tickets risky, or the need to allow extra time, leading to a longer

Making It Happen

Multi-modal journeys can be made easier and more seamless through greater collaboration between transport providers and local authorities to offer integrated ticketing across travel modes, better coordination of timetables and ensuring that space is given for mobility hubs in new development. Mobility hubs offer easy interchange, such as co-located bus and train terminals, taxi ranks and shared EV and bike facilities, with good pedestrian access. This is already found at some of Devon's train stations such as at Exeter St. David's and Exeter Central.

Strategically-placed car parks on the edge of towns and cities could encourage car sharing or switching to active or public transport before entering town and city centres, reducing congestion within urban centres.

The Actions:

T27. Greater provision of cycle parking across Devon and at key interchange locations.

T28. Local Plans to require mobility hubs for new developments of appropriate size.

T29. Make it easier to take cycles on trains.

T30. Introduce integrated ticketing.

T31. Modernise and create car parks at strategic points to encourage car sharing and onward journeys by active travel or public transport.

10.5.5 Goal TE - Electric Vehicles Become Commonplace

For smaller cars, vans and boats electrification is the front-running technology. Larger vehicles pose distinct challenges and are considered separately at Section 10.5.8.

The UK Electric Vehicle Infrastructure Strategy expects to end the sale of petrol and diesel cars by 2030, and that all new cars and vans will be zero emission at the tailpipe from 2035.[23] Whilst sales of electric and hybrid cars (collectively known as ultra-low emission vehicles) have overtaken those of diesel-powered vehicles,[24] this still represents just 0.5% of cars and vans licensed in Devon.[25]

Making It Happen

Range

Already some models of electric car can do more than 300 miles on a single charge. The development of electric boats is further behind than cars and vans, yet Devon is pioneering the development of electric propulsion in small, commercial vessels,[27] which includes the electrification of the Mount Batten Ferry.[28] Small, electric, outboard motors have been used by anglers on inland waterways for many years and models that can compete with larger petrol alternatives are now coming to market[29] The range depends upon the type of vessel they are fitted to.

Range anxiety can be reduced by ensuring charging infrastructure is in place and 92% of the Devon Climate Assembly support this happening.[17] The CCC estimate that 3,880 publicly-accessible chargers (22kW – 350kW) will be required in Devon by 2050 for cars and vans.[30] A charging network for boats is required along Devon's coasts to enable leisure and commercial craft not to have to return to the home-port to recharge. This would support residents and the wider economy, including tourism, to make the switch.

Cost

The CCC estimate that electric cars and vans will become cost-effective compared to petrol and diesel vehicles by 2030 and will be cheaper to run.[30] In the meantime there is an opportunity for DCE partners to aggregate procurement of vehicles. This could reduce the cost of vehicles and charging infrastructure and would stimulate local markets and supply chains through providing volume.

The development of publicly-accessible charging networks for cars and vans is unlikely to be commercially viable in rural areas where demand is currently low and therefore subsidy support will be needed. The 3,880 publicly-accessible chargers will cost £5.4m per annum from now to 2050.[30]

Western Power Distribution (WPD) state that the existing electricity distribution network is likely to have the capacity to support charging of EVs at expected deployment rates with just minor local upgrades. Domestic chargers with 3kW capacity can be simply connected. It is estimated that around 239,000 households in Devon in 2050 would have this type of "slow" charger.[30] From 2022, new homes, workplaces and supermarkets with parking spaces will have an electric vehicle charger installed as standard.[30]

Strategy

EV Charging Strategies are required to coordinate the deployment of charging infrastructure. These strategies could be prepared for each local authority geography or at the Devon level. If the former, the strategies must integrate with each other. They would consider:

- The needs of different EV users.
- The variety of charging requirements and the appropriate speed of charger for each type of location.
- The potential for employers to encourage staff to purchase EVs through provision of workplace charging and other incentives such as dedicated parking spaces and salary sacrifice schemes.

Regulation

Local authorities with responsibility for taxi licensing can accelerate the introduction of electric cars into taxi fleets by mandating ultra-low emissions vehicles, or by offering incentives such as licence fee discounts or extending their age limits.[32] Exeter City Council, for example, already requires non-accessible Hackney Carriages to meet this requirement.[33]

The Actions:

T32. Develop EV Charging Strategies to deploy the right chargers in the right place

T33. DCE partners to use their assets to provide publicly-accessible EV charging and shared mobility infrastructure.

T34. Provide electric charging infrastructure in harbours and marinas.

T35. DCE partners and organisations in the County to transition their fleets to Ultra Low Emission Vehicles.

T36. Accelerate the switch to Ultra Low Emission Vehicle taxis by placing requirements and incentives within the licensing process.

10.5.6 Goal TF - Flying is Reduced and Devon is Contributing to Low Carbon Aviation

UK aviation emissions have more than doubled since 1990, with 80% of journeys being for leisure.[34] Tackling flying is particularly important as emissions at high altitude cause additional warming effects on the climate.

Making It Happen

Devon's powers to act

Reductions in aviation emissions require national and international legislation, as well as individual behaviour change. Devon's local authorities have limited powers to influence the agenda locally and there is a risk that attempting to constrain aviation in Devon without national action would lead to carbon leakage - i.e. residents would travel to use airports elsewhere which could increase total emissions.

Pathways to low carbon aviation

Currently there are no commercially-available zero-carbon planes.[35] Long lifetimes of aircraft and the challenges in developing and deploying new technologies make decarbonising aviation by 2050 difficult. It will require action on engine and aircraft technology, airspace management and operations, sustainable fuels and demand reduction.[34]

Electrification is most suited for short-haul flights. The use of hydrogen and synthetic fuels are being developed by Airbus and Boeing for medium and long-haul travel.[36]

The CCC Further Ambition scenario expects residual aviation emissions to be offset by GHG removal. Devon has great potential to deliver natural GHG removal through habitat enhancement and creation, and land use changes. However, offsets will also be needed for other sectors and will be in competition with other uses for land. Therefore, offsetting aviation emissions may require utilising currently-underdeveloped forms of carbon capture and storage technologies.

Devon is well placed to support the acceleration of technology to enable zero-carbon aviation given its existing aerospace expertise and skills base,[37] demonstrated by the trial of a hybrid flight between Exeter and Newquay.[38] Partners can raise awareness of the carbon impacts of aviation so that people can make the appropriate choice for their circumstances.

The Actions:

T4. *Provide up-to-date information and advice about reducing the need to travel and the most sustainable travel choices.*

T37. Seize opportunities to trial low-carbon aviation.

10.5.7 Goal TG - Freight Distribution is More Efficient

Making It Happen

Reduce mileage of freight

There are opportunities for logistics improvements for freight which could reduce heavy goods vehicle (HGV) mileage by 10% nationally.[34] Opportunities include optimally-locating distribution centres and new collaborations between companies to promote co-loading. These require new ways of businesses working together and in some cases subsidies to make them cost effective.[35] Facilitating collaboration between hauliers and supporting them with the required infrastructure will be important.

Modal shift of freight

Within urban areas freight can be distributed from consolidation centres using more sustainable modes, such as electric cargo bikes. Local partners can facilitate trials of such approaches.

Rail is currently the lowest-carbon form of transport for long-distance freight[35] as one freight train can remove up to 76 trucks from the road,[39] but infrastructure availability limits its scope locally. Grants are available from government to support the moving of freight from road to rail but grants are no longer available for capital costs for infrastructure.[40] Devon can collaborate with regional and national bodies to work with government for greater support for rail freight. In the meantime, there is a danger that in the absence of demand Devon loses rail infrastructure, such as rail-side warehousing, that will be valuable in the future. The needs of future rail freight should be considered in spatial planning strategies.

Canals and waterways are unlikely regain their historical importance for freight movement, but may have an increased role to play in specific circumstances e.g. for construction freight.

The Actions:

T38. Support the provision of electric cargo bikes.

T39. Transport authorities and hauliers to collaborate to identify opportunities to reduce emissions.

T40. Local Plans to safeguard existing rail-freight infrastructure.

Needing Action Beyond Devon

T41. Work with government to improve and promote rail-freight grants to incentivise modal shift and provide funding for new infrastructure.

10.5.8 Goal TH - Larger Vehicles have Transitioned to Low Carbon Technologies

Individual needs of larger vehicles such as heavy goods vehicles (HGVs), buses, trains, ships and agricultural machinery will lend themselves to different future technologies.

All HGV sales will need to be low-emission varieties from 2040. For small-rigid HGVs electrification is likely to be the appropriate technology, though for larger-rigid
and articulated HGVs hydrogen will be an option, as will synthetic fuels. The cost for the UK to provide hydrogen refuelling infrastructure is between £3 -- £16 billion.[30]

Low emission buses will make up 80% of sales by 2050. Like HGVs, electrification, hydrogen and synthetic fuels are likely options. With electric buses, operation and scheduling become more difficult since they have less route flexibility. Furthermore, the limited battery range and the potential need for top-up charging on routes can create a need for extra buses, and hence increased costs, which will need national government support.[41] It will be important to match the right fuel with the operational requirements of the network. Hydrogen buses store large quantities of energy, which can make them well-suited to longer routes.[42]

The government has challenged the rail industry to remove diesel-only powered passenger trains by 2040. The Rail Industry Decarbonisation Taskforce believes this is possible and reports that all diesel powered passenger trains can be removed by 2050. They favour battery, electric and hydrogen technologies. Each has different technical capabilities which mean that not all are suitable for all types of rail services. In Devon, the mainlines and the Paignton branch line are expected to be electrified. Trains on the Gunnislake branch line are tipped to be battery powered, whilst the Barnstaple and Exmouth lines are forecast for hydrogen propulsion. Timescales for these initial proposals have yet to be developed. A solution for the Okehampton line, only recently fully reopened, has not been suggested. Freight trains are predicted to make use of electrified lines for most of their journey and use a battery shunting locomotive for the first and last miles of their journey along lines that are not electrified.[39]

Shipping needs a solution to provide power for weeks at a time but still leave plenty of room for cargo. Ammonia is the favoured technology because, unlike hydrogen, it doesn't have to be stored in high-pressure tanks and provides ten-times the energy density of a lithium battery.[11] Commercial
port facilities e.g. at Plymouth, Brixham, Teignmouth and Appledore, would need to provide fuel storage.

Agricultural machinery has a less certain technology path. Electrification could be problematic

Making It Happen

The transition of larger-vehicle fleets to new technologies can be accelerated through collaborative approaches to trials and demonstrations. These can lower the risks for partners through shared learning, supporting local research (for which Devon is already a leader for marine technology) and the possibility of reduced costs.

The Actions:

T42. Trial low-carbon propulsion for large vehicles and transition fleets to these new technologies.

Needing action beyond Devon

T43. Through the Peninsula Sub-National Body, work with government to pilot and implement low-carbon solutions for trains.

Case Study

Griffiths, Devon County Council's contractor on the North Devon Link Road, has run one of the country's first trials with a synthetic fuel, called hydrotreated vegetable oil (HVO), in its diesel construction vehicles. HVO is a "green diesel" made from waste vegetable fats and hydrogen – it produces up to 90% less CO_2 than regular diesel and can reduce emissions of particulate matter and nitrogen oxide by 44% and 11% respectively[44] – both contributors to poor air quality.

Griffiths Project Manager Hedley Martin said: "The experience has been extremely positive for everyone involved, knowing we are doing our bit to reduce the emissions makes us feel very

proud. We were also impressed with the Health and Safety benefits that the fuel delivered. Our onsite Plant Operatives have experienced a more pleasant working environment with better air quality since the machines have been operating on HVO fuel."

The company aims to roll out the fuel to 50% of its sites by the end of 2022 and to the remainder by end of March 2023.

10.6 SUMMARY OF THE ACTIONS

Figures 10.3 and 10.4 show the reference number and text of each of the Transport actions in this Plan. The anticipated start and duration of each action is shown on the right hand side of the diagram.

The actions with their duration highlighted in red in Figures 10.3 and 10.4 have been identified as a priority through two processes. Firstly, some of the actions have been selected by the Net Zero Task Force based on an assessment of their potential to contribute to significant emissions reductions and the likelihood they can be implemented. Secondly, some actions were highlighted as being important by the respondents to the public consultation.

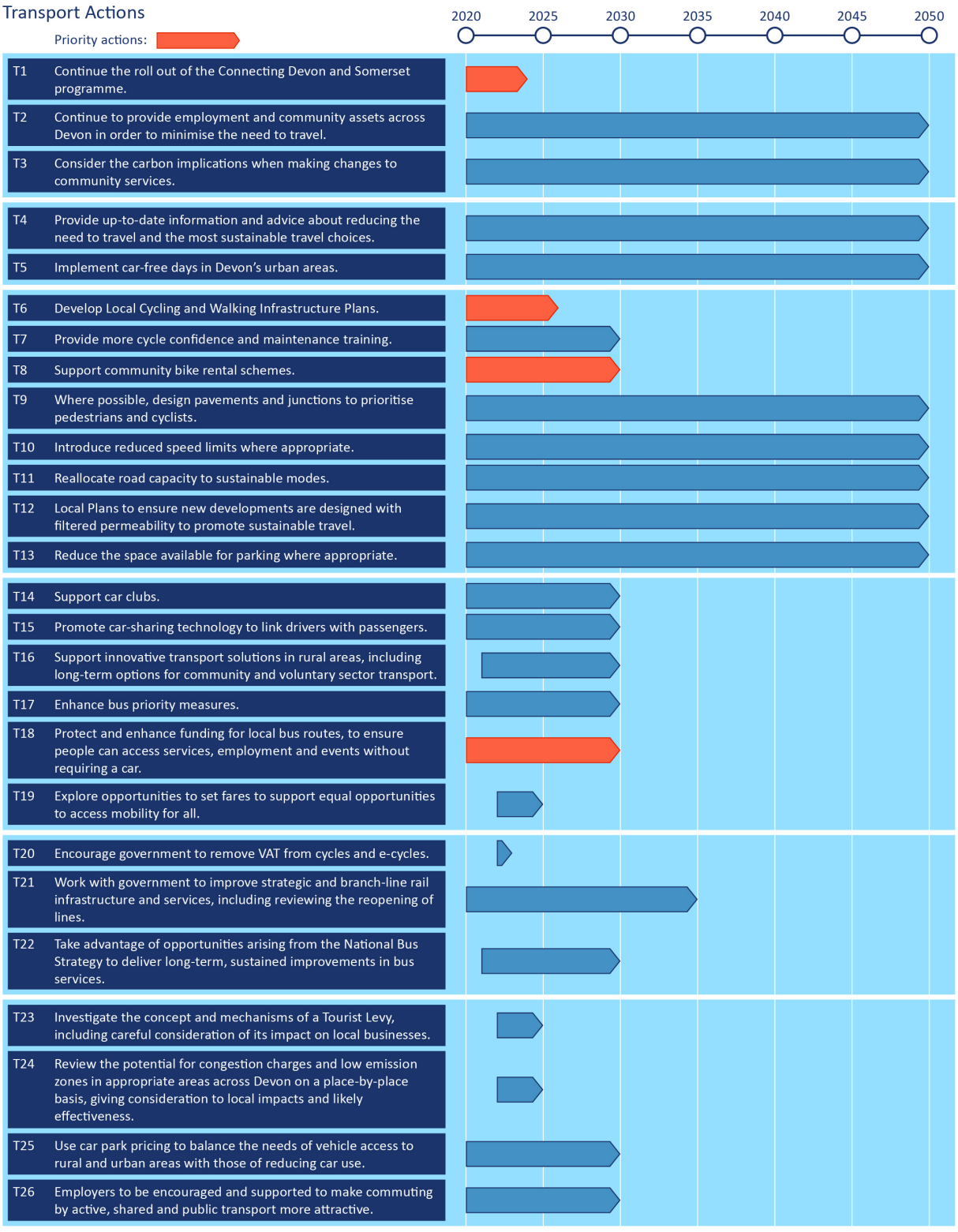


Figure 10.3 - This diagram shows the anticipated start and duration of the Transport actions and the priority actions.

