Plan 2030

Accelerating action for a Net Zero 2030

A report for South Gloucestershire Council

27 April 2022

Professor JWS Longhurst
University of the West of England, Bristol
Frenchay Campus
Coldharbour Lane
Bristol
BS16 1QY

UWE Bristol | University of the West of England

South Gloucestershire Council

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This review was commissioned by and prepared for South Gloucestershire Council.

For any queries or correspondence regarding the report, please contact the UWE Bristol Project Manager:

Professor JWS Longhurst
University of the West of England, Bristol
Frenchay Campus
Coldharbour Lane
Bristol
BS16 1QY

E-mail: James.Longhurst@uwe.ac.uk
Tel: (+)44 (0)117 3283692

For any queries or correspondence regarding Contract or Intellectual Property issues relating to this review, please contact the following:

Head of Contracts
Contracts and Legal Team
Commercial Services
University of the West of England, Bristol
Frenchay Campus
Coldharbour Lane
Bristol
BS16 1QY

E-mail: Amy.Charles@uwe.ac.uk
Tel: (+44) (0)117 3282125

Version and activity history

Log	Issue	Date	Actions / Changes / Comments
1	UWE Bristol commissioned by SGC	23/12/21	Plan 2030 brief and associated documents supplied by SGC.
2	Contract agreed as part of framework with SGC	10/1/22	Terms and timescale agreed.
3	Clarification of brief and information required	3/2/22	Kick-off meeting – additional data needs shared.
4	Further information requests	Various dates in February and March	Additional data supplied by SGC including Council functions, budget allocations and regulatory powers.
5	Draft of report shared	7/3/22	Incomplete draft V1 for comment by SGC.
6	Comments from SGC	16/3/22 – 30/1/22	Response to comments and further updating to a new draft V2.
7	Final draft report	31/3/22	Report finalised and submitted.
8	Final report	13/4/22 and 13/9/22	Minor comments from SGC incorporated.

Preamble

'Any further delay in concrete anticipatory global action on adaptation and mitigation will miss a brief and rapidly closing window of opportunity to secure a liveable and sustainable future for all.'

IPCC (2022) Climate Change 2022: Impacts, Adaptation and Vulnerability. Working Group II contribution to the Sixth Assessment Report.
Available at: https://report.ipcc.ch/ar6wg2/pdf/IPCC_AR6_WGII_FinalDraft_FullReport.pdf

'The five-year assessment, delivered under the Climate Change Act 2008 and following close work with the Climate Change Committee (CCC), identifies the risks that climate change poses to multiple parts of our society and economy. For eight individual risks, economic damages could exceed £1 billion per year each by 2050 with a temperature rise of 2°C, with the cost of climate change to the UK rising to at least 1% of GDP by 2045.'

UK Government (2022) Government publishes UK's Third Climate Change Risk Assessment. Defra. Available at: https://www.gov.uk/government/news/government-publishes-uks-third-climate-change-risk-assessment

'While we aim to limit warming to 1.5°C, the evidence shows that we must be prepared for warming up to 4°C.'

UK Government (2022) Third Climate Change Risk Assessment. Defra.
Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1047003/climate-change-risk-assessment-2022.pdf

The Climate Emergency Strategy vision is 'for a climate resilient South Gloucestershire with a thriving low carbon economy and lifestyle reflected in our travel, homes, businesses and communities, where nature can flourish'.

South Gloucestershire Council (2019) Climate Emergency Strategy.
Available at: https://beta.southglos.gov.uk/wp-content/uploads/Climate-Emergency-Strategy.pdf

Executive summary

Achieving net zero in 2050 is enshrined in UK law. The first three national carbon budgets have made an impressive start on the UK decarbonisation journey but the challenge of implementation facing the fourth, fifth and sixth budget is significant. The UK Net Zero Strategy is an impressive outline of good intention and proposed actions to build on progress, but urgent action is needed to meet the UK commitment to achieve net zero by 2050. Equally, while commendable progress has been made by South Gloucestershire Council, further urgent action is required across South Gloucestershire, including the council itself, to meet the Climate Emergency declaration commitment by 2030. The Council is not alone in needing to scale up its actions and this is consistent across the local government family.

South Gloucestershire Council's Climate Emergency declaration pledges to provide the leadership to enable South Gloucestershire to become carbon neutral by 2030. The Climate Emergency Strategy and Action Plans interpret this as leading, enabling and inspiring climate action across the area recognising that the council does not have the powers and resources to require climate action of residents and enterprises. Territorial emissions of CO_2 in South Gloucestershire are estimated at just over 1,137 kt for the year 2019. Council direct emissions are approximately 1% of the total emission. Adaptation measures and resilience in the face of a changing climate requires enhanced attention and the implications for South Gloucestershire of the UK's Third Climate Change Risk Assessment are discussed in this report. Whilst the focus of this report is to review progress and steps required to achieve net zero, the South Gloucestershire Climate Emergency declaration helpfully sets out commitments to restore nature and double tree canopy cover across the area, which plays a key role in plans for adaptation, resilience and other benefits across the council's priorities. South Gloucestershire as an area will, on current estimates, have a residual CO_2 emission of some 5–600 kt in 2030. As is the case in other local authorities, the vast majority of this residual comes from territorial emissions from industry, transport and the domestic sector.

In the absence of any further local action to reduce territorial emissions over and above national actions South Gloucestershire will need to determine how this residual could be managed through compensation actions such as offsetting and where capacity exists through approaches to insetting. Land will need to be acquired and long-term funding for the ongoing management of the offset secured.

Scope 3 emissions defined in the Greenhouse Gas Protocol (including those from construction, waste, water, commuting, travel, food and procurement) require further attention in the discussions and actions of the council and of key employers across South Gloucestershire. While work is underway to assess the scale of scope 3 emissions, this will need to be systematically integrated with Council decision making. The rate and scale of decarbonisation activity can be enhanced by actions undertaken by the council, especially through leadership. As the national target is net zero by 2050 and South Gloucestershire has set a 2030 target there is a disconnect between the delivery of actions nationally and locally. In order to meet its ambitions South Gloucestershire Council will need to increase innovation and potentially be more disruptive in its actions and to support this, recommendations are provided covering 20 areas of action to enhance the scale and accelerate the rate of decarbonisation within South Gloucestershire.

The success of this work hinges on the engagement and cooperation of a range of actors including:-

Local businesses; Residents; The Local Strategic Partnership; Academic institutions and Educational Facilities; Installers and trade associations; Faith and community based organisations; Utility companies; Transport providers; Health and Emergency Services; Agricultural sector; Financial Intuitions; Press and media.

Climate and nature emergency – Plan to 2030

In a nutshell

- The council has a role in supporting the delivery of national policies and commitments that will deliver carbon emissions reductions to 2050 and needs to contribute to their delivery.
- These national policies will contribute to the 2030 target, but they are targeted to delivery by 2050 so they leave a significant gap in area-wide emissions.
- The remaining emissions in the SG area in 2030 are likely to be in the range of 500–665 kt (midpoint 582 kt). In 2019 the most recent available data area wide emissions were 1,137.4 ktof CO_2.
- The Council's direct emissions (schools, buildings, street lighting, vehicle fleet etc.) account for approximately 1% of area wide emissions.
- Targeted local action by the council (lead, enable, inspire) may help to reduce a further 250 kt.
- Alongside emissions reduction, the government's latest Climate Change Risk Assessment highlights the critical need to act on adaptation and resilience to help communities prepare for the local impacts of the changing climate.
- Whilst the focus of this report is emissions reduction, preparing for the local impacts of a changing climate and protection and restoration of nature are central to the successful outcomes of this work.

The council can make a significant contribution to reaching the 2030 area-wide goal over the next eight years by focusing efforts on leading, enabling, and inspiring.

Some of the key areas for focus to reduce emissions are:

Area focused

- Maximise support for domestic retrofit (the most likely largest remaining contributor to area emissions).
- Plug gaps in action on decarbonising heat.
- Maximise business engagement in carbon emissions reduction.
- Maximise advice and support for active travel support EV charging infrastructure roll-out.
- Work with WECA to consider adaptation in transport planning.
- Maximise growth of renewable energy across the area.
- Maximise green economic development. Target certain high impact sectors in industry and commerce, and encourage new green tech, services and businesses to locate in our area.
- Maximise climate and nature policies in the local plan.
- Align forces with WECA and regional partners to ramp up action across the region.

Council focused

- Become a carbon neutral council (direct emissions), reduce Scope 3 emissions.
- Embed climate and nature decision making as standard in council processes and ramp up internal and external training.
- Work with organisations across South Gloucestershire on emissions reduction and adaptation.
- Prepare the area and council for the local impacts of a changing climate focus health, vulnerable residents and infrastructure.
- Carry out the 31 actions for climate councils as identified by Friends of the Earth.

- Take more innovative and ambitious steps to plug gaps in local action using council powers around finance, decarbonisation of heat, nature recovery, home retrofit supply chain.
- The council needs to consider the impact of a possible four degree temperature rise by 2100 and the steps it can take to protect residents and businesses and maintain essential services.
- By the late 2030s extra capital spending will be offset by reductions in operational spending.
- The annual cost to the area of achieving net zero is likely to be in the region of £128–285 m at 2021 prices.
- The cost of not addressing the impacts of a changing climate is likely to be 1% of UK GDP by 2045; South Gloucestershire's current GDP is £12,865 m. It is not clear what percentage would fall on South Gloucestershire.
- After all mitigation initiatives have been undertaken carbon offsetting will be required. There will not be enough offsetting opportunity in the local area to cover emissions so this will need further consideration.

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1. Introduction

The University of the West of England supports and scrutinises South Gloucestershire Council in their Climate and Nature Emergency work through a University Advisory Group. This group meets monthly with representatives of South Gloucestershire Council's Climate Emergency Team to review, support, and critique Climate and Nature Emergency activities. Specifically, the University Advisory Group has

- Supported South Gloucestershire Council in the design and implementation of the Year 2 Climate Emergency Action Plan
- Provided advice and support of the Local Strategic Partnership's Joint Programme of Activity in 2020 and 2021
- Provided speakers for the South Gloucestershire Business Show in October 2021
- Provided a technical review of the outcomes of the Year 1[1] and the Year 2 Action Plan[2]
- Advised on the key issues to include in the Year 3 Action Plan[3]
- Provided academic guidance for a Work Based Learning student placement in the Climate Emergency team
- Advised on a range of ad hoc queries and requests relating to Climate Emergency matters.

South Gloucestershire Council has asked the University Advisory Group to identify the actions that may be taken to accelerate action within the area to mitigate emissions. The authority also asks that consideration be given to matters of adaptation and carbon sequestration but the primary focus is mitigation action.

This report therefore considers options to embed and accelerate Climate and Nature Emergency actions in South Gloucestershire. It does so by considering a wide range of policy and strategy documentation. These include the discussions and decisions made at COP26[4], UN[5] and IPCC[6] reports, UK government strategy and plans[7], BEIS local emission statistics[8], reports from the Committee on Climate Change[9] and the UK government's third Climate Change Risk Assessment (CCRA3)[10]. These documents alongside others included in the References will inform issues discussed in this report.

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[1] University of the West of England University Advisory Group (2020) Review of Year One of the Climate Emergency Action Plan. Available at: https://www.uwe.ac.uk/study/library/research-support/research-repository

[2] University of the West of England University Advisory Group (2021) Review of Year Two of the Climate Emergency Action Plan. Available at: https://beta.southglos.gov.uk/static/5e5bdbd83f51c0169af668c38fd5cd27/Appendix_6_Review_of_Year_2_Climate_Emergency_Action_Plan.pdf

[3] South Gloucestershire Council (2021) Climate Emergency Action Plan – Year 3 (2022/23). Available at: https://council.southglos.gov.uk/documents/s130493/Appendix%203%20Climate%20Emergency%20Action%20Plan%20Year%203.pdf

[4] COP26

[5] UN Agencies Present Latest Climate Science (2021) The UN Climate Science Summary. Available at: https://unfccc.int/news/un-agencies-present-latest-climate-science

[6] IPCC (2022) Climate Change 2022: Impacts, Adaptation and Vulnerability. Working Group II contribution to the Sixth Assessment Report. Available at: https://report.ipcc.ch/ar6wg2/pdf/IPCC_AR6_WGII_FinalDraft_FullReport.pdf

[7] The UK's Net Zero Strategy The UK's Heat and Building Strategy Transport Decarbonisation Plan

[8] UK local authority and regional carbon dioxide emissions national statistics: 2005 to 2019

[9] Evans, L.M. (2020) Local Authorities and the Sixth Carbon Budget. An independent report for the Climate Change Committee. Available at: https://www.theccc.org.uk/publication/local-authorities-and-the-sixth-carbon-budget/
Climate Change Committee's Report to Parliament on progress in adapting to Climate Change, Climate Change Committee's Report to Parliament on progress in reducing emissions, Climate Change Committee's Independent Assessment: The UK's Net Zero Strategy

[10] UK Government (2022) Third Climate Change Risk Assessment. Defra. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1047003/climate-change-risk-assessment-2022.pdf

The national and local context

- Urgent action is needed to meet the UK commitment to achieve net zero by 2050.
- Equally, urgent action is required across South Gloucestershire, including the council itself, to meet the Climate Emergency declaration by 2030.
- South Gloucestershire Council's Climate Emergency Declaration pledges to provide the leadership to enable South Gloucestershire to become carbon neutral by 2030.
- The Climate Emergency Strategy and Action Plans interpret this as leading, enabling and inspiring climate action across the area recognising that the council does not have the powers and resources to require climate action of residents and enterprises.
- Territorial emissions in South Gloucestershire are estimated at 1,137.4 kt for the year 2019[11]. Council direct emissions are approximately 1% of the total emission[12].
- Adaptation measures and resilience in the face of a changing climate require enhanced attention and the implications of CCRA3 for South Gloucestershire are discussed in this report.
- Whilst the focus of this report is to review progress and steps required to achieve net zero, the South Gloucestershire Climate Emergency declaration also sets out commitments to restore nature and double tree canopy cover across the area, which plays a key role in plans for adaptation, resilience and other benefits across the council's priorities.
- Under the Greenhouse Gas Protocol arrangements, Scope 3 emissions require further attention in the discussions and actions of key employers across South Gloucestershire.
- South Gloucestershire as an area will, on current estimates, have a residual CO_2 emission of some 5–600 kt in 2030. The vast majority of this residual comes from territorial emissions from industry, transport and the domestic sector.
- In the absence of any further local action to reduce territorial emissions over and above national actions South Gloucestershire will need to determine how this residual is to be managed through offsetting. Land will need to be acquired and long-term funding for the ongoing management of the offset secured.

The national position

The UK has set in law[13] a process of carbon budget setting covering five-year periods with the intention of reaching the UK net zero target in 2050. The first two budgets have been met (2008–12, 25% and 2013–2017, 31% reduction over baseline), and the third is likely to be met (2018–22, with a 37% cut compared to the baseline).

- The fourth carbon budget (2023–2027) requires that in 2025 emissions have reduced by 50% compared to the 1990 baseline.
- The fifth carbon budget (2028–2032) requires that in 2030 emissions have reduced by 57% compared to the 1990 baseline.
- Meeting the sixth carbon budget (2033–2037) will require emissions to reduce by 78% compared to 1990 in 2035.

[11] BEIS (2021) UK local authority and regional carbon dioxide emissions national statistics: 2005 to 2019

[12] South Gloucestershire Council (ND) Emissions Dashboard.
Available at: https://beta.southglos.gov.uk/climate-emergency-in-south-gloucestershire#emissions-dashboard

[13] HM Government (2008) Climate Change Act 2008.
Available at: https://www.legislation.gov.uk/ukpga/2008/27/contents (includes changes in force as of 0322)

The Net Zero Strategy[14] and the subordinate Transport Decarbonisation Strategy[15], the Hydrogen Strategy[16] and the Heat and Building Strategy[17] set out the UK Government's strategic aims and aspirations without always providing the policy, plans and resources information that will be needed to implement the ambitions of net zero.

The Sixth Carbon Budget[18] recommended pathway requires a 78% reduction in UK territorial emissions between 1990 and 2035. This brings forward the UK's previous 80% target by 15 years. Low carbon solutions will become the norm under the plan as the options for high carbon are progressively phased out. New cars and LDVs and all boiler replacements in homes and other buildings are low-carbon by the early 2030s. New HGVs are assumed to be low-carbon by 2040. Heavy industry will have adopted renewable electricity or hydrogen instead of coal, oil or gas or captured emissions using Carbon Capture and Storage technologies with the plan assuming that these are stored in undersea voids such as former gas fields in the North Sea.

UK electricity production has rapidly decarbonised over the last decade and is assumed to be zero carbon by 2035 with wind providing the majority of the UK energy system, assumed to be 40 GW in 2030[19] rising to over 100 GW by 2050. Electricity demand is expected to increase by 50% by 2035 to supply an increasingly electrified residential, transport and industrial sectors. The electricity supply is expected to meet at least a doubling of demand by 2050. These measures will enhance energy security as well as reduce carbon emissions.

Shift in energy sources and energy efficiency – the plan assumes that hydrogen, produced using low carbon/renewable energy sources, substantially increases in importance as a fuel for shipping, transport and heavy industry. In addition to supply changes the plan depends upon increasing energy efficiency with measures assumed to have been taken to improve efficiency in homes and industry. In addition to technology changes improved resource efficiency[20] will be needed to meet the 2050 target. Alongside changes in fuel type there will need to be reductions in vehicle kilometres travelled and in demand for aviation if net zero is to be achieved without a very high carbon offsetting or compensation requirement.

Agriculture – action will also be required to reduce the emissions from forms of UK agriculture which result in the production and consumption of high carbon emitting foods.

Enhancing carbon sequestration by land use changes is an essential part of the plan to net zero. Woodland land cover is assumed to grow to 18% of the UK by 2050 with substantial tree planting assumed to have happened by 2035. Energy crops will increase their share of UK agricultural land as the agricultural economy changes to maintain UK food supply whilst increasing woodland and energy crop cover. Carbon sinks such as peatlands and salt marsh are assumed to have been restored so as to restore their ability to capture and store carbon.

Environment Act 2021[21] – forthcoming statutory requirements to apply a metric and process to achieve Biodiversity Net Gain (BNG) through the planning process and to prepare Local Nature Recovery Strategies (LNRS) which will strengthen duties to deliver gain and recovery for nature and associated resilience and carbon sequestration benefits.

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[14] UK Government (2021) Net Zero Strategy: Build Back Greener. Department for Business, Energy & Industrial Strategy. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1033990/net-zero-strategy-beis.pdf

[15] Department for Transport (2021) Decarbonising Transport.
Available at: https://www.gov.uk/government/publications/transport-decarbonisation-plan

[16] UK Government (2021) UK Hydrogen Strategy CP475, BEIS. Available at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1011658/6-7515_BEIS_UK-Hydrogen-Strategy_017-Print-content.pdf

[17] HM Government (2021) Heat and Buildings Strategy. Department for Business, Energy & Industrial Strategy.
Available at: https://www.gov.uk/government/publications/heat-and-buildings-strategy

[18] Climate Change Committee (2020) The Sixth Carbon Budget. Available at: https://www.theccc.org.uk/publication/sixth-carbon-budget/

[19] DBEIS, PM Office (2020) The ten point plan for a green industrial revolution.
Available at: https://www.gov.uk/government/publications/the-ten-point-plan-for-a-green-industrial-revolution

[20] Allwood, J. M., Azevedo, J., Clare, A., Cleaver, C., Cullen, J., Dunant, C., Fellin, T., et al. (2019). Absolute Zero.
Available at: https://www.repository.cam.ac.uk/handle/1810/299414

[21] HM Government (2021) Environment Act 2021 https://www.legislation.gov.uk/ukpga/2021/30/contents/enacted

Achieving net zero in 2050 is set in UK law. The first three carbon budgets have made an impressive start on the UK decarbonisation journey but the challenge of implementation facing the fourth, fifth and sixth budget is significant. The Net Zero Strategy is an impressive outline of good intention and proposed actions to build on progress.

The policy ambitions in the Net Zero Strategy and the subordinate strategies and plans for industry, transport, heat and buildings and hydrogen include the following:[22-23]

Policy ambitions: Power

- 40 GW of offshore wind by 2030, including 1 GW floating offshore wind
- Advanced Modular Reactors demonstrator by the early 2030s
- Prototype fusion power demonstrator by the 2040s
- Deploy at least one operational power Carbon Capture, Usage and Storage (CCUS) project by 2030
- Deploy first of a kind Small Modular Reactor (SMR) by the 2030s
- By 2022, publish Biomass Strategy to establish the role of Bioenergy with Carbon Capture and Storage (BECCS)

Policy ambitions: Industry

- Connecting two of the UK's major industrial clusters to decarbonisation infrastructure by 2025 and four by 2030
- 20 TWh of fossil fuels replaced with low carbon alternatives by 2030
- 6 Mt CO_2e captured by 2030 and 9 Mt CO_2e by 2035
- Industrial emissions to fall by two-thirds by 2035 compared to today's levels and by 72% for sixth carbon budget
- World's first net zero industrial cluster by 2040
- No fossil fuels in use by 2050 (unless carbon emissions are captured)

Policy ambitions: Hydrogen

- Complete hydrogen neighbourhood trial and 20% blending testing (2023)
- Ambition for 1 GW hydrogen production capacity (2025)
- Hydrogen village trial (2025)
- Potential hydrogen town by end of 2020s
- 5 GW low carbon production capacity by 2030
- 1 net zero carbon industrial cluster (2040)

Policy ambitions: Carbon capture and underground storage and greenhouse gas removal

- Connect two of the UK's major industrial clusters to decarbonisation infrastructure by 2025 and four by 2030
- 3 Mt CO_2 e captured by 2030
- For GGRs[24], ambition for 5 Mt CO2 of engineered removals annually by 2030
- World's first net zero industrial cluster by 2040
- No fossil fuels in use by 2050 (unless carbon emissions are captured)

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[22] UK Government (2021) Net Zero Strategy: Build Back Greener. Department for Business, Energy & Industrial Strategy. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1033990/net-zero-strategy-beis.pdf

[23] HM Government (2021) UK Net Zero Research and Innovation Framework. Department for Business, Energy & Industrial Strategy. Available at: https://www.gov.uk/government/publications/net-zero-research-and-innovation-framework

[24] Element Energy and the UK Centre for Ecology and Hydrology (2021). Greenhouse gas removal methods and their potential UK deployment. A report published for the Department for Business, Energy and Industrial Strategy. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1026988/ggr-methods-potential-deployment.pdf

Policy Ambitions: Heat and buildings

- Decide on the long-term future of heat by middle of this decade
- Install 600k heat pumps per year by 2028
- Potential end to high-carbon heat sources off the gas grid
- Hydrogen neighbourhood trial by 2023, hydrogen village trial by 2025, hydrogen town by 2030
- As many homes as possible to meet EPC band C by 2035
- Future homes standard

Policy Ambitions: Transport

- End sale of new petrol and diesel cars and vans
- All new cars and vans must be zero emission at the tailpipe (2035)
- End sale of new non-zero emission HGVs (subject to consultation) (2040)
- Net zero domestic aviation (subject to consultation) (2040)
- Ambition to remove all diesel-only trains from the network (2040)

Policy Ambitions: Natural resources, waste and F-gases

- Eliminate food waste from landfill in England by 2030
- Eliminate avoidable waste by 2050
- 30k hectares trees planted each year by 2025 (and potentially beyond)
- Delivery of the Environmental Land Management Scheme
- Delivery of the Biomass Strategy (BEIS)
- Nature for Climate Fund set a target for 35k hectares of peat restoration in England by 2025
- 85% cut in hydrofluorocarbon consumption by 2036

A Biomass Policy Statement[25] was published by BEIS in 2021 setting out the initial policy ambitions and intents that will find fuller expression in the Biomass Strategy. Engineered Greenhouse Gas Removal (GGR) methods such as Direct Air Capture and Storage are immature technologies with significant research and innovation requirements to be met before deployment at scale.

