Towards a Climate Resilient Somerset

Somerset's Climate Emergency Strategy

Climate Resilient SOMERSET

Foreword

Climate Change, and its impacts on the world we live in, is one of the most significant issues facing us all today. The human effects on Global Warming are well publicised and pressure is mounting for Governments to act.

As the County Council Member and 4 District Council Members with Cabinet responsibilities for Climate Change, it gives us great pleasure to introduce our response to this call for action - "Towards a Climate Resilient Somerset"- the Climate Emergency Strategy for Somerset.During 2019, Somerset County Council and the 4 District Councils each declared or recognised a Climate Emergency and agreed to work together with partners to produce a Climate Emergency Strategy for the whole County of Somerset. The ambition was to produce a Strategy to lead this work for the whole County, not just to guide the actions and investment decisions of each of the Local Authorities in Somerset.

Tackling the impacts of Climate Change is not something the Local Authorities can do alone. It requires the commitment of every organisation, business, community and citizen of Somerset and requires, in some cases, fundamental societal change around the way we live our lives and the choices we make. Our Goals are ambitious. We have begun to identify the things we must do now to respond to the declared Climate Emergency and the further mitigating and adaptive actions we need to plan for in the medium and longer term. However, this is only the beginning of our journey. We won't have got everything right at the outset and we won't be able to do everything at once. There are some difficult decisions for us all to make, some complex issues and challenges to overcome, not least how this is funded, and we need to prioritise our activities to ensure we make progress against our Goals as quickly as is possible.

The Strategy therefore seeks to identify the outcomes we all want to achieve and the steps each organisation, individual community and household needs to commit to, to work towards Somerset being carbon neutral by 2030 and help build our resilience against the impacts of Climate Change both now and in the future. Being climate smart with decisions we take now and into the future will help ensure that the right actions are taken at the right time for the best value.

The Strategy has been developed in consultation with a range of partners, climate action experts and local interest groups and through engaging with, and listening to, the feedback from our communities, both adults and young people.

We have some significant challenges ahead, but with these challenges come some real and exciting opportunities which we must seize for the people and businesses of Somerset. By tackling the climate crisis and by focusing on clean growth and a 'green economy' we can create a cleaner, healthier environment that both accelerates the transition to Net Zero whilst making Somerset's communities resilient for future generations.

We have a beautiful County - an outstanding environment with an abundance of natural resources at our disposal to help us plan for and mitigate against Climate Change. We need to work with and support our most vulnerable communities as they will be impacted the most. A low carbon future will be hugely positive for Somerset providing a more equitable society who experience better health and wellbeing, a thriving 'green' economy and with nature restored.

Join us in making this happen.

Cllr. Tom Ronan
Mendip District Council

Cllr. Janet Keen
Sedgemoor District Council

Cllr. Clare Paul
Somerset County Council

Cllr. Peter Pilkington
Somerset West & Taunton Council

Cllr. Sarah Dyke
South Somerset District Council

"I don't think as a human race that we can be so stupid that we can't face an existential threat together and find a common humanity and solidarity to respond to it. Because we do have the capacity and the means to do it - if we have the political will."

Mary Robinson,
Former President of Ireland,
October 2019

Climate Resilient SOMERSET

Executive Summary

Climate Change, and its impacts on the world we live in, is one of the most significant issues facing us all today. The human effects on Global Warming are well publicised and pressure is mounting for Governments to act.

In response to the overwhelming evidence, and growing concern from local communities and residents for urgent, decisive action, each of the 5 Somerset Councils has passed resolutions declaring or recognising a Climate Emergency. Each declaration aspires to:

- A Carbon Neutral Somerset by 2030
- Building our resilience for, or adapting to, the impacts of a changing climate

This Strategy - 'Towards a Climate Resilient Somerset' - is Somerset's response to the Climate Emergency declarations. Led by Somerset's 5 Local Authorities, with support and guidance from a range of organisations and individuals with sector expertise, the Strategy serves as:

1. An evidence base, setting out how our climate is changing and the challenges and opportunities we face
2. A policy document, outlining our goals and ambitions for tackling Climate Change here in Somerset, and
3. A high level action plan, setting out the critical actions needed to deliver our goals, enabling us all to adapt and thrive in the future.

The focus of the Strategy

The 5 Local Authorities agreed to work together to develop a shared Climate Emergency Strategy for Somerset built around these 3 Goals:

GOAL 1

To decarbonise Local Authorities, the wider public sector estates and reduce our carbon footprint

GOAL 2

To work towards making Somerset a Carbon Neutral County by 2030

GOAL 3

To have a Somerset which is prepared for, and resilient to, the impacts of Climate Change

Work began to understand where Somerset's carbon emissions are generated, identifying 9 sectors which have a major impact upon our ambition to become a carbon neutral County by 2030. **These 9 sectors are:**

- The **Energy** we use, the emissions produced from its use and the types of energy we will look to harness in future
- Our **Transport** networks - when and where we travel, and the means we choose to make these journeys
- The **Built Environment** - where and how we live and work, the types of homes we live in, our commercial and industrial buildings and what we want for buildings in the future
- Our local economy - specifically our **Business, Industry and Supply Chains**
- Our **Natural Environment** - how we can protect it and utilise it to reduce the harmful impacts of Climate Change
- Our **Farming & Food** - what, where and how we produce our food and crops, vital to the rural economy of Somerset
- Our **Water** resources - how they are managed to minimise the impacts of flooding and drought on our residents, buildings and landscapes
- The management of our **Waste & Resources** - how we handle and treat our waste
- How we **Communicate** and Engage - with Somerset's citizens to enable us all to make life choices which reduce our impact on the environment locally, nationally & globally

Specialists led work on each of the 9 sectors, analysing and prioritising current and future issues, considering local and UK Government policy implications, and identifying a series of actions needed to minimise emissions and build resilience within each area of work.

What is Climate Change?

The scientific evidence is clear. Concentrations of harmful greenhouse gases (mainly carbon dioxide CO_2, methane CH4, nitrous oxide N2O, ozone O3, chlorofluorocarbons and water vapour) in our atmosphere are increasing rapidly - carbon dioxide levels are now 40% higher than in pre-industrial times and greater than any time in the past 800,000 years. Human activities, such as burning fossil fuels for power generation and heating, are contributing significantly to Climate Change, releasing millions of tonnes of additional greenhouse gases into our atmosphere, causing average global temperatures to rise at an alarming rate.

Somerset's emissions

Although UK carbon emissions have been reducing since 1990 levels, they are not reducing quickly enough. The latest carbon emissions data estimates indicate in 2018, a total of 3,269 $ktCO_2$ (kilotonnes of carbon dioxide) were emitted in Somerset from industrial, agricultural, domestic and transport-related sources, with the largest amount of carbon emitted by the transport sector (46%), followed by industrial processes (25.3%), the domestic sector (24%) and agriculture and land use (4.7%).

So why do we need to act?

Urgent action is needed now. If we do not act decisively, the impacts of Climate Change across Somerset will be considerable. Our coastal communities and the Somerset Levels are at high risk from coastal flooding as sea level rises. Sedgemoor is named the 3rd most vulnerable area in the UK in a recent Government report. Significant sea level rise and extreme weather events will result in flooding, damage to properties, the destruction of transport infrastructure and interruption to power and communications networks. Heatwaves and droughts bring water shortages and will reduce our water quality, posing significant human health risks to the vulnerable, impacting on agricultural productivity, causing damage to soils, reducing biodiversity and habitat, with the loss of many native species. It is well understood that the economic and health benefits of acting on Climate Change outweighs the costs, especially with a future of clean growth, high quality employment in the 'green' economy, low carbon transport and better health and wellbeing.

Challenges to achieving our Goals

The Local Authorities understand that the Goals set are ambitious and will be challenging to deliver. The 5 Local Authorities will lead the way by cutting emissions from their own operations and through building resilience into service delivery. We will lobby the UK Government for policy changes and further funding, and work with other organisations across Somerset to drive change. We know that the reach, funding and resources of Local Authorities are limited.

If we are to reach our Goals, we will need support and 'buy in' to our vision from every organisation, business and resident of Somerset. The decisions we each take, and the everyday choices we make, will ultimately have the biggest impact. To deliver fundamental and lasting changes, we must encourage, empower and enable our residents to take personal decisions that reduce their own carbon footprints and help us meet our goals.

Covid 19, clean growth and 'green' recovery

Whilst this Strategy was being written, the Covid-19 pandemic changed our lives, causing devastating effects on human health and the economy. Due to the extensive lockdowns and reduction in economic activity, there was

a significant, albeit temporary, fall in global greenhouse gas emissions. But this effect is only temporary. Carbon emissions must be cut consistently, year after year, to halt global warming.

As we recover from the pandemic, and face a new 'normal', we must seize the opportunity to make the Covid-19 recovery a defining moment in tackling the climate crisis, strengthening our resilience to Climate Change impacts, whilst driving new economic activity. A 'green' recovery shifting away from polluting, carbon based, fossil fuels can create a cleaner, healthier environment whilst investments in low-carbon, climate-resilient industries can create jobs and stimulate economic recovery. In Somerset, Hinkley Point C and the Gravity Campus in Sedgemoor are UK-wide leading examples of how clean, low carbon growth can and will create high value jobs, benefit the local supply chain and help deliver a 'Net Zero' future.

Sector summaries and outcomes

A summary of findings from each of the 9 sectors is presented in Chapter 7, setting out the main outcomes needed to tackle Climate Change and meet our Goals along with the main opportunities and challenges each sector faces. A detailed report for each sector is available in the Appendices.

Action Plan, monitoring and review

From the 63 outcomes identified, a series of actions have been developed into a high-level Action Plan. The Plan outlines what actions are needed, who will deliver them, how much it will cost where that is known, and what funding is available, or required. The Actions will be dynamic and flexible in nature, continuously adapting to the most up-to-date evidence, methodologies, funding sources, emerging innovation and ideas. The Action Plan will be reviewed regularly and reported on.

Communication and engagement

An essential element to support the aims of this Strategy will be a comprehensive communications and engagement plan to aid the discussion about the Climate Emergency and encourage our residents, communities and businesses to support the Strategy and take affirmative action to tackle Climate Change.

Summary

We urgently need to take action to tackle the Climate Emergency. This Strategy is the beginning of our journey. We all face difficult decisions and have many challenges to overcome, but by working together we can make significant progress to deliver our Goals for a brighter future.

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Introduction: 'Towards a Climate Resilient Somerset'

1.1 About this Strategy

This Strategy 'Towards a Climate Resilient Somerset' is our collective response to the Climate Emergency being declared all around the world. It sets out the evidence of how our climate is changing, the impacts it will have at a global, national and local level and outlines the many challenges we face, and the measures and opportunities we must take here in the County of Somerset to enable us all to adapt and thrive in the future.

The Strategy

outlines 3 ambitious Goals which set out **"what we want to achieve?"**

details outcomes and objectives needed to meet these Goals **"how will Somerset be different as a result of our collective actions?"**

explains what actions to take to achieve these outcomes **"what we need to do?"**

identifies organisations and individuals to lead these actions **"who will do what?"**

provides indicative timescales for these actions need to be delivered **"by when?"**

1.2 Why has this Strategy been developed?

Human activities have already contributed to a 1°C rise in global average temperature above pre-industrial levels which has had a significant impact on the human and natural world. The science on the Climate Emergency is clear, we need urgent action now to reduce our global carbon emissions to keep any global temperature rise below 1.5°C to prevent disastrous consequences.

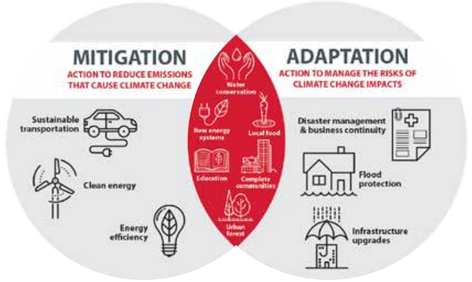
In response to the overwhelming evidence and growing concern from local communities and residents for urgent, decisive action, each of the 5 Somerset Councils (Mendip District Council, Sedgemoor District Council, Somerset County Council, Somerset West and Taunton District Council and South Somerset District Council) passed resolutions which declared or recognised a Climate Emergency (see Appendix 1).

Each declaration, although slightly different, aspired to work towards:

- A Carbon Neutral Somerset by 2030
- Building our resilience for, or adapting to, the impacts of a changing climate

To achieve these aims, the 5 Somerset Local Authorities agreed to work together to develop and deliver a Climate Emergency Strategy for Somerset.

Building Climate Resilience



Source: https://www.calgary.ca

The Strategy addresses

The Definition of Carbon Neutrality

The Councils have agreed upon the following definition of carbon neutrality: 'Carbon neutrality (having a Net Zero carbon footprint) refers to achieving Net Zero carbon emissions by minimising CO_2 emissions and by balancing the remaining amount of carbon released with an equivalent amount sequestered or offset'

Climate Mitigation

These are the actions we can take to minimise or cease harmful emissions caused by human behaviour which damage our environment

Climate Adaptation

This is adapting how and where we live to the actual or expected impacts of Climate Change and extreme weather events

Carbon Sequestration & Storage

This is how we can utilise technology and our natural resources to help capture atmospheric carbon dioxide or other forms of carbon and store them long-term to either mitigate or defer global warming

Carbon Offsetting

This is buying carbon credits equivalent to the amount of carbon you emit to ensure your overall impact on the environment is 'Net Zero'. This can be helpful in tackling emissions which are difficult to prevent or expensive to cut. However, buying carbon credits is controversial as it utilises economic power (money) to buy a way out of having to act on reducing your emissions and avoiding taking direct responsibility for your actions.

1.3 Scope and guiding principles

This ambitious County-wide Strategy, although led by Somerset's 5 Local Authorities, requires the commitment from every organisation, business, community and resident of Somerset if we are to achieve our goal of becoming a climate neutral county by 2030 and building our resilience to the impacts of Climate Change over the forthcoming years for a better, brighter future.

The Strategy follows the 'One Planet Living Principles'[1] which take a holistic approach to sustainability and focuses on how we all live our lives - going beyond cutting carbon and conservation to enhancing wellbeing, building better communities and businesses, promoting sustainable consumption and production and the need for socially sustainable procurement as well as a move towards a circular economy.

The journey will undoubtedly require overcoming a series of challenges that require legislative changes at both national and local levels and clear funding mechanisms to implement the extensive changes needed. Only through this shared commitment and a sharp focus on the actions needed to meet our Goals will we be able to deliver transformational, sustainable and long-lasting change to benefit our County.

The Strategy demonstrates Somerset's commitment to the UK Government's 2050 target of reducing greenhouse gas emissions to 'Net Zero' and supports the UK's 2015 Paris Agreement pledge to keep global temperatures below 2°C by 2050.

Following the publication of this Strategy, we will also take the opportunity to develop numerous "Big Asks" of Government and actively lobby for the necessary amendments to legislation and for funding to enable Somerset to deliver on its Climate Emergency Goals.

1.4 Prioritisation

In developing this Strategy, each course of action has been reviewed to reduce any risk that it might create unintended consequences, that's to say, by fixing one problem, we don't unintentionally cause a problem elsewhere.

We are responding to a 'Climate Emergency' and know our residents and communities are eager to see actions on the ground. We have exercised caution in focusing on "Quick Wins" or undertaking activities that could be seen as simply "Greenwashing." Instead, the outcomes and actions are based on the best available knowledge, evidence of need, and impact they will have in cutting emissions and/or building resilience. They will be prioritised to ensure any investment makes the biggest contribution to achieving the Goals of this Strategy.

SECTION 2

Focusing the Strategy: Our approach

The Somerset Councils' Climate Emergency Declarations set out shared ambitions to deliver:

- A Carbon Neutral Somerset by 2030
- Building our resilience for, or adapting to, the impacts of a changing climate'

The 5 Councils agreed to work together to tackle the Climate Emergency and develop a shared Strategy for Somerset built around these 3 Goals.

GOAL 1

To decarbonise Local Authorities, the wider public sector estates and reduce our carbon footprint

GOAL 2

To work towards making Somerset a Carbon Neutral County by 2030

GOAL 3

To have a Somerset which is prepared for, and resilient to, the impacts of Climate Change

2.1 Climate Emergency Framework

The first step on the road to carbon neutrality was to engage the people, communities and businesses of Somerset in a discussion about Climate Change.

A high-level Climate Emergency Framework document was produced, setting the context, identifying the sources of emissions and scoping out the potential workstreams for action. This was released for a wide online public consultation in Spring 2020. The feedback from the consultation helped frame the Climate Emergency Strategy at a local level and identified what residents see as the priorities for action for Councils, communities and individuals. A full report on the public consultation is available in Appendix 3.

2.2 Climate Emergency Strategy

Following the consultation, work began shaping the Strategy based on the feedback received and analysis of the changes required for Somerset to become carbon neutral and increase our resilience to the risks posed by Climate Change at a local level.

To utilise the expertise available within the County, a wide range of partners with sector expertise were invited to inform and lead several workstreams within the Strategy along with input and review from a range of key organisations with Climate Change and sustainability sector intelligence. To ensure the approach taken was on a sound scientific basis, further guidance was also taken from academics at Exeter University.

The Strategy identifies 9 key sectors responsible for the majority of carbon emissions released across Somerset, action on which will have a major impact on our journey to carbon neutrality by 2030.

The Strategy also outlines a wide range of objectives and outcomes that each sector will need to deliver in order to cut emissions and to adapt and build our County's resilience to the adverse impacts of Climate Change in the immediate, medium and longer term.

The aim is for the Strategy to be ratified and formally adopted by all 5 of Somerset's Local Authorities by the end of 2020. It is hoped that other key organisations and communities across Somerset will endorse and adopt the Strategy and its recommendations and use it as a guide or 'route map' to prioritise action, activities and investment at community, organisational and individual level.

2.3 The 9 key thematic sectors

The 9 sectors, or themes, identified within the Strategy are:

- The **Energy** we use, the emissions produced from its use and the types of energy we will look to harness in future
- Our **Transport**networks - when and where we travel, and the means we choose to make these journeys
- The **Built Environment** - where and how we live and work, the types of homes we live in, our commercial and industrial buildings and what we want for buildings in the future
- Our local economy - specifically our **Business, Industry and Supply Chains**
- Our **Natural Environment** - how we can protect it and utilise it to reduce the harmful impacts of Climate Change
- Our **Farming & Food** - what, where and how we produce our food and crops, vital to the rural economy of Somerset
- Our **Water** resources - how they are managed to minimise the impacts of flooding and drought on our residents, buildings and landscapes
- The management of our **Waste & Resources** - how we handle and treat our waste
- How we **Communicate and Engage** - with Somerset's citizens to enable us all to make life choices which reduce our impact on the environment locally, nationally and globally

The sector lead and relevant experts developed each chapter by:

- analysing the current and future issues faced by their specialist sector
- considering the national and local policy context affecting or impacting the sector
- researching and prioritising the key issues
- developing a range of climate mitigation and adaptation responses
- where possible, identifying and evaluating the costs, benefits and timescales of the actions needed to meet the Goals
- working together with other sector teams on cross-cutting issues and avoiding any unintended secondary consequences from the actions listed

By following this approach, the findings of each sector are based on the latest research, evidence and thinking from a wide range of individuals, interest groups, specialists and organisations. In addition, because there are potential health and wellbeing implications from the impacts of Climate Change within all sectors, public health experts reviewed and contributed to each of the thematic sections of the Strategy. A summary of the findings from each Sector is provided in Section 7 of this Strategy. The full detailed report from each workstream is available in Appendices 6-14. A complete table of all the outcomes derived from all sectors is presented in Appendix 15.

2.4 Climate Emergency Action Plan

From the objectives and outcomes listed, a high-level Action Plan has been created setting out a list of actions that are needed to start us on the journey to carbon neutrality. See Appendix 16

Some of these actions have been costed, key leads identified and timescales for delivery set, whilst other actions require further work, more detailed feasibility studies, wider consultation with the public and project funding identified. The Action Plan is a 'live' document which will be reviewed and updated regularly to monitor progress, new technologies and innovations, national and local policy, legislation change, and funding streams as they become available or cease.

As this is a Somerset-wide Strategy, the range of actions listed will need collaboration from businesses, communities and individuals from both within, and outside, the County.

In addition to the actions listed in the Action Plan, the County Council, District Councils and other partners will produce, or have already produced, their own bespoke Environmental or Carbon Management plans to deliver significant cuts in emissions from their own estates and operations, and to build resilience into future service delivery, estates and assets.

These plans compliment the Climate Emergency Action Plan, focusing on actions needed within each administrative area, detailing how and when projects will be delivered and funded in response to area-specific issues. Again, these plans will be dynamic and flexible in nature, continuously adapting to the most up-to-date evidence, methodologies, funding sources, emerging innovation and ideas. Links to each of the County and District environmental plans are shown in Appendix 4.

SECTION 3

So what is Climate Change?

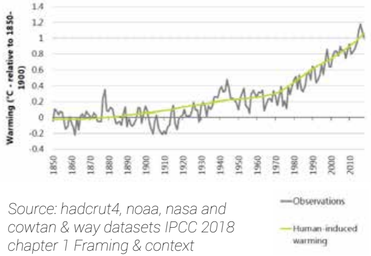
Climate Change refers to a large scale, long term shift in the earth`s weather patterns and average temperatures which is driven by increased concentrations of greenhouse gases in our atmosphere. The 'greenhouse effect' is a naturally occurring process by which carbon dioxide, water vapour, methane, ozone and nitrous oxide form a blanket around the earth in our upper atmosphere. This traps heat from the sun, preventing it from radiating back out to space, thereby regulating our climate. Since the mid-1800's Industrial Revolution, humans have, by using fossil fuels such as coal, gas and oil for heat and power generation, released millions of tonnes of additional greenhouse gases such as carbon dioxide, methane and nitrous oxide into the atmosphere, enhancing the greenhouse effect causing the temperature of the earth to rise. Carbon dioxide levels are now 40% higher than pre-industrial times and greater than any time in the past 800,000 years.

Greenhouse gases are measured in carbon dioxide equivalents (CO_2e), this allows the various global warming potentials of each types of gas to be converted into a single, comparable measure. A tonne of CO_2e equates to driving approximately 11,800 km or 7,300 miles in a small, economical diesel car or the equivalent emissions generated by a single person travelling on a flight from London to Kuala Lumpur in Malaysia[2].

3.1 How fast are temperatures rising?

Since the industrial revolution, the earth`s average temperature has risen by 1°C, a very rapid change in terms of our global climate system. Also, the world is not warming evenly, so the temperature increase is higher in some parts of the world. The UK Met Office stated that as of 2018, the 20 warmest years on record globally had occurred in the past 22 years[3]. This warming is shown on the graph below.

Most of these anthropogenic emissions will remain in the atmosphere for centuries and continue to cause long term changes to our climate system. Also, as the earth warms, the speed at which further warming occurs increases and we become more at risk of reaching a 'tipping point' whereby large and abrupt changes occur, such as arctic permafrost thawing rapidly or the Greenland ice sheet melting away causing extreme and catastrophic events.



Source: hadcrut4, noaa, nasa and cowtan & way datasets IPCC 2018 chapter 1 Framing & context

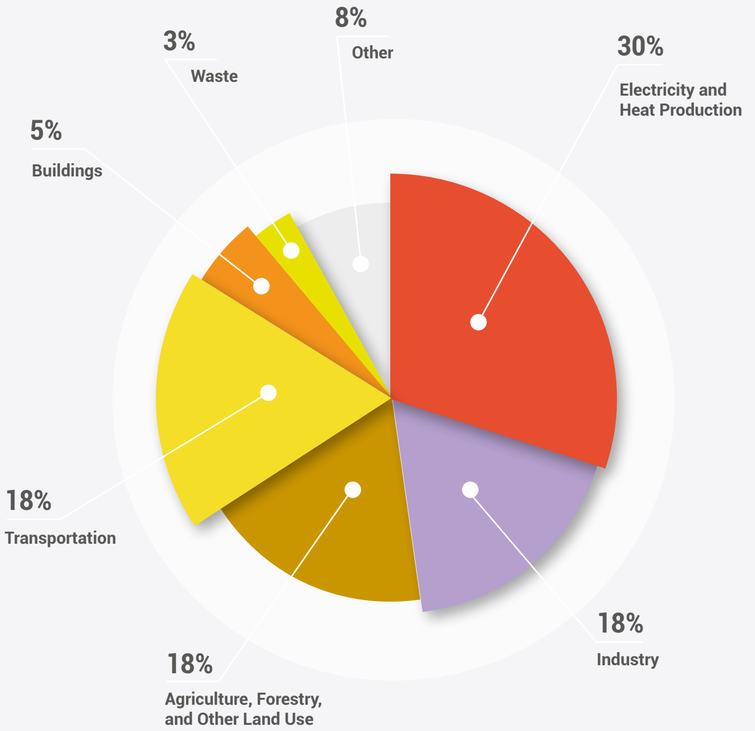
3.2 Emissions by sector

3.2.1 Global emissions
In 2017, the Intergovernmental Panel on Climate Change (IPCC) estimated that the total annual greenhouse gas emissions, including from land-use change, reached a record high of 53.5 (Gigatonne's) $GtCO_2e$. These emission estimates can be broken down by the economic activities that lead to their production as shown here.