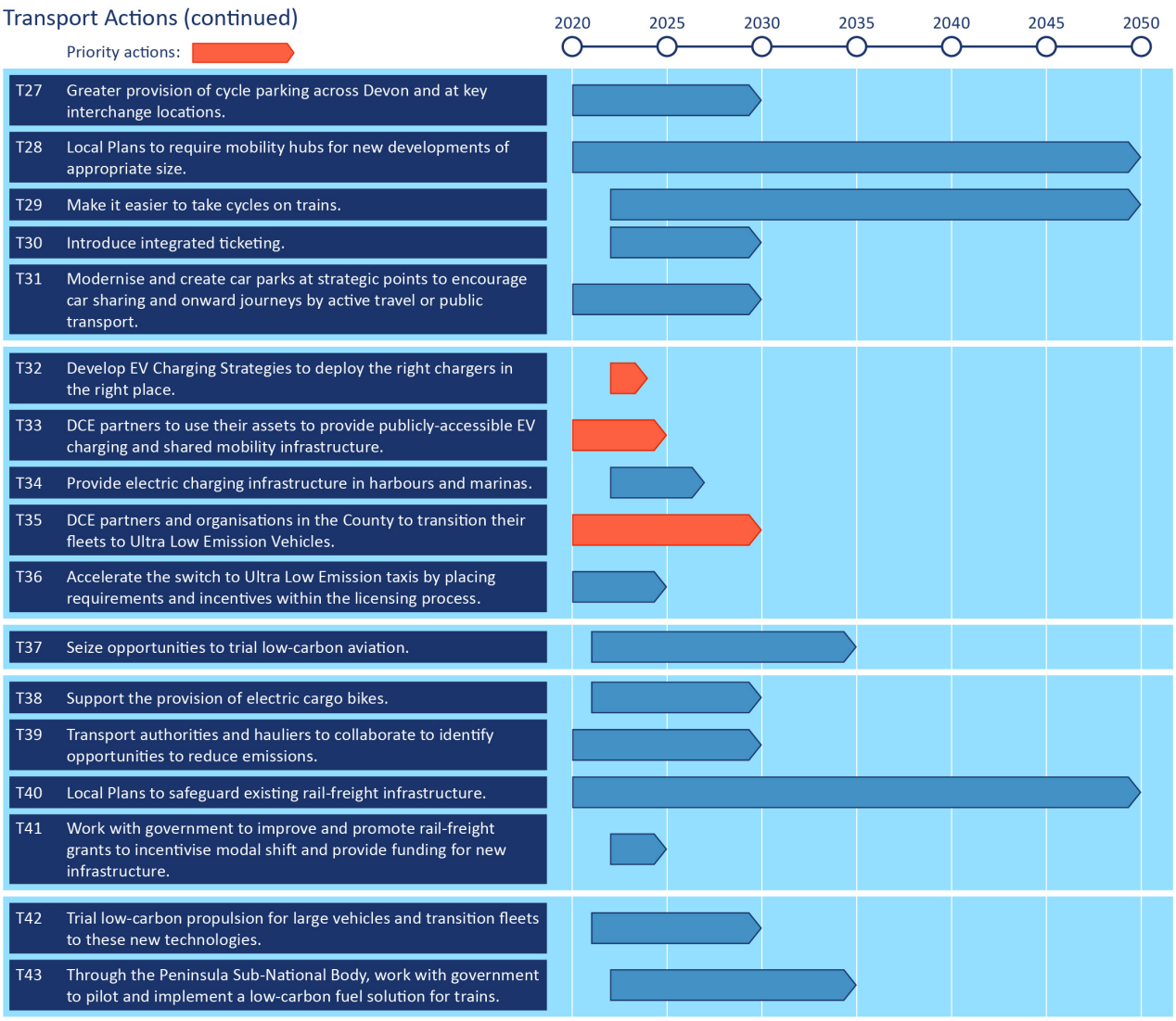


Figure 10.4 - (continued from Figure 10.3) This diagram shows the anticipated start and duration of the Transport actions and the priority actions.

For more detail, including who can help to deliver these actions, see the full action table.

10.7 MILESTONES

Delivering the actions in this section of the Plan will help to achieve the milestones in Figure 10.5 below. These milestones reflect the Climate Change Committee's Further Ambition Scenario.

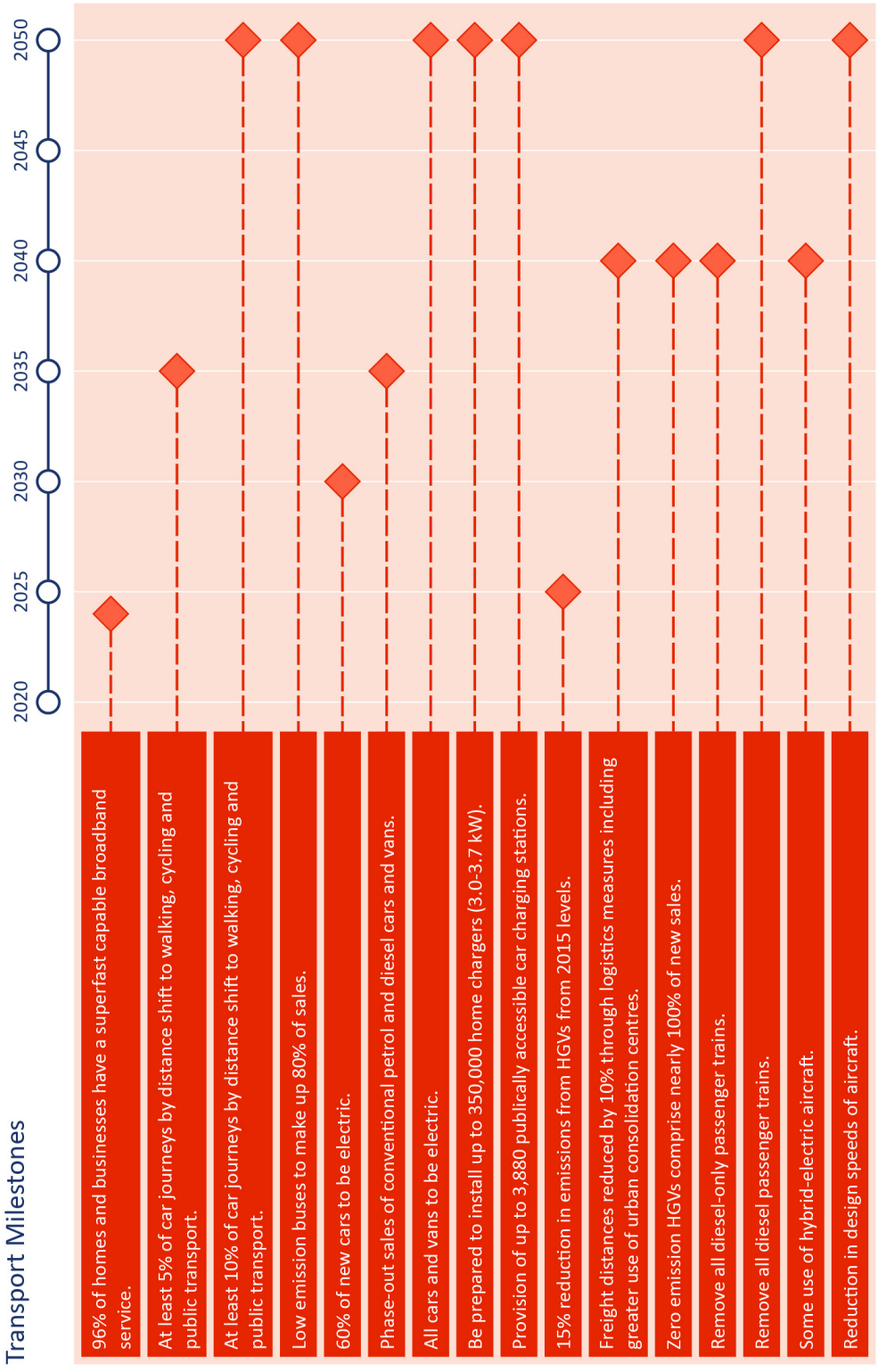


Figure 10.5 – This diagram shows the milestones which the actions in this section of the plan will help achieve.

10.8 REFERENCES

[1] Mitchell A. et al. (2020) Greenhouse Gas Emissions Report – Devon, Plymouth, Torbay 2019. Centre for Energy and Environment, University of Exeter. Available at: https://www.devonclimateemergency.org.uk/studies-and-data/devons-carbon-footprint/

[2] Banister (2008) The sustainable mobility paradigm, Transport Policy, 15 (2), pp. 73-80. Available at: https:/doi org/10.1016/j.tranpol.2007.10.005

[3] Devon County Council (2020) Planetary and Human Health: Public Health Annual Report 2019-20. Available at:https://www.devonhealthandwellbeing.org.uk/aphr/2019-20/

[4] Climate Change Committee (2019) Net-zero: The UK's contribution to stopping global warming Available at: https://www.theccc.org.uk/publication/net-zero-the-uks-contribution-to-stopping-global-warming/

[5] Department for Transport (2021) Decarbonising Transport – A Better, Greener Britain. Available at: https:// www.gov.uk/government/publications/transport-decarbonisation-plan

[6] Calculated by Devon County Council's Environment Group

[7] Capellan-Pereza, I. et al. (2019) Dynamic Energy Return on Energy Investment (EROI) and material requirements in scenarios of global transition to renewable energies, Energy Strategy Reviews, 26, 100399. Available at: https://doi.org/10.1016/j.esr.2019.100399

[8] Cleveland, C. and Morris, C. (2015) Dictionary of Energy (Second Edition). Elsevier.

[9] Synhelion (Unknown) Synthetic Fuels Explained. Available at: https://synhelion.com/news/synthetic-fuels explained

[10] Blain, L. (2021) Green ammonia electrolysis breakthrough could finally kill Haber-Bosch. New Atlas. Available at: https://newatlas.com/energy/green-ammonia-phosphonium-production/

[11] Gallucci, M. (2021) Why the shipping industry is betting on ammonia. IEEE Spectrum. Available at: https:// spectrum.ieee.org/why-the-shipping-industry-is-betting-big-on-ammonia

[12] Jennings, N. et al. (2019) Co-benefits of climate change mitigation in the UK: What issues are the UK public concerned about and how can action on climate change help to address them?, Grantham Institute Briefing Paper, 31, Grantham Institute, Imperial College, London. Available at: https://www.imperial.ac.uk/media/ imperial-college/grantham-institute/public/publications/briefing-papers/Co-benefits-of-climate-change-mitigation-in-the-UK.pdf

[13] Cycling UK (2016) Cycling and the Economy, Available at: https://www.cyclinguk.org/campaigning/views-and-briefings/cycling-and-economy

[14] Living Streets (2018) The Pedestrian Pound: The Business Case for Better Streets and Places. Available at: https://www.livingstreets.org.uk/media/3890/pedestrian-pound-2018.pdf

[15] Lash, D. (2021) Assessing the Greenhouse Gases Emissions of Home Working versus Commuting to an Office, Centre for Energy and Environment, University of Exeter. Available at: https://www.devonclimateemergency. org.uk/studies-and-data/greenhouse-gas-emissions-of-home-working-vs-office-working/

[16] Connecting Devon and Somerset (Unknown) Digital Infrastructure – Chronology and Narrative. Available at:https://democracy.devon.gov.uk/documents/s38423/Digital%20Infrastructure%20-%20CDS%20Chronology%20and%20Narrative.pdf

[17] Scott, K. and Ward, D. (2021) Devon Climate Assembly - "How should Devon meet the big challenges of climate change?". Available at: https://www.devonclimateemergency.org.uk/devon-climate-assembly/ devon-climate-assembly-report/

[18] Department for Transport (2017) Local Cycling and Walking Infrastructure - Technical Guidance for Local Authorities. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachm ent_data/file/908535/cycling-walking-infrastructure-technical-guidance-document.pdf
[19] RAC Foundation (2012) Spaced out: perspectives on parking policy. Available at: http://www.racfoundation.org/research/mobility/spaced-out-perspectives-on-parking
[20] Devon County Council (2021) Devon County Council Bus Service Improvement Plan. Available at: https://www.traveldevon.info/bus/bsip/
[21] Department for Transport (2021) Bus Back Better: The National Bus Strategy for England. Available at: https:/ www.gov.uk/government/publications/bus-back-better
[22] Peninsula Transport (Unknown) Rail Priorities. Available at: https://www.peninsulatransport.org.uk/rail-priorities/
[23] Department for Transport (2022) UK Electric Vehicle Infrastructure Strategy. Available at: https://www.gov.uk/government/publications/uk-electric-vehicle-infrastructure-strategy
[24] BBC News (2021) Electric vehicle sales outpace diesel again. Available at: https://www.bbc.co.uk/news/business-58100474
[25] Department for Transport (2020) Vehicle Licensing Statistics. Available at: https://www.gov.uk/government/collections/vehicles-statistics
[26] Wilkinson, L. (2022) The longest range electric cars of 2022. Car Magazine. Available at: https://www.carmagazine.co.uk/electric/longest-range-electric-cars-ev/
[27] Williams, A. (2020) UK's first sea-going electric ferry launches in Plymouth. University of Plymouth. Available at: https://www.plymouth.ac.uk/news/uks-first-sea-going-electric-ferry-launches-in-plymouth Technical Guidance for Local Authorities. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/908535/cycling-walking-infrastructure-technical-guidance-document.pdf
[28] Mount Batten Ferry (2021) Mount Batten Ferry Service Goes Electric. Available at: https://www.mountbattenferry.co.uk/mountbatten-ferry-service-goes-electric/
[29] Motorboat &; Yachting (2021) E-Motion 180: World's most powerful electric outboard takes aim at petrol rivals. Available at: https://www.mby.com/gear/e-motion-180-most-powerful-electric-outboard-117155
[30] Lash, D. et al. (2020) Net Zero Devon, Plymouth and Torbay. Centre for Energy and the Environment, University of Exeter. Available at: https://www.devonclimateemergency.org.uk/wp-content/uploads/2021/11/DPT-net-zero-report-v1-140820.pdf
[31] Race, M. (2021) New homes in England to have electric car chargers by law. BBC News. Available at: https://www.bbc.co.uk/news/business-59369715
[32] Local Government Association (2021) Electric Vehicle Taxi transition. Available at: https://www.local.gov.uk/case-studies/electric-vehicle-taxi-transition
[33] Exeter City Council (2020) Vehicle applications and renewals. Available at: https://exeter.gov.uk/licensing/taxis-and-private-hire/vehicle-applications-and-renewals/
[34] Committee on Climate Change (2019) Net Zero Technical Report. Available at: https://www.theccc.org.uk/publication/net-zero-technical-report/
[35] Allwood, J. M. et al. (2019). Absolute Zero. Available at: https://doi.org/10.17863/CAM.46075
[36] Engineering and Technology (2021) Airbus to continue burning traditional jet fuel until at least 2050, Available at: https://eandt.theiet.org/content/articles/2021/06/airbus-to-keep-burning-jet-fuel-until-at-least-2050/
[37] Think UK South West (2018) Europe's Aerospace Powerhouse. Available at:https://heartofswlep.co.uk/wp-content/uploads/2018/11/European-Aerospace-Powerhouse.pdf

[38] Mills, F. (2021) England's first demo flight of a hybrid electric plane flies from Exeter to Newquay. Devon Live. Available at: https://www.devonlive.com/news/englands-first-demo-flight-hybrid-5828039

[39] Network Rail (2020) Traction Decarbonisation Network Strategy. Interim Programme Business Case Available at: https://www.networkrail.co.uk/wp-content/uploads/2020/09/Traction-Decarbonisation-Network-Strategy-Interim-Programme-Business-Case.pdf

[40] Rail Delivery Group (2021) Rail Freight: Building a Stronger, Greener Future for Britain. Available at: https://www.raildeliverygroup.com/media-centre-docman/12827-2021-07-rail-freight-future-for-britain/file.html

[41] Aldenius, M. (2022) Electric buses in England and Sweden – Overcoming barriers to introduction. Transportation Research Part D: Transport and Environment, 104. Available at: https://doi.org/10.1016/j.trd.2022.103204

[42] Mayor of London (2021) Mayor launches England's first hydrogen double decker buses. Available at: https://www.london.gov.uk/press-releases/mayoral/englands-first-hydrogen-double-deckers-launched

[43] Farmers Weekly (2021) JCB's hydrogen-fuelled combustion engine examined. Available at: https://www.fwi.co.uk/machinery/technology/jcbs-hydrogen-fuelled- combustion-engine-examined

[44] Lakanen, L. et al. (2021) Applying the handprint approach to assess the air pollutant reduction potential of paraffinic renewable diesel fuel in the car fleet of the city of Helsinki. Journal of Cleaner Production. 290. Available at: https://doi.org/10.1016/j.jclepro.2021.125786

SECTION 11.