Despite the suite of policies, strategies and plans, concerns remain that the detailed plans for implementation are absent. The Climate Change Committee[26] expressed concern that the detailed implementation plans and strategies are not yet in place to give confidence that the net zero ambition can be realised in 2050 without further action. This concern was reinforced in March 2022 with the publication of the House of Lords' Industry and Regulators Committee report on net zero transformation: delivery, regulation and the consumer.[27] The report concluded that the 2050 net zero target and the commitment to a net zero power system by 2035 have not been matched by the policies necessary to unlock the substantial private investment required to decarbonise the industrial and domestic sectors. The pressing need to deliver fuel security in the face of new geopolitical concerns may well see a step change in the national policy approach to nuclear power, renewables and energy efficiency.

[25] Department for Business, Energy and Industrial Strategy (2021) Biomass Policy Statement. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1031057/biomass-policy-statement.pdf

[26] Climate Change Committee (2021) Independent Assessment: The UK's Net Zero Strategy. Available at: https://www.theccc.org.uk/publication/independent-assessment-the-uks-net-zero-strategy/

[27] House of Lords' Industry and Regulators Committee (2022) The net zero transformation: delivery, regulation and the consumer. 1st Report of Session 2021-22. HL Paper 162. Available at: https://publications.parliament.uk/pa/ld5802/ldselect/ldindreg/162/16202.htm

Local authorities and net zero

Local authorities are increasingly ambitious in their plans to tackle climate change. Over 300 local authorities have declared climate emergencies[28], and many have developed plans to deliver against ambitious net zero targets.[29] Local authorities have a range of existing levers that can be used to deliver local action that reduces emissions and prepares local areas for the challenge of a changing climate. However, these levers alone are unlikely to be sufficient to deliver local authorities' net zero ambitions at a faster rate than the national target. Local authority powers, policy and funding to deliver net zero are limited and there can be a lack of local capacity and capability to implement strategic decarbonisation actions.

The Climate Change Committee's report[30] on the role of local authorities in delivering the UK's Net Zero ambition sets out a framework for aligning local action with the UK decarbonisation pathway. It makes recommendations for local, regional and national governments aiming to remove barriers to delivering local climate action in the UK.

Key recommendations from Local Authorities and Sixth Carbon Budget report

- The Sixth Carbon Budget can only be achieved if Government, regional agencies and local authorities work seamlessly together.
- More than half of the emissions cuts needed rely on people and businesses taking up low-carbon solutions – decisions that are made at a local and individual level. Many of these decisions depend on having supporting infrastructure and systems in place. Local authorities have powers or influence over roughly a third of emissions in their local areas.
- Top-down policies go some way to delivering change, but can achieve a far greater impact if they are focused through local knowledge and networks.
- Four key things are needed to achieve this vision of collaborative delivery:
  - **Framework:** An agreed framework for delivery for net zero incorporating local and national climate action
  - **Financing:** Appropriate long-term financing to support local authorities in delivering net zero
  - **Flexibility:** Local operational flexibility around how local areas address climate change
  - **Facilitation:** coherent policy and powers for the facilitation of delivery.

Following the Committee on Climate Change Report to Parliament in 2020 the Committee responded to a question on the 'role of local authorities in getting the UK to Net Zero'[31] noting that 'Local authorities can support key priorities identified in the Progress Report. They can do this through

- Building community consensus on plans for decarbonising heating and delivering retrofit across all housing tenures – social housing, council housing, private sector housing
- Transport planning, including providing high-quality infrastructure for walking and cycling, provision of charging infrastructure for electric vehicles
- Putting in place plans to ensure local areas are resilient to the future impacts of climate change.

[28] Climate Emergency UK (ND) Map of Local Council Declarations.
Available at: https://www.climateemergency.uk/blog/map-of-local-council-declarations/

[29] Climate Emergency UK (2022) Council Climate Plan Scorecard. Available at https://councilclimatescorecards.uk/

[30] Evans, L.M. (2020) Local Authorities and the Sixth Carbon Budget. An independent report for the Climate Change Committee.
Available at: https://www.theccc.org.uk/publication/local-authorities-and-the-sixth-carbon-budget/

[31] Climate Change Committee (2020) Climate Change Committee 2020 Progress Report to Parliament. Your Questions Answered.
Available at: https://www.theccc.org.uk/2020/07/17/2020-progress-report-to-parliament-your-questions-answered/

The Committee noted that there are many challenges to effective delivery of net zero at a local level, including inconsistent reporting across the country and a lack of resources which can mean that climate change is lost amongst many competing priorities. The Committee noted government should incentivise, support and enable local authorities to deliver emissions reductions and climate adaptation measures at a local level. Cities need to be enabled to collaborate, scale up programmes and share lessons learned.'

In 2022 the UK Institution of Environmental Sciences (IES) produced a gap analysis[32] of progress in meeting recommendations from the IES report[33] of the ambition and current status of actions to reach net zero. The assessment showed that of the 54 recommendations for actions the UK Government had partially met 30 recommendations, 11 recommendations are not met, just 9 were considered to have been met, and it is unclear whether or not the remaining 4 have been met.

Third Climate Change Risk Assessment (CCRA3)

The Government's Third Climate Change Risk Assessment (CCRA3)[34], required by the Climate Change Act 2008, recognises the unprecedented challenge of ensuring the UK is resilient to climate change and setting out the work already underway to meet that challenge. The assessment identifies the risks that climate change poses to multiple parts of UK society and economy. CCRA3 says that whilst the government aims to limit warming to 1.5°C, the evidence shows that we must be prepared for warming up to 4°C.

The risk assessment considers 61 UK-wide climate risks and opportunities cutting across multiple sectors of the economy and prioritises the following eight risk areas for action in the next two years:

- Risks to the viability and diversity of terrestrial and freshwater habitats and species from multiple hazards
- Risks to soil health from increased flooding and drought
- Risks to natural carbon stores and sequestration from multiple hazards
- Risks to crops, livestock and commercial trees from multiple climate hazards
- Risks to supply of food, goods and vital services due to climate-related collapse of supply chains and distribution networks
- Risks to people and the economy from climate-related failure of the power system
- Risks to human health, wellbeing and productivity from increased exposure to heat in homes and other buildings
- Multiple risks to the UK from climate change impacts overseas

For each of these eight individual risks, economic damages could exceed £1 billion per year each by 2050 with a temperature rise of 2°C, with the cost of climate change to the UK rising to at least 1% of GDP by 2045 with CCRA3 highlighting the need to prepare for a potential 4°C temperature rise by end of century. For comparison the share of UK GDP taken by the NHS in 2020 was just over 7%[35] whilst defence accounted for 2.3% of GDP in 2020.[36]

A specific recommendation of CCRA3 is that climate science and research, such as the UK Climate Projections 2018[37-38], are fully integrated into planning and decision-making, including on major infrastructure.

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[32] Institution of Environmental Sciences (2022) What still needs to happen to reach Net Zero? Available at: https://www.the-ies.org/analysis/what-still-needs-happen-climate-change-COP27

[33] Institution of Environmental Sciences (2021) A Manifesto for Transformative Change. Available at: https://www.the-ies.org/resources/manifesto-transformative-change

[34] UK Government (2022) Third Climate Change Risk Assessment. Defra. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1047003/climate-change-risk-assessment-2022.pdf

[35] Nuffield Trust (ND) NHS spending as a percentage of GDP: 1950 – 2020. Available at https://www.nuffieldtrust.org.uk/chart/nhs-spending-as-a-percentage-of-gdp-1950-2020

[36] Statista (ND) Defence expenditure as a share of GDP in the United Kingdom from 1980 to 2020 Available at: https://www.statista.com/statistics/298527/defense-spending-as-share-of-gdp-united-kingdom-uk/

[37] Met Office (ND) UK Climate Projections. Available at: https://www.metoffice.gov.uk/research/approach/collaboration/ukcp/index

[38] Met Office (ND) About UKCP18 Available at: https://www.metoffice.gov.uk/research/approach/collaboration/ukcp/about

The implications of CCRA3 will inform the development and implementation of the UK Government's National Adaptation Programme (NAP3), to be laid in Parliament in 2023.

The current position in South Gloucestershire

South Gloucestershire's Climate Emergency Declaration[39] was published in 2019 requiring an updated Climate Emergency Strategy[40] which, in turn, was published in 2020 setting out a 10-year ambition to achieve the aim of the 2019 Climate Emergency Declaration for the council to provide the leadership to enable South Gloucestershire to become carbon neutral by 2030, to restore nature and double tree canopy cover across our area. The Strategy sets out the council's principles and general approach to delivering this aim. The Strategy is jointly owned by South Gloucestershire Local Strategic Partnership and South Gloucestershire Council and sits under the South Gloucestershire Sustainable Community Strategy. The Climate Emergency Declaration and Strategy recognises that the council does not have the powers and resources to require action on climate but that through its leadership it can enable and inspire others to undertake such actions. The Climate Emergency Strategy is supported by an annual action plan setting out a suite of activities divided into those addressing the authority's own actions and enabling and inspiring actions for enterprises and residents.

The council maintains a substantial web presence detailing its climate actions,[41] action plans and a variety of statistical information including the latest territorial emission estimates[42] and a report on direct emissions from council activities.[43] The website also hosts documents relating to Community Engagement in Climate and Nature Action.[44]

In addition, the review has considered a wide range of South Gloucestershire Council documentation including the Sustainable Community Strategy,[45] the Joint Strategic Needs Assessment,[46] the Flood Risk Management Strategy,[47] the new Local Plan documents,[48] the Council Plan,[49] Social Value in Procurement document,[50] Key Facts and Figures,[51] the Annual Equalities Report[52] and the documents relating to the Local Strategic Partnership.[53]

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[39] South Gloucestershire Council (2019) Climate Emergency Declaration.
Available at: https://beta.southglos.gov.uk/wp-content/uploads/Climate-Emergency-Declaration.pdf

[40] South Gloucestershire Council (ND) Climate Emergency Strategy.
Available at: https://beta.southglos.gov.uk/wp-content/uploads/Climate-Emergency-Strategy.pdf

[41] South Gloucestershire Council (ND) Available at: https://beta.southglos.gov.uk/climate-emergency-in-south-gloucestershire

[42] South Gloucestershire Council (ND) Emissions Dashboard
Available at: https://beta.southglos.gov.uk/climate-emergency-in-south-gloucestershire#emissions-dashboard

[43] South Gloucestershire Council (ND) Local Greenhouse Gas Emissions
Available at: https://beta-edit.southglos.gov.uk/wp-content/uploads/SGC-Local-Greenhouse-Gas-Emissions-Report-2020-2021.pdf

[44] South Gloucestershire Council (ND) Community Climate and Nature Emergency. Take Action. Available at: https://rise.articulate.com/share/9QiA4S0YBjYOAofoNGOey94j-z-NVTgT#/ and South Gloucestershire Council (ND) Climate Emergency Community Engagement Group. Available at: https://beta.southglos.gov.uk/climate-emergency-community-engagement

[45] South Gloucestershire Council (2016) Sustainable Community Strategy.
Available at: http://www.ourareaourfuture.org.uk/sustainable-community-strategy/

[46] South Gloucestershire Council (2018) Joint Strategic Needs Assessment. Available at: https://www.southglos.gov.uk/community-and-living/stronger-communities/community-strategy/joint-strategic-needs-assessment-jsna/

[47] South Gloucestershire Council (2022) South Gloucestershire Local Flood Risk Management Strategy 2022-2027 Draft.
Available at: www.southglos.gov.uk

[48] South Gloucestershire Council (2022) South Gloucestershire New Local Plan Phase 2. Available at: https://beta.southglos.gov.uk/new-local-plan/ and South Gloucestershire Council (2022) New Local Plan Evidence Base. Available at https://beta.southglos.gov.uk/local-plan-2020-evidence-base/

[49] South Gloucestershire Council (ND) Council Plan 2020-2024
Available at: https://beta.southglos.gov.uk/publications/council-plan-2020-2024/council-plan-2020-2024

[50] South Gloucestershire Council (ND) Creating Social Value through Procurement
Available at: https://www.southglos.gov.uk/business/tenders-and-contracts/creating-social-value-south-gloucestershire/

[51] South Gloucestershire Council (ND) Key Facts and Figures.
Available at: https://www.southglos.gov.uk/council-and-democracy/census/key-facts-and-figures/

[52] South Gloucestershire Council (ND) Annual Equalities Report for 2018–2019. Available at: www.southglos.gov.uk

[53] South Gloucestershire Council (ND) Local Strategic Partnership
Available at: https://beta.southglos.gov.uk/climate-emergency-in-south-gloucestershire/

The council also recognises the Nature Emergency and embeds the response to that crisis in plans to tackle the Climate Emergency. Commitments and action to respond to the Nature Emergency are included in the Green Infrastructure and Nature Recovery theme in the annual Climate Emergency Action Plan. In November 2021 the South Gloucestershire Council adopted a Green Infrastructure Strategy[54] and a Green Infrastructure and Nature Recovery Action Plan.[55] Work is underway to bring together the reporting strands from the Climate Emergency Action Plan and the Green Infrastructure and Nature Recovery Action Plan. A single action plan will be developed for implementation in 2023.

UWE Bristol's University Advisory Group (UAG) has reviewed the Year 1 and the Year 2 Action Plan of South Gloucestershire Council. The UAG recognised the comprehensive nature of each action plan with a clear portfolio of 'lead, enable and inspire' projects and made selected recommendations to focus action in future years.

Summary of UAG review recommendations on the Year 1 Action Plan

- Enhancing communication and engagement actions to enhance mitigation and adaptation awareness and action. Use trusted sources such as GPs/schools/parish council/youth groups/guides/scouts etc. to promote the messaging.
- Enhancing consideration of adaptation and resilience actions and moving to implementation actions.
- Mitigation of direct and indirect emissions within the council and across the area of South Gloucestershire.
- Calculation of an indicative carbon budget for each year to 2030 that will achieve the carbon neutral ambition and ensure that the project portfolio of planned or funded projects can deliver the required reductions.
- Investigation of insetting and offsetting opportunities across the district.
- Integration of climate considerations into routine council business.
- Action to enhance co-benefits of ecological recovery and climate action.
- Exploration of collaboration opportunities with WECA and local councils to identify early implementation opportunities and possible economies of scale for shared actions.
- Stimulating co-ownership and implementation of the Action Plan by Local Strategic Partnership (LSP) members.
- Amending the routine LSP agenda to ensure routine discussions on progress by members in responding to the Climate and Nature Emergency.
- Encouraging LSP members to discuss and agree actions that will adapt their business and build resilience in the face of climate change.
- Chief Officers to ensure embedding of climate action into all policies/plans/strategies and actions.
- Council decision making should incorporate carbon budget considerations.
- Joining up climate and the ecological emergency through clear linkage between ecological solutions and wider benefits of biodiversity enhancement in the district – tree planting, peatland restoration, and green infrastructure.

[54] South Gloucestershire Council (ND) Green Infrastructure Strategy.
Available at: https://beta.southglos.gov.uk/green-infrastructure-strategy

[55] South Gloucestershire Council (2021) Green Infrastructure and Nature Recovery Action Plan.
Available at: https://beta.southglos.gov.uk/static/6a19e2ec7b92c55c84ea7b93b8db1481/South_Gloucestershire_Green_Infrastructure_and_Nature_Recovery_Action_Plan_V2_18_November_2021.pdf

Summary of UAG review recommendations on the Year 2 Action Plan

- Emissions within SGC's scope of control are associated with transport, the commercial, industrial, domestic, and public sector. Mitigation actions should focus on supporting decarbonisation within each of these sectors. Ramping up of current initiatives such as EV charging, promotion of active travel, and domestic retrofit is required alongside enhanced communications to enable easier access to advice, guidance and services.
- The Communications Toolkit developed with the LGA NZIP[56] project should enable further engagement by LSP members. Area wide action is needed and LSP members have reach and impact across the SGC area. LSP members can reinforce messaging about the importance of preparing and adapting to extreme weather events in the future.
- Consideration should be given to developing the use of the Cornwall Decision Making Wheel[57] so that decision makers in the council can better understand the climate and wider contexts and impacts of decision making.
- Small and medium sized enterprises not part of the LSP could be encouraged to engage with Business West's Climate Action initiatives.
- Further work is required to accelerate renewable energy generation by the council, to encourage consumers in the domestic and commercial sectors to switch to a guaranteed renewable tariff. Whilst this will have significant longer term benefits the short-term impacts are acknowledged.
- Further consideration should be given to the role of battery storage within the area alongside opportunities for the construction of district heat networks (DHN) at sites such as the Arena, Brabazon, and the Science Park and to connect UWE Bristol's existing DHN to the surrounding area.
- Opportunities for regional cooperation with neighbouring Unitary Authorities and the West of England Combined Authority should be explored. The Western Gateway initiative provides a further opportunity for South Gloucestershire Council to exercise its leadership in promoting decarbonisation and adaptation measures.
- Nature recovery and green infrastructure schemes provide important adaptation measures including shading, cooling, and air purification. The council's intention to develop an asset bank of sites suitable for green and blue infrastructure is noted and encouraged.

Recommendations from the review of the Year 1 and Year 2 Action Plans remain valid for consideration in the context of Plan 2030.

[56] De Vito, L., Longhurst, J.W.S., Rees, L. & Wyatt, B. (2021) Co-developing a Carbon Communication Toolkit for South Gloucestershire. Net Zero Innovation Programme case study. Report for the LGA.
Available at: https://www.uwe.ac.uk/study/library/research-support/research-repository

[57] Cornwall Council (ND) Cornwall Decision Wheel.
Available at: https://www.cornwall.gov.uk/media/43hpmphv/decision-making-wheel-flier.pdf

2. The Brief from South Gloucestershire Council

As per the review of Year 1, we remain committed to a short annual review of the climate emergency work of the council as part of the current arrangements, looking at how each plan has contributed to the delivery of the declaration. Last year the annual report included recommendations for future actions and focus. We wish this aspect of the work of the Advisory Group to be bolstered by and to encapsulate a timetable up to 2030, setting out the fact that the gap to delivering on the objectives is sizeable while recognising the situation is not unique to South Gloucestershire and the next few years are about scaling up action and prioritising what aspects of this work can be delivered and influenced by the council.

Strategic focus to 2030

Building on the annual review work and our 2019 area-wide carbon emissions baseline report, we require a report which moves us on from the initial 'emergency' response to the declaration of a Climate Emergency, to deal more strategically with the scale of the challenge up to 2030 and what, in outline, the Council's approach should be, to place itself on the correct pathway to a Carbon Neutral/Net Zero South Gloucestershire. Specifically, we need to account for likely emission reductions that will flow from national policy and fiscal interventions along with the anticipated scale of behavioural changes. Essentially, we are seeking to define what the emissions gap would look like in South Gloucestershire in 2030, which was just reliant on national, and statutory only approaches within the council e.g. a building regulations only approach to new build energy performance, then, based on this 'policy off' position consider the contribution the Council can make in narrowing this gap.

Step 1

Looking at the recent trends in UK emissions and emissions reductions https://www.theccc.org.uk/wp-content/uploads/2020/06/Reducing-UK-emissions-Progress-Report-to-Parliament-Committee-on-Cli.. -002-1.pdf and any other relevant sources, combined with South Gloucestershire's carbon baseline study, reflect South Gloucestershire's trajectory in the context of national progress. This 'policy off' assessment would need to assume that the council was only implementing its statutory functions up to 2030. Step 1 would need to speculate on what that emissions gap would look like in 2030 and its composition.

Step 2

Using the analysis from Step 1, look at the Committee on Climate Change's December 2020 report on the role of Local Authorities and in particular Box 2 'Recommendations to Local Authorities', carry out an assessment of where South Gloucestershire Council is currently placed against these recommendations. Local Authorities and the Sixth Carbon Budget - Climate Change Committee (theccc.org.uk)

Based on the circumstances within the geography and organisational structures of South Gloucestershire's public bodies, consider if there are any further recommendations (or actions within the CCC recommendations) over and above those of the CCC that the Council should be actively pursuing in order to resolve the gap 2030.

Using the Box 2 'Recommendations to Government' consider if SGC should be either pursuing preparative actions or defining new pathways or approaches in the absence of clear national policy, funding, or leadership, if approaches already available to SGC are insufficient to meet the gap by 2030.

Questions we are seeking to address:

- Where are we now, where do we as an area need to be? Identifying the scale of the remaining challenge (conceptualise the mountain)
- What is the likely local area gap based on current trajectory?
- What is the national policy gap we need to be aware of and realistic approaches to compensate by SGC (policy and investment programmes will come with varying degrees of certainty and timing)?
- What should we prioritise within existing policy and funding levers?
- What do the council and our communities need to do now and in the years leading up to 2030, to lead and enable this agenda, and what contribution is it likely to make?
  - E.g. council reach net zero in Scope 1, 2 and 3 before 2030 to show leadership.
  - Lay the foundations to enable others to take action (such as the Renewable Energy Resource Assessment (RERAS), provide and enhance walking and cycling infrastructure.
  - Set a framework for residents to take action – tools and education on how to take action.
  - Examples of projects that could deliver area wide benefit (what are the big wins we can influence?)
- How does the council deliver CE as a whole – how do we change our priorities and decision-making (Cornwall Decision Wheel or other approaches)

Step 3

Pulling on existing work (such as the report produced by CSE for 2030 in response to climate declarations). Breakdown sector response (as per CCC categorisations) – Transport/Buildings Built Development/Renewable Energy/Adaptation and Resilience/Cross Cutting/Resources and Waste.