Electricity and Heat Production (30%)
The burning of coal, natural gas, and oil for electricity and heat is the largest single source of global greenhouse gas emissions.

Industry (18%) primarily from fossil fuels burned on site at facilities for energy. This sector also includes emissions from industrial processes such as chemical, metallurgical and mineral processing and waste management activities. (Note: Emissions from industrial electricity use are excluded and are instead covered in the Electricity and Heat Production sector).

Agriculture, Forestry, and Other Land Use (18%) mostly from agriculture (cultivation of crops and livestock) and deforestation. This estimate does not include the CO_2 that ecosystems remove from the atmosphere by sequestering carbon in biomass, dead organic matter and soils, which offset approximately 20% of emissions from this sector.



Estimated Global Emissions by sector 2016
Source: https://ourworldindata.org/emissions-by-sector

Transportation (18%) primarily from fossil fuels burned for road, rail, air and marine transportation. Almost all (95%) of the world's transportation energy comes from petroleum-based fuels, largely from petrol and diesel.

Buildings (5%) arising from onsite energy generation and burning fuels for heat in buildings or cooking in homes. (Note: Emissions from electricity use in buildings are excluded and are instead covered in the Electricity and Heat Production sector).

Waste (3%) emissions arising from treatment and disposal of waste.

Other (8%) all emissions including those from fugitive emissions from industrial processes and those from the energy sector which are not directly associated with electricity or heat production, such as fuel extraction, refining, processing and transportation.

3.2.2 UK emissions

In 2018, the UK greenhouse gas emissions published by the Department for Business, Energy and Industrial Strategy (BEIS)[4] were estimated to be 451.5 million tonnes CO_2e, a significant reduction of around 43% since 1990. However, most of this progress derives from decarbonising electricity production, down 62% from 1990, as coal power generation has been phased out and replaced with less polluting energy generation methods. Emission reductions in key sectors, such as transport (28%) and the built environment (15%) have made little progress since 1990.

Transport was the largest emitting sector of UK greenhouse gas emissions in 2018

Other includes Public, Industrial Processes and the Land Use, Land Use Change and Forestry (LULUCF) sectors (note that LULUCF acts as a net sink of emissions). The percentages may not sum to 100% due to rounding.

Source: BEIS 2018 UK Greenhouse Gas Emission Statistics

Energy supply delivered the largest reduction in emissions from 2017 to 2018

	2017-2018 % change	1990-2018 % change
Transport	1%	3%
Energy supply	7%	62%
Business	3%	31%
Residential	4%	14%
Agriculture	1%	16%
Waste management	1%	69%
Other	8%	89%

The energy supply sector has accounted for around half of the overall reduction in UK emissions since 1990, at which point it accounted for 35% of all emissions in the UK. It was the largest emitting sector until its emissions fell below transport in 2016.

3.2.3 Somerset emissions

EMISSIONS BY SECTOR FOR SOMERSET 2018 ($KTCO_2$)

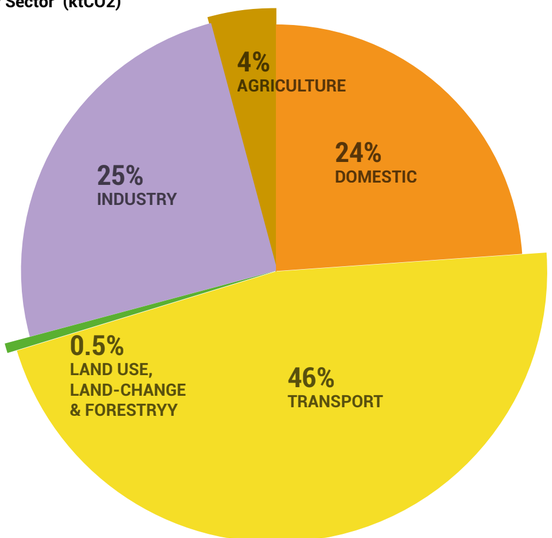
	Somerset West & Taunton	Sedgemoor	South Somerset	Mendip	Somerset	Emissions %
Industry & Commercial	158.8	196.2	263.2	206.2	824.4	**25.2**
Agriculture	43.3	23.8	38.4	32.4	137.9	**4.2**
Housing	212.8	165.1	239.7	167.5	785.1	**24.0**
Transport	408.9	450.9	386.3	259.5	1505.5	**46.1**
Land-use, Land-change & Forestry (LULUCF)	-56.6	29.4	-9.5	52.5	15.8	**0.5**
TOTAL	767.1	865.4	918.1	718.1	3,268.7	100

Source: UK local authority & regional CO_2 emissions national statistics 2005-2018

The latest carbon emissions data estimates published by BEIS shows that in 2018, a total of 3,269 (kilotons) of $ktCO_2$ were emitted in Somerset from industrial, agricultural, domestic and transport related sources[5].

The largest amount of carbon emissions generated by sector within Somerset were produced by the transport sector (46%) with a further 25% produced from industrial processes, 24% from the domestic sector, 4% from agriculture and 0.5% from LULUCF.

2018 Carbon Emissions (%) in Somerset by Sector (ktCO2)

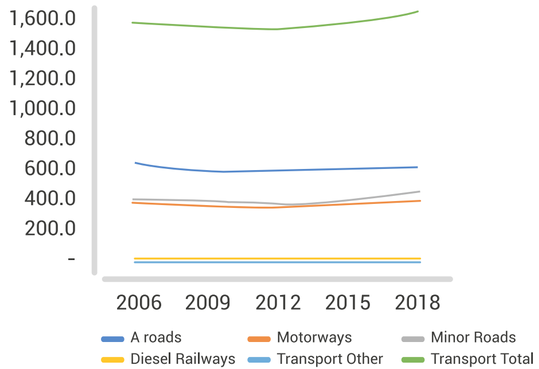


Source: UK local authority & regional CO_2 emissions national statistics 2005-2018

Transport sector 46%

Transport emissions in Somerset have remained stubbornly high, at 1,500 $ktCO_2$, with little change in the volume of emissions since the mid 2000's despite improvements in modern vehicles becoming cleaner, less polluting and more efficient.

Transport Sector Emissions in Somerset ($ktCO_2$)



Source: UK local authority & regional CO_2 emissions national statistics 2005-2018

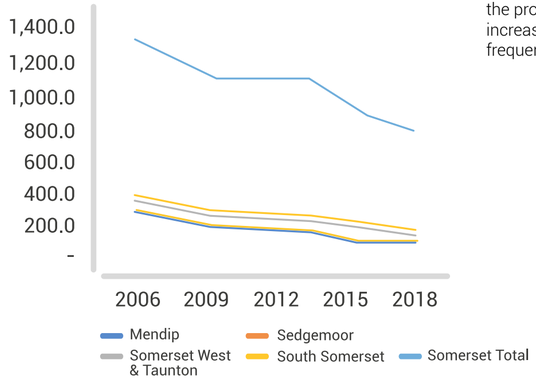
Reducing transport emissions in Somerset will be a considerable challenge, due to the rurality of the County, which makes it difficult for public transport schemes to connect dispersed communities. The geography of Somerset, and variation in access to public transport, means it is unlikely there is a single low carbon transport solution appropriate across all areas.

However, the Local Authorities are positively encouraging a modal shift away from journeys undertaken in cars to more active travel choices or public transport with the aim to make walking, cycling and public transport (in that order and wherever possible), the most convenient modes of travel. They will seek investment in developing, improving or upgrading appropriate existing transport links and networks to support this approach.

Domestic sector 24%

Emissions from the domestic sector accounted for 24% of the total emissions released in the County in 2018. The graph below shows a slow and steady reduction from all the administrative areas from around 1,300 $ktCO_2$ in 2006 to 785 $ktCO_2$ in 2018. The majority of these reductions were due to the decarbonisation of the energy sector, not significant improvements in energy efficiency within properties across the County. Progress has slowed in recent years as some of the easiest carbon reduction actions have been taken and supporting mechanisms to encourage individuals to take action (Solar PV feed-in-tariff and Green Deal) have either ceased or not been widely adopted.

Domestic Sector Emissions in Somerset ($ktCO_2$)



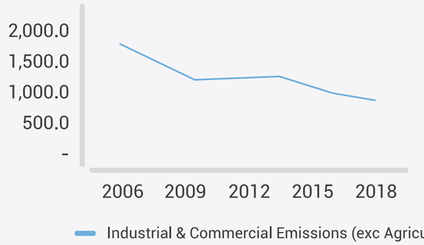
Therefore, minimising and decarbonising energy consumption in buildings will be crucial to meeting carbon neutrality targets by 2030. Through planning, Local Authorities have the power to influence the location, type of development, materials used, low carbon building design and renewable energy generation requirements for new development.

However, most buildings that will be standing by 2030 have already been built and influencing how this existing housing stock can be improved or retrofitted regarding energy efficiency measures and cutting carbon emissions is far more challenging and complex.

New developments and existing buildings and infrastructure will also require considerable investment to adapt them and build resilience to the projected impacts of Climate Change such as increased flood risk and overheating and more frequent extreme weather events.

Industry and commercial 25%
In 2018, emissions from the industry and commercial sector made up 25% of the annual carbon emissions for the County at 824.4 $ktCO_2$ (excluding Agriculture). Since the mid 2000's the volume of emissions has declined by over 50% with steep falls from emissions from large industrial installations and commercial electricity.

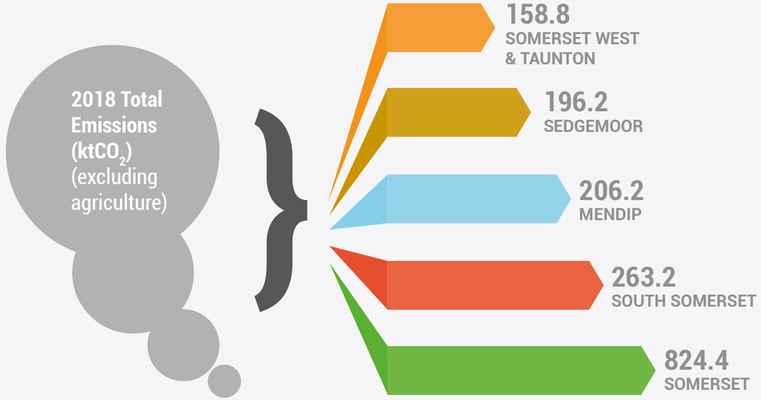
Industry & Commercial Sector Emissions in Somerset ($ktCO_2$)



Source: UK local authority & regional CO_2 emissions national statistics 2005-2018

There is a relatively even spread of emissions from this sector across all 4 District Council Areas with Somerset West & Taunton District having the lowest emissions at 159 $ktCO_2$ and South Somerset District the highest at 263 $ktCO_2$.

Industry & Commercial emissions by administrative area $ktCO_2$

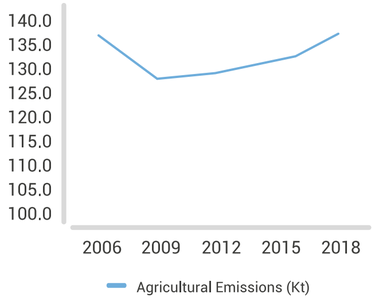


Source: UK local authority & regional CO_2 emissions national statistics 2005-2018

Whilst the dataset is used to calculate emissions at an overall District level, it only includes emissions generated within the County and does not include emissions generated from supply chains and distribution beyond the County's borders.

Agriculture 4%
The total carbon emissions from the County's agricultural sector have remained static over the past 12 years at around 138 $ktCO_2$, which equates to around 4% of the total carbon emissions for Somerset. It should be noted that methane from agricultural practices is a much greater source of greenhouse gas emissions rather than carbon emissions from the sector. This explains the disparity between agriculture accounting for 10% of the UK greenhouse gas emissions, which includes methane (as shown in section 3.2.2) and only 4% of carbon emissions for Somerset which does not take methane emissions into account. Agriculture and food production are crucial elements in the management of our local environment and the economy of Somerset. They also have national significance in terms of the quality of the landscapes and natural environment and the contribution to UK food production.

Agricultural Sector Emissions in Somerset ($ktCO_2$)



The Climate Change narrative around farming and food is one of "complexity" not only with regard to agriculture's role as an emitter and sequester of carbon, but also around how the land is, and should be, managed plus the role farming plays regarding the delivery of wider social, health and environmental benefits. As such it should be noted that this is an emerging and dynamic policy area and will need to be reviewed over time to reflect sector innovation, new evidence, science and best practice.

It must also be noted that the agricultural sector will be significantly impacted by the effects of Climate Change. Rising temperatures, altered rainfall patterns and variations to atmospheric CO_2 concentrations will impact operations and productivity, as well as pest prevalence and bring the potential for the introduction of new invasive species within the UK.

3.3 Emissions from what is consumed within Somerset

In addition to those emissions directly produced in Somerset, to which the above statistics are relevant, there are further indirect emissions. These arise from the manufacture or delivery of products, goods and services that are purchased, used or consumed by the residents, businesses and communities of Somerset but made or created elsewhere.

It is important that we do not focus solely on reaching 'Net Zero' by regarding emissions produced at a local level only. Carbon emissions will still be generated elsewhere to provide us with products and services further contributing to future Climate Change.

However, measuring the volume of 'consumption' emissions is complex, with limited 'experimental' UK data on consumption emissions published by the Department for Environment, Food and Rural Affairs (Defra) available annually. Consumption emissions statistics have higher uncertainty than the area-based emissions described above. This is due to the large amount of national accounts and trade data required, in addition to Greenhouse Gas inventories, to map the global flows of goods and services which provide inputs for a final product consumed in the UK.

In 2017, the most recent year for which estimates are available, the UK's consumption CO_2e emissions footprint was estimated to be 772 $MtCO_2e$. This is larger than the 505 $MtCO_2e$ for the UK's territorial emissions in 2017. This gap between the UK's consumption emissions and territorial emissions reflects the difference between the imported emissions to satisfy UK consumption and the emissions embedded in UK exports.

The UK has a similar consumption footprint to many European countries, with consumption footprint CO_2e emissions per person greater than France, but lower than Germany and significantly lower than non-European developed countries such as the USA, Japan, Russia and Canada[6].

Calculating emissions produced by industries and businesses is particularly difficult, primarily due to emissions from their supply chains. Not all emissions have to be publicly disclosed by businesses, so there is a lack of data available to assess the emissions of individual organisations.

From the latest estimated data, 54% of the UK's consumption footprint emissions were produced in the UK and are therefore counted in the UK's territorial account. An additional 10% are produced in EU countries, meaning around two-thirds of the UK's consumption footprint falls within countries that have legislated, or have currently proposed, an equally ambitious long-term emission reductions target as the UK. Emissions produced in China contribute 8% of the UK's consumption footprint. The large number of regions that make a significant contribution to the UK's carbon footprint reflects the complexity of current global supply chains[7].

3.4 Why is it important to act?

Due to emissions released over the next few decades added to the emissions already within our atmosphere, global average temperature will rise by over 1.5°C and climate related risks to health, the environment and economic prosperity will increase significantly.

3.4.1 The global response

At a global scale, there have been several landmark commitments and legislation (See appendix 5) to take action to cut greenhouse gas emissions including the:

- establishment of the Intergovernmental Panel on Climate Change (IPCC) in 1988 to provide detailed scientific research and reporting on how and why our climate was changing and what can be done to prevent the damaging impacts
- 1992 United Nations Conference, or Rio Earth Summit, whereby member states were brought together to cooperate on environmental issues and agree the first Framework Convention on Climate Change to stabilise Greenhouse Gas concentrations in the atmosphere
- establishment of the annual United Nations Conference of the Parties (COP) which has resulted in ground-breaking legislation including the 1997 Kyoto Protocol which set the first obligations for industrialised countries to cut carbon emissions and the 2015 Paris Agreement whereby 195 countries agreed to adopt legally binding carbon reduction targets to keep global warming below a 2°C average temperature rise.

In 2018, the Intergovernmental Panel on Climate Change's (IPCC) published its detailed special report[8] on Global Warming of 1.5°C, outlining the significant impacts this level of warming will have on the world. It also identified substantial number of climate risks that would be avoided by keeping warming to below 1.5°C compared to a greater increase.

Climate extremes Temperature extremes are expected to increase by 2-3 times the increase in global average temperature between 1.5°C and 2°C. Around 420 million fewer people would be exposed to extreme heatwaves if warming was kept to 1.5°C rather than 2°C.

Ecosystems Risks of species extinction on land and in the ocean are lower at 1.5°C than 2°C. For example, the fraction of global land area that would change ecosystem type due to Climate Change factors at 2°C (13%) would be roughly halved if warming was kept below 1.5°C (7%).

Distribution of risks The increase in climate risk between a 1.5°C and 2°C warming would disproportionately impact the poorest. Poverty and disadvantage have already increased with recent warming and will increase for many populations as average global temperatures increase from 1°C to 1.5°C and higher.

Irreversible changes Marine ice sheet instability in Antarctica and/or irreversible loss of the Greenland ice sheet could possibly be triggered by warming between 1.5°C and 2°C. Keeping warming below this level reduces the risk of triggering these large-scale irreversible shifts.

3.4.2 The UK response

The UK has been at the forefront of Climate Change legislation and established the UK Climate Change Programme in 2000 to cut greenhouse gas emission and deliver the emissions reductions agreed in the Kyoto protocol.

Climate Change Act 2008
In 2008, the Climate Change Act[9] was passed enshrining a legal duty to ensure that UK greenhouse gas emissions reduced by 80% by 2050 and established the UK Committee on Climate Change (CCC) to advise the Government.

Climate Emergency 2019
In 2019, following a review of the latest scientific evidence, the CCC published its own report 'Net Zero'[10] which supported the previous IPPC findings. They advised the UK Government to revise its long term 2050 carbon emissions target from an 80% cut, to a 'Net-Zero' target for greenhouse gas emissions by 2050.

Following the report, the UK Government revised its carbon emissions target to Net Zero by 2050 and became the first national Government to declare a Climate Emergency in May 2019. Now over 270 Councils, as well as countless other private and public sector entities, educational establishments and not for profit organisations have followed suit and declared or recognised a Climate Emergency.

The Environment Bill 2020

The UK Government has also looked to address several issues related to the natural environment by introducing the Environment Bill. This legislation will create legally binding environmental improvement targets, deliver biodiversity net gain on future developments and create a new independent Office for Environmental Protection. Its role will be to scrutinise environmental policy and law, investigate complaints and take enforcement action against public authorities to uphold environmental standards.

2021 UNFCCC Conference of the Parties (COP 26) and G7 Presidency

In 2021, under the UK's Presidency, the delayed 26th UNFCCC climate summit[11] will be held in Glasgow. The UK Government will take this opportunity to demonstrate its leadership on climate mitigation and adaptation by encouraging an increase in global climate ambition. It will focus the world on 'green growth' aiming not only to meet our Climate Change targets set under the Paris Agreement, but also demonstrating how to deliver multiple benefits from developing clean renewable energy and zero emissions transport to boost economic growth, create jobs, whilst improving public health through cleaner air. It will also promote how, through protecting and restoring nature, we can improve the resilience, sustainability and economics of agriculture. By incorporating adaptation and resilience into recovery plans, we can better prepare for an uncertain future while supporting the global economy. Underpinning all of these aims and ambitions is the need to align our public and private finance with the Paris Agreement and that through these campaigns, we can not only 'do no harm', but also rebuild our economies better than ever before.

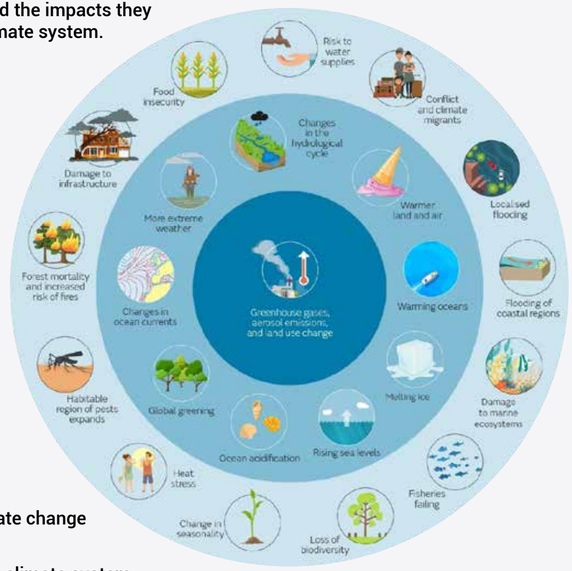
3.5 What are the impacts of Climate Change?

3.5.1 Global impacts

Some of the possible impacts of Climate Change include:

- **Rising sea levels** - Rising temperatures cause glaciers and ice sheets to melt, increasing runoff resulting in global sea level rise. Seas and oceans absorb 90% of the extra heat from global warming: warmer water expands taking up more space.
- **Flooding of coastal regions** - Coastal towns and cities are at greater risk from flooding as sea levels continue to rise.
- **Extreme weather events** – Climate changes causes extreme weather events to become more intense and frequent, such as heatwaves, droughts and floods
- **Food insecurity** - High temperatures, extreme weather events, flooding and droughts damage soils and reduce biodiversity affecting crop yields year on year.
- **Damage to marine ecosystems** - Rising ocean temperatures, ocean acidification and ocean anoxia (lack of oxygen) are damaging to marine life such as fish and coral reefs.
- **Ocean acidification** - occurs when the ocean absorbs carbon dioxide and becomes more acidic, a damaging side effect from more carbon in the atmosphere.
- **Conflict and climate migrants** - Climate Change is a stress multiplier - it can take existing problems, such as lack of food or shelter and make them worse. This can cause people to compete or fight over scarce resources (food, water, and shelter), or to migrate.

This diagram illustrates some of the drivers of Climate Change and the impacts they could have on the climate system.