FOOD, LAND AND SEA

- Developing demand for nutritious and sustainably-produced food.
- Reducing greenhouse gas emissions and improving carbon storage from farming.
- Maximising carbon storage in the environment.

11.1 INTRODUCTION

Devon is mostly rural with two coastlines and up to 92% of land used for farming in some local authority areas[1] So how Devon balances concerns for food production, and security, and the need for its land and seas to store more carbon and do more for wildlife, is a crucial element of our response to the climate and ecological emergency.

The Agriculture, Forestry and Other Land Use (AFOLU) category of Devon's greenhouse gas (GHG) emissions is different from others because methane (CH4) and nitrous oxide (N_2O) are the main emissions rather than carbon dioxide (CO_2). Nitrous oxide emissions largely come from the application of manure and other organic fertilisers as well as chemical fertiliser to land, whilst methane is mainly produced by the digestion of food by cattle and sheep.

Emissions from AFOLU accounted for 17% of Devon's GHG emissions in 2019.[2] This category is both a source of emissions and provides opportunities for their removal by increasing the amount of carbon stored in the environment[3] and by reducing methane emissions (see Box 1). For example, Dartmoor's peat soils store an estimated 10 million tonnes of carbon - equivalent to an entire year of CO_2 emissions from UK industry.[4]

The AFOLU emissions for Devon do account for the contribution made by land habitats in removing CO_2 from the atmosphere (-347,422 tCO_2 in 2019) but do not account fully for emissions from peatland. Improvements to estimates of peatland emissions will be included in the 2020 data release. The role of marine habitats is not included as data are not yet available.

In addition to AFOLU emissions, the fossil fuels used in the agriculture, forestry and fishing sectors for machinery and processes contribute 4% of Devon's total emissions, bringing the total for the sector to 21%. Solutions to reducing these emissions are described in the Energy Supply and Transport sections of this Plan.

This section describes what needs to happen to reduce net AFOLU emissions from food, land and sea based on the Climate Change Committee's (CCC's) Further Ambition Scenario27 (which

does account for the additional emissions from peatlands not currently included in Devon's emissions inventory). It introduces goals which will overcome the barriers to achieving net-zero in Devon identified during the Thematic Hearings and the Public Call for Evidence, followed by the actions proposed to achieve the goals.

Box 1 – Short-Lived Greenhouse Gases

The amount of energy each greenhouse gas (GHG) traps in the atmosphere varies. The effect of a GHG on global warming is known as its global warming potential relative to 1 unit of carbon dioxide over 100 years (known as GWP_{100}). The United Nations Framework Convention on Climate Change uses GWP_{100} to analyse the warming effect of different GHGs on a comparable basis – referred to as 'carbon dioxide equivalent' (abbreviated as CO_2e). The GWP100 of methane and nitrous oxide are 27 and 273 respectively. It is on this basis that Devon's GHG emissions have been compiled and this Plan prepared.

However, each GHG stays in the atmosphere for different lengths of time, which is not accounted for by the GWP_{100}.[5] Carbon dioxide lasts thousands of years, methane persists for a decade and nitrous oxide is around for about 100 years.[6] This means that GWP_{100} exaggerates the effect of short-lived GHGs on Earth's temperature because they do not accumulate in the atmosphere over this time scale like longer-lived GHGs.[5]

A recently-proposed alternative is termed GWP*. This still uses a 100-year timescale but it effectively spreads the emissions of short-lived GHGs evenly over the 100-years. Yet this method receives criticism for understating the warming effect of short-lived GHGs.[7] This is the subject of ongoing research.

This uncertainty is not a reason to ignore methane emissions. Reducing methane emissions now will be effective in reducing peak temperatures and delaying the time at which warming thresholds are crossed.[8] To achieve temperature targets and for temperatures to subsequently decline it is important that shorter-lived GHGs and carbon dioxide are addressed together.[9]

11.2 THE CHANGE NEEDED

Three main changes are needed to reduce the GHG emissions from food, land and sea. Devon's farming and fisheries businesses are at the core of delivering the solutions:

1. **Develop demand for nutritious and sustainably-produced food.** We need to increase our engagement with food and its production; eat less red meat and dairy; and use our spending power to support local farmers, fisheries and horticulture that demonstrate best practice.

2. **Reduce GHG emissions and improve carbon storage from farming.** Farm machinery needs to use renewable fuels; emissions from manures, wastes and fertilisers must reduce; and food production needs to transition towards practices that improve the amount of carbon in soils.

3. **Maximise carbon storage in the environment.** The extent and condition of existing habitats and ecosystems that store carbon need to be protected, enhance and restored. New, joined-up habitats must be created on land, in estuaries and at sea.

These are described in more detail below.

Throughout this Section, learning is taken from the Ruby Country Net-Zero Beef Farming Forum. In Spring 2021, it brought together 24 people involved in beef farming in northwest Devon to discuss how Ruby Country beef farming can best transition to net-zero GHG emissions by (or

11.2.1 Develop Demand for Nutritious and Sustainably-Produced Food

The CCC's Further Ambition scenario recommends we each eat at least 20% less red meat and dairy than we were in 2017. This would allow changes in land use to benefit nature without increasing reliance on imports.[10] It would also improve health - the average person in industrialised countries eats almost three times as much meat as is considered healthy (Figure 11.1).[11]

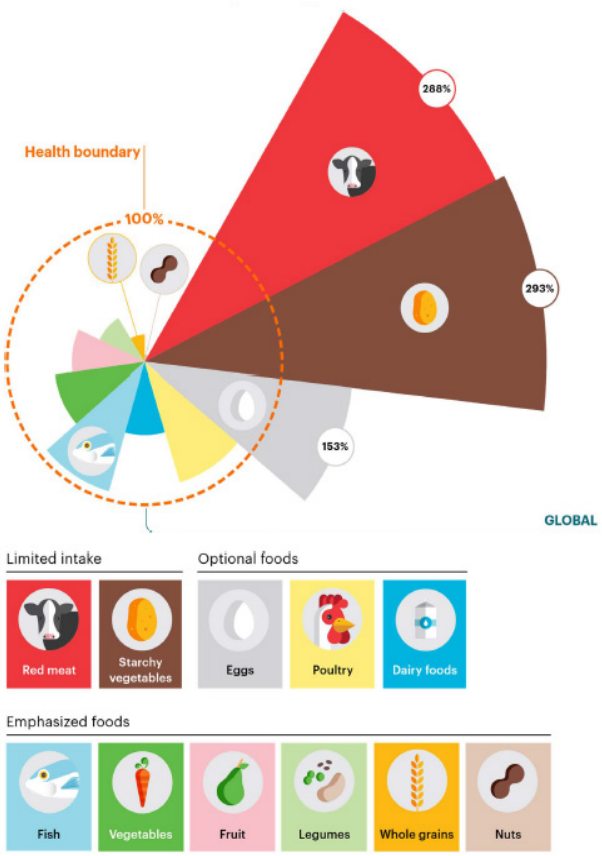


Figure 11.1 - The "diet gap" in industrialised countries between current dietary patterns and recommended intakes of food in the planetary health diet. For example, people in industrialised countries eat 293% of the recommended healthy-level of starchy vegetable intake (almost three times more). Credit: The EAT Foundation. Reproduced with permission.[11]

The CCC anticipates that by 2050 these dietary changes will result in a 10% reduction in cattle and sheep numbers in the UK and contribute to a 42% decrease in grassland area across England as a whole between 2017 and 2050 to make way for trees, peatland restoration and bioenergy crops.[10]

Livestock farming is a significant part of Devon's economy, landscape and heritage.

The Thematic Hearings and the Public Call for Evidence highlighted the divergent views within the County on the topic of diet – there was resistance to reduced numbers of livestock from producers and consumers, as well as support for reduced meat and dairy diets. It was noted that some wildlife habitats depend on low intensity grazing. Yet these changes are already happening: On average, we are each eating 36% less red meat now than in 2008. This has been partly offset by an increase in white meat consumption, whilst the amount of fish eaten in diets has remained steady. Overall, personal meat consumption has reduced by 17%.[12] Over the same period, consumption of milk has fallen 11% and the amount of non-dairy alternatives consumed has doubled.[13]

Raising people's awareness about how they can use their grocery budget for maximum benefit to their health, the climate and local food producers must be a priority.

11.2.2 Reduce GHG Emissions and Improve Carbon Storage from Farming

The NFU has set the national goal of reaching net-zero GHG emissions across the whole of agriculture in England and Wales by 2040.[14] There are already excellent examples of best practice being trialled and integrated into land-businesses' everyday activities.[34]

Soil Carbon

Soils are the second largest carbon store on the planet behind the oceans[15] but soil carbon stocks have been declining rapidly over the past 200 years due to agricultural practices that have declined soil health (primarily ploughing and the use of inorganic fertilisers).[16]

There is an opportunity to increase the amount of CO_2 sequestered (removed) from the atmosphere and stored as carbon in soils by helping farmers and land managers change their practices.

Practices that enhance and maintain soil carbon include:[17]

- **Regenerative practices.** These include techniques that rotate crops with livestock grazing;[18] reduce tilling and ploughing; and planting cover crops after the main crop has been harvested.
- **Agroforestry.** This incorporates varieties of trees, hedges and shrubs into cropland and grazing land and avoids monocultures.

- **Pasture-based livestock farming (permanent and leys).** Animals raised solely on grass reduce tillage by removing the need to grow supplementary feedstuffs, and the manures and plant roots enable soil health to improve.

In addition to the practices above, there is evidence that organic farming can enhance and maintain soil carbon.[19]

Due to improved soil health, these practices increase the amount of certain vitamins, minerals and phytochemicals in crops and levels of omega-3 fats in meats – which are beneficial to reducing risk of a variety of chronic health conditions including heart disease, cancer and arthritis.[20]

Caution will be needed by policy makers when incentivising regenerative techniques to make sure the carbon storage is additional throughout the global agricultural system. For example, whilst regenerative practices add carbon to the soil, they will generally cause a decline in yield. This could cause a forest to be cleared to grow crops to replace the lost production.[21] The National Food Strategy is optimistic that a combination of 'sustainable intensification' on some farms (enabled through emerging technology) and land-sharing approaches on other farms, through which farmers deliberately share their land with nature, can minimise this risk.[31]

Nitrogen fertiliser

When applied to land, nitrogen fertilizer is taken up by soil microbes which results in N2O being emitted to the atmosphere. Loss of N2O from arable soils accounts for around 1.5% of GHG emissions globally. Also, the manufacture of artificial nitrogen fertiliser is carbon intensive, and so its use should be minimised. Careful application of fertiliser to ensure dosing is appropriate for the location and season by using technology, such as GPS-guided machinery, can reduce these emissions by up to 50%. High fuel prices and the Russian invasion of Ukraine have increased the cost of fertilizer,[22] meaning that farm businesses are having to scrutinise more than ever the value being obtained from these artificial fertilizers.

Yet large reductions in nitrogen fertiliser application will reduce crop yields which can lead to more intensive farming practices elsewhere, increasing GHG emissions, to make-up for the reduced productivity.[23] Agroforestry, making use of nitrogen-fixing species, can increase nitrogen availability naturally,[24] and could therefore be part of the solution whereappropriate. The continued but prudent use of fertilisers seems to be the best approach currently for the global environment, if this can be sustained economically.

Farm machinery

Net-zero will require the almost complete decarbonisation of on-farm machinery through switching away from diesel towards hydrogen, electricity, robotics and biomethane.[26] Sharing of machinery between farmers to minimise the amount of new equipment required will reduce embodied energy and contribute to achieving net-zero; for example machinery to enable direct drilling of seed, a method which can reduce the need for ploughing and the associated loss of soil carbon.

Agricultural Wastes

Agricultural wastes and manures can be processed through anaerobic digestion (AD) to produce biomethane, which in turn can be used to generate electricity or power vehicles. This is a carbon-negative fuel, meaning its production avoids GHG emissions in comparison to how these wastes would traditionally be treated.[25] Furthermore, AD produces a liquid digestate. This can be used as a fertiliser to avoid the need for manufactured alternatives that are carbon-intensive in their production. But as in the application of all fertilisers, digestate must be applied carefully to avoid runoff into watercourses, which is a pollution issue in parts of Devon.

11.2.3 Maximise Carbon Storage in the Environment

The CCC Further Ambition scenario uses trees, hedges and peatlands to illustrate the extent of carbon storage required to achieve net-zero by 2050. The scenario requires UK average woodland cover to increase from 13% now to 17% by 2050, hedgerow length to be increased in the UK by 40% and for 55% of peatlands to be restored.[26] The current woodland area in Devon is 12%[27] (79,000 ha) which means an annual planting rate of 818 ha per year[27] is required if no other habitats are used to increase carbon storage. Bringing undermanaged woodlands into positive management offers a further opportunity to enhance carbon storage,[28] as does letting existing trees in hedges grow and restoring those lost through modern agricultural practices.

There are many habitats that are effective at sequestering and storing carbon, so in practice it will not just be tree planting and the restoration of upland peatlands that will help meet net-zero. Other habitats in Devon that are effective at storing carbon include: wetland habitats such as reedbeds and valley mires; wet Culm grasslands; salt marshes and mudflats; and marine sea grass meadows and kelp beds.