E.g. Buildings and Built Development

E.g. We need to decarbonise heat: (what?), domestic and industrial heat makes a huge contribution to our area carbon emissions (why a priority), retrofit how many homes (scale of the remaining challenge), council can contribute by providing a shop front to channel demand and give confidence to the supply chain, supporting residents to get bespoke advice on home energy retrofit – PAS2030 reports, running local initiatives solar together (how the council can contribute), residents and businesses to prepare for changing heating systems (what can other actors contribute to this WECA/residents/businesses)

- This is what we need to do as an area.
- This is what the council can do towards this.
- This is what other actors need to do.
- First next steps.
- Steps between now and 2030
- Likely scale of costs/ investment needed – not meaning that the council can provide all the investment required but the council needs to be prepared and ready to access/seek available funds – funding officer?
- How much staff resource – revenue needed to spend capital funding?

Critical success factors

- Clearly articulates where should we be focusing our time and effort to be most effective in the existing policy circumstances we are in.
- Clear articulates what council needs to do and has the levers to control and what other actors need to do.
- Clearly sets out what level of resource is needed to scale up this work.
- A clear steer on priority projects for Year 3 and for the years to 2030.

3. Step 1: Trajectory and likely evolution of territorial emissions over the decade to 2030

What is the national emissions picture?

At COP26, the UK presented its Nationally Determined Contribution (NDC). The UK NDC is an economy-wide net reduction in greenhouse gas emissions of at least 68% by 2030 compared to the 1990 reference year with emissions in $MtCO_2e$.

The Sixth Carbon Budget reduces the UK's annual per capita emissions by 2035 to under 3 tCO_2e per person, in line with global pathways consistent with meeting the Paris 1.5°C goal.[58] Currently South Gloucestershire per capita emission is 4 tCO_2[59] but this excludes significant emission sources such as heavy industry, motorway emissions and aviation. It also excludes consumption-based emissions and greenhouse gases other than CO_2 such as methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulphur hexafluoride (SF_6) and nitrogen trifluoride (NF_3)

The National Audit Office[60] *described achieving net zero as 'a colossal challenge and significantly more challenging than government's previous target to reduce emissions by 80% by 2050. Achieving net zero means all parts of the economy, including those that are harder to decarbonise, need to reduce emissions substantially. In some sectors, there are well-understood pathways to net zero but there is uncertainty in other sectors over how to reduce emissions. This is because it is not yet known how quickly some technologies will develop or how much individuals will be willing to change their behaviours'.*

These challenges are magnified for a target that is 20 years earlier than the UK national target and where the Authority has few powers or levers in addition to those being implemented at the national level.

The UK government through the Nationally Determined Contribution is committed to a 68% cut on 1990 emissions by 2030. The following section presents scenarios in order to understand the likely evolution of carbon emission reductions in South Gloucestershire over the period to 2030.

Six possible scenarios projecting emissions from the current case to 2030 are presented in order to estimate the likely scale of residual carbon emissions in 2030 arising from activities in the territorial area of South Gloucestershire.

[58] Climate Change Committee (2020) The Sixth Carbon Budget.
Available at: https://www.theccc.org.uk/publication/sixth-carbon-budget/

[59] South Gloucestershire Council (ND) Emissions Dashboard.
Available at: https://beta.southglos.gov.uk/climate-emergency-in-south-gloucestershire#emissions-dashboard

[60] National Audit Office (2020) Achieving Net Zero NAO HC1035.
Available at: https://www.nao.org.uk/wp-content/uploads/2020/12/Achieving-net-zero.pdf

Table 1. Decarbonisation scenarios

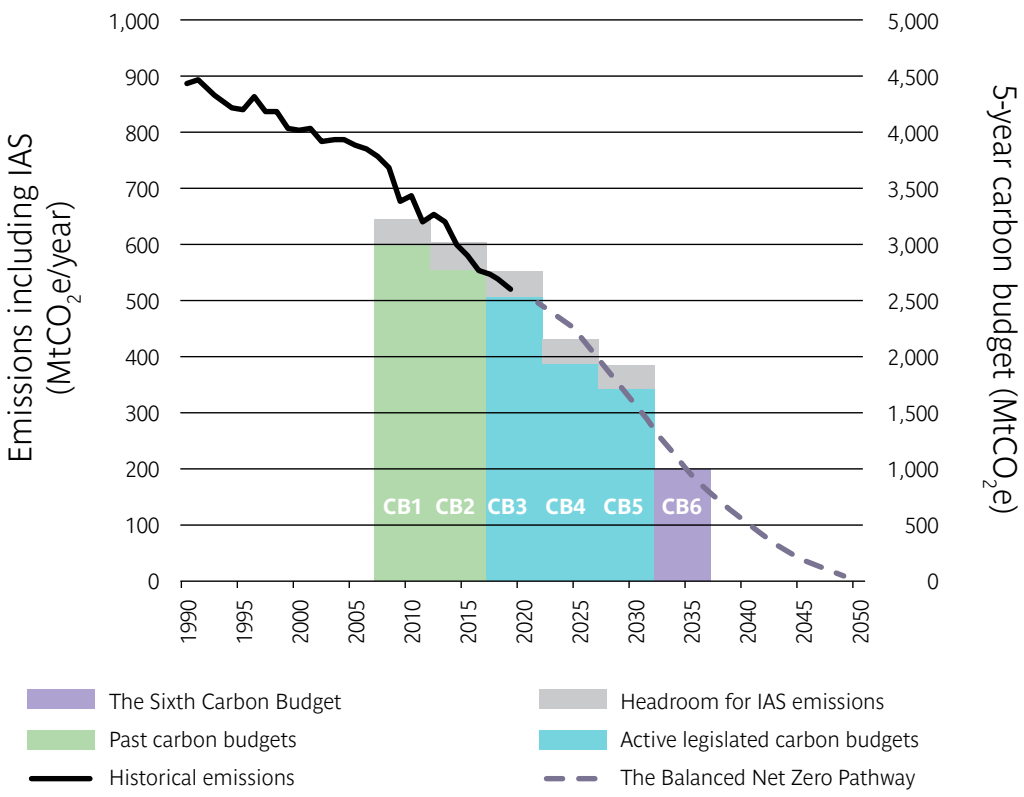
Scenario	Origin
1. Projects a decarbonisation pathway based upon the long-term trend in the rate of emission reduction continuing.	Gale, 2022[61]
2. A South Gloucestershire decarbonisation pathway aligned to the Sixth Carbon Budget	Gale, 2022
3. A South Gloucestershire decarbonisation pathway based on a reduction in UK GHG emissions of 78% by 2035	Gale, 2022
4. Regen Net Zero Pathway for South Gloucestershire	Regen, 2019[62]
5. Regen Highly Ambitious Net Zero Pathway	Regen, 2019
6. Tyndall Centre Budget for South Gloucestershire	Tyndall Centre, 2019[63]

[61] Gale, R. (2022) Net Zero: An Investigation of Best Practice Options for South Gloucestershire's Residual Emissions. MSc Environmental Management Dissertation, UWE Bristol.

[62] Regen (2019) South Gloucestershire CO_2 emissions baseline and net zero gap analysis Report for South Gloucestershire Council. Available at: https://beta.southglos.gov.uk/wp-content/uploads/Carbon-Emissions-Baseline-Report.pdf

[63] Kuriakose, J., Jones, C., Anderson, K., Broderick, J. & McLachlan, C. (2020) Setting Climate Commitments for South Gloucestershire. Quantifying the implications of the United Nations Paris Agreement for South Gloucestershire. Available at: https://carbonbudget.manchester.ac.uk/reports/E06000025/print/

Figure 1. The national picture of emission reductions according to the Sixth Carbon Budget [64]



Source: BEIS (2020) *Provisional UK greenhouse gas emissions national statistics 2019*; CCC analysis
Notes: Emissions shown include emissions from international aviation and shipping (IAS) and on an AR5 basis, including peatlands. Adjustments for IAS emissions to carbon budgets 1–3 based on historical IAS emissions data; adjustments to carbon budgets 4–5 based on IAS emissions under the Balanced Net Zero Pathway.

The above figure shows the substantial decline in emissions projected for the period of the Third, Fourth, Fifth and Sixth Carbon Budgets. The effect of the five-year budgets between 2017 and 2032 is to create substantial downward pressure on emissions.

[64] Climate Change Committee (2020) The Sixth Carbon Budget.
Available at: https://www.theccc.org.uk/publication/sixth-carbon-budget/

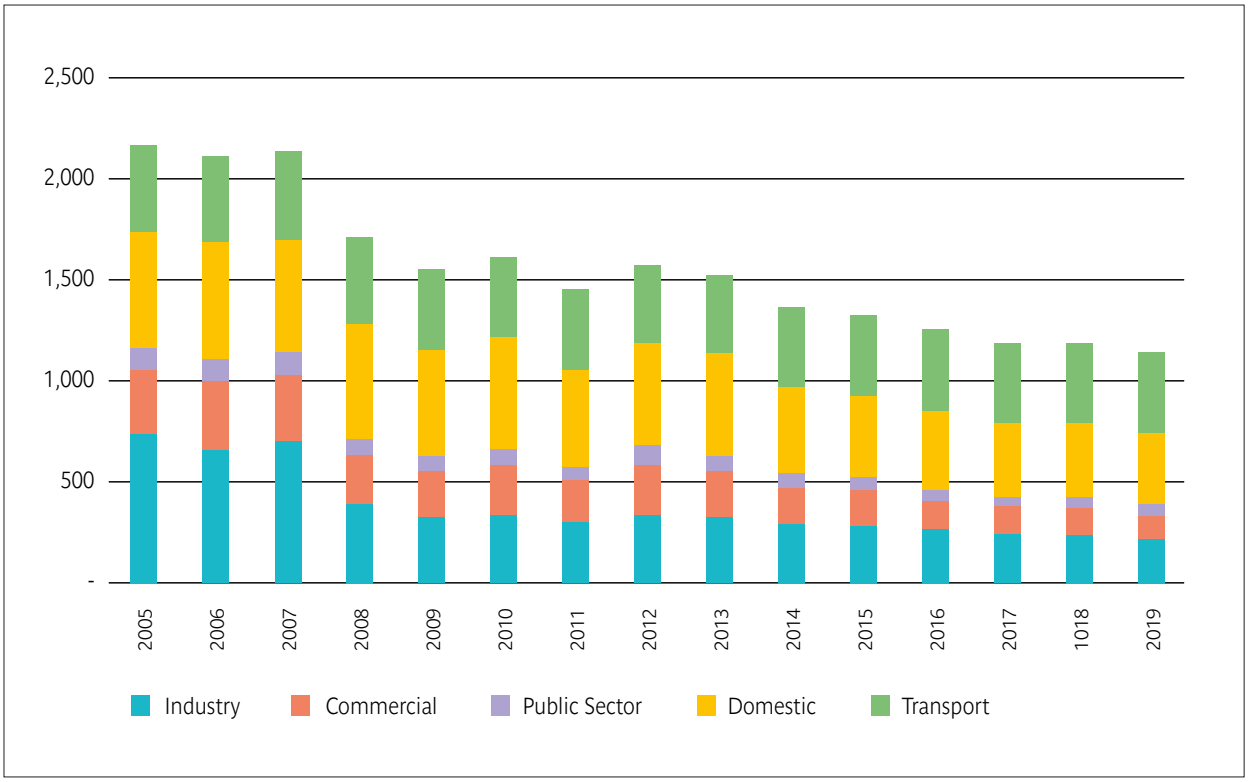
The local picture

In 1990, territorial emissions of CO_2 from South Gloucestershire are estimated to be 2,073.3 kt. By 2019, the most recent year for which comparable data published by BEIS[65] are available, emissions had fallen to 1,137.4 Kt of which emissions from the activities of the Council contribute about 1%. This equates to a per capita average emission 4 t CO_2 per person[66] for a mid-year 2019 estimated population of 285,100 and an emission of 2.1 kt per square kilometre of the authority (note South Gloucestershire covers 536.4 square kilometres).

The most recent UK government data for local authority carbon dioxide emissions only covers territorial emissions from within South Gloucestershire and thus ignores wider supply chain and consumption-based emissions. The largest source of emissions is the transport sector. The domestic sector is the second largest category, followed by industry, commerce and public services. Agriculture is considered a modest carbon sink and can provide a variety of nature recovery and biodiversity enhancement benefits alongside opportunities for providing flood mitigation.

Table 2 shows the distribution of emissions by sector for the period from 2005. Progress has been made with respect to industrial, commercial and domestic emissions but the transport sector has remained broadly consistent across the time series.

Table 2. South Gloucestershire territorial emissions 2005–2019



Source Melville (2021)[67] using the data from the BEIS data set in Footnote 54.

[65] Department for Business, Energy and Industrial Strategy (2021a) UK local authority and regional carbon dioxide emissions national statistics: 2005 to 2019. Available at: https://data.gov.uk/dataset/723c243d-2f1a-4d27-8b61-cdb93e5b10ff/uk-local-authority-and-regional-carbon-dioxide-emissions-national-statistics-2005-to-2019

[66] South Gloucestershire Council (ND) Emissions Dashboard
Available at: https://beta.southglos.gov.uk/climate-emergency-in-south-gloucestershire#emissions-dashboard

[67] Melville, N. (2021) South Gloucestershire Emissions Data. South Gloucestershire Council

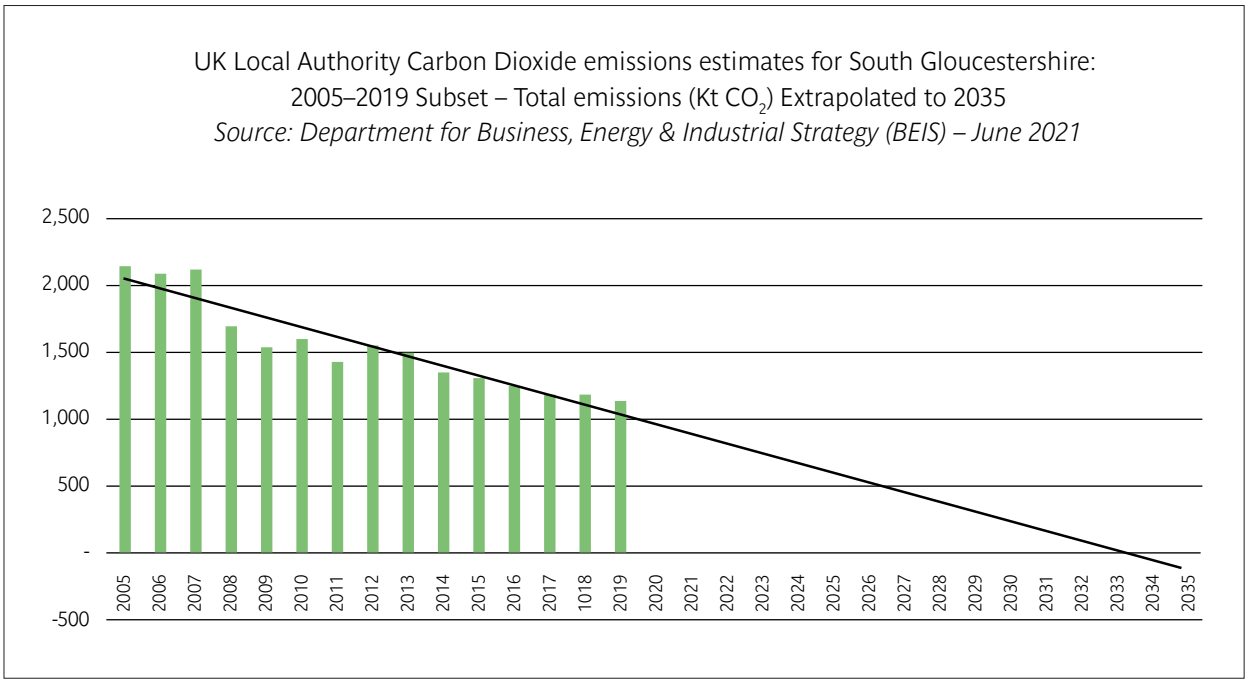
The area emissions data presented relate to the 'subset' of total local area emissions which is deemed to be within the scope of influence of Local Authorities. The data excludes emissions from aviation, shipping and military transport, and emissions from motorways, diesel railways, and land use, land use change and forestry, EU emissions trading system sites.

Reduction pathways to 2030 estimating the residual in 2030

Gale (2022) has estimated reduction pathways for South Gloucestershire. Figure 2 (after Gale) projects a decarbonisation pathway based upon the long-term trend in the rate of emission reduction continuing. In this scenario, the residual in 2030 is of the order of 250 kt of CO_2. This can be considered an optimistic projection based upon a best-fit line projecting from actual emissions between 2005 and 2019.

Scenario 1

Figure 2. South Gloucestershire CO_2 emissions 2005–2019 extrapolated to 2035



After Gale (2022)[68]

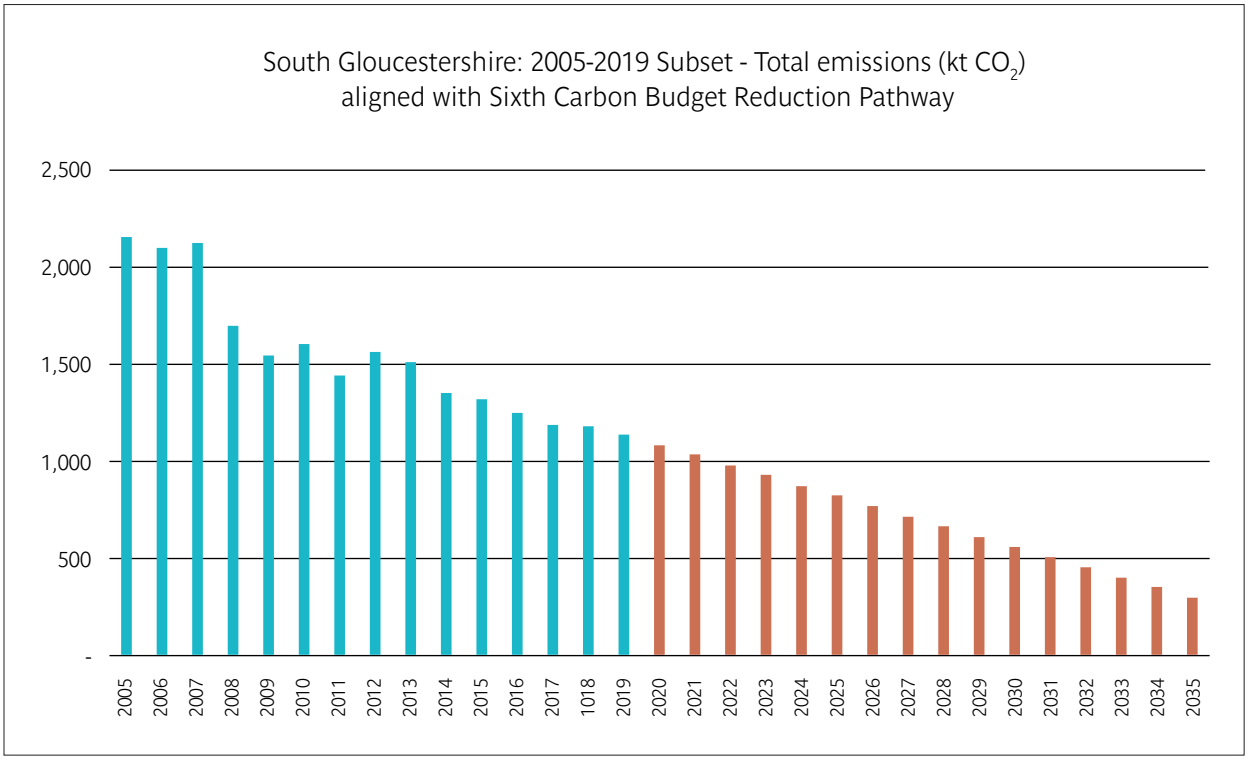
Scenario 2

To meet the UK Government target the Climate Change Committee recommends that over the five year periods of the Third, Fourth, Fifth and Sixth Carbon Budget[69] emissions must fall by an annual average of 21 Mt CO_2e from 2019 to 2035. Gale estimates that in 2019 South Gloucestershire's emissions were 0.25% of total UK emissions. 0.25% of 21 Mt CO_2e is 52,500 tonnes equivalent to a reduction of 52.2 kt CO_2 per year from 2019 to 2035. This projection is an estimate based on the application of national policies and alignment with the Sixth Carbon Budget Reduction pathway. This would leave 560 kt CO_2 in 2030 to be offset or otherwise compensated.

[68] Gale, R. (2022) Net Zero: An Investigation of Best Practice Options for South Gloucestershire's Residual Emissions. MSc Environmental Management Dissertation, UWE Bristol.

[69] Climate Change Committee (2020) The Sixth Carbon Budget.
Available at: https://www.theccc.org.uk/publication/sixth-carbon-budget/

Figure 3. South Gloucestershire emissions pathway to 2035 aligned to Sixth Carbon Budget



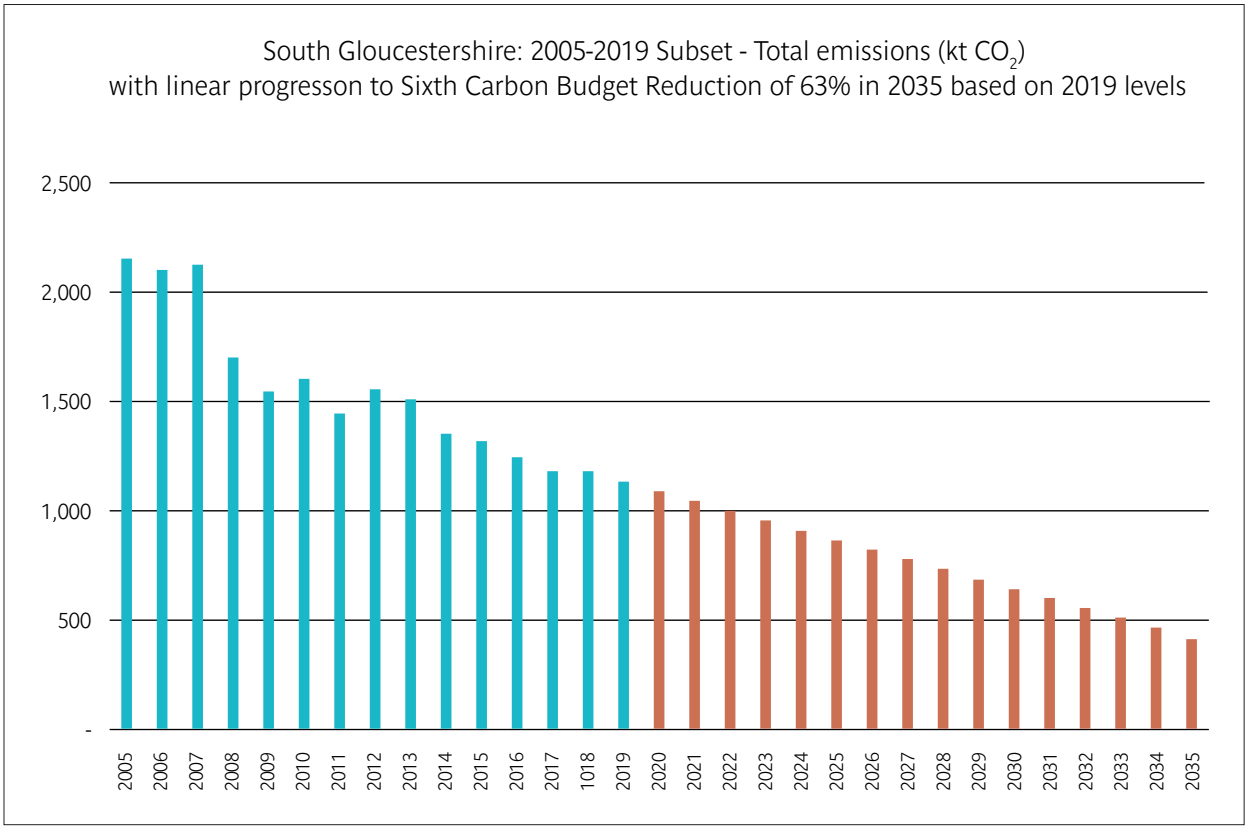
After Gale (2022)

Scenario 3

The Committee on Climate Change's Sixth Carbon Budget[70] proposes a reduction in UK GHG emissions of 78% by 2035 relative to 1990. This is the equivalent of a 63% reduction in 2030 from 2019 emissions. A linear 63% reduction over this period for South Gloucestershire is projected. In this scenario an emission of 645 kt CO_2 would remain in 2030 and require offsetting or compensation.

