



Winchester City Council

CARBON NEUTRALITY ROADMAP

A Roadmap to Carbon Neutrality for Winchester District by 2030



Winchester
City Council

OCTOBER 2022



TYPE OF DOCUMENT (VERSION) PUBLIC

PROJECT NO. 70096193

DATE: OCTOBER 2022

WSP

4th Floor

6 Devonshire Square

London

EC2M 4YE

Phone: +44 20 7337 1700

Fax: +44 20 7337 1701

WSP.com



CONTENTS

EXECUTIVE SUMMARY	9
KEY FINDINGS	9
1 INTRODUCTION	1
1.1 THE REPORT IS STRUCTURED AS FOLLOWS:	2
1.2 PURPOSE OF THE ROADMAP TO CARBON NEUTRALITY	2
1.3 CLIMATE CHANGE	3
1.4 NATIONAL CONTEXT	4
1.5 HAMPSHIRE COUNTY COUNCIL	5
2 STAKEHOLDER ENGAGEMENT	8
2.1 PURPOSE OF THIS SECTION	8
2.2 INTRODUCTION	8
2.3 APPROACH TO STAKEHOLDER ENGAGEMENT	8
2.4 SUMMARY OF FINDINGS FROM ENGAGEMENT	8
3 CARBON NEUTRALITY METHODOLOGY	12
3.1 PURPOSE OF THIS SECTION	12
3.2 INTRODUCTION	12
3.3 DATA COLLECTION	12
3.4 APPROACH FOR THE ESTIMATION OF CARBON EMISSIONS	12
3.5 SUMMARY OF THE METHODOLOGICAL APPROACH FOR CARBON NEUTRALITY ROADMAP	14
3.6 CARBON IN HABITATS METHODOLOGY	19
4 WINCHESTER DISTRICT ENERGY CONSUMPTION AND EMISSIONS ANALYSIS	21



4.1	PURPOSE OF THIS SECTION	21
4.2	WINCHESTER ENERGY USE	21
4.3	WINCHESTER CARBON EMISSIONS	23
4.4	BUSINESS-AS-USUAL (BAU) FORECAST	25
5	REVIEW OF CNAP AND DISTRICT-WIDE POLICIES	27
5.1	PURPOSE OF THIS SECTION	27
5.2	ENERGY SECTOR	27
5.3	TRANSPORT SECTOR	30
5.4	BUILDINGS SECTOR	33
5.5	WASTE AND RECYCLING SECTOR	35
5.6	LAND USE AND BIODIVERSITY	36
5.7	IMPACT OF CURRENT ACTIONS IN THE CLIMATE NEUTRALITY ACTION PLAN	38
6	CARBON NEUTRALITY ROADMAP	40
6.1	PURPOSE OF THIS SECTION	40
6.2	EMISSIONS REDUCTION IMPACT OF NEW INTERVENTIONS	40
6.3	CARBON NEUTRALITY ROADMAP DIAGRAM	41
6.4	ACTION SUMMARY MATRIX TABLE	43
6.5	DOMESTIC INTERVENTIONS	48
6.6	COMMERCIAL INTERVENTIONS	54
6.7	INDUSTRIAL INTERVENTIONS	60
6.8	TRANSPORT INTERVENTIONS	64
6.9	LAND-USE INTERVENTIONS	75
6.10	WASTE INTERVENTIONS	79
6.11	CARBON IN HABITATS ASSESSMENT	81
7	ECONOMIC COST OF CARBON EMISSIONS REDUCTION	86
7.1	PURPOSE OF THIS SECTION	86
7.2	DESCRIPTION OF THE ANALYSIS AND HOW TO READ A MACC CURVE	86
7.3	KEY FINDINGS FROM THE ANALYSIS	87

8	RECOMMENDATIONS	90
<hr/>		
8.1	HIGH LEVEL RECOMMENDATIONS FOR PURCHASING OFFSETTING CREDITS	90
8.2	RECOMMENDATIONS FOR ENABLING MECHANISMS, FEASIBILITY STUDIES AND FURTHER RESEARCH	90
9	CONCLUSIONS	94
<hr/>		
APPENDIX A: BEST PRACTICE CASE STUDIES		95
<hr/>		
9.1	INTRODUCTION	95
9.2	RETROFIT & ENERGY EFFICIENCY	95
9.3	15-MINUTE NEIGHBOURHOODS	95
9.4	INDUSTRIAL & COMMERCIAL ENERGY	96
9.5	NATURAL CAPITAL	97
9.6	TRANSPORT	99
9.7	ENERGY	101
9.8	PENSIONS	103
9.9	WASTE MANAGEMENT	104
<hr/>		
APPENDIX B: LIST OF DOCUMENTS REVIEWED		105
<hr/>		
—	LIST OF DATA SOURCES	105
—	SUMMARISING POLICY REVIEW WORK	110
<hr/>		
APPENDIX C – CARBON IN HABITATS TOOL		112
<hr/>		
APPENDIX D: MODELLING OVERVIEW		116
<hr/>		
TABLES		
	Table 1-1 - Defining Carbon Neutrality and Net Zero Targets	4
	Table 2-1 - Summary of Stakeholder Engagement (Interviews and Workshops)	9
	Table 3-1 - Fuel Types and Consuming Sectors Included in the Subnational Total Final Dataset	13
	Table 3-2 – Description of Scenarios levels for Roadmap Interventions	16



Table 4-1 – Carbon Dioxide Emissions for Winchester District in 2019. Source: WSP with data from BEIS.	25
Table 5-1 - Energy Sector Actions included in the Climate Neutrality Action Plan 2020-2030	27
Table 5-2 - Transport Sector Actions included in the Climate Neutrality Action Plan 2020-2030	30
Table 5-3 - Building Sector Actions included in the Climate Neutrality Action Plan 2020-2030	33
Table 5-4 - Waste and Recycling Sector Actions included in the Climate Neutrality Action Plan 2020-2030	35
Table 5-5 - Land Use and Biodiversity Sector Actions included in the Climate Neutrality Action Plan 2020-2030	36
Table 6-1 – Action Summary Matrix Table	43
Table 6-2 - Summary Results of the Carbon in Habitats Tool	82
FIGURES	
Figure 4-1 - Winchester’s District Energy Use 2005-2019. Source: WSP with data from BEIS.	21
Figure 4-2 - Winchester District Energy Use by Fuel and Sector in 2019. Source: WSP with data from BEIS.	22
Figure 4-3 - Annual District Carbon Emissions 2005-2019. Source: WSP with data from BEIS.	24
Figure 4-4 - Annual Carbon Dioxide Emissions Splits for Winchester District in 2019. Source: WSP with data from BEIS.	24
Figure 4-5 - Winchester District BAU Carbon Dioxide Emissions for 2005-2019. Source: WSP.	26
Figure 5-1 - Emissions in Winchester District	29
Figure 5-2 - How Journeys into Winchester are Made (2011 Census)	31
Figure 5-3 - Winchester Emissions Graph for current actions and BAU interventions	39
Figure 5-4 - Winchester Emissions 2030 Waterfall Chart for current actions and BAU interventions	39
Figure 6-1 - Winchester Emissions Graph for additional actions	40
Figure 6-2 - Winchester Emissions 2030 Waterfall Chart for additional actions	41
Figure 6-3 – Winchester Carbon Neutrality Roadmap by 2030. Source: WSP.	42
Figure 7-1 - How to read a MACC Curve. Source: Climateworks (climateworkscentre.org)	87



Figure 7-2 - MACC for WCC in 2030 based on action timeline

EXECUTIVE SUMMARY

Winchester City Council (WCC) is committed to reducing the Winchester district's carbon footprint. In 2019, the council declared a Climate Emergency and set the goal of becoming a carbon neutral council by 2024 and a carbon neutral district by 2030. Winchester City Council's Carbon Neutrality Action Plan (CNAP) was approved by Cabinet in December 2019 and sets out their journey to carbon neutrality.



This Roadmap to Carbon Neutrality Report has been developed for the Winchester District to enable stakeholders to work towards meeting its ambitious 2030 target. The Carbon Neutrality Roadmap Tool will support the monitoring of progress, and the summary version of this report will support public engagement.

This carbon neutrality roadmap for the district is intended to identify the interventions needed to achieve carbon neutrality by 2030. By adopting the roadmap, the district's efforts to reduce carbon emissions will be aligned with and support economic development and promote a resilient, low-carbon future for the district.

KEY FINDINGS



Modelled CNAP actions represent 7.5 ktCO₂ avoided by 2030. These are not sufficient to reduce emissions by 2030 to carbon neutral. An additional 16 interventions have been modelled. Additionally, 4 carbon habitats interventions have been recommended.



Current carbon stored in Winchester district's habitats is 11,484.0 ktCO₂. For woodland the total storage is 8,103.8 ktCO₂. An extra 557.7 ktCO₂ will be stored through carbon sequestration by 2030, and an additional 1,320.9 ktCO₂ stored by 2050.



With proposed interventions implemented by 2030 Winchester will have avoided 1,116.1 ktCO₂, requiring 377Kt ktCO₂ to be offset in 2030 to achieve carbon neutrality. At the current market rate of £20/tCO₂ this will cost £7.54m to offset in 2030.



Winchester district will only be able to include newly planted trees towards its offsetting budget of 377 ktCO₂ in 2030 (with this dropping to 17 ktCO₂ in 2050) as per the Woodland Carbon Code.



The top 3 interventions based on carbon emissions reduction are in the domestic, transport and land use sectors:

1. Generating 50MW of utility scale solar PV installed on poorer quality land and onshore wind potential.
2. Invest in EV charging to decarbonise private cars and,
3. Install renewable heating measures to provide heating and hot water within homes.



Under a Medium scenario, interventions in domestic, commercial, industrial, transport and land use sectors could deliver a 35.2% reduction by 2030 (against 2022). The “Medium” scenario is recommended to be used as the standard to set the delivery goal ambitions.

The Low scenario represents the slowest delivery pace, and is beyond the current efforts included in the WCC CNAP, and thus current efforts would not be sufficient to align with a “Low Scenario”.



By 2030, the district will need to install heating measures for space heating and hot water in approx. 5,940 homes (33% of all domestic dwellings) at a rate of ~849 per year starting in 2023 to remove 68 KtCO₂ from their baseline.



The installation of 50 MW of utility-scale solar PV on poorer quality land (ground mounted) or rooftop provides the greatest potential for emission reductions and financial savings.



By 2030, the district will need to invest in EV charging to support the decarbonisation of private cars, resulting in approx. 11,400 EVs (16% of all vehicles)



Supporting the installation of energy efficiency measures in offices, retail, and other commercial property types provides a significant carbon reduction per annual cost.



By 2030, the district should have installed 50 MW of solar and wind power, generating the average annual energy demand of 3,100 UK households.



Transport interventions such as promoting hybrid working to reduce carbon emissions from commuting and fuel switching are cost beneficial.



Stakeholders highlighted that net zero strategies should sit within a broader policy framework that connects with issues such as wellbeing, inequality, and biodiversity.



Recommended feasibility studies include **exploring the practicalities of a south coast hydrogen hub/cluster bringing together neighbouring local authorities (such as Winchester, Southampton and Portsmouth councils)** supporting the national government in developing hydrogen as an alternative fuel.

Timely communication is key as well as active collaboration with local partners and citizens.

1 INTRODUCTION

Winchester City Council (WCC) declared a Climate Emergency in 2019, setting the goal of being a carbon neutral council by 2024 and a carbon neutral district by 2030. WSP has been commissioned by the council to develop a Roadmap to Carbon Neutrality by 2030. It was developed, working with the WCC project team and key stakeholders including the Parish Councillors and local organisations as described in Section 2. Stakeholder Engagement. This plan focuses on what stakeholders in Winchester district are best placed to deliver, in partnership, to secure a low-carbon and climate-resilient district. WSP acknowledges the contribution of WCC and stakeholders that provided their time to speak to WSP about their work and priorities for the district.

This Carbon Neutrality Roadmap Report (“Roadmap”) builds from work by the WCC such as the Carbon Neutrality Action Plan (CNAP), Biodiversity Action Plan and Winchester District Green Economic Development Strategy (GEDS), to create an evidence-based, data-driven roadmap to support the delivery of carbon neutrality across the district.

The 2015 Paris Agreement, agreed by the 196-member United Nations Climate Change Conference, set a global target of keeping emission-based temperature rises below 2°C and preferably below 1.5°C on pre-industrial levels. Net zero should be reached by the middle of the 21st century. To avoid a 1.5°C rise, global emissions need to be halved by 2030. By building on existing work and implementing the measures and strategies outlined in this Roadmap, WCC will contribute to achieving this global goal.

WSP identified, modelled and quantified 16 roadmap interventions across domestic, commercial, industrial, transport, land-use and waste sectors to deliver carbon neutrality by 2030 in the Winchester district. Key findings include:

Modelled CNAP actions represent 7.5 ktCO₂e avoided by 2030. These are not sufficient to reduce emissions by 2030 to carbon neutral. An additional 16 interventions have been modelled covering domestic, commercial, industrial, transport, land use and waste sectors.

With proposed interventions implemented by 2030, Winchester will still need to offset 377ktCO₂ in 2030 to be on track to achieve carbon neutrality by the middle of the century. At the current market rate of £20/tCO₂e this will cost £7.54m to offset in 2030.

The top 3 interventions based on carbon emissions reduction are on domestic, transport and land use PV sector:

- Generating 50MW of utility scale solar PV installed on poorer quality land and onshore wind potential.
- Invest in EV charging to decarbonise private cars and,
- Install renewable heating measures to provide heating and hot water within domestic dwellings.

By 2030, the district should have installed 50 MW of solar and wind power, generating the average annual energy demand of 3,100 UK households. This intervention also provides the greatest potential for emission reductions and financial savings.



As included in the CNAP, the roadmap defines carbon neutrality as “having a net zero carbon footprint, refers to achieving net zero carbon emissions by balancing a measured amount of carbon released with an equivalent amount sequestered or offset”.

It is key for the roadmap to be a living, transparent document with buy-in from council members and officers, partners, stakeholders, and residents. A Carbon Neutrality Roadmap Tool will support the tracking of roadmap interventions and a summary version for communication will support the engagement and communication of the roadmap with the public and stakeholders.

1.1 THE REPORT IS STRUCTURED AS FOLLOWS:

Section 2 outlines WSP's approach to stakeholder engagement on the roadmap and the results of conversations with stakeholders in the district.

Section 3 outlines the WSP methodology for developing the carbon neutrality roadmap, including a carbon baseline for the district and the anticipated impact of policy changes and interventions.

Section 4 provides an analysis of energy consumption and emissions trends. This information has been used to model business as usual (BAU) routes up to 2050.

Section 5 outlines the review of CNAP and other key policies in the district. The carbon impact of implementation (tCO₂) of CNAP actions by 2030 is given in Appendix D – Modelling .

Section 6 details carbon neutrality interventions regarding carbon reduction, timeline and costs. An additional 15 roadmap interventions have been designed, and their impact assessed.

Section 7 analyses the economic costs of reducing carbon emissions for carbon neutrality interventions.

Section 8 provides a vision of future trends utilising WSP's in-house “Future Ready” research. These future trends will support current decision-making.

Section 9 includes a set of conclusions developed by WSP.

1.2 PURPOSE OF THE ROADMAP TO CARBON NEUTRALITY

Winchester City Council commissioned WSP to produce a Roadmap to Carbon Neutrality for the Winchester District by 2030. WSP's Net Zero Cities Team developed this Roadmap for stakeholders in Winchester district to work towards carbon neutrality by 2030 by estimating carbon savings of existing actions and identifying additional interventions required to achieve their carbon neutrality goal.

Additionally, a Carbon Neutrality Roadmap Tool, that can be updated by WCC, will support the roadmap by enabling the review and tracking of the roadmap interventions. The summary version for communication of the roadmap report will support the engagement and communication of the roadmap with the public and stakeholders.

We advise the reader to consider the following points:



This Roadmap is based mainly on BEIS total energy consumption data up to 2019¹, the most recent available. Thus, data doesn't reflect the impact of the COVID-19 pandemic. However, we have provided comments about the possible effects;

This Roadmap may not reflect all the work already underway or planned in the district by all stakeholders. While significant effort was placed in capturing information through stakeholder engagement and data requests, we recognise the Roadmap most likely reflects the efforts of WCC;

The actions of the Roadmap cover the period from July 2022 to 2030; and

Beyond carbon savings, WSP provides recommendations to WCC to manage and deliver the interventions included in this Roadmap.

1.3 CLIMATE CHANGE

According to the IPCC (International Panel on Climate Change) Sixth Assessment Report², our climate is heating up due to anthropogenic, or human-caused, emissions. Globally, this is leading to rising sea levels, irregular rains causing droughts and floods, and a collapse in the ecosystem services that provide us with oxygen, food and water. Locally, we will see more floods and water shortages, increasing temperatures which exacerbate poor air quality and heat waves, and the loss of biodiversity as habitats are degraded.

Net anthropogenic carbon emissions have increased since 2010 across all major sectors globally³. An increasing share of emissions can be attributed to cities. In Winchester district, carbon dioxide (CO₂) emissions associated with energy use have reduced 42% from 2005-2019. In 2019, in emissions accounted for 621 KtCO₂⁴. These emissions savings are primarily from electricity grid decarbonisation. Local authorities can reduce emissions by:

- Increase resource efficiency and the systemic transition of infrastructure;
- Reducing or changing energy and material consumption;
- Electrification; and
- Enhancing carbon uptake and storage in the urban environment.

Limiting global temperature rise to 1.5°C is still possible, but only if we act immediately. Global carbon emissions need to peak before 2025, nearly halve carbon emissions by 2030, and reach net zero CO₂ emissions by 2050, while also ensuring a just and equitable transition⁵.

Winchester district has committed to carbon neutrality by 2030 and thus this Roadmap has been designed with carbon neutrality as a target as per the definition below in the table below.

¹ BEIS, 2021, Sub-national total final energy consumption data. Available online at:

<https://www.gov.uk/government/collections/total-final-energy-consumption-at-sub-national-level>

² IPCC, 2021, Climate Change 2021: The Physical Science Basis: Available online at: [Climate Change 2021: The Physical Science Basis | Climate Change 2021: The Physical Science Basis \(ipcc.ch\)](#)

³ IPCC, 2022, Climate Change 2022: Mitigation of Climate Change. Available online at: [Climate Change 2022: Mitigation of Climate Change \(ipcc.ch\)](#)

⁴ Figures estimated by WSP. Please review Section 4 of this report.

⁵ World Resources Institute, 2022, 6 Takeaways from the 2022 IPCC Climate Mitigation Report. Available online at: [Top IPCC Climate Change Mitigation Report Findings | World Resources Institute \(wri.org\)](#)

Table 1-1 - Defining Carbon Neutrality and Net Zero Targets

Carbon Neutral(ity)	Net zero
<p>Also referred as net zero CO₂ emissions, according to Glossary — Global Warming of 1.5 °C (ipcc.ch)</p> <p>Race to Zero considers net zero CO₂ emissions are achieved when anthropogenic CO₂ emissions are balanced globally by anthropogenic CO₂ removals over a specified period.</p> <p>Net contribution to global CO₂ emissions is zero, irrespective of the time period or the relative magnitude of emissions and removals involved.</p> <p>Not synonymous with net zero because it only refers to carbon.</p>	<p>The IPCC defines net zero as: When anthropogenic emissions of greenhouse gases to the atmosphere are balanced by anthropogenic removals over a specified period.</p> <p>Race to Zero considers individual actors to have reached a state of net zero when:</p> <p>An actor reduces its emissions with any remaining carbon emissions attributable to that actor being fully neutralized by like-for-like removals (e.g., permanent removals for fossil carbon emissions)</p>

Source: Race to Zero Lexicon. [Race-to-Zero-Lexicon.pdf \(unfccc.int\)](#).

1.4 NATIONAL CONTEXT

Climate commitments and targets set at the national level will enable the achievement of emission reduction targets in Winchester. This section summarises the relevant key national policies.

The UK is committed to achieving net zero by 2050 – this is a statutory obligation set out in the Climate Change Act of 2008, (as amended 2019). Achieving this target and delivering the necessary transformative change at scale and pace, will require significant changes to the generation, supply and use of energy for heat, power and transport in all sectors of the economy. There will also need to be a different approach to resources, moving from a linear to a circular economy model; delivering high quality nature-based solutions and biodiversity net gain; the way buildings are constructed and the standards to which they are built. Citizen’s behaviour will change but it will also require changes to the ways that projects are developed, financed and delivered.

The most significant recent policy announcements by the UK Government relevant to this roadmap are:

- **‘Ten Point Plan for a Green Industrial Revolution’ by the department for Business, Energy & Industrial Strategy (November 2020)** – The plan focuses on advancing offshore wind, driving the growth of low carbon hydrogen, delivering new and advanced nuclear power, accelerating the shift to zero emission vehicles, green public transport, cycling and walking, ‘jet zero’ and green ships, greener buildings, investing in carbon capture, usage and storage, protecting our natural environment and green finance and innovation. The ten-point plan will mobilise £12bn of government investment, and potentially three times as much from the private sector, to create and support up to 250,000 green jobs.
- **‘The Sixth Carbon Budget’ by Climate Change Committee (December 2020)** – The recommended pathway requires a 78% reduction in UK territorial emissions between 1990 and 2035. In effect, bringing forward the UK’s previous 80% target by nearly 15 years. The four key steps include the take up of low-carbon solutions; expansion of low carbon energy supplies; reducing demand for carbon-intensive activities and land; and greenhouse gas removal.

- **Environment Act (November 2021)** – This key piece of legislation sets out the post-Brexit environmental framework, aiming to clean up the UK’s air, restore natural habitats, reduce waste, increase biodiversity and better use resources. The Act is the first of its kind to commit to reversing species decline by 2030 and gives councils more authority to consider the environment during planning decisions. There are also provisions to transition to a circular economy, increase recycling and reducing plastic packaging. Water companies are required to progressively reduce sewage discharge into waterways.
- **Energy White Paper (December 2020)** – The white paper set out the government policy agenda for energy, with a goal of net zero by 2050. A UK Emissions Trading Scheme is designed to replace the EU carbon market and underpins the decarbonisation of the UK energy sector. The White Paper also proposes £1bn ringfenced for carbon capture and storage with a £240m Hydrogen Fund aiming to stimulate the creation of 5GW of low-carbon hydrogen by 2030. Offshore wind and nuclear are key elements behind this strategy, but with changes in national government it is uncertain which aspects of energy policy will be prioritised by the next government.
- **The Transport Decarbonisation Plan (December 2021)** – Building on the 2020 document, Decarbonising transport: setting the challenge, this plan sets the government’s agenda and commitments to decarbonising transport and contributing towards the UK’s path to net zero. Mobility shapes our lives and our communities; the plan’s intention is to create healthier, quieter spaces whilst creating new skilled jobs and avoiding a “car-led recovery” by prioritising public transport, ridesharing, active travel and flexible working.

Given the volume of legislation, regulation, policy and change coming from The UK Government, it is essential for WCC and Hampshire County Council to keep up to date with opportunities to influence, engage with and implement change. An officer or councillor from WCC should be given a specific responsibility to monitor communications and policy announcements in light of the net zero review being led by Chris Skidmore MP. This review is expected to provide the new prime minister with recommendations by the end of 2022. This could produce a new or reformed policy landscape.

There needs to be a clear route to acting on addressing climate change. A key part of this is understanding the right route for delivery. The concept of subsidiarity is an important one for this plan – understanding the best spatial scale to deliver the change needed. This may be a community project; a local authority-led programme; a business change; a national or international effort. This roadmap focuses on what stakeholders in Winchester district are best placed to deliver, in partnership, to play its part in securing a net zero carbon future.

To achieve Winchester’s carbon ambitions, everyone in the region – councils, businesses, government and members of the public – will need to play their part.

1.5 HAMPSHIRE COUNTY COUNCIL

Hampshire County Council (HCC) declared a Climate Emergency in 2019, setting a target of carbon neutrality by 2050, in line with national legislation. HCC’s Climate Change Strategy 2020-2025 “recognise[s] the changing climate as the biggest threat” to Hampshire. Hampshire County and



Winchester City Councils work in partnership to deliver projects in areas such as transport, planning, waste management and energy generation.

Coordination between HCC and WCC is key, however it is important to highlight the difference in the timeline of carbon neutrality goals, as HCC aims to achieve this goal by 2050, while WCC would do so by 2030. WCC must consider levers to achieve its goal in key sectors such as transportation, a major source of emissions for both HCC and WCC, and shared responsibilities.

There are Six Key Principles outlined in the Climate Change Strategy (CCS)⁶, including delivering equitable co-benefits and going beyond government targets where possible. Importantly, the Carbon Hierarchy is adopted in the CCS, as switching energy sources, materials used, and offsetting emissions will only go so far, their priority is reducing energy consumption and avoiding activities, such as conducting meetings virtually as appropriate.

The Hampshire 2050 Partnership and Public Sector Working Groups provide forums for collaboration across the county and are supported by other networks to engage businesses, expert organisations and other stakeholders. Embedding climate targets across every aspect of work will be essential to maximise opportunities for a green and just transition.

The main sources of emissions in Hampshire have been identified as transport petroleum (37%) and industrial & commercial petroleum (14.7%), domestic gas (13.9%), industrial & commercial electricity (11.2%), industrial & commercial manufactured fuels (8.8%) and domestic electricity (7.6%) as of 2019. This is a typical national breakdown in emissions, with petroleum and gas accounting for most of the emissions, and similar to Winchester district, transport dominates emissions.

The Local Transport Act 2008 contains a statutory requirement for HCC to produce and review Local Transport Plans and transport policies. HCC has responsibilities for transport that are both statutory and discretionary, aimed at achieving objectives set out in the Corporate Plan and Community Strategy.

Active and public transport is key area for collaboration between HCC and Winchester district. As seen above, transport is the largest source of emissions and impacts quality of life through congestion and air pollution, cultural heritage as pollutants damage historic buildings and communities that are structured around cars rather than people. The Local Transport Plan 4 (LTP4),⁷ City of Winchester Movement Strategy⁸ and the Local Cycling and Walking Infrastructure Plan (LCWIP)⁹ will be the foundation of a new approach to travel in the district. Measures to encourage cycling and bus use are being adopted and potential additional locations for Park & Ride

⁶ Hampshire County Council, 2020, Hampshire County Council Climate Change Strategy 2020-2025. Available online at: [Hampshire-Climate-Change-strategy-2020-2025.pdf \(hants.gov.uk\)](https://www.hants.gov.uk/hants-climate-change-strategy-2020-2025.pdf)

⁷ Hampshire County Council, 2022, Local Transport Plan. Available online at: <https://www.hants.gov.uk/transport/localtransportplan>

⁸ Hampshire County Council and Winchester City Council, 2019, City of Winchester Movement Strategy. Available online at: [City of Winchester Movement Strategy](https://www.winchestercity.gov.uk/movement-strategy)

⁹ Hampshire County Council, 2019, Winchester Movement Strategy: Next Steps Proposals & LCWIP Research report [Local Cycling and Walking Infrastructure Plan](https://www.winchestercity.gov.uk/lcwip-research-report)



sites are being explored. Further information about transport in the district is provided in Section 5 which includes a review of the CNAP and relevant policy.

2 STAKEHOLDER ENGAGEMENT

2.1 PURPOSE OF THIS SECTION

This section sets out the stakeholder engagement process that informed the development of the roadmap. The following paragraphs outline the process of mapping and engaging with stakeholders and includes a summary of results from the formal engagement activities undertaken by WSP.