11.3 GREENHOUSE GAS OUTCOMES

Figure 11.2 shows the GHG emissions arising from AFOLU and the use of fossil fuels by agriculture, forestry and fishing in the context of Devon's total GHG emissions. Gross emissions from AFOLU in 2019 were 1.6Mt CO_2e, and from fossil fuel were 0.26Mt CO_2e. Carbon sequestration was -0.35Mt CO_2e, meaning that net emissions were 1.5Mt CO_2e. The Figure also shows the projected reduction trajectory for these to 2050 as a result of the delivery of the CCC's Further Ambition Scenario aided by the actions in this Plan. **Through the activities identified in this Plan, by 2050, the net-emissions, are expected to fall to -1.2Mt CO_2e which will be used to offset emissions continuing from the transport, buildings and waste management sectors to achieve net-zero.**

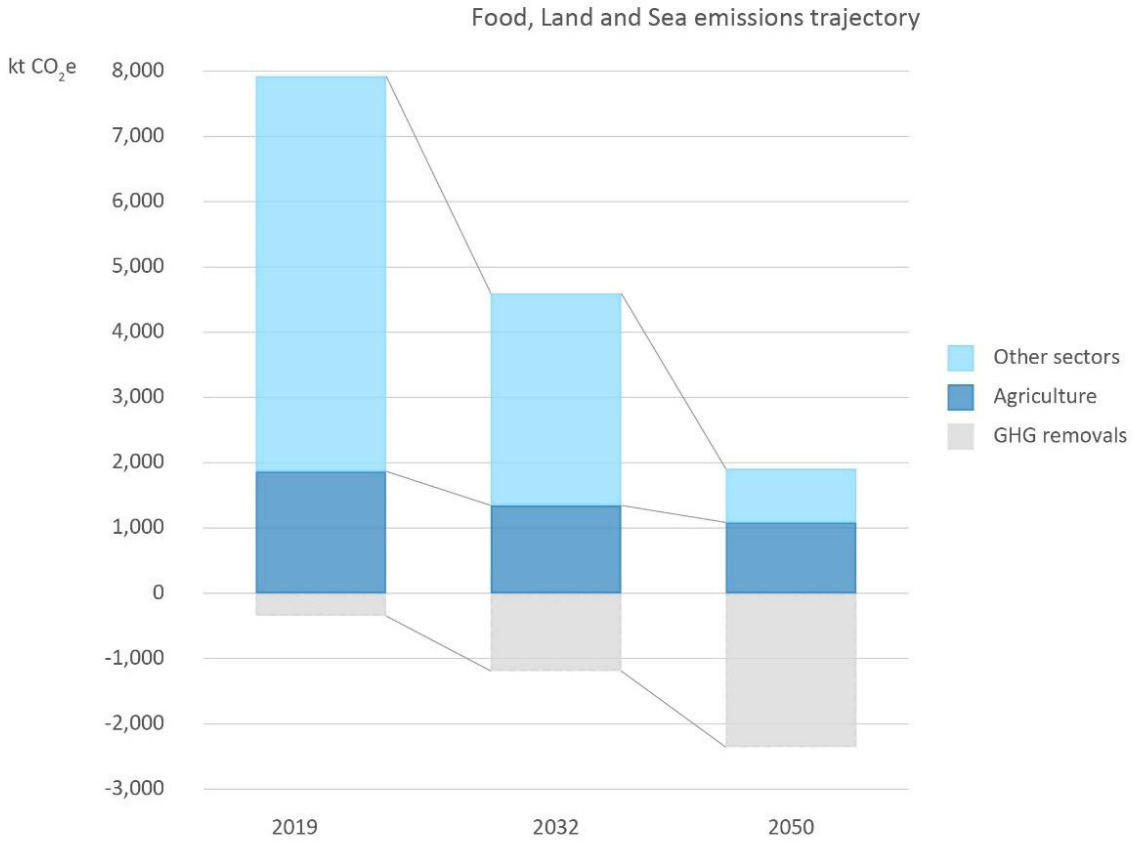


Figure 11.2 - Trajectory for Devon's production emissions, highlighting those from the Agriculture sector. This combines the AFOLU and fossil fuel emissions from agriculture, farming and forestry into a single figure. GHG removals refers to approaches that remove carbon dioxide from the atmosphere.

11.4 OTHER OPPORTUNITIES AND BENEFITS

- Restored and newly-created habitats will help address the ecological crisis on land and in the sea, reducing extinctions of beneficial insects and much-loved familiar species.
- Enhancing Devon's environment will bring benefits for our wellbeing through greater opportunities for contact with nature.
- Tree planting, improving soil carbon and restoring peat bogs, hedges and other habitats will reduce the rate that water moves through landscapes helping reduce flood risk.
- Slowing water down allows the environment to filter it more thoroughly. This improves water quality which eases drinking-water treatment requirements and benefits wildlife in rivers and estuaries, ultimately helping to protect and enhance carbon stored in marine environments and reduce household bills.
- Restored and newly-created habitats provide coastal protection from storms and sea level rise and provide habitat for commercially important fisheries.

- Eating a nutritious and sustainably-produced diet improves health and wellbeing.[11] This in turn would reduce the strain on the National Health Service and Public Health budgets.
- Our increased awareness of how food is produced, where it comes from and the effect of diet on health can create additional jobs in local food supply chains.
- Employment opportunities will appear in growth sectors, such as forestry.
- Devon's landscapes are enriched through appropriately located, expanded, restored and managed network of trees, hedges, woodland and other wildlife habitats, and a more diverse farmed environment.
- Healthy ecosystems contribute to Devon's beauty and appeal, further encouraging eco-tourism and enjoyment of the natural environment.

11.5 DEVON'S GOALS TO MEET NET-ZERO

11.5.1 Goal FA - Everyone Can Choose a Healthy and Sustainable Diet

Healthy food choices are often the better choice for GHG emissions. Following the government's Eatwell Guide, which reduces the animal products we eat and increases consumption of vegetables, fruits, nuts and wholegrains, has a 32% lower environmental footprint in comparison to the typical UK diet.[29]

People need to be helped to become more aware of how their food choices affect their health and the environment.

Making It Happen

Transparency in how food is produced

Clear information about the carbon and nature impact of different food products is needed to enable everyone to make more sustainable choices. It is a complicated picture as the sustainability of food is affected by various factors including land management practices, the use of fertilizers and pesticides, energy requirements, processing within the supply chain, storage needs, transport distances and mode (e.g. a ship or train is much more carbon efficient than a diesel lorry).[30] The National Food Strategy Independent Review (Part 2)[31] recommends to the government that the Food Standards Agency should develop a food labelling system to describe the environmental impacts of food products. Devon should support this recommendation in any future consultation. In the meantime, food producers and retailers should be transparent with their customers about how their food is produced. The Devon Climate Emergency partners can raise awareness about making informed food choices, and they can help farmers tell their stories.

Whilst people's dietary choices impact the carbon intensity of food much more than the 'localness' of the food they buy, local food produced with the environment in mind can have a

People can look for the Made in Devon and Food Drink Devon provenance labels to identify local produce. More local food retailing – through on-street and indoor markets as well as market-garden scale horticulture, like Chagfood – can bring local people and food producers together to create community connections centred around food issues. In this way, local horticulture near towns provides an opportunity to help achieve the 30% increase in consumption of fruit and vegetables necessary to meet the Eatwell Guide's diet.[31] However, land near settlements can be expensive due to its potential development value, meaning securing its use for horticulture can be difficult. Development plans should help improve confidence in negotiations between land owners and potential horticultural businesses by allocating land for horticulture.

There is a risk that replacements to European Union food legislation post Brexit will enable imported food and animal feed, which may be subject to lower environmental standards, to undercut UK producers who are working to higher environmental standards. This could increase the carbon intensity of food consumed in the UK. Yet the government decided in 2021 not to give preferential trade tariffs to food products that demonstrate the minimum standards recommended by the National Food Strategy Independent Review (Part 1).[31] This means it's even more important for us to buy local food of known provenance where possible.

Affordability

Healthier choices under the current food system are often more expensive.[31] The poorest 10% of English households would need to spend close to three-quarters of their disposable income on food to eat the Eatwell Guide diet, compared with only six percent for households in the wealthiest 10%.[32] This highlights the challenge of enabling everyone to achieve healthy and environmentally-friendly diets, particularly given the rising pressures on the cost of living.

Bringing producers together through food hubs that offer shared processing facilities, joint marketing and assisted access to local markets, could lower costs for producers. These could then be passed on to consumers.

'Grow, Cook, Eat' programmes can be offered to engage people with the enjoyment that can be gained from cooking, encourage the uptake of menu planning, and enhance cooking skills with fruit and vegetables to keep costs down. Existing examples in Devon include: Nourishing Families which runs workshops to transform how families experience food and mealtimes; Incredible Edible grows food in public spaces in Ilfracombe, Totnes, Hatherleigh, Crediton and Cranbrook; and Growing Devon Schools helps children develop practical growing skills.

Devon Food Partnership

The Devon Food Partnership, created following a recommendation of the Interim Devon Carbon Plan, is well placed to coordinate the activities required to increase people's awareness of – and improve their access to - healthy and sustainably-produced food. It can also aid collaboration between local and national level policy makers to inform the development of new food and agricultural policy.

The Actions:

F1. Support the Devon Food Partnership.

F1.1. Create local food retail areas.

F1.2. Bring local producers together in food hubs to enable joint processing, marketing and access to local markets.

F1.3. Promote a healthy and sustainably-produced diet, following the government's Eatwell Guide.

F1.4. Provide Grow, Cook, Eat programmes to reconnect people with the origin and seasonality of food and develop cooking skills.

F2. Development plans to allocate land for horticulture near to settlements where suitable.

Needing action beyond Devon:

F3. Show support to government for the introduction of a food labelling system to highlight its environmental impact.

F4. Encourage central government to give preferential trade tariffs to food products that demonstrate food standards equivalent to UK.

11.5.2 Goal FB - Organisations are Serving Local, Sustainable and Healthy Food

Organisations, especially 'anchor institutions' (i.e. those that are unlikely to leave an area, such as the NHS, universities, local authorities and schools), can help raise expectations in food provision. They can prioritise environmental enhancement, local sourcing and high nutritional standards in food procurement. In turn, this should reduce supply chain emissions, increase demand for local food and contribute to improved public health outcomes.

Making It Happen

To achieve these outcomes, organisations must commit to providing meals aligned with the Eatwell Guide and set an example for its employees and other organisations. The Food for Life Served Here standard offers a ready-made solution.

Onerous procurement processes create barriers to local producers securing contracts with anchor institutions. Simplifying procurement procedures could enhance market access for the many Small and Medium-Sized Enterprises (SMEs) which form the heart of Devon's food producers.

The South West Food Hub,[33] launched in May 2020, is supporting the region's food network. It is establishing shorter supply chains between producers and public sector organisations to make it easier to serve local, seasonal, fresh produce. It is also helping SMEs to meet purchasers'

The Actions:

F5. Anchor institutions to consider buying local through the South West Food Hub

F6. Organisations to provide meals aligned to the government's Eatwell Guide and incentivise sustainable food-practices through procurement procedures.

11.5.3 Goal FC - Farmers and Land Managers Have Access to Impartial Advice, Demonstrator Projects and Resources for Low-Carbon Agriculture

The Thematic Hearings revealed that although there are advice services available to farmers and land managers to improve food-production profitability, their capacity is limited and often focused on specific issues. Furthermore, most farm advice is not impartial as it is connected to the sale of particular products or services, and the Ruby Country Net-Zero Beef Farming Forum[34] reported that the advice can be contradictory. Examples of good practice are often not well-disseminated, and research is often undertaken on landholdings that don't reflect the smaller-size or practices of Devon's farms. Also there is inadequate support for farmers developing business skills needed to enhance the financial viability and longevity of their businesses and seize emerging opportunities. Some big-name retailers are already asking farming businesses about their knowledge of carbon footprinting as the reporting of this data may become a common contractual requirement, but many farms are still developing this expertise.[34]

Alongside advice and the demonstration of low-carbon agriculture, farmers need financial support and an available workforce to transition their practices.

Making It Happen

Impartial Advice

Acknowledging that the mix of solutions will be different for each farm, this Plan recommends the creation of a one-stop-shop Devon Farm Advice Service. This will use farm advisors with access to the latest information to enable farmers to look at every aspect of the business - rom producing high-quality, nutritious food to using new approaches and technology to reduce GHG

emissions, generate renewable energy (particularly using anaerobic digestion of farm wastes on larger farms) and sequester carbon - to improve environmental outcomes in ways that maintain or increase profitability. The advice provided would consider the objectives of the Land Use Framework and the Nature Recovery Network proposed in Section 11.5.4, and the new funding opportunities described in Section 11.5.5. The service could also coordinate groups of landowners to develop river-catchment scale initiatives that respond to specific or linked environmental problems (Section 11.5.6).

Since publishing the Interim Devon Carbon Plan, a thorough review of the advice currently available to farmers has been completed and the initial structures and pilots to put the Devon Farm Advisory Service in place are underway – see Box 2.

Box 2 - The Future Farm Resilience Programme in Devon[35]

Defra's Future Farm Resilience Programme has been operating in the County for several years and, if the current bids to its third 'Scale-up' phase are successful, it is likely to be the main route for publicly funded advice to farmers from September 2022 to March 2025. The programme has been run in Devon by Devon County Council (contracted to Business Information Point) and by the Prince's Countryside Fund (contracted to the Dartmoor Hill Farm Project and Exmoor Hill Farming Network). Both organisations have submitted bids to the 2022-25 'scale-up' phase.

The programme offers participating farmers an introductory workshop on the agricultural transition and additional options for one-to-one advice and attendance at specialist workshops covering topics that farmers have expressed interest in.

Demonstrators

Devon is home to world-leading agricultural research institutions as well as innovative organisations demonstrating regenerative agriculture, the use of new technology and novel land management projects – such as Rothamsted Research, The Dartington Estate, Devon Environment Foundation and Apricot Centre. Furthermore, Devon County Council's 68 County Farms already expect new tenants to have the foresight to identify and exploit new land-based business opportunities.[36] More must be made of these resources in partnership with County Farm tenants to showcase the actions that are possible.

This offers an opportunity for a Devon Farm Advice Service to be involved in the testing of research and advice and identifying which are the most beneficial approaches. This would allow farmers to keep up-to-date with new and emerging findings that are directly relevant to Devon's farms. This may include running engagement activities on farms to exchange knowledge in a practical setting and establishing peer-learning forums.

Finance

The new Environmental Land Management Schemes and markets for environmental outcomes, such as carbon offsetting, must provide assistance, as discussed in Section 11.5.5. The costs of transitioning to lower-carbon agriculture include expenditure on equipment. Establishing machinery cooperatives that purchase equipment and employ mechanics and operators on behalf of local farms helps reduce costs and provides more stable employment for farm workers.[37] Approaches to sharing equipment should be supported.

Accommodation for Rural Land Workers

Labour shortages are currently a concern for much of Devon's farming sector, as is accommodation in rural areas for those who work on farms. However, there is the potential for increased requirements for labour to implement regenerative practices in coming decades.[38] Some aspects of regenerative farming that do not lend themselves to mechanisation (e.g. hedge laying, harvesting wood, mob grazing practices which require continual adjustments to fencing paddocks).[34] Horticulture and other smaller-scale, regenerative agricultural systems can need more permanent dwellings and accommodation for temporary/seasonal workers, volunteers and trainees, than may be expected in other forms of agriculture.

Rising rural property prices, and homes previously used by rural workers being sold separately from their adjoining land, have meant that the availability of affordable dwellings for rural land workers is already reducing.[39]

National and local planning policy and guidance allow new, permanent dwellings for rural workers if the need can be demonstrated, but not for non-permanent accommodation that responds to the needs of agricultural systems fit to achieve net-zero. Development plans' policies should respond to the distinctive workforce needs of horticulture and other smaller-scale, regenerative agricultural systems. Non-permanent accommodation may be provided by caravans or cabins etc. that are sited year-round but removed once they are no longer needed.

The Actions:

F7. Look to set-up a Devon Farm Advice Service.

F8. Support development of on-farm anaerobic digestion of agricultural wastes.

F9. Support the testing and adoption of low-carbon agricultural practices.

F10. Explore how the County farms estate could be used to demonstrate low-carbon agriculture.

F11. Support the sharing of agricultural machinery.

F12. Development plans to allow for greater scope in the provision of rural land workers' accommodation.

Case Study

Devon and Cornwall Soils Alliance[40]

The DCSA, launched in 2019, is led by the Westcountry Rivers Trust. It is a collection of private, public and third sector organisations and individuals with a shared interest in addressing the perilous state of our soils by building capacity and capability in soils advice.

The initial stage was funded through the European Agricultural Fund for Rural Development (EAFRD), via the Water Environment Grant fund, with the main deliverables including:

- **100+ advisors trained** in soil management.
- **40+ mentors** to share knowledge with others.
- **2 demonstration areas** to showcase techniques to remedy compacted soils.
- **7 feasibility reports** in catchments across Devon and Cornwall to highlight the diversity of soils across the region.
- **10 micro-catchment** Natural Flood Management and Water Framework Directive investigations.

The project has found that in some areas farming practices are not appropriate for the type of soil and so a more fundamental change is needed to deliver improved water and environmental quality. This will require incentives to encourage reduced stocking levels or shifting away from arable cropping.

The alliance will be continued through Westcountry Rivers Trust to support advisors and farmers in improving soil health as well as embed the approach in wider learning and college courses.

11.5.4 Goal FD - The Potential for Land to Address the Climate and Ecological Emergencies is Being Used to Maximum Effect

Land is a limited resource and is under pressure from competing demands such as food production, forestry, housing, infrastructure, water storage and space for wildlife. Decisions about how land is used do not consider all of the competing demands and outcomes needed. This results in land not achieving its maximum potential for the climate, people and nature. For net-zero to be achieved, increasing carbon sequestration and storage needs to be a central objective of the decisions we make about how land is used.