[70] Climate Change Committee (2020) The Sixth Carbon Budget.
Available at: https://www.theccc.org.uk/publication/sixth-carbon-budget/

Figure 4. South Gloucestershire emissions pathway – assuming a 63% national emission reduction in 2030

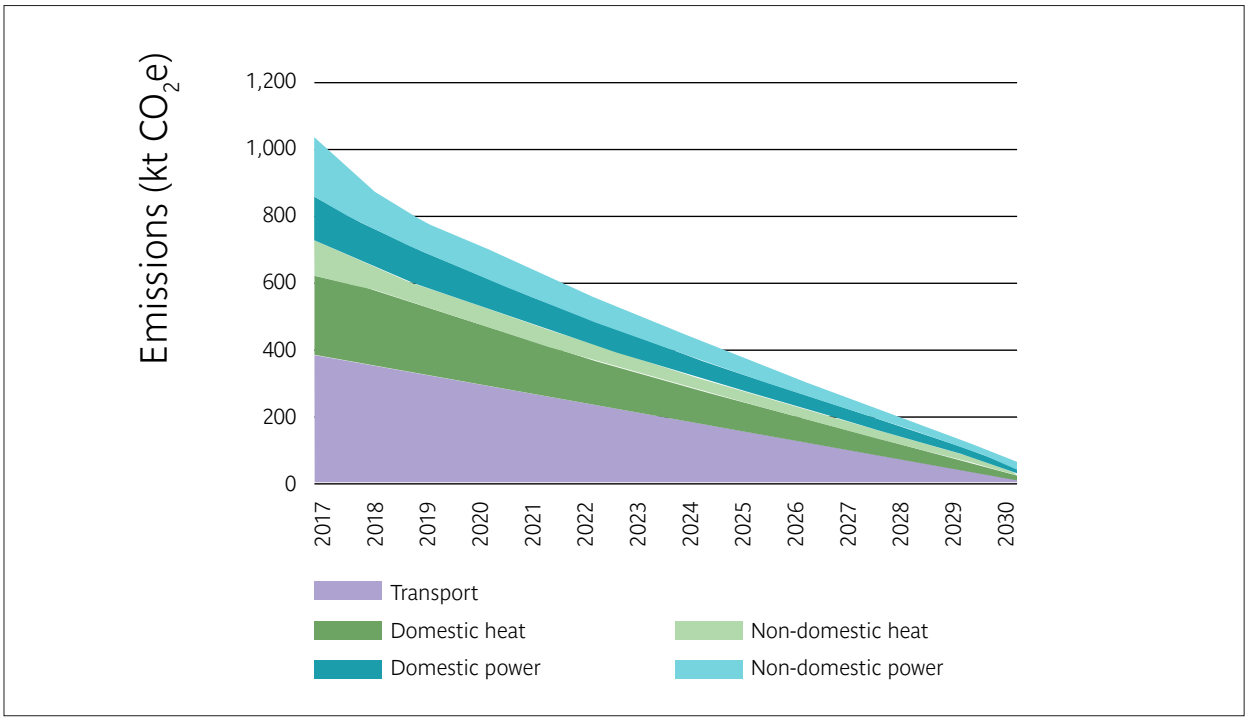


After Gale (2022)

These three projections have a range of between 250 kt and 644.6 kt CO_2 residual emissions in 2030.

Scenario 4:

Figure 5. Regen net zero pathway for South Gloucestershire (Regen 2019)[71]



Regen 2019[71]

Need to do actions, identified by Regen, to meet this scenario's goal

Achieving net zero means the complete transition of the energy systems, through activities already known as needed, but also through additional as yet unknown actions.

Power consumption decarbonises rapidly and drops to almost zero by 2030. This requires action at the national scale, but is also facilitated by local projects and decision-making to support renewable energy and limit the deployment of new fossil fuel infrastructure.

The scale of challenge to decarbonise heat and transport is clear. Rather than centralised wholesale changes, decarbonisation will require changes to almost every home and vehicle. For example, an estimated 97,000 gas-boilers in the area need replacing with low-carbon alternatives, alongside LPG and other fossil fuel heat technologies.

Approximately 45% of non-domestic properties are heated by gas. As with domestic boilers, these need replacing with low-carbon alternatives wherever possible.

All journeys will need to be made through active travel or using low carbon vehicles. The lowest emitting vehicles would be mass transit such as trains or buses, however, electric cars are recognised as a key route to decarbonisation.

The roll-out of energy efficiency measures needs to be maximised under the net zero pathway, with 75% of homes retrofitted to EPC C.

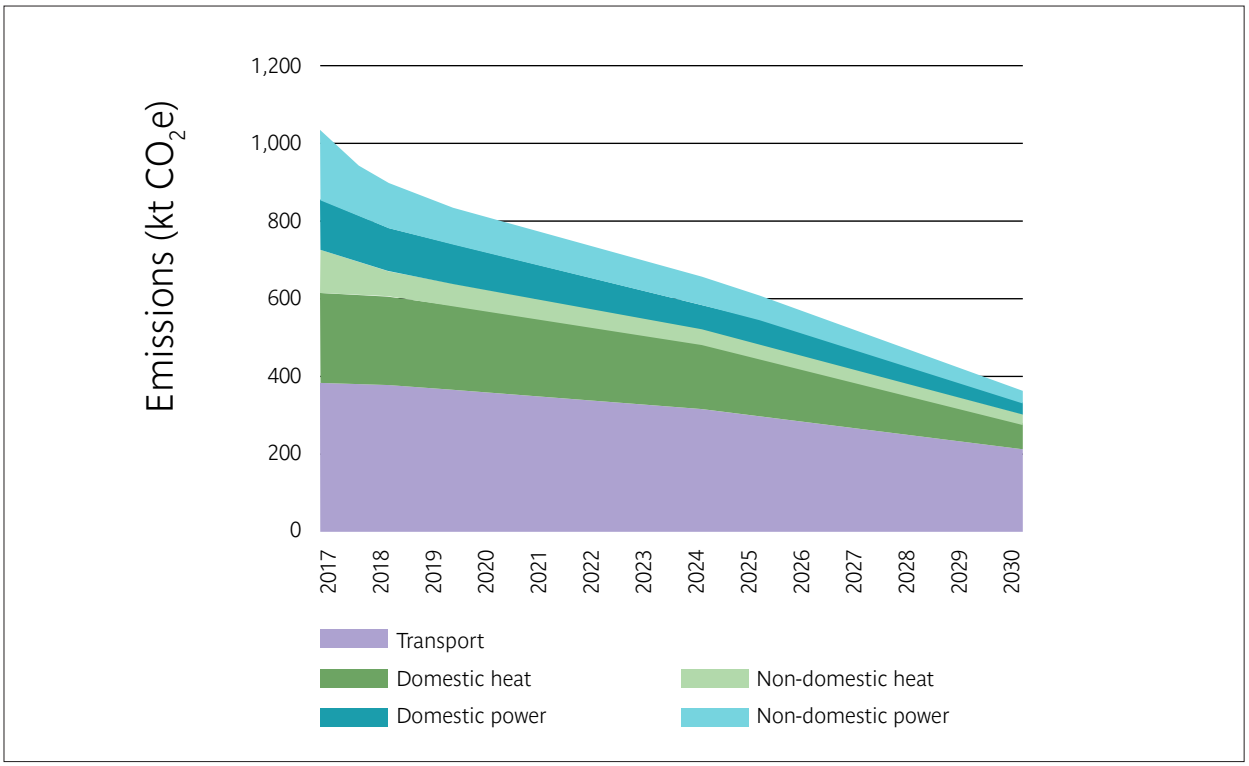
[71] Regen (2019) South Gloucestershire CO_2 emissions baseline and net zero gap analysis Report for South Gloucestershire Council. Available at: https://beta.southglos.gov.uk/wp-content/uploads/Carbon-Emissions-Baseline-Report.pdf

Every home built between now and 2030 which is not a zero-carbon home will need to be retrofitted within the period to achieve a zero carbon standard. The same is true for non-domestic properties.

Scenario 4 will result in about 100 Kt of residual emissions in 2030. This can be considered optimistic as the necessary lead times for the actions recognised by Regen as essential are lengthy and in many cases have not commenced.

Scenario 5:

Figure 6. Regen highly ambitious net zero pathway



Regen 2019

Under this Scenario Regen noted that each sector shows significant reductions far beyond the precedent of decarbonisation rates achieved so far. It illustrates the scale of impact of potential decarbonisation interventions and the gap that still remains between this highly ambitious emissions reduction pathway and net zero in 2030.

Need to do actions, identified by Regen, to meet this scenario's goal

The highly ambitious pathway towards net zero sees significant and rapid reductions in emissions from both heat and power by 2030.

Emissions from transport do not approach zero under this pathway. However, there is still very high uptake of electric vehicles and a reduction of mileage, leading to a 40% reduction in emissions.

Both the domestic and non-domestic sectors are reduced to below 50 kt CO_2e each. Almost all domestic properties are insulated to at least an EPC band of C reducing emissions up to 44%, and non-domestic properties reduce their energy consumption by 10%.

There are very high reductions in road transport emissions from around 380 to around 220 kt CO_2e. This is made up of changes to fuel type as well as from mileage reduction.

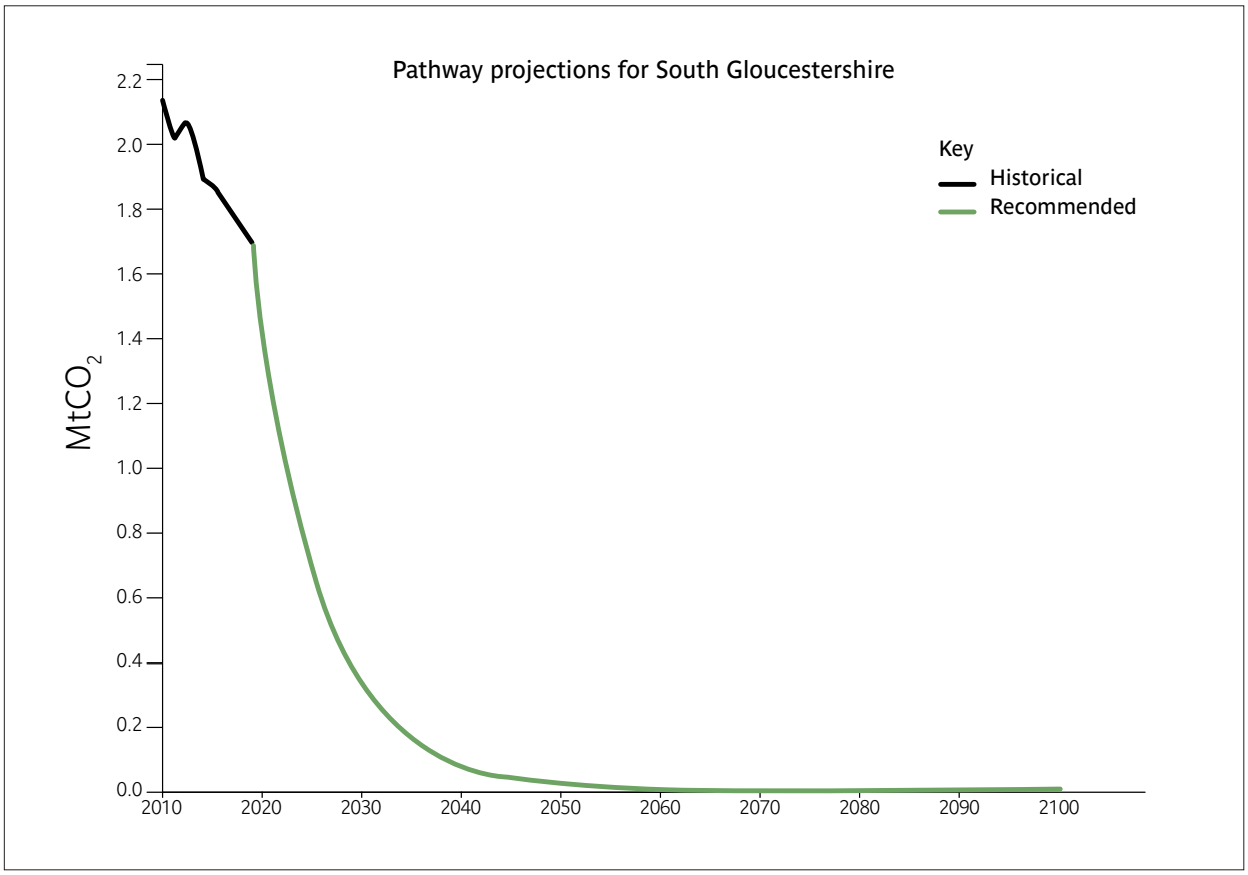
Electricity supply is decarbonised at a national level much faster than the current (2019) BEIS trajectory, to 50g CO_2/kWh by 2030.

Scenario 5 projects approximately 500 kt of residual emissions in 2030.

Scenario 6

In October 2019 the Tyndall Centre at the University of Manchester, produced a carbon budget for South Gloucestershire Council territorial area.[72] The report provides South Gloucestershire with budgets for carbon dioxide (CO_2) emissions from the energy system for 2020 to 2100 and has been produced using the Science Based Targets method.[73-74]

Figure 7. Tyndall Centre budget for South Gloucestershire



From Kuriakose *et al* (2020)

The report provides:

- a long-term carbon budget for South Gloucestershire from 2020 to 2100;
- a sequence of recommended five-year carbon budgets;
- a date of 'near zero'/zero carbon for the area.

[72] Kuriakose, J., Jones, C., Anderson, K., Broderick, J. & McLachlan, C. (2020) Setting Climate Commitments for South Gloucestershire. Quantifying the implications of the United Nations Paris Agreement for South Gloucestershire.
Available at: https://carbonbudget.manchester.ac.uk/reports/E06000025/print/

[73] World Resources Institute (ND) The Science Based Targets Initiative.
Available at: https://www.wri.org/our-work/project/science-based-targets-initiative

[74] United Nations (ND) The Paris Agreement.
Available at: https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement

Table 3. Five-year periodic carbon budgets for South Gloucestershire

Carbon budget period	Recommended carbon budget (Mt CO_2)
2018–2022	7.2
2023–2027	3.5
2028–2032	1.7
2033–2037	0.8
2038–2042	0.4
2043–2047	0.2
2048–2100	0.2

Assuming a budget of 1.44 Mt in 2022 (2018–2022 budget divided by 5) the Tyndall budget to 2100 is 8.4 Mt of which the period 2022 to 2030 is projected to expend 5.28 Mt. Assuming an equal share of the budget in each year for the period 2028 – 2032, the 2030 budget may be as little as 340 Kt CO_2. This is a significantly smaller emission than Scenarios 2, 3 and 5 above.

The Tyndall report for South Gloucestershire makes the following recommendations

1. Stay within a maximum cumulative carbon dioxide emissions budget of 10.6 million tonnes ($MtCO_2$) for the period of 2020 to 2100.

2. Initiate an immediate programme of CO_2 mitigation to deliver cuts in emissions averaging a minimum of at least 13.8% per year to deliver a Paris aligned carbon budget. These annual reductions in emissions require national and local action, and could be part of a wider collaboration with other local authorities. It is worth noting that the recent year-on-year reductions in territorial emissions are of the order of 3–4%, between a third and a quarter of the recommended annual reduction.

3. Reach zero or near zero carbon no later than 2041. This report provides an indicative CO_2 reduction pathway that stays within the recommended maximum carbon budget of 10.6 $MtCO_2$. At 2040 5% of the budget remains. This represents very low levels of residual CO_2 emissions by this time, or the Authority may opt to forgo these residual emissions and cut emissions to zero at this point. Earlier years for reaching zero CO_2 emissions are also within the recommended budget, provided that interim budgets with lower cumulative CO_2 emissions are also adopted.

The Tyndall Centre report produces a budget to 2100 but most of the emissions are assumed to have been reduced by 2050. South Gloucestershire have set a target of achieving carbon neutrality by 2030. Thus there is greater urgency to achieve large and early carbon emission reductions over and above those identified by the Tyndall Centre. Simply following the Tyndall carbon budget recommendation will be insufficient to achieve the target.

Table 4. Scenario summary

Scenario	Estimated 2030 residual CO_2 in kt
Baseline	1100, 2019 case
1. A decarbonisation pathway based upon the long-term trend in the rate of emission reduction.	250
2. A South Gloucestershire decarbonisation pathway aligned to the Sixth Carbon Budget	560
3. A South Gloucestershire decarbonisation pathway based on a reduction in UK GHG emissions of 78% by 2035	665
4. Regen Net Zero pathway for South Gloucestershire	100
5. Regen Highly Ambitious Net Zero Pathway	500
6. Tyndall Centre Budget for South Gloucestershire	340

Scenario 1 and 4 are considered unduly optimistic. Scenario 6 is more optimistic than Scenario 2, 3 and 5 which produce a broadly similar emission total for 2030 of approximately half the 2019 baseline, ranging from 500 to 665 kt. The range of these estimates is 165 kt with a midpoint of 582 kt CO_2.

South Gloucestershire Council will need to determine if a residual of approximately 582 kt is acceptable in 2030. The council will need to consider what options are within its scope to drive down the size of the residual emission. In the absence of such action the council and the wider South Gloucestershire area will have a large offsetting requirement. The council, residents and enterprises in South Gloucestershire will need to determine what further mitigation actions are feasible to reduce the gap between the effect of national actions and the ambition of net zero/carbon neutrality by 2030.

The scenarios vary in their use of CO_2 or CO_2e as the emission but given other inaccuracies in the estimation of 2030 emissions this is unlikely to generate major errors given that South Gloucestershire is unlikely to be a major source of the emissions bundled together as CO_2e.

Reviewing the projection of the six scenarios the most likely South Gloucestershire residual territorial emission in 2030 is in the range 500 to 665 kt of CO_2 with a mid-point of approximately 582 kt. This value results from national mitigation action but can be reduced further by enhanced local mitigation efforts led by the council and implemented by residents, enterprises and the council. These issues are discussed in the remainder of this report.

4. Step 2: Assessment of South Gloucestershire Council activities against the recommendations for local authorities identified in the Sixth Carbon Budget Report of December 2020

The following table presents an assessment of South Gloucestershire Council's actions in respect of the recommendations in the report on the role of Local Authorities[75] prepared for the Climate Change Committee in 2020.