Source: www.metoffice.gov.uk/weather/climate-change/what-is-climate-change

3.5.2 Summary of expected local impacts of Climate Change

TRANSPORT NETWORKS

Disruption to transport networks from extreme weather events, (flood and heat) impacting on local economy, health & wellbeing

Flood risk to transport infrastructure

Heavy rain/high winds leading to more accidents, treefalls, road closures and delays

Risk of slope/ embankment failures

Overheating/failure of signalling & comms

Risk of rails buckling, cables sagging and roads softening in heat

Discomfort on public transport

THE BUILT ENVIRONMENT

Overheating risks in housing, offices, schools, hospitals and social care settings

Damage to buildings and infrastructure from extreme weather events

Need to retrofit buildings to build resilience

New design standards needed for drainage, insulation and building fabric etc Increased flood risk

Increased water stress

Disruption to power and communication networks

BUSINESS & INDUSTRY

Costs to reduce emissions and adapt infrastructure to Climate Change

Disruption to transport, energy and communications

Risks to supply chains both local, national and global

Increased prices for raw materials, goods, and other imported commodities

Reduced comfort in buildings impacting on productivity

Changes to markets and demand

THE NATURAL ENVIRONMENT & AGRICULTURE

Risk to vulnerable species and habitats

Impacts on 'eco-system services' enjoyed by people

Impacts of increased drought

Damage to natural habitats from water stress

Pests and disease risk of invasive/non-native species colonising

Changes to growing seasons

Heat stress on livestock

Damage to crops & landscapes from flooding

WATER (FLOOD RISK & DROUGHT)

Increase risk of coastal, pluvial and fluvial flooding

Increased flash flood risk from extreme weather events

Further stress on already under pressure water resources

Increased competition for water between agriculture, industry, households and the needs of the natural environment

Drought impacts on water quality and supply

HEALTH & WELLBEING

Increase in heat-related illness and death

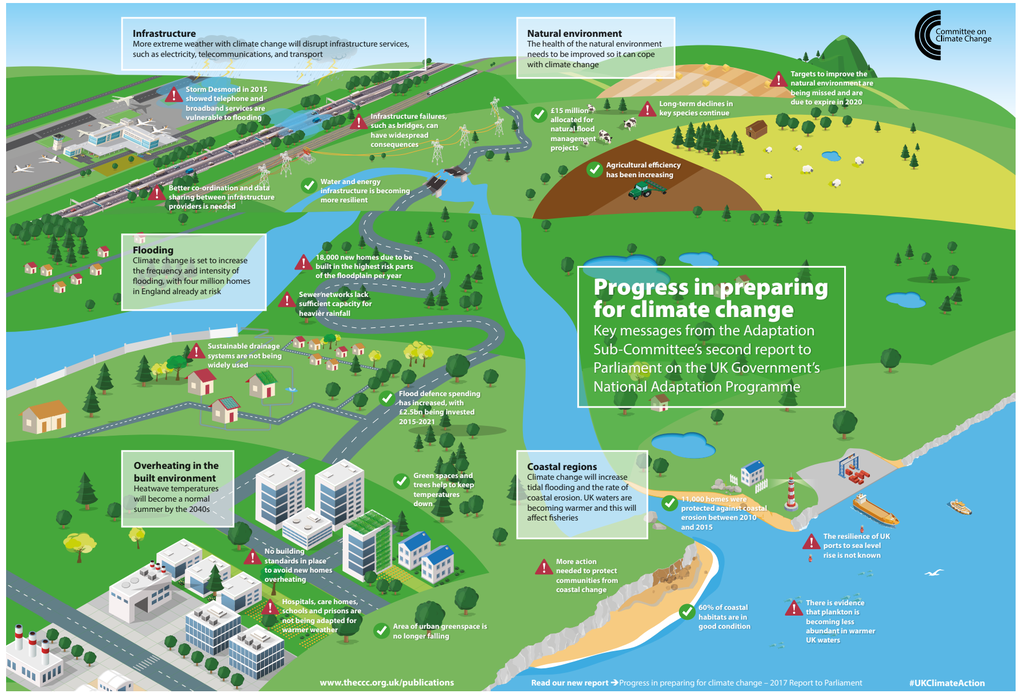
Risk to the elderly and very young with heart and respiratory disease

Disrupted access to services and facilities from extreme weather events

Flooding impacts on health, wellbeing and livelihoods

Air quality impacts exacerbated

UK Progress in preparing for Climate Change



Source: www.theccc.org.uk/publications

3.6 The co-benefits of acting on Climate Change

The scientific evidence presented above describes why we must take urgent action to reduce our carbon emissions. However, there is also much to be gained from doing so as part of a 'smart and sustainable' future for Somerset. Since the publication of the Stern report in 2006 on the economic impacts of Climate Change, it has been well understood that the benefits of acting to reduce carbon emissions outweigh the costs[12]. While there are considerable challenges associated with reaching our carbon neutral target by 2030, the benefits of taking action significantly outweigh the costs over time.

SUMMARY OF CO-BENEFITS OF ACTING ON CLIMATE CHANGE

ECONOMIC	SOCIAL	ENVIRONMENTAL
Clean and inclusive growth in the local economy	Improved air quality	Reduced flood risk (coastal, pluvial and fluvial)
Low carbon technologies	Lower living costs	Improved access to greenspace and nature
High quality employment	More active, outdoor lifestyles	Improved & enhanced biodiversity and habitats
Improved productivity	Healthier diets	Improved land management
Diversification to more sustainable markets	Fuel poverty alleviated	Cleaner air
Reduced heat & energy costs	Less demand on health services	Cleaner water
Increased energy security	Improved mental health	Greater water security
Reduced imported fuels and materials	Fewer work & school days missed	Carbon sequestration in all habitats
Reduced congestion	Less premature deaths	Less risk of heatwaves and extreme weather events
Reduced costs from flood & extreme events	Warmer, healthier homes	Less waste/less resource use
Reduced waste	Quieter, safer streets	Reduced/reverse species decline
A circular economy	Improved community cohesion	
	Better work/life balance	
	Less waste	

SECTION 4

Our Goals

GOAL 1

To decarbonise Local Authorities, the wider public sector estates and reduce our carbon footprint

GOAL 2

To work towards making Somerset a Carbon Neutral County by 2030

GOAL 3

To have a Somerset which is prepared for, and resilient to, the impacts of Climate Change

4.1 Goal 1: To decarbonise the Local Authority and wider public sector estates and reduce our carbon footprint

This Goal is formed of 2 discrete parts and should be considered a short-term Goal delivered within the next decade.

GOAL 1A
The aim of Goal 1a is to decarbonise the Local Authority estate, assets and operations across Somerset, reducing its overall carbon footprint in the short term. The ability to act and affect a positive change lies directly within the gift of the 5 Somerset Local Authorities.

In order to meet this aim, significant investment, along with a comprehensive review of how and where services are delivered, how staff travel and work and what is purchased, and from where, is needed to identify where the carbon savings can be made. This is where the Local Authorities have the greatest ability to influence and contribute to the wider Goal 2 (See below).

Goal 1B
The aim of Goal 1b is to encourage and support the decarbonisation of the wider public sector estate across Somerset, reducing the carbon footprint of its operations and activities. Whilst the ability to direct the type or speed of the activity to cut carbon emissions is not solely within the gift of the 5 Local Authorities, many public sector partners across Somerset are already on a similar journey to decarbonise their estates and assets. It is therefore possible for the Local Authorities to lead by example, share learning, look for joint working opportunities and share services and assets where economies of scale can be identified.

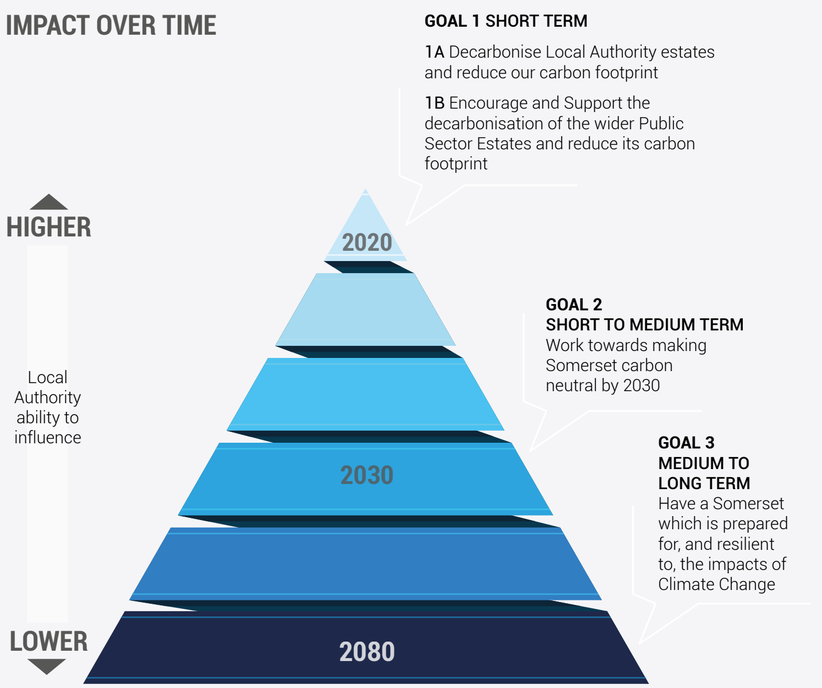
4.2 Goal 2: To work towards making Somerset a carbon neutral County by 2030

This is considered a short to medium term Goal with the ambition to have delivered this by 2030. Whilst by setting the Goal of Carbon Neutrality by 2030 goes much further and faster than the Climate Emergency declarations made by the UK Government and some other Local Authorities, it was agreed that this Strategy should set this ambitious target in order to address the pressing need for rapid action on Climate Change. We all must take ownership and achieving this goal will require a strong commitment from our communities, our businesses, our partners and our citizens.

A primary objective of this Strategy is to identify clear pathways by which carbon emissions from all sectors within and beyond Somerset can be directly reduced, avoided or mitigated against. The 5 Local Authorities have a key role in both leading and supporting others to act but its success will rely on significant national and local policy change and the commitment of others to act and rapidly adopt significant changes to existing lifestyles and behaviours.

Achieving this Goal will require far reaching and unprecedented changes in all aspects of society.

IMPACT OVER TIME



4.3 Goal 3: To have a Somerset which is prepared for, and resilient to, the impacts of Climate Change

This is considered a medium to long term Goal, with resilience being developed from now until the middle and latter parts of the century.
This Goal seeks to ensure that the County of Somerset is prepared for, and builds resilience to, the likely impacts of future Climate Change. This will require action across all sectors within the County, as well as commitment and support from business and industry, farming and food sectors, communities and individuals. Action will need to be taken to adapt or 'future proof' the homes we live in, the places we work, our transport and communication networks and how goods and services are provided and delivered across the County.

It requires focusing on adapting the built environment (homes, offices, industrial buildings, roads and railways) where possible to protect against rising temperatures, changing patterns of rainfall, sea level rise as well as extreme weather events (heatwaves and flooding).

In addition, our natural environment will be impacted, growing seasons will change, pests and disease could become more prevalent and our soils and vegetation will be at risk from extreme events such as drought and flood. Through careful thought and planning, any potential benefits that may arise from our changing climate can be captured and exploited.

Achieving this Goal for the whole of Somerset will be beyond the limited control of the Local Authorities alone. Its success will largely rely on major policy changes at a national level, with regards to building standards for homes and infrastructure, significant funding being made available to help fund the levels of future proofing needed and the commitment of others (businesses, communities and individuals) to act and make significant changes to lifestyles and behaviours.

SECTION 5

Challenges to achieving these Goals

5.1 The Local Authorities' role

The role of the Local Authorities will be to show leadership by adapting its own estate, assets and operations, lobbying the UK Government for funding and legislative changes as well as influencing, enabling, supporting and working with individuals and organisations to drive change. By working with an array of groups, Local Authorities can empower, encourage and support the strategic actions required to achieve carbon neutrality for Somerset. This underlines why it is essential to build a consensus and ensure Somerset residents share ownership of the Strategy and the delivery of its actions.

The policies, strategies and regulatory powers of the Local Authorities can make significant contributions to reductions to net emissions across Somerset. For example, the ability of Local Authorities to stipulate higher standards for new developments is limited by the National Planning Policy Framework (NPPF) but local planning policies can set more challenging carbon reduction targets for new developments to cut emissions, as opposed to continuing a 'business as usual' approach to development. However, it is likely the NPPF will require significant amendment to enable Councils to enforce these standards without fear of developers launching and winning costly, damaging appeals against local planning policies and decisions.

5.2 Transport

The composition of Somerset, both geographically and demographically, adds to the difficulties in delivering our Goals. Whilst the beauty of the natural environment and rurality of the region makes Somerset a special place to live, reducing emissions from the transport sector is less simple than in an urban town or city with a more concentrated, less dispersed population.
There are 6,604km (4,104 miles) of roads in the County with a total of 4.31 billion miles travelled upon them in 2018[13].Whilst urban centres like Taunton, Yeovil and Bridgwater are relatively well connected, accessibility is an issue in rural areas due to the limited local road network and a paucity of public transport in areas like the Mendip Hills, Exmoor and between Somerset's many villages and hamlets.

Additionally, the presence of arterial roads spanning Somerset (the M5 and A303) contributes to a large proportion of transport emissions with journeys not necessarily originating or terminating within the County. 26% of Somerset's total transport emissions derive from the M5 alone. Changes in national policy are needed to tackle emissions generated from these transient journeys as they fall largely outside the remit of the Somerset Local Authorities.

5.3 Low carbon energy

Furthermore, the abundance of protected landscapes, such as Exmoor National Park and the four Areas of Outstanding Natural Beauty (AONBs), add to the natural capital within Somerset, yet may prove problematic when identifying areas suitable for renewable energy generation and storage, and Climate Change adaptation projects.

Initial scoping work has highlighted the need for retrofitting or the upgrading of a large number of existing domestic and commercial buildings in Somerset to improve energy efficiency, decarbonise heat and power, and ensure future resilience. To meet the national Net Zero target, it is estimated that 26 million properties across the UK will require a deep retrofit by 2050[14]. This equates to 16,000 properties per week, yet currently only around 20,000 per year are in receipt of energy efficiency measures.

The lack of disposable income and prevalence of fuel poverty in some of our communities, as well as the limited opportunities for Local Authorities to influence the energy standards of private properties, present barriers to project implementation. Furthermore, the end of life disposal or recycling of any low carbon or renewable energy technologies (electric vehicle batteries, solar panels or wind turbines) needs to be carefully considered at the implementation stage in order to minimise any future environmental impact.

For many years, Somerset has hosted nuclear power production, which is recognised as a low carbon power generator. With Hinkley A having ceased production and Hinkley B nearing the end of its productive life, the Hinkley C plant currently under construction will continue low carbon energy production in Somerset for decades to come.

5.4 Funding

The UK Government's target for national carbon neutrality by 2050 means that centralised funding for initiatives may be out of step with our 2030 target unless the investment is front-loaded in the 2020s. We will need to lobby Government to prioritise Somerset for investment if our Goals of carbon neutrality are to be met. New funding streams and programmes are being announced as part of the 'green' recovery following the Covid-19 pandemic, such as the Green Homes Grant, but it is too early to judge what impact these will have.

With limited resources available for Local Authorities to deliver projects and infrastructure change, prioritising resource allocation is essential. We collectively have finite and limited funds, and a significant proportion of this money is already allocated. We must ensure we gain optimal benefits and emissions reductions from all our investments. Whilst there is a role for in-depth analysis and longer-term planning, it should not prevent us from taking immediate action in areas that already have a strong evidence base. The Committee on Climate Change's Net Zero report provides clear guidance as to the 'least regret options' and interventions that will be necessary in order to deliver on a carbon neutrality target.

5.5 Skills, knowledge and innovation

Research shows that a wide array of both higher and lower-level skills will be needed to meet carbon neutrality objectives, cutting across multiple industries and supporting activities such as low-carbon heating and energy, the production and maintenance of low-emission vehicles, as well as the wide-scale retrofitting of homes[15]. The challenge for Somerset will be in understanding the specific skills required and ensuring that the current and future workforce has access to appropriate training. It is important to ensure that individuals understand the opportunities in relation to carbon neutral jobs both now and in the future. This will ensure Somerset has an appropriately skilled workforce 'pipeline' which fully meets demand.

The Hinkley Point C project[16] demonstrates the demand for both high-level skills and more basic skills when delivering large-scale low carbon projects. This dynamic of requiring a combination of higher (NVQ4), to lower-skilled (NVQ2-3) roles is replicated across low-carbon industries, from heating and energy to electric vehicle production.

In broad terms, Somerset has a greater proportion of people with NVQ1-3 skills levels (i.e. up to and including further education) and marginally fewer people with NVQ4+ skills (i.e. degree level and above). However, the County has leading skills and innovation strengths in industries such as aerospace, nuclear and advanced engineering and manufacturing. Achieving carbon neutrality, whilst profiting from the opportunities of transition, will require the development of new skills as well as the repurposing of others, enabling workforce mobilisation across sectors, capitalising on competitive advantages we have in certain industries, whilst plugging inevitable skills gaps elsewhere.

5.6 Everybody must play their part

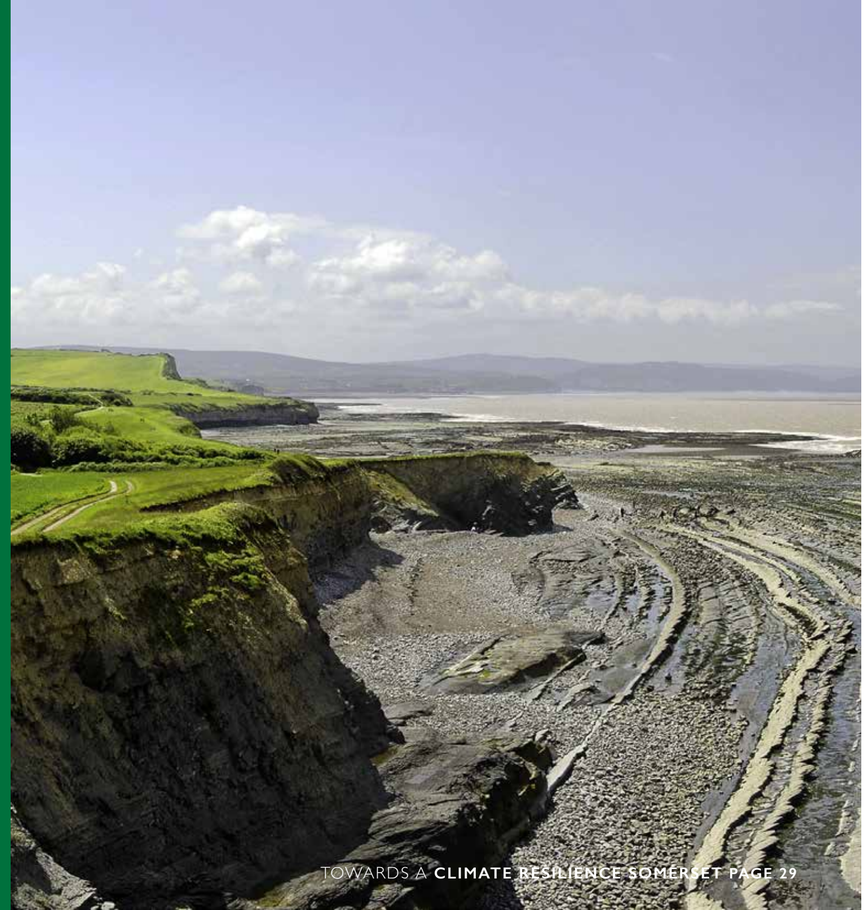
All the challenges described above require a whole system approach to tackling Climate Change and demonstrate the need for a joined-up strategic plan for delivery. The biggest gains in direct emissions reduction will be delivered via the decarbonisation of the energy and transport sectors through electrification. However, there will be constraints on how hard and fast we are able to go, not least from funding, but also due to constraints on our electric grid system.

Whilst the Local Authorities can set policies and create programmes to drive things forward, it is ultimately Somerset's residents, and the everyday choices they make, that will have the biggest impacts. In order to deliver fundamental and lasting change, in the absence of national legislative drivers, we (the Local Authorities) must encourage, empower and enable our residents to take personal decisions that will reduce their own personal carbon footprints and change behaviours so the Goals of the Strategy can be met. However, we also understand that adopting a low carbon lifestyle, by purchasing an electric vehicle, retrofitting a home, buying low energy appliances and buying locally sourced and healthier foods can be expensive and unaffordable for many residents and households on low incomes.

Town and Parish Councils, with their detailed local knowledge, understanding of local needs and ability to connect with and empower local residents to take action are ideally placed to support communities to take these steps. They are in a position to share information about the impacts and opportunities presented by Climate Change, to plan the responses needed and they will play a critical role in the collective efforts for Somerset to become carbon neutral, and building future resilience at a community and household level.

SECTION 6

Covid-19 and the opportunities from a 'green' recovery



Whilst this Strategy was being drafted, the world was impacted by the Covid-19 pandemic. The rapid development of this public health crisis changed all our lives, with devastating impacts on human health and the economy. It triggered the worst recession in living memory (around a 20% contraction in the UK for the 3 months from March to May 2020 according to the Office for National Statistics[17]) and raising unemployment to levels beyond the 2008/09 financial crisis. The extraordinary steps taken to slow infection rates and protect public health created new economic and social pressures with significant changes to how we live and work.

There were marked decreases in local and regional traffic levels (down around 40% according to AA reports) as society locked down, shops and businesses closed, and commuting ceased as people either worked from home or were furloughed. Passenger flights from major airlines in the UK and around the world decreased by up to 90% and there was a massive increase in active travel modes (walking and cycling), with an uptake in cycling of over 200% in many areas. These modal shifts away from car use has led to significant improvements in localised air quality and health.

Other impacts of lockdown were that electricity demand fell, the four remaining UK coal fired power stations were taken offline, and renewable energy sources supplied nearly 40% of the energy used. People shopped more locally buying local produce.

Since the onset of Covid-19, due to the extensive lockdowns and reduction in economic activity, there has been a significant, albeit temporary, fall in greenhouse gas emissions both in the UK and around the world. Indeed, the International Energy Agency (IEA) suggest that global CO_2e emissions are likely to fall by as much as 8% this year – six times larger than the reduction seen following the global financial crash[18].

But this effect is only temporary. CO_2e emissions must be cut consistently year after year until they reach Net Zero to slow and halt global warming if we are to address the cumulative problem of rising concentrations of greenhouse gases in the atmosphere. Innovative and radical solutions are needed to cut emissions permanently as people return to pre-Covid-19 routines and practices unless greener, low carbon options are made available and, in some cases, enforced.

6.1 Build Back Better

As we recover from the pandemic and return to a new 'normal', the Committee on Climate Change (CCC) has called on the UK Government to seize the opportunity to make the Covid-19 recovery a defining moment in tackling the climate crisis, framing a recovery that both accelerates the transition to Net Zero and strengthens our resilience to the impacts of Climate Change, whilst driving new economic activity[19]. In May 2020 Lord Deben, Chair of the CCC, stated:

"The Covid-19 crisis has shown the importance of planning well for the risks the country faces. Recovery means investing in new jobs, cleaner air and improved health. The actions needed to tackle Climate Change are central to rebuilding our economy. The Government must prioritise actions that reduce climate risks and avoid measures that lock-in higher emissions"

6.2 Risks to Net Zero and Build Back Better

The Covid-19 crisis however also presents potential threats and obstacles to delivering the UK's Net Zero goal. Inevitably, greater measures to protect public health will affect the ability to deliver some climate measures (e.g. continued social distancing will hinder moves towards public transport, and some low-carbon investments will be delayed).

In the short term, with the economy operating well below capacity, action by Government must aim to tackle unemployment and inequality, protect workers and businesses, restore confidence, encourage spending and rebuild a greener economy, particularly for the most affected regions and sectors. These objectives can be strongly complementary to the UK's climate goals but must avoid locking in any carbon-intensive activities in the long term.

Longer term, a 'green' recovery shifting away from polluting, carbon-based fossil fuels can create a cleaner, healthier environment. Investments in low-carbon and climate-resilient industries and infrastructure can create jobs and stimulate economic recovery, change the trajectory of UK emissions toward Net Zero, whilst improving our resilience to Climate Change impacts.

In Somerset, Hinkley Point C and the Gravity Campus are leading UK examples of how clean, low carbon growth can create high value jobs, benefit the local supply chain and help deliver a 'Net Zero' future.

There are clear economic, social, and environmental benefits from immediate expansion of the following measures:

- Investment in low-carbon and climate-resilient infrastructure
- Support for reskilling, retraining and research for a Net Zero, climate-resilient economy
- Greater investment in renewable energy technologies and the wider development of a resilient and flexible 'smart grid' energy system to allow these technologies to support more of our changing energy demands
- Upgrading and retrofitting homes and other buildings to improve energy efficiency, implementing low carbon heating and ensure properties are resilient for the future
- Decarbonising the transport system by investing in electric vehicle charging infrastructure, rail electrification and hydrogen technologies along with investment and space to make it easy for people to walk, cycle and work remotely
- Improved green space management including peatland restoration, improving the productivity and resilience of our food supply, strengthening investment in water management, flood protection and coastal defences, protecting and enhancing biodiversity and researching the development of natural carbon storage at a much larger scale

Public money should not support industries or infrastructure in any way that is inconsistent with the future Net Zero economy or that increases exposure to climate risks.