Making It Happen

A Land Use Framework for Devon is required to establish the principles that can coordinate land-use decisions to achieve the best multiple outcomes from land. Such multiple outcomes include food production, carbon storage, habitat creation, energy generation, natural flood management and so on. Its preparation has begun and is involving extensive stakeholder engagement.

For the Land Use Framework to be effective it will need to influence the reviews of existing land-use strategies, such as Local Plans, River-Basin Management Plans and Local Transport Plans, becoming part of the extensive evidence bases compiled by public authorities to guide their plans. It will also need to function in partnership with farmers, land managers and the new Environmental Land Management Schemes to help guide the opportunities they wish to pursue.

The Land Use Framework will be founded on the requirements of nature and informed by a Nature Recovery Network. Responding to the ecological emergency, the 2021 Environment Act requires preparation of a Devon Local Nature Recovery Strategy. This will set out the priorities and actions required to achieve a Devon Nature Recovery Network (NRN) of joined-up habitats on land and at sea that will provide places that wildlife needs to feed, breed, sleep and move from place to place. It will allow the natural world to adapt to change. A NRN map will show Devon's existing habitats and identify opportunities for their enhancement, creation and joining-up. This will identify suitable

The Actions:

F13. Develop a Land Use Framework.

F14. Develop a Local Nature Recovery Strategy and create and implement a Nature Recovery Network.

F15. Design and implement a Trees for Devon initiative.

11.5.5 Goal FE - Mechanisms and Funding are in Place to Protect, Restore and Enhance Nature-Based Carbon Storage

Devon's environment is all owned, often as part of a land-based business. Financial incentives are therefore required to encourage landowners and managers to implement environmental enhancements by making them an attractive investment proposition.

Making It Happen

Environmental Land Management Schemes

The UK is no longer part of the European Union (EU) and farms' access to payments under the EU Common Agricultural Policy (CAP) are being phased out between now and 2027. These are being replaced by the Environmental Land Management Schemes (ELMS) offering payments for delivering different environmental goals.

'Tests and Trials' of ELMS, to be fully launched by 2025, have been underway in Devon.[41] These will inform how this new agricultural payment system can support farmers and land managers to deliver food production alongside carbon storage, other public benefits and the delivery of the NRN.

However, there are concerns that ELMS will not bring as much funding into Devon as the CAP did[42] and that it may not reward existing environmentally-beneficial agricultural practices or provide support appropriate to smaller farms (e.g. for planting small woodlands).[34] We must continue to work closely with central government to ensure the scheme is effective and responds to the needs of Devon's farming communities and wider environment.

Carbon Offsetting

A carbon offset is a measure by an individual or company to compensate for their carbon emissions, usually through a payment for activities which absorb CO_2, such as tree planting. The issues associated with carbon offsetting are complex and are considered further in The Potential Role for Carbon Offsetting in the Devon Carbon Plan.[43] Carbon offsetting mechanisms alone are inadequate for achieving net-zero. They need to be pursued alongside reducing emissions at source, which must be the over-riding priority.

Nonetheless, carbon offsetting will be needed to meet net-zero because some activities will still emit GHGs beyond 2050. Organisations setting earlier targets for net-zero will need to invest in carbon offsetting to compensate for activities that still use fossil fuels beyond the organisation's target date. This may be because zero-carbon technology is underdeveloped or too expensive. These organisations' need for carbon sequestration offers an income stream to land managers and an opportunity to improve the condition of Devon's natural environment.

Purchasers of carbon offsets will need to be confident that their money is storing carbon long-term. Currently, accreditation schemes only exist for two habitat types via the Woodland Carbon Code and the Peatland Code. Similar schemes are needed for other terrestrial, coastal and marine habitats.

Environmental Net-Gain

The National Planning Policy Framework requires new developments to provide 'net gains for biodiversity'[44] by creating or enhancing habitats to leave the environment in a measurably better state than it was beforehand.[45] The Environment Act, which became law in November 2021, mandates the net-gain requirement to be at least 10%. Such investments could deliver far more if they support a landscape-scale approach that contributes strategically to multiple outcomes, including carbon storage. The NRN will help achieve this by identifying areas of Devon that would benefit from investment. Additionally, guidance needs to be prepared to assist developers to understand these new requirements.

Similar net-gain requirements are needed for marine developments, which will require new national legislation. Crucially, coordination is required to ensure marine net-gain initiatives are not implemented in isolation and instead achieve greater outcomes by partnering with other development projects, fisheries management and marine users.[46] Marine net-gain must therefore be integrated with marine planning and natural capital approaches (see Section 11.5.6).

Linking Investors with Providers

Habitat owners need to be aware of the opportunity to receive payments to host biodiversity net-gain and carbon offsetting projects and local investors need to know where to find these

opportunities. An online marketplace is needed to facilitate this trading - the North Devon Biosphere's Natural Capital Marketplace launched in 2022 with this intention and will need support from organisations looking to buy and sell environmental services for it to succeed.

The Actions:

F16. Create Biodiversity Net-Gain Planning Guidance.

F17. Develop an online investment platform to provide a match-making service between providers of environmental services and people wishing to purchase them.

Needing action beyond Devon:

F18. Support the development of carbon storage accreditation schemes for a range of carbon rich terrestrial, coastal and marine habitats.

F19. Work with government to design an effective Environmental Land Management Scheme that will ensure food production alongside carbon storage and other public goods.

F20. Work with government to require marine development to provide environmental net-gain.

Case Study

Devon Silvopasture Network[47]

Launched in 2021, this farmer-led agroforestry project will spend the next twelve years investigating whether the practice of silvopasture is a viable way to address the climate and nature crises while maintaining productive farmland.

The new field lab, involving seven farms in Devon, will be the largest participatory research project to date looking at silvopasture – a practice of integrating trees and livestock. The farmers, who produce beef, sheep, venison and dairy, are expecting the trees to bring a range of benefits to their farming systems by enhancing the natural processes that underpin sustainable food production.

The Woodland Trust have designed a planting system for each farm, and provided funding to cover the planting. The Organic Research Centre is leading on the animal behaviour and health aspects whist Rothamsted will focus on soils and hydrology. They will also host a trial at their North Wyke Farm to understand the three planting designs under a more controlled

environment. The Farming, Wildlife and Advisory Group South West is leading on biodiversity research, including ground vegetation, monitoring of birds, bats, flies and dung beetles. They will monitor and collate the data on the practicalities of managing and establishing the trees.

Research to date suggests that soil health is expected to improve, with increased soil carbon, earthworms and fungi. It is also hoped to improve livestock health and welfare through providing shelter and additional nutrition, diversify farm income by providing extra crops of fruit, nuts and timber and boost the nutritional value of forage.

11.5.6 Goal FF - Devon's Coastal and Marine Habitats Have Been Protected, Restored and Enhanced

Coastal and marine habitats store significant amounts of carbon, termed 'blue carbon' and some of these can store more carbon per square metre than forests.[48] Devon's coastlines have significant areas of seagrass meadows, salt marshes, maerl beds, kelp forests, coastal sand dunes and coastal shelf sediments that all store carbon (Figure 11.3).[49] Marine creatures in these ecosystems also store carbon in their bodies, which sink to the sea floor when they die, with their carbon potentially remaining buried for thousands of years.[50]

The extent of coastal habitats in the UK has declined by 10% since the 1950s due to development for housing, industry, tourism, land reclamation and sea defences. [51] Many that remain are degraded. All of Devon's coastal and estuarine waters are classified as 'moderate' overall-status for water quality under the Water Framework Directive but none are classified as 'good' or 'high'.[52] Protecting coastal and marine habitats and species as part of the net-zero challenge requires water quality to be improved throughout the length of river catchments, not just at the coast. Various factors have combined to cause the degradation of river and marine habitats. The most common are: [53]

- Physical modifications of water bodies, for example flood defences and weirs that change natural flow levels and allow sediments to build up.
- Pollution from rural areas that includes bacterial contamination from animal manure, pesticides and fertilisers, and sedimentation caused by soil erosion from compacted soils from livestock.
- Pollution from waste water and sewage entering waterbodies where sewage treatment technology to remove enough of the harmful chemicals doesn't exist, or where storm overflows release untreated sewage into the environment.

All such pollutants are ultimately carried out into our coastal waters and their habitats.

In addition to the issues caused by pollution, coastal and marine habitats are being over-exploited. Wild fisheries are declining due to unsustainable catch rates and habitat destruction from fishing gear.[51] Development for energy, telecommunications, aggregates, port facilities and recreation are also contributing to harm.[54]

The exact size of the opportunity for Devon's coastal ecosystems to store carbon is significant but has yet to be fully quantified. Further work is needed to understand and to begin valuing these habitats for their full potential.

Mud flats

Mud flats are found in coastal areas, such as estuaries, sheltered from waves. They are covered at high tide and exposed during low tide and become saltmarshes towards land. New sediment is brought in with each tide. As the sediment remains wet, decomposition is slow which allows carbon stores to accumulate.

Devon has approximately 3000 ha of intertidal mud and sand flats.

Saltmarshes

Saltmarshes in some locations have been found to **sequester carbon 35 times faster than tropical rainforests.**

Devon has approximately 550ha of saltmarsh habitat, particularly located in the Tamar and Exe estuaries.

Seagrass

Seagrass beds are sometimes described as the rainforests of the sea. They trap sediment in the water, creating carbon rich 'mattes', that raise the seafloor by approximately 1mm per year. The seagrass and their mattes store between **12-20% of global oceanic carbon.** When seagrass habitats are destroyed or damaged their ability to sequester carbon is reduced and carbon dioxide is released. There has been significant long-term reduction in seagrass extent and quality around the UK and seagrass beds are one of the most rapidly-declining habitats globally.

In Devon, the most extensive seagrass bed is found in Torbay

Maerl beds

Maerl is a purple-pink hard seaweed that forms spiky underwater 'carpets' on the seabed, known as 'maerl beds'. Maerl deposits lime in its cell walls as it grows, creating a hard, brittle skeleton, which is an effective carbon store. These maerl beds are slow growing, fragile and do not recover from damage.

In Devon, maerl beds are found in Lyme Bay and off the coast of Lundy

Sand dunes

A sand dune is a hill beyond the reach of the tides that has formed over many years and is home to a variety of vegetation.

Braunton Burrows is the largest dune system in England at 1 mile wide and nearly 4 miles long

Kelp forests

Kelp is a large seaweed which can form dense underwater forests that **capture 75% of the carbon stored annually in the sea.**

Figure 11.3 - Devon's Blue Carbon.[49]

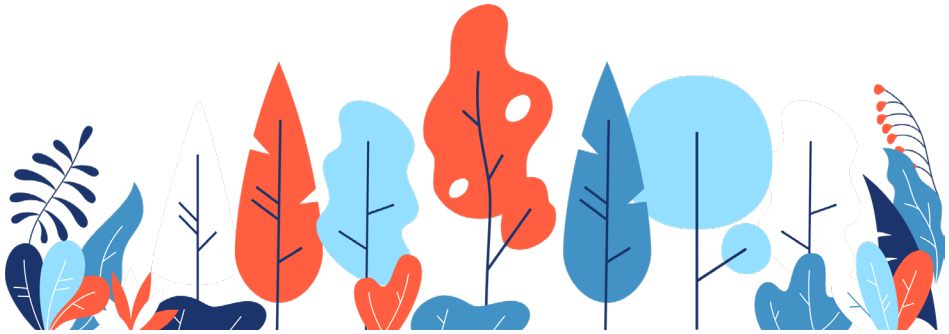
Making It Happen

A Natural Capital Approach

Initially, a better understanding of the extent and condition of marine habitats and species is needed to establish an asset register of marine natural capital. This would be used to track changes in the stock, distribution, health and enhancement opportunities for marine habitats and provide an inventory of the services they provide, such as carbon storage, food, recreation opportunities, coastal defence and jobs. Valuing these ecosystem services will improve the way this natural environment is evaluated against other priorities and will ultimately lead to greater environmental protection.

The effectiveness of the protection and enhancement measures implemented across the County would be demonstrated by changes to natural capital stock and health recorded in subsequent years using the asset register.

North Devon's Marine Natural Capital Plan[55] already takes this approach. A similar approach is required for the south of the County.



The Catchment-Based Approach

As activity within the full extent of river catchments – from the estuary to the inland watershed – can affect the health of marine and coastal habitats, it is vital that projects and management practices are coordinated between all stakeholders to achieve maximum benefit. This whole catchment approach also benefits flood alleviation, water quality, the health of inland ecosystems and their ability to store carbon.

Working with Sea Level Rise

Rising sea levels will reduce the extent of saltmarshes, sand dunes and other carbon rich habitats where they are restricted from moving landward by coastal defences. Further opportunities for habitats to survive and expand by migrating inland need to be explored in the three Shoreline Management Plans covering Devon's coastlines when they are next reviewed. These identify the most appropriate approach to managing coastal flooding and erosion risk for each stretch of coast. This will require the managed retreat of sea defences, where appropriate, to enable coastal habitats to move landward.

Fishing

Large-scale, commercial fisheries can cause significant damage to marine ecosystems through the volume of fish caught, scouring of the seabed by some types of equipment and excessive by-catches (the unintended capture of non-target species).[56]

Initiatives that target multiple issues, such as minimising by-catch (e.g. specifying minimum net mesh sizes), protecting vulnerable ecosystems and managing multiple species are referred to as taking 'an ecosystem approach for fisheries management'.[57] This ethos underpins the approach taken by The Devon and Severn Inshore Fisheries and Conservation Authority (DS IFCA).[58] In its role managing fisheries, it sets and enforces local byelaws that fishermen must adhere to.

The work of the DS IFCA includes the defence of Devon's 19 marine protected areas.[59] In these areas, activities that can damage ecosystems, like fishing, are regulated. Fishing controls can include seasonal restrictions, specific species protection and banning certain fishing practices. This has proven effective at enabling ecosystems and fish populations to recover.[60]

Small-scale fisheries, using smaller boats and traditional methods to target species, are more compatible with the ecosystem approach as they have a lower impact on habitats and fish populations. They also employ additional people per landed-tonne of fish than large-scale fisheries and, because of this, contribute more value to local communities.[61]

There is a need to provide more support to small-scale fisheries and establish further marine protected areas.

Lost and discarded fishing gear can be lethal to marine life and subsequently degrades ecosystems.[62] Furthermore, polyethylene, often used for fishing gear, produces methane and ethylene greenhouse gases as it degrades, and so contributes directly to climate change.[63] Despite laws prohibiting the disposal of fishing gear at sea, measures are needed to reduce intentional discarding. It needs to become easier for fishermen to recycle damaged fishing equipment.[64]

Planning of Marine Development

Decisions about marine development need to enhance the ecosystem services these marine environments provide. The Marine Management Organisation is preparing Marine Plans for all England's marine waters. The Devon Maritime Forum and Devon's estuary partnerships should continue to engage with the preparation of these plans, including ensuring active and open dialogue with local people. Local people's knowledge and views will be vital for the design and implementation of effective plans that ensure new developments do not damage key marine habitats that sequester carbon and give them space to expand.

Education

It is important to achieve a deeper understanding of how our actions, as individuals and organisations, can harm or enhance blue carbon. Efforts must be increased to raise awareness of the link between the climate emergency and the fish we choose to eat, and the chemicals used in gardens, household appliances, bathrooms and kitchens which end up in the marine environment. This must make best use of existing educational assets, such as the National Marine Aquarium, the Wembury Marine Centre, the Torbay Seashore Centre and the new Plymouth Sound National Marine Park.

The Actions:

F21. Devon Maritime Forum and Devon's estuary partnerships to push for the aims and priorities set out in the Devon Carbon Plan to be incorporated within Marine Plans.

F22. Future reviews of Devon's Shoreline Management Plans to enable, where possible, carbon-rich habitats to migrate inland with sea level rise.

F23. Develop and implement a South Devon Marine Natural Capital Plan.

F23.1 Establish and maintain an inventory of marine natural capital.

F23.1 Pilot initiatives which increase blue carbon sequestration.

F23.3 Provide support for smaller fisheries that implement sustainable practices

F23.4 Trial new ecosystem approaches for fisheries management.