Table 5. Recommendations to local authorities. Assessment of South Gloucestershire Council's Current Position

CCC (2020) Recommendations to local authorities (Box 2)	Assessment of South Gloucestershire Council's (SGC) current position
Local authorities are well placed to deliver climate action in the UK, and should be supported to do so. Local authorities looking to act on climate change should consider the following over-arching priorities:	SGC has declared a Climate Emergency, developed a Climate Emergency Strategy[76] and is now in Year 3 of its Climate Emergency Action Plan[77] cycle. In 2022 SGC was identified as one of the best performing Single Tier Authorities in the Climate Emergency UK[78] assessment of Climate Action Plans. It is well placed to build on these achievements and to drive forward mitigation, adaptation and sequestration activities supported by targeted information and awareness raising campaigns.
Develop Net Zero or Climate Action Plans with delivery projects that prepare the area to make the transition to net zero choices from 2030, and align with climate adaptation, biodiversity net gain and other key local strategies. Include immediate actions that kick-start delivery now and that support low-carbon and green skills and jobs.	SGC has developed a comprehensive suite of strategy and action plans with clear senior leadership and councillor support. The University of the West of England has independently reviewed the action plans. The action plans meet the expectation of this recommendation in respect of net zero but greater urgency will be required in the rest of this decade if the best possible emissions outcome is to be achieved. Further effort is required to build resilience and begin adaptation so as to prepare the area for a changing climate which by 2100 may see global temperatures rise *(continues on next page)*

[75] Evans, L.M. (2020) Local Authorities and the Sixth Carbon Budget. An independent report for the Climate Change Committee. Available at: https://www.theccc.org.uk/publication/local-authorities-and-the-sixth-carbon-budget/

[76] South Gloucestershire Council (2021) Climate Emergency Action Plan – Year 3 (2022/23) Available at: https://council.southglos.gov.uk/documents/s130493/Appendix%203%20Climate%20Emergency%20Action%20Plan%20Year%203.pdf

[77] South Gloucestershire Council (2019) Climate Emergency Strategy Available at: https://beta.southglos.gov.uk/wp-content/uploads/Climate-Emergency-Strategy.pdf

[78] Climate Emergency UK (2022) Council Climate Plan Scorecard. Available at: https://councilclimatescorecards.uk/

CCC (2020) Recommendations to local authorities (Box 2)	Assessment of South Gloucestershire Council's (SGC) current position
	by 4ºC[79-80] and for which outcome planning is recommended. It is unclear what efforts have been made by SGC to develop the green business and jobs market in the area. WECA[81] have taken a lead on this issue but as yet efforts appear modest and not yet calibrated to the scale of need and opportunity presented by a transition to a net zero future. Ecuity[82-83] have produced two reports for WECA green skills. Considerable attention has been given to the development of green skills for the needs of a decarbonising future with important contributions from the Green Jobs Taskforce[84], the Green Alliance[85] and Eunomia[86]. Without investment in developing and sustaining the new skills and human resources required to develop and operate the decarbonised economy of tomorrow the technical innovations may find implementation limited by the lack of a skilled workforce. South Gloucestershire Council should engage with local colleges and universities to ensure curricula are developed that build the skills and knowledge required for the net zero economy. The Net Zero Strategy[87] sets out the range of technical developments that will stimulate skills development and generate employment opportunities. The House of Commons Environmental Audit Committee reviewed the progress with the green jobs agenda.[88]

[79] UK Government (2022) Third Climate Change Risk Assessment. Defra. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1047003/climate-change-risk-assessment-2022.pdf

[80] Betts, R.A., Haward, A.B. and Pearson, K.V. (Eds). (2021) Technical Report of the Third UK Climate Change Risk Assessment Report prepared for the Climate Change Committee. Available at: https://www.ukclimaterisk.org/independent-assessment-ccra3/technical-report/

[81] West of England Combined Authority (ND) Green Skills
Available at: https://www.westofengland-ca.gov.uk/what-we-do/employment-skills/green-skills/

[82] Ecuity (2021a) Retrofit Skills Market Analysis. A report for the West of England Combined Authority. Available at: https://www.westofengland-ca.gov.uk/wp-content/uploads/2021/07/WECA_Green-Jobs-and-Skills_Retrofit_Report-1_Final_01_06_2021.pdf

[83] Ecuity (2021b) Green Skills Market Analysis. A report for the West of England Combined Authority. Available at: https://www.westofengland-ca.gov.uk/wp-content/uploads/2021/07/WECA_Green-Jobs-and-Skills_Phase-2-Report_Final_01_06_2021.pdf

[84] Green Jobs Taskforce (2021) Report to Government, Industry and the Skills Sector.
Available at: https://www.gov.uk/government/groups/green-jobs-taskforce

[85] Green Alliance (2022) Closing the UK's Green Skills Gap.
Available at: https://green-alliance.org.uk/publication/closing-the-uks-green-skills-gap/

[86] Eunomia (2021) Building Skills for Net Zero Report for CITB.
Available at: https://www.citb.co.uk/media/kkpkwc42/building_skills_net_zero_full_report.pdf

[87] UK Government (2021) Net Zero Strategy: Build Back Greener. Department for Business, Energy & Industrial Strategy. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1033990/net-zero-strategy-beis.pdf

[88] House of Commons Environmental Audit Committee (2021) Green Jobs. Third Report of Session 2021-22.
Available at: https://publications.parliament.uk/pa/cm5802/cmselect/cmenvaud/75/75.pdf

CCC (2020) Recommendations to local authorities (Box 2)	Assessment of South Gloucestershire Council's (SGC) current position
Monitor and report on progress in reducing emissions to local communities and government. Where possible share standardised data, benchmark and provide clear evidence to inform policy.	SGC has developed a comprehensive suite of strategy and action plans. The University of the West of England has independently reviewed the action plans and concluded that the action plans meet the expectation of this recommendation in respect of net zero. SGC publishes an emissions dashboard[89] showing the most recent BEIS territorial emissions data[90],1137.4 kt of CO_2 in 2019 and expressing this as a per capita emission, currently 4 t CO_2 per person.
Conduct policy and service reviews to align policy, spending and functions with net zero. Identify contradictions, then put in place mitigation plans to align them at a future date and reduce emissions in the meantime. Develop project and financial appraisal systems that include emissions and climate impacts.	The annual action plan sets out projects that are specific to the authority and these include policy alignment and influencing the decisions of spending departments within SGC. The extent to which the Climate Emergency Action Plans are driving policy change within spending departments is unclear and further action by the Climate Emergency team is recommended to align policy in such departments with the Action Plans, perhaps supporting the use of the Cornwall Decision Wheel to support alignment of council spending with actions that advance climate and nature emergency aims. This will require the support and probable intervention of the political leadership to achieve the goal.
Implement training and capacity building to deliver net zero within the local authority and with key suppliers and contractors. Climate, energy, sustainability and carbon understanding needs to be embedded in the whole authority, across staff and systems. Increasingly specialist skills will be needed around energy systems. Climate change should be central to Elected Member and Senior Director training.	SGC have developed a freely available training package for use by SGC staff, local residents and LSP members amongst others[91]. This has been distributed across the area but it is unclear to what extent the training package has been used by partners and residents. The training package is excellent and further action will be needed to ensure wide distribution and uptake. Elected members and senior officers have been offered training but it is unclear if this is a mandatory requirement for said individuals to complete. This training needs to include measurement of take up, preferably broken down by area.

[89] South Gloucestershire Council (ND) Emissions Dashboard.
Available at https://beta.southglos.gov.uk/climate-emergency-in-south-gloucestershire#emissions-dashboard

[90] Department for Business, Energy and Industrial Strategy (2021a) UK local authority and regional carbon dioxide emissions national statistics: 2005 to 2019. Available at: https://data.gov.uk/dataset/723c243d-2f1a-4d27-8b61-cdb93e5b10ff/uk-local-authority-and-regional-carbon-dioxide-emissions-national-statistics-2005-to-2019

[91] South Gloucestershire Council (ND) Community Climate and Nature Emergency. Take Action.
Available at: https://rise.articulate.com/share/9QiA4S0YBjYOAofoNGOey94j-z-NVTgT#/

CCC (2020) Recommendations to local authorities (Box 2)	Assessment of South Gloucestershire Council's (SGC) current position
Develop capacity to innovate and scale up. Climate change action plans help identify future delivery projects for when funding becomes available. Local authorities should prioritise applying for funding and managing funds if successful. *This recommendation sits alongside the recommendation to government to implement longer term funding windows, longer periods for funding and flexibility to blend funding streams. It is also backed by a recommendation for more funding for local authorities to act on climate change.*	SGC's action plans provide an annual programme of actions to address the net zero target. These are divided into those actions to be undertaken by SGC and those that it can enable or inspire other actors and agencies to undertake. Within the scope of the existing staff base and resources available the plans are innovative, target key areas, and are successful. However, much more can and must be done if the net zero target is to be achieved by 2030 with the smallest residual remaining for offsetting. Action Plans for Year 4 onward increasingly will need to identify opportunities for renewable energy generation within the authority area and rapidly to stimulate the market for the retrofit of housing and commercial/SME premises. To do so will require additional resources, alignment of policies and plans especially the Local Plan.[92] A considerable literature has recently emerged to advise and direct action to address the retrofit challenge. For example, see LETI[93], RICS[94] or UK Green Building Council.[95] Sectoral road maps also are being produced such as MAKE[96], NHS[97] or the British Retail Consortium.[98] SGC has been active in seeking external resources to support its Climate Emergency Strategy with bids, for example, to central government, the LGA[99] and the Environment Agency.

[92] South Gloucestershire Council (2022) South Gloucestershire New Local Plan Phase 2.
Available at: https://beta.southglos.gov.uk/new-local-plan/
[93] LETI (2021) Climate Emergency Retrofit Guide. How existing homes can be retrofitted to meet UK climate targets.
Available at: https://www.leti.london/retrofit
[94] RICS (2020) Retrofitting to decarbonise UK existing housing stock. RICS net zero policy position paper. Available at: https://www.rics.org/globalassets/rics-website/media/news/news--opinion/retrofitting-to-decarbonise-the-uk-existing-housing-stock-v2.pdf
[95] UK Green Building Council (2021) Net Zero Whole Life Carbon (WLC) Roadmap for the UK Built Environment.
Available at: https://www.ukgbc.org/ukgbc-work/net-zero-whole-life-roadmap-for-the-built-environment/
[96] MAKE UK (2022). Manufacturing Sector Net Zero Road Map.
Available at: https://www.makeuk.org/insights/reports/manufacturing-sector-net-zero-roadmap
[97] NHS (2020) Delivering a Net Zero National Health Service. NHS England and NHS Improvement, PAR 133. Available at:
https://www.england.nhs.uk/greenernhs/wp-content/uploads/sites/51/2020/10/delivering-a-net-zero-national-health-service.pdf
[98] British Retail Consortium (2021) Climate Action Roadmap. Available at: https://brc.org.uk/climate-roadmap/
[99] De Vito, L., Longhurst, J.W.S., Rees, L. & Wyatt, B. (2021) Co-developing a Carbon Communication Toolkit for South Gloucestershire. Net Zero Innovation Programme case study. Report for the LGA.
Available at: https://www.uwe.ac.uk/study/library/research-support/research-repository

CCC (2020) Recommendations to local authorities (Box 2)	Assessment of South Gloucestershire Council's (SGC) current position
Collaborate with neighbouring and cross-tier local authorities and other key delivery bodies on strategies and plans which ensure systems-wide transformation is coherent and supportive of net zero. This should include energy, transport, housing, infrastructure and skills. This should enable local authorities to cluster to share skills, expertise, achieve economies of scale and deliver more effectively. Local area energy plans should be conducted at a scale larger than small district councils should and with awareness of the wider energy assets in the region.	SGC Climate Emergency dashboard[100] page states that SGC will work with WECA and the other West of England Authorities who each have a net zero 2030 target. Officers from each authority meet to discuss common issues and challenges and to enhance inter-authority collaboration. SGC as part of WECA will influence the shape and scale of the Spatial Development Strategy[101] and the Transport Strategy. WSP[102] are undertaking a transport decarbonisation study for WECA and the conclusions to date are not encouraging. Actions to date focus on carbon emissions reductions from the traditional engineering and demand management solutions and there may be more opportunities to reduce emissions in the digitalisation of services, home working and local neighbourhoods. Much more effort will be required to ensure decarbonisation and adaptation truly sit at the heart of these spatial planning structures. Bristol CC is developing an innovative City Leap energy transformation scheme[103] and has announced a joint venture with Ameresco and Vattenfall. There are opportunities for SGC to participate in schemes wider than Bristol particularly in the provision of low or zero carbon heat from industrial enterprises on Severnside and Avonmouth. Whilst the council may not have suitable assets for inclusion in a similar approach to Bristol (e.g. own housing stock), there may be some innovative funding approaches to be considered.
Develop green finance know-how. Private sector investment and green finance will be required to deliver the scale of the change needed. Local authority legal and finance teams, and project delivery teams will need to develop their knowledge of the finance industry.	It is unclear whether SGC legal and financial teams and project delivery teams have the necessary understanding of the green finance opportunities that exist to support net zero and adaptation schemes. The training programme could be expanded to include this element. For further details about the financing of net zero see, for example, the Glasgow Financial Alliance for Net Zero.[104]

[100] South Gloucestershire Council (ND) Climate Emergency Dashboard.
Available at: https://beta.southglos.gov.uk/climate-emergency-in-south-gloucestershire#emissions-dashboard
[101] West of England Combined Authority (ND) Spatial Development Strategy.
Available at: https://www.westofengland-ca.gov.uk/what-we-do/planning-housing/spatial-development-strategy/
[102] WSP (2022) Transport Decarbonisation Study. Emerging Issues and Options. Report for West of England Combined Authority.
[103] Bristol City Council (ND) City Leap. Available at: https://www.energyservicebristol.co.uk/cityleap/
[104] Glasgow Financial Alliance for Net Zero (ND) Bringing together the financial sector to accelerate the transition to a net-zero economy.
Available at: https://www.gfanzero.com/

CCC (2020) Recommendations to local authorities (Box 2)	Assessment of South Gloucestershire Council's (SGC) current position
Communicate and engage with local communities, businesses and partners on net zero so that a mandate for action is maintained. Support community action with citizens, schools, businesses and other groups. Assess the skills needed locally to deliver the transition, developing green and low-carbon jobs and supporting a resilient recovery.	SGC has a Climate Emergency community engagement group.[105] This is run jointly with CVS South Gloucestershire (Community and Voluntary Services). The group is open to everyone in South Gloucestershire and meets quarterly. The reach, scale and impact of the group does not indicate that it is addressing the urgency of the Climate and Nature Emergency. South Gloucestershire Council's Local Strategic Partnership (LSP)[106] brings together a number of private sector, public sector and third sector bodies including Business West, University of the West of England, Avon and Somerset Fire Service, Airbus and South Gloucestershire and Stroud College. The LSP is described as the co-owner of the Climate Emergency strategy and the climate is a regular agenda item at meetings. Despite training being offered to LSP members it is not clear that LSP members exercise the responsibility of joint ownership and the requirement to implement actions contained in the Action Plan. Urgent consideration should be given to re-energising the LSP's climate engagement and the research of De Vito et al[107] provides suggestions as to how this might be undertaken. Political leadership will be required over and above officer engagement. As noted above it is unclear what initiatives SGC has undertaken to develop the green skills agenda or to support low/zero carbon jobs. The green skills agenda has been addressed by WECA with two reports commissioned by Ecuity published in 2021.[108]

[105] South Gloucestershire Council (ND) Climate Emergency Community Engagement Group.
Available at: https://beta.southglos.gov.uk/climate-emergency-community-engagement
[106] South Gloucestershire Council (ND) Local Strategic Partnership
Available at: https://beta.southglos.gov.uk/climate-emergency-in-south-gloucestershire/
[107] De Vito, L., Longhurst, J.W.S., Rees, L. & Wyatt, B. (2021) Co-developing a Carbon Communication Toolkit for South Gloucestershire. Net Zero Innovation Programme case study. Report for the LGA.
Available at: https://www.uwe.ac.uk/study/library/research-support/research-repository
[108] Ecuity (2021a) Retrofit Skills Market Analysis. A report for the West of England Combined Authority. Available at: https://www.westofengland-ca.gov.uk/wp-content/uploads/2021/07/WECA_Green-Jobs-and-Skills_Retrofit_Report-1_Final_01_06_2021.pdf
Ecuity (2021b) Green Skills Market Analysis. A report for the West of England Combined Authority. Available at: https://www.westofengland-ca.gov.uk/wp-content/uploads/2021/07/WECA_Green-Jobs-and-Skills_Phase-2-Report_Final_01_06_2021.pdf

CCC (2020) Recommendations to local authorities (Box 2)	Assessment of South Gloucestershire Council's (SGC) current position
Local authority pension funds should disclose their approach to assessing and managing climate risks and should consider investing in net zero aligned schemes within their legal duties.	SGC employees can join the Avon Pension Fund.[109] The fund has set clear climate change objectives to reduce the amount of carbon their investments generate, to invest more heavily in companies and assets that are making a contribution to the low carbon transition and to use their influence as a shareholder to ensure those individuals and communities affected by the transition are protected.[110] Avon Pension Fund is transitioning its entire legacy low carbon equity strategy (~£780m) into the recently launched Paris Aligned Benchmark (PAB) developed by FTSE Russell and Brunel Pension Partnership. By investing in the PAB, Avon Pension Fund expect to deliver annual emissions reductions of at least 7% per annum, adding to the progress already made to be net zero by 2050 or earlier.[111] SGC may have the opportunity to appoint a trustee or board member overseeing the fund. If so, is SGC advocating for earlier and faster action on pension investment decarbonisation? Of course, this must be consistent with the duties of a trustee, the legal requirements on the operation of the fund and the legitimate expectation of members for a healthy return on pension payments. It should be noted that fund investments in carbon intensive industries run the risk of stranded assets, liabilities and poor returns in the future.

[109] Avon Pension Fund (ND). Local Government Pension Scheme. Available at: https://www.avonpensionfund.org.uk/
[110] Avon Pension Fund (ND) Climate Emergency. Available at: https://www.avonpensionfund.org.uk/climate-emergency
[111] Avon Pension Fund (2021) Avon Pension Fund sets ambitious climate change targets and takes steps to mitigate the financial risk of climate change in review of equity portfolio. Available at: https://www.avonpensionfund.org.uk/avon-pension-fund-sets-ambitious-climate-change-targets-and-takes-steps-mitigate-financial-risk-of

Assessing performance and potential actions

In 2020 a number of environmental organisations including Friends of the Earth, the Climate Disclosure Programme and Ashden published a list of 31 Climate Actions for Councils.[112]

Table 6 reviews the position of South Gloucestershire Council against these 31 actions.

Table 6. Assessment of SGC's actions against the 31 Climate Actions for Councils

31 Climate Actions for Councils	South Gloucestershire Council actions	Recommended priority 1 high, 5 low
RAISING MONEY		
1. Introduce a workplace car parking levy and/or similar initiative to fund sustainable transport.	Not a current action. Timescale to implement short term. Cost low. Powers available to SGC to act. Beneficial impact realised in the short term. Carbon impact depends on scale of implementation.	1. Levy proceeds can be recycled into Climate and Nature Emergency actions.
2. Set up a Carbon Offset Fund through Section 106 agreements.	Not a current action, planning for offsetting an active discussion for officers of SGC. External bids for resource have been made. Timescale to implement medium. Cost varies according to scale but will require officer time. Powers available to SGC to act. Beneficial impacts realised in the medium to long term and requires ongoing management and resource. Carbon impact depends on scale of implementation and to achieve net zero will require all residual territorial carbon emissions, after mitigation implemented, to be offset each year after 2030.	1. Section 106 agreements or CIL funds currently are hypothecated for Climate and Nature Emergency actions. There may be opportunities for increasing the share of CIL resources devoted to Climate and Nature Emergency actions

[112] Ashden, FoE and CDP (2020) 31 Climate Actions for Councils.
Available at: https://ashden.org/wp-content/uploads/2020/08/31-Climate-Actions-for-Councils.pdf

BUILDINGS		
3. Enforce minimum energy efficiency standards in the private rental sector.	A current action. Government requires that homes that are privately rented meet a minimum 'Energy Performance Certificate' rating of E. Local authorities are responsible for enforcement. Timescale to implement short as already an existing responsibility. Cost – need an officer to administer and enforce. Powers available to SGC to act. Beneficial impact medium term. Carbon impact depends on scale of implementation but it is known that many privately rented houses have poor insulation and high energy bills.	1. Enforcing minimum standards is an essential precondition for improving energy efficiency and comfort in dwelling.
4. Encourage 100 Energiesprong (or similar) retrofits a year – initially in social housing and then rolling out to the private sector.	Not a current action although budget provision has been made to support a small zero energy retrofit demonstrator. Timescale to implement long term. Cost high. Powers not required as the action is to encourage. Beneficial impact realised in medium or longer term. Carbon impact depends on scale of implementation.	1. Action recommended is to encourage social housing providers to retrofit.
5. Retrofit council-owned homes to EPC C.	SGC does not own social housing properties. Timescale to implement long term. Cost to SGC high. Powers available – unknown? Can certainly encourage social housing providers. Beneficial impact medium or longer term but depending on rate and scale of implementation. Carbon impact depends on scale of implementation.	1. Recommend encouragement of social housing providers to retrofit to EPC C.

6. Require higher than current national energy efficiency standards for privately built new homes.	Not a current action. Timescale to implement medium. Cost – will require an officer to liaise with developers. Powers unavailable, requires liaison. Beneficial impact medium or longer term. Carbon impact depends on scale of implementation.	1. Recommend liaison with and encouragement of action by developers but note the new build stock will be a small fraction of the total housing stock. New local plan could develop policies that go above national energy efficiency standards with net zero requirements for the operation of new developments.
7. Encourage /enable retrofit of all existing owner-occupied housing stock to EPC level C or above.	Encouragement of energy efficiency improvement is discharged though Severn Wye Energy Agency.[113] Timescale to implement – immediate for encouragement. Cost high for owners to achieve significant retrofit benefits, low for SGC to run encouragement campaigns. Powers not required. Beneficial impact medium or longer term Carbon impact depends on scale of implementation.	1. Action recommended. Although new developments will be a small fraction of the total built environment specifying and enforcing the requirement for the highest standards will demonstrate the seriousness of SGC's climate commitment and avoid a future requirement for expensive retrofit.
8. Require homes built on council land to be PassivHaus (PH) standard or similar (and, if developing new council facilities, ensure they are built to the highest standards e.g. BREEAM excellent).	A current action. Timescale to implement at scale – medium. Cost low for SGC, cost borne by developer and purchaser. SGC has no power to require PH. Beneficial impact realised in the medium term through reduced energy demand and improved thermal efficiency of the building stock. Carbon impact depends on scale of implementation.	1. Action recommended. Although new developments will be a small fraction of the total built environment specifying and enforcing the requirement for the highest standards will demonstrate the seriousness of SGC's climate commitment and avoid a future requirement for expensive retrofit.

[113] Severn Wye Energy Agency (ND). Available at: https://severnwye.org.uk/

TRANSPORT		
9. Introduce measures to encourage cycling and walking.	A current action but SGC decisions prioritise vehicle-based travel. Timescale to implement short for promotion but longer term for infrastructure developments. Cost for infrastructure high. Powers available to SGC to act. Beneficial impacts occurs over variable timescales depending on promotion and investment. Carbon impact depends on rate and scale of implementation.	1. Action recommended is to prioritise active travel in council policies and plans particularly land use decision-making via the local plan and in public health campaigns for healthier active lifestyles.
10. Ban or discourage private cars from the city centre.	Not a current action Timescale to implement a ban medium. Cost high for scheme. Officer time required to run campaign to discourage car-based travel. Powers unavailable to ban, public information campaign could be developed. Beneficial impacts realised in medium or longer term. Carbon impact depends on rate and scale of implementation.	5. Encouragement of active travel is better option than banning supported by an information campaign encouraging public transport use. Car park charging can support this action. SGC could also facilitate wider city-region improvements like Park & Ride, and WECA-led initiatives such as mobility hubs. The council can use its influence with public transport providers to substantially improve the frequency and reliability of public transport that can substitute for car-based travel.
11. Establish urban consolidation centres.	A current action Timescale to implement medium Cost variable depending on land ownership and willingness of parties to engage. Officer time to coordinate. Powers available are a combination of land use planning and encouragement. Beneficial impact short medium or longer term. Carbon impact depends on rate and scale of implementation.	2. Action recommended. Establishment of consolidation centres can reduce emissions associated with HGVs in populated areas. Transferring goods to electric vehicles or cargo bikes for the final stage of delivery will enhance the overall scheme benefits.