2.2 INTRODUCTION

Key stakeholders have been engaged during the development of the roadmap. This process has helped us to identify different perspectives, challenges and priorities as well as facilitating stakeholder buy-in. As part of this process, we have worked with external stakeholders including Winchester Action on Climate Change (WinACC), Wessex Green Hub, Hampshire County Council and the Winchester Climate Action Network (WeCAN). A questionnaire was also used to engage with internal stakeholders such as the Carbon Neutrality Delivery Group to build consensus on the direction forward.

2.3 APPROACH TO STAKEHOLDER ENGAGEMENT

Stakeholder engagement supporting the roadmap development includes the following aspects:

- the processes required to identify the people, groups and organisations that could affect or be affected by Winchester City Council's roadmap to carbon neutrality ,
- analysis of stakeholder expectations and their impact on the roadmap
- development of appropriate strategies and tactics for effectively engaging stakeholders that is relevant to their interest and involvement in the design and implementation of the roadmap actions.

STAKEHOLDER MAP

Winchester City Council drew up a list of key internal and external stakeholders who it engages with in projects related to carbon neutrality. WSP then undertook a process of stakeholder management whereby we ranked relevant stakeholder based on levels of influence and interest. Stakeholders with the highest levels of interest and influence were invited to take part in either one-to-one interviews or group presentations (workshops).

2.4 SUMMARY OF FINDINGS FROM ENGAGEMENT

The formal stakeholder engagement methods used in this project have taken the form of three interviews and two workshops (also referred to as group presentations). These workshops and interviews have allowed us to gain a better understanding of existing activities, explore peoples' priorities and suggestions for the roadmap, understand existing challenges and successes and levels of interest and influence across the stakeholder group. At a political level, the team attended the Health and Environment Policy Committee session on 5 July 2022 to introduce the project to city councillors' and members of the committee.

A summary of the information gathered from the stakeholder engagement process is outlined in the following table. This is split by engagement method and identifies who the comments came from.

Key themes that came out during this process include:



Net zero strategies should sit within a broader policy framework that connects with issues such as wellbeing, inequality, and biodiversity.

Communication is a key issue and working with local partners and citizens is vital in achieving carbon neutrality and a just transition

Winchester needs to be realistic and targeted in what it can achieve

Table 2-1 - Summary of Stakeholder Engagement (Interviews and Workshops)

Stakeholder (Who)	Findings	Integration of Feedback
Interviews		
Wessex Green Hub	<p>Nothing wrong with a net zero strategy in itself but it is only a single question.</p> <p>This strategy should sit within a wider, more holistic framework that connects with issues such as wellbeing, inequality, biodiversity etc.</p>	<p>We will include a section with recommendations for WCC on how to consider co-benefits for the delivery of the roadmap actions.</p> <p>Carbon savings estimations for actions in the roadmap will be complemented by estimations of costs, stakeholders to be engaged and identify SDGs (co-benefits) tackled by the action.</p>
Winchester Action on the Climate Crisis (WinACC)	<p>Emissions in the district haven't reduced sufficiently in the last decade. Most emissions come from transport sector.</p> <p>The WCC will need to work with local partners and citizens to achieve the carbon neutrality goal.</p> <p>More ambitious actions are required across multiple sectors. Recommendations have been provided to the council.</p>	<p>We are taking into consideration WinACC's work on estimations of annual carbon emissions for the district, which includes local context, trends & recommendations on actions.</p> <p>We will provide a set of recommendations on governance & partnerships for the roadmap's delivery</p>
Interview with HCC	<p>No issue with having two different targets, all districts need to get to net zero for Hampshire to get to net zero.</p> <p>Transport is a key area for action- The numbers don't align with their 2030 target however, most of reductions will be achieved through national policy.</p> <p>LTNs, 20-min neighbourhoods, park & rides & house building- all key development areas</p> <p>Opportunity for the district council to create retrofit infrastructure for residents. WCC should finance that for residents, green bonds, working with lenders</p>	<p>The work of HCC and its relationship with WCC is key to the governance and progress of net zero</p> <p>We will incorporate the points made by stakeholders at HCC in the development of the roadmap and its recommendations</p> <p>We will follow up with recommended contacts and give HCC the opportunity to comment directly on the draft roadmap.</p>

Stakeholder (Who)	Findings	Integration of Feedback
	<p>There is a good working relationship between WCC and HCC at an officer level- Movement Strategy is a good example</p> <p>Winchester are very ambitious and want to do everything at the same time. They should prioritise, perhaps through an implementation plan.</p> <p>Need to better integrate transport & land use</p> <p>Need to engage with and support harder to reach & vulnerable people.</p> <p>Institutions in Winchester work well together, WinACC and the University. Activism needs to be embraced with some realism.</p> <p>Developing community energy projects is a priority for HCC. Working with Community Energy South.</p>	
Workshops		
<p>Parish Councillors with support from the Winchester Climate Action Network (WeCAN)</p> <p>During this workshop participants were split into three breakout groups to discuss either home energy, transport or biodiversity.</p>	<p>Home energy</p> <p>There are local projects that could be enhanced, replicated, and expanded such as: a planned local community energy project in Twyford.</p> <p>Lots of old properties around WCC with different requirements, particularly around rooftop solar.</p> <p>Developers installing gas boilers in new properties – focus on clean technologies.</p> <p>People lack time to research projects. It would be good to organise a fact-finding trip so councillors can understand the community energy project process.</p> <p>Transport</p> <p>Need to improve walkability and engage landowners to improve accessibility.</p> <p>Challenge of improving active travel around schools – financial constraint.</p> <p>Bus routes are being cut which will have negative impact on some groups. People feel like they can't influence service providers.</p> <p>Existing charging points are not well used. Location is very important as is the installation of fast charging points. Need for profit share arrangements.</p> <p>The 15-minute neighbourhood concept could be good. Need to improve basic services within the Parishes, currently people must travel too far to access quality shops. (See Appendix A: Best Practice Case Studies)</p> <p>Biodiversity</p>	<p>Information from this workshop provided excellent context and allowed us to gain a better understanding of what is happening on the ground across the district. It also gave us an insight into the feelings of local residents towards key aspects of sustainability. This contextual information has played a role in our ongoing analysis.</p> <p>We will consider the challenges and opportunities raised during this workshop when putting together our recommendations. In particular we will highlight the issues of governance that have been raised across the groups in this session and across all of our stakeholder engagement activities.</p>

Stakeholder (Who)	Findings	Integration of Feedback
	<p>Frustration at the lack of communication about biodiversity, and sustainability more generally, from WCC. Current biodiversity action by the Council isn't visible or connected. There needs to be a better demonstration that WCC are doing something physical. Would be useful for parishes to have a list of practical actions they could do to help biodiversity.</p> <p>While it is good more people are using green spaces there is concern that Council measures to attract more visitors will harm local biodiversity.</p> <p>WCC should be lobbying for more people and more funding. It needs to have a strategy in both directions (empowering communities & lobbying at a national level).</p>	
<p>Workshop with external stakeholders including:</p> <ul style="list-style-type: none"> Sustrans, Winchester Food Partnership University of Winchester Winchester Food and Climate Working Group. Cycle Winchester. 	<p>Participants asked questions around:</p> <ul style="list-style-type: none"> The Granularity of the data The lack of consideration of consumption emissions The need to split out sectors rather than amalgamating (e.g., separating gas & electric) Clarifying language and figures Accounting for population change Lifecycle assessments Consideration of the 2 degrees warming projection The inclusion of the circular economy <p>Participants also flagged ongoing initiatives in Winchester such as the Mini Holland bid.</p>	<p>Participants asked some very important and challenging questions that will help to shape the roadmap. While time and budget constraints mean that we will not be able to incorporate all suggestions into the analysis, they will be acknowledged as limitations.</p>

3 CARBON NEUTRALITY METHODOLOGY

3.1 PURPOSE OF THIS SECTION

This section provides a detailed description of the methodological approaches adopted by WSP for the development of the carbon neutrality roadmap (e.g., carbon baselines, scenarios and the design of roadmap interventions). Carbon emissions are territorial estimates¹⁰ covering the emissions produced within the Winchester district geographical borders. At the end of this section, we described the methodological approach to quantifying carbon sequestration potential.

3.2 INTRODUCTION

WSP created an energy and carbon model for the Winchester district based on WSP's local authority tool. The model is based on data and models from public agency and government sources. This techno-economic model aims to characterise the district and understand the total impact of the actions needed to achieve its decarbonisation goal.

3.3 DATA COLLECTION

WSP has conducted a thorough review of existing national and local sustainability literature and national government net zero and sustainability policies, plans and programmes to identify opportunities with existing and emerging policies (i.e., minimum energy efficiency standards which require buildings to achieve a certain level of performance by 2030).

At the local level, we have reviewed the Carbon Neutrality Action Plan (CNAP) 2020-2030 and other key policies and strategies such as the Portrait of Winchester, Winchester District Green Economic Development Strategy, and the Biodiversity Action Plan. This serves as a stocktake of work undertaken to date and informs our energy and carbon emissions analysis.

Various studies and documents were reviewed as part of this study. A list of documents and sources used for the development of this report is included in Appendix B – List of documents reviewed.

3.4 APPROACH FOR THE ESTIMATION OF CARBON EMISSIONS

To estimate carbon dioxide (CO₂) emissions for the district we have considered the fuel use within the local authority geographic area only and have therefore quantified territorial emissions. Sub-national total energy consumption statistics and CO₂ emissions estimations are published every year by the UK Government which simplifies the process of data collection for local authorities and allows for comparison and benchmarking across the UK.

Several local authorities in the UK use this approach to estimating carbon emissions. It differs from the Scopes 1, 2 and 3 methodology used by local authorities and organisations.

This approach considers only energy use within the physical boundary of the district as defined by BEIS in the Subnational Consumption Statistics Methodology and Guidance Booklet¹¹. The

¹⁰ This approach aligns with Territorial estimates are published by the Department for Business, Energy and Industrial Strategy (BEIS), are used to monitor net zero and other UK-wide targets. These estimates include emissions produced within the UK's geographical borders.

¹¹ BEIS, 2022, Subnational Consumption Statistics. Available online at: [Subnational Consumption Statistics: methodology and guidance \(publishing.service.gov.uk\)](https://www.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/104444/subnational-consumption-statistics-methodology-and-guidance.pdf)

approach is also limited to carbon dioxide emissions and thus excludes other greenhouse gases (GHGs) emissions such as nitrous oxide and methane.

The four main fuel categories considered in our analysis are (see Table 3-1):

- Gas (real consumption recorded from meters and weather corrected);
- Electricity (real consumption recorded from meters);
- Road transport (petrol and diesel only, excludes electricity and motorways); and
- Residual fuel (non-gas, non-electricity, non-road transport).

National level data published by ECUK¹² has been used for the most recent year available to split fuel usage by end-use. This approach is not ideal, but the district is reasonably representative of the wider country.

Fuels not included in the subnational energy consumption datasets are derived gases consumed in the industrial sector, petroleum products used by air transport and national navigation, heat sold in all sectors and non-energy use of petroleum and natural gas.

Table 3-1 - Fuel Types and Consuming Sectors Included in the Subnational Total Final Dataset

Fuel Type	Consuming Sector
Petroleum Products	Industrial, commercial, domestic, road, rail, public administration, agriculture
Coal	Industrial and commercial, domestic, rail, public administration, agriculture
Manufactured solid fuels	Industrial and commercial, domestic
Bioenergy & Wastes	Industrial and commercial, domestic, road
Gas (weather corrected)	Domestic industrial, commercial and other
Electric	Domestic industrial, commercial and other

Source: [Sub-national consumption statistics: methodology and guidance](#) Department for Business, Energy & Industrial Strategy (BEIS).

3.4.1 INTERVENTION AREAS

To reach carbon neutrality we have identified opportunity areas for reducing carbon dioxide emissions as summarised in Figure 4-2.

- **Domestic** – These are opportunities related to energy consumption and generation of dwellings. This is further divided into energy consumption reduction and efficiency, use of decarbonised fuels (primarily the electrification of heat) and lastly renewable energy generation (primarily rooftop photovoltaics).
- **Commercial** – These are opportunities related to energy consumption and generation of non-dwellings. This is further split into energy consumption reduction and efficiency, use of

¹² BEIS, 2020, Energy consumption in the UK 2020. Available online at: [Energy consumption in the UK 2020 - GOV.UK \(www.gov.uk\)](https://www.gov.uk/government/statistics/energy-consumption-in-the-uk-2020)

decarbonised fuels (primarily the electrification of heat considering the 5-year timeframe) and lastly renewable energy generation (primarily rooftop photovoltaics).

- **Industrial** - These are opportunities related to energy consumption and generation of high energy consumption industries e.g., cement manufacturing, steel and iron manufacturing etc. Specifically, the focus is on processes which use high temperatures and therefore may require technologies which are not yet commercialised such as hydrogen and carbon capture and storage.
- **Transport** – There are emissions associated with all forms of transportation of people and goods. This was built around the A-S-I concept of avoiding, changing, and ultimately improving. First, opportunities to reduce the need to travel were considered. Next, where travel is necessary, active travel and low-carbon modes of transport should be favoured. Ultimately, each of the transportation modes should switch to low-carbon fuel sources, likely electric in the short term, but potentially hydrogen, biofuels, or other technologies later.
- **Land Use** – There are opportunities to reduce carbon dioxide emissions by considering large-scale land use options. The focus here is on low value land and how this can be used to improve natural capital or the potential for renewable energy generation.
- **Waste** – These are opportunities to reduce carbon emissions by increasing recycling and improving waste management.

3.5 SUMMARY OF THE METHODOLOGICAL APPROACH FOR CARBON NEUTRALITY ROADMAP

3.5.1 STEP 1 – PREPARE A BASELINE

WSP reviewed carbon dioxide emissions estimations developed by local stakeholders¹³ and prepared an energy and carbon emissions baseline for the Winchester district. When considering the historical energy and carbon emissions associated with the region, the main data sources used were:

Sub-national total final energy consumption data;

UK local authority and regional carbon dioxide emissions national statistics: 2005 to 2020; and

Government emission conversion factors for greenhouse gas company reporting.

This data was edited to convert it from tonnes of oil equivalent to GWh and the motorway usage of road transport was removed from the total. This was to ensure that the of the emissions aligned with the emissions scope.

This was projected into the future using other data sources, including:

Projections of changes in energy consumption in both domestic and non-domestic sectors; and

Green Book supplementary guidance: valuation of energy use and greenhouse gas emissions for an appraisal¹⁴ (for forecasts for the decarbonisation of electricity).

¹³ Greenhouse gas emissions in Winchester District: Part XI, WinACC (2021). Available online at: [greenhouse-gas-emissions-in-winchester-district-2021-web-version.pdf \(winacc.org.uk\)](https://www.winacc.org.uk/greenhouse-gas-emissions-in-winchester-district-2021-web-version.pdf)

¹⁴ BEIS, 2021, Green Book supplementary guidance: valuation of energy use and greenhouse gas emissions for appraisal. Available online at: <https://www.gov.uk/government/publications/valuation-of-energy-use-and-greenhouse-gas-emissions-for-appraisal>

Using the data sources above, WSP produced an estimate of projected carbon dioxide emissions associated with energy consumption in Winchester district.

3.5.2 STEP 2 – BUSINESS-AS-USUAL (BAU) SCENARIO

For this baseline, the impact of a 'Business-as-Usual' scenario was considered, including all actions that are likely to take place or have already been confirmed to impact the district. It reflects ongoing and current efforts and pace of decarbonisation forecasted from 2021 to 2050. The district will continue to emit carbon emissions beyond 2030 and therefore efforts to reduce emissions will need to continue beyond 2030. Limiting warming to 1.5°C implies carbon neutral emissions globally by 2050¹⁵, the district must continue efforts to support the UK and global emissions reduction target.

What is a BAU Scenario?

After completing the baseline, the next step was to assess the impact of policies, plans, and trends if no further action was taken. This is defined as a business-as-usual scenario. The BAU's actions already represent a significant change from previous efforts and would require continuation of the ongoing effort and fulfilment of commitments. Modelled policies include:

- Domestic Minimum Energy Efficiency Standard (MEES);
- Transport electrification, including ICE (internal combustion engines) sale ban in 2030; and
- Electricity grid decarbonisation.

3.5.3 STEP 3 – MODEL CLIMATE INTERVENTIONS

Step 3 is divided in two parts, firstly WSP modelled existing actions in CNAP and quantified their impact in terms of carbon emissions reduction. Actions were categorised as modelled, non-modelled, or covered by BAU modelled policies. Additional intervention would be modelled if current efforts are insufficient to achieve carbon neutrality goal by 2030.

As a second step we identified, designed and model and additional 16 interventions needed to achieve carbon neutrality by 2030 for the district, as detailed in the roadmap with interventions section. These interventions were identified by considering: on:

- Baseline emission source areas (set out in section 4)
- Winchester CNAP 2020-2030 (and priorities for 2022-2023);
- Stakeholder engagement;
- Literature review undertaken;
- Existing, and understanding of future, government policy; and
- WSP's experience in the field.

The 16 interventions have been analysed to understand the carbon reduction potential for each within the district.

The 16 interventions were then developed into the carbon neutrality roadmap for Winchester district.

¹⁵ IPCC, 2022, Climate Change 2022: Mitigation of Climate Change. Available online at: <https://www.ipcc.ch/report/ar6/wg3/>

In each case, there are four separate goal levels; low, medium and high and very high (the latter representing an ambition beyond what is currently considered realistic). For each intervention carbon savings and cost (£) per tonne of carbon have been estimated.

The Carbon Neutrality Roadmap Tool has been developed for users to test the impact of the different scenarios for roadmap interventions and visualise how the decarbonisation path changes by 2030.

3.5.4 STEP 4 – MODEL SCENARIOS AND DEFINE INTERVENTIONS

Three scenarios were developed, based on a differing level of achievement, reflecting the pace of decarbonisation (e.g., by 2050 for low scenario and 2030 or earlier for Very High) in each of the 16 intervention goals. These are 'Low', 'Medium', 'High', and 'Very High'.

- The Low scenario will represent the slowest pace of implementation, as most interventions are set for 2050. The current efforts included in the CNAP would not be sufficient to align with a "Low Scenario", as the decarbonisation achieved for these does not achieve carbon neutrality.
- The Medium scenario is the reference scenario for this plan. It is ambitious and will require a step change in delivery. Typically, targets are more ambitious for 2030 to reduce emissions to a level where the remaining emissions can be offset.
- The High scenario represents a transformational change in the pace of delivery and enabling conditions and therefore not feasible by 2030. This scenario would align with the 2030 carbon neutrality goal without significant offset.
- The Very High scenario is a maximum ambition scenario based on 'Very High' target levels, meaning it is at or beyond the limits of what is technically feasible and would require sweeping legislative and financial changes.

The interventions identified across the scenarios are described in the table below. As noted earlier, the interventions reflect a combination of agreed policies and targets as well as new interventions that respond to Winchester district's lead emission sources.

Many of the interventions are the same across the scenarios with varied levels of pace and scale applied (e.g., percentages of homes receiving measures).

Some interventions deliver national policy or other standards that WCC will need to meet (and as such do not align with the scenarios). For modelling, these interventions are included consistently across the scenarios and is reflected in the table below (e.g., intervention 1 sets a target for all homes to have all feasible measures (which are not already installed) installed by 2030

Further detail on how the intentions apply, and how they related to wider polices can be found in the chapter 6 Carbon Neutrality Roadmap and in the Carbon Neutrality Roadmap Tool.

The interventions presented here are indicative and will need further development through the implementation stages of the roadmap to develop further design and specification along with business cases and delivery plans.

Table 3-2 – Description of Scenarios levels for Roadmap Interventions

Sector	Intervention	Details of intervention per scenario			
		Low	Medium	High	Very High
Domestic	1. Installation of energy efficiency measures within domestic dwellings	Third of all homes have all feasible measures (which are not already installed) installed by 2030			All homes have all feasible measures (which are not already installed) installed by 2030
	2. Install renewable heating measures to provide heating and hot water within domestic dwellings	7% of homes have renewable heating installed by 2030	11% of homes have renewable heating installed by 2030	50% of homes have renewable heating installed by 2030	60% of homes have renewable heating installed by 2030
	3. Install solar PV microgeneration (primary or rooftop solar) within domestic dwellings	17% of all homes have solar PV by 2030			50% of all homes have solar PV by 2030
Commercial	4. Support installation of energy efficiency measures in offices, retail, and other commercial property types	8% of commercial buildings implement feasible measures by 2030	17% of commercial buildings implement feasible measures by 2030	33% of commercial buildings implement feasible measures by 2030	All commercial buildings implement feasible measures by 2030
	5. Low carbon heating systems installed in commercial properties	7% of commercial buildings have renewable heating installed by 2030	11% of commercial buildings have renewable heating installed by 2030	50% of commercial buildings have renewable heating installed by 2030	60% of commercial buildings have renewable heating installed by 2030
	6. Install 8MW of rooftop solar PV across Winchester district	12.5% of commercial buildings have solar PV installed by 2030	17% of commercial buildings have solar PV installed by 2030		50% of commercial buildings have solar PV installed by 2030
Industrial	7. Support and mandate installation of energy efficiency and heating retrofit measures within industry	4% deployment of H2 and 3% of CCS for High Temp process	8% deployment of H2 and 10% of CCS for High Temp process	17% deployment of H2 and 13% of CCS for High Temp process	33% deployment of H2 and 40% of CCS for High Temp process 15% energy efficiency by 2030

Sector	Intervention	Details of intervention per scenario			
		Low	Medium	High	Very High
		2% energy efficiency by 2030	3% energy efficiency by 2030	5% energy efficiency by 2030	
	8. Support and incentivise businesses to install Solar PV on industrial units	Solar PV installed on 17% of all industrial buildings by 2030			Solar PV installed on 50% of all industrial buildings by 2030
Transport	9. Promote hybrid working to reduce carbon emissions from commuting	35% of people tele-commuting 50% of time by 2030			35% of people tele-commuting 50% of time by 2025
	10. Reduce car journeys by improving active travel infrastructure and public transit options	1.9% reduction in car journeys by 2030 Target of 50% driving, 5% cycling, 25% walking by 2050	3.8% reduction in car journeys by 2030 Target of 40% driving, 7.5% cycling, 26% walking by 2050	7.5% reduction in car journeys by 2030 Target of 35% driving, 10% cycling, 27% walking by 2050	15% reduction in car journeys by 2025 Target of 35% driving, 10% cycling, 27% walking by 2030
	11. Decarbonise passenger service fleets through Hampshire County Council procurement	38% of bus and taxi electrification by 2030	100% of bus and taxi electrification by 2035	100% of bus and taxi electrification by 2030	100% of bus and taxi electrification by 2025
	12. Work with local business and procurement teams to decarbonise freight fleets	25% of HGVs electrified by 2030	33% of HGVs electrified by 2030	50% of HGVs electrified by 2030	50% of HGVs electrified by 2030
	13. Invest in EV charging to decarbonise private cars	16% of cars electrified and 4% of LGVs by 2030 46% of cars are EV (32,700) by 2050			
Land Use & Biodiversity	14. 50MW of utility scale solar PV installed on poorer quality land and onshore wind potential	50MW of Solar PV and 54MW of onshore wind installed by 2030			50MW of Solar PV and 54MW of onshore wind installed by 2025
	15. Plant 400 trees per year	400 trees planted per year			
Waste	16. Increase recycling to 65% by 2035	2025: 55% 2030: 60%	2035: 65%		

3.6 CARBON IN HABITATS METHODOLOGY

WSP estimated the total carbon stock, total carbon flux, and change in carbon stored from the baseline stock up to 2030 and 2050 for habitats within Winchester district to estimate the carbon sequestration potential of the district and to support offsetting of remaining carbon emissions by 2030.

3.6.1 HABITATS COVERED AND DATA SOURCES

WSP considered areas of individual habitat parcels, along with appropriate values for carbon storage and flux using best practice taken from the Natural England and UK Woodland Carbon Code literature listed below. For example, woodland habitats are net-absorbers of carbon dioxide, whereas arable land is a net-emitter. The areas of 'Broad Habitats within the region' were provided as Geographical Information System (GIS) data by WCC, which includes land within the South Downs National Park Authority. For the carbon storage and flux values associated with these habitats, the calculator uses the following sources:

Natural England, (2021), Carbon Storage and Sequestration by Habitat (2nd)¹⁶; and
UK Woodland Carbon Code, (2021), Woodland Carbon Code Calculator (V2.4)¹⁷.

Carbon stock, measured in kilotons of carbon dioxide equivalent (ktCO₂), refers to the amount of carbon dioxide equivalent stored in biomass, including vegetation and soil. Carbon flux, measured in kilotons of carbon dioxide equivalent sequestered per year (ktCO₂/yr), refers to the transfer of carbon dioxide between living plants, soils and the atmosphere. Negative flux values indicate net carbon sequestration, whilst positive values represent net carbon emissions to the atmosphere.

STEP 1 – GATHERING HABITAT CARBON VALUES

Woodland habitat carbon values were identified from the Woodland Carbon Code calculator, which was developed to enable carbon sequestration predictions for woodland creation projects. The Woodland calculator contains carbon stock and flux lookup values for individual tree species and mixes, including mixed broadleaved and conifer. These are the two main UK woodland categories and include tree species such as oak, ash, pine, and yew. When modelling future woodland carbon sequestration, the model clusters tree species into either broadleaved or conifer categories, due to robust and available literature sources for future carbon projections only being available for these two categories. Furthermore, robust literature values on the progression of carbon storage in non-woodland habitats over time are not currently available. Therefore, it is not possible to predict future carbon storage values for non-woodland habitats and a constant carbon stock and flux value has been used for each non-woodland habitat type, from the baseline through to the 2030 and 2050 projection modelling. Some of these habitats will, however, be absorbing carbon dioxide, but they cannot currently be modelled from the available literature data.

¹⁶ Natural England, 2021, Carbon Storage and Sequestration by Habitat 2021 (NERR094). Available online at: [Carbon Storage and Sequestration by Habitat 2021 - NERR094 \(naturalengland.org.uk\)](https://www.naturalengland.org.uk/Carbon-Storage-and-Sequestration-by-Habitat-2021-NERR094)

¹⁷ Woodland Carbon Code, 2021, 3.3 Project carbon sequestration. Available online at: [3.3 Project carbon sequestration - UK Woodland Carbon Code](https://www.woodlandcarboncode.org.uk/3-3-Project-carbon-sequestration)



STEP 2 – GEOREFERENCED HABITAT AREAS

GIS habitat area data provided by WCC were imported into the WSP Carbon Habitat Tool. Using the Integrated Habitats System Definitions (version 2-001)¹⁸, imported habitat types were translated from Level 3 UK Habitat Classification and Integrated Habitat System codes into the Level 4 UK Habitat Classification format required by the tool. Habitat areas were also converted from m² to hectares.

STEP 3 – HABITATS CARBON BASELINE

The baseline calculation for woodland assumes a woodland age of 50 years (a general age for mature woodland), using the associated carbon storage and sequestration values from the Woodland Carbon Code calculator. The data used in the tool is based on an average woodland and not the actual woodland age within the district, therefore, it should be caveated that this is a high-level assessment of carbon currently stored in woodland within the district.

STEP 4 – HABITATS CARBON PROJECTIONS

For 2030 and 2050 carbon projections, woodland age and associated carbon values for broadleaf and coniferous woodland were altered to the associated 55-60 year and 75–80-year periods. Non-woodland habitat types were assigned the stated Natural England literature review carbon storage and sequestration values in both future scenarios. Similarly, orchards, scrub woodland, and lines of trees were not considered to be woodland and were instead assigned suitable alternative classes (intensive orchards, dense scrub, and hedgerows, respectively), with associated carbon values from the Natural England literature review. Therefore, for the 2030 and 2050 projections, these classes will not be associated with the Woodland Carbon Code calculator value increases in woodland carbon storage as habitats mature, despite being treed habitats with the potential for carbon sequestration.