F23.5 Improve access to, and incentivise, shoreside disposal of old fishing equipment.

F23.6 Encourage behaviour change by enhancing public awareness of behaviours and activities that damage marine and coastal habitat.

The Actions:

F24. Develop more whole-catchment improvement projects.

Needing action beyond

F23. Develop and implement a South Devon Marine Natural Capital Plan.

F23.7 Work with government to introduce more marine protected areas and provide the resources necessary to protect and monitor them.

F23.8 Work with government for greater monitoring and enforcement of the dumping of fishing gear at sea.

Case Study

Catchment Management in Devon

The South West River Basin Management Plan provides a framework for introducing measures to improve the condition of the water environment in Devon's main catchments. Devon is covered by four of these catchments – Tamar, North Devon, South Devon and East Devon. Each of these has a catchment partnership – groups of organisations with an interest in improving the environment associated with the operational catchments of each main river. The partnerships also cover coastal and marine waters. They help implement measures by:

- providing local evidence
- targeting and coordinating action
- identifying and accessing funding for improvements in the catchment
- incorporating river basin management planning into the wider environmental management of the catchment

The catchment-based approach is being demonstrated by various projects, three of which are:

- South West Water's Upstream Thinking: This recognises that it is more cost effective to help farmers deliver cleaner raw water (water in rivers and streams) than it is to pay for the expensive filtration of polluted water taken from rivers for drinking. Since 2010 the Upstream Thinking project has spent £20m restoring mires and Culm grasslands (that naturally filter water) and on providing pesticide advice and water-quality improvement infrastructure to farmers.[65]
- Connecting the Culm: This is testing ways of making river catchments more resilient to the impacts of climate change (mainly flooding and drought), using nature-based solutions and collaborating with people living in the Culm catchment to do so.

- The Triple Axe Project: This is piloting bespoke Farm Transformation Plans in the Axe Catchment which enable farms to either partly or completely restructure their operation in order to reduce their impacts on water quality, aid nature recovery (with proposals linked to the Nature Recovery Network) and improve profitability. [66]

11.5.7 Goal FG - Environmental Law is Effectively Enforced

The evidence collected through the Thematic Hearings identified that existing environmental law designed to regulate environmentally harmful activities is not always enforced effectively. National government agrees.[67]

Making It Happen

In response, the government has introduced the Environment Act that has created the Office for Environmental Protection. This independent body has the powers to investigate other public bodies that fail to exercise any activities they are required to carry out under environmental law, for example not properly regulating environmentally harmful activities they are responsible for licensing.[68]

Devon Climate Emergency partners must cooperate with the Office for Environmental Protection and support its establishment but also work with government to improve the availability of resources

The Actions:

Needing action beyond Devon

F25. Work with government to improve the effectiveness of environmental legislation and resources for enforcement.

11.6 SUMMARY OF THE ACTIONS

Figures 11.4 and 11.5 below show the reference number and text of each of the Food, Land and Sea actions in this Plan. The anticipated start and duration of each action is shown on the right hand side of the diagram.

The actions with their duration highlighted in red in Figures 11.3 and 11.4 have been identified as a priority through two processes. Firstly, the Net Zero Task Force assessed each action's potential to contribute to significant emissions reductions and the likelihood they can be implemented in a timely fashion. Secondly, some actions were highlighted as being important by the respondents to the public consultation.

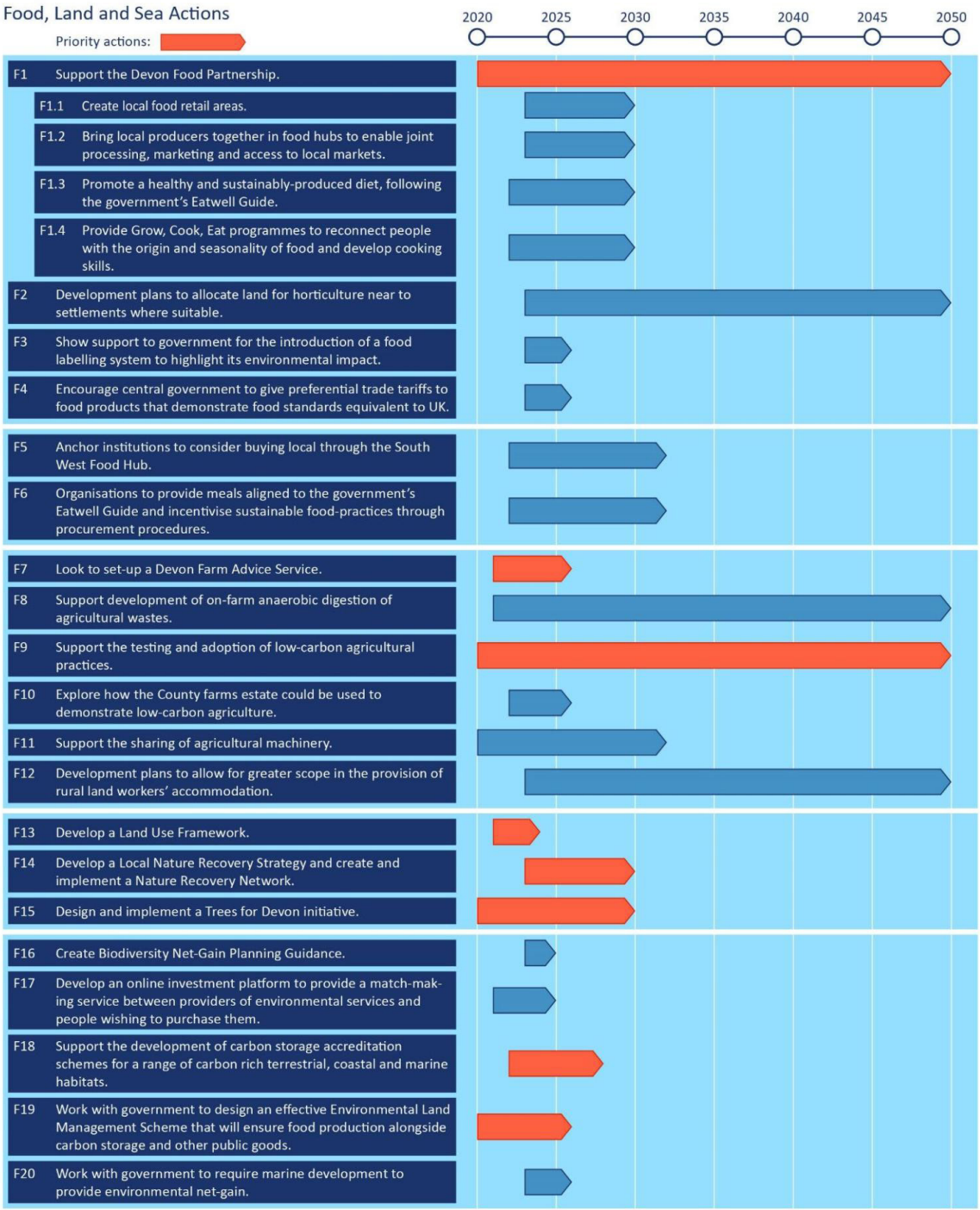


Figure 11.4 - This diagram shows the anticipated start and duration of the Food, Land and Sea actions and the priority actions.

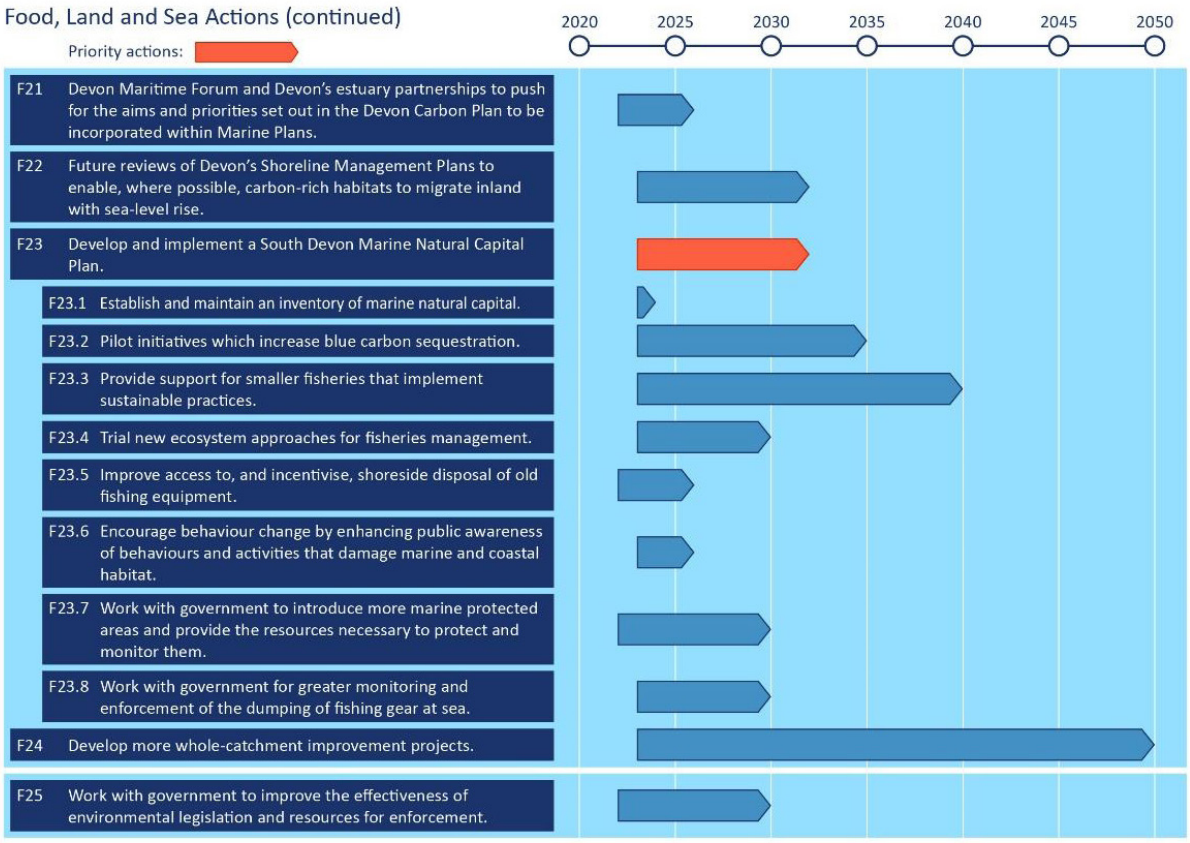
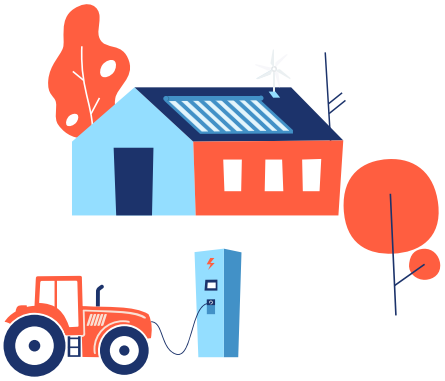


Figure 11.5 - (continued from Figure 11.4) This diagram shows the anticipated start and duration of the Food, Land and Sea actions and the priority actions.

For more detail, including who can help to deliver these actions, see the full action table.

11.7 MILESTONES

Delivering the actions in this section of the Plan will help to achieve the milestones in Figure 11.6 below. These milestones reflect the Climate Change Committee's Further Ambition Scenario.



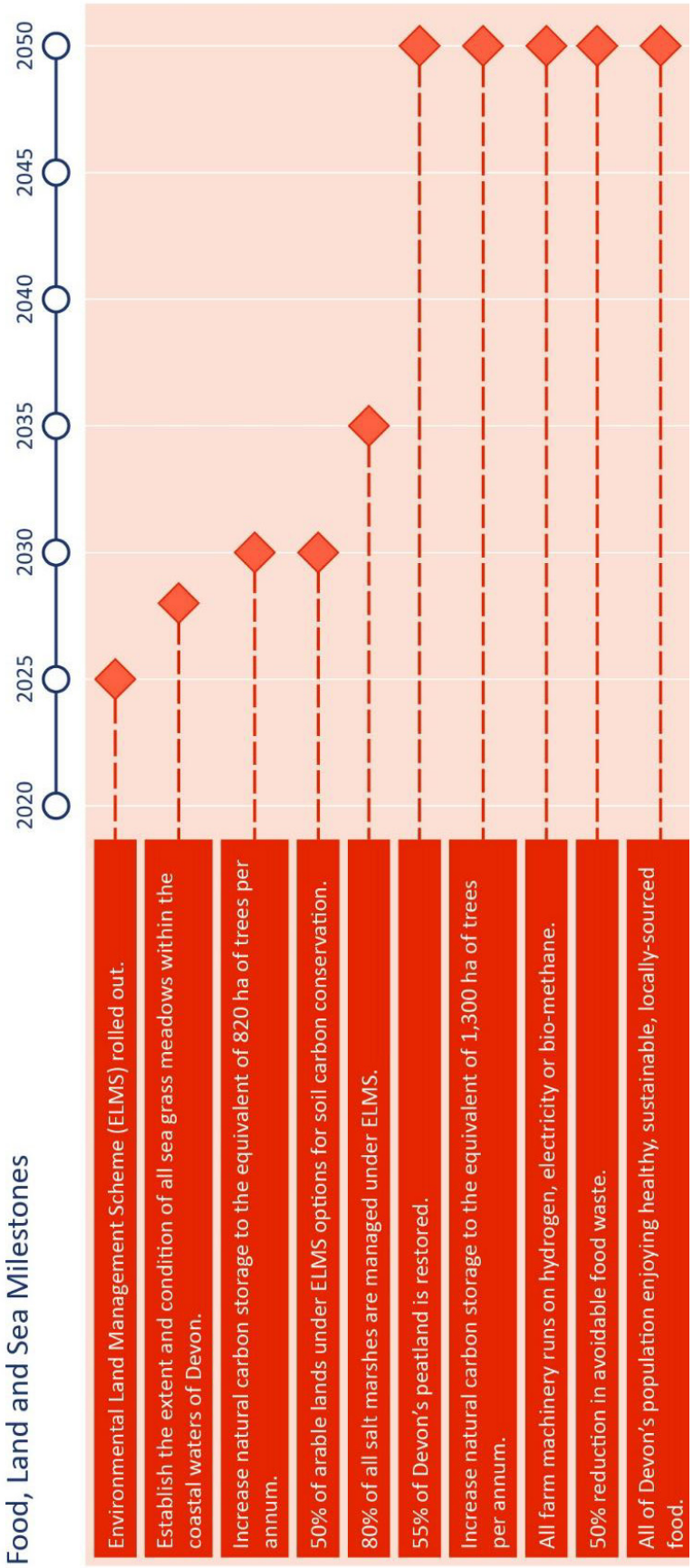


Figure 11.6 – This diagram shows the milestones which the actions in this section of the plan will help achieve.