12. Encourage car sharing.	A current action. Timescale to implement short term. Cost low for campaigns to change behaviour. Powers not required for public information. Beneficial impacts realised in medium or longer term. Carbon impact depends on rate and scale of adoption.	1. Recommend information campaign to build on existing car sharing messaging and allied to active travel messaging, particularly through major employers and workplaces. Can also modify infrastructure to discourage single occupancy vehicle use.
13. Enable the rapid shift to electric vehicles through putting in place EV charging.	A current action. Timescale to implement medium Cost medium. Powers available to SGC to act. Beneficial impact realised in the medium term. Carbon impact depends on rate and scale of adoption.	1. Essential action to support 2030 ICE ban and to continue healthy growth of EVs in the new car market.
14. Replace existing buses with electric buses.	SGC is not a bus operator but can encourage adoption of electric buses by bus and coach companies serving South Gloucestershire. Timescale to implement for advice and guidance short term. Cost low, officer time required for advice and encouragement. Powers available to SGC to act. Beneficial impact short to medium term. Carbon impact depends on rate and scale of adoption.	3. Electrification of the bus and coach fleet is a necessary development on the road to net zero. SGC can use its influencing powers to encourage adoption and can include the requirement for an electric bus/ coach when hiring a vehicle or where SGC financially supports a bus route. Electrification of school transport should be a priority to reduce air pollution exposure of young people and to demonstrate the viability of the action.
15. Deliver a rapid transition of the council's own fleet to electric.	A current action. Timescale to implement medium. Cost – medium. Powers available to SGC to act. Beneficial impact realised in medium term. Carbon impact depends on size of fleet, rate and scale of conversion.	1. This should be an ongoing action to demonstrate to residents and enterprises that SGC is committed to decarbonisation. Recycling vehicles and waste collection vehicles may be suitable for electric motive power and such use can be encouraged in waste contract renewal discussions.
16. Require all taxis to be electric through licensing.	A current action. Timescale to implement medium. Cost low for SGC, high for operators. Powers available to SGC to act. Beneficial impact short to medium term. Carbon impact depends on size of fleet, rate and scale of conversion.	1. SGC as the licensing authority can implement this action.

17. Reduce the need to own and use a car through managing developments in the local plan.	A current action. Timescale to implement depends on local plan adoption. Cost low. Powers available to SGC through Planning policies. Beneficial impacts realised in longer term. Carbon impact depends on the nature of the local plan actions and the implementation through development control decisions.	1. An essential requirement of the forthcoming WECA Spatial Development Strategy and the SGC Local Plan. Planning policies can be used to prioritise active travel and reduce the land allocated to road and parking space.
COUNCIL ESTATE		
18. Encourage and enable energy saving/low carbon behaviour by all council staff.	A current action. Timescale to implement short term. Cost low with costs recouped by savings. Powers available to SGC to act. Beneficial impact realised in short term. Carbon impact depends on the campaigns and their uptake.	1. Improving energy efficiency in council owned, managed or leased buildings is an essential part of a net zero strategy. SGC should set an ambitious target for year-on- year reduction in the council's own emissions. SGC's current target is a 10% year on year reduction.
19. Ensure council's procurement strategy specifies that low carbon lights and appliances are procured.	Check SGC status. Timescale to implement short term Cost low in terms of policy change, potential cost increase for low energy purchases but recouped through energy savings. Powers available to SGC to act. Beneficial impact short term. Carbon impact depends on policy change and the implementation of the new policy.	1. Specifying low carbon requirements in purchasing policy supports energy efficiency actions and when linked to Scope 3 questions can realise further carbon management opportunities for SGC.
20. Upgrade the insulation and heating systems of council buildings, taking advantage of interest free finance available.	A current action. Timescale to implement medium. Cost high to medium. Powers available to SGC to act. Beneficial impact realised in the medium or longer term. Carbon impact depends on the rate and scale of insulation and heating control implementation.	1. Many of the upgrade schemes will already be completed or planned. A continuing programme of upgrades to building stock will be needed with external resources secured where financing schemes exist, e.g. Salix.[114] Upgrades to the building stock including the school estate will need to be considered, planned, funded and adaptation measures implemented to ensure that the building purpose can still be met with an adversely changed climate.

[114] Salix Finance Ltd (ND) Available at: https://www.salixfinance.co.uk/

21. Switch street lighting to well-designed and well directed LED lights.	A current action. Timescale to implement short term. Cost high but recouped from savings. Powers available to SGC to act. Beneficial impact realised in short term. Carbon impact depends on the number of LEDs installed across lighting columns in SGC.	1. Programme already underway and due to complete in 2024.[115] Once the LED programme is complete the residual energy demand for lighting will remain and new developments will increase street lighting energy demand burden. The decarbonisation of the national grid will help but the council should assess whether further action is required to meet the council's own net zero ambition.
22. Require the integration of renewable energy such as solar thermal, PV or heat pumps in local authority owned buildings.	Requirement not a current action. Timescale to implement medium term. Cost high but offset by savings. Powers available to SGC to act. Beneficial impact realised in medium term. Carbon impact depends on policy change and the rate and scale of implementation of the new policy.	1. This should be an ongoing action to demonstrate to residents and enterprises that SGC is committed to decarbonisation and improved energy efficiency.

[115] South Gloucestershire Council (ND). Street Lights Available at: https://www.southglos.gov.uk/transport-and-streets/streets/road-and-traffic-management-information/lighting-street-lights/led-street-lighting/

POWER GENERATION		
23. Identify areas suitable for renewable energy in the local plan.	A current action, Timescale to implement short term to identify, longer term to implement schemes. Cost low in identification phase, high in implementation phase. Powers available to SGC through Planning system. Beneficial impacts realised in longer term. Carbon impact depends on rate and scale of areas zoned for renewable energy and the rate at which these are developed.	1. An essential action. Increasing renewably generated energy within SGC is an essential component of achieving the net zero goal. SGC records the share of energy renewably generated in the area and publishes this on the Climate and Nature Emergency pages.[116] The RERAS[117] report for SGC identified opportunities, barriers and options for action. It provides an evidence base to inform the development of local planning policy and assesses the potential for the deployment of various renewable and low and zero carbon energy technologies at different scales and in different locations across South Gloucestershire. See also[118] The proportion of local energy demand met by renewable energy generated locally is 3.7% with a target of 13%.[119] Serious consideration should be given to substantially enhancing this level of ambition so as to provide better energy security, reduce fuel poverty and to support a faster rate of decarbonisation.
24. Invest in the development of renewable energy and energy storage and support community energy schemes.	Community energy scheme support and investment in renewable energy current actions. Energy storage not a current action. Timescale to implement medium to long term. Cost high, costs recouped from savings on energy purchases. Powers available to SGC to act. Beneficial impact medium to longer term. Carbon impact depends on the rate and scale of investment.	1. Support for such schemes is recommended on carbon saving and energy security grounds. SGC support through land use policies can enhance scheme viability. Battery and other storage systems will increasingly become important as the supply system becomes more distributed and storage and balancing requirements increase.

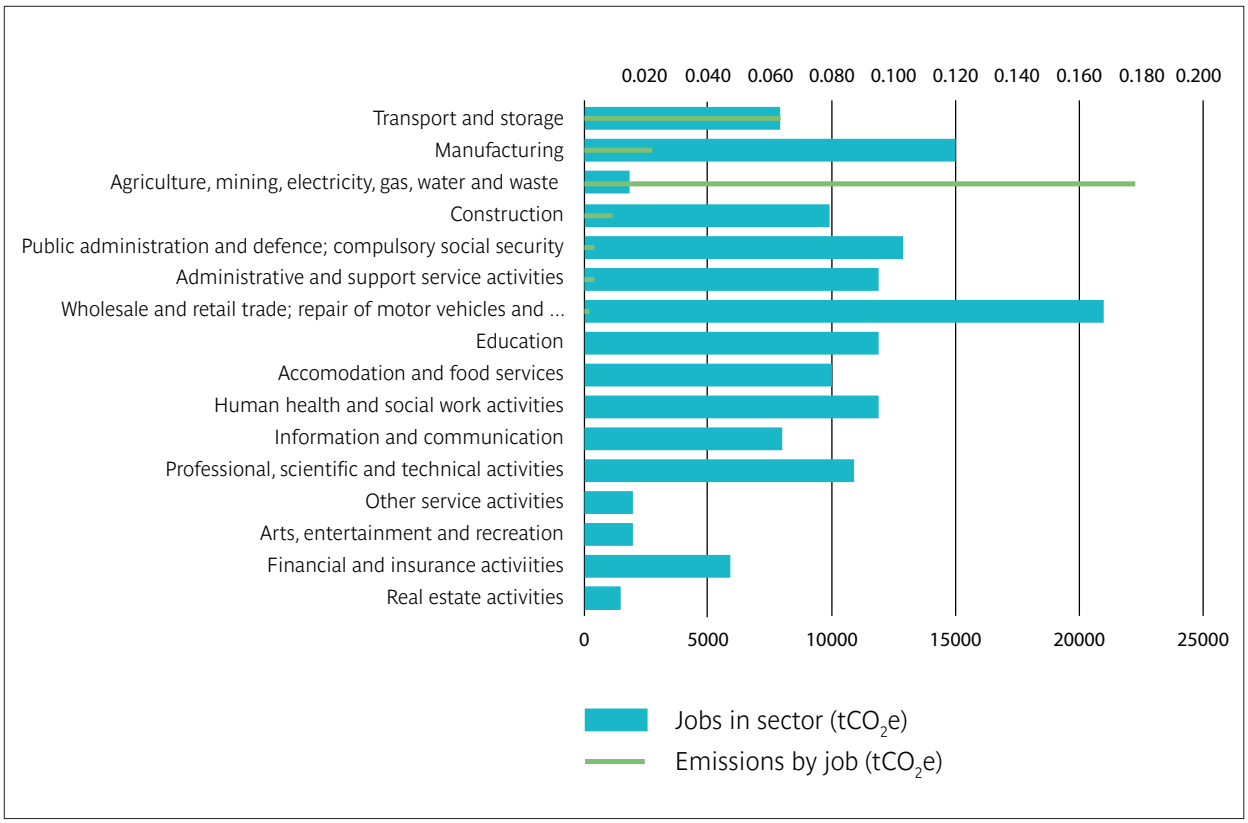
[116] South Gloucestershire Council (ND). Climate Emergency
Available at: https://beta.southglos.gov.uk/climate-emergency-in-south-gloucestershire
[117] AECOM (2021) Renewable Energy Resource Assessment Study. Report for South Gloucestershire Council.
[118] South Gloucestershire Council (ND) Renewable Energy Available at:
https://www.southglos.gov.uk/environment/climate-change/low-carbon-and-renewable-energy-projects/renewable-energy/
[119] South Gloucestershire Council (ND) Energy Dashboard
Available at: https://beta.southglos.gov.uk/climate-emergency-in-south-gloucestershire

WASTE		
25. Cut the council's paper waste by offering papers electronically.	A current action. Timescale to implement short term. Cost low. Powers available to SGC to act. Beneficial impact realised in the short term. Carbon impact modest.	5. This should be a common action across council business although it should be noted that paper copies may be required for those with particular needs.
26. Use food waste according to the food waste hierarchy of prevent, reuse, recycle, and use remaining biodegradable waste to generate biogas.	Food waste is collected in SGC but could further develop public information campaigns to encourage waste management according to the waste hierarchy. Timescale to implement low. Cost for public information campaigns low. Powers available to SGC to act. Beneficial impact medium term. Carbon impact depends upon volumes of material saved or treated according steps in the hierarchy.	1. Recommended action to enhance public information and encourage actions aligning to food waste hierarchy.
LAND USE		
27. Increase tree cover on council owned land and on streets; update local planning strategies to encourage nature-based solutions such as increasing tree cover across the council area.	A current action as part of green infrastructure and nature recovery work. Timescale to implement medium term. Cost medium. Powers available to SGC to act. Beneficial impact realised in short to medium term. Carbon impact depends on the rate and scale of planting.	1. Improving tree cover with native species adapted to predicted future climate, restoring and increasing species rich grassland and wetlands will provide sequestration, shading, cooling and flood /draught resilience alongside biodiversity gains. Care should be taken to ensure the most efficient and sustainable land use decisions ensuring that productive agricultural land is used for food production.

INFLUENCING OTHERS		
28. Support particularly SME businesses to access funds and expertise for reducing carbon pollution.	A current action, e.g. SGC Business Show provided advice and guidance on net zero plus signposting to Business West net zero support[120] or the UK Business Hub.[121] Timescale to implement short term. Cost low, requires officer time to review and share opportunities. Powers available to SGC to act. Beneficial impacts realised in the short to medium term. Carbon impact depends on success of connecting SMEs to funding streams.	1. The Economic Development team in SGC should enhance their advisory and support services for decarbonisation and adaptation amongst the SME business community and encourage green technology and other businesses to invest and locate in South Gloucestershire to benefit environmental and economic resilience. SGC's role can include signposting to the myriad of services offered by WECA and other agencies rather than having to provide direct support themselves.
29. Encourage and support schools to cut carbon e.g. through participating in the LESS CO_2 programme and through accessing Salix finance.	A small-scale current action. Timescale to implement medium term. Cost low, will require officer time to develop information campaigns, research opportunities for funding and to support schools in applying. Powers available to SGC to act. Beneficial impact medium term. Carbon impact depends on the uptake by schools.	1. SGC should scale up their support for decarbonisation and adaptation by schools. As the Climate Emergency team may not have capacity to support this initiative maybe the additional information can piggyback on services already delivered to schools by others in SGC.
30. Engage with schools to ensure meals are delivered in accordance with the official Eatwell Guide, with the majority of options on menus are healthy and plant-based, with less and better meat.	It is believed that SGC serves school meals that meet standards set by the Soil Association. Timescale to implement low. Cost medium to low. Powers available. Beneficial impact medium term. Carbon impact depends on the uptake by schools.	1. Food and food waste are a source of carbon emissions and by improving the climate impact of school meals SGC has the opportunity to link climate awareness information with healthier meals. SGC could use their procurement role to support local growers to provide food for school meals.
31. Use the council's procurement processes to ensure the local authority supply chain is minimising carbon emissions, including through circular procurement.	A current action. Timescale to implement short to medium term. Cost low. Powers available to SGC to act. Beneficial impact will be medium or longer term. Carbon impact depends on establishing accounting measures to record carbon savings.	1. SGC can use its purchasing power to drive climate action in its supply chain. By sourcing locally, the council's purchasing can reduce its indirect emissions and help reduce direct emissions within the SGC territory. This will require purchasing policy and procedures to be rewritten so that carbon accounting is embedded in transactions.

[120] Business West (ND) Trading to Net Zero. Available at: https://www.businesswest.co.uk/trading-to-net-zero
[121] UK Government (ND) UK Business Climate Hub. Available at: https://businessclimatehub.org/uk/

Figure 8. Jobs and emissions in South Gloucestershire



After Regen 2019[122]

This gives some indication of the relative number of jobs by key employment sectors in South Gloucestershire and an estimate of the carbon intensity of each job. Regen (2019) noted that transport and storage, manufacturing, and construction are all sectors with both relatively high employment and high emissions per job.

There are relatively few employees in the 'agriculture (etc.)' category; however, the sector has a high emission associated with each job and emits a range of climatically active gases. Agriculture also provides opportunities to prepare for the local impacts of a changing climate and to protect and restore nature.

The above data on sector employment and worker carbon emission intensity have been used in conjunction with De Vito and Hayes' (2021) assessment of the decarbonisation challenge faced by the major manufacturing and service sectors. The assessment identifies key engagement opportunities for South Gloucestershire Council to enhance and accelerate decarbonisation activity in the industrial and commercial sectors operating within the council area.

[122] Regen (2019) South Gloucestershire CO_2 emissions baseline and net zero gap analysis Report for South Gloucestershire Council. Available at: https://beta.southglos.gov.uk/wp-content/uploads/Carbon-Emissions-Baseline-Report.pdf

Table 7. Prioritising actions based on sector employment and worker carbon emission intensity

(Column 1–3 from Journey to Net Zero: Challenges for the UK industrial sector (De Vito and Hayes, 2021))

Sector	Key challenge	Key enabling processes	Importance of sector in South Gloucestershire	Priority for engagement in SGC 1 high, 4 low
Agriculture, forestry, and fishing	The key challenge for the sector is to overcome resistance to consumer and farmer behaviour change and to implement innovative practice that will reduce diffuse pollution from agriculture.	Increase deployment of action-based engagement activities and training and of collaborative pilot schemes aimed at improving efficiency in fertilisers, resource use and land management practices.	Low employment, high carbon emission intensity per worker. Medium opportunity for SGC to influence sector emissions. Small opportunity for influencing employee wider behaviours through engagement with workplaces. Potential to deliver outcomes for nature and for local adaptation high.	3
Mining and quarrying	The key challenge for mining and quarrying is to overcome barriers to capital and operational investments that would enable a switch to greener energy sources and optimise extraction processes, logistics and transportation vis-à-vis projections that point to increased demand.	Global coordination and governance should encourage technological innovation and capital investments, as well as setting energy efficiency and circular economy benchmarks.	Low employment, high carbon emission intensity per worker. Medium opportunity for SGC to influence sector emissions especially through procurement. Small opportunity for influencing employee wider behaviours through engagement with workplaces. As minerals are worked out mitigation and restoration provide an opportunity for nature recovery and biodiversity gain.	3

Sector	Key challenge	Key enabling processes	Importance of sector in South Gloucestershire	Priority for engagement in SGC 1 high, 4 low
Manufacturing	The key challenge for manufacturing is to integrate a whole supply chain perspective in their carbon accounting practice. Within the manufacturing sector, some industries like cement are to be harder to abate as well as facing growing demand.	Full integration of whole supply chain carbon accounting (cradle-to-grave and, where appropriate, cradle-to-cradle) and carbon labelling could enable environmentally conscious customers to make informed choices in favour of more sustainable options, as well as supporting practices to prevent waste and exploit circular economy opportunities.	Medium employment, high carbon emission intensity per worker. Large opportunity for SGC to influence sector emissions. Medium opportunity for influencing employee wider behaviours through engagement with workplaces.	2
Electricity, gas, steam and air conditioning supply	The key challenge for the electricity and gas sector is to ensure an orderly transition to minimise financial risks to both consumers and the sector, including credit risks and market risks, and uneven distributional impacts if prices for renewables are high or perceived to be unaffordable.	Regulatory regimes, taxes and subsidies should reflect a prioritisation and support of renewable energy technologies over high carbon sources. Research and Innovation could support the sector in overcoming existing technological limitations of large-scale renewable schemes.	Low employment, high carbon emission intensity per worker. Small opportunity for SGC to influence direct sector emissions through encouragement of electric heating and on-site renewables. Larger opportunity if backed up by planning policy requirements. Large opportunity for influencing employee wider behaviours through engagement with workplaces. There is also an opportunity to work with training providers.	2

Sector	Key challenge	Key enabling processes	Importance of sector in South Gloucestershire	Priority for engagement in SGC 1 high, 4 low
Construction	The key challenge for the construction sector is to adopt a whole supply chain perspective to encourage the use of less carbon intensive material and reduce energy demands for electricity and heating purposes.	Fuller integration of environmental impacts during the design and manufacturing processes would minimise waste and emissions. Urban mining practices and Green Infrastructure would deliver benefits in terms of emissions reductions and increased resilience to climate change.	Medium employment, high carbon emission intensity per worker. Large opportunity for SGC to influence direct sector emissions. Medium opportunity for influencing employee wider behaviours through engagement with workplaces. Opportunity to support skills development / re-training for home energy efficiency retrofit and related installations. There is also an opportunity to work with training providers.	2
Wholesale and retail trade	The key challenge for the wholesale and retail sector is to account for embedded emissions and work with suppliers to address high carbon production, as well as working on behavioural change campaigns to encourage sustainable behaviours among customers.	Corporate Social Responsibility processes can be strengthened to integrate explicit carbon reduction targets in line with national and international targets. This means placing carbon data at the core of business and retail decisions and would enable customers to make more informed choice.	High employment, low-carbon emission intensity per worker. Small opportunity for SGC to influence direct sector emissions. Large opportunity for influencing employee wider behaviours through engagement with workplaces.	1

Sector	Key challenge	Key enabling processes	Importance of sector in South Gloucestershire	Priority for engagement in SGC 1 high, 4 low
Transport	The key challenge for the transport sector is to enable behaviour change and encourage sustainable and active travel without disproportionately affecting people from disadvantaged backgrounds.	Focus on non-technological measures to enable widespread behaviour change towards active and sustainable travel. Better integration between climate change actions and air quality management could deliver important co-benefits, including on public health.	Medium employment, high carbon emission intensity per worker. Large opportunity for SGC to influence direct sector emissions. Medium opportunity for influencing employee wider behaviours through engagement with workplaces. Opportunity to support skills development / re-training for home energy efficiency retrofit and related installations. There is also an opportunity to work with training providers.	1
Accommodation and food service activities	The key challenge for the sector is to reduce emissions from on-site energy use and, with regards to food-related activities, to minimise food waste and embed carbon accounting in menus to enable environmentally-conscious choices.	Embodied carbon emissions should be fully integrated in marketing materials and menus to enable more informed choices. Clear targets should be set and monitored, including during the design stage.	Medium employment, low- carbon emission intensity per worker. Small opportunity for SGC to influence sector emissions. Medium opportunity for influencing employee wider behaviours through engagement with workplaces. Opportunity to influence customer behaviour to support local sustainably produced food.	1

Sector	Key challenge	Key enabling processes	Importance of sector in South Gloucestershire	Priority for engagement in SGC 1 high, 4 low
Information and communication	The key challenge for the ICT sector is to reduce the carbon emissions across the supply chain, particularly during the manufacture and disposal stages. ICT could play a key role in driving down emissions in other sectors.	Minimising waste and enhancing circular economy practice will support achievement of net zero in ICT. This should be fully integrated into procurement processes.	Medium employment, low- carbon emission intensity per worker. Small opportunity for SGC to influence direct sector emissions. Medium opportunity for influencing employee wider behaviours through engagement with workplaces. Opportunity to raise awareness among businesses and residents of the digital emissions footprints and action that can be taken to minimise this.	3
Financial and insurance activities	The key challenge for the UK financial sector is to re-direct investments towards low carbon projects and infrastructure and to ensure that these are delivered in a socially just way that minimises potential adverse effects of low carbon transitions.	The sector should focus on green investments in infrastructure and innovation to support a low carbon economy more broadly while also adopting place-based approaches. The UK Government should integrate climate goals into financial regulations with clear targets for the sector.	Medium employment, low carbon emission intensity per worker. Small opportunity for SGC to influence direct sector emissions but can show leadership with the authority's own investment strategy. Medium opportunity for influencing employee wider behaviours through engagement with workplaces. Opportunity to engage with Avon Pension Fund to accelerate decarbonisation of the sectors invested in by the Fund.	3