¹⁸ Somerset Environmental Records Centre, 2007, IHS Definitions. Available online at: [Microsoft Word - Descriptions.doc \(somerc.com\)](https://www.somerc.com)

4 WINCHESTER DISTRICT ENERGY CONSUMPTION AND EMISSIONS ANALYSIS

4.1 PURPOSE OF THIS SECTION

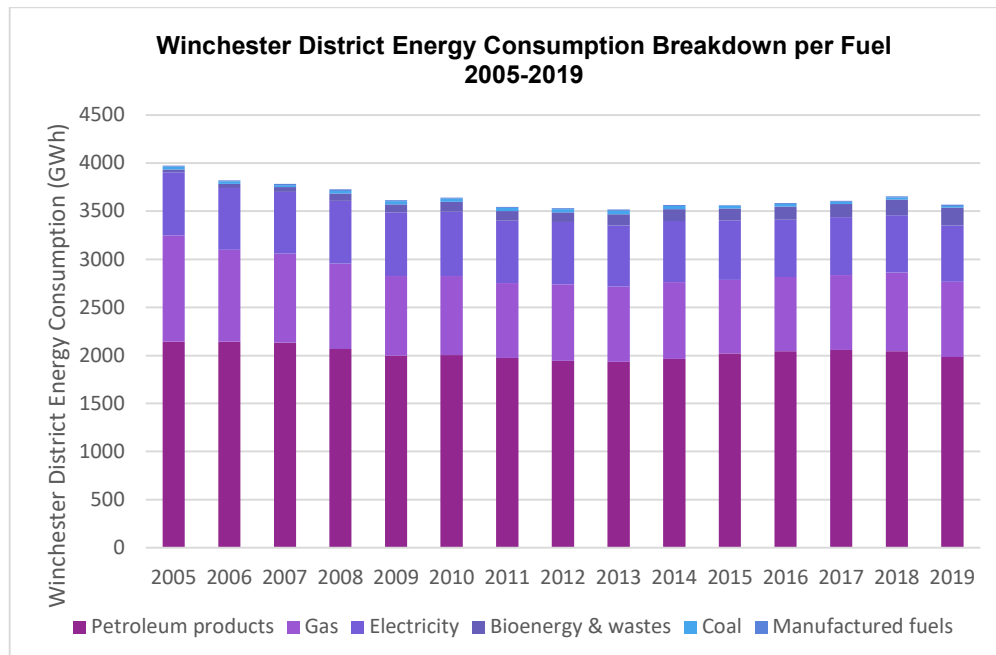
In this section we provide a detailed analysis of energy consumption and related carbon dioxide emissions in the Winchester District for the period of 2005-2019. The estimations have been developed by WSP following the approach described in Section 3. Methodology (Step 1). Findings from stakeholder engagement has enable us to understand the context of these estimates and consider current and future implications to reduce emissions in the district.

4.2 WINCHESTER ENERGY USE

Energy consumption across the district in 2019 was approximately 3,568 GWh. The figure below represents a reduction of around 11% since 2005. Total final energy consumption at regional and local authority level: 2005 to 2019 have been used throughout the analysis available from the Department for Business, Energy & Industrial Strategy (BEIS), which publishes it with a two-year lag.

Figure 4-1 presents the breakdown of energy consumption by fuel type in the district in GWh. It also shows consumptions trends overtime. This breakdown has been prepared using sub-national total final energy consumption data from BEIS (2021)¹⁹ and a detailed description of insights is provided below.

Figure 4-1 - Winchester’s District Energy Use 2005-2019. Source: WSP with data from BEIS.



¹⁹ BEIS, 2021, Sub-national total final energy consumption data. Available online at:

<https://www.gov.uk/government/collections/total-final-energy-consumption-at-sub-national-level>

Figure 4-2 - Winchester District Energy Use by Fuel and Sector in 2019. Source: WSP with data from BEIS.

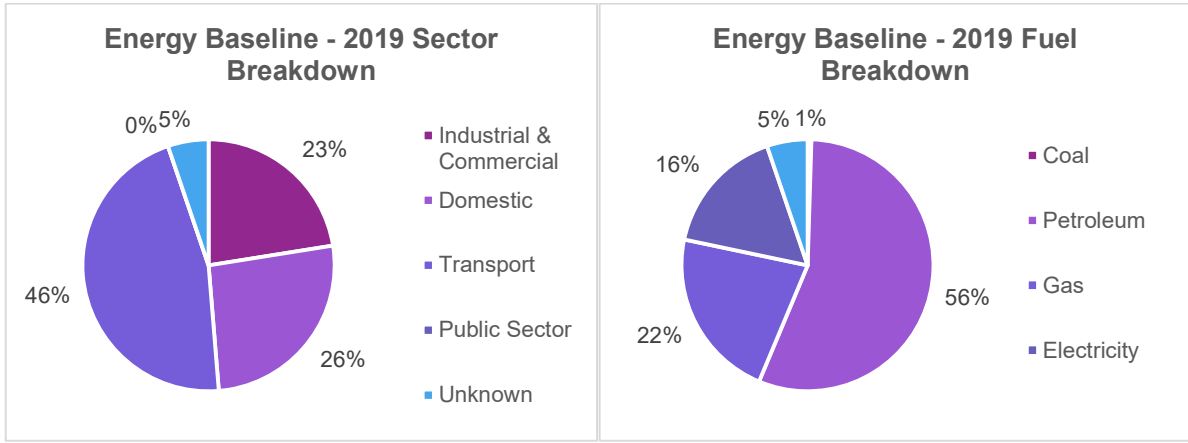


Figure 4-2 presents the breakdown of energy consumption by fuel type and by sector. These sectors align with the intervention areas of the district's carbon neutrality roadmap. A more detailed analysis of perceptions is provided below.

From Figure 4-1 there has been an increase in the use of bioenergy and wastes, while there has been a decrease in the consumption all other fuels, with petroleum remaining relatively stable from 2015 to 2019 and only experiencing the smallest reduction of approximately 8% over this period.

There has been a steady decrease in total electricity consumption approximately down 11% in 2019 compared to 2005 levels. BEIS attributes this trend for the UK to the reduction of average electricity consumption per household due to energy efficiency improvements e.g., better insulation and improved appliances, as well an increase in the price of electricity since 2005.

In 2019, transport is the dominant consumer of energy (excluding motorways) representing 48% of total energy consumption in the district, followed by an almost equal split between domestic and industrial and commercial sectors, representing 28% and 24% respectively.

Transport energy consumption is predominantly road transport petroleum use. As sub-national data sets are being used to quantify energy consumption, aviation is not included or considered within the scope of this assessment in line with the methodology used. Motorways are also excluded from the analysis as this are managed by the central government.

National level data published by ECUK²⁰ has been used for the most recent year available to split fuel usage by end-use. This approach is not ideal, but the district is reasonably representative of the wider country.

²⁰ BEIS, 2020, Energy consumption in the UK 2020. Available online at: [Energy consumption in the UK 2020 - GOV.UK \(www.gov.uk\)](https://www.gov.uk/government/statistics/energy-consumption-in-the-uk-2020)

It has been assumed domestic energy consumption patterns in Winchester District broadly mirror UK-wide patterns. Therefore, most gas use by domestic users is for space heating (75%) and domestic hot water generation (23%) with only 2% used for cooking as per the ECUK end uses dataset for 2019.

In contrast, it was assumed 22% of domestic electricity use is for heating and hot water; this is expected in properties with electric panel or storage heaters. Most of the domestic use of electricity is for appliances (60%) and lighting (13%). Cooking only represents 5%.

75% of commercial use and 12% of industrial use of gas is for space heating. Industrial uses are divided into high temperature processes (22%), low temperature processes (42%), drying/separation (12%), and other uses (12%).

Only 12% of electricity is used by commercial users and 8% industrial users for space heating and hot water. Industry users used 10% in high, 18% low temperature processes and 6% in drying. Commercial users used 23% for lighting, 13% in cooling and ventilation, 10% for cooking, 10% for computing, and 32% for other uses.

In 2019, petrol and diesel cars make up the majority of petroleum consumption accounting for 66% of the total, the Heavy Goods Vehicles (HGV) and Light Goods Vehicles (LGV) fleet make up 32% (14%-17% each) buses operating in the district consume just 2% of fuel²¹. Since 2005 energy consumption from buses has been steadily decreasing.

4.3 WINCHESTER CARBON EMISSIONS

Carbon dioxide emissions have been quantified using our energy carbon model and thus cover the period from 2005 to 2019. Carbon dioxide (CO₂) emissions associated with energy use have reduced 42% from 2005-2019 as shown in the figure below. **In 2019, in emissions accounted for 634 KtCO₂. These emissions savings are primarily from electricity grid decarbonisation.**

These findings are also shared in the 11th edition of the Greenhouse gas emissions in Winchester District report published by WinACC in 2021 which uses UK local authority and regional carbon dioxide emissions national statistics published BEIS 2005-2019.

This year BEIS²² estimations have been expanded to also include estimates of methane (CH₄) and nitrous oxide (N₂O) for 2018-2020. In 2019, CO₂ emissions in Winchester District accounted for 86% of GHG emissions and in 2020 84% of GHG emissions. As described in Section 3. Methodology, emissions covered by the roadmap focus on carbon dioxide emissions (CO₂) to achieve carbon neutrality by 2030.

Figure 4-3 illustrates the carbon emissions associated with each fuel type. This carbon emissions have been estimated using the energy consumption per fuel type presented in Figure 4-1 which provides a breakdown of energy consumption per fuel type and consumption trends over time. A detailed description of the insights from this figure is provided below.

²¹ BEIS, 2022, Sub-national road transport consumption. Available online at: [Sub-national road transport consumption data - GOV.UK \(www.gov.uk\)](https://www.gov.uk/government/statistics/sub-national-road-transport-consumption)

²² BEIS, 2022, UK local authority and regional greenhouse gas emissions national statistics, 2005 to 2020. Available online at: [UK local authority and regional greenhouse gas emissions national statistics, 2005 to 2020 - GOV.UK \(www.gov.uk\)](https://www.gov.uk/government/statistics/uk-local-authority-and-regional-greenhouse-gas-emissions-national-statistics-2005-to-2020)

Figure 4-4 complements Figure 4-3 as it provides a breakdown of carbon emissions for the year 2019 per fuel type and per sector. These sectors align with the intervention areas of the district's carbon neutrality roadmap.

Figure 4-3 - Annual District Carbon Emissions 2005-2019. Source: WSP with data from BEIS.

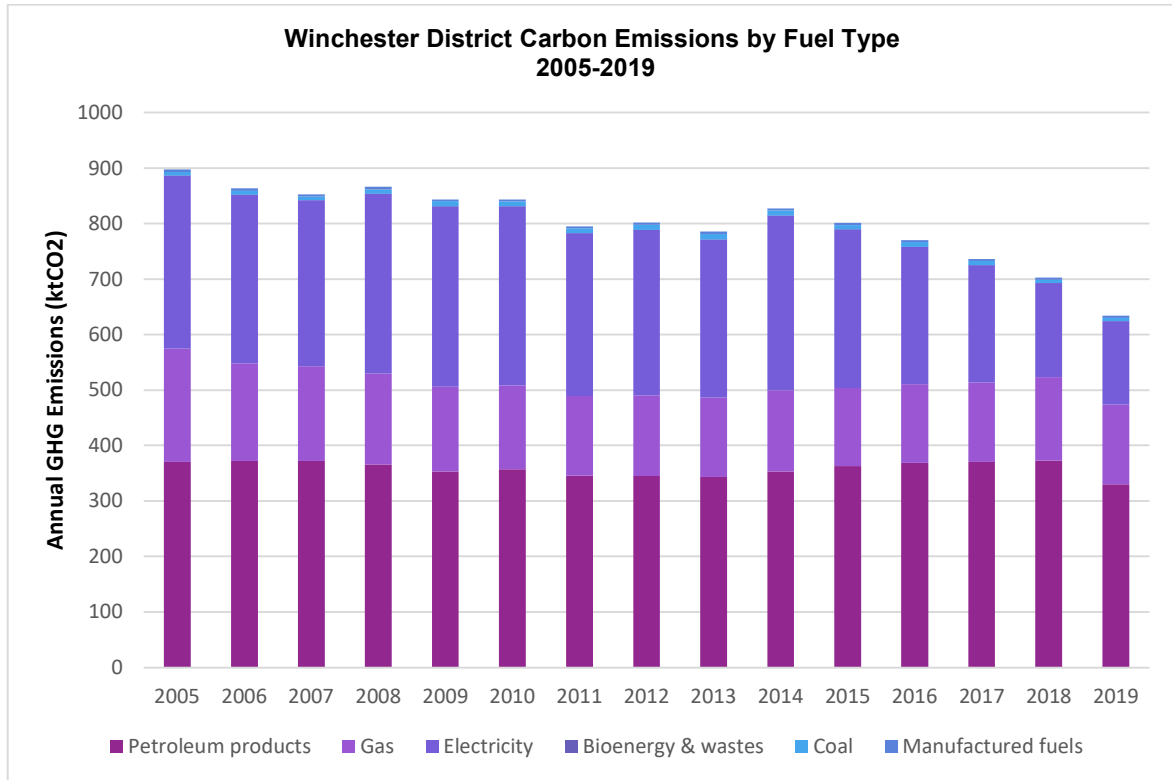


Figure 4-4 - Annual Carbon Dioxide Emissions Splits for Winchester District in 2019. Source: WSP with data from BEIS.

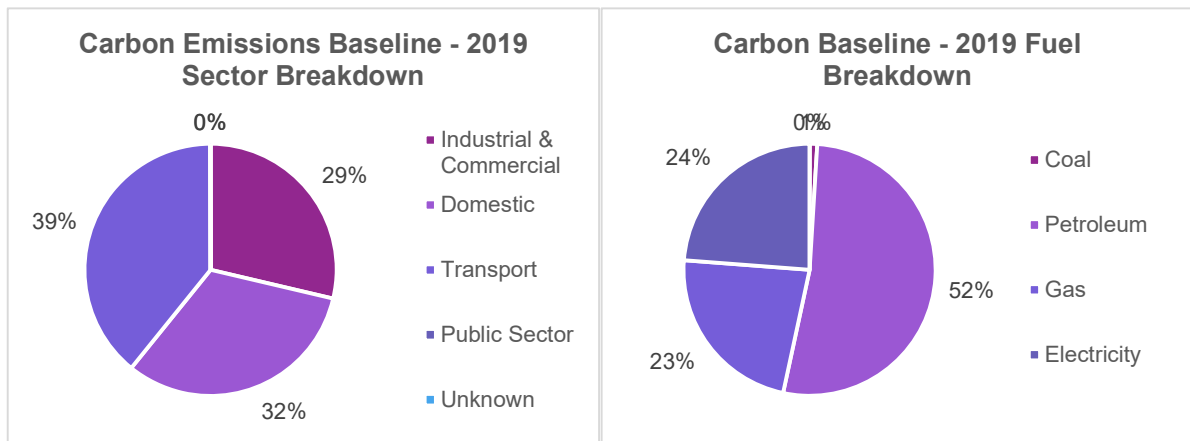


Table 4-1 – Carbon Dioxide Emissions for Winchester District in 2019. Source: WSP with data from BEIS.

Fuel Type	Carbon Emissions in 2019 (Kt CO ₂)	Sector	Carbon Emissions in 2019 (Kt CO ₂)
Coal	6.1	Industrial	177.6
Petroleum	330.3	Commercial	199.3
Gas	143.8	Transport	242.6
Electricity	149.9	Public Sector	0.2
Bioenergy & waste	0.0	Unknown	0.0

As can be seen from the charts and tables:

Whilst emissions from gas and petroleum have remained static overtime, the decarbonisation of the electricity grid has meant that emissions from electricity consumption have declined rapidly, a trend that BEIS predicts will continue into the future as shown in Treasury Green Book projections²³.

The carbon intensity of electricity is already lower than that of gas and therefore, to meet the Winchester District and UK carbon emissions targets, the district must prioritise stopping using gas in buildings, while it is also required to stop using petroleum in the transport sector.

In 2019, 39% of emissions came from the transport sector, the highest emitting sector in the district, 32% from domestic energy consumption and 29% of GHG emissions came from commercial and industrial activities. The sectoral distribution differs from energy consumption due to the relative carbon factors of the fuels used.

Emissions from petroleum consumption (most transport emissions) represents 52% of emissions, while there is an even split between combustion of natural gas results and electricity consumption of 23% of CO₂ emissions in 2019. Coal represents less than 1% of emissions.

4.4 BUSINESS-AS-USUAL (BAU) FORECAST

Following the estimation of the carbon baseline WSP developed a Business-As-Usual Scenario forecast. As described in Section 3. Methodology, the Business-As-Usual Scenario considers policies, plans and trends for the district, if no other action was taken. These actions already represent a significant step change from the way things have happened in the past and would require continued effort in order to bring to fruition.

Figure 4-5 outlines the carbon emission trajectory for Winchester District. The blue area indicates the estimated emission reduction based on a Business-as-Usual (BaU) scenario. The policies

²³ BEIS, 2021, Green Book supplementary guidance: valuation of energy use and greenhouse gas emissions for appraisal. Available online at: <https://www.gov.uk/government/publications/valuation-of-energy-use-and-greenhouse-gas-emissions-for-appraisal>

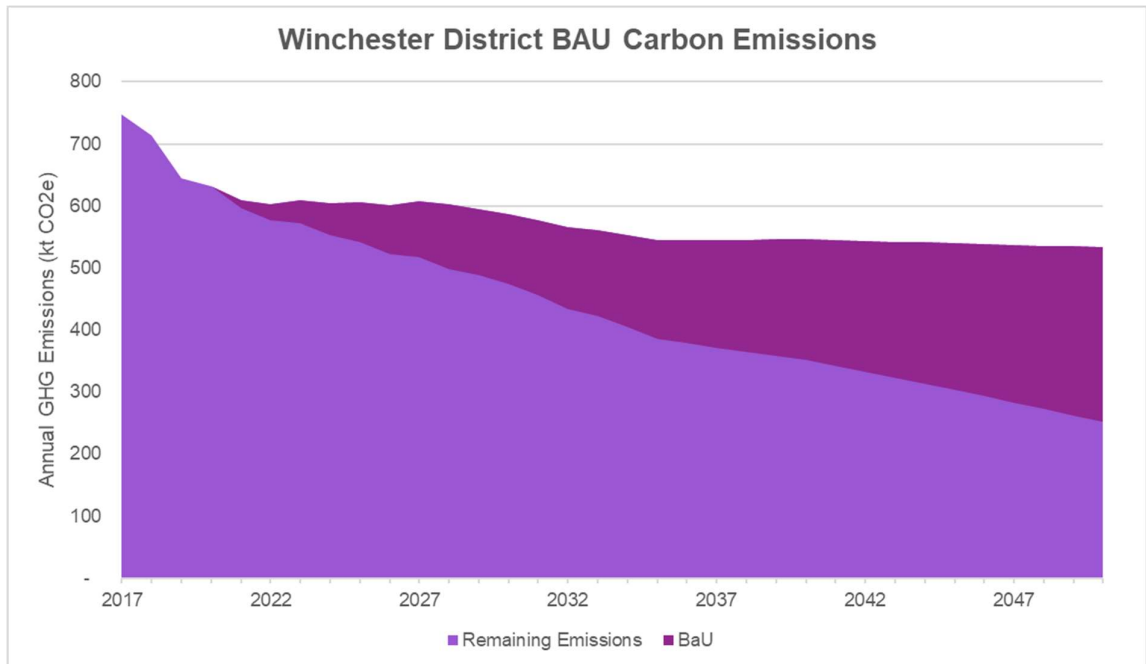
modelled in this scenario are outline below. The light purple area is the remaining emissions after the BaU policies have been modelled.

Business-as-Usual (BAU) policies modelled include:

- Domestic Minimum Energy Efficiency Standard (MEES)²⁴ – this regulation has been modelled as domestic buildings in the private rental sector needing to reach EPC C by 2025.
- Transport electrification, including ICE (internal combustion engines) sale ban in 2030. This has been based the National Grid’s Future Energy Scenario modelling²⁵; and
- Electricity grid decarbonisation – this has been estimated using the Treasury’s Green Book emissions factors²⁶.

By 2030, BAU reductions represent a reduction of 170 ktCO₂ from baseline emissions.

Figure 4-5 - Winchester District BAU Carbon Dioxide Emissions for 2005-2019. Source: WSP.



²⁴ BEIS, 2022 (accessed), Domestic private rented property: minimum energy efficiency standard - landlord guidance. Available online: <https://www.gov.uk/guidance/domestic-private-rented-property-minimum-energy-efficiency-standard-landlord-guidance>

²⁵ National Grid, 2020, FES Documents archive. Available online: <https://www.nationalgrideso.com/future-energy/future-energy-scenarios/archive>

²⁶ BEIS, 2021, Green Book supplementary guidance: valuation of energy use and greenhouse gas emissions for appraisal. Available online at: <https://www.gov.uk/government/publications/valuation-of-energy-use-and-greenhouse-gas-emissions-for-appraisal>

5 REVIEW OF CNAP AND DISTRICT-WIDE POLICIES

5.1 PURPOSE OF THIS SECTION

This section provides a high-level review of the local context and policies that impact the Winchester District and commitments in the key sectors covered by the roadmap. It provides a grounding for the roadmap in following Carbon Neutrality Roadmap chapter. The carbon baseline and methodology are outlined in the previous Winchester District Energy Consumption and Emissions Analysis chapter. WSP’s modelling indicates that existing strategies will avoid 7.5 ktCO₂ in Winchester District 2030.

5.2 ENERGY SECTOR

Combined energy emissions account for a significant portion of the Winchester district’s carbon footprint from residential, commercial and industrial sources, with WCC producing 1,780 tonnes CO₂ and the district 172,000 tonnes CO₂ (Winchester Carbon Neutrality Action Plan). WCC has the following energy actions in their CNAP and summarised in the table below.

Table 5-1 - Energy Sector Actions included in the Climate Neutrality Action Plan 2020-2030

Climate Neutrality Action Plan 2030 Actions
Undertake research into suitable alternatives to natural gas especially in relation to local generation potential.
Build or invest in large scale renewable generation project(s), e.g., solar farms, heat pumps, solar-battery car ports, anaerobic digester, wind farm, hydropower.
Explore the feasibility of developing a hydrogen generating plant as a source of renewable fuel and to divert waste from land fill.
Engage with the district’s largest businesses to work jointly on initiatives that reduce energy use or generate renewable energy, e.g., roof-top solar PV on commercial buildings.

The **UK published the British Energy Security Strategy**²⁷ in April 2022 which aims to source up to 95% of the UK’s electricity from low-carbon sources by 2030. Specific projects that Winchester could take lessons from are discussed in Appendix A: Best Practice Case Studies. Key points relevant to Winchester district include:

Wind: The strategy raises the government’s target for offshore wind generation from 40GW to 50GW by 2030, including up to 5GW of floating wind. Offshore wind production is currently the government’s preferred renewable energy generation strategy. For onshore wind farms it wants to develop partnerships with supportive communities who want to host turbines in exchange for guaranteed cheaper energy bills.

Hydrogen: The government targets for hydrogen production have been doubled to 10GW by 2030. Hydrogen can be used for industry as well as for power, transport and potentially heating. However, hydrogen technology is in its infancy with energy companies seeking to establish trial hydrogen towns and villages to act as ‘hubs’ to test real world applications.

²⁷ BEIS, 2022, UK hydrogen strategy. Available online at: [UK hydrogen strategy - GOV.UK \(www.gov.uk\)](https://www.gov.uk/government/consultations/uk-hydrogen-strategy)

Much of this is planned on the east coast of England and Scotland due to crossovers with North Sea gas production and storage. National policy is focused on clusters so WCC and HCC could, along with Portsmouth and Southampton, conduct a feasibility study to understand how southern England fits into hydrogen deployment plans.

Solar: National government is currently aiming to drive a five-fold increase in deployment up to 2035. The south coast is well-suited to solar power as demonstrated by World Bank/Solargis research²⁸. Solar represents a market-ready energy alternative, with installation cost-effective for households, commercial properties and industry. Installing batteries alongside solar maximises the benefits by reducing the need to draw from the National Grid. Trials around agrivoltaics suggest the potential for dual-use food and energy production on appropriate farmland. This is discussed further in Appendix A: Best Practice Case Studies.

Oil and gas: The UK will utilise more of the North Sea's oil and gas supplies to reduce its dependence on foreign imports. A new licensing round for North Sea projects is being launched on the basis that producing gas in the UK has a lower carbon footprint than doing so abroad. Winchester district should focus on renewable energy and energy efficiency measures (e.g., improving insulation, double glazing) to achieve carbon neutrality by 2030.

Anaerobic digestion: AD can be a carbon neutral energy source but care needs to be taken to ensure that potential food crops or land are not being used which could increase food insecurity. AD is popular in Germany and Denmark with farm waste such as slurry being used to generate energy. Gases such as methane and carbon dioxide are produced and these biogases can create energy, air pollution or emissions so need to be carefully managed to avoid unintended consequences. Waste should not become central to energy systems as this could create perverse incentives.

Heat pumps: The government plans to launch a £30m heat pump investment accelerator competition to make British heat pumps as an alternative to gas and launched a Boiler Upgrade Scheme to encourage uptake. Winchester district can leverage on these initiatives to scale up heat pump deployment in the district.

Geothermal: Although the UK is not generally geologically active, Hampshire does have geothermal energy resources that could be worth exploring. Government research²⁹ has identified the Cheshire and Wessex sedimentary basins as potential locations for geothermal to support small scale district heating projects³⁰.

Fuel and energy switching will be essential for decarbonisation as, when included with transport, fossil fuels are the predominant emissions source in the district. Emissions from electricity have come down substantially since 2012 as National Grid decarbonisation has affected local emissions.

²⁸ Solargis, 2020, Solar resource maps of the United Kingdom. Available online at: [Solar resource maps and GIS data for 200+ countries | Solargis](#)

²⁹ DECC, 2013, Deep Geothermal Review Study: Final Report. Available online at: [Deep Geothermal Review Study Final Report Final.pdf \(publishing.service.gov.uk\)](#)

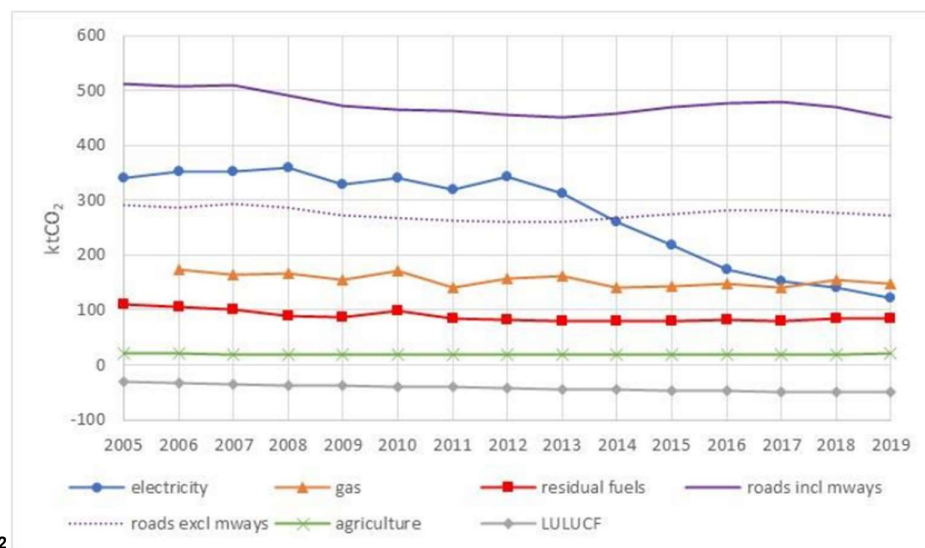
³⁰ Keeping warm: a review of deep geothermal potential of the UK - JG Gluyas, CA Adams, JP Busby, J Craig, C Hirst, DAC Manning, A McCay, NS Narayan, HL Robinson, SM Watson, R Westaway, PL Younger, 2018 (sagepub.com). Available online at: <https://journals.sagepub.com/doi/10.1177/0957650917749693>

Winchester is ideally suited for solar; the district has made progress on new solar farms such as at Christmas Hill and installed solar PV at Winchester Sport & Leisure Park which generates 140,000 kW per year. Renewable energy only accounts for 16% of Winchester’s overall energy mix. Adopting a 100% renewable electricity tariff for all operational buildings in April 2020 has reduced WCC emissions by 15%. Moving all WCC buildings onto this tariff is expected to cut emissions by 40%³¹.