SECTION 7

Challenges to achieving these Goals

As described previously, 9 key sectors, responsible for the majority of the CO_2e emissions released within Somerset, were identified:

- The **Energy** we use, the emissions produced from its use and the types of energy we will look to harness in future
- Our **Transport**networks - when and where we travel, and the means we choose to make these journeys
- The **Built Environment** - where and how we live and work, the types of homes we live in, our commercial and industrial buildings and what we want for buildings in the future
- Our local economy - specifically our **Business, Industry and Supply Chains**
- Our **Natural Environment** - how we can protect it and utilise it to reduce the harmful impacts of Climate Change
- Our **Farming and Food** - what, where and how we produce our food and crops, vital to the rural economy of Somerset
- Our **Water** resources - how they are managed to minimise the impacts of flooding and drought on our residents, buildings and landscapes
- The management of our **Waste and Resources** - how we handle and treat our waste
- How we **Communicate and Engage** - with Somerset's citizens to enable us all to make life choices which reduce our impact on the environment locally, nationally and globally

Specialists led work on each of the 9 sectors, analysing and prioritising current and future issues, considering local and UK Government policy implications, and identifying a series of actions needed to minimise emissions and build resilience within each area of work.

A workstream lead, supported by a wide range of relevant sector and subject-matter experts and stakeholders worked to:

- analyse the current and future issues faced by their specialist sector
- consider the national and local policy context affecting or impacting the sector
- research and prioritise the key issues
- develop a range of climate mitigation and adaptation responses
- identify the key outcomes each sector would need to work towards to achieve the Climate Emergency Strategy's Goals

A summary of the findings from each sector, along with the outcomes needed to lead us towards carbon neutrality, is presented here. The organisation(s) who will lead, support and enable the delivery of each outcome are identified, along with the goal(s) the outcome delivers against. Also included is the indicative timescale by when each outcome will need to be achieved and some of the likely co-benefits that may arise from enacting each.

A detailed report from each of the sectors, and a complete table of the 63 sector outcomes is provided in Appendices 6-15.

7.1

ENERGY SECTOR SUMMARY

Introduction

We all depend on energy to power, light and heat our homes and businesses. Across Somerset, we currently consume approximately 2,451 GWh of electricity[20] and 3,179 GWh of gas per annum[21]. In addition to this, we consume approximately 2,570 GWh of residual fuels such as petroleum, coal, solid fuels, bioenergy and waste (excluding road transport[22]). To become a carbon neutral County, it is critical that we eliminate the use of fossil fuels and support the UK's transition to a low carbon, predominantly electric, smart, flexible, Net Zero energy system. This will include the electrification of transport and heating, mitigating the rise in demand for electricity and significantly reducing energy consumption through energy conservation, efficiency, increasing renewable energy generation and embracing smart grid technologies across Somerset.

A 'whole systems' approach to transforming the energy system is required. Every topic within this chapter could be considered individually, with projects arising from each taken forward in isolation, but major inter-dependencies and opportunities would be missed by taking this approach. A 'whole systems' approach to energy policy is required nationally and locally.

Within the region, there are major players in the energy sector with whom the Local Authorities will work closely to develop projects and proposals through to delivery so as to address some of the challenges this paper presents and ensure an optimal outcome for Somerset. Close working relationships with Western Power Distribution (WPD), Scottish and Southern Electricity Networks (SSEN), EDF Energy, public sector partners, Somerset Community Energy (SCE), community energy groups, the University of Exeter Centre for Energy and the Environment, Regen, The Centre for Sustainable Energy (CSE), the South West Energy Hub, the South West Energy Unit, and others will be vital to achieving success.

In addition, the Heart of the South West (HotSW) Local Enterprise Partnership (LEP) has reframed its Local Industrial Strategy in relation to delivering clean growth[23]. It will be important for the Local Authorities to engage closely with the LEP as into 'on the ground' delivery through its emerging Energy Strategy Action Plan[24].

Considering the Covid-19 crisis, the accompanying recession and the amount of economic stimuli that will be necessary to achieve a recovery, there is an opportunity for Somerset to re-prioritise and stimulate the economy through investment in renewable energy and energy efficiency to deliver our carbon neutral Goals.

No.	ENERGY SECTOR OUTCOME	Outcome Delivered by?	Which Goal Outcome Supports	TIMESCALE Short, Medium or Long Term	CO-BENEFITS
1	Develop and deliver an Energy Plan for Somerset - Roadmap to decarbonising the energy system in Somerset. whole systems approach (buildings, heat, transport and power generation).	Local Authorities, Delivery Partners, Businesses, Industry, Agriculture, WPD, SSEN	1, 2 & 3	Short, Medium & Long Term	Stimulate the market, green economy, growth and prosperity, energy security.
2	Local Authority Energy Performance is smarter, more efficient and eliminates the use of fossil fuels for heating and transport by 2030 (Estate and Operations)	Local Authorities	1& 2	Short, medium & long term	Minimised running costs, stimulate market & supply chain, demonstrate real world examples, leading by example
3	100% of Local Authority energy demand is met through locally generated and locally owned renewable energy by 2030. (Estate & Operations)	Local Authorities	1 & 2	Short, medium & long term	Stimulate the market, green economy, growth and prosperity, energy security, leading by example
4	Low carbon and renewable energy generation, storage and schemes supporting smarter grid flexibility are delivered on Local Authority land and assets.	Local Authorities	1 & 2	Short, medium & long term	Stimulate the market, green economy, growth and prosperity, energy security, leading by example
5	A significant proportion of electricity demand across Somerset is met by locally generated and locally owned low carbon and renewable energy (excluding nuclear) by 2030, moving towards 100% and then becoming a net exporter by 2050	UK Government, LEP, DSOs, partners, Energy Hub, community energy groups, individuals, businesses	1 & 2	Medium to long term	Energy security, affordable energy for all, money spent on electricity stays within the County, community investment, green economy, growth and prosperity.
6	The electricity grid is smarter, more flexible and peak demand is met through low carbon and renewable energy, energy storage and improved demand side response.	UK Government, Ofgem, LEP, DSOs, Local Authorities, Energy Generators, Businesses, Individuals	1 & 2	Medium to long term	Unlocks huge economic potential. Local energy markets, affordable energy for all
7	Heat demand within Somerset is reduced and decarbonised as far as possible by 2030 and fully by 2050	UK Government, Local Authorities, Community Energy, Businesses, Individuals	1 & 2	Medium to long term	Stimulate the market, green economy, growth and prosperity, energy security
8	Energy infrastructure in Somerset is adapted and resilient to the projected impacts of Climate Change.	UK Government, DSOs, Local Authorities.	3	Short, medium & long term	Energy security/ reliability

Renewable energy

Somerset has significant untapped potential in relation to renewable energy generation. The 2015 'The Power to Transform the South West' Report considers, at a high level, the renewable energy opportunities across the South West. It suggests that 152% of total future energy needs for Somerset could be produced through renewable energy in the County to a tune of 3,646 MWe (electrical) and 1,320 MWth (thermal) generation (assuming a 40% reduction in demand through energy efficiency improvements[25]). The County Council is a founding member of UK 100's Countryside Climate Network and has pledged to secure the future of the County by shifting to 100% clean energy by 2050.

There is a well-established community energy sector within Somerset and working in partnership to support community energy is key to the transition. Community energy offers an opportunity for communities to take a direct and active role in reducing their energy consumption and costs, increasing renewable energy generation, and benefitting economically, socially and in terms of security of supply.

The Somerset Local Authorities will:

- Switch to 100% renewable energy tariffs (short term solution) with a medium to long term view to purchase energy from local community energy schemes and renewable energy generators in the County.
- Explore and implement opportunities for generating renewable energy and battery storage initiatives on Local Authority land
- Support and develop partnerships with community energy initiatives and explore how to support these organisations.
- Map and analyse low carbon and renewable energy resources and opportunities across the County to a suitable level of detail to support allocation of sites and identification of suitable areas through Local Plans.
- Define a clear pathway for increasing renewable energy in the County with road maps to 2030 and 2050.
- Develop an Energy Plan for Somerset in partnership with the DSOs and key stakeholders.
- Design Local Authority new buildings and developments to maximise opportunities for renewables including potential for micro-grids and heat networks.
- Enact planning policies and strategies to create a positive and proactive environment to enable renewable energy generation and which supports the transition to a smart, flexible energy system.

Opportunities and benefits

- Energy security
- Reduce the County's dependency on imported fossil fuels
- Money spent on electricity stays within the County
- Community energy investment
- Community energy groups could be a vehicle for energy conservation and efficiency initiatives.
- Green economy, growth and prosperity
- Develop skills and training
- Stimulating the market and supply chain
- Promote existing schemes such as Solar Streets
- Transition to a smart, flexible grid network
- Local energy markets

Barriers and challenges

- Grid capacity is a significant issue for Somerset
- Grid issues may be a barrier to connection in certain areas, e.g. high connection costs, costly grid reinforcements and long waiting times.
- Engaging landowners
- Changing public perception and misconceptions

Hinkley Point C

The construction of Hinkley Point C (HPC) offers transformational potential for Somerset. HPC is the largest 'low carbon' energy project in the UK and offers a range of economic, social and environmental opportunities during and after the construction period.

HPC plays a vital role in the UK's move to Net Zero. Once operational (unit 1 is expected to be commissioned in 2025, with unit 2 approximately a year later) HPC will provide 7% of the nation's electricity, enough to supply 6 million homes. EDF estimates that 9 million tonnes of CO_2 will be avoided per year when compared with electricity generation from gas power stations. EDF also estimates that in order to build HPC, around 3 $MtCO_2$ will have been produced or generated, meaning that the plant will only need to operate for around 4 months to offset the emissions released during its construction.

The power plant is expected to operate for at least 60 years. HPC is identified in the new Local Industrial Strategy as key to delivering 'Energy Futures' for the Heart of the South West. 'Energy Futures' is defined as the opportunity for clean, inclusive growth associated with the nuclear industry, marine renewables and improvements to energy infrastructure.

During construction, supply chain, skills development and inward investment all benefit significantly from this £21bn project, with over £1.3 billion already invested directly to South West Businesses. At peak construction at least 5,600 workers will work on site each day. The HPC education, skills and employment pipeline is continuing to ensure that the huge opportunities available throughout the construction of the new power station can be accessed by individuals from across Somerset and the South West, whether they are in school, exploring careers or accessing apprenticeships and other career routes[26].

Several initiatives are already under way to secure a clean energy legacy from HPC, including:

- Nuclear South West
- The South West Nuclear Hub
- Nuclear Sector Deal

The construction of HPC will create a lasting legacy from the investment in skills, business development, the supply chain, environment, housing and infrastructure, with the opportunity to create and sustain a strong clean energy industrial sector based around high-technology industry, new sectors and a highly skilled work force, benefitting the growth of the wider green economy.

Electrification of transport

The Committee on Climate Change Net Zero Report identifies that extensive electrification of surface transport is required to meet Net Zero, coupled with major expansion of renewable and low carbon power generation[27]. The shift to electric vehicles has the potential to reduce the annual cost of transport in the UK by £5 billion[28] and combat local air quality issues. The shift to all electric cars and vans by 2050 "would require 3,500 rapid and ultra-rapid chargers near motorways to enable long journeys and 210,000 public chargers in towns and cities. Today in total there are 21,000 public chargers of all speeds[29]". Electric vehicle charging infrastructure in Somerset needs to scale-up significantly. There are concerns that the grid currently has insufficient capacity to accommodate electric vehicles on a wide scale within Somerset. Significant action is required from the whole community, locally, and internationally - working together. Local Authorities have limited options and funding available to accelerate the shift to zero emission vehicles so the Strategy will identify how Somerset's Local Authorities can work closely with the UK Government, industry and other stakeholders to bring about change.

The Somerset Local Authorities will lead by example in the electrification of their vehicle fleets and in the development of an Electric Vehicle Charging Strategy for Somerset. The Strategy will provide the basis for the Somerset Local Authorities to:

- Develop and deliver projects on their own land and assets as appropriate, informed by the best way to 'future proof' investment, maximise opportunities and benefits.
- Influence investment in the grid and work to release capacity in the grid by the Distribution Network Operators (DNOs).
- Set policies and guidance and allocate specific sites for charge point development though Local Plans and other means.
- Lobby the UK Government and others on the prerequisites for proliferating electric vehicles in Somerset.
- Understand what their role should be on delivering electric vehicle charging points going forward.

Opportunities and benefits

- Reducing the County's dependency on imported fossil fuels
- Energy security
- Reduced CO_2 emissions and improved air quality
- Vehicle to grid (V2G) - enabling consumer participation in smart grid
- Electric vehicles are cheaper and cleaner to run
- incentivising households, businesses and community investment in renewable energy (e.g. charging car batteries using roof top solar etc)
- Green economy, growth and prosperity
- Develop skills and training
- Stimulating the market and supply chain

Barriers and challenges

- Grid capacity is a significant issue for Somerset
- Requires a detailed plan to influence investment on the grid / release capacity
- Incentives for the take-up of electric vehicles and charge points
- Range anxiety
- Issues regarding off-street parking,
- Time needed for planning processes and construction of infrastructure, etc.
- Initial cost of purchase

Heat

37% of carbon emissions in the UK are derived from heat[30] and approximately 70% of homes in Somerset are connected to the gas network[31]. Gas is the predominant heating source across the County, however, with approximately 30% of homes not connected to the network, there is a significant proportion of homes being heated by other means including LPG, oil, electricity, biomass, solid and other fuels[32].

The CCC Net Zero Report identifies that heat should be decarbonised across the building stock, with all new buildings, all non-residential buildings and 90% of existing homes having their heat demand met by low carbon heat[33]. This is a significant increase on the 4.5% of existing buildings which currently meet their heat demand from low carbon sources. The Report identifies that meeting this target will require far greater and faster roll out of heat pumps, hybrid heat pumps and district heating, in conjunction with hydrogen, and new smart storage heating, combined with high levels of energy efficiency as well as no new homes being connected to the gas grid from 2025.

The Somerset Local Authorities will:

- Lead by example: retrofitting existing LA owned buildings (offices, public buildings, schools and social housing, etc.)
- Lead by example: All LA new builds to be exemplar in terms of carbon neutrality, smart energy systems and future resilient
- Local Plans to contain policies requiring low carbon heating and connection to heat networks where opportunities exist
- Engage households, landlords, businesses, communities and wider public sector to promote clean, carbon neutral alternatives to fossil fuel heating (gas, oil, LPG, etc.), insulation and heating controls.
- Engage Colleges and the Further Education Sector to develop skills and training
- Map and analyse potential heat network opportunities across Somerset

Opportunities and benefits

- Reduced emissions associated with heat, hot water, cooking and industrial processes
- Reduce the County's dependency on imported fossil fuels
- Alleviate fuel poverty
- Warmer, healthy homes
- Green economy, growth and prosperity
- Develop skills and training
- Stimulate the market and supply chain
- Optimise energy performance of public estate

Barriers and Challenges

- Current building regulations. New Builds not carbon neutral in design and operation, (fossil fuel boilers, etc.)
- Clearer guidance from the UK Government required e.g. Heat Strategy
- Cost to retrofit
- Meaningful incentives needed for retrofitting energy efficiency and low carbon heating systems
- Changing public perception and misconceptions
- Lack of skills and supply chain for heat pumps and networks
- Risk that technology such as heat pumps wil not be installed / optimised correctly

Energy consumption and efficiency

Across Somerset, we currently consume approximately 2,451 GWh of electricity[34] and 3,179 GWh of gas a year[35]. In addition to this, we consume approximately 2,570 GWh of residual fuels such as petroleum, coal, solid fuels, bioenergy and waste (excluding road transport[36]) .

Energy consumption from high carbon electricity generation is one of the main of causes of Climate Change. We use energy to light, heat and power our homes, businesses, in our manufacturing and industrial processes, and in transport. To achieve carbon neutrality and mitigate Climate Change it is essential that we minimise energy waste and improve energy efficiency. Minimising energy waste can be as simple as switching off energy consuming equipment when it's not required. Energy efficiency refers to using less energy to perform the same task, through upgrading, retrofitting existing equipment and the use of a smart grid.

Through energy conservation and improving energy efficiency, complemented by the use of smart technologies, we can reduce the UK's overall demand for energy, the amount of additional energy generation required, minimise capacity issues, and enable the transition to smarter Energy Futures.

Key challenges include the cost to retrofit and implement energy efficiency measures, and it's not just about existing buildings. We cannot continue building new homes and non-residential buildings that require retrofitting in the future. It is imperative that new buildings are carbon neutral in their design and operation.

Energy UK identifies that nationally, "a 25% reduction in domestic energy use could be achieved through existing low-cost measures alone, and would save the equivalent amount of energy to that produced by six nuclear power stations the size of Hinkley Point C – and deliver average bill savings of £270 per year. This energy could instead help to meet the substantial need for electricity to support decarbonisation in other areas, such as transport and heating[37]"

Somerset Local Authorities will:

- Lead by example by optimising the energy performance of their estates and operations through investment in energy conservation, efficiency, renewable energy generation and smart energy initiatives with a target to being carbon neutral by 2030
- Deliver an energy awareness campaign for Somerset residents and businesses, and
- Lobby the UK Government for improved Building Regulations- that will deliver buildings that are carbon neutral in their design and operation, smart grid compatible and Climate Change resilient.

Opportunities and benefits

- Optimising the energy performance of the Local Authority estates and operations epitomises responsible stewardship of public money
- Engage and collaborate with the wider public sector
- Energy efficient and energy managed buildings with minimised running costs
- Finance is available for Local Authorities to invest
- Energy security
- Alleviation of fuel poverty by reducing energy costs
- Reduced energy demand in buildings
- Transition to a flexible, smart energy system
- Green economy, growth and prosperity
- Creation of jobs
- Developing skills and training
- Stimulating the market and supply chain

Barriers and challenges

- Cost to retrofit
- Meaningful incentives are needed for retrofitting energy efficiency and low carbon heating systems (domestic, commercial and industrial)
- Current building regulations. New Builds are not carbon neutral in design and operation.
- Underdeveloped local Supply chain for skills to retrofit

Decentralisation and the transition to a smart energy system

"Anyone who pays an electricity bill contributes to the cost of running the network, so a more efficient and flexible network will provide better value for money. The alternative would be to spend millions on upgrading the network infrastructure to accommodate the UK's maximum energy demand. Because there is uncertainty about how, where, when and how much electricity we will use in the future, using the network in a flexible way is a smarter solution".
Western Power Distribution[38]

Historically, electricity generation has been delivered though large coal, gas and nuclear power stations connected to the transmission network. Many coal and gas fired power stations have closed or will close in the next few years. More recently there has been a significant increase in renewable energy generation connected to local distribution networks. These changes in the energy sector have driven the UK's overall emissions reductions[39]. The result of changes in how energy is produced and consumed is a less centralised and more complex network, with a shift in roles and responsibilities from DNOs to DSOs[40]. A smart grid network is the vision for a modern electricity system and is central to achieving the UK's Net Zero plans, whereby DSOs use information and communications technology to monitor and actively control energy generation in near real time. Within a smart grid, consumers and communities play a more active role in helping to balance supply and demand, utilising smart meters to understand energy costs and manage consumption and smart devices, which will act as generators, discharging electricity from batteries at key times. This will increase renewable power capacity connected to the grid and reduce energy demand during peak hours. Smart grids will unlock huge economic potential, increase renewable energy generation capacity and take the UK a step further towards an affordable, zero carbon energy system which will reduce the overall costs for consumers.

The Somerset Local Authorities will:

- Lead by example e.g. microgrids on new Local Authority owned developments, utilising Council owned land for large scale renewables and storage, smart buildings and vehicle fleet charging.
- Communicate what it means in practice to achieve Net Zero i.e. transitioning to a smart, flexible system with consumers taking a more active role in balancing supply and demand in future, explaining the importance of smart metering, etc.
- Develop an 'Energy Plan' for Somerset in partnership with the DSOs and key stakeholders.
- Engage with DSOs in their Business Planning for RIIO-ED2 (Revenue = Incentives + Innovation + Outputs - Electricity Distribution 2) and beyond.

Opportunities and Benefits

- Local Authorities to demonstrate real world examples of smart energy initiatives
- Unlocks huge economic potential
- Energy security
- Smarter, more flexible management of supply and demand
- Releases existing network capacity to enable faster, cheaper connections
- Enables penetration of variable renewable energy and optimises electricity system operation
- Reduces costs to consumers
- Enables greater consumer and community participation

Barriers and Challenges

- Significant investment is required to upgrade the network
- Public perception of smart metering
- Lack of awareness of smart energy systems and the importance of consumer participation
- Local energy markets
- Socio-technology concern
- Technical challenges, interoperability, network communications, distribution

Grid capacity

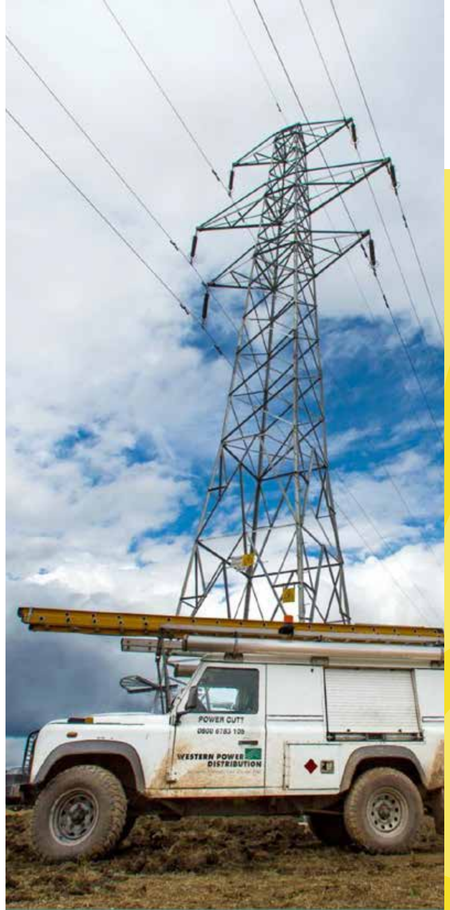
The grid underpins the transition to Net Zero. The electricity grid in Somerset is constrained, ageing infrastructure is inflexible and unable to cope with significant additional demand and generation in certain locations. (WPD) and (SSEN) are the main DNOs within Somerset. WPD provides network capacity maps and offers opportunities for customers to participate in flexibility programmes at peak times.

WPD is working to understand how the grid can be made smarter by increasing its flexibility and reducing the costs of expensive grid reinforcement. With population growth, and the need to electrify heat and transport supported strongly by the CCC as key aspects of a Net Zero future, electricity demand is likely to increase significantly over the next 10 years and beyond. In addition, we will need the ability to significantly increase decentralised power generation (renewable energy) in the County to meet our carbon neutral targets. The transition to a smart, flexible grid will facilitate this but, in the short term, there are issues with network congestion and insufficient capacity to facilitate new connections to the network in certain locations. This has resulted in long waiting times and high connection costs (grid reinforcements, etc.).

The Office of Gas and Electricity Markets (Ofgem) is an independent regulator of the UK's energy system and energy companies operating within it. Its role is to facilitate the most cost-effective path to Net Zero at the lowest cost to consumers, in the context of UK Government policy[41]. DNOs base their business plans for network upgrades and reinforcement on 'Future Energy Scenarios' from National Grid. These forecasts align with the UK Government's target of achieving Net Zero by 2050. Price controls are set by Ofgem to determine how much DNOs can spend, earn and what consumers receive as a result. RIIO-ED2 is the next Business Plan period and will run for 5 years from 2023-2028.

The Somerset Local Authorities will:

- Engage with DNOs during their Business Planning for RIIO-ED2 and beyond.
- Develop an Energy Plan for Somerset in partnership with the DSOs and key stakeholders.

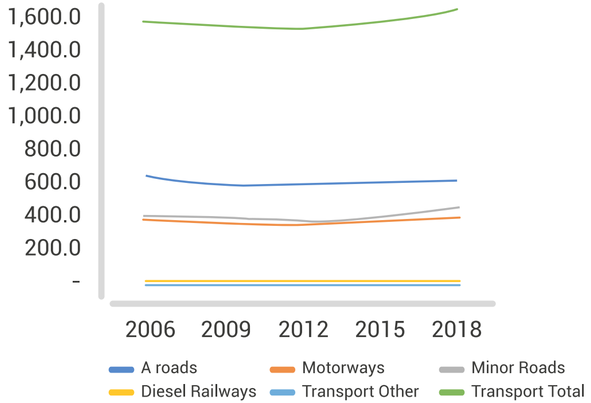


7.2 TRANSPORT SECTOR SUMMARY

This sector describes transport and its emissions within Somerset, including those sections of the M5 and A303 in the County, although due to our limited impact on through traffic, focuses mainly on transport movements within the County.