Sector	Key challenge	Key enabling processes	Importance of sector in South Gloucestershire	Priority for engagement in SGC 1 high, 4 low
Real estate activities	The key challenge of the real estate sector is to push towards more energy efficient buildings and emphasise the role of energy performance certificates.	The use of energy performance certificates, especially in commercial buildings, should be enhanced. Stricter building standards and retrofitting the existing housing stock will support decarbonisation in the sector.	Low employment, low-carbon emission intensity per worker. Small opportunity for SGC to influence direct sector emissions. Small opportunity for influencing employee wider behaviours through engagement with workplaces.	4
Professional, scientific and technical activities/ Administrative and support service activities	The key challenge for the professional service, scientific, technical sector and for the administrative support sector is to ensure that people are enabled to switch from high to low carbon employment.	Investment in active and sustainable commuting are key to achieve carbon neutrality in the sector. The UK Government should conduct a skills audit to enable and support workers to move from high to low carbon employment.	High employment, low-carbon emission intensity per worker. Small opportunity for SGC to influence direct sector emissions. Large opportunity for influencing employee wider behaviours through engagement with workplaces.	1
Public administration and defence	The key challenge of the public administration and defence sector is to accelerate progress towards low carbon estate management and enhance sustainable procurement policies with a particular focus on monitoring compliance.	Circular economy principles must be fully deployed across the public and defence sectors, including in procurement activities. Monitoring compliance with mandatory Government sustainable procurement buying standards should be enhanced.	High employment, low-carbon emission intensity per worker. Small opportunity for SGC to influence direct sector emissions. Large opportunity for influencing employee wider behaviours through engagement with workplaces. Defence and defence related industries are a significant employer in South Gloucestershire and provides an opportunity for wider influencing of role and preparedness of the defence sector for a changing climate.	1

Sector	Key challenge	Key enabling processes	Importance of sector in South Gloucestershire	Priority for engagement in SGC 1 high, 4 low
Education	The key challenge for the education and higher education sector will be linked to improvements in energy efficiency in buildings and campuses and in tackling emissions from travelling to and from schools and campuses	The UK Government and local authorities should work together to strongly encourage active and sustainable travel to and from schools/campuses. This will result in significant co-benefits in terms of improved air quality and public health. Campuses and schools should collaborate to develop climate action toolkits that work for their contexts or make use of existing tools.	High employment, low-carbon emission intensity per worker. Small opportunity for SGC to influence direct sector emissions. Large opportunity for influencing employee and wide public behaviours through engagement with education settings and workplaces. Large opportunity to influence wider/future behaviour through resources developed for use in the curriculum.	1
Human health and social work activities	The key challenge for the health sector is to tackle energy emissions from buildings and transport emissions (people travelling to the NHS).	Focus on active travel and energy savings in buildings and operations.	Medium employment, low- carbon emission intensity per worker. Small opportunity for SGC to influence direct sector emissions. Medium opportunity for influencing employee wider behaviours through engagement with workplaces. SGC's public health role provides a significant opportunity for influencing behaviours and promoting active travel choices to improve health outcomes and reduce travel emissions.	2

Sector	Key challenge	Key enabling processes	Importance of sector in South Gloucestershire	Priority for engagement in SGC 1 high, 4 low
Arts, entertainment and recreation	The key challenge for the sector is to minimise the carbon footprint of events and tours by incorporating carbon accounting mechanisms in tour and event planning. Circular economy principles and sharing of equipment through collaborative schemes could also deliver carbon reduction benefits.	The sector should fully incorporate carbon accounting and circular economy principles into tour and event planning and should include consideration of how people travel to events. Collaborative schemes could enhance the sharing and re-use of equipment.	Low employment, low-carbon emission intensity per worker. Small opportunity for SGC to influence sector emissions. Low opportunity for influencing employee wider behaviours through engagement with workplaces. New leisure developments in South Gloucestershire, including the Arena, Wild Place and the Wave, provide an opportunity to influence public behaviours through partnerships with leisure and entertainment providers.	2

5. Step 3: Rising to the challenge of quicker territorial decarbonisation – what South Gloucestershire needs to do next

Table 8 presents actions for South Gloucestershire to mitigate territorial emissions.Committee in 2020.

Table 8. Action to accelerate territorial mitigation

BEIS territorial emission sector	Council action
Residential	Engage with and provide advice and support for residents about actions they can take to lower their footprint. Offer Climate and Nature Emergency training for residents, residents' groups, town and parish councils and other groupings. Advice and support about retrofit options to improve energy efficiency and reduce emissions. Engage with people from equality, diversity and lower socio-economic groups to identify risks and priorities for action to mitigate widening of the inequality gap caused by Climate and Nature Emergency impacts.
Commercial	Engage with and provide advice and support for businesses to assess their carbon footprint using standardised tools. Provide opportunity, via a web environment, for businesses to share footprint and good practices. Reinvigorate and extend the reach of the LSP to support the above. Offer Climate and Nature Emergency training to SMEs. Encouragement for on-site renewable electricity generation on rooftops of commercial premises. Encourage new green technology businesses and other sustainable businesses which contribute to anticipated future market demands, environmental solutions and local economic resilience.
Industrial	As above Encouragement for on-site renewable electricity generation, decarbonised heat supply and purchase of renewably generated electricity. Offer Climate and Nature Emergency training to industrial enterprises.
Public	Through its own actions and through the LSP to provide public sector demonstrations of mitigation actions in public building stock including on-site renewables, improved energy efficiency measures, biodiversity improvements and whole building retrofit.
Transport	Advice and support for active travel and improved public transport. Support for EV charging roll-out.

BEIS territorial emission sector	Council action
Agriculture	Integrate green infrastructure and nature recovery actions with decarbonisation and flood and drought risk management actions in the land use, agriculture and forestry sector.
Cross cutting	Ensure planning policy and transport strategy align with mitigation measures. Ensure climate and nature consideration are part of all council strategy and planning processes.

Table 9 sets out proposed actions for council functions and departments to embed Climate and Nature Emergency considerations within routine business and to address mitigation and adaptation requirements.

Table 9. Council action to accelerate mitigation and adaptation planning for a 4°C temperature rise by 2100

Function/Department	Action
Finance	Establish an annual carbon budget for departments alongside conventional budget. Develop the capacity to assess the climate risk associated with capital and revenue decisions and allocations, including the costs of impacts if no action is taken.
Planning	Foreground mitigation and climate risk adaptation into strategic planning functions and into development management functions. Ensure that the local plan embeds mitigation and adaptation as its guiding principles and land allocation proposals reflect the known and potential climate risks over the period to 2080. Work with WECA to ensure that the Spatial Strategy integrates mitigation and adaptation into the final plan. Identify suitable land for renewable energy development, wind and solar informed by the RERAS.[123] Review the council's suite of Supplementary Planning Documents to ensure they are aligned with adaption, resilience and mitigation of a changing climate. Review the Design Checklist Supplementary Planning Documents 2007 to include standards regarding whole-life carbon and materials resilience to temperature remelt points and combustion.[124] Consider a new 'Adaptation to the Changing Climate SPD' to include whole-life carbon, resilience to temperature of materials and overheating heating risk to optimise thermal comfort and health of occupants. Ensure a robust monitoring and compliance system is in place so that council policy is implemented and enforced.

[123] AECOM (2021) Renewable Energy Resource Assessment Study. Report for South Gloucestershire Council.
[124] South Gloucestershire Council (2007) The South Gloucestershire Design Checklist. Supplementary Planning Document. Available at: https://beta.southglos.gov.uk/static/4806903b71dd993a453c7f277ef3f633/Design-checklist-design-and-landscape-SPD.pdf

Function/Department	Action
Transport, strategic infrastructure and highways	Work with WECA to ensure that the Transport Strategy integrates mitigation and adaptation into the final plan. Identify the risks and associated costs of high temperatures regarding risk of melting and combustion points of materials used for existing and new infrastructure
Education and children's services	Emission reduction and mitigation from the school estate. Adaptation of the school estate. Offer Climate and Nature Emergency training to teachers. Consider how the development of skills and capabilities for the green economy can be infused across the formal and informal curriculum. Note the vulnerability of young people to rising temperatures, how is shade and ventilation to be provided across the school estate? Include this risk in emergency and resilience planning considerations. Address the rising prevalence of 'eco anxiety' linked mental health conditions, particularly among young people, and the evidenced benefits of engagement and agency in positive action and nature connection opportunities. The Department for Education has published its Sustainability and Climate Change Strategy.[125] The strategy sets out a range of ambitions for the Department to increase sustainability and climate awareness across its education remit including the school estate
Adult social care	Climate risk assessment of commissioning activities. Offer Climate and Nature Emergency training to care home staff. Develop an understanding of the suitability of care homes and other settings to address rising average temperatures, noting the enhanced vulnerability of the elderly to heat stress. Include this risk in emergency and resilience planning considerations. Prepare plans to respond to the anticipated increased numbers of displaced people (locally, nationally and globally) due to the changing climate and weather events including increased demand for emergency accommodation.
Public health	Climate risk assessment, plan development and implementation. How will a possible 4°C rise in the global average temperature affect South Gloucestershire? What risks will become manifest across the decades to 2100? Who is most affected by temperature rises and when? Identify fire risks. What additional risks become real with increased storm activity, high wind speeds and high rainfall intensity? Who and where will be affected by fluvial and pluvial flooding? How are these risks communicated and mitigated? Turn awareness into proactive engagement and plans to reduce risk.

[125] Department for Education (2022) Sustainability & Climate Change. A strategy for the education and children's services systems. Available at: https://www.gov.uk/government/publications/sustainability-and-climate-change-strategy

Function/Department	Action
Procurement	Through procurement processes request and require where appropriate supplier emissions data and mitigation action plans so as to understand the Scope 3 emissions of the council and to develop carbon accounting procedures to track such emissions.
Emergency planning	To develop understanding of the scale of likely impacts and to develop emergency response plans for identified risks including flooding, heat, fire and new disease vectors affecting people and new diseases affecting nature.
Other council communication services	Engage with LSP, other stakeholders and residents to promote Climate and Nature Emergency training. Prepare and deliver a Communications Plan including public information and awareness raising activities to encourage mitigation, energy efficiency and adaptation actions in the commercial, business and domestic sectors.
Avon Pension Fund	Pension contributions will contribute to the Scope 3 emissions of the council, engagement with pension providers to support decarbonisation of the portfolio. Ensure Pension trustees are properly trained in Climate and Nature Emergency issues and enabled to challenge investment decisions.

6. Discussion

Step 1. What the emissions gap would look like in 2030 and its composition

The emissions gap in 2030, in the absence of any additional action by South Gloucestershire Council, residents and enterprises, has been estimated as 500 to 665 kt of CO_2 with a mid-point of approximately 582 kt. A decarbonisation pathway calculated by Gale[126] based upon the long-term trend in the rate of emission reduction suggests that a continuation of mitigation actions at the pace and intensity seen over the past decade could reduce the emissions gap to some 330 kt.

Electrification of the national grid and improving energy efficiency in the **industrial and commercial sectors** will continue to put downward pressure on emissions from these sectors. Actions to increase the availability of renewably generated energy through planning policies, direct investment and encouragement for improved grid infrastructure are all necessary to support this sectoral decarbonisation strategy.

Transport emissions from ICE will reduce as EVs continue to penetrate the market with 2030 seeing the banning of new ICE vehicles.

HGVs, LDVs and PSVs present different mitigation challenges with LDVs suitable for electric motive power but the power requirements of HGVs may require a hydrogen solution and this is unlikely to be available at scale before 2030. In the period to 2030 any increase in vehicle kilometres driven will retard the rate at which emissions fall.

Actions to **promote active travel, enhance EV infrastructure and support the development of a hydrogen economy** are recommended for further decarbonisation in the transport sector.

Emissions from the **public sector** are a minor part of the current and 2030 emission profile. Grid decarbonisation and increased energy efficiency allied to a digital first strategy for electronic communications and transactions will continue to put downward pressure on this sector. Collaborations across public sector bodies can catalyse and drive wider changes in other sectors, sometimes directly (e.g. district heating infrastructure) and sometimes indirectly (e.g. through supply chain measures).

The **residential sector** is likely to be the largest contributor to the South Gloucestershire emission profile. UK homes are amongst the least energy efficient in Europe and the Energy and Climate Intelligence Unit reports that the average Energy Performance Certificate (EPC) rating is band D.[127] Upgrading the 1 million houses from EPC D to EPC C is estimated to lead to an average cut in natural gas demand of 20%.[128]

Grid decarbonisation will grow at pace over the period to 2030 with 2035 as the estimated point at which the grid becomes carbon free at the point of generation. The economy will become increasingly dependent upon electricity across the decade with significant demand growth as sectors formerly powered by fossil fuels, such as natural gas, switch to electricity. This pathway can be supported by local actions to encourage and support development of renewable energy across the area of South Gloucestershire. The domestic sector's challenge is complex, comprising supply and demand issues and financial elements. Improved energy efficiency and alternative sources of energy to substitute for natural gas or oil-fired heating are both needed. Government funded schemes to improve energy efficiency in the domestic sector have not been particularly successful.

[126] Gale, R. (2022) Net Zero: An Investigation of Best Practice Options for South Gloucestershire's Residual Emissions. MSc Environmental Management Dissertation, UWE Bristol.
[127] Energy and Climate Intelligence Unit (2022a) Insulation and gas prices. Available at: https://eciu.net/analysis/briefings/heating/insulation-and-gas-prices
[128] Energy and Climate Intelligence Unit (2022b) How to cut the UK's dependency on Russian gas… permanently. Available at: https://eciu.net/analysis/briefings/how-to-cut-the-uks-dependency-on-russian-gas-permanently

Awareness of such schemes needs to be increased, processes need simplification and implementation needs to be at a scale not yet seen. The conversion of the UK to natural gas in the late 1960s and 1970s provides an indication of the scale of change required. There is a risk that the workforce will insufficient to meet the scale of the retrofit challenge. SGC can stimulate the development of training and reskilling schemes to supply the skilled and capable workforce of tomorrow.

South Gloucestershire can support information and awareness-raising through its communication role, but the financial resources required for implementing at anything like the scale needed are beyond the scope of the council. Smaller scale demonstration projects exemplifying retrofit techniques, electrification and heat decarbonisation are within scope alongside encouragement of social housing providers and new build developers to retrofit or build to the highest standards of energy efficiency. Such schemes should be designed to be district heat network (DHN) ready where a DHN is planned, and to include ground or air source heat pumps alongside roof-mounted PV arrays.

In order to demonstrate leadership and commitment to a net zero South Gloucestershire the council should strive to deliver a net zero operation of the council estate and activities. This should encompass at least Scope 1 and 2 emissions and ideally Scope 3 (supply chain and upstream) emissions. The purpose of this recommendation is to enable the council to demonstrate leadership and to provide examples of how decarbonisation can be achieved in practice.

Step 2. Assessment of South Gloucestershire Council activities against the recommendations for local authorities Identified in the Sixth Carbon Budget Report of December 2020

Table 5 above has reviewed the nine actions recommended for local authorities in the Sixth Carbon Budget report. In each of these areas, South Gloucestershire Council has undertaken actions to implement the recommendations. However, the review found that in order to make significant progress towards the 2030 goal South Gloucestershire Council should enhance its actions in seven areas. Each of these areas requires staff resource and revenue budget if the decarbonisation opportunity is to be realised. Mechanisms for identifying, monitoring and reporting the carbon savings associated with the implementation of actions in each area should be developed.

1. Review division and department policies, plans and strategies to ensure alignment of actions and spending with mitigation and adaptation requirements.
2. Ramp up the training and capacity building offer within the authority and across the district.
3. Build further institutional capacity to innovate and scale up mitigation and adaptation actions.
4. Enhance collaborative actions with WECA and neighbouring authorities and other partners to harmonise actions and spending power.
5. Develop institutional expertise and understanding of green finance to enable a proactive response to new opportunities.
6. Ramp up internal and external engagement and information campaigns to inform, enable and inspire public understanding and action on mitigation and adaptation.
7. Further engage with the Avon Pension Fund to accelerate progress towards a net zero investment strategy.

Step 3. Council leadership and next steps

The council can use its leadership role to enable and inspire local residents to engage in the decarbonisation agenda through switching to low/zero carbon fuels, improving home energy efficiency and to engage in active travel. Communications can also include advice on adaptation measures such as shading, cooling and to support nature recovery through the use of green/blue infrastructure as part of adaptation to a riskier future climate. In parallel with these information/education initiatives the council should re-engineer its decision-making processes to place mitigation and adaptation considerations at the heart of policy by using decision support techniques such as the Cornwall Decision Wheel.[129]

The council can contribute by providing a shop front for domestic decarbonisation to channel demand and give confidence to the supply chain, supporting residents to get bespoke and trusted advice on home energy retrofit which might include vetting of suppliers and supporting supplier training. The council can exert influence across a number of scales. It can lobby with others to influence central government to accelerate decarbonisation implementation. The council could offer to be a location for demonstrating and exemplifying mitigation and adaptation projects and provide workshops and information sessions for community groups.

The council can work with WECA to ensure the Spatial Development Strategy and the Transport Strategy fully embraces the mitigation agenda. Developing a skilled work force for the green economy is an essential prerequisite for deploying the technologies required for decarbonising and adaptation. Collaboration with neighbouring authorities can bring economies of scale through joint projects, co-funding and cross border initiatives in, for example decarbonising heat through a shared DHN.

Without further action South Gloucestershire will likely have an emission of some 500–600 kt of CO_2 in 2030. The decarbonisation trajectory projected from the rate of decline in recent years suggests that it may be possible to remove a further 250 kt of CO_2 in 2030 through targeted local actions.

Such actions might include some or all of the initiatives set out in Table 10 on the following page.

[129] Cornwall Council (ND) Cornwall Decision Wheel
Available at: https://www.cornwall.gov.uk/media/43hpmphv/decision-making-wheel-flier.pdf

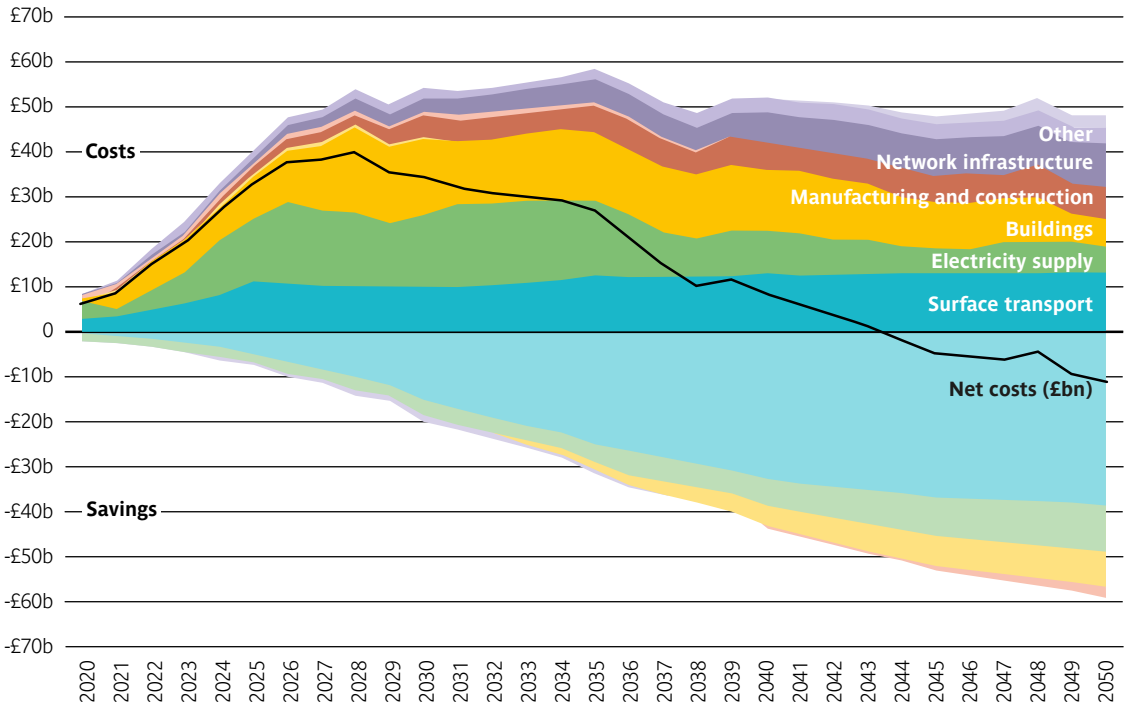
Table 10. Potential local actions to accelerate decarbonisation

Theme	Possible development
Heat network	Joint ventures with partners to offer heat as a service to existing homeowners.
Financing	Share the risk of developing renewable energy assets through the establishment of a Joint Venture with a range of partners, the creation of community energy companies and direct investment.
Financing	Catalyse investment, grants and loans to resolve grid capacity bottlenecks to facilitate new renewable energy capacity.
Financing	As part of the above or separately, the creation of an Energy Supply Company (ESCO) to focus on the provision of energy assets and the retailing of the energy via Power Purchase Agreements to specific consumers.
Home retrofit	Supported by the proceeds from the ESCO the substantial expansion of the council handyman service to provide elements of energy retrofit and expert services supporting/providing advice to Housing Associations and contractors doing retrofit work, insulation, renewable energy installations etc., capitalising on the council's reputation as a trusted provider.
Heat network	Delivery and ownership either directly or via an SPV of the assets required for the delivery of strategic heat networks.
Demonstration projects	Create a policy and planning framework to support deployment of innovative schemes and technologies for net zero.
Nature recovery	Creation of a bank of investable solutions for Biodiversity Net Gain and carbon offsetting/Insetting with the use of hypothecated revenues to fund land acquisition.
Bioenergy	Direct investment into the treatment of biogenic waste via anaerobic digestion to support the retailing of energy services under the ESCO or SGC's own operational needs.
Green hydrogen	Direct investment into green hydrogen generation from renewables to supply fuel to support the retailing of energy services under the ESCO or SGC's own operational needs such as refuelling.
District heat network	Joint pilot with City Leap in northern fringe rolling out heat network in existing residential areas with heat from a heat network.
Heat source	Via the Coal Authority explore the heat resource available in abandoned coal mines and develop schemes to progress promising sites to pilot and demonstration projects.
Heat	Prioritise economic development to identify strategic sites for uses with high heat reject to serve heat networks.
Home retrofit supply chain	Provide support to enable the industrialisation of the whole house retrofit supply chain

Paying for net zero

The Institute for Government[130] reviewed the costs of net zero and whilst noting the upfront investment required will be substantial, it also recognised the long-term savings will be substantial. The Climate Change Committee[131] estimates that the cost of net zero will be about £50 bn per year by the late 2020s continuing at that rate until 2050 with the majority of spending going on transport, renewables and buildings.

Figure 9. Capital and operation expenditure to get the UK to net zero



Source: Climate Change Committee, *The Sixth Carbon Budget - Dataset*, 9 December 2020
Note: Darker colours represent CAPEX, lighter colours represent OPEX. Values are a three-year rolling average of in-year costs. "Other" includes aviation, shipping, LULUCF, agriculture, removals, waste and F-gases. Costs of electricity are included in the energy supply esctor, other low-carbon fuels such as hydrogen and bioenergy are included in the respective sectors which use those fuels.