WCC is also overseeing the Local Energy Advice Partnership (LEAP), the Greener Future Fund and Sustainable Business Network to support external organisations and individuals to decarbonise their emissions. To address the decarbonisation challenge, local authorities need to facilitate citizen and local organisation efforts to reduce district emissions. Community energy projects can decarbonise supplies, address fuel poverty and increase delivery capacity.

There are six operational solar farms within Winchester district, two with approval awaiting construction and a further two under review for planning approval. An estimated 1,012 hectares, approximately 4 square miles, of solar arrays will be required to cover Winchester district’s electricity needs. Arrays are unlikely to be approved within the South Downs National Park. The emerging Local Plan should prioritise streamlining planning permission for solar farms and seek out development partners.

Figure 5-1 - Emissions in Winchester District



32

5.2.1 KEY TAKEAWAYS

Reduction in energy emissions is so far largely the result of grid decarbonisation nationally; need to prioritise local renewable energy generation;

³¹ Winchester City Council, 2022, Renewable Energy. Available online at: <https://www.winchester.gov.uk/climate-change-and-energy/climate-emergency-what-we-are-doing-now/investing-in-100-renewable-energy>

³² WinACC, 2021, Greenhouse gas emissions in Winchester District: Part XI. Available online: <https://www.winacc.org.uk/wp-content/uploads/2021/10/greenhouse-gas-emissions-in-winchester-district-2021-web-version.pdf>

Solar and heat pumps are market-ready alternatives that could be adopted on relatively short timeframes.

Winchester City Council energy emissions are 1% of the district – carbon neutrality can only be achieved if industry and commercial sectors also decarbonise.

5.3 TRANSPORT SECTOR

Transport is the most significant carbon emitter and public consultations have demonstrated that traffic congestion is a major concern for Winchester residents. Stakeholder engagement shows a desire from residents for the council to take a proactive approach towards active travel. 1,494 tonnes CO₂ were produced by WCC and 287,000 tonnes CO₂ across the district (Carbon Neutrality Action Plan). The road network is near capacity and, given the historic nature of the city centre, widening roads is often not an option and does not deliver sustainable places.

In addition to the county-wide LTP4, WCC and Hampshire County Council (HCC) have jointly adopted the Movement Strategy as a key step going forward. Delivery will rely on effective collaboration between stakeholders, such as public transport providers and Cycle Winchester. HCC will need to enable this through their tendering and procurement processes. As part of this strategy, a new Park & Ride site is being explored as are changes to parking provision.

WCC’s next local plan will also offer an opportunity to use planning decisions to shape future development of the region and to promote sustainable transport.³³

WCC has committed to reduce emissions from transport as outlined in the table below.

Table 5-2 - Transport Sector Actions included in the Climate Neutrality Action Plan 2020-2030

Climate Neutrality Action Plan 2030 Actions
Develop an expanded network of EV charging points across the district – starting with up to 46 points on the council’s own estate by 2024, adding to existing provision and working with partners to identify where more are needed.
Facilitate roll out of private charging facilities, in new commercial and housing developments.
Deliver key studies in 2020 to take forward the Winchester Movement Strategy which have a focus on achieving carbon emission reduction: <ul style="list-style-type: none"> ○ Walking & Cycling Strategy; ○ Freight Strategy; and ○ Parking & Access Strategy.
Require buses and taxis to be low emission/ alternative fuel vehicles by 2030.
Develop additional Park & Ride facilities to increase capacity starting with the Vaultex site with 130 initial new car park spaces 2020, increasing to 300 in 2021.

³³ Winchester City Council, Winchester District Local Plan 2018-2039 (Emerging), available from <https://www.localplan.winchester.gov.uk> (accessed October 2022)

Climate Neutrality Action Plan 2030 Actions

Seek investment to deliver smart mobility projects especially at Park & Ride sites and key gateways to the city and district by 2021.

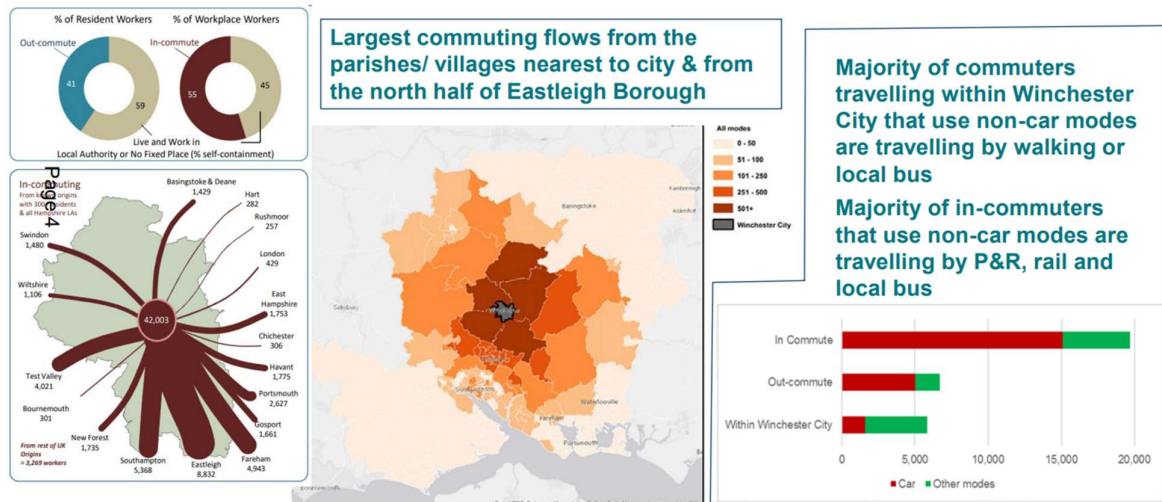
Implement differential charging for low emission vehicles in council car parks.

Collaborate with Hampshire County Council and private operators to expand and enhance public transport services (bus and rail), including access, frequency and affordability.”

Some of these actions, such as the new Vaultrex Park and Ride have already been completed.

Evidence³⁴ has shown that road construction counter-productively increases traffic congestion and make streets less suitable for pedestrians and cyclists. 76% of traffic involves those travelling from outside the Winchester urban area into it or those within it travelling outside of the city for work. This includes 16,000 daily commuter car trips into the city. Many of these journeys originate from the south, as highlighted below, which should be considered when designing transport solutions. There are direct trains to and from Southampton, Eastleigh, Fareham and Portsmouth (key inward commuter towns) and which can provide the infrastructure basis to replace car journeys. At one hour, the commute from Portsmouth via public transport is at the limits of acceptability.

Figure 5-2 - How Journeys into Winchester are Made (2011 Census)³⁵



The following key opportunities and challenges for the Winchester transport sector have been identified:

³⁴ DfT, 2019, Induced travel demand: an evidence review. Available online at:

<https://www.gov.uk/government/publications/induced-travel-demand-an-evidence-review>

³⁵ Hampshire County Council, 2021, H&EP Committee Update on Decarbonising Transport. Available online at:

[https://democracy.winchester.gov.uk/documents/s17124/HEP presentation on Transport Decarbonisation 30 Sept 2021.pdf](https://democracy.winchester.gov.uk/documents/s17124/HEP%20presentation%20on%20Transport%20Decarbonisation%2030%20Sept%202021.pdf)

- **Decarbonising freight:** There was a high-level of support during public consultations for the construction of a freight delivery hub on the edge of Winchester and WCC is working with cargo bike delivery firm Zedify, to eliminate emissions and congestion caused by van deliveries. Vans and lorries present a risk to people travelling by foot or wheel and have a disproportionate impact on air quality and congestion.
- **Improving sustainable travel priorities:** Delivering actions that support the sustainable travel hierarchy³⁶ such as implementing safe cycle routes, as proposed in the draft LCWIP, increasing Park & Ride usage, and facilitating businesses switching to sustainable delivery alternatives. These types of interventions will reduce carbon emissions, ease traffic congestion, improve air quality, supports improvements to the Winchester public realm, and provides health and social benefits for citizens.
- **Low levels of cycling:** Winchester residents have reported a willingness to walk and cycle more during public consultations, but expressed concerns around unsegregated cycle lanes and routes with poor air quality ([physical barriers can drastically increase feelings of safety and usage](#)). Currently, cycling rates are low at only 3% of journeys around Winchester, with cycling to school making up only 1% of trips to school. Actions to increase cycling and active travel include reducing traffic, providing greater priority for cyclists, and providing high quality, direct, active travel infrastructure.
- **Addressing rural challenges:** Implementing 15-minute neighbourhood approaches (see Appendix A: Best Practice Case Studies) and reducing private car use in rural areas can be challenging. Within urban environments employment, leisure and retail opportunities are often within walking distance but in smaller villages residents may rely on cars. Country roads tend not to have pavements or dedicated cycle lanes which act as barriers to safe active travel. Public transport can also be less frequent due to low demand and may require travelling into the city to reach secondary locations. Winchester and Hampshire are rural districts, and the LTP4 makes rural connectivity a priority. Superfast broadband and reliable phone signals enable more people to work from home and effective utilisation of the Rights of Way network and improving the provision of public transport can strengthen travel options. Community EV hire schemes can offer an alternative to private car ownership and have been successfully trialled in Wales (Bethesda and Abergynolwyn).³⁷
- **Improving active travel information:** Hampshire County Council has a Rights of Way map on its website³⁸, however, it is not especially user friendly. The maintenance of routes can also be an issue as footpaths can become overgrown or have barriers, such as high or unsteady stiles, muddy paths or deliberate obstacles. Making improvements to information

³⁶ Energy Saving Trust, An introduction to the sustainable travel hierarchy, (2021), available at <https://energysavingtrust.org.uk/an-introduction-to-the-sustainable-travel-hierarchy/>

³⁷ Business Wales, Community Electric Car Launch, Available online at: [Community Electric Car Launch Business Wales - Business Wales \(gov.wales\)](#)

³⁸ Hampshire County Council, Map of Public Rights of Way. Available online at: <https://maps.hants.gov.uk/rightsofwaydefinitivemap/largemap>

available active travel alongside improving the routes themselves, such as all-weather paths, will help to increase their usage.³⁹.

- **Electric vehicle charging infrastructure:** A network of 33 fast and rapid electric vehicle charging points (EVCP) has been installed across public car parks in the Winchester city, supported by a five-year strategy adopted in 2018⁴⁰. When installing EVCP it is important to install multiple charge points to build confidence in their availability. There can be a temptation to see EV vehicles as a ‘magic bullet,’ allowing a transformative reduction in emissions with little behaviour change, but they will not resolve issues around congestion, air pollution from tyre and brake particulates or achieve the health and social benefits from active travel. There are also associated emissions from the production of EVs and their reliance on rare earth metals for batteries. Reducing consumption is the first step in the Energy Hierarchy. The pace of technology change means that some ECVPs will become outdated in the next decades. Although EVs are complementary to carbon reduction targets, public transport and active travel should be prioritised.

5.3.1 KEY TAKEAWAYS

High level of public support for active travel measures and edge-of-town delivery hub identified through WCC consultations;

Air pollution and congestion are key concerns for Winchester residents. EVs resolve air pollution locally but not congestion and emission savings are reliant on grid decarbonisation (and capacity); and

76% of Winchester traffic is caused by commuters – partnership with HCC needed as WCC is not travel authority

5.4 BUILDINGS SECTOR

Property accounted for 420 tonnes of CO₂ for the council and 193,400 tonnes CO₂ for the district. There are two approaches towards ensuring buildings achieve net zero:

Retrofitting existing properties; and

Building new developments to higher standards.

WCC has included building sector actions following these two approaches in their CNAP, with actions summarised in the table below.

Table 5-3 - Building Sector Actions included in the Climate Neutrality Action Plan 2020-2030

Climate Neutrality Action Plan 2030 Actions

Through the LEAP programme facilitate energy efficiencies in homes in fuel poverty and support vulnerable tenants.

³⁹ Royal Town Planning Institute, Living Locally in Rural Wales: Planning policy and practice (2022) source: [Plan The World We Need \(rtpi.org.uk\)](https://www.rtpi.org.uk)

⁴⁰ Winchester City Council, 2022, Electric Vehicles. Available online at: <https://www.winchester.gov.uk/climate-change-and-energy/climate-emergency-what-you-can-do-to-help/actions/electric-vehicles>

Climate Neutrality Action Plan 2030 Actions

Deliver campaigns to inspire people to reduce energy consumption and provide energy advice for the home, helping tenants and homeowners switch energy supplier, for example.

Provide and share information with residents on how to live more sustainably and where local groups are so they can get further support in their communities.

To develop a council led pilot Passivhaus housing scheme in Micheldever by 2021.

All new council homes will be built to the highest efficiency standards by 2024.

To bring forward the Local Plan update with an emphasis on low carbon housing development by 2021.

To invest an additional £1m per annum on energy and water efficiency measures to council housing stock with the aim of all properties meeting an EPC standard of C by 2027.

All major projects will incorporate carbon reduction features and new schemes to meet BREEAM excellent development standards.

Use new schemes as an opportunity to deploy environmental technology and green design as exemplars in the marketplace and attract investment.

The following bullets summarise key issues and opportunities in relation to the two approaches towards ensuring buildings achieve net zero for the Council and the district

- **Retrofitting existing WCC properties:** WCC has embarked on a £1.5m programme to retrofit existing council housing properties, which will help decarbonise, improve energy efficiency and lower energy bills for residents.
- **Increasing energy efficiency standards for existing buildings:** these will be enhanced over the next decades by national governments and residents will expect better performance to avoid high bills and decreased carbon footprints. Under Minimum Energy Efficiency Standard Regulations (MEES) legislation introduced in 2018, commercial properties with an EPC rating lower than E cannot be rented to new tenants or renew existing tenancies. In April 2023, this will apply to all existing commercial leases. Landlords could face a fine of 10% of the property's value (up to £50,000) if they continue to rent properties in breach of the new standard and could face a fine of 20% (up to £150,000) if letting a non-compliant property for longer than three months. The government is exploring policy options to continue tightening regulations and it is expected that an EPC C rating will be the standard by 2030. These changes put an onus on landlords to improve the energy efficiency of their properties.
- **Higher building standards for new WCC buildings** is reflected by the new Winchester Sport and Leisure Park being awarded BREEAM Excellent accreditation. WCC has also overseen retrofitting of corporate buildings such as the City Offices and Guildhall.
- **New building standards:** The development of a Passivhaus pilot in Micheldever should help to demonstrate the market readiness of certain technologies and innovations. A tender has been launched by WCC to develop six Passivhaus-standard apartments with delivery expected by September 2023. Planning decisions, both when considering applications by private developers and considering new council-led construction projects, should be mindful

that buildings have lifespans in decades; not designing net zero-ready features now will entail costly redesigns and retrofitting in the near future. This issue has been reflected in Winchester’s forthcoming Local Plan. Enfield council’s new Local Plan requires residential developments to achieve a Home Quality Mark of 4* working towards 4.5* and non-residential developments a BREEAM certification of excellent working towards outstanding.

5.4.1 KEY TAKEAWAYS

Minimum Energy Efficiency Standards (MEES) are raising the floor on housing standards; Retrofitting is a highly effective way to reduce emissions, tackle the cost-of-living crisis and potentially stimulate local economic growth if local materials and contractors are sourced; and

Working both through planning frameworks and in partnership with development sector, developers and planners need to be conscious of likely changes to building regulations and design in net zero features to be future proofed.

5.5 WASTE AND RECYCLING SECTOR

The rate of recycling in Winchester district is 30%, according to the latest available figures provided by WCC. This is below the 44% average in England and below the national target of 50% by 2020. The new target for England is 65% of municipally collected waste being recycled by 2035⁴¹.

WCC considers waste and recycling key to the delivery of the Climate Neutrality Action Plan and actions have been summarised in the table below.

Table 5-4 - Waste and Recycling Sector Actions included in the Climate Neutrality Action Plan 2020-2030

Climate Neutrality Action Plan 2030 Actions
Reduce levels of contamination in the recycling waste streams through clearer information and guidance.
Add further waste streams to introduce recycling services such as food and additional plastics.
Install recycling bins in the city centre.

The key issues and opportunities related to waste are set out below:

- **Partnerships for greater efficiency** Recently, WCC adopted [Project Integra](#) (through the joint municipal waste management strategy (JMWMS)), covering the period 2021-2035. Currently, there is a fortnightly collection of waste and recycling on alternate weeks and a plan to introduce weekly food waste collection.
- **UK Government Policy:** The UK Government’s resources and waste strategy, supporting the 25 Year Environment Plan, seeks to establish more circular economy principles by

⁴¹ The Welsh government is leading on this issue, with a statutory target of 70% by 2025 and a current rate of 65% for 2020/21. In 1998/99 the recycling rate was just 4.8%.

increasing recycling, reducing landfill, driving efficiencies, improving access to secondary materials and implementing waste hierarchies.

- **Opportunity for increased collection services:** Many local authorities have moved to weekly recycling and fortnightly refuse collections to encourage recycling; 19 local authorities have moved to three-week collections of refuse, without seeing increases in flying tipping. Conwy County Borough Council has introduced a four-week refuse collection alongside weekly food waste and hygiene collections. See Appendix A: Best Practice Case Studies for more information.
- **Legislative requirements:** The Environment Act 2021 will support local authorities to introduce collections such as food waste through the 'new burdens' approach, committing central government funding to the new obligations. New kerbside collections for glass, batteries and small electrical items have been introduced with plans to introduce food waste collections by 2023.
- **Quality of recycling:** The quality of recycling, not just quantity, is important, as contaminated loads reduce the recycling potential of the entire collection⁴². Knowledge and awareness raising campaigns should be implemented alongside increased recycling collections. Switching to ultra-low emission collection vehicles by 2028 will support decarbonising WCC transport emissions.

5.5.1 KEY TAKEAWAYS

Winchester & Hampshire are behind national recycling targets;

Changes to collections impact on behaviour; and

Support for re-use, circular and sharing enterprises reduces consumption-based emissions.

5.6 LAND USE AND BIODIVERSITY

Located between the New Forest, the North Wessex Downs, Cranborne Chase and the South Downs National Park with important waterways such as the rivers Test, Hamble and Itchen, and the Basingstoke Canal, Winchester and Hampshire are ideally suited to being a green lung, offsetting emissions and connecting key habitats east to west and coastal to rural.

Biodiversity and considerate land use can be a source of local offsetting whilst strengthening ecosystem resilience. Street trees counter the urban heat island effect, improve quality of life, and sequester carbon. In 2019, WCC's Natural Environment (land use, land use change and forestry) offset 49.13 tonnes of CO₂. Additionally, forestry across the Winchester district sequesters up to 47,000 tonnes of CO₂ (CNAP).

WCC has included several actions on land use and biodiversity as part of their CNAP, GEDS, Biodiversity Action Plan (BAP) and Local Plan. CNAP actions are summarised in the table below:

Table 5-5 - Land Use and Biodiversity Sector Actions included in the Climate Neutrality Action Plan 2020-2030

⁴² WRAP, 2020, Tackling contamination in dry recycling. Available online at: <https://wrap.org.uk/resources/guide/tackling-contamination-dry-recycling>

Climate Neutrality Action Plan 2030 Actions

In collaboration with partners to identify at least 100 hectares of land to support additional tree planting and/or creation of grassland/wetland habitat.

Ensure the design of new housing and regeneration developments include the creation of green open spaces, and the inclusion of green roofs and green corridors

Plant new woodlands to both increase biodiversity habitats, for health and wellbeing and to act as carbon sinks for offsetting in partnership with key stakeholders and landowners. Including, developing a programme of rewilding starting with planting at least 100 trees annually on Council land.

The key opportunities and challenges related to land use and biodiversity are set out below.

- **Impact of new projects on ecosystems:** The Winchester district provides key ecosystem services and physical and mental health benefits for residents and visitors. As habitat fragmentation can lead to a loss of genetic diversity considering landscape-scale conservation and wildlife movement is important. New projects should be constructed with an awareness to how wildlife traverse and interact with developments such as new arterial roads and motorways or housing estates. Healthy and functioning ecosystems are effective at sequestering and storing carbon.
- **Protecting biodiversity loss:** The BAP outlines how between 2006 and 2018, Winchester lost 69.1% of its wood pasture and parkland, 44.9% of lowland meadow, 12% of lowland mixed deciduous woodland and 8.6% of wet woodland caused by development and agricultural intensification. Nutrient runoff is also polluting waterways. The area has also been impacted by ash dieback and invasive species, such as signal crayfish, Himalayan balsam and American mink. Only 10.37% of the River Itchen SSSI is in a favourable condition. The Environment Act sets out a new biodiversity net gain condition for planning applications which WCC can use to support environmental policies.
- **Taking opportunities to incorporate nature-based assets:** GEDS prioritises the creation of green infrastructure, biodiversity and renewable energy. It complements the BAP and CNAP by encouraging new developments to design in green infrastructure, such as green walls and sustainable urban drainage (SuDS). Designing nature-based solutions into development inception is more cost-effective, and produces more desirable developments, than retroactive measures.
- **Using Council estate to develop nature reserves:** WCC has created a new nature reserve at Barton Meadows, changed management practices on council-owned sites to improve biodiversity such as wildflower meadows, delayed grass cuttings, setup bird and bat boxes on council buildings and assessed the Local Plan and planning applications against new legislative frameworks. The BAP identified four key habitats and 22 species which required a particular focus, including habitats that are a conservation priority or indicator species.
- **Increasing new tree planting:** Currently, the target to plant 100 trees annually does not go far enough. WCC have requested WSP model an increased figure of 400. WCC could also consider a Food, Soil and Carbon Sequestration Strategy to maximise the sequestration

potential of green spaces and local agriculture⁴³. Local farmers are a valuable stakeholder in this process. The BAP sets out measures such as 100 trees planted annually on council land, protecting existing trees, increasing the number of meadows, grasslands and wetlands and providing natural features in play areas. It also seeks to ensure that WCC meet their legal and moral obligations and identifies monitoring procedures.

- **Using nature as part of public engagement on climate action:** The recovery of otters, peregrines and water voles in the region demonstrates that decline can be reversed. These flagship species, along with popular endangered animals such as the hedgehog, can be used as the photogenic public face of biodiversity policies.

5.6.1 KEY TAKEAWAYS

Winchester is in a green and strategic location, 40% of the district is in the South Downs, and land use has the potential to act as a carbon sink or source;

The forthcoming Local Plan should identify sites which can couple food production with decarbonisation;

Natural environments are crucial for physical, mental and planetary health but face threats from development, agriculture and road building which need to be prioritised during planning decisions.

5.7 IMPACT OF CURRENT ACTIONS IN THE CLIMATE NEUTRALITY ACTION PLAN

As a first step to develop the roadmap of actions to achieve carbon neutrality by 2030, we reviewed existing actions and projects in terms of their impact on carbon dioxide emissions. The following documents were reviewed to identify a list of actions for the assessment.

Winchester Climate Emergency - Carbon Neutrality Action Plan 2020 - 2030

WCC Carbon Neutrality Annual Report 2020-21

WCC Carbon Neutrality Annual Report 2021-22

The list of 26 actions evaluated, as well as the results of the evaluation, are summarised and have been included in Appendix D -Modelling Overview. The list groups actions by councils and districts considering the impact at the district level. Figure 5-3 describes the impact and status of modelled actions.

5.7.1 SUMMARY OF ASSESSMENT RESULTS

The current planned actions modelled represent 7.5 ktCO₂ avoided by 2030. These are not sufficient to reduce emissions by 2030 to carbon neutral. This Roadmap was commissioned to provide an additional set of interventions to complement planned actions.

Of the 26 actions analysed, 14 actions were modelled or covered by an additional intervention in the main energy and carbon model, only 12 were not modelled, due to the need for more details that are not currently available to the council or available datasets, not significant

⁴³ World Economic Forum, 2020, How carbon-smart farming can feed us and fight climate change at the same time. Available online at: <https://www.weforum.org/agenda/2020/08/how-carbon-smart-farming-tackles-climate-change/>

enough for the neutrality objective, or are an enabling action instead of an action with a direct impact on emissions.

Actions modelled include transport actions such as develop an expanded network of EV charging points across the district – starting with up to 46 points on the council's own estate by 2024, adding to existing provision and working with partners to identify where more are needed. The action that provided the highest carbon savings was to invest an additional £1m per annum in energy and water efficiency measures to council housing stock with the aim of all properties meeting an EPC C rating by 2027.

Figure 5-3 - Winchester Emissions Graph for current actions and BAU interventions

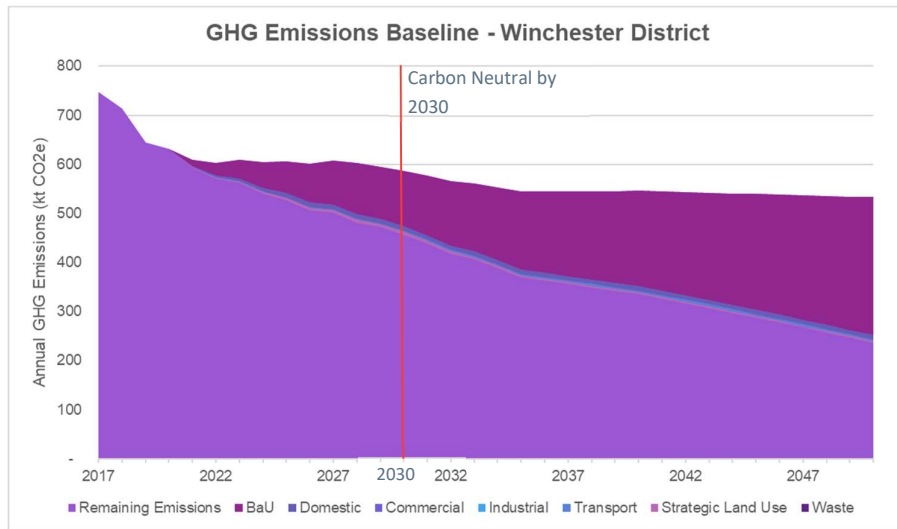
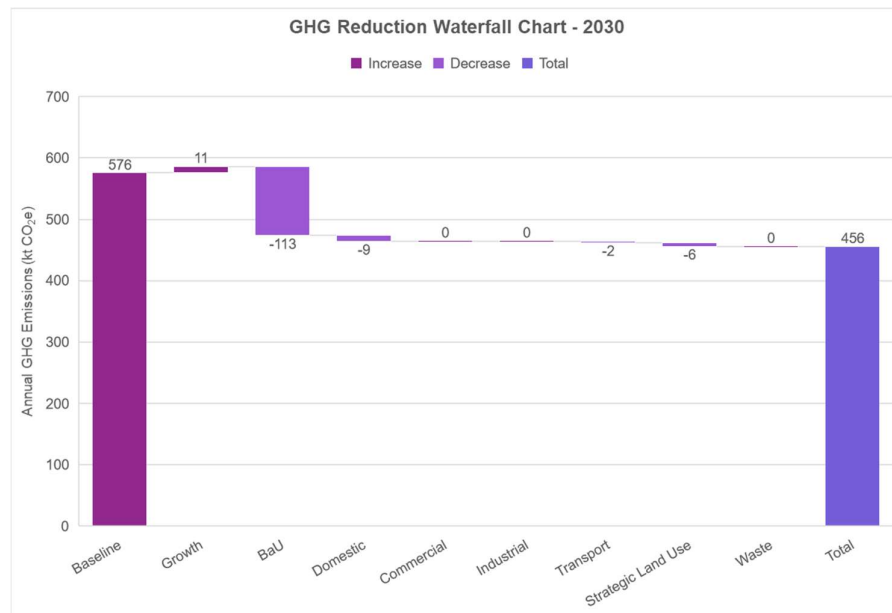


Figure 5-4 - Winchester Emissions 2030 Waterfall Chart for current actions and BAU interventions



6 CARBON NEUTRALITY ROADMAP

6.1 PURPOSE OF THIS SECTION

Current actions in the CNAP are not sufficient to achieve Winchester District carbon neutrality by 2030. The 2050-time horizon is also unlikely to achieve carbon neutrality on present trajectories without significant offsetting. An additional 16 interventions have been identified, designed and modelled, and are detailed below. Ingrained and residual emissions will require offsetting to reach carbon neutrality by 2030. WSP has used official guidance and the latest industry standards to accurately reflect best practice. Nature-based recommendations are made but where no metrics, data and official accounting guidelines exist it is not possible to quantify the impacts and so they have not been included in the modelling.