Transport CO_2 emissions which are within the influence of Local Authorities (i.e. excluding trunk roads outside our control) are around 1094 $ktCO_2$ per annum. In 2018, BEIS showed that transport remains the largest emitting sector, responsible for 28% (124.4 $MtCO_2e$) of all greenhouse gas emissions in the UK, only 3.0% lower than in 1990.

TRANSPORT EMISSIONS IN SOMSERSET ($KTCO_2$)



Source: UK local authority & regional CO2 emissions national statistics 2005-2018

SOMERSET TRANSPORT EMISSION ($KTCO_2$) 2018

	A- ROADS	MOTORWAYS	MINOR ROADS	DIESEL RAILWAYS	TRANSPORT OTHER	**TRANSPORT TOTAL**
Mendip	133.3	-	105.2	19.8	1.3	259.5
Sedgemoor	102.7	254.7	86.8	4.5	2.1	450.9
Somerset West and Taunton	111.2	135.9	152.5	4.2	5.1	408.9
South Somerset	244.7	-	121.4	18.3	1.8	386.3
Somerset Total	**592.0**	**390.6**	**465.8**	**46.8**	**10.3**	**1,505.5**

In 2018, within Somerset, transport was responsible for 1,505 $ktCO_2$ (46%) of emissions. This is significantly higher than the total UK emissions from transport (28%). The main source of emissions from this sector is the use of petrol and diesel in road transport. The emissions for the Local Authority areas of Somerset are shown in the table above.

The challenge

Reducing Somerset's transport emissions is a major challenge due to the rurality of the region. Transitioning to electric and ultra-low emission vehicles for both the general population and businesses is considered a 'fool-proof' solution and must form a key pillar of any national transport decarbonisation plan. However, whole life-cycle emissions and an underdeveloped market for re-using older electric vehicle batteries mean that modal shift to active travel modes (walking and cycling), in addition to decarbonisation of vehicles, would be more beneficial for both cutting emissions and improving public health.

Reducing the need to travel through better design of new developments and homeworking, enabling walking and cycling by providing infrastructure for footpaths and cycle paths, improving public transport options and encouraging car-sharing schemes can all improve air quality, reduce emissions and cut congestion.

Reducing longer distance car trips will have the greatest impact on emissions. However, many short distance road journeys, particularly in urban areas, could be achieved by other transport modes. Also, encouraging multi-modal journeys such as bike/train or bike/bus journeys, common in other European countries, can deliver great benefits.

Covid-19

During the Covid-19 lockdown there was a sharp reduction in all types of travel. Traffic levels in Somerset fell by up to 80% but have since rebounded to 10% lower than pre-Covid-19 levels. As we transition out of lockdown, and public transport capacity is limited for social distancing measures, there is an increasing reliance on private cars, walking and cycling. Longer term, it is hard to predict how behaviours will evolve and if travel responses seen in lockdown will be maintained.

The Covid-19 travel patterns reiterated the scale of the challenge. According to the IEA, surface transport emissions declined by over 40% at the peak of Covid-19 restrictions but are bouncing back. Overall, the Covid-19 pandemic will only lead to an overall 8% drop in global carbon emissions in 2020 but this scale of reduction is needed on a year-by-year basis to meet our emissions target. Post-Covid-19 there is a unique opportunity to 'lock in' the recently changed travel behaviours, such as working from home and an increase in walking and cycling.

The impacts of Climate Change

Transport and transport infrastructure are vulnerable to many Climate Change impacts, including sea and river level rises, storms, flash flooding, periods of drought and extremes of temperature.

If such impacts are not anticipated and planned for in future transport infrastructure design and maintenance, those changing climate and weather conditions will accelerate the deterioration of transport infrastructure, increase severe damage risks and cause traffic interruptions and accidents which could directly affect economic activities and the wellbeing of communities.

No.	TRANSPORT SECTOR OUTCOME	Outcome Delivered by?	Which Goal Outcome Supports	TIMESCALE Short, Medium or Long Term	CO-BENEFITS
1	Change in Vehicle Types: By 2030, carbon emissions generated on Somerset's roads are reduced through the change to electric vehicles, ultra-low emission commercial vehicles and an overall reduction in road use (no. of miles travelled).	UK Government, Local Authorities, Businesses & Industry & Residents	1 & 2	Short to Medium Term	Health and wellbeing benefits, air quality improvements
2	Behaviour Change: By 2030, carbon emissions from transport are reduced by encouraging and facilitating behaviour change including: - reducing the number of single occupancy vehicle journeys undertaken by promotion of car sharing - increased public transport use - combining trips - replacing vehicular journeys with active travel modes (walking and cycling)	Local Authorities, Businesses & Industry & Residents	2	Short to Medium Term	Health & wellbeing benefits, air quality improvements, increased community cohesion
3	Adaptation Planning: Climate Change adaptation plans have been developed and implemented to build and maintain the resilience of Somerset's transport infrastructure.	Local Authorities & Delivery Partners	3	Short, Medium and Long term	Health & wellbeing benefits, economic & societal benefits
4	Spatial Planning: Transport inequality has been addressed by reducing the need for car travel through improved spatial planning, public transport options/availability and public service delivery	Local Authorities & Delivery Partners	3	Short to Medium Term	Health & wellbeing benefits, economic & societal benefits

Opportunities and Benefits

- **Health and wellbeing benefits**
  Improved health outcomes from reductions in air pollution and particulates and an increase in active travel modes (walking and cycling).
- **Improved, demand responsive, public transport**
  More varied forms of traditional public transport and mobility as a service.
- **Better connected and improved networks of footpaths and cycle ways**
  Economic benefits derive from higher footfall, dwell time and spend per head when walking and cycling rather than using a car. Increasing the numbers of people living in urban areas brings positive impacts and complements 'Shop Local' campaigns.
- **Community cohesion**
  Co-location of housing, employment and leisure reduces car use.

Barriers and Challenges

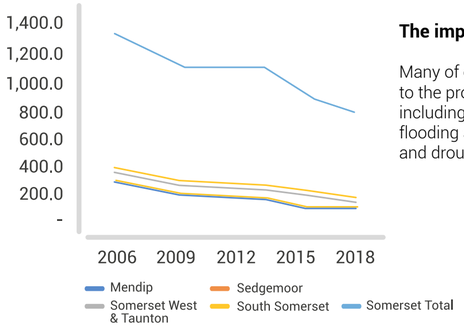
- **Funding and capacity to deliver**
  Sustainable funding mechanisms needed to provide consistent and appropriate funding streams, along with greater resource capacity to research and develop appropriate transport solutions and bid for funds.
- **Dispersed nature and geography of Somerset**
  Settlement patterns and geography make it extremely challenging to deliver cost effective public transport. Need more interconnected routes to widen the network.
- **Lack of national standards for electric vehicle infrastructure**
  Ad-hoc approach to infrastructure and solutions for electric vehicles, without common standards and specifications, will prove a barrier to wider adoption in the short term.
- **Changing travel behaviours**
  Changing residents' travel choices and behaviours requires both policy instruments to reduce the attractiveness of car travel and encouragement to adopt walking and cycling.
- **Existing approach to new developments**
  New developments need to be centred around sustainable travel.
- **Cost of electric vehicles preventing wider adoption**
  Current cost of electric vehicles preventing their wider adoption, particularly amongst those on low incomes. As their market share increases and a second-hand market is established, costs are likely to reduce.

7.3

BUILT ENVIRONMENT SECTOR SUMMARY

This chapter describes the built environment and addresses the issues, opportunities and challenges that Climate Change presents to both existing and new developments. This includes the location, form and design of developments, retrofitting of existing buildings to improve energy efficiency and cut CO_2 emissions, and how we plan and prepare for a resilient Somerset by adapting to expected Climate Change impacts. There are approximately 250,000 homes in the County, many of which have a poor energy performance as indicated by local data held on Energy Performance Certificates.

EMISSIONS FROM THE DOMESTIC SECTOR 2006 - 2018 ($KTCO_2$)



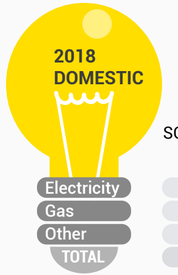
In 2018, data from BEIS showed that emissions from the built environment in Somerset accounted for 24% of the total emissions released in the County. The graph shows a slow and steady reduction from all Local Authority areas from around 1,300 $ktCO_2$ in 2006 to 785 $ktCO_2$ in 2018. The reductions can mainly be attributed to decarbonised electricity generation. However, progress has slowed in recent years.

Minimising and decarbonising energy consumption from buildings is crucial to meeting carbon neutrality targets by 2030. However, most buildings that will be standing by 2030 have already been built. Influencing how the existing housing stock can be improved or retrofitted is more challenging and complex.

The impacts of Climate Change

Many of our existing settlements are vulnerable to the projected impacts of Climate Change, including fluvial (river), pluvial (rain) and marine flooding as well as coastal change, overheating and drought.

DOMESTIC SECTOR EMISSIONS FROM SOURCE $KTCO_2$



	SOMERSET WEST & TAUNTON	SEDGEMOOR	SOUTH SOMERSET	MENDIP	SOMERSET TOTAL
Electricity	65.6	52	77.1	49	243.6
Gas	109.3	79.3	108.4	89.9	386.9
Other	37.9	33.8	54.2	28.6	154.5
TOTAL	212.8	165.1	239.7	167.5	785.1

Urban areas are often not designed with the impacts of Climate Change in mind. Both new developments and existing buildings and infrastructure will require considerable investment to adapt them to make them more energy efficient and to build resilience to the projected impacts of climatic change which will accelerate the deterioration of infrastructure, impact economic activity and the wellbeing of communities.

The spaces between our buildings provide vital opportunities to make settlements more adapted and resilient to these projected impacts (i.e. through retrofit of sustainable urban drainage systems (SUDS), tree planting and space for growing food), but the very location of some settlements puts them in harm's way from rising sea levels and coastal erosion.

Spatial planning

With regards to new development, local planning authorities are responsible for the preparation of Local Plans which set policies to regulate land use and development. These are informed by locally derived evidence but importantly must be in conformity with national planning policy. This may be impacted by the Planning White Paper and other regulatory reforms currently being proposed by the Government.

Local planning authorities can stipulate zero carbon development through Local Plan policies however, it must be demonstrated to be viable and deliverable. Local Plans are limited with regards to setting policy around the energy performance of dwellings to a maximum 19/20% improvement over 2013 Building Regulations.

Retrofitting existing housing stock

The UK has the least energy efficient housing stock in Europe and currently more than 12 million homes fall below the Energy Performance Certificate (EPC) band C (graded from A-G) and only 29% of homes meet this standard. Research suggests if every UK home had cost effective, conventional energy saving measures installed, energy use would fall by 25%. If the full technical potential of conventional measures was realised, regardless of cost, energy use could be reduced by about 53%.

To meet emissions reduction targets, nearly all heat generation in homes and industrial processes will need to be decarbonised. For new homes, low carbon heat is expected to be primarily met by heat pumps, heat networks in some circumstances and via direct electric heating where buildings are particularly energy efficient.

Many of our existing homes and non-residential properties currently rely on the gas grid for heating. These buildings will need to move over to heat pumps with opportunities for heat network developments in some settlements.

The UK Government's recently launched 'Green Homes Grant' will look to tackle the issues of our existing inefficient housing stock.

No.	BUILT ENVIRONMENT SECTOR OUTCOME	Outcome Delivered by?	Which Goal Outcome Supports	TIMESCALE Short, Medium or Long Term	CO-BENEFITS
1	All new developments (new homes and non-residential) will be highly energy efficient, at least zero carbon and climate resilient from as early a date as possible.	Local Authorities, Businesses & Industry, Delivery Partners & Residents	1(a), 1(b), 2 & 3	Short, Medium and Long Term	Economic, environmental & societal benefits, health & wellbeing benefits
2	All new developments will be constructed from sustainable, carbon neutral materials designed for reuse with circular economy principles in mind from as early a date as possible.	Local Authorities, Businesses & Industry, Delivery Partners & Residents	1(a), 1(b), 2 & 3	Short, Medium and Long Term	Economic, environmental & societal benefits, health & wellbeing benefits
3	All new developments will reduce the need to travel to access key services and employment opportunities and facilitate sustainable movement patterns in and around them by default.	Local Authorities, Businesses & Industry, Delivery Partners & Residents	1(a), 1(b), 2 & 3	Short, Medium and Long Term	Economic, environmental & societal benefits, health & wellbeing benefits
4	All new Local Authority buildings & commissioned builds are designed to be zero carbon exemplars in sustainability and resilient for future climate impacts	Local Authorities, Businesses & Industry, Delivery Partners	1(a), 1(b), 2 & 3	Short, Medium and Long Term	Economic, environmental & societal benefits,
5	All Local Authority housing stock to be at least EPC C by 2030	Local Authorities, Businesses & Industry, Delivery Partners	1(a), 1(b), 2	Short & Medium Term	Economic, environmental & societal benefits, health & wellbeing benefits
6	All private landlords' properties to be at least EPC C standard by 2030	Local Authorities, Businesses & Industry, Delivery Partners & Residents	1(a), 1(b), 2	Short & Medium Term	Economic, environmental & societal benefits, health & wellbeing benefits
7	A significant number of private homes are rated at least EPC C by 2030	Local Authorities & Businesses & Residents Local Authorities	1(a), 1(b), 2	Short & Medium Term	Economic, environmental & societal benefits, health & wellbeing benefits
8	Development Planning is undertaken on a Somerset wide basis with a County wide Development Planning Document (DPD) adopted	Local Authorities, Businesses & Industry, Delivery Partners & Residents	1(a), 1(b), 2	Short & Medium Term	Economic, environmental & societal benefits
9	Somerset communities and infrastructure are resilient, safe and well adapted and co-benefits of Climate Change are realised	Local Authorities, Delivery Partners & Residents	2 & 3	Medium & Long Term	Economic, environmental & societal benefits, health & wellbeing benefits
10	The incidences and impacts of fuel poverty are significantly reduced across Somerset	Local Authorities, Delivery Partners & Residents	2 & 3	Medium & Long Term	Economic, environmental & societal benefits, health & wellbeing benefits

Opportunities and benefits

- **Planning opportunities**
  We have opportunities to reduce carbon dioxide emissions and deal with flood risk when making planning decisions. We need the confidence to act in the certainty of a strong National Planning Policy Framework (NPPF) and through the best use of existing policy, legislation, and technology.
- **Green Homes Grant**
  In July 2020, in recognition of the need for urgent action in tackling the retrofitting of the UK's inefficient housing stock and as part of the 'green' recovery from the Covid 19 pandemic, the UK Government launched the 'Green Homes Grant' to cut carbon emissions, create jobs and reduce householders' bills.
- **Taunton 'Garden Town'**
  The designation of Taunton as a "Garden Town" gives us the impetus and focus to direct efforts and funding to creating a 'holistically planned new settlement which enhances the natural environment, tackles climate change and provides high quality housing and locally accessible jobs in attractive, healthy and sociable communities'.
- **Local Authority built assets**
  Local Authorities can show leadership by ensuring all the buildings we commission, build or retrofit (schools, offices and housing) are super energy efficient and served by low carbon energy services with a reduced ecological footprint.

Barriers and Challenges

- **Legislation and planning policy**
  The UK Government recently consulted on a new national Future Homes Standards. This proposed that significantly improved levels of energy efficiency would not come into force until 2025 and, even then, rely heavily on decarbonisation of the electricity grid in order to meet zero carbon rather than enabling the very highest levels of energy efficiency possible in new developments.
- **Supply chain and skills**
  Supply chain limitations and skills shortages are potential issues which prevent the more rapid delivery of zero carbon buildings. There needs to be a local, regional and national focus on building the supply chain and plugging the skills gaps.
- **Deliverability of planning proposals:**
  Local planning authorities must consider the viability of plans, policies and proposals. The impact of delivering zero carbon new homes needs to be considered in the context of other priorities which will impact upon development viability including affordable housing, infrastructure and wider design and space standards.
- **Five-year deliverable supply of land**
  Local Authorities with responsibility for housing must maintain a five-year deliverable supply of land for housing and can come under pressure to approve developments which are less sustainable than they could be.

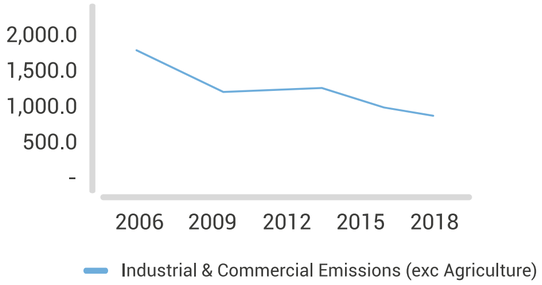
7.4

BUSINESS, INDUSTRY & SUPPLY CHAIN SECTOR SUMMARY

This sector describes the implications for, and issues associated with, Business, Industry and their Supply Chains. In Somerset, there are over 24,000 VAT and/or PAYE registered businesses. 99.8% of these are SMEs employing fewer than 250 people, with 89.6% employing fewer than 10 people. However, Somerset does have many large employers, including Leonardo, EDF Energy, Oscar Mayer, Numatic, Refresco, C & J Clark International, Yeo Valley, Relyon, Western Provident Association, UK Hydrographic Office, Morrisons Distribution Centre and Butlins.

2018 data from BEIS shows that emissions from business and industry make up 20% of the annual carbon emissions for the UK (89.2 $MtCO_2$). Since the mid-2000s, the volume of emissions has declined by over 50% with steep falls in emissions from large industrial installations and commercial electricity generation. Within Somerset, the emissions from the Industrial and Commercial sector were 25% (824.4 $ktCO_2$) of total emissions, excluding agriculture.

INDUSTRY & COMMERCIAL SECTOR EMISSIONS IN SOMERSET (KTCO2)



Source: UK local authority & regional CO_2 emissions 2005-2018

Social pressure, legislation and economic factors will increasingly encourage business and industry in Somerset to reduce their environmental impact, but there is an important role for Local Authorities, economic development and business support partners to play in supporting the shift to a low carbon economy. Priority areas of focus will include:

- Renewable Energy
  Sustainable means of generating power such as wind, tidal and solar technologies, to ensure clean and green growth.
- Energy Efficiency
  Better insulation of buildings, the use of more energy efficient equipment and better utilisation of technology.
- Supply Chains
  Need to make supply chain and supplier arrangements based on environmental considerations as much as economic ones.

The impacts of Climate Change

Irrespective of size, all businesses have a direct impact on the climate as a result of their production and consumption of goods and services, and through their operational practices.

There are multiple impacts of Climate Change on businesses and other organisations, which create a series of risks. Besides the most obvious physical risks (e.g. the operational impacts of extreme weather events, or supply shortages caused by water scarcity), companies are exposed to transition risks which arise from society's response to Climate Change, such as changes in technologies, markets and regulation that can increase business costs, undermine the viability of existing products or services, or affect asset values.

But Climate Change also offers businesses opportunities. By increasing energy efficiency, they can reduce their costs. Businesses can adapt supply chains or reduce reliance on price-volatile fossil fuels by shifting towards renewable energy technologies.

Climate Change can also spur innovation in products and services which are less carbon intensive, or which enable carbon reduction by others. Together, these actions can foster competitiveness and unlock new market opportunities.

Covid-19

The economic impact of the Covid-19 pandemic on Somerset's business community has been profound. There has been a steep rise in the claimant count across Somerset, with 5.1% of Somerset's working age population claiming out-of-work benefits in July 2020 compared with 2.3% in March 2020.

Also, as of the July 2020, over 78,000 employments had been furloughed which represents a take up rate of 30% of the furlough scheme in Somerset. A further 25,000 self-employed people claimed income support, 73% of those eligible. Many businesses also had to access emergency grant support to remain viable.

Much of the economic impact is still emerging, and there is bound to be long-term economic 'scarring' and labour market dislocation. Whilst the underlying context in which specific climate policies will be implemented has undergone significant change, the impetus for a broad range of policies orientated towards achieving a carbon-neutral economy has never been greater.

Clean growth and green recovery

The risk of de-prioritising carbon neutrality in our desire to restart the economy at pace will only exacerbate existing climate issues. The need to provide substantive stimuli to aid economic recovery post-Covid-19 presents an opportunity for the carbon-neutral agenda to be tied to this wider priority, whilst simultaneously achieving broader Climate Emergency objectives.

Longer term, a 'green' recovery shifting away from polluting, carbon-based fossil fuels, can create a cleaner, healthier environment. Investments in low-carbon and climate-resilient industries and infrastructure, such as that proposed at the Gravity Enterprise Zone in Sedgemoor, can create jobs and stimulate economic recovery, change the trajectory of UK emissions toward Net Zero, whilst improving our resilience to Climate Change impacts.

No.	BUSINESS, INDUSTRY & SUPPLY CHAIN SECTOR OUTCOME	Outcome Delivered by?	Which Goal Outcome Supports	TIMESCALE Short, Medium or Long Term	CO-BENEFITS
1	Businesses in Somerset will have a reduced carbon footprint (incl. both direct and indirect emissions)	Local Authorities, Businesses, Industry & Agriculture, Delivery Partners & Residents	1 & 2	Short to Medium Term	Emissions reduced, health and wellbeing benefits, air quality improvements
2	Businesses in Somerset will have increased resilience to the impacts of Climate Change (incl. both direct and indirect impacts)	Local Authorities, Businesses, Industry & Agriculture, Delivery Partners & Residents	2 & 3	Medium to Long Term	Economic and environmental resilience to Climate Change impacts, profitability and jobs safeguarded
3	Businesses in Somerset will have a strong understanding of the challenges and benefits of transitioning to a low carbon, clean growth economy	Local Authorities, Businesses, Industry & Agriculture, Delivery Partners & Residents	1 & 2	Short to Medium Term	Able to make informed decisions and seek opportunity for new products & services and to grow new and existing market share
4	Somerset will have transitioned to a Clean Growth economy	Local Authorities, Businesses, Industry & Agriculture, Delivery Partners & Residents	3	Long Term	Economic prosperity, health and wellbeing benefits

Opportunities and Benefits

- **Clean growth**
  Clean Growth sits at the 'dynamic heart' of the Heart of the South West (HotSW) Local Industrial Strategy's long-term growth ambitions, informing the three key themes of Energy, Engineering and Digital Futures. It is also core to the Somerset Growth and Recovery Plan. Somerset has significant strengths in advanced manufacturing and engineering (notably aerospace and marine), energy, and increasingly digital technologies, presenting clear business opportunities in the transition to a clean growth, low carbon economy.

  Hinkley Point C (HPC), the UK's first commercial nuclear power project in 20 years, is central to Somerset's drive towards clean growth. HPC is a low carbon energy source in its own right, as well as being key to achieving ambitious carbon emissions reduction targets at a county, regional and national level. HPC has and will continue to act as catalyst for employment growth in new technology consistent with clean growth.

  It has created thousands of jobs, many of which have been local, and enabled £1.5 billion of contracts to businesses across the South West. Building on the experiences of HPC, a number of other key projects are emerging, including the smart innovation campus proposals on the Gravity Enterprise Zone, providing space for green innovation.

- **Business benefits**
  Developing and following sound environmental policy is not only good for the environment but it's good for business too, especially in an environment where customers and consumers are becoming more environmentally conscious and making more ethical choices in buying goods and services. Reduced costs and new markets for clean or green products and services offer a great opportunity for businesses to increase profitability.
- **Sustainable tourism**
  Marketing Somerset as a 'sustainable' holiday destination has considerable economic potential and by promoting and celebrating our natural environment, rolling countryside and coastline, the visitor experience has an appeal beyond the environmentally conscious.
- **Digital Infrastructure**
  Improved digital infrastructure (both mobile and broadband) will be crucial in helping Somerset reduce its carbon emissions. Digital solutions enable newer, more agile and flexible ways of working, which can reduce the necessity for travel.
  The Connecting Devon and Somerset (CDS) project team reports that as of June 2019, 89% of Somerset's premises had access to superfast broadband.