11.8 REFERENCES

[1] BBC News (2017) How much of your area is built on. Available at: https://www.bbc.co.uk/news/uk-41901294

[2] Mitchell A. et al. (2020) Greenhouse Gas Emissions Report – Devon, Plymouth, Torbay 2019. Centre for Energy and Environment, University of Exeter. Available at: https://www.devonclimateemergency.org.uk/studies-and-data/devons-carbon-footprint/

[3] Smith P. et al. (2014) Agriculture, Forestry and Other Land Use (AFOLU). In: Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Edenhofer, O., R. et al. (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA. Available at: https://www.ipcc.ch/site/assets/uploads/2018/02/ipcc_wg3_ar5_chapter11.pdf

[4] Dartmoor National Park (2020) South West Peatland Project. Available at: https://www.dartmoor.gov.uk wildlife-and-heritage/our-conservation-work/the-south-west-peatland-project

[5] Liu, S. et al. (2021) Rethinking methane from animal agriculture. CABI Agriculture and Bioscience 2, 22. Available at: https://doi.org/10.1186/s43170-021-00041-y

[6] United States Environmental Protection Agency (2022) Understanding Global Warming Potentials. Available at: https://www.epa.gov/ghgemissions/understanding-global-warming-potentials

[7] Cain, M. et al. (2019) Improved calculation of warming-equivalent emissions for short-lived climate pollutants. npj Climate and Atmospheric Science 2, 29. Available at: https://doi.org/10.1038/s41612-019-0086-4

[8] Abernethy S. et al. (2021) Methane removal and the proportional reductions in surface temperature and ozone. Phil. Trans. R. Soc. A.379 Available at: http://doi.org/10.1098/rsta.2021.0104 Technical Guidance for Local Authorities. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/908535/cycling-walking-infrastructure-technical-guidance-document.pdf

[9] Forster, P., et al. (2021). The Earth's Energy Budget, Climate Feedbacks, and Climate Sensitivity. In Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change, Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA . Available at: https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_Chapter07.pdf

[10] Climate Change Committee (2020) Land Use: Policies for a Net Zero UK. Available at: https://www.theccc org.uk/publication/land-use-policies-for-a-net-zero-uk/

[11] EAT-Lancet Commission (2020) The Planetary Health Diet and You. Available at: https://eatforum.org/eat lancet-commission/the-planetary-health-diet-and-you/

[12] Stewart, C. et al. (2021) Trends in UK meat consumption: analysis of data from years 1–11 (2008–09 to 2018–19) of the National Diet and Nutrition Survey rolling programme. Lancet Planet Health, 5, e699 – 708. Available at: https://doi.org/10.1016/S2542-5196(21)00228-X

[13] Defra (2022) Family Food Datasets 19/20 – UK Household Purchases. Available at: https://www.gov.uk/government/statistical-data-sets/family-food-datasets

[14] NFU (2019) Achieving NET-ZERO: Farming's 2040 goal. Available at: https://www.nfuonline.com/nfu-online/business/regulation/achieving-net-zero-farmings-2040-goal/

[15] European Environment Agency (2015) Soil and Climate Change. Available at: https://www.eea.europa.eu/signals/signals-2015/articles/soil-and-climate-change

[16] Sanderman, J. et al. (2017) Soil Carbon Debt of 12,000 Years of Human Land Use. Proceedings of the National Academy of Sciences of the United States of America. 114 (36) Available at: https://doi.org/10.1073/pnas.1706103114

[17] CPRE (2018) Food and Farming Foresight Paper 3. Back to the land: rethinking our approach to soil. Available at: https://www.cpre.org.uk/wp-content/uploads/2019/11/CPRE_FF3_Soil_26Nov_web.pdf
[18] Gattinger, A. (2012) Enhanced Top Soil Carbon Stocks Under Organic Farming. Proceedings of the National Academy of Sciences of the United States of America. 114 (36). Available at: https://doi.org/10.1073/pnas.1209429109
[20] Montgomery D.R. et al. (2022) Soil health and nutrient density: preliminary comparison of regenerative and conventional farming. Peer J. PMID: 35127297. Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8801175/
[21] Ranganathan, J et al. (2020) Regenerative Agriculture, Good for Soil Health, but Limited Potential to Mitigate Climate Change. World Resources Institute. Available at: https://www.wri.org/insights/regenerative-agriculture-good-soil-health-limited-potential-mitigate-climate-change
[22] World Bank (2022) Fertilizer Prices Expected to Remain Higher for Longer. URL: https://blogs.worldbank.org/opendata/fertilizer-prices-expected-remain-higher-longer
[23] Woods, J. et al, (2010) Energy and the Food System. Philosophical Transactions of the Royal Society B, 365, 2991 – 3006. Available at: https://doi.org/10.1098/rstb.2010.0172
[24] Raj, A. et al. (2017). Role of Agroforestry in Nutrient Cycling. Kisan World, 44 (7), 38 – 40 Available at: https://www.researchgate.net/publication/318317004_Role_of_Agroforestry_in_Nutrient_Cycling
[25] Zhou, Y. et al. (2021) Life-cycle Greenhouse Gas Emissions of Biomethane and Hydrogen Pathways in the European Union. The International Council on Clean Transportation. Available at: https://theicct.org/sites/default/files/publications/lca-biomethane-hydrogen-eu-oct21.pdf
[26] Climate Change Committee (2019) Net-zero: The UK's contribution to stopping global warming. Available at: https://www.theccc.org.uk/publication/net-zero-the-uks-contribution-to-stopping-global-warming/
[27] Lash, D. et al. (2020) Net Zero Devon, Plymouth and Torbay. Centre for Energy and the Environment, University of Exeter. Available at: https://www.devonclimateemergency.org.uk/wp-content/uploads/2021/11/DPT-net-zero-report-v1-140820.pdf
[28] Forestry Commission (2022), Responding to the Climate Emergency with new Trees and Woodlands. Forestry Commission. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1057842/WoodlandsTreesForests.pdf
[29] Carbon Trust (2016) The Eatwell Guide: A More Sustainable Diet. Available at: https://www.carbontrust.com/resources/the-eatwell-guide-a-more-sustainable-diet
[30] Stein, A.J., Santini, F. (2022) The sustainability of "local" food: a review for policy-makers. Rev Agric Food Environ Stud. 103, 77–89. Available at: https://link.springer.com/article/10.1007/s41130-021-00148-w
[31] Defra (2021) National Food Strategy Independent Review. Available at: https://www.gov.uk/government/publications/national-food-strategy-for-england
[32] The Health Foundation (2020) Health Equality in England: The Marmot Review 10 Years On. Available at: https://www.health.org.uk/publications/reports/the-marmot-review-10-years-on
[33] The South West Food Hub (Unknown), Home Page. Available at: https://www.thesouthwestfoodhub.co.uk/
[34] Guilbert et al. (2022) The Ruby Country Net-Zero Beef Farming Forum Final Report [draft]. Will be available at: https://blogs.exeter.ac.uk/rubycountrynetzero/
[35] Ash Futures (2022) A Review of Devon Farm Advice – Draft Final Report for Steering Group. Commissioned by Devon County Council
[36] Devon County Council (2020) County Farms. Available at: https://www.devon.gov.uk/economy/business-support/County-farms/

[37] Teagasc (2021) Machinery Cooperatives in Ireland. Available at: https://www.teagasc.ie/news--events/daily/farm-business/machinery-co-operatives-in-ireland.php
[38] Bradford, J (2019) The Future Is Rural. Post Carbon Institute. Available at: https://www.arc2020.eu/wp-content/uploads/2019/09/Bradford_The-Future-Is-Rural_2019_compressed.pdf.
[39] Dartmoor National Park Authority (2021) Dartmoor Local Plan 2018 – 2036. Available at: https://www.dartmoor.gov.uk/living-and-working/business/planning-policy/local-plan
[40] Westcountry Rivers Trust (2020) Devon and Cornwall Soils Alliance. Available at: https://wrt.org.uk/project/dcsa/
[41] Defra (2021) Environmental Land Management Scheme Test and Trials. Available at: https://www.gov.uk/government/publications/environmental-land-management-tests-and-trials
[42] Short, C. et al. (2022) Assessing the impact of Agricultural Transition in Cornwall & the Isles of Scilly, Devon, Dorset and Somerset: Research to inform future planning– Stage 2 Final Report. Report to Great South West Partnership. Countryside and Community Research Institute: Cheltenham. Available at: https://heartofswlep.co.uk/wp-content/uploads/2022/05/GSW-agricultural-tranistion-report.pdf
[43] D. Lash, 2020, The Potential Role for Carbon Offsetting in the Devon Carbon Plan, Centre for Energy and Environment, University of Exeter. Available at: https://www.devonclimateemergency.org.uk/studies-and-data/carbon-offsetting/
[44] DLUHC (2012) National Planning Policy Framework, Section 15 – Conserving and Enhancing the Natural Environment. Available at: https://www.gov.uk/guidance/national-planning-policy-framework/15-conserving-and-enhancing-the-natural-environment
[45] Planning Advisory Service (Unknown) Biodiversity Net Gain. Available at: https://www.local.gov.uk/pas/topics/environment/biodiversity-net-gain
[46] Hooper, T., et al. (2020) Developing policy and practice for marine net gain. Journal of Environmental Management, Vol 1, p 277. Available at: https://doi.org/10.1016/j.jenvman.2020.111387
[47] Innovative Farmers (2021) Twelve Year Field Lab Into the Benefits of Silvpoasture Launched. Available at: https://innovativefarmers.org/news/2021/february/18/twelve-year-field-lab-into-the-benefits-of silvopasture-launched/?count=103
[48] IUCN (2020) Issues Brief: Blue Carbon. Available at: https://www.iucn.org/resources/issues-briefs/blue-carbon
[49] Guilbert,S. (2019) Devon Local Nature Partnership (Sustainable Seas) Submission to the Public Call for Evidence for the Devon Carbon Plan.
[50] UN Environment Programme (2018) Business unusual: How “fish carbon” stabilizes climate. Available at: https://www.unenvironment.org/news-and-stories/story/business-unusual-how-fish-carbon-stabilizes-our-climate
[51] Defra (2011) UK National Ecosystem Assessment. Available at: http://uknea.unep-wcmc.org/Default.aspx
[52] Environment Agency (2021) WFD Transitional and Coastal Water Bodies Cycle 2 Classification 2019. Available at: https://data.gov.uk/dataset/0f6c2aee-3f8e-476c-93df-e629881bd985/wfd-transitional-and-coastal-water-bodies-cycle-2-classification-2019.
[53] Defra (2015) South West River Basin Management Plan. Available at: https://www.gov.uk/government/publications/south-west-river-basin-district-river-basin-management-plan
[54] Parliamentary Office of Science and Technology (2011) Marine Planning. https://www.parliament.uk/globalassets/documents/post/postpn388_Marine-Planning.pdf
[55] North Devon UNESCO Biosphere Reserve (2020) North Devon Marine NaturalCapital Plan. https://www.northdevonbiosphere.org.uk/uploads/1/5/4/4/15448192/north_devon_marine_plan_final_version_approval__1_.pdf

[56] Kumar, A.B. and Deepthi, G.R. (2006) Trawling and by-catch: Implications on marine ecosystem. Current Science. 90 (7). Available at: https://www.researchgate.net/publication/255635078_Trawling_and_by-catch_Implications_on_marine_ecosystem

[57] Morishita, J. (2008) What is the ecosystem approach for fisheries management?, Marine Policy, 32 (1), 19 – 26. Available at: https://doi.org/10.1016/j.marpol.2007.04.004

[58] Devon and Severn Inshore Fisheries and Conservation Authority (2021) Ecosystem Approach. Available at: https://www.devonandsevernifca.gov.uk/Environment-and-Research/Marine-Environmental-Matters/Ecosystem-Approach

[59] Devon and Severn Inshore Fisheries and Conservation Authority (2021) Marine Protected Areas in the DS IFCA's District. Available at: https://www.devonandsevernifca.gov.uk/Environment-and-Research/Marine-Protected-Areas/MPAs-in-D-S-IFCA-s-District

[60] Davies, F. R. (2021) Ecosystem Approach to Fisheries Management works—How switching from mobile to static fishing gear improves populations of fished and non-fished species inside a marine-protected area. Journal of Applied Ecology. 58 (11), 2463 – 2478. Available at: https://doi.org/10.1111/1365-2664.13986

[61] Carvalho, B. et al. (2011) Defining scale in fisheries: Small versus large-scalefishing operations in the Azores. Fisheries Research. 109 (2-3), p360 – 369. Available at: https://doi.org/10.1016/j.fishres.2011.03.006

[62] Kuczenski, B. et al. 2021. Plastic gear loss estimates from remote observation of industrial fishing activity. Fish and Fisheries. 23 (1). Available at: https://doi.org/10.1111/faf.12596

[63] Royer S-J, et al. (2018) Production of methane and ethylene from plastic in the environment. PLoS ONE 13(8). Available at: https://doi.org/10.1371/journal.pone.0200574

[64] Defra (2019) Evidence Review of Abandoned, Lost or otherwise Discarded Fishing Gear. Available at: http://sciencesearch.defra.gov.uk/Document.aspx?Document=14883_ME5232ALDF Gevidencereview_Final pdf

[65] Catchment Based Approach (Unknown) Upstream Thinking. Available at: https://catchmentbasedapproach.org/learn/upstream-thinking/

[66] Blackdown Hills Area of Outstanding Natural Beauty (2022) Triple Axe Project. Available at: https://blackdownhillsaonb.org.uk/project/triple-axe-project/

[67] Defra (2021) Environmental Governance Factsheet (Parts 1 and 2). Available at: https://www.gov.uk/government/publications/environment-bill-2020/10-march-2020-environmental-governance-factsheet-parts-1-and-2

[68] Office for Environmental Protection (Unknown) What we can investigate. Available at: https://www.theoep.org.uk/what-we-can-investigate

SECTION 12.

MAKING THE PLAN REALITY

12.1 ENGAGEMENT AND OWNERSHIP

This Plan is the result of extensive collaboration between the Devon Climate Emergency partners, the Net-Zero Task Force, individuals and communities with a wealth of experience and expertise, who responded to the Call for Evidence or shared insights at the Thematic Hearings, as well as all those who participated in the Devon Climate Assembly.

The ambition is that the implementation of this Plan will be equally collaborative. Everyone in Devon needs to know about this Plan and play an active role in its implementation. Every individual, organisation and community, including the Devon Climate Emergency partners, are encouraged to look at the actions and select those that they will help deliver.

Many organisations and communities have already developed plans to reduce their emissions to net-zero. The partners are sharing these stories on the website and would love to hear about your progress. Activity can be shared with the partnership and showcased on the website, the monthly newsletter via environmentalpolicy@devon.gov.uk, or find the Devon Climate Emergency on social media.

Devon-based organisations are encouraged to join the partners in endorsing the Devon Climate Declaration and reduce their direct emissions to net-zero by 2030.

12.2 FUNDING AND INVESTMENT

Achieving net-zero by 2050 at the latest will require a major nationwide investment programme, led by national government, but largely funded and delivered by private companies and individuals. Low-carbon markets and supply chains must scale up so that almost all new purchases and investments are in zero-carbon solutions by 2030 or soon after – some of the actions in this Plan will help achieve this.

Costs for meeting net-zero in Devon have not been prepared, but may be in a future update to this Plan. National estimates give an indication of the scale of investment required. The Climate Change Committee (CCC)[1] says there needs to be a sustained increase in capital investment, adding around £50 billion annually by 2030 (compared to current economy-wide investment of nearly £400 billion). The largest increases are for low-carbon power capacity (£14 billion/a), work retrofit of buildings (£12 billion/a) and the added costs of batteries and infrastructure for electric

vehicles (£10 billion/a). These investments are well within the range of historical changes in UK total investment.

These costs do not take account of reduced running costs. Many - though not all - of the technologies required for net-zero have considerably lower running costs than the alternatives they replace. The transport sector has the largest opportunity to save costs, with some further savings available for buildings and electricity supply.

Electrified surface transport is far more efficient than high-carbon alternatives and has significantly lower maintenance costs. Overall, this can deliver annual operating cost savings of over £30 billion by 2050 across the UK. Low-carbon electricity generation has low costs in operation, in particular by avoiding fuel costs. The complete decarbonisation of the electricity sector will reduce operating costs by around £10 billion per year in the UK relative to the high-carbon alternative. Energy efficiency improvements and switches to low-carbon heating deliver reductions in operating costs for buildings of around £8 billion per year in the UK by 2050.

By 2050, for the UK as a whole, aggregate cost savings will be similar to the annual investment requirements for the net-zero transition. As a result, the annualised net-cost of meeting net-zero is estimated to be less than 1% of Gross Domestic Product (GDP) through to 2050. This is a reduction since the figures reported in the Interim Devon Carbon Plan, which reflects the falling costs of low-carbon technologies.

This will not necessarily reduce GDP by an equivalent amount. The CCC suggest that GDP will be around 2% higher than it would have otherwise been by 2035 as resources are redirected from fossil fuel imports to UK investment. At worst the size of the economy would be similar to that expected without climate action, but with valuable co-benefits.