6.2 EMISSIONS REDUCTION IMPACT OF NEW INTERVENTIONS

Figure 6-1 represents the medium ambition scenario and it is the reference scenario for this plan. It is ambitious and will require a step-change in delivery of climate neutrality interventions.

Six scenarios have been modelled which correspond to sectors: domestic, commercial, industrial, transport, land use and waste. Each represents a combination of interventions, identified, designed and model by WSP. Additionally, the business-as-usual (BAU) and growth scenario includes interventions such as grid decarbonisation, vehicle electrification and minimum energy efficiency standards (MEES) regulation.

Current modelling suggests that despite the proposed interventions implemented by 2030, Winchester will still need to offset 377Kt carbon emissions in 2030 (remaining emissions in chart below) to achieve its carbon neutrality target at the current market rate of £20/tCO₂ this will cost £7.54m to offset in 2030.

Figure 6-1 - Winchester Emissions Graph for additional actions

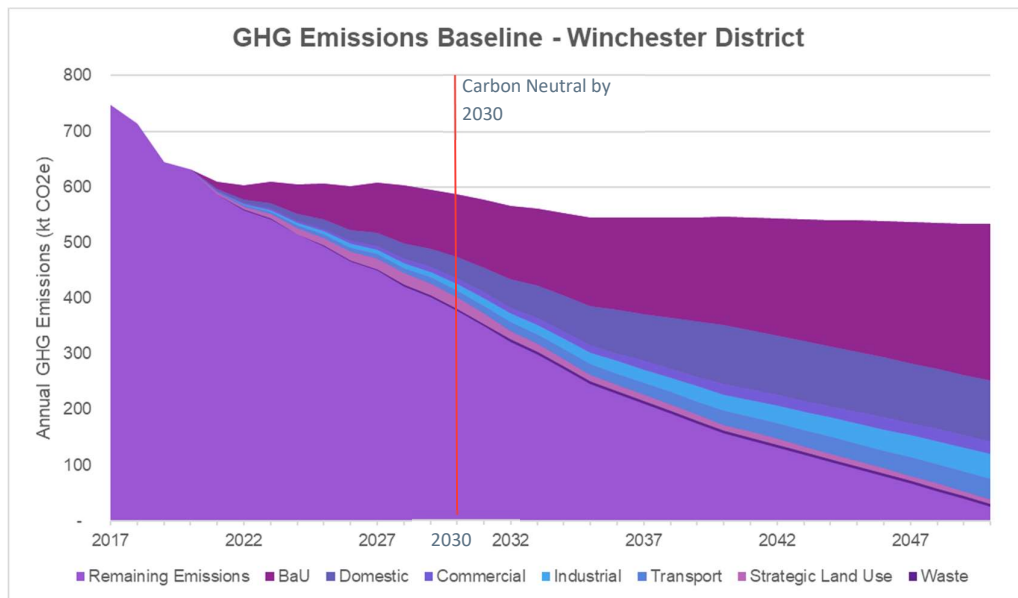


Figure 6-2 - Winchester Emissions 2030 Waterfall Chart for additional actions

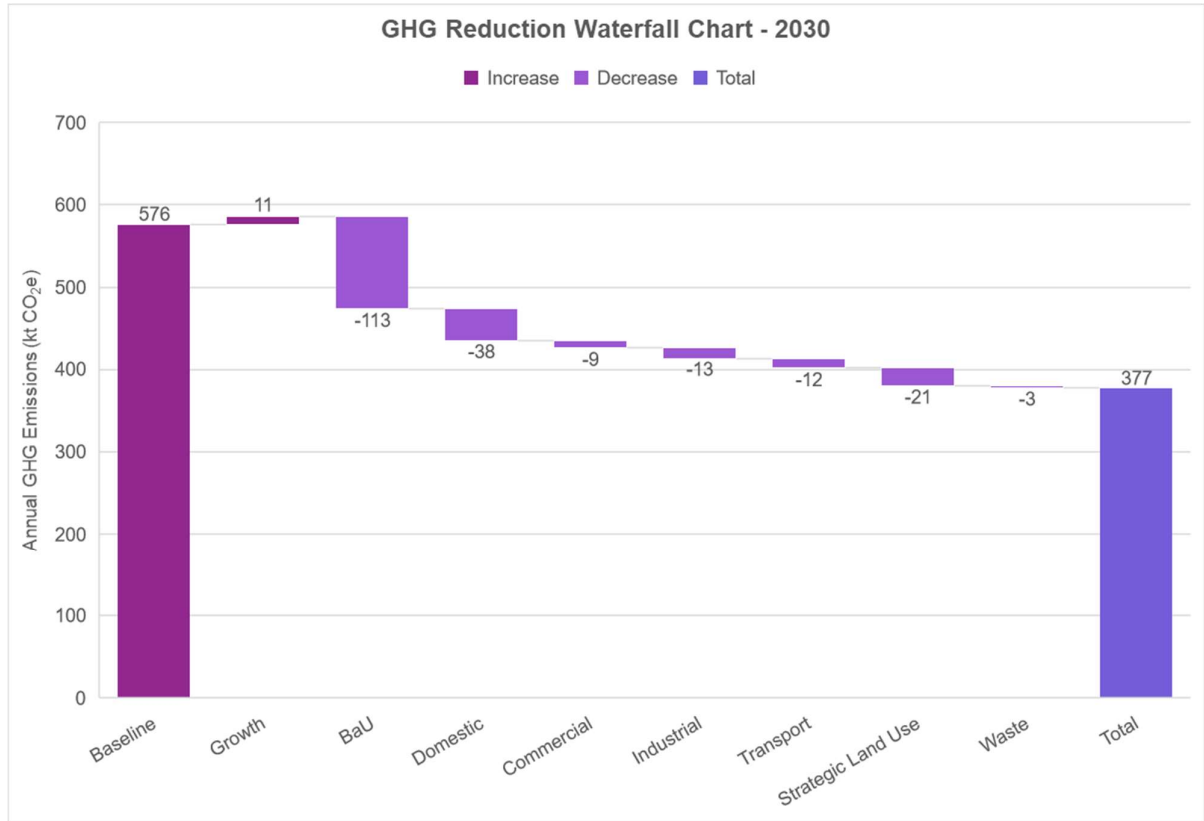


Figure 6-2 provides a snapshot of carbon emissions in the Winchester District in year 2030. Baseline emissions have been included for the year 2030, which is the base year for CNAP. This baseline is used to show the pace of decarbonisation and the individual impact of the sector scenarios developed by WSP to achieve carbon neutrality by 2030. The total bar represents the remaining emissions for the period, which as explained above still requires a significant offset to achieve carbon neutrality.

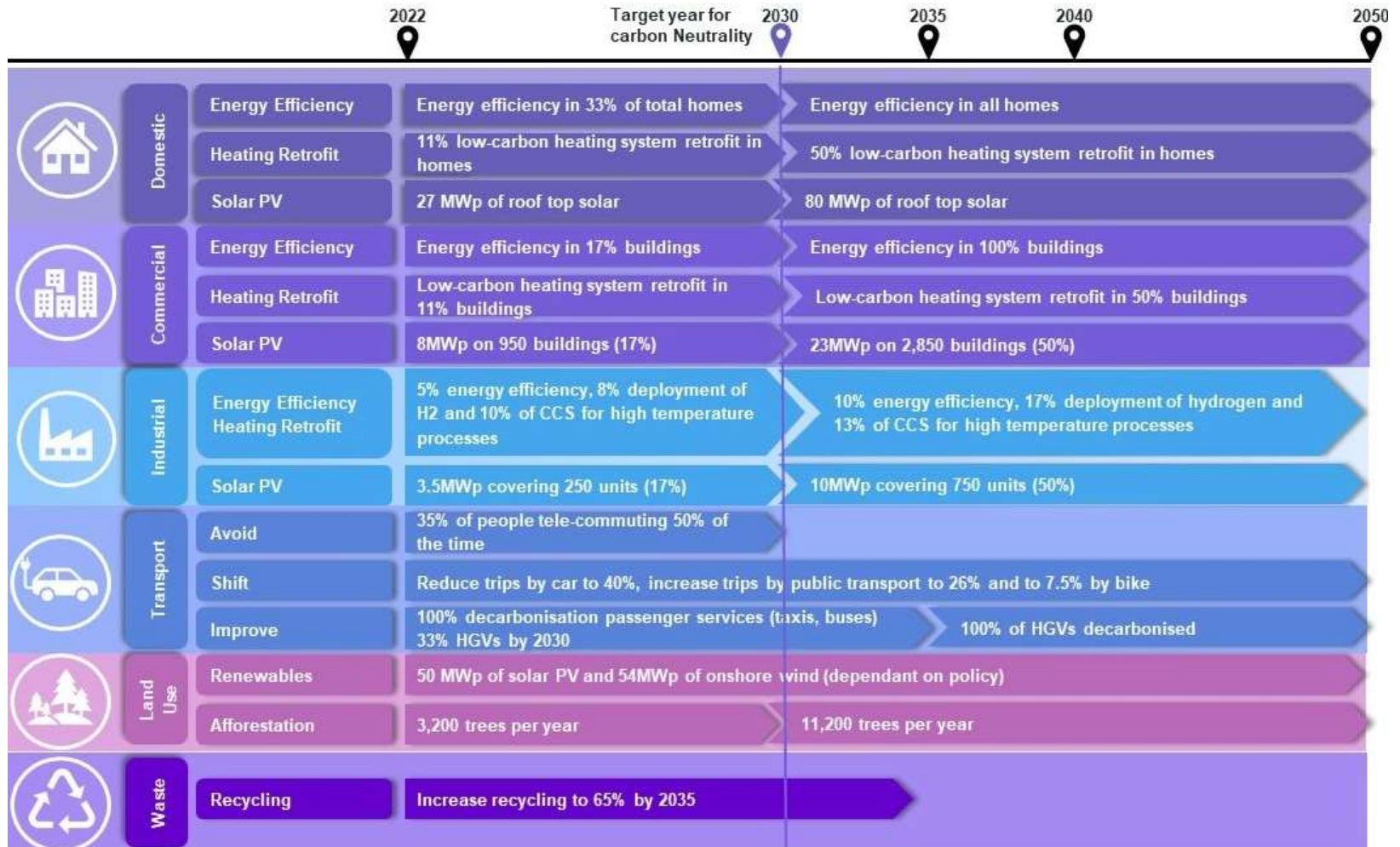
6.3 CARBON NEUTRALITY ROADMAP DIAGRAM

Figure 6-3 provides a graphic representation of the 16 carbon neutrality interventions that make up the carbon neutrality roadmap for Winchester District.

These interventions have been designed to start in 2022, the year of publication of this roadmap. They will significantly reduce carbon emissions in 2030 if the level of effort for each intervention is achieved, increasing over time and achieving carbon neutrality by 2050 without the need for substantial offsetting. It is essential to highlight that this roadmap represents the medium scenario and already requires a significant increase of current efforts and pace of decarbonisation. WSP has included in the design that interventions will continue after 2030 in order to reduce offsetting require to maintain and achieve carbon neutrality by 2050.



Figure 6-3 – Winchester Carbon Neutrality Roadmap by 2030. Source: WSP.





6.4 ACTION SUMMARY MATRIX TABLE

The following table provides a summary of the carbon neutrality roadmap interventions for ease of comparison in terms of their delivery schedule for 2030 (target year for carbon neutrality) and 2050 (national goal for net zero GHGs), estimated carbon reduction by 2030 and estimated cost (and reduction). The following section provides an analysis of the economic cost of emission reductions for each intervention.

Costs estimates have been categorised **low** (£5-10m), **medium** (£15-50m), **high** (£90-200m).

Cumulative carbon reductions estimate up to 2030 have been categorised **low** (0.1-10 ktCO₂), **medium** (17-43 ktCO₂), **high** (56-600 ktCO₂).

Table 6-1 – Action Summary Matrix Table

Sector	#	Intervention	Action Owner	Monitoring	Timeline with level of effort (metrics)	Carbon Reduction KtCO ₂ by 2030	Carbon Reduction Impact	Cost (CAPEX)
Domestic	1	Installation of energy efficiency measures within domestic dwellings	Property owners	WCC	2030: 18,000 homes (33%) 2050: 54,000 homes (100%)	26.00 ktCO ₂	Medium	Medium Estimated capex of £30-50m for 2030 target
	2	Install renewable heating measures to provide heating and hot water within domestic dwellings	Property owners	WCC	2030: 5,940 homes (11%) 2050: 27,000 homes (50%)	68.00 ktCO ₂	High	High Estimated capex of £150-200m for 2030 target



	3	Install solar PV microgeneration (primary or rooftop solar) within domestic dwellings	Property owners	WCC / WinACC	2030: 27 MWp, generating the average yearly energy demand of 1,700 UK homes 2050: 80 MWp, generating the average yearly energy demand of 5,000 UK homes	22.00 ktCO ₂	Medium	Medium Estimated capex of £15-25m for 2030 target
Commercial	4	Support installation of energy efficiency measures in offices, retail, and other commercial property types	Private sector	Winchester BID	2030: Installed in 17% of buildings, ~969 buildings 2050: 50% of commercial buildings, ~2,565 buildings	44.00 ktCO ₂	Medium	Medium with cost savings Estimated capex of £15-20m for 2030 target
	5	Low carbon heating systems installed in commercial properties	Private sector	Winchester BID	2030: Installed in 11% of buildings, ~600 buildings 2050: Installed in 50% of buildings, ~2,565 buildings	4.00 ktCO ₂	Low	High with cost savings Estimated capex of £5-10m for 2030 target
	6	Install 8MW of rooftop solar PV on commercial properties across Winchester district	Multiple	WCC / WinACC	2030: 8MWp, covering 17% of commercial buildings, ~950 buildings 2050: 23MWp, covering 50% of commercial buildings, ~2,565 buildings	7.00 ktCO ₂	Low	Low Estimated capex of £4-6m for 2030 target (Upfront costs but revenue generating)

Industrial	7	Support and mandate installation of energy efficiency and heating retrofit measures within industry	Private sector	Winchester BID	2030: 5% of buildings with energy efficiency measures, 8% deployment of H2 and 10% of CCS for high temperature processes 2050: 10% of buildings with energy efficiency measures, 17% deployment of hydrogen and 13% of CCS for high temperature processes	60.00 ktCO ₂	High	Medium with cost savings Unable to estimate capex due to novel technology
	8	Support and incentivise businesses to install Solar PV on industrial units	Private sector	Winchester BID	2030: 3.5 MWp, covering 17% of industrial buildings, ~250 units 2050: 10 MWp, covering 50% of industrial buildings, ~750 units	3.00 ktCO ₂	Low	Low with cost savings Estimated capex of £2-3m for 2030 target
Transport	9	Promote hybrid working to reduce carbon emissions from commuting	Employers & employees	Private sector entities	2030: 35% of people tele-commuting 50% of the time	10.00 ktCO ₂	Medium	Low (Potential savings via smart offices) Estimated capex of £3-5m for 2030 target
	10	Reduce car journeys by improving active travel infrastructure and public transit options	Residents	WCC & HCC	2030: 50% of trips by car, 25% by public transport, 5% by bicycle 2050: 40% of trips by car, 26% by public transport, 7.5% by Bike	17.00 ktCO ₂	Medium	High (Individual savings on car expenses but capital expenditure on active travel and buses) Too many variables to estimate capex





	11	Decarbonise passenger service fleets through Hampshire County Council procurement	HCC	WCC	2035: 100% decarbonisation	56.00 ktCO ₂	High	Medium-small Estimated capex of £250-500k (taxis) and £35-£40m (buses) for 2030 target
	12	Work with local business and procurement teams to decarbonise freight fleets	BEIS	WCC	2030: 33% of HGVs decarbonised 2050: 100% of HGVs decarbonised	34.00 ktCO ₂	Medium	High (Consider need for hydrogen / EVCP refuelling stations) Unable to estimate capex due to novel technology
	13	Invest in EV charging to decarbonise private cars	Multiple	Private sector entities	2030: 16% of cars electrified, ~11,400 2050: 46% of cars electrified, ~32,700	600.00 ktCO ₂	High	High Too many variables to estimate capex
Land Use & Biodiversity	14	50MW of utility scale solar PV installed on poorer quality land and onshore wind potential	Multiple	WCC / WinACC	2030: 50MW, generating the average yearly energy demand of 3,100 UK homes; 54MW of onshore wind (dependant on English planning policy change)	147.00 ktCO ₂	High	High (Upfront costs but revenue generating) Estimated capex of £90-100m for 2030 target (PV and Wind)
	15	Plant 400 trees per year (an increase in the CNAP target based on WCC request)	WCC	WCC / BAP	2030: 3,200 trees 2050: 11,200 trees	0.10 ktCO ₂	Low	Low Too many variables to estimate capex



Waste	16	Increase recycling to 65% (2035)	Project Integra	WCC / Biffa	2035: 65%	18 ktCO ₂	Medium	Low Reduced service costs £100k-£200k
-------	----	----------------------------------	-----------------	-------------	-----------	----------------------	--------	---

6.5 DOMESTIC INTERVENTIONS

 Intervention 1: Installation of energy efficiency measures (EEMs) within domestic dwellings	
<p>What?</p> <p>This intervention aims to reduce carbon emissions through increased energy efficiency in the use of energy in domestic dwellings (smart meters, smart thermostats, cavity and solid wall insulation, loft insulation, double glazing in addition to household behavioural change).</p>	<p>Co-benefits:</p> <ul style="list-style-type: none"> Improved health and quality of life (reduced air pollution) Reduced energy bills and lower costs Reduced inequality (fuel poverty) and improve energy security Reduced demand for fossil fuels
<p>Carbon savings (2030): 26 ktCO₂</p>	<p>SDGs:</p> 
<p>Cost (2030): Estimated capex £30-50m</p>	
<p>How?</p> <ul style="list-style-type: none"> Evaluate a 'building passport' approach for 2030 to demonstrate how and when a zero carbon-compatible level of retrofit will be achieved by new developments in the district. Develop a local incentives plan for the installation of specific measures, (where not already present), including smart meters, smart thermostats, cavity and solid wall insulation, loft insulation, double glazing and other water saving measures, in homes. Hampshire County Council are working with Community Energy South to develop community-led energy projects. Develop pilot projects to facilitate the delivery of major retrofit projects in social housing in partnership with housing associations. Through scale-up of pilot Passivhaus housing scheme in Micheldever. 	<p>Lead:</p> <p>Winchester City Council (Corporate Head of Housing)</p> <p>Landlords</p> <p>Property owners</p> <p>Partners:</p> <p>Hampshire County Council, Housing associations, local authority housing, homeowners and private landlords, supply chain providers, public institutions and national government e.g. BEIS, non-profits (WinACC SuperHomes, Community Energy South)</p>
	<p>Level of effort and Timeline:</p> <ul style="list-style-type: none"> By 2030: Energy efficiency measures installed in third (33%) of dwellings By 2050: Energy efficiency measures installed in all (100%) dwellings

<ul style="list-style-type: none"> ▪ Finance the installation of above measures in council properties. An example of this approach is the Nottingham Deep Retrofit Energy Model (DREeM). ▪ Engage the public to reduce energy consumption through better information in particular for private rental sector housing and owner occupier housing. UKGBC has an Accelerator Cities Programme with guidance and resources for home retrofit. The council can also scale-up their LEAP scheme to provide advice to all residents. ▪ Provide training for assessors and coordinators in the PAS 2035 standard ▪ Conduct a private MEES survey to improve EPC ratings in the private rental sector and develop compliance and enforcement of MEES regulations in the private-rented sector. ▪ Build local partnerships with private landlords, supply chain providers to design sound retrofit programmes to capture social value and stimulate a green economy ▪ Create and manage retrofit programmes to up-skill those already working within the construction sector and recruit from outside the sector and collaborate with industry to create the workforce of the future 	<p>Baseline:</p> <p>Domestic energy is the second highest source of district carbon emissions (e.g., 193 kilo tonnes of carbon dioxide). Energy efficient measures deemed most applicable for WCC (based on technology installation data) are smart thermostats (applicable for 94% of domestic properties in Winchester district), followed by smart meters (69% applicability).</p> <p>WCC has already committed to over £1 million on a variety of energy efficiency measures to bring all council owned properties to an EPC C rating by 2027</p> <hr/> <p>National Policy:</p> <ul style="list-style-type: none"> ▪ Heat and Buildings Strategy ▪ Household Support Fund ▪ PAS 2035:2019 ▪ Local policy: WCC- Energy Audit 2021
--	--

INVESTMENT AND FUNDING

The sources of finance for implementing this intervention are diverse and include partnerships with public sector and housing associations. Private owners and landlords as well as existing and new taxpayer funding streams offer significant opportunities for financing. Some of the most relevant sources of funding include:



- Homeowner and private landlord investment
- Private Sector revolving finance
- Local Authority Delivery funding
- Household Support Fund to support vulnerable households in England

WINCHESTER CITY COUNCIL ROLE

Influencing: Lobbying for funding and running promotional and educational campaigns.

Enabling: Develop local policies (e.g., local plan and housing plan). Managing financial streams from national government and other funding. Develop partnerships with private landlords, private sector (manufacturers) and community led organisations.

Delivering: Retrofit own housing stock. Develop, manage and administer housing programme, including procurement and framework for implementation.

 Intervention 2: Install renewable heating measures to provide heating and hot water within domestic dwellings	
<p>What?</p> <p>Alongside energy efficiency measures, installing retrofit heating (e.g., nominally air source heat pumps) will reduce carbon emissions from domestic energy in Winchester. Air source heat pumps are low carbon heating alternatives for domestic properties and can be rolled out across neighbourhoods. Example schemes for joint procurement aimed at able to pay market include Solar Together by the GLA.</p>	<p>Co-benefits:</p> <ul style="list-style-type: none"> ▪ Savings on energy bills ▪ Reduced reliance on National Grid ▪ Fuel switching ▪ Smaller and individual properties can be actioned with fewer resources than big installations
<p>Carbon savings (2030): 68ktCO₂</p>	<p>SDGs:</p> 
<p>Cost (2030): Estimated capex £150m-£200m</p>	
<p>How?</p> <ul style="list-style-type: none"> ▪ WCC install low carbon heating system retrofits in 11% of homes in the district by 2030. ▪ Council-controlled homes should be the starting point for any intervention. ▪ For the wider housing market, joint procurement and application for schemes such as LADS can fund wider installations. ▪ New developments on district heating / microgrids / renewable heating/cooling measures to limit requirement for costly retrofits. 	<p>Lead:</p> <p>Winchester City Council Landlords Property owners</p> <p>Partners:</p> <p>Community Energy South Parish councils</p> <p>Timeline:</p> <ul style="list-style-type: none"> ▪ 2030: Measures installed in 11% of homes ▪ 2050: Measures installed in 50% of homes

<ul style="list-style-type: none"> ▪ Provide capital for upfront costs, repaid by energy savings. ▪ Work with community groups, charities, Community Energy to support low income, non-council house residing residents in owned and private rented sector. ▪ Ensure landlords understand changes to EPC rent regulation changes. ▪ Only refer council tenants to private landlords with above minimum EPC ratings. ▪ Complementing GEDS, support Green Skills Academy to upskill tradespeople. ▪ Long-term installation programme provides local investment certainties. ▪ Exemplar houses throughout the district for residents and developers to view. ▪ Complete and publicise PassivHaus programme. ▪ Work with community groups and parish councils to encourage ‘Keep up with the Jones’ attitude to installing measures among those who can afford it. ▪ Apply for HNIP funding on appropriate projects ▪ Boiler Upgrade Scheme 	<p>Baseline:</p> <p>Alongside energy efficiency measures, installing retrofit heating (e.g., nominally air source heat pumps) will reduce carbon emissions from domestic energy in Winchester. This will complement existing WCC plans, such as investing £1.5mn in 2022/23 on retrofitting existing housing stock in the district.</p> <p>£1.5mn in 2022/23 on retrofitting existing housing</p> <p>Clean Growth Grand Challenge aims to halve energy use in all new buildings</p> <hr/> <p>National Policy:</p> <ul style="list-style-type: none"> ▪ Standard Assessment Procedure (SAP) ▪ Clean Growth Strategy ▪ Future Homes Standard ▪ Heat Networks Investment Project (HNIP)
--	--

INVESTMENT AND FUNDING

Council-controlled homes should be the starting point for any intervention. In terms of the wider housing market, joint procurement and application for schemes such as LADS⁴⁴ can fund wider installations. Example schemes for joint procurement aimed at able to pay market Solar Together⁴⁵ by the GLA.

The sources of finance for implementing this intervention are diverse and include partnerships with public sector and housing associations. Private owners and landlords as well as existing and new taxpayer funding streams offer significant opportunities for financing. Some of the most relevant sources of funding include:

- Homeowner and private landlord investment
- Private Sector revolving finance
- Local Authority Delivery funding

⁴⁴ BEIS, 2022, Sustainable Warmth Competition: successful local authorities. Available online at: <https://www.gov.uk/government/publications/sustainable-warmth-competition-successful-local-authorities>

⁴⁵ GLA, Solar Together London. Available online at: <https://www.london.gov.uk/what-we-do/environment/energy/solar-together-london>



WINCHESTER CITY COUNCIL ROLE

Influencing: Incentivise homeowners to install renewable heating measures.

Lobbying for funding and running promotional and educational campaigns for the public.

Enabling: Develop local policies (e.g., local plan and housing plan). Managing financial streams from national government and other funding. Develop partnerships with private landlords, private sector (manufacturers) and community led organisations.

Delivering: WCC can take the lead for properties that it manages and can work with installers, homeowners and domestic landlords to lower barriers for those that it does not. Develop, manage and administer housing programme, including procurement and framework for implementation.