Barriers and Challenges

- **Reducing the environmental impact of businesses**
  Business and industry will need to minimise the environmental impacts of production, services, exports and imports through greener supply chain management.
- **Grid capacity and infrastructure**
  The existing energy grid and distribution infrastructure requires considerable investment to adapt to future energy demands and emerging technologies. Without improved infrastructure, businesses cannot fully exploit electric vehicles, or on-site renewable energy opportunities.
- **Funding mechanisms**
  Adequate funding to support and incentivise businesses to reduce emissions and their environmental impacts is essential. Appropriate finance models and support (including Green Finance) is needed to drive change and meet the needs of Somerset's small, dispersed business communities.
- **Legislation**
  To meet the UK Government's carbon reduction commitments, new legislation and requirements will be placed upon businesses and residents. It is essential that we support businesses to respond and adapt, to ensure continued growth and resilience.
- **Timescales for change**
  The financial cost and effort required to put transformational change into place will mean a longer-term, planned programme of change for many businesses.

7.5

NATURAL ENVIRONMENT SECTOR SUMMARY

This section describes the impacts, challenges and opportunities for Somerset's natural environment from Climate Change.

The current situation

Somerset is a large, rural County rich with fertile agricultural land, abundant with wetlands, peatland, trees and hedgerows which naturally sequester and store greenhouse gases including carbon dioxide present in the atmosphere. If invested in, protected and regenerated these natural resources within Somerset can help us mitigate against the increasing impacts of flooding and drought. They can also provide new economic opportunities in green and eco-tourism, help us become more resilient to the impacts of Climate Change and reverse biodiversity decline, while improving our health and wellbeing.

The future health and sustainability of our rural economy, particularly our agriculture, food and tourism sectors and protected landscapes, will be largely dependent on the decisions we make now. How we utilise the land we have, and our attitude to protecting our natural environment and making the most of these natural resources is critically important. There are many opportunities to be derived by understanding the benefits and potential of our rich natural resources.

It has already been identified at national level that there are potential opportunities for the UK, arising from a modest level of Climate Change, through extended growing seasons and improved productivity in agriculture, forestry and fisheries and in diversifying and restoring natural assets. These opportunities can only be realised, if limiting factors such as water availability, soil health and pests and diseases are managed. Therefore 4 key focuses for the Natural Environment within this Strategy are:

- protecting what we already have
- restoring nature at scale to enable natural processes, such as carbon sequestration and natural flood management to function. We should lead by example and be bold in our approach setting a target of at least 30% of Somerset's land cover being managed positively for nature with healthy natural processes by 2030
- engaging communities and landowners in protecting and restoring nature for their own benefit and wider benefit of the environment
- identifying investment to support Somerset's natural environment to deliver biodiversity gain and protect indigenous flora and fauna through positive changing land use, positive marine protection and from harmful invasive species and diseases such as Ash Die Back

Impacts of Climate Change

Somerset is on the UK's frontline of Climate Change, with the County's long coast and large areas of low-lying land, facing increased risks from river flooding, drought and sea level rise. Likely climate issues include:

- Warmer, drier Summers:
  Altered growing seasons
  Increased drought and water stress
  Reduced stream flow and water quality

- Wetter, milder winters:
  Increased winter flooding and waterlogged soils, Damage to soil structure

- Rising sea levels:
  Inundation of land
  Increased erosion
  Salination of freshwater

- Extreme weather events
  Damage from flooding and wind
  Loss of land due to flood and erosion

Impacts on biodiversity and habitat

- Habitat loss
  Climate Change will exacerbate the challenges faced by habitats. Storms can sweep away precious topsoil; greater temperatures can mean newly planted hedgerows struggle to establish and sea level rise linked to storm surges can damage precious dune systems and lead to inundation of land.

- Soil Loss: Quantity and Quality
  Soil depth and soil quality (not compacted with the right levels of soil organisms) are crucial to food production, flood reduction, and abundance of nature. A compacted impoverished and thin soil can lead to increased flooding and runoff causing multiple problems within river systems

- Water Quality
  Poor water quality has a significant impact on the ecosystems it supports. Natural England recently issued guidance on the impact of water quality on the protected (Ramsar) wetlands of the Somerset Levels in a move towards nutrient neutrality. Many options to tackle water quality issues, such as diffuse pollution (pollution from multiple, often intermittent sources which collectively impact water quality) or point sources of nutrients (from waste water discharged into watercourses in urban areas or industry via pipe networks) could either help or hinder achieving Net Zero' aims.

- Insect Decline
  Insects make up the bulk of known species on earth and are integral to the functioning of terrestrial and freshwater ecosystems, performing vital roles such as pollination, seed dispersal and nutrient cycling. They are also food for numerous larger animals, including birds, bats, fish, amphibians and lizards.
  The main causes of decline include habitat loss and fragmentation (partly caused by Climate Change), and the overuse of pesticides.

- Pests and diseases
  As our local flora is put under increasing stress due to Climate Change effects, it can become weaker and more susceptible to pests and diseases. This is compounded by imported plant stocks from abroad which enable diseases to spread more easily.

Carbon sequestration

Somerset's landscapes are uniquely placed to be part of the solution to tackle Climate Change by both reducing emissions and acting as a carbon sink. We must preserve and enhance the carbon reserves already in our soils, vegetation, hedgerows, trees, wetlands and peatlands.

No.	NATURAL ENVIRONMENT SECTOR OUTCOME	Outcome Delivered by?	Which Goal Outcome Supports	TIMESCALE Short, Medium or Long Term	CO-BENEFITS
1	Biodiversity and bio-abundance are increased and natural processes including carbon storage, water quality and natural flood management across Somerset's natural environment are restored through a clear shared vision and spatial plan embedded in decision-making processes	Local Nature Partnership	3	Medium to Long Term	Improvements in land management, greater resilience, environmental, economic & societal benefits, health & wellbeing benefits, air quality improvements
2	Healthy soils and watercourses underpin healthy ecosystems across Somerset which have increased biodiversity, locked-in carbon and support healthy productive farming and land management with reduced flood risk	Local Nature Partnership	2 & 3	Medium to Long Term	Increase in biodiversity & habitat, improvements in land management, greater resilience, environmental, economic & societal benefits, health & wellbeing benefits, supply of quality local produce
3	Everyone in Somerset has access to good quality natural environments resilient to Climate Change benefitting their health and wellbeing and increasing productivity	Local Nature Partnership	3	Long Term	Environmental, economic & societal benefits, health & wellbeing benefits, air quality improvements
4	A Nature Recovery Network and natural capital solutions are co-ordinated and delivered through community action	Somerset Wildlife Trust and others	3	Long Term	Environmental, economic & societal benefits, health & wellbeing benefits, air quality improvements
5	Somerset communities are prepared for locked-in Climate Change taking a natural climate solutions and Adaptation Pathways approach	Local Nature Partnership	3	Long Term	Increased environmental awareness, increase in biodiversity & habitat, improvements in land management, greater resilience
6	Soil health, carbon storage and biodiversity are improved through changes to land management practices by farmers and landowners	Local Nature Partnership	2 & 3	Medium to Long Term	Environmental, economic & societal benefits, health & wellbeing benefits, supply of quality local produce

Opportunities and Benefits

- **Collaborative approach by the Local Nature Partnership (LNP)**
  The LNP includes representatives from agriculture wildlife, nature, water, tourism and environment organisations Local Authorities, Areas of Outstanding Natural Beauty (AONB), Exmoor National Park (ENP) as well as major employers. Partnership collaboration is crucial to unlocking the latent opportunities provided by our rich natural environment and to overcoming the challenges to our communities and natural habitats brought about by the impacts of Climate Change.
- **Somerset Pollinator Action Plan**
  This Plan sets out actions to ensure pollinators are factored into decision-making and planning, that pesticide use is reduced, habitat increased, protected, connected and improved, and awareness of the importance of pollinators to the UK economy for food production is raised.
- **Carbon sequestration and the creation of saltmarsh**
  Saltmarsh habitat is an effective way of locking up large amounts of carbon. Sea level rise is a serious threat to Somerset, but coastal re-alignment, with the creation of saltmarsh, could offer large scale carbon sequestration opportunities while protecting vulnerable communities and infrastructure.
- **Woodland regeneration and tree planting**
  Woodland regeneration and appropriate tree planting brings multiple benefits for flood prevention, carbon capture, shading, crops, health benefits and soil retention. 'The right tree in the right place' is based on which native species of tree sequesters the most carbon in the short, medium and longer term and can survive in a changing climate.

Barriers and Challenges

- **Funding**
  Current funding is often spent inefficiently which adversely impacts moves towards zero carbon and increased biodiversity targets. Redeploying existing funding to achieve benefits for nature, such as the through the new Environmental Land Management Schemes will be crucial to achieving shared goals.
- **Speed at which Climate Change progresses**
  Matching the rapidly changing climate with people's livelihoods and the state of nature will be a constant challenge and shows how important a robust nature recovery network will be.
- **Consistent political will**
  Lack of coherent and consistent policies at UK Government level to end the market for carbon emitting industries and encourage a switch to less damaging products and businesses. New ways of embedding consistent political support, looking beyond the current electoral cycles.
- **Lack of responsibility for actions**
  The long discussed 'polluter pays' principle must become mainstream. Clear penalties are needed for organisations causing pollution, with liability for clean-up costs.

7.6

FARMING & FOOD SECTOR SUMMARY

This sector describes the impacts, challenges and opportunities for Somerset's Farming and Food Sector from Climate Change. Agriculture and food production are crucial to the economy and environment of Somerset with over 10,000 people employed in the sector. It has national importance in terms of the delivery of food and management of the natural environment with 275,000ha of farmed land in the County. Within the South West, farming contributes over £1bn to the regional economy.

The current situation

The latest BEIS data shows that the total carbon emissions from the County's agricultural sector have remained static over the past 12 years at around 133 ktCO_2, which equated to around 4% of the total emissions for Somerset in 2018. However, methane produced from farming practices is a much bigger contributor to Climate Change.

It is arguable that Climate Change is already having an impact at a farm level across Somerset. Changes to the way rainfall events happen over a year, coupled with changes to temperature in the different seasons, has meant increased challenges for farming. At a farm level this results in farmers changing dates for sowing and harvesting, housing livestock for longer, dealing with extreme weather events, rapidly moving from very wet periods, managing flooded land or erosion risks, to very dry weather and providing feed for livestock or irrigating crops.

The current situation in farming is very volatile. The recent impacts of Covid-19 and the lack of transparency on future trade agreements the UK will enter into once we exit the European Union, along with the associated tariff and non-tariff barriers, mean greater uncertainty for food producers and the food supply chain, and difficulties in developing future business models with any confidence. This, coupled with the ongoing consultations on the Agriculture Bill and Environment Bill, mean that the sector cannot be sure when and how the UK Government will provide support for decarbonisation of the sector. Many farmers are keen to find solutions that provide stability in the short to medium term, but the agricultural sector will need clarity on market risks and opportunities.

The National Farmers' Union (NFU) has committed to 'Net Zero' by 2040 so, as an industry, there is leadership and support for developing Net Zero policies that support farmers and the delivery of wider environmental and social benefits. Farm incomes are derived from a variety of sources, which adds to the complexity, highlighting the need for effective "business support".

Impacts of Climate Change

Farmers will need to plan for many issues related to a changing climate. Likely issues include:

- **Warmer, drier Summers**
  Heat stress to poultry and livestock
  Increased risk of disease in crops
  Altered growing seasons
  Increased drought and water stress
  Reduced stream flow and water quality
  Decreased crop yields
- **Wetter, milder winters**
  Increased winter flooding and waterlogged soils, damage to soil structure
  Risks to livestock
  Reduced access to land
- **Rising sea levels**
  Loss of productive land due to:
  Increased coastal flooding
  Inundation of land
  Increased erosion
  Salination of freshwater
- **Extreme weather events**
  Crop damage from flooding and wind
  Risks to livestock
  Loss of productive land due to flood and erosion
  Damage to buildings, infrastructure and risks to health

Carbon sequestration

Agriculture in Somerset is uniquely placed to be part of the solution to tackling Climate Change by both reducing emissions and acting as a carbon sink. Farmers have a special role to preserve and enhance the carbon reserves already in our soils and vegetation and this places considerable importance on ensuring that existing pastoral farming involving livestock is maintained and enhanced within the County.

Agricultural emissions differ from other sectors of the economy as the main greenhouse gas emissions produced are methane and nitrous oxide rather than CO_2 which most other sectors emit from fossil fuel use.

NFU's "Achieving Net Zero" Farming's 2040 Goal
The NFU's Strategy sets out 3 Key Pillars to describe the opportunities and benefits derived through changes in farming policy and practice:

- **Boosting productivity and reducing emissions:** improving farming's productive efficiency will enable farmers to produce the same quantity of food, or more, with less inputs, in smarter ways. This, in turn, will enable the sector to reduce its greenhouse gas emissions.
- **Farmland carbon storage:** By improving land management and changing land use to capture more carbon, through the provision of bigger hedgerows, more woodland and more carbon-rich soils. This has positive benefits to the environment, wider landscape and local biodiversity by locking up harmful emissions whilst conserving existing carbon stores in grassland and pasture.
- **Coupling bioenergy to carbon capture, utilisation and storage:** boosting renewable energy and the bio-economy to displace greenhouse gas emissions from fossil fuels and create greenhouse gas removal through photosynthesis and carbon capture. Deliver savings of greenhouse gases from the atmosphere through the development of bioenergy with carbon capture and storage and the use of bio-based materials in construction and insulation, such as hemp fibre and sheep's wool.

No.	FARMING & FOOD SECTOR OUTCOME	Outcome Delivered by?	Which Goal Outcome Supports	TIMESCALE Short, Medium or Long Term	CO-BENEFITS
1	The overall Agricultural Sector emissions are significantly reduced as we work towards to 'Net Zero' by 2030.	Local Authorities, Businesses, Industry & Agriculture & Residents	2	Short to Medium Term	Environmental, economic & societal benefits
2	Significant growth of the local food economy with a greater number of local farm businesses supplying to local markets, businesses and public sector including Somerset's Local Authorities.	Local Authorities, public sector organisations, Businesses, Industry & Agriculture and Delivery Partners	1(a), 1(b) & 2	Short to Medium Term	Economic & societal benefits, health & wellbeing benefits, local employment and supply of quality local produce
3	Somerset residents making informed purchasing decisions which reduce the impacts on the environment, support healthy, less carbon intense diets and locally sourced products and produce.	Local Authorities, Businesses, Industry & Agriculture & Residents	2 & 3	Short, Medium & Long Term	Environmental, economic & societal benefits, health & wellbeing benefits, supply of quality local produce
4	Farm businesses have transitioned to farm operations with lower greenhouse gas emissions, enhanced environmental and biodiversity benefits and are better adapted for the impacts of Climate Change.	Businesses, Industry & Agriculture and Delivery Partners	2 & 3	Medium & Long Term	Environmental, economic benefits & societal benefits, health & wellbeing benefits
5	Farmers have adapted their means of production to support the supply of local, regional, national and international markets whilst minimising their greenhouse gas emissions	Businesses, Industry & Agriculture and Delivery Partners	2 & 3	Medium & Long Term	Economic and environmental benefits
6	Local communities are more engaged in food production and the impact of sourcing local food in reducing Climate Change	Local Authorities, Businesses, Industry & Agriculture, Delivery Partners & Residents	2 & 3	Medium & Long Term	Environmental awareness raised
7	The carbon sequestration and storage potential of Somerset's landscapes (including soils, biomass, coastal areas, hedgerows, etc) are fully mapped and evaluated and land management measures have been adapted to maximise this resource to cut carbon emissions across Somerset	Local Authorities, Businesses, Industry & Agriculture, Delivery Partners	2 & 3	Medium & Long Term	Increase in biodiversity & habitat, improvements in land management, greater resilience

Opportunities and benefits

- **NFU Achieving Net Zero**
  NFU's Strategy "Achieving Net Zero Farming's 2040 Goal" sets out how agriculture can play a key role in tackling Climate Change and achieving 'Net Zero' by 2040.
- **Carbon sequestration**
  Agriculture is uniquely placed to capture CO_2 from the air and utilise it to produce a wide range of crops, foods, fibres and fuels. 'Carbon capture' positively contributes by removing harmful emissions from the atmosphere balancing out agriculture's emissions of methane (CH4) and nitrous oxide (N2O).
- **Local markets and local produce**
  Opportunity to develop local markets supporting shorter 'climate friendly' supply chains and improve links between the local farming sector, consumers and communities making a positive impact on the local food economy whilst supporting farming businesses.
- **On-farm renewables**
  Growth of on-farm renewables will help cut costs, reduce emissions and help balance out energy demand.
- **Improved on-farm recycling**
  Improved on-farm recycling saves money, reduces energy from sourcing and processing new materials, cuts carbon emissions and creates new market opportunities from farming by-products whilst preventing waste products entering local waterways and the environment.

Barriers and Challenges

- **Hard to engage producers**
  Partnership working and the promotion of common messages through local networks, charities, the UK Government and non-government organisations will be required to achieve mass engagement on Climate Change issues with all producers.
- **Legislation and guidance**
  Planning policies must support farms in making appropriate investments in measures to reduce emissions, improve efficiency and build resilience, such as renewable energy.
- **Funding and infrastructure**
  Limited access to the energy grid, high speed broadband and research and development (R&D) investment limits the technologies farms can invest in, either to export energy produced by on farm renewables, or innovative technologies to cut emissions, improve efficiency and build climate resilience
- **Farm economics and markets**
  Future trade deals will have a significant impact on the market value of agricultural products, a major driver in business decisions and abilities to invest, meaning that farmers' ability to act on Climate Change is currently limited.
- **Carbon footprint**
  The wide range of tools available to undertake baseline monitoring of emissions, uncertainties within the data and lack of scientific data to support monitoring of measures such as carbon sequestration in soils make it difficult for farmers to demonstrate positive impacts taken to reduce their carbon footprint.

7.7

WATER SECTOR SUMMARY

This sector describes the impacts, challenges and opportunities for water within Somerset. The roles and responsibilities for water, flood and coastal erosion risk management are complex, involving many organisations and authorities. To respond to our changing climate, we must secure buy-in and support from those charged with managing the water environment beyond the Local Authorities to ensure water is appropriately captured, utilised, sustainably managed and treated at all stages in between for the benefit of all.

The sector's operational emissions, from the water collection, treatment and supply services, make up approximately 0.7% of the UK's total greenhouse gas emissions, around 781,000 $MtCO_2$ in 2017, predominantly due to the highly energy-intensive pumping and treatment activities of large volumes of water and wastewater. Water UK, along with the English Water Companies, have pledged to achieve 'Net Zero' carbon emissions for the whole sector by 2030, the first industrial sector in the UK to make such a pledge.

The impacts of Climate Change

The consequences of Climate Change pose significant threats to Somerset. Given the current risk and future projections, Somerset will be disproportionately affected by changes to storm and rainfall patterns, causing increased drought, flooding and coastal erosion. The County's long coast and large areas of low-lying land make it one of the UK's most climate-vulnerable areas, facing increased risks from sea level rise, river flooding and drought. The latest UK Government Climate Change Risk Assessment (CCRA) identifies Sedgemoor District as in the top 3 Local Authority areas at risk from flooding, alongside Hull and Portsmouth. Additionally, the complex water management practices on the Levels and Moors have high energy demands. Finding ways to reduce energy usage and mitigate the carbon costs of water management will be essential if the County is to become carbon neutral.

As Climate Change progresses, flood risk zones will change; new areas will be vulnerable, whilst regions currently susceptible will increase in risk. The type of flooding that devastated the Somerset levels in 2013/14 is likely to become more frequent. Tidal and coastal flooding around the Somerset coastline will increase, presenting significant risks to coastal communities along with increased risk of flooding from local sources (ordinary watercourses, surface water, groundwater) with implications for many urban areas.

Flooding from local sources cannot be tackled in isolation as multiple sources often combine to produce a flood event. No one organisation has sole responsibility to manage flood risk from all these sources; we therefore recognise the value and importance of working with others to manage flood risk and to fulfil our respective roles and responsibilities. Climate Change will also impact on water availability and quality and exacerbate the effects of pollution damaging ecology and biodiversity.

Flood risk

The response to flood risk management often remains piecemeal and reactive. The Environment Agency (EA) has recently set out a broad framework to approach things differently, describing the significant level of extra investment needed to enable communities to adapt to Climate Change. The EA estimates that nationally, on average at least £1 billion annual investment is needed in flooding and coastal change infrastructure over the next 50 years.

A key risk, and opportunity, in the water sector is that many decisions taken today on replacing or improving water management infrastructure need to take account of what the environment will be like in 50+ years due to the long design life of such infrastructure.

Therefore, due consideration is needed when including climate adaptation or resilience measures as it is expensive or difficult to reverse these decisions and could increase vulnerability if we get them wrong or they are inadequate.

Key resilience decisions occur when planning new developments, maintaining or upgrading current infrastructure or when recovering from extreme events. Utilising these decision points to plan for the future can increase resilience, and at a lower cost than if these opportunities were not taken.

Somerset's innovative 'Adaptation Pathways in Somerset' (APIS) and 'Co-Adapt' projects are examples of collaborative approaches to managing these risks and ensuring the County is adequately prepared for the future. They draw on the expertise and experience of multiple decision makers and those affected by their decisions to develop adaptation plans, through a process known as co-creation.

The APIS project has been recognised as 'best practice' by the EA, Meteorological Office and others. More on APIS can be found in appendix 12.

Water shortage

Tackling water resource issues is one of the five priority risks identified by the CCC. If action is not taken in the immediate future, parts of the South and South-East of England could run out of water within 20 years. Reducing demand is essential to prevent water shortages as water companies are running out of low-cost options for increasing water supply.

Private water companies are currently responsible for promoting the need to reduce household water consumption, but water use has continued to rise.

Adaptation

Adaptation measures to address climate impacts should seek to achieve multiple benefits. Techniques such as Natural Flood Management and Sustainable Drainage Systems (SuDS) are already widely implemented addressing flood and water management challenges in a more sustainable way and offering increased carbon sequestration and improved catchment management.

These innovative projects often include engagement with the local community to develop opportunities and "co-create" solutions, raising awareness of Climate Change and flooding risks.

No.	WATER SECTOR OUTCOME	Outcome Delivered by?	Which Goal Outcome Supports	TIMESCALE Short, Medium or Long Term	CO-BENEFITS
1	The energy used in the management and movement of water is optimised	Water Companies & other Risk Management Authorities	1(a), 1(b) & 2	Short & Medium Term	Reduced costs, and reduced bills to consumers and taxpayers
2	Water conservation measures are implemented at all levels (households, businesses, industry and agriculture) across Somerset and water is appropriately treated	Risk Management Authorities (Local Authorities, SRA, Water Companies, EA) Businesses, Industry & Agriculture, Residents	2 & 3	Medium & Long Term	Reduced water pollution, leading to increased environmental benefits and reduced water treatment costs. Reduced household bills.
3	Flood risk is increasingly managed through nature-based solutions which also sequester carbon	Risk Management Authorities (EA, Drainage Boards, Local Authorities, SRA, Water Companies), Businesses & Industry, Agriculture,	2 & 3	Medium & Long Term	Environmental, economic & social benefits e.g. increase in biodiversity, water quality, increase in tourism revenues, provide recreational opportunities for citizens, and help lower temperatures and pollution levels in urban areas
4	Flood risk from fluvial and coastal sources is managed through mitigation and adaptation measures	Risk Management Authorities (EA Local Authorities, SRA), Businesses, Industry & Agriculture, Residents,	2 & 3	Medium & Long Term	Environmental, economic and social benefits e.g. increase in biodiversity, increase in tourism revenues, provision of recreational opportunities for citizens
5	Flood risk from local sources (surface water, groundwater, ordinary watercourse) is managed through mitigation and adaptation measures	Risk Management Authorities (Local Authorities, SRA, Drainage Boards), Businesses, Industry & Agriculture, Residents	2 & 3	Medium & Long Term	Environmental, economic and social benefits e.g. increase in biodiversity, increase in tourism revenues, provision of recreational opportunities for citizens
6	The impact of invasive non-native species on the water environment will be better understood and managed appropriately	Risk Management Authorities (EA Water Companies, Local Authorities, SRA & Delivery Partners)	3	Medium & Long Term	Increase in biodiversity and ecological status of the water environment.
7	Changing patterns of flood risk, sea level rise and extreme weather events are understood by residents and communities across Somerset and resilience is developed through co-created solutions	Risk Management Authorities (EA Local Authorities, Drainage Boards, Businesses, Industry & Agriculture, Delivery Partners	3	Medium & Long Term	Building community resilience and preparedness. Reduced damage from flood events and extreme weather, and improved ability to recover fully & quickly

Opportunities and benefits

- **Water UK - Net Zero 2030**
  Water UK and the English Water Companies have pledged to achieve 'Net Zero' carbon emissions for the whole sector by 2030, the first industrial sector in the UK to do so.
- **The 'Refill' campaign**
  Bottled water is around 900 times more carbon intensive than tap water. The water industry is leading a national shift towards refilling water bottles through the 'Refill' campaign, whilst committing to stopping 4 billion plastic bottles ending up as waste by 2030.
- **Somerset Rivers Authority**
  Following the 2013-14 flood event, the Somerset Rivers Authority was formed offering a means to raise money locally to provide additional standards of protection according to local priorities.
- **Adaptation Pathways in Somerset**
  This work puts Somerset at the forefront of the strategic assessment of Climate Change vulnerabilities and interventions throughout the UK.
- **Improved resilience to Climate Change impacts** Adaptation measures, such as Natural Flood Management and Sustainable Urban Drainage Systems (SUDs) are being implemented to address flood and water management challenges in a more sustainable way, achieving multiple benefits by offering increased carbon sequestration and providing landscape-based resilience to Climate Change.