From Institute for Government. Paying for Net Zero[130]

By the late 2030s this extra capital investment will be offset by reductions in operational spending. Other analyses have come to broadly similar conclusions. In a July 2021 report on fiscal risks, the Office for Budget Responsibility[132] estimated a net cost of the UK reaching net zero by 2050 to be £321bn, or just over £10bn per year. Costs of around £1.4trn are offset by savings estimated at £1.1trn. The OBR noted that delaying action would increase costs, while losing control of climate change would increase them many times over.

[130] Institute for Government (ND) Paying for Net Zero.
Available at: https://www.instituteforgovernment.org.uk/explainers/paying-net-zero
[131] Climate Change Committee (2020) The Sixth Carbon Budget.
Available at: https://www.theccc.org.uk/publication/sixth-carbon-budget/
[132] Office for Budget Responsibility (2021) Fiscal risks Report July 2021. Available at: https://obr.uk/frr/fiscal-risks-report-july-2021/

The DBEIS impact assessment[133] estimated that the UK's net zero target offered a net benefit to society of £266bn over 30 years. The Institute for Government reported that in all of the pathways set out by the Climate Change Committee,[134] the cost of reaching net zero is less than 1% of GDP per year, before benefits are counted. As noted earlier, the UK housing stock is amongst the least energy efficient in Europe with an average EPC rating of D.[135] The Climate Change Committee, in their analysis of buildings prepared for the Sixth Carbon Budget, has estimated that around two thirds of UK housing stock could have major energy efficiency improvements for as little as £1,000 per property.[136]

Government will need to lead a nationwide investment programme but government expects that most of the investment will be funded and delivered by the private sector or individuals. Public money will need to be used in a targeted way to unlock private investment and meet costs that the private sector is unlikely to meet. The UK Net Zero Strategy[137] sets out a suite of policies, regulations and government capital investments that will leverage up to £90bn of private investment by 2030 to develop skills, create green jobs and support the net zero pathway. The Institute for Government notes that the costs will fall on three areas, on taxpayers, on consumers and on businesses.

What share of the late 2020s annual £50 billion of costs might fall to South Gloucestershire? This is difficult to estimate with any precision or accuracy but three simple calculations can illustrate the scale of costs.

South Gloucestershire's population[138] is 0.42% of the UK's[139] 67.1 million.

South Gloucestershire's emissions are 0.25% of the UK's.

South Gloucestershire's GDP[140] at £12,865 m (2018) is 0.57% of the UK's[141] £2,218,196 m.

In this simple estimate an annual cost of 0.25% – 0.57% of £50bn might be expected to fall on South Gloucestershire's residents and enterprises. This is equal to £125 m – £285 m at 2021 prices. It is also useful to consider the cost of offsetting residual CO_2 emissions. UK-based accredited woodland offset schemes conservatively are likely to cost between £10 and £50 per tonne offset. In this case the offset would require the purchasing of carbon credits from accredited woodland schemes. With potentially 582 kt requiring compensation in 2030 the offset cost at current prices will be between £5.8 and £29.1m.

The distribution of the costs of mitigation and offsetting and how they may be met is beyond the scope of this report but the numbers are included for illustration of the scale of effort that will be required in the latter years of this decade. The scale of these costs needs to be considered in relation to the cost of damage expected to occur under a changed climate. Many of the mitigation and adaptation measures can be considered 'low regret' as they lead to improved living standards, reduced health inequalities and better ecological health and energy security.

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[133] DBEIS (2021) Impact Assessment for the Sixth Carbon Budget.
Available at: https://www.legislation.gov.uk/ukia/2021/18/pdfs/ukia_20210018_en.pdf
[134] Climate Change Committee (2020) The Sixth Carbon Budget.
Available at: https://www.theccc.org.uk/publication/sixth-carbon-budget/
[135] Energy and Climate Intelligence Unit (2022a) Insulation and gas prices.
Available at: https://eciu.net/analysis/briefings/heating/insulation-and-gas-prices
[136] Climate Change Committee (2020) The Sixth Carbon Budget. Buildings.
Available at: https://www.theccc.org.uk/wp-content/uploads/2020/12/Sector-summary-Buildings.pdf#page=48
[137] UK Government (2021) Net Zero Strategy: Build Back Greener. Department for Business, Energy & Industrial Strategy. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1033990/net-zero-strategy-beis.pdf
[138] South Gloucestershire Council (ND) Key Facts and Figures.
Available at: https://www.southglos.gov.uk/council-and-democracy/census/key-facts-and-figures/
[139] Office for National Statistics (2021) Population estimates for the UK, England and Wales, Scotland and Northern Ireland: mid 2020.
Available at: https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/bulletins/annualmidyearpopulationestimates/latest
[140] South Gloucestershire Council (ND) Council Plan 2020-2024
Available at: https://beta.southglos.gov.uk/publications/council-plan-2020-2024/council-plan-2020-2024
[141] Statista (ND) Gross domestic product of the United Kingdom from 1948 to 2021
Available at: https://www.statista.com/statistics/281744/gdp-of-the-united-kingdom/

The government has conducted an assessment of the risks that climate change poses to multiple parts of society and economy. For just eight individual risks, economic damages could exceed £1bn per year each by 2050 with a temperature rise of 2°C, with the cost of damage in the UK due to climate change rising to at least 1% of GDP by 2045.[142] It is questionable whether or not the global increase in temperature can be kept to just 2°C. If not, economic damage due to climate change could be significantly larger.

[142] UK Government (2022) Government publishes UK's Third Climate Change Risk Assessment. Defra. Available at: https://www.gov.uk/government/news/government-publishes-uks-third-climate-change-risk-assessment

7. Conclusions

In order to realise the ambition of South Gloucestershire's Climate Emergency Declaration requires a cross-council, cross-area integrated approach to climate mitigation and adaptation in all the actions of the authority and across communities. Keeping within just a 1.5°C global temperature rise by the end of the century remains a challenging target and requires renewed vigour in mitigation action. The IPCC 6th Report and the UK CCRA3 report provide worrying examples of a changing climate with the CCRA3 recommending planning for a 4°C temperature rise by 2100. Local communities are already beginning to experience the impacts of a changing climate and this will in time impact on the council's ability to deliver services, on council costs and the need for support from the council from residents and businesses will increase. These changes will affect transport networks and utilities, food and water supplies, health and wellbeing and access to basic needs. Many young people in school in South Gloucestershire today can expect to live until they are 80 years old, and will experience the increasing impacts of a changing climate across their life course.

Plan 2030 must set the conditions for accelerating action to reduce greenhouse gas emissions, address mitigation challenges and to raise awareness and drive forward action on adaptation.

First and foremost, South Gloucestershire Council needs to build on its Climate and Nature Emergency work and plans by increasing capacity to embed the actions within routine council activities and to extend this to all stakeholder engagements and other forms of communication. It is an emergency and the response of the authority must be to treat the issue as a real and present emergency. This requires alignment of policies, strategies, plans and funding decisions with the goals and timescale of the Climate Emergency declaration. It is worth noting that the council's direct contribution to territorial emissions is only about 1% of the 2019 emission total but excludes Scope 3 emissions.

The council's strongest opportunity and scope for action is its ability to influence, lead, enable and inspire residents and enterprises to take decarbonisation and adaptation actions. If it is willing to fully exercise these capabilities and to effectively integrate climate mitigation and adaptation into all aspects of its core business then South Gloucestershire Council has the opportunity to become a UK leader in its integrated, systematic and strategic response to the Climate and Nature Emergency.

8. Recommendations for Council next steps

Table 11. Recommendations

Issue to be addressed	Recommended action
Ambitious and disruptive actions	Innovative ideas and solutions are needed to really drive down emissions. The council has the ambition and some of the powers to implement radical and disruptive actions to achieve change but to do so will require a willingness to act and additional resources of capital, revenue and staff. Actions in Table 10 include initiatives to develop financial mechanisms to accelerate adoption of decarbonisation activities, development of heat networks, support for home retrofit and the development of large scale retrofit supply chains, actions to support nature recovery and the production and use of bioenergy and green hydrogen. These are ambitious initiatives that go beyond the current scope of business as usual.
Green economic development	Work with existing local business leaders and new businesses to progress and pioneer new green technologies and services which delivers climate solutions –and will boost and future proof the local economy. Progress development of new mechanisms to draw in and scale up external green investment funding.
Internal training	Expand internal training to build awareness and increase capability within the authority and across the district.
Training offer to South Gloucestershire residents and enterprises	Expand the offer of training across the district targeting major employers, schools, town and parish councils, residents association, and places of worship, scouts and guides charities and community groups.
Communication and information campaigns	Re-engineer communication and information campaigns to build awareness of mitigation and adaptation needs and direct residents and enterprises to where support can be found. Engage with LSP, other stakeholders and residents to promote Climate and Nature Emergency training. Prepare and deliver a communications plan including public information and awareness raising activities to encourage mitigation, energy efficiency and adaptation actions in the commercial, business and domestic sectors.
Council policies, plans and funding allocations	The council must align its policies, plans and funding to support the Climate and Nature Emergency through all of its service delivery and back office functions.

Issue to be addressed	Recommended action
Finance	Work with the Climate Emergency team to establish an annual carbon budget for departments alongside conventional budget. Develop the capacity to assess the climate risk associated with capital and revenue decisions and allocations.
Collaboration with neighbouring authorities, WECA and other agencies	Enhance collaborative action and share good practices with neighbouring single tier authorities and the combined authority to share costs and to drive forward mitigation and adaptation actions.
Lobbying central government	Engage with central government departments to promote South Gloucestershire as a location for pilot and demonstration projects for mitigation and adaptation action and for green job providing enterprises.
Procurement	Embed Climate and nature Emergency issues into procurement processes. Use procurement processes to request, and require where appropriate, supplier emissions data and mitigation action plans so as to understand the Scope 3 emissions of the council and to develop carbon accounting procedures to track such emissions.
Land use planning	Planning and transport policies and strategies need to be re-engineered to place mitigation and adaptation at the heart of the decision-making process. Business as usual is no longer an option. Planning land use policies must favour new renewable energy developments –wind, solar and small-scale hydro. Ensure that the local plan embeds mitigation and adaptation as its guiding principles and land allocation proposals reflect the known and potential climate risks over the period to 2080. Work with WECA to ensure that the Spatial Strategy integrates mitigation and adaptation into the final plan. Identify suitable land for renewable energy development, wind and solar informed by the RERAS . Review the council's suite of supplementary planning documents to ensure they are aligned with adaption, resilience and mitigation of a changing climate. Ensure that Biodiversity Net Gain requirements, Nature Recovery Networks and Green and Blue Infrastructure priorities and opportunities are considered at the heart of local plan place making, development and decision- making.

Issue to be addressed	Recommended action
Transport, strategic infrastructure and highways	Work with WECA to ensure that the Transport Strategy integrates mitigation and adaptation into the final plan including implementation of Biodiversity Net Gain. Identify the risks and associated costs of high temperatures regarding risk of melting and combustion points of materials used for existing and new infrastructure. Planning and transport policies and strategies need to be re-engineered to place mitigation and adaptation at the heart of the decision-making process. Business as usual is no longer an option. Highways policies must promote active travel and support the rapid development of charging infrastructure. Ensure that Biodiversity Net Gain requirements, Nature Recovery Networks and Green and Blue Infrastructure priorities and opportunities are considered at the heart of Transport, strategic infrastructure and highways plans and decision-making. Workplace parking levy and public car park charging hypothecating revenue for climate and energy projects.
Net zero building policy	The council should work jointly with the other West of England authorities to produce a set of local planning policies that are aligned, and ensure that all new development, both residential and non-residential, follows the principles of the energy hierarchy and minimises energy demand through fabric energy efficiency measures and then meets all residual energy demand through renewable energy technologies. No use of on-site fossil fuel should be permitted in new developments, and on-site renewable energy generation should be maximised, at least matching the residual energy demand on site. Achieving energy neutral (or even energy positive) development would mean that all new development would be net zero carbon (in terms of operational carbon emissions). Policies should also require embodied carbon emissions to be minimised where possible, and set targets for this to be achieved, ideally aiming for net zero embodied carbon by 2030
Education and children's services	Climate awareness and action opportunities for schools. Emission mitigation from the school estate. Adaptation of the school estate. Offer Climate and Nature Emergency training to teachers Consider how the development of skills and capabilities for the green economy can be infused across the formal and informal curriculum. Note the vulnerability of young people to rising temperatures, how is shade and ventilation to be provided across the school estate? Address the rising prevalence of 'eco anxiety'-linked mental health conditions, particularly among young people, and the evidenced benefits of engagement and agency in positive action opportunities.

Issue to be addressed	Recommended action
Adult social care	Climate risk assessment of commissioning activities. Offer Climate and Nature Emergency training to care home staff. Develop an understanding of the suitability of care homes and other settings to address rising average temperatures, noting the enhanced vulnerability of the elderly to heat stress. Prepare plans to respond to the anticipated increased numbers of displaced people (locally, nationally and globally) due to the changing climate and weather events including increased demand for emergency accommodation.
Public health	Climate risk assessment, plan development and implementation. How will a possible 4°C rise in the global average temperature affect South Gloucestershire? What risks will become manifest across the decades to 2100? Who is the most affected by temperature rises and when? Identify fire risks. What additional risks become real with increased storm activity and high rainfall intensity? Who and where will be affected by fluvial and pluvial flooding? How are these risks communicated and mitigated? Turn awareness into proactive engagement to reduce risk
Emergency planning	Develop understanding of the scale of projected impacts and develop emergency response plans for identified risks including flooding, heat and fire.
The council estate	Enhance mitigation efforts through energy efficiency measures. Accelerate fleet conversion to non-fossil fuels. Move to renewable energy supply. Develop further renewable energy supply sources. Increase adaptation measures including green/blue infrastructure to increase cooling, shading and flood/drought resilience. Adapt the estate as a demonstrator thereby encouraging confidence within the supply chain.
Staff	In order to deliver these actions and achieve council ambitions and commitments across service areas, more staff resource is urgently needed. By having the capacity in place now to progress these actions the council can reduce the costs of impacts from the changing climate locally and be better placed to proactively draw in external funding through bids and new green investment mechanisms.
Avon Pension Fund	Pension contributions will contribute to the Scope 3 emissions of the council, engage with pension providers to advance decarbonisation of the portfolio. Ensure pension trustees are properly trained in Climate and Nature Emergency issues and enabled to challenge investment decisions.

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Glossary, definition of terms and abbreviations

Term	Definition
Adaptation	The process of adapting to a changed climate, i.e. extreme heat, flooding, etc. by reducing the severity of the impact through protective measures or reducing the vulnerability of people or infrastructure to the change.
Carbon	Carbon is sometimes used as a shorthand for referring to CO_2, or greenhouse gases. It can be used to express CO2 emissions in terms of the amount of carbon in CO_2. The atomic weight of a carbon atom is 12 and the atomic weight of oxygen is 16, so the total atomic weight of CO_2 is 44 (12 + (16 * 2) = 44). A quantity of CO_2 can be expressed in terms of the amount of carbon it contains by multiplying the amount of CO_2 by 0.27 (12/44). Thus 1 kg of CO_2 can be expressed as 0.27 kg of carbon. From https://ecometrica.com/white-papers/greenhouse-gases-co2-co2e-and-carbon-what-do-all-these-terms-mean
Carbon neutral	An entity is carbon neutral where emissions of carbon are eliminated or more likely are balanced by removal of an equivalent amount elsewhere.
CCC	Climate Change Committee.
CIL	Community Infrastructure Levy.
CO_2	Carbon dioxide. CO_2 is sometimes inaccurately used as a shorthand expression for all greenhouse gases.
CO_2e	When referring to GHGs collectively the term carbon dioxide equivalent or CO_2e should be used. CO_2e describes different greenhouse gases in a common unit. For any quantity and type of greenhouse gas, CO_2e signifies the amount of CO_2 which would have the equivalent global warming impact. A quantity of GHG can be expressed as CO_2e by multiplying the amount of the GHG by its Global Warming Potential (GWP). CO_2e allows mixtures of greenhouse gases to be expressed as a single number; and it allows different mixtures of GHGs to be easily compared.
COP	Conference of the Parties to the UNFCCC. See https://ukcop26.org/uk-presidency/what-is-a-cop/
EV	Electric Vehicle.
GHG	Greenhouse Gas.
GHGP	Greenhouse Gas Protocol, the GHGP, provides accounting and reporting standards, guidance and calculation tools to measure progress towards net zero or climate neutrality. https://ghgprotocol.org/
ICE	Internal Combustion Engine.
IPCC	Intergovernmental Panel on Climate Change, the IPCC is the UN body responsible for assessing the science related to climate change.

Term	Definition
Kyoto Protocol	The UN Kyoto Protocol operationalises the United Nations Framework Convention on Climate Change (UNFCC) by committing industrialised countries and economies in transition to limit and reduce greenhouse gas (GHG) emissions in accordance with agreed individual targets. The Convention itself only asks those countries to adopt policies and measures on mitigation and to report periodically. https://unfccc.int/kyoto_protocol The Kyoto Protocol covers seven GHGs: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons s(HFCs), perfluorocarbons (PFCs), Sulphur hexafluoride (SF_6), and nitrogen trifluoride (NF_3). https://naei.beis.gov.uk/overview/ghg-overview
LULUCF	Land Use, Land-Use Change and Forestry https://unfccc.int/topics/land-use/workstreams/land-use--land-use-change-and-forestry-lulucf
Mitigation	The reduction or avoidance of emissions of GHGs through fuel switching, energy efficiency or similar measures which achieve the same effect. Mitigation is also used to describe measures to enhance the sinks which sequester greenhouse gases.
(ND)	No Date.
Net zero	Net zero refers to all greenhouse gases covered in the Kyoto Protocol and is achieved when emissions of GHGs to the atmosphere are balanced by removals of GHGs from the atmosphere. Removal of GHGs occurs when plants and soil sequester carbon or via carbon being extracted from emissions by carbon capture, usage and storage technologies.
Offsetting	The process of compensating for GHG emissions from human activity by schemes designed to remove an equivalent amount of GHGs from the atmosphere, e.g. by sequestration such as tree planting, or by schemes designed to remove GHGs before release to the atmosphere, e.g. by installation of more efficient combustion technology or pollution control equipment.
Resilience	The ability of humans, built environments and natural environments to withstand and respond to future climate change.
Sequestration	The process of removing carbon from the atmosphere and storing it in carbon sinks such as plants, the soil or the oceans.
Scope 1	The GHGP defines Scope 1 emissions as direct emissions from owned or controlled services such as vehicle use or fuel combustion.
Scope 2	The GHGP defines Scope 2 emissions as the indirect emissions from the generation of purchased electricity, steam, heating and cooling consumed by the reporting entity.
Scope 3	The GHGP defines Scope 3 emissions as all other indirect emissions associated with the reporting entity's footprint including upstream and downstream activities.
UNFCC	The United Nations Framework Convention on Climate Change (UNFCC) entered into force on 21 March 1994. Today, it has near-universal membership. The 197 countries that have ratified the Convention are called Parties to the Convention. Preventing 'dangerous' human interference with the climate system is the ultimate aim of the UNFCCC. https://unfccc.int/process-and-meetings/the-convention/what-is-the-united-nations-framework-convention-on-climate-change
Zero carbon	Where no GHG emissions take place from a specified entity, e.g. from a residence, firm, city or nation.

Addendum

Climate Change 2022: Mitigation of Climate Change. Working Group III contribution to the IPCC Sixth Assessment Report[144]

The IPCCC WG III report was published after Plan 2030 was finalised. The conclusions of WGIII simply add greater urgency to the conclusions of that report.

The WG III report clearly states that limiting global warming will require ***major transitions across all sectors of society*** but that this can be achieved with only a small reduction in Global Gross Domestic Product in 2050 if the actions necessary to limit warming to 2°C or below are taken, compared to maintaining current policies. This conclusion does not take into account the economic benefits of reduced adaptation costs or avoided climate impacts.

In 2010–2019 average annual global greenhouse gas emissions were at ***their highest levels in human history,*** but the rate of growth has slowed. However, without immediate and deep emissions reductions across all sectors, ***limiting global warming to 1.5°C*** is beyond reach. Greenhouse gas emissions must peak before 2025, at the latest, and reduce by nearly half by 2030 if warming is to be limited to just 1.5°C. Emissions of methane must be reduced by about a third. This will require a major transition in the energy sector with fossil fuel use substantially reduced, wide scale adoption of electrification and much improved energy efficiency measures alongside increasing availability of alternative fuels.

The report identifies a critical role for urban areas in reducing emissions. The report highlights opportunities to improve energy consumption and efficiency, transport sequestration and planning measures to enhance nature-based solutions for carbon sequestration.

The good news is that global temperature will stabilise when carbon dioxide emissions reach net zero and this must be achieved in the early 2050s. This assessment shows that limiting warming to around 2°C still requires global greenhouse gas emissions to peak before 2025 at the latest, and be reduced by a quarter by 2030.

The assessment concludes that the evidence is clear, the time for action is now.

[144] IPCC, 2022: Climate Change 2022: Mitigation of Climate Change. Contribution of Working Group III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [P.R. Shukla, J. Skea, R. Slade, A. Al Khourdajie, R. van Diemen, D. McCollum, M. Pathak, S. Some, P. Vyas, R. Fradera, M. Belkacemi, A. Hasija, G. Lisboa, S. Luz, J. Malley, (eds.)]. Cambridge University Press, Cambridge, UK and New York, NY, USA. doi: 10.1017/9781009157926
https://www.ipcc.ch/report/ar6/wg3/

The UK Energy Security Strategy[145]

The strategy was published after Plan 2030 was finalised. The strategy might perhaps better be described as an energy supply strategy.

The strategy outlines plans for a substantial increase in nuclear power with a goal of eight new reactors providing 24 GW of power by 2050. Offshore wind capacity, currently 10.4 GW, is now expected to reach 50 GW by 2030. Solar PV capacity is planned to increase fivefold by 2035, up from the current 14 GW capacity. This in part will be achieved by easing the rules for installation on domestic and commercial rooftops and strengthening policy for ground mounted arrays in favour of development on non-protected land.

10 GW of hydrogen production is planned by 2030, half produced by renewable electricity, the rest from fossil fuel.

A new Heat Pump Investment Accelerator Competition worth £30m is proposed with the aim of encouraging UK heat pump manufacturing capability and capacity.

The strategy also proposes further licensing for offshore oil and gas projects although it is not clear how this is compatible with the net zero legal requirement.

Disappointingly, the strategy has little to say about energy efficiency and home retrofit schemes which many see as a relatively quick, efficient and effective way to address energy security concerns, fuel poverty and net zero ambitions.

End of document.

JWS Longhurst

13 April 2022

[145] British Energy Security Strategy
https://www.gov.uk/government/publications/british-energy-security-strategy/british-energy-security-strategy

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