 Intervention 3: Install solar PV microgeneration (primary or rooftop solar) within domestic dwellings	
<p>What?</p> <p>It is recommended that WCC implement a solar PV installation programme for domestic properties, building on the current solar PV installed within the district. WCC could either directly fund installations in specific neighbourhoods, or it could incentivise homeowners to install the solar PV themselves. Other technologies should be installed simultaneously (e.g., energy efficiency, batteries and heating retrofit measures).</p>	<p>Co-benefits:</p> <ul style="list-style-type: none"> ▪ Lower energy bills ▪ Energy security ▪ Very visible ▪ Increase property prices ▪ Encourage “Jones” mentality
<p>Carbon savings (2030): 22ktCO2</p>	<p>SDGs:</p> 
<p>Cost (2030): Estimated capex £15m-£25m</p>	
<p>How?</p> <ul style="list-style-type: none"> ▪ Equivalent of 27MWp is installed within domestic properties (assuming 3kW installed per household). This is a third of the potential capacity that could be deployed to 2030. ▪ Publish Solar Resource Map that is currently under development. ▪ Provide initial capital through loans, leasing or hire-purchase agreements 	<p>Lead:</p> <p>Winchester City Council Property owners Community energy (CE) groups</p> <p>Partners:</p> <p>Community Energy South Solar installers WinACC</p>

<p>with residents, repayments could be made based on energy bill savings.</p> <ul style="list-style-type: none"> Support establishment of community energy groups who can lessen capacity demands on council and access additional funding sources. Community energy groups could require seed funding, peppercorn rents for room/office space, business case development support (potentially through council purchase commitments; WCC could co-ordinate these commitments with public/private sector partners i.e., local schools or businesses rather than necessarily making all commitments itself). Organising fact-finding trips/workshops to understand community / micro-generation initiatives elsewhere was popular during stakeholder engagement. List of approved tradespeople/installers to give consumers confidence. Bulk purchasing (possibly across local public sector to maximise bulk discount) to offer discounts to local residents. Long-term plans to generate business investment confidence. Through community groups, support collective street installations to minimise costs where properties are appropriate and residents supportive. Assess options for historic/listed properties – rooftop solar may be inappropriate but could host batteries to complement neighbouring PV. 	<p>Timeline and level of effort:</p> <ul style="list-style-type: none"> Q3 2022-Q2 2023: scope interest for CE groups Q2-Q3 2023: fact-finding CE workshops Q4 2023: CE trial projects ready for Spring '24 deployment 2030: 27MWp 2050: 80MWp <p>To reach carbon neutrality it is recommended that the equivalent of 27MW is installed within domestic properties (assuming 3kW installed per household). This is a third of the potential capacity that could be deployed to 2030 as it assumed other technologies will be installed simultaneously (e.g., energy efficiency and heating retrofit measures).</p> <p>Baseline:</p> <p>Approximately 13 MW of solar PV</p> <p>Over 2,000 households have installed solar panel (March 22)</p> <p>National Policy:</p> <ul style="list-style-type: none"> Usually under Permitted Development, stakeholder engagement demonstrated uncertainty around this. Smart Export Guarantee (SEG) payments
--	--

INVESTMENT AND FUNDING

Similar to interventions 1 and 2, the sources of finance for implementing this intervention are diverse and include partnerships with public sector and housing associations. Private owners and landlords as well as existing and new taxpayer funding streams offer significant opportunities for financing. Some of the most relevant sources of funding include:

- Homeowner and private landlord investment
- Private Sector revolving finance
- Local Authority Delivery funding


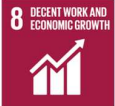


WINCHESTER CITY COUNCIL ROLE

Influencing: Incentivise homeowners to install the solar PV themselves. Lobbying for funding and running promotional and educational campaigns for the public.

Enabling: Develop local policies (e.g., local plan and housing plan). Managing financial streams from national government and other funding. Develop partnerships with private landlords, private sector (manufacturers) and community led organisations.

Delivering: It is recommended that WCC support a solar PV installation programme for domestic properties, building on the current solar PV installed within the district (equivalent of approximately 13 MW). WCC could either directly fund installation in specific neighbourhoods.

6.6 COMMERCIAL INTERVENTIONS

 Intervention 4: Support installation of energy efficiency measures in offices, retail, and other commercial property types	
<p>What?</p> <p>Energy efficiency measures should be applied to a third of offices, retail, and other commercial property types in the Winchester district, as identified in the Building Energy Efficiency Surveys. Collaborating with private and third sector organisations will be essential to drive district-wide decarbonisation as the commercial sector accounts for 172ktCO₂ or 27% of the overall property mix. There will be quick wins, such as installing doors on refrigeration shelves in shops and supermarkets, but other measures may have longer timescales and require different levels of investment. WCC could work closely with the Winchester Business Improvement District (BID) and other business associations to better understand how to support and drive private sector decarbonisation.</p>	<p>Co-benefits:</p> <ul style="list-style-type: none"> ▪ Reduced energy bills and lower costs ▪ Increasing business competitiveness ▪ Energy security ▪ Reduced demand for fossil fuels ▪ Reputational benefits ▪ Lowered costs can help SMEs
<p>Carbon savings (2030): 43ktCO₂</p>	<p>SDGs:</p>   
<p>Cost (2030): Estimated capex £15m-£20m</p>	

<p>How?</p> <ul style="list-style-type: none"> ▪ Ofgem provides advice, grants and loans to for businesses. ▪ Business-focused workshops to understand specific barriers to decarbonisation and energy efficiency measures. ▪ Act as initial point-of-contact to organise joint / symbiotic programmes. ▪ Council can use publicity and procurement to encourage / advertise private sector uptake. ▪ Capital loans to fund measures (likely on a more commercial basis than those provided to residents). ▪ Through GEDS, help businesses understand benefits of investment to lower long-run costs. ▪ Encourage businesses to put Carbon Footprint or EPC rating, similar to food hygiene ratings, so consumers can choose to support low carbon and decarbonising businesses. ▪ Demonstrate 'quick wins' such as turning off equipment when not in use, turning off lights at night/empty rooms and covering refrigeration units. ▪ Costs and consumer behaviour will drive company actions; consumers need accurate information to counter contradictions arising through Imperfect Knowledge. ▪ Low Carbon Across the South and East (LoCASE) grant and funding support for SMEs 	<p>Lead:</p> <p>Private sector</p> <p>Partners:</p> <p>Ofgem</p> <p>Winchester City Council / WinACC</p> <p>Hampshire County Council</p> <p>Installers</p> <p>Winchester BID / Sustainable Business Network / Carbon Trust and other business associations</p> <p>Meerkat Associates</p> <p>LoCASE</p>
	<p>Timeline:</p> <ul style="list-style-type: none"> ▪ 2030: Installed in 17% of buildings ▪ 2050: Installed in 100% of buildings
	<p>Baseline:</p> <p>Meerkat Associates have been asked to help Winchester businesses to reduce monthly costs and carbon emissions.</p>
	<p>National Policy:</p> <ul style="list-style-type: none"> ▪ Energy Security Strategy ▪ Heat and Buildings Strategy

INVESTMENT AND FUNDING

Funding for these measures is diverse, however mostly will be in the private sector, but there may also be taxpayer funding for upgrades. Additionally, most of the investment will be driven by private sector decision making, but also influenced by policy drivers that will drive investment in the energy efficiency area, more specifically Minimum Energy Efficiency Standards (MEES) for commercial sector requires an EPC rating of E or better by 2023 and the UK government is consulting on a requirement for a B rating by 2030.

Relevant sources of finance include:

Private sector investment

Fit for free solar investors



BEIS funding for SME energy efficiency and for heat networks in dense clusters

WINCHESTER CITY COUNCIL ROLE

Influencing: Running promotional campaigns and findings opportunities to network with business and organisations.

Enabling: Collaborating with private and third sector organisations will be essential to drive district-wide decarbonisation as the commercial sector accounts for 172ktCO₂ or 27% of the overall property mix. WCC could work closely with the Winchester Business Improvement District (BID) to better understand how to support and drive private sector decarbonisation

Delivering: Developing, managing and administrating a programme for commercial sector or through a third party, to provide advice services, guidance on incentives framework for suppliers.

 Intervention 5: Low carbon heating systems installed in commercial properties	
<p>What?</p> <p>Installing low carbon heating in 11% of commercial properties by 2030 is necessary to meet net zero targets – this installation could be applied to retail and offices (excluding industry). Heat pump technology has improved in recent years and is now a cost-effective, market-ready solution for commercial, residential and industrial properties. The effectiveness of these systems can be further improved when implemented as part of a wider heating network, which retains and reuses excess heat – Winchester could consider this in the future.</p>	<p>Co-benefits:</p> <ul style="list-style-type: none"> ▪ Reduced energy bills and lower costs ▪ Increasing business competitiveness ▪ Energy security ▪ Reduced demand for fossil fuels ▪ Reputational benefits
<p>Carbon savings (2030): 4ktCO₂</p>	<p>SDGs:</p> 
<p>Cost (2030): Estimated capex £5m-£10m</p>	

<p>How?</p> <ul style="list-style-type: none"> ▪ Apply for HNIP funding on appropriate projects ▪ Ofgem provides advice, grants and loans to for businesses. ▪ Replacing fossil fuel boilers with nominally air source heat pumps with a co-efficient of performance (COP) of 2.75 as a minimum is recommended. ▪ InnovateUK offer funding for businesses to test innovate ideas. ▪ Workshops to scope interest, barriers, potential projects, co-interests. ▪ District heating and microgrids can reduce waste by sharing resources, which can be considered for new developments. ▪ Grants, subsidies, loans and bulk purchasing to support capital gaps. ▪ Winchester BID / other business associations could jointly procure to benefit members via bulk purchasing 	<p>Lead:</p> <p>Private sector</p> <p>Partners:</p> <p>Ofgem</p> <p>Winchester City Council / WinACC</p> <p>Hampshire County Council</p> <p>Installers</p> <p>National Grid</p> <p>Winchester BID / Sustainable Business Network / Carbon Trust and other business associations</p> <p>Meerkat Associates</p>
	<p>Timeline:</p> <ul style="list-style-type: none"> ▪ 2030: Installed in 11% of buildings ▪ 2050: Installed in 50% of buildings
	<p>Baseline:</p> <p>Hampshire County Council was awarded £144,000 towards developing a business case for a district energy network in Winchester in 2014, potentially connecting Royal Hampshire County Hospital, University of Winchester, HM Prison Winchester and Hampshire County Council.</p> <p>Local Plan Policy CP12</p>
	<p>National Policy:</p> <p>Clean Heat Grant</p> <p>Smart Export Guarantee (SEG)</p> <p>Heat and Buildings Strategy</p>

INVESTMENT AND FUNDING

Funding for these measures is diverse, however mostly will be in the private sector, but there may also be taxpayer funding for upgrades. Additionally, most of the investment will be driven by private sector decision making, but also influenced by policy drivers that will drive investment in the energy efficiency area, more specifically Minimum Energy Efficiency Standards (MEES) for commercial sector requires an EPC rating of E

or better by 2023 and the UK government is consulting on a requirement for a B rating by 2030.

Relevant sources of finance include:



- Private sector investment
- Fit for free solar investors
- BEIS funding for SME energy efficiency and for heat networks in dense clusters

WINCHESTER CITY COUNCIL ROLE

Influencing: Running promotional campaigns and findings opportunities to network with business and organisations.

Enabling: Collaborating with private and third sector organisations will be essential to drive district-wide decarbonisation as the commercial sector accounts for 172ktCO₂ or 27% of the overall property mix. WCC could work closely with the Winchester Business Improvement District (BID) to better understand how to support and drive private sector decarbonisation

Delivering: Developing, managing and administrating a programme for commercial sector or through a third party, to provide advice services, guidance on incentives framework for suppliers.

 Intervention 6: Install 8MW of rooftop solar PV on commercial properties across Winchester district	
<p>What?</p> <p>Solar photovoltaics (solar PV) will be beneficial in the shorter term for Winchester district to accelerate grid decarbonisation. Rooftop solar is a highly effective way for businesses and residents to reduce their carbon footprint and save money on energy bills.</p>	<p>Co-benefits:</p> <ul style="list-style-type: none"> ▪ Lower energy bills ▪ Energy security ▪ Very visible ▪ Reputational benefits
<p>Carbon savings (2030): 7ktCO₂</p>	<p>SDGs:</p> 
<p>Cost (2030): Estimated capex £4m-£6m</p>	
<p>How?</p> <ul style="list-style-type: none"> ▪ Emphasise market-readiness, cost saving and revenue generating potential. ▪ Workshops with businesses to identify interest, barriers, misconceptions. ▪ Commercial properties that are rented will require co-ordination between landlord, renter and supplier to install solar PV. 	<p>Lead:</p> <p>Private sector</p> <p>Winchester City Council</p> <p>Partners:</p> <p>Hampshire County Council / WinACC / Solar Together Hampshire</p>

<ul style="list-style-type: none"> ▪ WCC could make solar PV programmes more appealing by offering clarity on the planning regulations. ▪ Reviving a reviewed version of the Hampshire bulk purchase scheme to offer discounts on commercial prices. ▪ Co-ordinating installations on shared properties and at street level. ▪ Working with community groups to organise street-level installations (often installing runners across terraced rooftops) to lower costs and installation times. ▪ Link interested businesses with community groups for joint projects the council does not have to manage. ▪ 'Rent-a-Roof' schemes can fill homeowner capital gaps; these are less commercially popular since Feed-in Tariffs were stopped. ▪ Local authority-backed loans can provide upfront capital; energy bill savings could be used to repay council's initial capital expenditure. ▪ Installing batteries alongside solar helps resolve 'duck curve' and should be considered essential to PV installations. ▪ Support community/shared ownership schemes that pool resources and benefits; those whose properties are unsuitable could contribute capital or battery storage capacity and receive dividends. Utilities, businesses and non-profits can be involved alongside residents. ▪ Microgrids can lessen National Grid bottlenecks and support rural communities / businesses 	<p>Parish councils</p> <p>Solar installers</p> <p>Community Energy England</p> <p>Home/property owners</p> <p>National Grid / electricity suppliers</p> <p>LoCASE</p> <hr/> <p>Timeline:</p> <ul style="list-style-type: none"> ▪ Measures can be implemented immediately ▪ Dependent on capacity of qualified solar installers ▪ Long-term plan will encourage tradespeople to upskill ▪ 2030: 8MWp ▪ 2050: 23MWp <hr/> <p>Baseline:</p> <p>Solar Together Hampshire is inviting registrations for bulk purchasing scheme.</p> <p>Local Plan Policy CP12</p> <hr/> <p>National Policy:</p> <ul style="list-style-type: none"> ▪ Usually under Permitted Development; stakeholder engagement demonstrated uncertainty around this. ▪ Smart Export Guarantee
---	---

INVESTMENT AND FUNDING

Similar to interventions 4 and 5, funding for these measures is diverse, however mostly will be in the private sector, but there may also be taxpayer funding for upgrades. Additionally, most of the investment will be driven by private sector decision making, but also influenced by policy drivers that will drive investment in the energy efficiency area, more specifically Minimum Energy Efficiency Standards (MEES) for commercial sector requires an EPC rating of E or better by 2023 and the UK government is consulting on a requirement for a B rating by 2030.

Relevant sources of finance include:

- Private sector investment

- Fit for free solar investors

- BEIS funding for SME energy efficiency and for heat networks in dense clusters




WINCHESTER CITY COUNCIL ROLE

Influencing: Running promotional campaigns and findings opportunities to network with business and organisations.

Enabling: Commercial properties that are rented will require co-ordination between landlord, renter and supplier to install solar PV WCC could make solar PV programmes more appealing by offering clarity on the planning regulations and reviving a reviewed version of the Hampshire bulk purchase scheme. In London, a ‘Solar Opportunity Map’ has been created to give residents and property owners a high-level idea of the solar resources potentially available, WCC could explore something similar with partners in Winchester to produce a high-level resource map.

Delivering: Co-ordinating installations on shared properties, on street level and joint purchasing could bring down costs.

6.7 INDUSTRIAL INTERVENTIONS

 Intervention 7: Support and mandate installation of energy efficiency and heating retrofit measures within industry	
<p>What?</p> <p>It is recommended that WCC support and incentivise energy efficiency and heating retrofit measures in the chemical, food and beverages industry (largest energy consumers). An example of this is the Kalundborg industrial symbiosis discussed in Appendix A: Best Practice Case Studies.</p>	<p>Co-benefits:</p> <ul style="list-style-type: none"> Cost savings will make Winchester more appealing district Reputational benefits to district and firms Future Ready and anticipates future policy development
<p>Carbon savings (2030): 60ktCO2</p>	<p>SDGs:</p>  
<p>Cost (2030): Unable to estimate capex due to novel technology</p>	
<p>How?</p> <ul style="list-style-type: none"> Where possible, WCC should mandate energy efficient measures within the private sector by introducing sustainable procurement requirements and/or local air pollution regulation standards. WCC could support the installation of energy efficient measures by collaborating with BID partners to identify barriers to decarbonisation and scope areas of potential public- 	<p>Lead:</p> <p>Winchester City Council Private sector firms</p> <p>Partners:</p> <p>Winchester BID Enterprise M3 Growth Hub IncuHive Enterprise First Business South Hampshire Chamber of Commerce</p>

<p>private-private collaboration to accelerate the uptake of such measures within industry.</p> <ul style="list-style-type: none"> WCC should aim for an 8% deployment of hydrogen energy in industry and 20% of carbon capture and storage (CCS) for high temperature processes within industry. Improving energy efficiency by 5% and shifting towards electrification of 50% for low temperature processes aligns with Winchester’s net zero aspirations. Use existing business networks to share best practice and explore areas of co-operation to spread and lower costs. Emphasise how cost savings proactive policies will support business development With GEDS, support green and sustainable local start-ups and green enterprise hub. The European Union has recently published: Decarbonisation road map for the European food and drink manufacturing sector. District heating can move excess heat from one business to another, improving efficiency. 	<p>Timeline:</p> <ul style="list-style-type: none"> Q1 2023 – workshops to identify barriers to decarbonisation Q3 2023 – flagship energy efficiency and retrofit project launched 2024 – Local Plan published supporting continued measures and incorporating previous lessons 2030 – 5% energy efficiency; 8% deployment of H2; 10% CCS for high temperature processes 2050 – 10% energy efficiency; 17% H2; 13% CCS for high temperature processes
	<p>Baseline:</p> <p>Meerkat Associates have been asked to help Winchester businesses to reduce monthly costs and carbon emissions.</p>
	<p>National Policy:</p> <ul style="list-style-type: none"> British Energy Security Strategy Heat and buildings strategy Net Zero Strategy: Build Back Greener

INVESTMENT AND FUNDING



It is anticipated that initial by WCC will attract private investment, this hasn’t been quantified. If successful, this approach could be replicated in other interventions driven by private sector. There are limited policy levers around the industrial sector, all of the investment will require private sector decision making. However, Minimum Energy Efficiency Standards still apply to buildings.

WINCHESTER CITY COUNCIL ROLE

- Influencing:** Running promotional campaigns and findings opportunities to network with business and organisations.
- Enabling:** WCC should mandate energy efficient measures within the private sector by introducing sustainable procurement requirements and/or local air pollution regulation standards. WCC could support the installation of energy efficient measures by collaborating with BID partners to identify barriers to decarbonisation and scope areas of potential public-private-private collaboration to accelerate the uptake of such measures within industry. An

example of this is the Kalundborg industrial symbiosis as discussed in Appendix A: Best Practice Case Studies

Delivering: Possibly managing procurement and frameworks for deployment.

 Intervention 8: Support and incentivise businesses to install Solar PV on industrial units	
<p>What?</p> <p>Industrial buildings offer significant opportunities for solar PV in Winchester. It is recommended that 3.5 MWp of rooftop solar PV is installed on industrial units in Winchester. Installing solar carports can utilise additional space.</p>	<p>Co-benefits:</p> <ul style="list-style-type: none"> Lower energy bills and sell to EVCP users Energy security Very visible – reputational benefits Increase property prices
<p>Carbon savings (2030): 3ktCO₂</p>	<p>SDGs:</p> 
<p>Cost (2030): Estimated capex £2m-£3m</p>	
<p>How?</p> <ul style="list-style-type: none"> Support and incentivise the development of decentralised microgrids, which can later be connected to the National Grid and each other - mitigating potential capacity bottlenecks. Explore profit sharing, renting or purchasing rooftop capacity from property owners on a case-by-case basis which is effective particularly where multiple businesses rent conjoined units. Further research is required to map available space suitable for solar PV on industrial units (district high level data is currently only available). 	<p>Lead:</p> <p>Winchester City Council Winchester BID Private sector partners</p> <p>Partners:</p> <p>Solar installers Property owners and tenants National Grid / electricity suppliers</p> <p>Timeline:</p> <ul style="list-style-type: none"> Requires qualified installers and participating firms 2030: 3.5MWp 2050: 10MWp

<ul style="list-style-type: none"> ▪ Work with local industry to incentivise its uptake if the scale of opportunity was identified – WCC developing solar map should support this. ▪ Businesses will particularly benefit from solar as peak generation is normally during work hours. ▪ In combination with EVCP, firms could sell electricity to staff/car park users or offer cheap charging as a company benefit. ▪ Support packages to SMEs on similar basis to homeowners of fronting capital costs in exchange for longer term repayments. ▪ See Intervention 6 as there will likely be cross-overs between industrial and commercial strategies. 	<p>Baseline:</p> <p>HCC Solar Together for residents and SMEs to bulk purchasing PV.</p>
	<p>National Policy:</p> <ul style="list-style-type: none"> ▪ Usually included within Permitted Development ▪ Smart Export Guarantee

INVESTMENT AND FUNDING

It is anticipated that initial by WCC will attract private investment, this hasn't been quantified. If successful, this approach could be replicated in other interventions driven by private sector. There are limited policy levers around the industrial sector, all of the investment will require private sector decision making. However, Minimum Energy Efficiency Standards still apply to buildings.



WINCHESTER CITY COUNCIL ROLE

Influencing: Running promotional campaigns and findings opportunities to network with business and organisations.

Enabling: WCC could support and incentivise the development of decentralised microgrids, which can later be connected to the National Grid and each other - this would mitigate potential capacity bottlenecks. WCC could work with local industry to incentivise its uptake if the scale of opportunity was identified. It is recommended that 3.5 MWp of rooftop solar PV is installed on industrial units in Winchester.

Delivering: Possibly managing procurement and frameworks for deployment.

6.8 TRANSPORT INTERVENTIONS

 Intervention 9: Promote hybrid working to reduce carbon emissions from commuting	
<p>What?</p> <p>Local emissions plummeted during the pandemic as many people were forced to work from home, coupled with the district's prevalence of private car use for commuting. Now, with the growing demand for hybrid work practices, there is an important opportunity to reduce transport emissions. As a major local employer, WCC has led by example by providing flexible working options and supporting employees to work from home. This reduces emissions while also meeting demands for flexible and hybrid working conditions which will improve wellbeing and retention among staff.</p>	<p>Co-benefits:</p> <ul style="list-style-type: none"> ▪ Staff satisfaction, productivity and retention ▪ Lower firms', individuals' and district's carbon footprint ▪ Improve air quality and protect historic buildings ▪ Lower bills: employee costs associated with commuting and corporate costs associated with offices ▪ Fewer road traffic incidents ▪ Quieter streets for active travel and schoolchildren ▪ Can support SMEs by reducing expectation for offices
<p>Carbon savings (2030): 10ktCO2</p>	<p>SDGs:</p> 
<p>Cost (2030): Estimated capex £3m-£5m</p>	
<p>How?</p> <ul style="list-style-type: none"> ▪ WCC has agreed that all employees must spend at least 50% of time in office, it could aim for 35% of the workforce to work from homes 50% of the time (from pre-pandemic levels). This target is based on a 2020 study by the ONS. ▪ Emphasise to private sector partners, potentially via Winchester BID, of the benefits of flexible working in staff retention, productivity and corporate carbon footprint. ▪ As detailed in GEDS, support deployment of super-fast broadband 	<p>Lead:</p> <p>Winchester City Council Hampshire City Council</p> <p>Partners:</p> <p>Private sector firms and trade groups Other public sector employees</p> <p>Timeline and level of effort:</p> <p>2030: 35% of people tele-commuting 50% of the time</p> <p>WCC has agreed that all employees must spend at least 50% of time in office. It could aim for 35% of the workforce to work from homes 50% of the time (from pre-pandemic</p>

<p>and improved phone/data signals in rural areas.</p> <ul style="list-style-type: none"> Working from home can increase certain emissions through private usage, so it is important to enact within the broader decarbonisation of electricity. Employers should also implement sustainable travel plans for their organisations to ensure that when employees do travel for work, it is done with the least possible carbon emissions. Employers should tailor arrangements around staff, some will be unable to work from home and others will be more productivity doing so; important neither are forced into inappropriate circumstances. 	<p>levels). This target is based on a 2020 study by the ONS.</p>
	<p>Baseline:</p> <p>April 2020 (latest available figures) 46.6% of people in employment did some work from home (ONS national statistics).</p> <p>Many organisations, including WCC have since adopted more flexible policies towards home/distance working.</p>
	<p>National Policy:</p> <ul style="list-style-type: none"> Acas code of practice for handling requests in a reasonable manner Making a statutory application

INVESTMENT AND FUNDING



For this intervention it could be a combination of public and private investments, as WfH could be promoted as a measure to be adopted by other employers in Winchester district.

WINCHESTER CITY COUNCIL ROLE

Influencing: As a major local employer, WCC has led by example by providing flexible working options and supporting employees to work from home, it could promote benefits to other employers in the district.

Enabling: Multidisciplinary co-ordination, managing resources, facilitating connections and accelerating changes in the district.

Delivering: Continue to deliver transport plans and policies with HCC, influencing behaviours through communications and information.