Barriers and Challenges

- **Resources and funding**
  Significant levels of extra investment are needed to enable our communities to adapt to Climate Change with around £1 billion required annually for flooding and coastal change infrastructure over the next 50 years.
- **Legislation and guidance**
  Lack of coherent policies leading to an often-reactive approach to flood risk management.
- **Water management infrastructure**
  The long design life of water infrastructure means that decisions taken today on replacing or improving water management infrastructure need to take account of the environment 50+ years from now. Mal-adaptation is expensive or difficult to reverse, increasing vulnerability if we get decisions wrong or they are inadequate.
- **Complexity of flood risk**
  Flooding cannot be tackled in isolation as many factors can combine to produce a flood event. All organisations have to coordinate activities and working together to manage and reduce flood risk.
- **Extent of Climate Change is unknown**
  We cannot know what the pace of Climate Change will be, therefore the risks we are designing for are uncertain. How well we plan for and manage that uncertainty, will have a significant impact on the resilience of the County.

7.8

WASTE & RESOURCES SECTOR SUMMARY

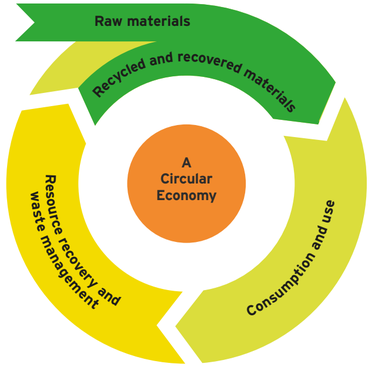
This sector describes the management of waste and resources and its emissions within Somerset. The latest greenhouse gas emission data from BEIS shows that this sector accounts for 4.6% of the total carbon emissions released in the UK in 2018. Since 1990, UK emissions from this sector have fallen from 66.6 $MtCO_2e$ to 20.7 $MtCO_2e$ in 2018, a decrease of nearly 70%. Increased reuse and recycling, reducing the biodegradable materials entering landfill, and moving away from reliance on landfill to dispose of waste has been crucial to this achievement.

Within Somerset, domestic waste and recycling is managed by the Somerset Waste Partnership (SWP). Somerset is independently ranked within the top 10% of Local Authorities in England in carbon saving from its household waste and recycling services, saving 103kg of carbon equivalent per person, mainly due to how well and how much gets recycled within the County. However, waste still makes a significant contribution to our carbon emissions from methane produced by the decomposition of biodegradable waste. In the UK alone, an estimated 10 million tonnes of food and drink are wasted post-farm gate annually, worth around £20 billion.

Waste is a valuable resource and developing a 'circular' economy would see us keeping more resources in use for as long as possible, extracting the maximum value from them. We should recover and regenerate products and materials whenever we can, giving them a new lease of life.

Somerset is well placed to adapt to the demands of a circular economy and is focused on collecting high quality materials that are in demand by UK re-processors. Further changes to what we collect and how we collect it might be needed to ensure that we are best placed to support a circular economy within Somerset – including moving up the waste hierarchy to focus much more on reduction, repair and reuse than on recycling and reprocessing.

THE CIRCULAR ECONOMY



Source: Resources & Waste Strategy for England

Somerset Waste Partnership

SWP manages household waste services and schools' waste on behalf of all 5 Local Authorities in Somerset and collects waste from over 250,000 households.

SWP makes over 20 million collections each year, taking place from five collections depots serving the County. There are also 16 Household Waste Recycling Centres across the County providing facilities for households to recycle additional materials including garden waste, bulky items, electricals and hazardous waste. The recycling centres achieved a recycling rate of 69% in 2018/19.

SWP recently introduced a new fleet of vehicles which will increase the capacity for recycled materials by 27,000 tonnes and will save around 30% of emissions compared to the previous vehicles.

Currently the market for alternative fuelled waste vehicles is not sufficiently advanced to make the current electric or hydrogen vehicles viable for a large rural County but it is assumed by 2024/25 when the fleet is replaced the technology will have matured.

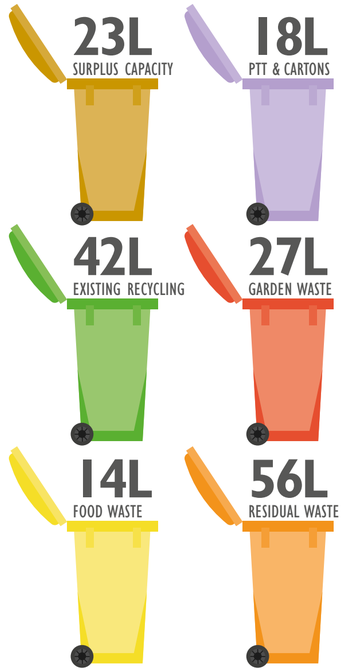
In Somerset, 85% of households take part in the recycling collections whilst 62% take part in food waste collections. Somerset Schools still lag behind, with recycling rates of 25%. The current household recycling rate is 52.41% and of this material, 91% was recycled in the UK, with almost 46% reprocessed in Somerset. Food waste still accounts for a large percentage of the waste in the refuse bin and has the biggest carbon impact.

The impacts of Climate Change

Waste Sector assets and operations are vulnerable to many climate-change impacts. There is likely to be increased disruption to waste collections due to extreme weather events; flooding, heatwaves, stormy weather and damage to infrastructure and vehicles, delayed collections due to inaccessibility, and higher levels of waste created from the clearance of flooded and damaged homes and businesses.

Higher summer temperatures may increase risk of smells and vermin around poorly managed waste, and impact on collection crews who are working outside in the heat of the day.

Increased temperatures will also increase the risk of odour and vermin around waste transfer stations and working landfill sites. This will make working conditions difficult for the site staff. However, the increased heat will increase the rate at which the waste breaks down and will quicken the rate of power generation to the grid through the anaerobic digestion process.



No.	WASTE & RESOURCES SECTOR OUTCOME	Outcome Delivered by?	Which Goal Outcome Supports	TIMESCALE Short, Medium or Long Term	CO-BENEFITS
1	By 2030, Somerset's Waste Carbon Footprint has reduced significantly from 2020	Local Authorities, SWP, Businesses, Industry & Agriculture, Residents, & Delivery Partners Local Authorities, SWP, Businesses, Industry & Agriculture, Residents, & Delivery Partners	1 (a), 1 (b) & 2	Short & Medium Term	Health and wellbeing, economic & social & environmental benefits air quality improvements
2	By 2030, (where possible) Somerset has a fully developed circular economy, managing our own waste and resources. The infrastructure is in place to achieve this and support local innovation. We gain value from items discarded by returning them back into the system	Local Authorities, SWP, Businesses, Industry & Agriculture, Residents, & Delivery Partners	2 & 3	Medium & Long Term	Economic & social & environmental benefits
3	Domestic and non-domestic waste has reduced significantly following circular economy and waste hierarchy principles of refuse, reduce, reuse and recycle. This is enabled by the mechanisms and support to allow easier sorting and recovery of waste	Local Authorities, SWP, Residents, & Delivery Partners	1 (a), 1 (b), 2 & 3	Short, Medium & Long Term	Economic & social & environmental benefits
4	Recycling of 'on the go' waste has increased from a (very) low base	Local Authorities & SWP Local Authorities, SWP, Residents & Businesses, Industry & Agriculture	2	Medium Term	Social & environmental benefits
5	By 2030, the waste vehicle fleet is made up of low carbon or electric vehicles	Local Authorities, SWP, Businesses, Industry & Agriculture, Residents, & Delivery Partners	1 (a), 1 (b) & 2 2	Short & Medium Term	Economic & social & environmental benefits, health & wellbeing benefits, air quality improvements
6	By 2030, year-on-year reductions in levels of fly-tipping achieved	Local Authorities, SWP, Businesses, Industry & Agriculture, Residents, & Delivery Partners	1 (a), 1 (b) & 2	Medium Term	Environmental benefits

No.	WASTE & RESOURCES SECTOR OUTCOME	Outcome Delivered by?	Which Goal Outcome Supports	TIMESCALE Short, Medium or Long Term	CO-BENEFITS
7	The majority of food waste is removed from general waste and processed in a way to minimise the release of greenhouse gas emissions and generate energy	Local Authorities, SWP, Businesses, Industry & Agriculture, Residents, & Delivery Partners	1 (a), 1 (b) & 2	Short & Medium Term	Economic & social & environmental benefits
8	By 2030, the volume of single-use plastics has significantly decreased without a switch to unsustainable alternatives.	Local Authorities, SWP, Businesses, Industry & Agriculture, Residents, & Delivery Partners	1 (a), 1 (b) & 2	Short & Medium Term	Economic & social & environmental benefits
9	Within schools, residual waste is reduced, and rates of re-cycling are at similar levels to domestic recycling	Local Authorities, SWP, Schools, & Delivery Partners	1(b) & 2	Short & Medium Term	Economic & social & environmental benefits
10	The Local Authorities in Somerset are exemplars in the County with regards to waste management and use of their purchasing powers to change the local commercial waste market.	Local Authorities, SWP & Delivery Partners	1 (a), 1 (b) & 2	Short & Medium Term	Economic & social & environmental benefits

Opportunities and benefits

- **Increased rates of recycling**
  Utilising initiatives such as Recycle More to engage with residents and drive up recycling rates.
- **Reducing the amount of waste generated**
  Restricting refuse capacity to make people consider how to generate less waste and where their waste comes from.
- **Better engagement with business**
  Provide advice and guidance to businesses regarding legislation, sustainable material choices for production and packaging, and encourage better sorting of waste to increase recycling.
- **Improved public sector waste and recycling**
  Optimise recycling across the public sector estate by providing the means, scale and guidance for recycling a wide range of products and material types.
- **Reducing emissions and building resilience across the waste management sector**
  Tackling emissions from waste operations and the vehicle fleet by investing in innovative, sustainable, low carbon technologies and adapting assets and delivery methods in the face of a changing climate.

Barriers and Challenges

- **Resources and funding**
  The Covid-19 pandemic had a significant impact on the delivery of the SWP programmes, causing delays to the Recycle More and Slim My Waste initiatives. SWP staff will be fully engaged supporting their roll out up to 2022 which will impact future priorities and decision-making.
- **Behaviour change**
  Encouraging all residents to adopt measures to minimise, sort and recycle all waste is challenging and will require resources to engage with 'hard to reach' households.
- **Engaging with businesses**
  Many small businesses lack the staffing levels, expertise, time and resources to make changes regarding their waste.
- **Legislative changes**
  The UK Government set out an ambitious policy agenda focussed on producer responsibility and quality. However, with further consultations expected, there is a lack of clarity around policy, making investment more challenging.
- **Markets**
  Our success in reducing disposal is highly dependent on accessing recycling markets. These are variable and can be subject to dramatic upturns and downturns, such as during the Covid-19 pandemic. Prices fluctuate, making it less economical for producers to use recycled material, highlighting the need to prioritise waste prevention, reduction and reuse.

7.9

COMMUNICATIONS SECTOR SUMMARY

This Strategy, whilst developed by the 5 Local Authorities, is a strategy for the whole of Somerset: for our City, Town and Parish communities, our people, our businesses and specific communities of interest.

The success of the Strategy in achieving its Goals and outcomes is dependent on 4 things:

- the effectiveness of the leadership and the commitment within the public sector and private sector in working towards carbon neutrality
- every citizen, community and organisation in Somerset having a common understanding of the issues and opportunities we are facing and an understanding of the actions we can take towards making Somerset carbon neutral
- effective engagement with and buy-in from our citizens and communities,
- everyone knowing what part that they can play in the success of the Strategy, and everyone making effective, lasting, behavioural change

We need to ensure everyone in Somerset understands the issues we are facing as a result of the way we live our lives, the impact this has had and continues to have on our climate.
We need to ensure that everyone understands what we are seeking to achieve through this Strategy and the actions we will need to take as individuals, communities and organisations if we are to reverse the damage already caused, achieve carbon neutrality and over time develop a County which is resilient to the impacts of Climate Change. This will be done through an underpinning Communications and Engagement Plan.

The Communications and Engagement Plan will have 4 key areas of focus:

- Messaging and promotion
- Community engagement
- Lobbying and influencing the UK Government and policy
- Influencing behaviour change

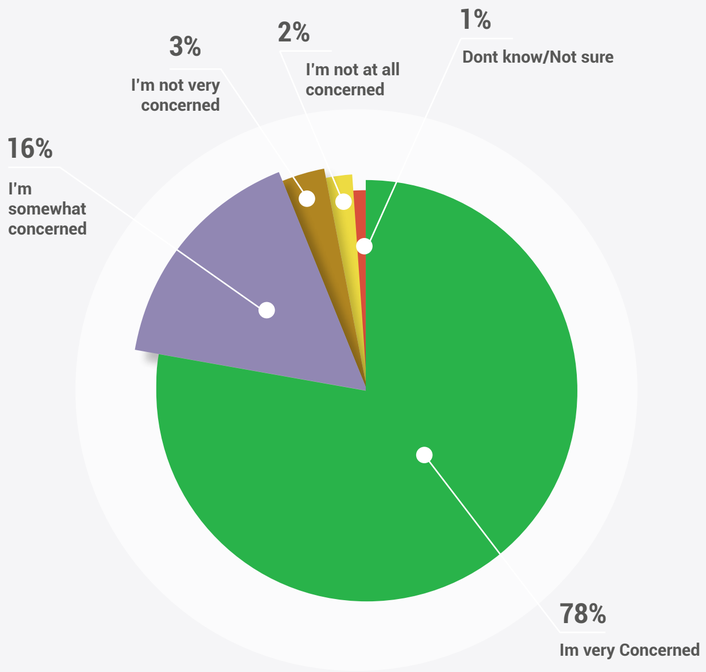
Current public perceptions

Initial consultation on the Climate Emergency Framework document which was proposed to form the basis of the emerging Strategy was undertaken in January and February 2020

The public consultation exercise was commissioned to:

- provide an opportunity for Somerset residents to comment on the proposed draft Framework document
- understand what residents feel Councils should prioritise when addressing the Climate Emergency, based on the options provided in the draft framework
- understand what further action residents believe Councils, communities, groups and individuals can and should take to address this challenge

CONSULTATION SURVEY RESPONSE: LEVELS OF RESIDENTS' CONCERNS REGARDING THE CLIMATE EMERGENCY



The findings were based on two Somerset-wide surveys among adults (16+) and young people (11-18), and visitor feedback from 4 public consultation events which were held in Taunton, Bridgwater, Shepton Mallet and Yeovil.

The vast majority of respondents are either 'very' or 'somewhat' concerned about Climate Change.

The results of the online surveys and consultation events give a clear picture that the public believes that the Councils were focusing on the right issues in the Climate Change Framework.

The public welcomed the direction of travel expressed in the Framework and the actions proposed, with many actions receiving a remarkable 90% plus approval rating as a 'priority' or 'major priority'. In fact, of the 33 proposed actions, the least popular is still regarded as a priority or major priority by 76% of respondents.

There is a high level of desire for action to tackle both the causes and impact of Climate Change among adults and young people in Somerset and that the Councils should support action as soon as possible.

Areas that are deemed the most pressing are transport and energy generation, while the impact of Climate Change in Somerset is most associated with flooding.

The feedback provided gives a clear indication as to what the public wants Somerset's Councils to do if the political will, legislation and funding were available:

- Defend against the impact of Climate Change by developing suitable flood defences and water management
- Encourage, support and subsidise renewable energy schemes for public buildings, community schemes, businesses and homes
- Lead by example through switching Council vehicles to electric or ultra-low emissions and installing renewable energy generation on all Council properties
- Planning support and priority for building (new and retrofit) or transport schemes that are carbon neutral or carbon negative

Transport is seen as a particular sticking point in rural Somerset; many residents would not opt for public transport as a mode of travel as it is thought to be inadequate or insufficient, and for many using an electric car is not an option as electric vehicles are too expensive to buy. Whilst this theme is seen to be the top priority for residents, it is thought that being able to do something effective might be more challenging for Councils. It is seen that lower cost impact can be made in better provision for walking and cycling, and this was a key priority for residents. Joining up cycle routes, better engineered junctions and general town planning that puts walkers and cyclists first would clearly address some of the residents' needs.

Nearly all survey feedback showed residents feel Climate Change is real and needs addressing through action to reduce carbon emissions. The respondents do not need convincing that Councils should do something but want to see evidence that Councils will or are doing something.

For those who do not 'buy into' the Climate Change narrative, any changes to their lifestyles will be met with resistance. To address this, any changes need to be shown as positives, such as cheaper electricity, lower fuel bills, safer routes to school, cleaner air and security from flooding.

There is a much larger task in effecting significant and lasting behavioural change in those businesses, communities and individuals who do not see that climate issues are a priority for them.

The final point from the feedback was the desire from the public for Local Authorities to 'get on with responding to the Climate Emergency', produce the Strategy as soon as possible and move to delivering actions. As a result of this feedback, a decision was taken not to go back out for consultation on the Final Climate Emergency Strategy. A report detailing the full findings of the consultation can be found in Appendix 3.

Behaviour change

In order to reduce the negative impacts on our climate caused by everyday living, we need to re-evaluate the way we live our lives and to make a conscious choice to make changes to our living, sleeping, travelling, eating and consumption habits.

Based on the 'One Planet Living Principles', we need the citizens of Somerset to:

- reduce consumption, reuse and recycle more to achieve zero waste and zero pollution both in their homes and at work
- make their homes energy efficient and resilient to the impacts of Climate Change
- use water efficiently, protecting local water sources and reducing flooding and drought
- help protect and restore land for the benefit of all people and wildlife, maximising the natural potential for our environment to act as a carbon sequester and store
- reduce the need to travel, and consider the alternatives of walking, cycling, low carbon transport and working from home where possible
- support their local communities in promoting a culture of sustainable living
- use more materials from sustainable sources
- reduce their carbon footprint by buying local
- help promote and maintain sustainable, humane farming
- change diets to include local, seasonal, organic food and vegetable protein to improve their health
- be responsible for maintaining our countryside, our natural habitats and open spaces to improve lives and promote good health and wellbeing
- encourage and support the businesses and organisations they work in to reduce their carbon emissions and consumption

Without these changes being made, we may not achieve our Goals of carbon neutrality and building a sustainable Somerset resilient to the impacts of Climate Change.

An aim of the Strategy is to help support these necessary behaviour and lifestyle changes by developing understanding, promoting the positive changes which can be made and by supporting local communities in reducing any negative impacts on the climate and our environment.

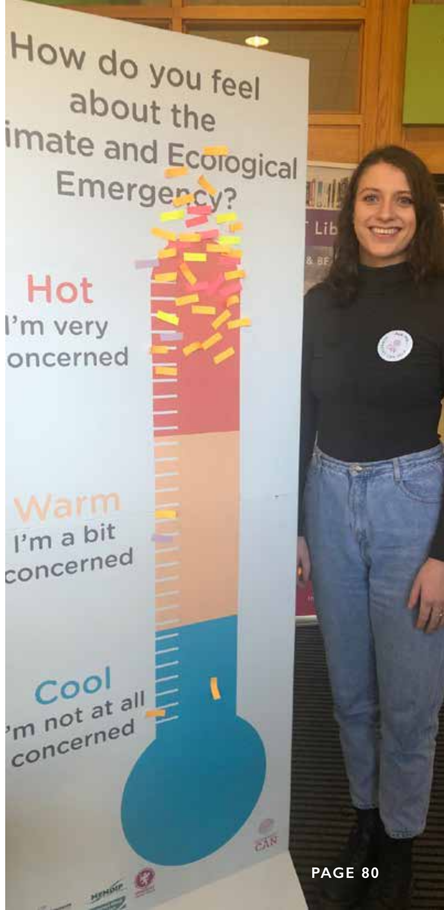
No.	COMMUNICATIONS SECTOR OUTCOME	Outcome Delivered by?	Which Goal Outcome Supports	TIMESCALE Short, Medium or Long Term	CO-BENEFITS
1	Every individual, organisation and business across Somerset is aware of the Climate Emergency Strategy and what it is trying to achieve	Local Authorities, Community Groups, Business Organisations	2 & 3	Short	Economic, environmental and societal benefits, health and wellbeing benefits
2	There is widespread ownership of the Strategy and every individual, organisation and business understand the part they have to play in achieving Net Zero carbon emissions by 2030 in Somerset	Local Authorities, Community Groups, Business Organisations Local Authorities, Community Groups, Business Organisations	1, 2 & 3	Short to Medium	Economic, environmental and societal benefits, health and wellbeing benefits
3	The Public and Private sectors understand what they can do to contribute to carbon reduction, and all organisations are actively working towards a carbon reduction culture which is embedded at all levels	Local Authorities, Community Groups, UK Government	1 & 2	Short to Medium	Economic, environmental and societal benefits, health and wellbeing benefits
4	People understand Climate Change and what is causing it.	Citizens and Businesses	1, 2 & 3	Short to Medium	Economic, environmental and societal benefits, health and wellbeing benefits
5	People and organisations consider Climate Change when making their decisions and embrace the positive changes that result.	Local Authorities, UK Government	1, 2 & 3	Short to Medium	Economic, environmental and societal benefits, health and wellbeing benefits
6	The 'big asks' of the UK Government are agreed and influencing national and regional policy and funding	Local Authorities, Local Businesses, Community Groups, Citizens	1, 2 & 3	Short to Medium	Economic, environmental and societal benefits, health and wellbeing benefits
7	Somerset is recognised as a leader and exemplar for the Climate agenda regionally & nationally		1, 2 & 3	Medium	Economic, environmental and societal benefits, health and wellbeing benefits

Opportunities and benefits

- This Strategy is an opportunity to get people and businesses within Somerset interested in climate matters; consider their own carbon footprints, address the myths surrounding Climate Change and encourage them to take affirmative action.
- By working with those closest to communities, there is an opportunity to develop and deliver actions that have the most impact and lasting benefit for areas, whilst also considering and reducing inequalities such as fuel poverty and social isolation through the delivery of local initiatives.
- It is an opportunity to encourage local communities and community groups to come together, share ideas and best practice, collaborate on schemes and projects to maximise utility, and gain economies of scale to tackle the Climate Emergency.
- An effective communications strategy can empower people and make them feel more invested in the issues, not just part of the problem.
- There is an opportunity to collaborate in our attempt to shape local, national and supranational policy through collective lobbying.

Barriers and Challenges

- Still a reticence in significant quarters of the population to accept that Climate Change is impacted by human activities and that significant behavioural and lifestyle changes need to be made by the majority of the population.
- Many people are still not informed or clear about the causes of Climate Change and don't know how to tackle it.
- Climate Change is not a key consideration for most people when making everyday decisions regarding what they wear, eat, where they work, how they travel, how they heat and light their homes.
- Need to engage people in Climate Change discussions to break down barriers that exist, highlight how lifestyles and attitudes can contribute to the issue and work towards solutions.
- Many actions for people and businesses to take to reduce carbon footprints require significant levels of investment, and substantial financial outlay with potentially long pay-back periods.