There are likely to be opportunities for technological innovation over the next three decades to reduce the investment costs further. There will of course be opportunities for philanthropic grant funding and the public sector to facilitate innovation and de-risk investments to bring new products and services to market. This Plan highlights the opportunities for public sector investment which the partners would like to work with national government to develop, many of which can respond to the levelling up agenda and the cost of living crisis.

12.3 OVERSEEING PROGRESS

12.3.1 New Oversight Structure

This Plan has been prepared by a collaboration of over 25 organisations with input from people across Devon. Many more people and organisations will be involved in its implementation. The existing governance arrangements have been appropriate for managing the development of the Plan, and the emerging Devon, Cornwall and Isles of Scilly Climate

Adaptation Plan, but the implementation of the programme of projects in the two plans will need something different to provide strategic oversight of their progress as a whole.

Figure 12.1 shows the governance arrangements which will come into place in 2022 to oversee the delivery of the Plan. The new structure aims to aid collaboration, have representation from the people of Devon and ensure opportunities to work with regional partners and government are harnessed.

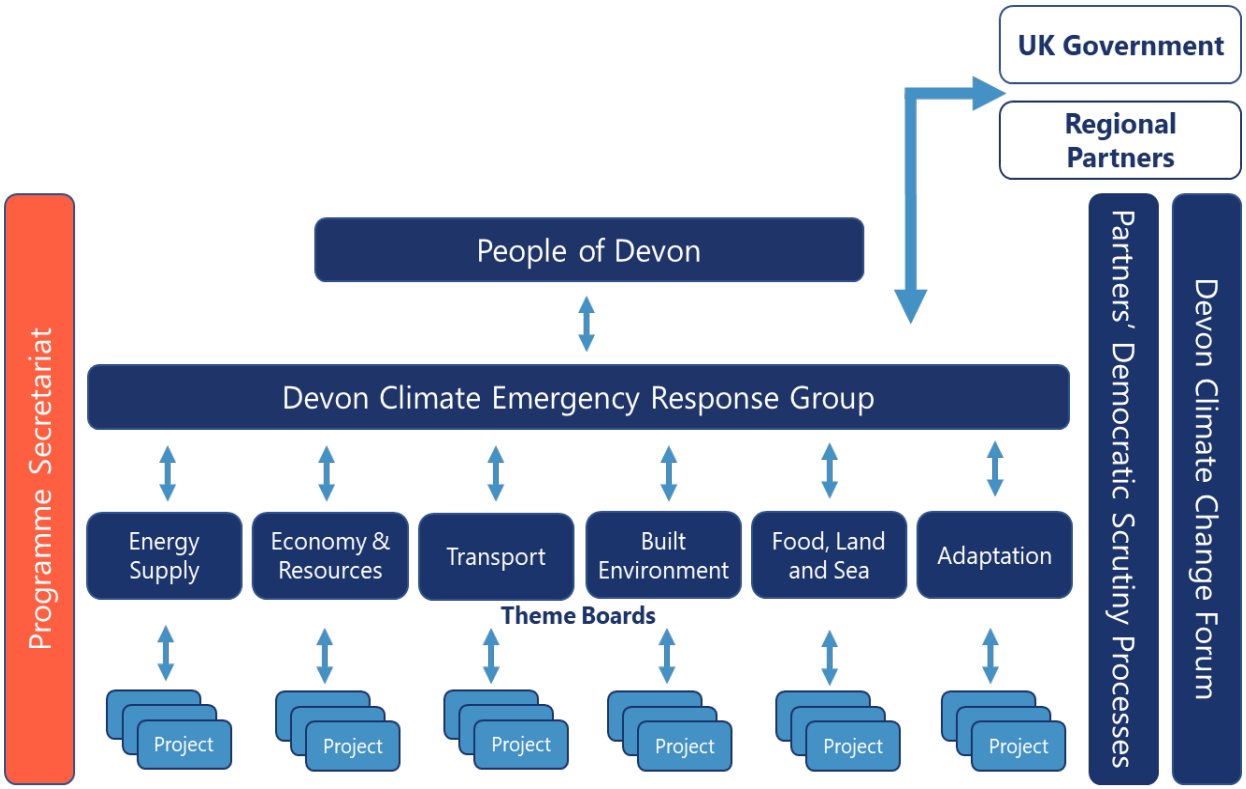


Figure 12.1 - Governance arrangements for the implementation of the Devon Carbon Plan and the Devon, Cornwall and Isles of Scilly Adaptation Plan.

The day-to-day implementation of each project will be managed by the organisation leading it.

The **Theme Boards**, will be made up of community representatives, including youth representation, volunteer specialists (similar to those who formed the Net-Zero Task Force) and specialist staff from the partner organisations. They will be chaired by a partner organisation and will oversee progress with the implementation of the programme of projects relevant to their theme. Each quarter they will receive a report collated by the Programme Secretariat from the project

managers highlighting progress and any issues arising. The Theme Boards will act to resolve issues where they are able. Issues outside their control will be raised with the Response Group.

The **Devon Climate Emergency Response Group** will reduce its meeting frequency from every month (as it has done since May 2019) to quarterly. It will continue to provide an opportunity for senior leaders from the partners to discuss progress, make programme decisions, seize on collaboration opportunities and be engaged with significant implementation issues that require seniority to unblock. It will be attended by the chairs of the Theme Boards to ensure cross fertilisation and ensure that the cross-cutting actions in the Plan are being monitored. The Group will also serve as the voice of the partnership with regional partners and government.

Partners' democratic scrutiny processes will continue to have a vital role in providing constructive and robust challenge to the Plan's implementation and to the execution of individual projects their organisations may be leading.

An independent **Devon Climate Change Forum** will provide impartial oversight, challenge and advice on behalf of the people of Devon to all tiers of the governance structure, meeting once or twice each year. It will include community representation. Part of its role will be to scrutinise progress on an annual basis and make recommendations for the year ahead –similar to the critical friend role of the Climate Change Committee to national government, but with greater citizen representation.

Officers from the partner organisations have been meeting monthly as the Tactical Group since May 2019. Whilst this group will not form part of the formal oversight structure, it will continue to meet to allow knowledge and experience sharing and to seize opportunities for collaboration on projects and funding bids.

12.3.2 Recruitment to the Theme Boards and Climate Change Forum

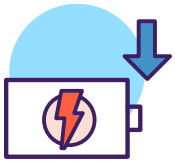
A list of the experience, knowledge and qualities needed on each of the Theme Boards and in the Climate Change Forum is being drawn up by the partnership. Devon's citizens and organisations who feel they can contribute to the needs of the Boards and Forum will be invited to express their interest in participating. The Boards and Forum will then be assembled from those who have expressed their interest.

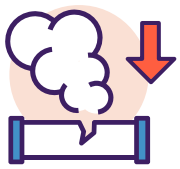
12.4 MONITORING

Figure 12.2 describes indicators that will be used to monitor the achievement of the Plan's objectives at a strategic level. Most of the data is available from national government and local sources on an annual basis. Some indicators do not have data available yet and require further investigation into how the data can be obtained or the development of alternatives.

These indicators will be reviewed by the Response Group and published online.

OBJECTIVE	INDICATORS	LATEST DATA
Net-zero emissions by 2050 at the latest and a 50% reduction in emissions by 2030 from 2010 levels	**1.** Devon's net production greenhouse gas emissions	2019[8] 7,574 $ktCO_2e$
	2. Devon's consumption greenhouse gas emissions	2017[2] 12.5 $MtCO_2e$
	3. Percentage reduction in Devon's production greenhouse gas emissions since 2010	2019[3] -22%
	4. Percentage reduction in Devon's consumption greenhouse gas emissions since 2010	2019[2] -18%
 **Engaged communities acting for resilience and a net-zero carbon Devon**	**5.** Total followers on the Devon Climate Emergency social media platforms	Aug 2022 5,751
	6. Total subscribers to the Devon Climate Emergency newsletter	Aug 2022 2,909
	7. Number of entities endorsing the Devon Climate Declaration	Aug 2022 84
	8. Percentage of the community feeling well-informed and supported to reduce their own carbon emissions	Data collection process to be established
	9. Number of community organisations (e.g. Transition and Community Action Groups) known to be acting locally for net-zero	264

OBJECTIVE	INDICATORS	LATEST DATA
 **Fossil fuels phased out as an energy source**	**10.** Proportion of Devon's energy consumption met by renewable energy generated within Devon	2017[4] 6.7%
	11. Total consumption of fossil fuel energy in Devon a. Domestic b. Industrial and Commercial c. Road transport	2019[5] 5,669 GWh 4,405 GWh 8,079 GWh
	12. Proportion of cars and light goods vehicles registered in Devon that are ultra-low emission (< 75gCO_2/km)	2022[6] 1.2%
 **Minimised energy consumption**	**13.** Number of Devon's homes with an Energy Performance Certificate of D – G	Mar 2022[7] 306,427
	14. Number of Devon's commercial premises with an Energy Performance Certificate of D – G	Mar 2022[7] 14,165
	15. Devon's energy consumption a. Total b. Transport c. Domestic d. Industrial and Commercial	2019[5] 24,406 GWh 8,551 GWh 8602 GWh 7,253 GWh
	16. Amount of funding spent through dedicated public grants on domestic retrofitting in Devon **17.** Amount of funding spent through dedicated public grants on commercial retrofitting in Devon	Data collection process to be established

OBJECTIVE	INDICATORS	LATEST DATA
 **Minimise fugitive greenhouse gas emissions**	**18.** Emissions from Product Use (HFCs, PFCs and SF6) in Devon	2019[8] 191 $ktCO_2e$
	19. Emissions from landfill and biological treatment of waste and wastewater in Devon	2019[8] 656 $ktCO_2e$
 **Minimise fugitive greenhouse gas emissions**	**20.** Net-emissions from livestock and land use in Devon	2019[8] 1,256 $ktCO_2e$
	21. Devon's soil organic matter percentage **22.** Carbon sequestered by improved habitat in Devon from 2020 a. Terrestrial b. Marine	Data collection process to be established
	23. Net carbon dioxide sequestered by land use, land use change and forestry in Devon	2019 -347 $ktCO_2$
 **Resilient local economies with access to green finance**	**24.** Investment in community-owned energy schemes in Devon	2018[9] £14.1 m
	25. Proportion of households in fuel poverty	2020[10] 12.3%
	26. Proportion of spending by the Response Group organisations with entities registered with EX, PL or TQ postcodes **27.** Number of non-profit organisations registered with EX, PL or TQ postcodes, providing goods and services to or for Response Group organisations	Data collection process to be established

OBJECTIVE	INDICATORS	LATEST DATA
 **A circular use of resources**	**28.** Number of Repair Cafes operating in Devon	24 [11, 12]
	29. Number of Library of Things operating in Devon	4 [13]
	30. Total household waste collected in Devon	2020/21 [14] 530.2 kt
	31. Household waste collected per person a. Devon County Council b. Plymouth City Council c. Torbay Council	2020/21 [15] 447 kg 407 kg 428 kg
	32. Percentage of household waste that is sent for reuse, recycling or composting a. Devon County Council b. Plymouth City Council c. Torbay Council	2020/21 [15] 55.3% 30.6% 35.5%
	33. Commercial and industrial waste in the Devon County and Torbay council areas a. Total arising b. Of which household-like waste c. Recycling rate	2018/19 [16] 560 kt 186 kt 34 - 40%
	34. Construction, demolition and excavation waste in the Devon County Council area a. Arising b. Recycling rate	2010 [17] 1,206 kt 87%
 **Carbon captured from the burning of fuels**	**35.** Proportion of carbon produced from the burning of fossil fuels in Devon that is captured by carbon capture and storage technology	2022 0%

Figure 12.2 - Indicators to monitor the achievement of the Plan's objectives

12.5 CLOSING REMARK

Now is the right time to set a target to achieve net-zero emissions and put in place a Plan to reach it. The broad involvement of businesses, the public sector, voluntary organisations and communities working together will help to create a resilient, net-zero carbon Devon where people and nature thrive and will provide an example for other counties and regions as part of the wider collective effort to address climate change.

12.6 REFERENCES

[1] Climate Change Committee (2020) The Sixth Carbon Budget: The UK's Path to Net-Zero. Available at: https://www.theccc.org.uk/wp-content/uploads/2020/12/The-Sixth-Carbon-Budget-The-UKs-path-to-Net-Zero.pdf

[2] Based on apportioning the UK imported consumption emissions in 2019 of 369 Mt CO 2 e by Devon's GVA share. UK total GVA of £1819.8 billion in 2017 and Devon's GVA of £24.2 billion in 2018. UK imported consumption emissions data is at: DEFRA (2022) Carbon footprint of the UK and England to 2019. Available at: https://www.gov.uk/government/statistics/uks-carbon-footprint/carbon-footprint-for-the-uk-and-england-to-2019

[3] 2010 emissions from Lash, D. et al. (2020) Net Zero Devon, Plymouth and Torbay, Centre for Energy and Environment, University of Exeter. Available at: https://www.devonclimateemergency.org.uk/studies-and-data/net-zero-devon-plymouth-and-torbay-reports/. 2019 emissions from Mitchell A. et al. (2020) Greenhouse Gas Emissions Report – Devon, Plymouth, Torbay 2019. Centre for Energy and Environment, University of Exeter. Available at: https://devonclimateemergency.org.uk/studies-and-data/devons-carbon-footprint/

[4] Calculated by the Net Zero Task Force from multiple sources.

[5] BEIS (2021), Estimates of total final energy consumption from 2005 to 2019 at a country, regional and local authority level. Available at: Total final energy consumption at regional and local authority level: 2005 to 2019 - GOV.UK(www.gov.uk) https://www.gov.uk/government/statistics/total-final-energy-consumption-at-regional-and-local-authority-level-2005-to-2019

[6] Calculated from DfT (2022) Statistical data set Vehicle licensing statistics data tables [online] URL: Vehicle licensing statistics data tables - GOV.UK (www.gov.uk) https://www.gov.uk/government/statistical-data-sets/vehicle-licensing-statistics-data-tables-ultra-low-emissions-vehicles

[7] LUHC (2022) Energy Performance of Buildings Data England and Wales. Available at: https://epc opendatacommunities.org

[8] Mitchell A. et al. (2020) Greenhouse Gas Emissions Report – Devon, Plymouth, Torbay 2019. Centre for Energy and Environment, University of Exeter. Available at: https://devonclimateemergency.org.uk/studies-and-data/devons-carbon-footprint/

[9] Regen (2018) Devon Community Energy Impact Report, Regen. Available at: https://www.regen.co.uk/publications/devon-community-energy-impact-report-2018/

[10] BEIS (2022), Sub-Regional Fuel Poverty data 2022. Available at: Sub-regional fuel poverty data 2022 - GOV.UK (www.gov.uk) https://www.gov.uk/government/statistics/sub-regional-fuel-poverty-data-2022

[11] Recycle Devon (2022) Repair Café , Available at: https://www.recycledevon.org/reuse/repair-cafe
[12] Restart (2022) Repair Café Plymouth, Available at: https://therestartproject.org/groups/repair-cafe-plymouth/
[13] Recycle Devon (2022), Borrow and Share, Available at: https://www.recycledevon.org/borrow-and-share
[14] Defra (2022), Local authority collected waste generation from April 2000 to March 2021 (England and regions) and local authority data April 2020 to March 2021. Table 1: Local Authority Collected and Household Waste Statistics 2014-15 to 2020-21, England. URL: https://www.gov.uk/government/statistical-data-sets/env18-local-authority-collected-waste-annual-results-tables
[15] Defra (2022), Local authority collected waste generation from April 2000 to March 2021 (England and regions) and local authority data April 2020 to March 2021. Table 3 – Selected Waste Indicators. URL: https://www.gov.uk/government/statistical-data-sets/env18-local-authority-collected-waste-annual-results-tables
[16] Devon County Council and Torbay Council (2020) Draft Resource and Waste Management Strategy for Devon and Torbay, 2020-2030.
[17] Devon County Council (2014) Devon Waste Plan. Available at: https://www.devon.gov.uk/planning/planning-policies/minerals-and-waste-policy/devon-waste-plan

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