 Intervention 10: Reduce car journeys by improving active travel infrastructure and public transit options	
<p>What?</p> <p>Reducing car journeys by incentivising active travel is a core part of reducing emissions and supporting the development of healthier, more connected neighbourhoods in the Winchester district. The 15 / 20-minute neighbourhood concept is at the forefront of WCC's thinking as it takes a holistic approach to local planning that includes not only travel but services, greenspace, and wellbeing - an approach that encourages cooperation across teams and between sectors. Stakeholder engagement has demonstrated that Winchester residents would use improved active travel options. Connectivity between towns and villages in the district should also be considered to save people unnecessary trips into Winchester city.</p>	<p>Co-benefits:</p> <ul style="list-style-type: none"> ▪ Improve air quality ▪ Reduce traffic congestion ▪ Lessens need for expensive motorised transport which opens new opportunities for work and alternative spending decisions, supporting local economy ▪ Allows residents to explore more of the district, potentially supporting rural villages
<p>Carbon savings (2030): 17ktCO2</p>	<p>SDGs:</p> 
<p>Cost (2030): Too many variables to estimate capex</p>	
<p>How?</p> <ul style="list-style-type: none"> ▪ Physical infrastructure separating active travel users and drivers. ▪ Improving active travel infrastructure (e.g., cycling routes) and public transport options (e.g., bus services frequency) in the district this will reduce reliance on cars. ▪ Transport options should be interconnected; buses, trains and active travel networks complementing one another. ▪ School Streets and Low Traffic Neighbourhoods can encourage more children to walk or cycle to school, lessening school hour congestion. 	<p>Lead:</p> <p>Hampshire County Council Winchester City Council</p> <p>Partners:</p> <p>Active travel groups, i.e., Cycle Winchester Bus companies Developers Local employers, schools and public sector</p> <p>Timeline:</p> <ul style="list-style-type: none"> • 2030: 50% of trips by car; 25% public transport; 5% bicycle

<ul style="list-style-type: none"> ▪ Utilising and publicising Rights of Ways to highlight route options. ▪ Ensuring footpaths are accessible, without heavy gates, unstable bridges or difficult stiles (or deliberate obstructions). ▪ Publish map of the district's foot and cycle lanes on website, community noticeboards, employee noticeboards and newsletters. ▪ Community car rental schemes (especially for villages) to reduce the need for private car ownership. ▪ Well-lit and maintained paths without blind corners to increase perceptions of safety. ▪ Specific routes for cyclists connecting towns, villages and city – where roads are used, requirement for plantings, barriers or other physical infrastructure to delineate road uses. ▪ Routes should intersect at various points to improve connectivity. ▪ Safer crossings and junctions, learning from the Netherlands and Oxford. ▪ Bridges or tunnels ideally when crossing roads, for where signalled junctions where not possible. ▪ Focus on making active travel appealing to women and children has disproportionately positive impact. ▪ Ample bicycle parking in convenient locations, including shelters and hangars. ▪ Encouraging employers to have cycle to work schemes, lockers and changing facilities on site. ▪ Provision for e-cycle charging infrastructure. ▪ Repair hubs, workshops and skills to build confidence maintaining bicycles. ▪ Clean Air Zone or Ultra Low Emission Zone allows council to restrict specific road users. 	<ul style="list-style-type: none"> • 2050: 40% of trips by car; 26% public transport; 7.5% bicycle • Behaviour change can create virtuous cycles
	<p>Baseline:</p> <ul style="list-style-type: none"> ▪ 68% of journeys are currently made by car. ▪ 3% by bicycle ▪ Cycling 1% of journeys to school <p>Currently, 68% of journeys made by car. By improving active travel infrastructure (e.g., cycling routes) and public transport options (e.g., bus services frequency) in the district, this would be reducing the number of car journeys to 40% and increasing cycling journeys to 4% and bus journeys to 27%.</p>
	<p>National Policy:</p> <ul style="list-style-type: none"> ▪ Active Travel England framework document ▪ Active travel: local authority toolkit ▪ Working together to promote active travel: a briefing for local authorities

<ul style="list-style-type: none"> ▪ Improved air quality will encourage take up. ▪ Pavements on country roads balanced with retaining of hedges/trees. ▪ Walking buses and cycle trains for schools. ▪ Speed limit restrictions ▪ Ensure development plans, give priority to provision of active travel options ▪ 	
--	--

INVESTMENT AND FUNDING

Sources of funding include both public and private financing. These sources can include:

Private operators

green and social investment models may access corporate and retail investors.

Government grants (e.g., Bus, Cycle, Rail, ZEV, Innovation)

New potential funding – National

New potential funding – locally raised revenues



Development contributions/CIL/Infrastructure Levy

WINCHESTER CITY COUNCIL ROLE

Influencing: Running active mobility workshops and supporting local business to add value to existing high streets. Influencing behaviours through communications and information, stakeholder engagement has demonstrated that Winchester residents would use improved active travel options. Overseeing and monitoring of the LTP4.

Enabling: Enabling new transport solutions, technologies and innovations with seed fundings. Securing funding and investment Multidisciplinary co-ordination, managing resources, facilitating connections and accelerating changes in the district.

Delivering: Collaborative delivery of schemes the Winchester movement strategy and LTP4 with HCC to demonstrate leadership in inclusive, zero carbon transport system. Connectivity between towns and villages in the district should also be considered to save people unnecessary trips into Winchester city. Decarbonise WCC's transport assets.

 Intervention 11: Decarbonise passenger service fleets through Hampshire County Council procurement	
<p>What?</p> <p>Only 2% of England’s local operator bus fleet is zero emission. This intervention aims to reduce emissions through decarbonising passenger service fleets such as taxis & buses.</p>	<p>Co-benefits:</p> <ul style="list-style-type: none"> Improved air quality Better health outcomes for residents Lower fares
<p>Carbon savings (2030): 56 ktCO₂</p>	<p>SDGs:</p> 
<p>Cost (2030): Estimated capex £250k-£500k (taxis) and £35m-£40m (buses)</p>	
<p>How?</p> <ul style="list-style-type: none"> Engage with key stakeholders to understand the barriers and opportunities to decarbonising passenger service fleets Mandate the procurement of decarbonised bus and taxi services Implementation of clean air or low emission zones to restrict petrol and diesel vehicles Provision of more electric vehicle charging points both locally & across the county Grants to help taxis to switch to electric (see Southampton case study) Explore the possibility of switching to fuels such as HVO or hydrogen. This is also an opportunity to incentivise the use of public transport more generally through measures such as: providing free bus passes, improving the reliability & frequency of services, and expanding the network 	<p>Lead: Hampshire County Council</p> <p>Partners:</p> <ul style="list-style-type: none"> Winchester City Council Central government Transport operators Energy providers EV charging point providers <p>Timeline:</p> <ul style="list-style-type: none"> 2035: 100% decarbonisation It is recommended that 100% of taxis and buses to be decarbonised by 2030. <p>Baseline:</p> <ul style="list-style-type: none"> WCC will require buses and taxis to be electric/alternative fuel vehicles by 2030 WCC will collaborate with Hampshire County Council and private operators to expand and enhance public transport services (bus and rail), including access, frequency and affordability.

	<p>National Policy:</p> <ul style="list-style-type: none"> ▪ Decarbonising Transport – A Better, Greener Britain ▪ Bus Back Better ▪ Zero emission buses: local authority toolkit
--	---



INVESTMENT AND FUNDING

Sources of funding include both public and private financing. These sources can include:

- Private operators
- Green and social investment models may access corporate and retail investors.
- Government grants (e.g., Bus, Cycle, Rail, ZEV, Innovation)
- New potential funding – National
- New potential funding – locally raised revenues
- Development contributions/CIL/Infrastructure Levy

WINCHESTER CITY COUNCIL ROLE

- Influencing:** Overseeing and monitoring of the LTP4. Cementing position as a global leader in new transport solutions, technologies and innovations. Lobbying for electric vehicle charging points in Winchester district.
- Enabling:** Mandating the electrification of taxis and buses throughout the region which would lead to the decarbonisation of this service. Enabling new transport solutions, technologies and innovations with seed fundings. Securing funding and investment Multidisciplinary co-ordination, managing resources, facilitating connections and accelerating changes in the district. Develop partnerships with private sector fleet operators.
- Delivering:** Collaborative delivery of schemes in the LTP4 with HCC to demonstrate leadership in inclusive, zero carbon transport system. Secure bus emissions improvement through partnership or franchising Develop a travel demand management programme, influencing behaviours through communications and information. Developing incentives for switch: providing free bus passes, improving the frequency of services, and expanding the network

 Intervention 12: Work with local business and procurement teams to decarbonise freight fleets	
<p>What?</p> <p>Developing strategies to regulate and incentivise the decarbonisation of freight fleets, including HGVs, will help to reduce emissions and comply with future national legislation. Winchester’s current work with Zedify to expand the use of cargo bikes is a great example of what the city can do to decarbonise local deliveries and support the local economy.</p>	<p>Co-benefits:</p> <ul style="list-style-type: none"> Improved air quality Better health outcomes for residents Less reliance on high-cost fossil fuels Improved cross-sector working relationships
<p>Carbon savings (2030): 34 ktCO₂</p>	<p>SDGs:</p> 
<p>Cost (2030): Too many variables and emerging technologies/approaches to estimate capex</p>	
<p>How?</p> <ul style="list-style-type: none"> Decarbonise the council fleet & procurement - Set standards for its own fleet (including HGV/HDVs) and for contractor vehicles. This could be achieved through a phased plan that focusses on known solutions and technologies (e.g. EV for cars and vans, greater use e-bikes for staff, reduced staff travel) with a phased approach for the wider fleet to align with technology and operational needs. Implementation of clean air or low emission zones to allow only decarbonised vehicles Provision of more electric vehicle charging points both locally & across the county. Work with businesses to understand the barriers to freight decarbonisation. Provide advice and support to businesses looking to decarbonise. Provide opportunities for operators to trial electric vans or cargo bikes. 	<p>Lead: WCC & HCC</p> <p>Partners:</p> <ul style="list-style-type: none"> Local businesses EV charging providers National government Cargo bike providers
	<p>Timeline:</p> <p>2030: 33% of HGVs decarbonised</p> <p>2050: 100% of HGVs decarbonised</p>
	<p>Baseline:</p> <ul style="list-style-type: none"> WCC has committed to delivering key studies in 2020 to take forward the Winchester Movement Strategy, including a Freight Strategy.

<ul style="list-style-type: none"> ▪ Create working group to explore interest/potential for out-of-town delivery hub. ▪ Allocate land for more efficient storage and distribution hubs (consolidation hubs) or use council assets as micro-hubs. ▪ Establish a freight forum or task group to support sector-led solution to decarbonising freight. ▪ Offer subsidised EV, Bikeability or specialist e-cargo bike training, or produce videos or checklists to familiarise drivers with the unique features of electric vehicles. ▪ Work with local dealerships or bike retailers to help them become EV approved. ▪ Require the use of high blend (Renewable Transport Fuel Obligation certified) renewable fuels in construction management plans. ▪ Offer an HDV grant. 	<p>National Policy:</p> <p>Decarbonising Transport – A Better, Greener Britain</p>
---	---

Removing heavy vehicles from city centre routes will have the knock-on effect of improving air quality and make cycling safer, motivating an additional shift away from cars and towards active travel (e.g., pedestrians and cyclists). This is complemented by LTP4 policy C2 on the “efficient and sustainable movement of goods and people.” Given the national decarbonisation of HGVs, WCC should aim for 50% of HGVs to be electric by 2030 and 100% by 2040. The proposed WCC delivery hub could include hydrogen refuelling and super-fast charging points to establish Winchester as a market leader in the sustainability sector.

INVESTMENT AND FUNDING

Sources of funding include both public and private financing. These sources can include:

Private operators

green and social investment models may access corporate and retail investors.

Government grants (e.g., Bus, Cycle, Rail, ZEV, Innovation)

New potential funding – National

New potential funding – locally raised revenues


Development contributions/CIL/Infrastructure Levy


WINCHESTER CITY COUNCIL ROLE

Influencing: Overseeing and monitoring of the LTP4. Cementing position as a global leader in new transport solutions, technologies and innovations. Lobbying for electric vehicle charging points in Winchester district.

Enabling: Developing strategies to regulate and incentivise the decarbonisation of freight fleets, including HGVs, will help to reduce emissions and comply with future national legislation. WCC could work in partnership across different levels of governance (e.g., national government and local authority tiers), private sector transport providers and businesses will be vital in facilitating a sustainable transition. Winchester’s current work with Zedify to expand the use of cargo bikes is a great example of what the city can do to decarbonise local deliveries and support the local economy.

Delivering: Collaborative delivery of schemes in the LTP4 with HCC to demonstrate leadership in inclusive, zero carbon transport system. Secure bus emissions improvement through partnership or franchising. Develop a travel demand management programme, influencing behaviours through communications and information. Developing incentives for switch: providing free bus passes, improving the frequency of services, and expanding the network.

 Intervention 13: Invest in EV charging to decarbonise private cars	
<p>What?</p> <p>Recent research has shown that most UK local authorities are unprepared for the growing demand for electric vehicles. WCC must prepare for and support the growth in electric vehicles by investing in EV charging points. Local authority led EV infrastructure provides an opportunity to shape the way EVs are used in the city, as well as potentially offering a new revenue stream. WCC’s recent work with JoJu Solar and Mer demonstrates that the Council is committed to supporting the transition to electric vehicles in the city. To keep up with the growing demand, WCC needs to build on this work and expand the current network of charging points.</p>	<p>Co-benefits:</p> <ul style="list-style-type: none"> ▪ Better health outcomes for residents through improved quality of place ▪ Less reliance on high-cost fossil fuels ▪ Improved cross-sector working relationships
<p>Carbon savings (2030): 600 ktCO₂</p>	

<p>Cost (2030): Too many variables to estimate capex</p>	<p>SDGs:</p> 
<p>How?</p> <ul style="list-style-type: none"> ▪ Build on existing work with JoJu Solar and Mer to expand the EV charging network in way that aligns and supports transport/mobility plans ▪ Implementation of low emission zones to encourage the transition to electricdecarbonised vehicles. ▪ Work with local organisations to provide EV charging points at workplaces and leisure facilities. ▪ Integrate corporate solar PV with staff EVs to allow businesses to sell / subsidise electricity to EV driving staff (EVs may become battery source in the future). 	<p>Lead: WCC & organisations specialising in the installation of low carbon electricity technologies.</p> <p>Partners:</p> <ul style="list-style-type: none"> ▪ Local businesses & organisations <p>Timeline:</p> <p>2030: 16% of car electrified</p> <p>2050: 46% of car electrified</p> <p>Baseline:</p> <ul style="list-style-type: none"> ▪ WCC has committed to adding 46 EV charging points on its own estate by 2024 and to facilitate the rollout of private charging facilities in new commercial and housing developments ▪ The Council will implement differential charging for low emission vehicles in council car parks
	<p>National Policy:</p> <p>Decarbonising Transport – A Better, Greener Britain</p>

INVESTMENT AND FUNDING

Sources of funding include both public and private financing. These sources can include:

Private sector

Green and social investment models may access corporate and retail investors.

Government grants (e.g., Bus, Cycle, Rail, ZEV, Innovation)

New potential funding – National

New potential funding – locally raised revenues

Development contributions/CIL/Infrastructure Levy



WINCHESTER CITY COUNCIL ROLE

Influencing: Overseeing and monitoring of the LTP4. Cementing position as a global leader in new transport solutions, technologies and innovations. Lobbying for electric vehicle charging points throughout Winchester district.

Enabling: Developing strategies to encourage the installation of EVCPs at public and private car parks, offices and residencies to help reduce emissions and comply with future national legislation. WCC could work in partnership across different levels of governance (e.g., national government and local authority tiers), private sector transport providers and businesses will be vital in facilitating a sustainable transition. Organising trials with EV providers for new technologies could support delivery.

Delivering: Collaborative delivery of schemes in the LTP4 with HCC to demonstrate leadership in inclusive, zero carbon transport system. Develop EV charging demand management programme, influencing behaviours through communications and information and work with private sector and local public bodies to provide EVCP on their properties.

6.9 LAND-USE INTERVENTIONS

 Intervention 14: 50MW of utility scale solar PV installed on poorer quality land	
<p>What?</p> <p>To accelerate grid decarbonisation and anticipate the rising demand for electricity, it is recommended that WCC generate more renewable energy and double the existing solar PV installation pipeline of 23MW to 50MW.</p>	<p>Co-benefits:</p> <ul style="list-style-type: none"> Provision of low-cost energy Local revenue generation Local energy security Community energy groups can build social capital
<p>Carbon savings (2030): 147 ktCO₂</p>	<p>SDGs:</p> 
<p>Cost (2030): Estimated capex of £90m-£100m (PV and wind)</p>	
<p>How?</p> <ul style="list-style-type: none"> Identify feasible sites for solar PV – Grade 3 agricultural land, flat and near to substations Work with landowners to buy or rent land. Facilitate workshops with local farmers and landowners to 	<p>Lead: WCC / WinACC</p> <p>Partners:</p> <ul style="list-style-type: none"> Local landowners & developers PV solar providers Community Energy South HCC Parish councils

<p>understand barriers or reluctance to solar arrays</p> <ul style="list-style-type: none"> ▪ Collaborate with renewable energy providers. E.g. Warrington worked with GRIDSERVE to develop solar farms ▪ Explore with landowners agrivoltaic possibilities. ▪ Consider lakes and reservoirs for floating solar arrays. ▪ SDNPA unlikely to be viable for PV installations. ▪ Local community is key to delivery as objection/support can be critical to planning approval. Public benefit needs to be prioritised and parish councils can lead on driving community support. ▪ Community energy PV arrays can reduce bills for neighbours. 	<p>Timeline and level of effort.</p> <p>2030: 50MW and 54MW of onshore wind (dependant on English planning policy change)</p>
	<p>Baseline:</p> <p>16% of Winchester district energy from renewable sources, primarily six solar farms (March 22).</p> <p>Existing: Southwick Estate (48MW) / Bishops Sutton (12MW) / Raglington Farm (6MW) / Field House (6MW) / Bishops Waltham (6MW) / Forest Farm (3MW).</p> <p>Under development: Christmas Hill (25MW), Locks Farm, Denmead Farm.</p>
	<p>National Policy:</p> <p>Net Zero review being led by Chris Skidmore MP</p>

INVESTMENT AND FUNDING

Funding for this intervention will most likely be from third party, however public and private landowners should be incentivised and enable to invest directly on deployment.



Sources of finance could include:

- Power Purchase Agreements – Sale to virtual end users
- Large energy users – Direct connection
- Contracts for Difference
- New potential green and social investment models may access corporate and retail investors
- National Lottery fund or similar

WINCHESTER CITY COUNCIL ROLE

- Influencing:** Lobbying support for renewable energy, and in particular solar power. Promote the opportunities around large-scale renewables, e.g., in communications and by advertising identified land areas.
- Enabling:** Developing a renewable energy planning approach to ensure communication with grid and network operators and connection to grid once opportunity areas have been identified.

Delivering: Manage and identify opportunities, to draft applications and research new financing mechanisms and delivery models.

 Intervention 15: Plant a minimum of 400 trees per year (enhanced CNAP target of 100 trees)	
<p>What?</p> <p>Just 13% of the UK is covered in woodlands, compared to an EU average of 38%</p> <p>Offsetting from tree planting can be used for residual emissions after 2050 but the priority needs to be emissions reductions with trees and shrubs used to maximise co-benefits.</p>	<p>Co-benefits:</p> <ul style="list-style-type: none"> ▪ Increased resilience to extreme heat & flooding ▪ Improved mental & physical health benefits for residents ▪ Carbon sequestration ▪ Benefits for local biodiversity ▪ Filter air pollution
<p>Carbon savings (2030): 0.1 ktCO₂</p>	<p>SDGs:</p> 
<p>Cost (2030): Too many variables to estimate capex</p>	<p>Lead: WCC</p> <p>Partners:</p> <ul style="list-style-type: none"> ▪ Local landowners & developers ▪ Local plant nurseries
<p>How?</p> <ul style="list-style-type: none"> ▪ Include tree planting across council strategies such as in the Corporate plan, planning and transport strategies e.g. Richmond ▪ Be strategic- plant new trees where they will have the most impact and select native species that will survive the changing climate. ▪ A variety of trees should be planted to avoid monocultures. ▪ Work with landowners to plant trees on private land. ▪ Work with local nurseries to procure trees. ▪ Plant trees where they will enhance the local ecology. ▪ Engage with communities and explore alternative funding models such as crowdfunding or tree sponsorship schemes. 	<p>Timeline and level of effort:</p> <p>2030: 3,200</p> <p>2050: 11,200 trees</p> <p>It is recommended that WCC aim to plant at least 400 native trees yearly under a 'right tree, right place' policy and encourage others to set similar targets.</p> <p>Baseline:</p> <ul style="list-style-type: none"> ▪ Winchester has a local Tree Strategy. ▪ The Council has committed to identifying up to 100 hectares of land to support additional tree

<ul style="list-style-type: none"> ▪ CityTree and BioSolar Leaf utilise biophilic design to filter air pollution, create potential biomass for AD and add greenery to urban areas where tree planting may not be possible. ▪ Green roofs and walls can upscale benefits of traditional planting. 	<p>planting and/or creation of grassland and wetland habitats.</p> <ul style="list-style-type: none"> ▪ Developing a programme of rewilding starting with planting at least 100 trees annually on council land.
	<p>National Policy:</p> <ul style="list-style-type: none"> ▪ Local Nature Recovery Strategies ▪ Biodiversity 2020: a strategy for England's wildlife and ecosystem services ▪ The England Trees Action Plan 2021-2024

INVESTMENT AND FUNDING

The funding for planting trees will come from landowners or investors, paid back through schemes, such as those below. In some cases, planting may be carried out as part of regeneration projects, new development or estate improvement, outside any direct support scheme.

Sources of finance include:

Private sector awards

Government grants (e.g. Nature for Climate Fund) and smaller grants

New potential green and social investment models may access corporate and retail investors.

Community Green Grants

Investment for broader natural capital approaches (See section 6.11 with carbon in habitats assessment)




WINCHESTER CITY COUNCIL ROLE

Influencing: WCC could develop partnerships with other organisations, such as local businesses, residents' associations, parish councils and charities to help exceed the target and ease capacity on WCC. Offsetting schemes should be engaged on a long-term basis to fully maximise investments based on confidence and stability.

Enabling: Co-ordination, resource management and facilitating connections to relevant national or international schemes and bodies. Monitoring of planted trees should be implemented to ensure survival rates are as anticipated to reflect actual rather than potential sequestration rates.

Delivering: Manage and identify opportunities, to draft applications and research new financing mechanisms and delivery models.

6.10 WASTE INTERVENTIONS

 Intervention 16: Increase recycling to 65% by 2035	
<p>What?</p> <p>According to the latest available figures provided by WCC, the current rate of recycling in the district is 30%. This is below the national recycling target of 50% by 2020. These targets are set to increase every 5 years until 2035 when 65% of collected household municipal waste should be recycled.</p>	<p>Co-benefits:</p> <ul style="list-style-type: none"> ▪ Cost saving to the council if refuse collections are made more infrequent (objective should eventually be monthly) ▪ Reduced landfill costs ▪ Lowers risk of fines if UK national government decides to adopt Welsh strategies. ▪ High quality recycling can be a (low) revenue generator ▪ Create circular economies and new jobs
<p>Carbon savings (2030): 18ktCO2</p>	<p>SDGs:</p> <div style="display: flex; justify-content: space-around; align-items: center;">   </div>
<p>Cost (2030): Increased recycling could save WCC between £100,000 to £200,000 in reduced service costs.</p>	<p>Lead:</p> <p>Project Integra Biffa (contracted until 2028) WCC</p> <p>Partners:</p> <p>Residents Friends of the Earth Winchester XR</p>
<p>How?</p> <ul style="list-style-type: none"> ▪ Residents and businesses correctly using their recycling bins are essential, contaminated loads can reduce the quality of recycling. ▪ Educational campaigns are key for this, building knowledge of how to properly recycle, what can be recycled and why bother. ▪ Children can often instigate change in the adults around them after learning about earth and environment issues in school or from peers – council officers could organise talks in schools. ▪ Door knocking and accompanying leafleting campaigns can build 	<p>Timeline:</p> <p>2035: 65%</p>

<p>awareness and motivation among residents.</p> <ul style="list-style-type: none"> ▪ Making refuse collections more infrequent (fortnightly or monthly in some authorities (see Appendix A)) forces behaviour change (this will likely only be possible on re-tendering the contract, unless Biffa are willing to voluntarily discuss new terms within the contract. Preparation needs to be put into collection changes to bring residents onboard. ▪ More infrequent collections can also reduce costs for the council in the long run. ▪ Awards and prizes, such as the street with the most recycling out or residents who put recycling out four weeks in a row, can be an engaging, positive way to stimulate behaviour change. ▪ Parish competitions could also drive engagement by fostering friendly rivalries. ▪ Publicity around the importance of recycling in council correspondence and public places. ▪ Communal bins, such as student halls, flats, public bins, HMOs are particularly challenging to resolve. Owner-occupier and single-rented properties should be first focus. ▪ Encouraging businesses and public bodies to have recycling and refuse bins on site for staff sets the agenda. ▪ Work with local businesses to create deposit return schemes. ▪ Caution over AD or WtE plants that rely on recyclable products, as this can create perverse incentives. ▪ Recycling services should continually try and expand items in kerbside collections. 	<p>Baseline:</p> <ul style="list-style-type: none"> ▪ Current rate of recycling is 30%, below national average (44%) and 2020 target (50%) ▪ Targets are 2020: 50% / 2025: 55% / 2030: 60% / 2035: 65% <p>The current rate of recycling is 30%, according to the latest available figures provided by WCC. This is below the UK national 2020 target of 50%. Welsh local authorities are leading in this sector, with an average recycling rate of 65.4%. Increasing the rate of recycling to 65% by 2035 (in line with national targets).</p> <p>WCC is working with Project Integra and Biffa to expand collections and will be introducing food waste collections soon which will further reduce emissions, particularly methane, and provides the opportunity for developing anaerobic digestion facilities.</p>
	<p>National Policy:</p> <ul style="list-style-type: none"> ▪ Waste (Miscellaneous Amendments) (EU Exit)

	<p>Regulations 2019 [enacted EU Waste Framework Directive 2008 into UK law]</p> <ul style="list-style-type: none"> Resources and waste strategy for England
--	--

INVESTMENT AND FUNDING

Initial funding from WCC and HCC to manage and administer delivery of the intervention. Project Integra and Biffa could be other sources of funding with private sector investment for scale up as well as potential new central government funding.

WINCHESTER CITY COUNCIL ROLE

- Influencing:** Training and communications material for the public, businesses and private sector. Monitoring and implementation of existing recycling projects.
- Enabling:** Co-ordination, resource management and facilitating connections to relevant national or international schemes and bodies.
- Delivering:** Manage and identify opportunities, to draft applications and research new financing mechanisms and delivery models.

6.11 CARBON IN HABITATS ASSESSMENT

It is recommended that WCC implement four key interventions that will contribute to carbon sequestration: Review of land management strategy; Agricultural land management strategy; Carbon sequestration through soils; Green Infrastructure - Verges Management – further information on these interventions is set out in the following section. It is, important to note that, alongside afforestation, these may only act as short-term carbon storage methods, with a high risk of reversal, if land management strategies change. WCC could consider investing in other methods of long-lived carbon storage, which are not related to nature-based solutions, which include direct air carbon capture and storage and bioenergy with carbon capture and storage (see section 7.6)⁴⁶.

The WSP used its Habitat Carbon Tool to quantitatively assess the baseline carbon stocks and carbon flux across the Winchester district. It has been used to understand Winchester district’s current carbon storage in woodland and their projected capacity for carbon storage and sequestration in 2030 and 2050. This potential for carbon storage and sequestration will contribute to reducing the carbon neutrality residual emissions through offsetting.

The WSP Habitat Carbon Tool is an Excel based tool that uses habitat information to estimate the total carbon stock stored within habitats and the current rate of carbon sequestration / emissions (the carbon flux). Estimations are made by cross referencing the habitat type against several different literature sources such as the Woodland Carbon Code⁴⁷ to find the most appropriate value. The Broad Habitats within

⁴⁶ University of Oxford, 2020, ‘The Oxford Principles for Net Zero Aligned Carbon Offsetting’. Available online at: <https://www.smithschool.ox.ac.uk/sites/default/files/2022-01/Oxford-Offsetting-Principles-2020.pdf>.

⁴⁷ The Woodland Carbon Code, 2022. Available online at: <https://woodlandcarboncode.org.uk/>



Winchester district data provided by WCC have been used in this tool to calculate the current and future rate of carbon sequestration.

WCC's 2021 Call for Sites invited the submission of sites with the potential for Carbon offsetting, Biodiversity Net Gain and Offsetting, Green Infrastructure, Nitrogen Offsetting, Renewable Energy, and Brownfield Land. These sites were included in a Green Sites register separate to the Strategic Housing and Employment Land Availability Assessment (SHELAA)⁴⁸, and will enable the allocation of land for environmental uses such as biodiversity enhancement and woodland creation. Whilst SHELAA sites on green spaces are likely to persist, WCC are committed to ensuring that development is focused on brownfield land first, therefore, reducing the impact of development on green spaces. Brownfield land must be at least 0.25ha in size or capable of providing at least five homes, suitable for residential development, available for residential development, and any development must be achievable development within fifteen years.