SECTION 8

Turning Strategy into delivery

This Strategy is underpinned by a series of actions designed to achieve the outcomes detailed in section 7 and these actions are detailed in the Climate Emergency Strategy Action Plan (Appendix 16). They will provide all partners and organisations involved in supporting the Climate Emergency declarations with a clear framework of tasks to manage and implement in order to deliver on the 3 Goals of the Strategy.

8.1 Climate Emergency Action Plan

The overarching Strategy Action Plan provides an overview of actions, timescales and responsibilities for the delivery of the short-and-medium term outcomes. It also provides some detail of the longer-term projects and activities which require significant policy and lifestyle changes and adaptive responses.

The Strategy Action Plan supports the Local Authorities and other partners in prioritising and identifying the resources required to deliver these actions. It identifies who will lead the actions, if funding has been secured. if further funding bids are required, and where the funding will come from to take these actions to implementation.

Projects have been prioritised through an assessment of:

- strategic fit with this Strategy
- activities which can be taken forward quickly
- scale of impact
- deliverability risk
- timescales to completion
- resources and capacity to deliver
- funding required and available to initiate and enable the activity
- costs of projects against return on investment (in terms of carbon saved and progress towards achieving our agreed Goals and outcomes)
- benefit to Somerset
- sustainability and future legacy

Our ability to deliver on these actions is entirely dependent on our ability to:

- secure and maintain partnership buy-in and ownership of the Strategy
- engage all segments of our community in contributing
- lobby for and secure UK Government support, national policy change, funding and resources

Activities that are as yet unfunded make up the majority of the identified actions and are marked accordingly in the Action Plan. Significant new funding from the UK Government will be required in addition to any funding already earmarked by the Somerset Local Authorities to deliver on the Goals of the Strategy; especially Goals 2 and 3.

A move away from fossil fuels to power transport and to heat and light homes and businesses will require significant investment from both the public and private sectors. This will not be easy to achieve in line with the timescales required to deliver on the aims of this Strategy.

A number of the changes required will necessitate investment from households, individuals and businesses to deliver the necessary carbon reductions. Investment in electric vehicles and electrified heating and lighting solutions, if not subsidised or incentivised, may be dependent on disposable income being available and prioritised.

Investment in the active travel (walking and cycling) and public transport has historically lagged behind expenditure in the highways network, which facilitates a greater number of cars on the roads. Recent announcements of funding for walking and cycling and green industrial recovery are welcome, but a fundamental change is needed in mindset from UK Government Departments to prioritise funding consistently to support a reduction in carbon emissions and building resilience for assets, infrastructure and our natural environment.

Underpinning the Strategy Action Plan, localised Environmental and Carbon Management Action Plans have been drawn up (or will be completed) by each of the 5 Somerset Local Authorities and detailed Project Plans developed for each proposed activity to ensure the planned programme of work can be appropriately and efficiently managed, resourced, sequenced and delivered.

These Environmental and Carbon Management Action plans will continue to evolve and change as actions are completed, as new actions are developed, as funding streams become available, policy and legislation changes or as technical drivers or innovative new solutions are implemented.

8.2 Work with communities

Although Local Authorities can play an integral role in carbon reduction by setting local policies and strategies, by directly funding schemes and playing a significant local leadership role, their resources and the scope of their direct influence is finite. Choices must be made by individuals and communities to take ownership of carbon emissions within their own spheres of influence and concern.

We require the support of our local communities and individuals to take forward many of the proposed actions and we will work with local City, Town and Parish Councils (including appropriate community groups in non-parished areas). Their detailed local knowledge, understanding of local needs and ability to connect with and empower local residents to take action are ideally placed to support communities to drive forward the agreed activities. Communities and community groups have access to funding that is not available to Local Authorities and the onus will be on those groups to identify and secure funding to deliver localised schemes.

8.3 Lobbying and influencing the UK Government and policy - the 'Big Asks'

Whilst a number of the actions identified in the Climate Emergency Strategy Action Plan are already funded or could be funded via the Local Authorities, many others, especially where new statutory duties arise, will require the support and leadership of the UK Government and a change to national strategy and policy. Significant new sources of funding will need to be secured and / or existing sources of funding made more flexible to support environmental and Climate Change focused programmes and projects.

It has been agreed that within the South West we will work together to develop a number of "Big Asks" of the UK Government and it is acknowledged that there is strength and consistency in this agreed approach. The most appropriate route to lobby the UK Government on these "Big Asks" is via the Heart of the South West Joint Committee and this will be developed through the South West Councils over the next 12 -18 months.

SECTION 9

Measurement, monitoring and review

9.1 Prioritisation of actions

At both a UK Government and Local Authority level, there must be a sea-change in how decisions and investments are made in order to support the carbon reduction agenda. Not only must due regard be given to the carbon impact of investment decisions, but also investment into schemes that actively reduce net carbon must be prioritised if carbon reduction targets are to be met.

As the Councils will have a finite amount of funding at their disposal to support this work, there is a need to measure the impact and relative merits (value for money) of each of the proposed activities within the 9 workstreams to support decision making and funding prioritisation.

9.2 Somerset CAN Measurement Tool Review

In order to help prioritise which actions should be adopted or invested in, Somerset Climate Action Network (Somerset CAN) were commissioned to investigate if there were any existing tools or methodologies that support decision making with prioritisation of investments in policies and actions and the ongoing monitoring of progress towards carbon emissions reduction across the County.

Somerset CAN's brief was to identify a tool or suite of tools that will enable the respective Local Authorities to:

- calculate the carbon benefits of proposed actions, commissioned activity or procured goods and services
- enable analysis of the relative benefits of different options to deliver proposed outcomes
- calculate both the direct (carbon) benefits and the co-benefits of the proposed actions
- calculate and compare value metrics in terms of finance, carbon emissions and co-benefits
- provide transparent metrics for investment decision-making and prioritisation
- measure progress against intended impacts
- benchmark against other Local Authorities, where appropriate and agreed

A draft list of 300 wide ranging actions from all sector workstreams was provided to Somerset CAN to help understand the type of actions the tool would need to assess. From their research, 65 resources were identified, many of these developed in the last 5 years, showing how rapidly this field of 'carbon calculation' is developing. Over 75% of the tools identified covered mitigation actions only, with a few suitable for adaptation projects and some covering both.

To aid with the evaluation, a set of criteria was identified against which each tool was assessed, which reduced the overall list down to 22 shortlisted resources. These 22 tools were then further reviewed against 14 high priority criteria. Significant gaps were identified in the Built Environment and Business, Industry and Supply Chain sectors. In the Built Environment sector, there appears to be no consistent tool in use to support action to retrofit homes, one of the Strategy areas with the largest emissions figures. However, the most significant gap identified is the absence of an aggregating tool that can bring coherent measurement of all programmes and projects across the 9 sectors into overview.

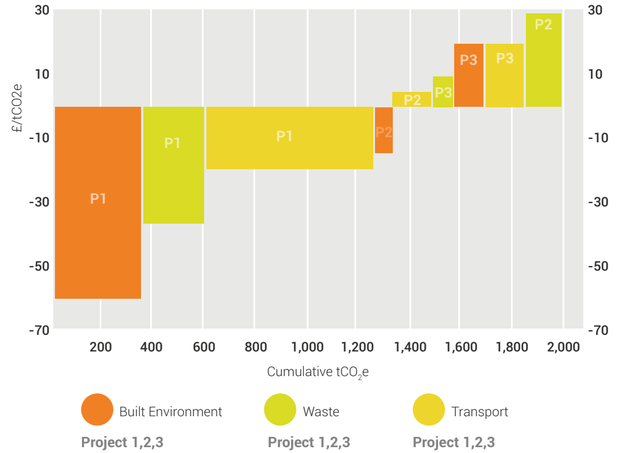
The main recommendation from the research is that the Marginal Abatement Cost Curve (MACC) approach is used and developed into both the aggregating tool and within sectors.

9.3 Marginal Abatement Cost Curve (MACC) analyses

MACCs have been extensively used as a powerful method of comparing the cost effectiveness of different measures and technologies for reducing carbon emissions. The vertical axis of a MACC chart plots the costs or savings per unit of CO_2e over the lifetime of the project. The horizontal axis plots the quantity of CO_2e abated, with the whole axis representing the cumulative CO_2e abated across all projects. Each project is displayed as a bar with height and width representing these two metrics, ranked in order from left to right, from the most cost-effective project to the least. Projects with high CO_2e reductions will show as wide bars.

The graph illustrates the principle in comparing 9 projects across the Built Environment, Transport and Waste sectors. Projects below the zero line represent a net saving over the lifetime of the project. Of these, Transport Project 1 delivers the highest CO_2e abatement and Built Environment Project 1 delivers the most cost-effective emissions reduction. The projects above the zero line represent a net investment over the project lifetime. Of these, Transport Project 3 delivers the highest CO_2e reductions. The full detail of the Somerset CAN report is available in Appendix 17.

ILLUSTRATIVE MACC CHART AGGREGATING SECTOR PROJECTS
SOURCE: SOMERSET CAN MEASUREMENT TOOLS REPORT, 2020



The MACC summarises overall cost-effectiveness. The MACC approach can be further developed by assessment of the net social costs or benefits of each project. The analyses will consider the different types of benefits between, for example, health and the wider environment. This information can then be added to MACC charts, so that co-benefits of projects can be included in decision making. The overall Net Zero carbon target can be shown as a vertical line on MACC charts, helping to ensure that interventions can be prioritised so that collectively, they meet the target. MACCs can be updated regularly to monitor progress.

Further work and research are needed to develop the MACC approach, but this is likely to form the cornerstone for how actions are prioritised to ensure an efficient, cost effective approach to delivering the biggest carbon reductions in Somerset. With so many diverse sectors all needing to play their part and multiple actions identified, knowing which should be implemented first will help in tackling the significant challenge of achieving a carbon neutral Somerset by 2030.

9.4 Monitoring and review

The monitoring approach for each individual action will be embedded into the Action Plan, which will be SMART (Specific, Measurable, Achievable, Relevant and Time scaled) and monitored on a regular basis.

PERFORMANCE MANAGEMENT SMART GOALS

At a programme level, the Local Authorities will set Key Performance Indicators (KPIs) to regularly review progress at both an individual action level and for the sector as a whole, which will determine whether the Action Plan is effective, or whether any changes need to be made at a project or programme level. Progress towards the Strategy Goals will be reported to the Somerset Local Authorities annually.

A strong governance process will be needed to ensure delivery of the actions within the Action Plans. A steering group, committee or task force, combining Officers and Members from across the Local Authorities, and representatives from key organisations will be needed to oversee the delivery of these actions. They will also advise on future courses of action, agree funding priorities and help communicate the successes and challenges that Somerset faces as we aim for a carbon neutral County by 2030.

9.5 Communications and Engagement Plan

An essential element to support the aims and ambition of this Strategy will be a comprehensive Communications and Engagement Plan. The far-reaching actions and activities required to deliver the Goals are beyond the scope of Somerset's Local Authorities and partner organisations and will require 'buy in' and ownership from the businesses, residents and communities in Somerset. The Local Authorities will facilitate the discussion about Climate Change, its causes and impacts, and support them to address their own carbon footprints by encouraging them to take affirmative action and the appropriate adaptive responses.

The Communications and Engagement Plan will have 4 key areas of focus:

- Messaging and promotion
- Community engagement
- Lobbying and influencing the UK Government and policy
- Influencing behaviour change

By working with those closest to communities, there is an opportunity to develop and deliver actions that will have the most impact and lasting benefit for those areas, whilst reducing inequalities such as fuel poverty and social isolation through the use of local initiatives.

This is also an opportunity to encourage local communities and groups to come together and share ideas, best practice and to collaborate on schemes and projects to maximise utility and gain economies of scale. An effective communications strategy can empower people, helping them become invested in the issues and, as a result, seeing themselves as part of the solution, not part of the problem.

Digital Communications

An online presence will be the centrepiece of communications and engagement for the Strategy. This will be the 'hub' for information about what Somerset is doing regarding carbon neutrality and in tackling the impacts of Climate Change. It will include case studies, progress updates, toolkits for individuals and businesses, and information on how to get involved (including online surveys and resources packs for schools and other audiences). Its associated social media channels will be critical to informing and engaging the wider public.

SECTION 10

Summary

This Strategy 'Towards a Climate Resilient Somerset' is Somerset's Local Authorities' collective response to the Climate Emergency declarations around the world. At the beginning, we set out our ambitious aims of delivering:

- A Carbon Neutral Somerset by 2030 and
- Building our resilience for, or adapting to, the impacts of a changing climate

We have presented the evidence of how our climate is changing, the impacts those changes will have, outlined the many challenges we face, and the measures and opportunities we must take, here in the County of Somerset, to enable us all to adapt and thrive in the future.

We have worked with a wide range of sector experts, delivery partners, organisations, individuals, interest groups, and specialists to identify what, to the best of our collective knowledge, experience and current thinking, is needed to deliver on our ambitions. We have started formulating the actions to take us there.

The success of the Strategy in achieving its Goals and outcomes is dependent on:

- the effectiveness of the leadership of the Local Authorities and the commitment within the public and private sectors in working toward carbon neutrality
- every citizen, community and organisation in Somerset having a common understanding of the issues faced, opportunities presented, and the actions needed to make Somerset carbon neutral
- effective engagement with and buy-in from our citizens and communities
- the residents of Somerset knowing what part they can play in the success of the Strategy and everyone making effective, lasting, behavioural changes

The CCC has called on the UK Government to seize the opportunity to make the Covid-19 recovery a defining moment in tackling the climate crisis, framing a recovery that both accelerates the transition to Net Zero and strengthens our resilience to the impacts of Climate Change, whilst driving new economic activity.

Clean growth and a 'green' recovery mean investing in new jobs and cleaner energy ensuring that the actions needed to tackle Climate Change are central to rebuilding our economy. The UK Government must prioritise actions that reduce climate risks and avoid measures that lock-in higher emissions. Within Somerset, the development of Hinkley Point C and the Gravity Campus provide an exciting opportunity for us to show leadership to the whole of the UK.

However, this is only the beginning of our journey. We won't have got everything right at the outset and we won't be able to do everything at once. There are some difficult decisions for us all to make, some complex issues and challenges to overcome, not least how all this is funded, and we need to prioritise our activities to ensure we make progress against our Goals as quickly as is possible.

Join us to help make it happen.

SECTION 11

Glossary of Terms

An explanation of some of the terms used within this Strategy

Adaptation, or Climate Change Adaptation: ways in which we act to manage the unavoidable risks and impacts of Climate Change, building resilience within, or adapting, our natural and built environment both now and into the future.

Adaptation Pathways: an approach which considers many possible future scenarios and permits all the options and their potential impacts to be considered.

Anthropogenic: originating from human activity

APIS: stands for 'adaptation pathways in Somerset'.

Arable farming: using farming land to grow crops.

Baseline: the measure of the County's current and future greenhouse gas emissions without reference to any changes to current policy and action. This is the 'line' against which change is, and will be, measured.

BEIS: the Department for Business, Energy and Industrial Strategy, part of the UK Government.

Big Asks: the list of changes to national strategy, policy and funding flexibility and sources, which will require UK Government support so Somerset can work effectively and efficiently on environmental and Climate Change focused programmes and projects.

BREEAM and Building Research Establishment Environmental Assessment Method: is a way of assessing, rating and certifying the sustainability of buildings, infrastructure and projects.

Carbon Credit: a term used to describe any tradeable certificate or permit giving the holder a right to emit one tonne of carbon dioxide, or the equivalent amount of a different greenhouse gas.

Carbon Footprint: the total greenhouse gas emissions caused by an individual, event, organisation, service or product expressed as carbon dioxide equivalent (CO2e), expressing the size of the impact something has on the environment

Carbon Neutrality: (also having a Net Zero carbon footprint) refers to achieving Net Zero carbon dioxide emissions either by balancing carbon emissions with carbon removal, or simply eliminating carbon emissions altogether.

Carbon Offsetting: a mechanism used to compensate for, or 'offset', carbon dioxide or greenhouse gas emissions made elsewhere. The process involves a business, individual or country providing the funds for activities or projects that improve or enhance the environment or buying 'carbon credits' to balance out the emissions from their own activities.

Carbon Sequestration and Storage: removing carbon dioxide and other forms of carbon from our atmosphere and storing it for the long term

CCC: the UK's Committee on Climate Change, formed mainly from a group of scientists, which gives independent advice to the UK Government on building a low-carbon economy and preparing for Climate Change.

CCRA: every 5 years, the UK Government is required under the terms of the 2008 Climate Change Act, to publish a Climate Change Risk Assessment. This Risk Assessment must address "the risks ... from the current and predicted impacts of Climate Change".

Circular Economy: an economic system aimed at eliminating waste and the continual use of resources, and seeking to de-couple growth from the consumption of finite resources.

Climate Change: the rising average temperature of earth's climate system, called global warming, is driving changes in rainfall patterns, extreme weather, arrivals of seasons, and more. Collectively, global warming and its effects are known as Climate Change.

Climate Emergency: a situation in which urgent action is required to reduce or halt Climate Change and avoid potentially irreversible environmental damage resulting from it.

Co-Adapt project: in Somerset, the Co-Adapt Project will invest in the development, testing and rolling out of nature-based solutions to increase capacity to adapt to the water-related effects of Climate Change.

CO_2: carbon dioxide, a greenhouse gas.

CO_2e: a measurement of the carbon dioxide equivalent of the amount of other greenhouse gases emitted by an event or action.

County: the County of Somerset.

Covid-19: An infectious disease caused by the most recent Coronavirus, first identified in 2019 and which has resulted in an ongoing pandemic.

Defra: the Department for the Environment, Food and Rural Affairs, part of the UK Government.

Distribution line: cabling which moves electricity from a substation to a customer

Distribution Network Operators (DNOs): companies licensed to distribute electricity in Great Britain eg. Western Power Distribution

Distribution System Operators (DSOs): those responsible for operating, ensuring the maintenance of and, if necessary, developing the distribution system in an area and ensuring long-term ability to meet reasonable demand.

EA and Environment Agency: a non-departmental public body with responsibility for protection and enhancement of the environment in England.

Ecosystem Services: the many and varied benefits provided by the natural environment and healthy ecosystems eg. pollination of crops, clean air, extreme weather mitigation, human well-being, clean water, waste decomposition and resilient, productive food systems.

Enterprise Zones: designated areas benefiting from tax breaks and UK Government support for local economic growth.

Flood Risk Zones: all land in England is zoned by the Environment Agency as 1, 2, 3a and 3b, indicating the area's probability of river or sea flooding.

Framework: the 5 Councils' joint document outlining the proposed areas of focus for the Strategy. The document details some actions that councils, residents, businesses and other organisations within Somerset can take to help reduce carbon emissions.

Fuel Poverty: households are considered to be in 'fuel poverty' when their members cannot afford to keep adequately warm at a reasonable cost given their income.

Gravity campus: a 635 acre site of mixed-use commercial development focused on clean growth based near Junction 23 of the M5 at Puriton in Somerset.

Greenhouse gases: the primary greenhouse gases in the earth's atmosphere are water vapour (H_2O), carbon dioxide (CO_2) methane (CH_4), nitrous oxide (N_2O) and Ozone (O_3)

GWh: Gigawatt hour, a unit of energy representing one million kilowatt hours or one billion watt hours. Gigawatt hours are often used as a measure of the output of large electricity power stations.

Heart of the South West Joint Committee: a partnership of Leaders and lead representatives from each of the 17 Local Authorities in Somerset, Devon, Plymouth & Torbay, Dartmoor and Exmoor National Parks, and three NHS Clinical Commissioning Groups which oversees a Productivity Strategy and discusses a range of policy areas with the UK Government.

HotSWLEP and Heart of the South West Local Enterprise Partnership: collaborations between 17 Local Authorities and businesses who decide economic priorities, drive growth and create local jobs and prosperity across the 'Heart of the South West' area – Somerset, Devon, Plymouth & Torbay.

IEA: the International Energy Agency, an independent intergovernmental organisation which focuses on energy security, economic development and environmental protection, particularly mitigating Climate Change and promoting alternate energy sources including renewable energy.

IPCC and International Panel on Climate Change: an intergovernmental body dedicated to providing objective scientific information relevant to understanding the risk of human induced Climate Change, its natural, political and economic impacts, risks and possible responses.

KPIs and Key Performance Indicators: ways of measuring the success or failure of a team, project, product or organisation using information on the achievements considered most important to success.

ktCO_2: kilotonnes of carbon dioxide.

MtCO_2e: million tonnes of carbon dioxide equivalent.

LIS and Local Industrial Strategy: led by the Heart of the South West Local Enterprise Partnership, this promotes the co-ordination of local economic policy and national funding streams and establishes new ways of working between national and local government, the public and private sectors.

Local Authority and Local Authorities: a Council or several Councils. In the Strategy this is likely to mean the 5 Somerset Councils.

Local Enterprise Partnership and LEP. voluntary partnerships between Local Authorities and businesses to help determine local economic priorities and lead economic growth and job creation in the area

LNPs and Local Nature Partnerships: these collaborations bring together local organisations, businesses and people who want to improve their local natural environment.

Marginal abatement cost curve (MACC): a chart showing estimates of the volume and costs of different ways to reduce emissions in a given year.

Mitigation and Climate Mitigation: ways to cut or prevent the emission of greenhouse gases and limit the impacts of future global warming.

Mixed farming: farming livestock and crops.

MWe: megawatt electrical.

MWth: megawatt thermal.

Natural capital: the stock of natural assets eg. geology, soil, air, water and all living things.

Natural flood management: using natural methods to reduce the risk of flooding eg. restoring river bends, land and soil management, strategic tree planting.

Nature recovery network: a Wildlife Trust initiative where interlocking projects aim to protect nature and increase its resilience and services through a multitude of government interventions, plans and people.

Net Zero: achieving an overall balance between emissions produced and emissions taken out of the atmosphere.

NFU: National Farmers' Union

NPPF and National Planning Policy Framework: the land-use planning policy in the UK.

'One Planet Living' Principles: ten principles that cover all aspects of social, environmental and economic sustainability.

Passivhaus and passive house: an ultra-low energy use standard for buildings, needing little energy for heating or cooling.

Pastoral farming: uses pasture, or grassland, to support livestock, like dairy farming, and farming beef cattle and sheep for wool.

R&D: research and development.

Ramsar: wetland sites designated to be of international importance.

RIIO-ED2 and RIIO-ET2: the next electricity distribution and transmission mechanism used by the Office of Gas and Electricity Markets (Ofgem) to control network prices. This will be tougher on network companies, who must deliver innovation, reliability and investment at the least cost to consumers. RIIO stands for Revenue using Incentives to deliver Innovation and Outputs.

Solar PV: solar photovoltaic - a method of generating electricity from sunlight, commonly using rooftop and panels at ground level.

Electricity distribution 2: the next round of electricity network price controls which start in 2021.

SME: small and medium-sized enterprise: a business with fewer than 250 employees.

SuDS: sustainable urban drainage systems, also sustainable drainage systems. Ways of managing water which allow rain and flood water to drain from land using deliberately placed water management systems, like storage areas, so as to reduce the risk of water and flood damage.

Transmission line: cabling which moves electricity from a power plant or station to substations.

V2G: a system whereby electric vehicles charge more slowly at a time when there is high demand for electricity from the grid, and when plug-in electric vehicles return electricity from their charged batteries to the electricity grid.

Water UK: A trade association representing the major water companies of the United Kingdom.

SECTION 12

Climate Emergency Strategy acknowledgements

We would like to give a special thanks to all those that contributed to this document including:

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SECTION 13

Appendices

Appendix 1: The 5 Somerset Council's Climate Emergency Declarations

Appendix 2: Key Climate Change Terms and Definitions

Appendix 3: Climate Emergency Framework Consultation (Somerset CAN) Report

Appendix 4: The 5 Somerset Local Council's Environmental or Carbon Management Action Plans

Appendix 5: Climate Change Legislation Summary

Appendix 6: CE Strategy Energy Sector Detailed Report

Appendix 7: CE Strategy Transport Sector Detailed Report

Appendix 8: CE Strategy Built Environment Sector Detailed Report

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Appendix 11: CE Strategy Farming and Food Sector Detailed Report

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Appendix 14: CE Strategy Communications Sector Detailed Report

Appendix 15: CE Strategy Outcomes Table

Appendix 16: CE Strategy Action Plan

Appendix 17: CE Strategy Carbon Measurement Tool Analysis (Somerset CAN Report)

SECTION 14

References

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