RESULTS OF CARBON IN HABITATS ASSESSMENT

A high-level summary of the results of the tool are outlined below in Table 6-1, which shows the estimated baseline carbon stock and carbon flux of woodland currently within the district, and how this will have changed by 2030 and 2050. Full results of the tool are provided in Appendix C. The results show that the current amount of carbon stored across all of Winchester district's habitats (which include, for example, woodlands, grasslands, and hedgerows) is 11,484.0 ktCO₂, and that specifically for the Winchester district's woodland the total storage is 8,103.8 ktCO₂. The current projection for carbon stored in the Winchester district's woodland shows that an extra 557.7 ktCO₂ will be stored through carbon sequestration by 2030, and an extra 1,320.9 ktCO₂ stored by 2050. This is based upon the current land area planted with trees i.e., 12,809 ha and that there are no significant changes to trees currently on the land (i.e., no trees are felled and re-grown). The figures for carbon stored are based upon the following ages of the trees:

- Baseline – 50 years;
- 2030 – 55-60 years; and
- 2050 – 75-80 years.

Maturity of the trees directly impacts the amount of carbon which can be stored. In order to provide accurate figures of carbon sequestration within the district, woodland ages would be needed.

Table 6-2 - Summary Results of the Carbon in Habitats Tool

		Total Stored Carbon (ktCO ₂)	Total Carbon Flux (ktCO ₂ ha-1 yr-1)	Change in Total Stored Carbon from Baseline (ktCO ₂)
Woodland	Baseline	8,103.8	-44.0	-

⁴⁸ Winchester City Council, 2022, Strategic Housing and Economic Land Availability Assessment (SHELAA). Available online at: <https://www.winchester.gov.uk/planning-policy/winchester-district-local-plan-2011-2036-adopted/evidence-base/housing/shlaa-strategic-housing-land-availability-assessment>

	2030	8,661.5,	-50.7	557.7
	2050	9,424.7	-32.5	1,320.9
Broad Habitats	Baseline	11,484.1	-31.7	-

As stated above, it is important to note that the projected total stored carbon is based upon no loss of the current level of trees through natural or human interactions/interventions.⁴⁹ It is proposed by WCC in its CNAP that an additional 100 trees are planted each year (no end date given for year of ambition). Trees reach maturity after 30 years, enabling 0.000021 ktCO₂ per year on average to be sequestered, subject to the tree species and yield class. From 2052, based upon the current tree planting ambition of 100 trees per year, an additional 0.0021 ktCO₂ can be cumulatively stored every year.

The district will need to offset 377 ktCO₂ in 2030, with this dropping to 17 ktCO₂ in 2050. Despite the future predictions for carbon sequestered by current Winchester district woodland (Table 6-1), as per the Woodland Carbon Code⁵⁰, WCC cannot claim carbon credits towards a carbon neutrality strategy from areas of existing woodland. Additionality is required to claim the credits. Any carbon credits generated in line with the Woodland Carbon Code will require the permanent transfer from non-woodland to woodland habitat, with a set target of carbon credits officially registered prior to planting, which will then be monitored and reported upon to ensure the carbon sequestration targets are delivered. Given the way carbon credits are currently calculated, Winchester district will only be able to include newly planted trees towards its offsetting budget, rather than existing stock.

Whilst the amount of carbon absorbed by non-woodland habitats cannot be predicted for the future, there is likely to be carbon sequestered by some of these habitats, however, carbon credits cannot currently be assigned to these habitats. Furthermore, non-woodland habitats with trees (hedgerows, intensive orchards, dense scrub) will also be absorbing relatively high levels of carbon dioxide, however, carbon credits cannot currently be assigned to these habitats, although a proposed hedgerow carbon code is under development⁵¹.

NATURE-BASED INTERVENTIONS

It is recommended that WCC consider carbon sequestration through nature-based approaches. Specific examples, detailed in the four interventions below, include: the restoration of forests, the restoration of grasslands and wetlands and sustainable land management activities through changes in agriculture. Research⁵² has shown that

⁴⁹ Winchester City Council, 2022, Carbon Neutrality Action Plan. Available online at: <https://www.winchester.gov.uk/no-listing/carbon-neutrality-action-plan>.

⁵⁰ The Woodland Carbon Code, 2022. Available online at: <https://woodlandcarboncode.org.uk/>

⁵¹ DEFRA, 2021, Innovative nature projects awarded funding to drive private investment. Available online at: <https://www.gov.uk/government/news/innovative-nature-projects-awarded-funding-to-drive-private-investment>

⁵² Seddon.N., Chausson.A., Berry.P., Girardin.A., Smith.A., Turner.B., (2020) 'Understanding the value and limits of nature-based solutions to climate change and other global challenges'. Philosophical Transactions of the Royal Society Biological Sciences.



nature-based approaches to carbon sequestration can provide multi-benefit approaches through sequestering carbon, which includes increasing biodiversity (helping WCC to achieve its aims and objectives in its Biodiversity Action Plan, for example adaption and resilience for species and habitats and halting the loss of habitats and species), reducing flooding and improving social wellbeing. However, it should be noted that within the UK currently there are only two official offsetting codes: Woodland Carbon Code⁵³ and The Peatland Code⁵⁴, with another three offsetting codes currently under consideration: saltmarsh, hedgerow, and soil carbon codes. Due to the soil geology of the Winchester District, the Peatland Offsetting Code would not apply, however, WCC can purchase carbon credits from the Woodland Carbon Code⁵⁵.

We have outlined four high-level key nature-based approach interventions which are applicable for WCC to implement in order to improve carbon sequestration. It should be noted that for the interventions noted below, they have not been quantified, as it sits outside the scope of work for this report. Likewise for renewable energy generation and direct air carbon capture. For the development of more specific and bespoke nature-based solutions across the Winchester district, it is recommended that a detailed assessment of opportunities within the land matrix is conducted.

Intervention 1: Review of land management strategy

Within WCC's Local Plan there is a call for green sites for biodiversity, nutrient offsetting, tree planting and wetland creation. This is in conjunction with WCC's BAP 2021 which sets out four priority habitats (species-rich grassland, chalk rivers, hedgerows and arable field margins and woodlands). As noted above, there are no official offsetting codes for these habitats (apart from woodlands). Whilst WCC could not claim carbon offsetting credits on these habitats, it is recommended that WCC considers its land management scheme to include all of these priority habitats, such as species-rich grassland, hedgerows and arable field margins or wetlands, therefore, improving both biodiversity and achieving wider net zero targets. The land management strategy should be interlaced with the development of the second intervention below.

Intervention 2: Agricultural land management strategy

Agriculture and the land management strategy should be considered alongside one another. For example, open habitats (such as heathlands and semi-natural grasslands), additional conservation headlands and arable field margins, and strip farming should be integrated into agricultural landscapes, or enhanced where already present. These habitats can sequester greater amounts of carbon than agriculture alone (which is considered a net-emitter of carbon dioxide in the carbon tool), reduce nutrient depletion and enhance soil health, which will indirectly sequester additional

⁵³ The Woodland Carbon Code, 2022. Available online at: <https://woodlandcarboncode.org.uk/>

⁵⁴ IUCN, Peatland Code, 2022. Available online at: <https://www.iucn-uk-peatlandprogramme.org/sites/default/files/header-images/Peatland%20Code/Peatland%20Code%20v1.2.%202022.pdf>

⁵⁵ The Woodland Carbon Code, 2022. Available online at: <https://woodlandcarboncode.org.uk/buy-carbon/how-to-buy>



carbon. This intervention is applicable to WCC, as Winchester has various agricultural landscapes. This is considered a multi-benefit approach.

Intervention 3: Carbon sequestration through soils

WCC should consider soil carbon sequestration. Soil carbon sequestration is important as it restores degraded soils, enhances biomass production, purifies surface and ground water, and reduces the rate of enrichment of atmospheric CO₂ by offsetting emissions due to fossil fuels (although there is no official offsetting standard currently). Soils are important stores for sequestered carbon, and net-emissions can be reduced through the promotion of sustainable and regenerative farming practices, reducing waste of soil and soil carbon, and mitigating development which would lead to soil degradation.

Intervention 4: Green Infrastructure - Verge Management

WCC should also consider changes in verge management alongside their road network, for example changes in methods of cutting verges (including timing), additional hedgerows/trees and improving the number and diversity of flowering plants on the verge sides⁵⁶. This is a natural capital approach, that would promote additional carbon sequestration through abating carbon dioxide emissions and local particle pollutants and enhance biodiversity. Although, as noted previously would not provide official carbon credits. Verge management is, therefore, just one potential green infrastructure invention that could be considered within WCC. These cuttings could be used to produce bioenergy through AD.

⁵⁶ Bromley.J., McCarthy.B., Shellswell.C., Plantlife (2019) 'Manging grassland road verges. A best practice guide'.

7 ECONOMIC COST OF CARBON EMISSIONS REDUCTION

7.1 PURPOSE OF THIS SECTION

In this section we provide a cost-benefit analysis of the estimated cost of the roadmap interventions relative to their potential emissions savings from implementing these interventions. This analysis is performed using a Marginal Abatement Cost Curve (MACC), which is a tool that employs a simple economic metric (£/tCO₂) to compare and prioritise interventions where carbon reduction (abatement) opportunities are potentially the largest and most cost effective. Carbon emissions reduction are quantified relative to the baseline as estimated in the Carbon Neutrality Roadmap Tool.

7.2 DESCRIPTION OF THE ANALYSIS AND HOW TO READ A MACC CURVE

A Marginal Abatement Cost Curve (MACC) was developed to compare different interventions by plotting the marginal abatement cost (the Net Present Value (NPV) over the carbon saving potential – in £ per tonne of carbon) against the absolute carbon saving. The Treasury Green Book value of 3.5% was used⁵⁷. The most financially advantageous / cost effective interventions appear to the left of the chart, with those below 0, indicating a positive financial return. The MACC does also not account for the set up of the programmes and projects, or their management; this is considered to be relevant for delivery of these interventions which is outside of the scope of this assessment.

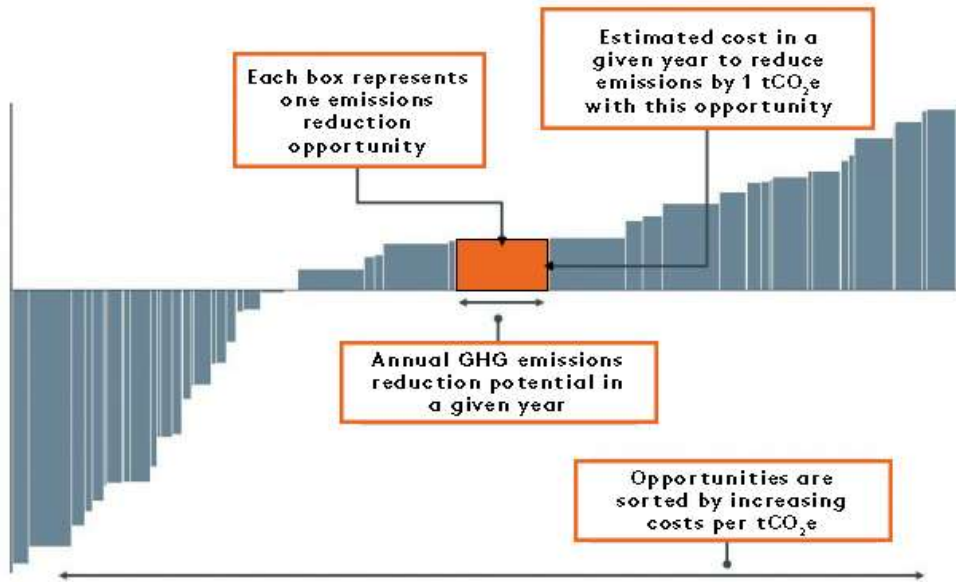
The MACC has been produced to inform the roadmap development and provide a transparent methodology for prioritising specific actions. As the MACC presents and ranks the costs or savings expected from different interventions, alongside the potential emissions reduction. They use the metric of pounds per tonne of carbon dioxide equivalent.

In summary the charts can be read as following and as explained in Figure 7-1:

- Each box represents an intervention which reduces emissions, presented as above or below the horizontal axis;
- The width of the box is the annual emission reduction for that intervention expressed as tCO₂;
- The height of the box is the marginal abatement cost annualised; above the axis, the higher the box, the higher the cost; below the axis, the lower the box, the greater the savings;
- Interventions are ordered by increasing cost per tCO₂, lowest costs to the left and highest costs to the right.

⁵⁷ HM Treasury, 2013, Green Book supplementary guidance: discounting. Available online at: <https://www.gov.uk/government/publications/green-book-supplementary-guidance-discounting>

Figure 7-1 - How to read a MACC Curve. Source: Climateworks (climateworkscentre.org)



7.3 KEY FINDINGS FROM THE ANALYSIS

Figure 7-2 gives the MACC for 2030 and recommended to be used to prioritise the implementation of interventions as an initial lens of where emissions reduction opportunities are potentially the largest and most cost effective.

The MACC findings should be used as a conversation starter from which further analysis can evolve.

The chart highlights the benefit provided by 50MW of utility scale solar PV installed on poorer quality land (ground mounted) or on roofs, and onshore wind potential as it provides the greatest emissions reduction potential and potential for financial savings (box under horizontal axis).

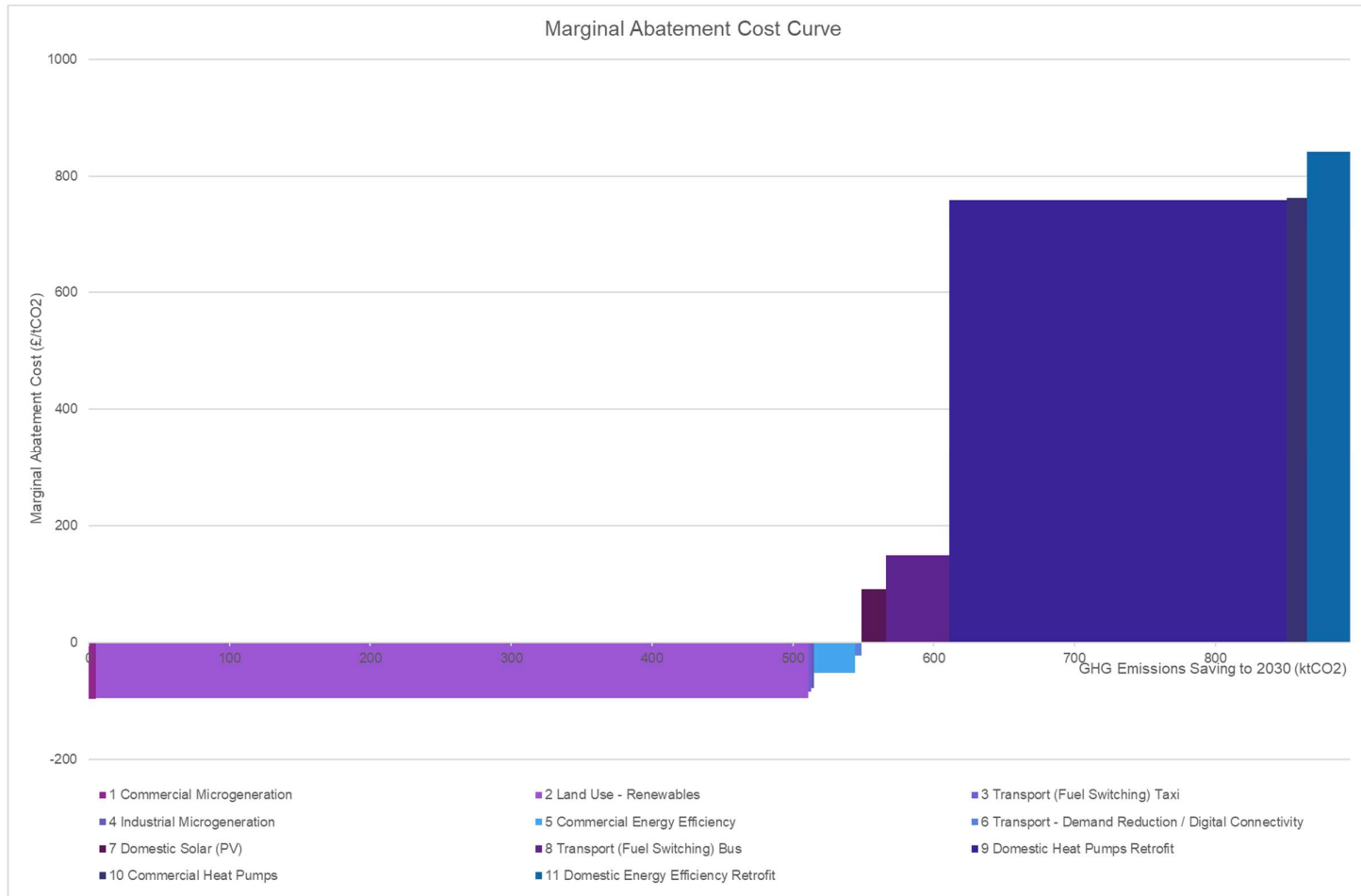
Supporting the installation of energy efficiency measures in offices, retail, and other commercial property types provides a significant carbon reduction per annual cost.

Transport interventions, for example promoting hybrid working to reduce carbon emissions from commuting provide carbon reductions for the annual cost.

Installing renewable heating measures to provide heating and hot water within domestic dwellings provide a significant carbon reduction, however annual cost is one of the highest from all interventions, this doesn't mean that this intervention should not be implemented it means that emissions reductions will come at a net cost.



Figure 7-2 - MACC for WCC in 2030 based on action timeline



8 RECOMMENDATIONS

8.1 HIGH LEVEL RECOMMENDATIONS FOR PURCHASING OFFSETTING CREDITS

To comply with offsetting standards, WCC could purchase carbon offsets through UK Woodland Carbon Code⁵⁸, which is the quality assurance standard for woodland creation projects in the UK and generates independently verified carbon units, or through the Peatland Code⁵⁹. Both these markets are currently established, with the UK forestry projects subject to EIA planning consent and regulatory enforcement by the Forestry Commission. Whilst offsetting credits is not currently featured within WCC policy, consideration could be given to purchasing credits to offset the district's 2030 and 2050 emissions. Purchasing carbon offsets through either the UK Woodland Carbon Code or The Peatland Code, would enable the district to offset carbon emissions within the UK rather than internationally. There are currently no options to purchase carbon offsets which would occur in the district, as per the Woodland Carbon Code register.

The current cost of buying carbon credits is in the region of £20/tCO₂, and between £10 and £20 /tCO₂ for purchases of Pending Issuance Units, which are promises to deliver a predicted sequestration within a set timeframe. It is recommended that WCC ensure that carbon offsets are verifiable with either the UK Woodland Carbon Code or The Peatland Code being the recommended schemes at this point in time as of 30 June 2022, there were 2,600 Woodland Carbon Units available for sale on the UK Land Carbon Registry, and 1,911,000 Pending Issuance Units⁶⁰.

8.2 RECOMMENDATIONS FOR ENABLING MECHANISMS, FEASIBILITY STUDIES AND FURTHER RESEARCH

This section gives further detail on additional feasibility studies and measures that WCC could adopt. These measures are not included in the above interventions chapter as their impacts are more challenging to quantify and so have not been included within the modelling. This may be because datasets or methodologies are currently insufficient or there is too much uncertainty over future changes to offer reliable projections.

8.2.1 WINCHESTER & HAMPSHIRE'S PLACE IN LOW-CARBON HYDROGEN DEPLOYMENT

With planned and existing projects in Portsmouth, Southampton and Shoreham ports and national government interest in developing hydrogen as an alternative fuel, especially in transportation and industry, there is a potential hydrogen future for the south coast. Government policy is focused on developing 'clusters', however with many of the projects currently focused on the east coast and Scotland it is worth Winchester exploring the potential of hydrogen development in southern England with other south coast partners to ensure that the region does not miss out on a potential growth opportunity.

⁵⁸ UK Woodland Carbon Code, 2022. Available online at: <https://woodlandcarboncode.org.uk/>

⁵⁹ Forest Carbon, 2015, The Peatland Code. Available online at: <https://www.forestcarbon.co.uk/certification/the-peatland-code>

⁶⁰ Woodland Carbon Code, 2022, WCC Statistics: Interim Statistics - 30 June 2022. Available online at: [WCC Statistics - UK Woodland Carbon Code](#)

A working committee of relevant neighbouring local authorities (such as Winchester, Southampton and Portsmouth councils), appropriately experienced academic researchers from local universities, interested private sector partners and a national government representative could be formed to explore the practicalities of a south coast hydrogen hub/cluster.

8.2.2 WINCHESTER DISTRICT SOLAR RESOURCE MAP

The Mayor of London and Environment Agency have developed a Solar Opportunity Map using LiDAR data for Greater London. The map provides residents and investors with a general overview of likely solar potential across the city and an indication on expected energy generation and where best to focus efforts. It is not a granular, house-by-house, assessment but provides a high-level insight that can be used to save initial scoping studies.

8.2.3 EXPLORE POTENTIAL FOR WINCHESTER GIGAFABRIQUES OR GREEN HUB

Electric vehicle and renewables will require gigafactories to produce the batteries necessary to store electrical energy. The UK has two operational so far, but this is an industry that will expand in the coming decades and could provide skilled employment. Winchester is well-located between London and the ports of Southampton and Portsmouth to potentially enjoy the export benefits from a renewable energy industry. WCC could complement work from the Green Economic Development Strategy (GEDS) to understand the conditions needed to make the city an attractive investment option for new green industries, such as gigafactories. The British Society for Motor Manufacturers and Traders have calculated that EV cars will require 60 gigawatt hours of local batteries by 2030. Nissan's Leaf factory in Sunderland, Britishvolt's start-up in Blyth and the West Midlands Gigafactory are early movers in this sector. Tesla has expressed interest, but its production facilities are primarily US-based. Coventry and Warwick Universities are working on optimising techniques and the UK benefits from a world-class research environment. The national government launched the UK Battery Industrialisation Centre in July 2021 to support companies to scale up innovative and experimental technologies and this could be a key partner for WCC to understand how develop this industry. Winchester benefits from a well-educated population, strategically located in proximity to Southampton and Portsmouth ports, airports and links to London.

8.2.4 IMPACT OF MOVING TO THREE-WEEK OR MONTHLY REFUSE COLLECTIONS

Recycling rates in Winchester are below the national target and recycling/refuse are currently collected on alternate weeks. Many local authorities in the UK have altered collection schedules to push behaviour change by residents and businesses. Initially, changing collection schedules can lead to pushback and anxiety – however, the effectiveness of these measures has been well-established when implementing properly with considerate engagement, awareness raising and explanation. WCC should explore options to increase recycling rates and quality. Removing food waste from landfill (refuse bins) is one of the most effective ways to reduce emissions and utilise circular economies.

8.2.5 FOOD, SOIL AND CARBON SEQUESTRATION STRATEGY

Food and soil are often overlooked when considering decarbonisation but agriculture consists of around 30% of global emissions, with additional issues surrounding biodiversity loss from pesticides, soil erosion and water exports. While it is not always true that local food has a lower carbon footprint than imported food, consumers are increasingly conscious of the impacts that their diets have on the planet. WCC could work with local residents, businesses, food producers and landholders to support sustainable intensification, innovative farming strategies using the latest scientific research and technological advances to better manage antibiotic, water, fertiliser and pesticide use. Allotments,

gardens and community groups can also help by building in food resilience, particularly as the global food markets face uncertainty.

8.2.6 IMPLEMENT GREEN SKILLS TRAINING COURSES WITH EDUCATIONAL INSTITUTIONS AND EMPLOYERS

The energy transition will require different skills in order for citizens to access high paying jobs in the new economy. Government schemes, such as the Green Homes Grant, have already suffered from a lack of trained and experienced technicians. Heat pump technology, EVs, solar installations and other advancements require a new knowledge basis; for Winchester to take advantage of new innovations, local supply chains must have the knowledge and experience necessary. Winchester College is world renowned, and the city is blessed with a university and other educational facilities. The council should work with appropriate and interested establishments to develop skills courses, both full time and in the evenings, to allow residents to upskill themselves and ensure Winchester maintains its high value local economy. Winchester's GEDS seeks to co-ordinate a Sustainable Construction Skills Academy, this should give students the opportunity to develop new skills and improve existing ones whilst remaining in work or in full-time studies.

8.2.7 CONNECTING RURAL LOCATIONS TO FACILITIES

The Royal Town Planning Institute has recently made recommendations on how rural communities can incorporate 20-minute neighbourhood and living locally into planning and development (while this report focusses on Wales, much of the findings are applicable to the WCC district).⁶¹ Relevant recommendations highlight the actions to improve connections to rural locations to services and facilities. For example, exploring new or enhanced public rights of way / bridleways / cycleways etc. and improvements to public transport. WCC could consider how it provides information to better help residents understand how they can use active travel and public transport around the district. In addition, upgrading active travel paths with all-weather improvements will maximise the value residents can gain from them. These actions can be particularly useful in facilitating inter-village connectivity and gives people alternative journeys than travelling into and back out of larger settlements, supporting a shift away from private car use, reducing congestion, carbon emissions and supporting rural development.

8.2.8 LOW TRAFFIC NEIGHBOURHOODS (LTN)

Local authorities have various transport options available to manage vehicle flows. Bristol City Council is in the process of launching a Clean Air Zone (CAZ) and residential streets have become popular throughout London, limiting when certain roads can be used, and by what vehicles. This reduces traffic as people walk, cycle or use public transport and redirects traffic towards larger roads with capacity. CAZ are discussed more in Appendix A: Best Practice Case Studies. Another approach is licence plate recognition with cities such as Paris experimenting with only allowing odd and even plates into the city on alternate days. Winchester could introduce vehicle restrictions to the use of its high street and town centre streets to discourage the use of private vehicles (especially petrol and diesel), encourage greater priority of active travel and public transport, and support improvements to and use of public spaces. This can provide a powerful motivation for choosing sustainable travel options and where private cars are used, they are electric.

⁶¹ The Royal Town Planning Institute; Living Locally in Rural Wales; January 2022; [Plan The World We Need \(rtpi.org.uk\)](https://www.rtpi.org.uk)

8.2.9 MONITOR SOURCES FOR FUNDING AND PILOTS

There are multiple potential sources of external funding and companies that wish to conduct pilots to test innovative solutions. Winchester should monitor funders including, but not limited to, Innovate UK: [Competition overview - Net zero living: Pioneer places - Innovation Funding Service \(apply-for-innovation-funding.service.gov.uk\)](https://www.innovation-funding.service.gov.uk); BEIS; Energy Systems Catapult; and Community Energy England. These organisations can offer ongoing financial and technical support for interventions and research.

Winchester should also show willingness to support innovative pilot projects proposed by stakeholders within the district and external firms looking to test ideas. This will support Winchester's green economic development by attracting investment and offering Winchester residents opportunities to trial new technologies. Gaining a reputation of forward-looking, sustainable development will encourage businesses to locate within Winchester.

8.2.10 PROCUREMENT FOR SOCIAL VALUE

The national government published a landmark piece of legislation, the Public Services (Social Value) Act 2012⁶² and updated this in 2020 with new guidance under the Social Value Model⁶³. The five key themes are: 1. Covid-19 recovery; 2. Tackling economic inequality; 3. Fighting climate change; 4. Equal opportunity; 5. Wellbeing. These pieces of legislation enable and encourage public sector procurement to consider wider metrics than simple cost/commercial considerations and empower the public sector to use spending decisions to achieve wider social, environmental and economic goals⁶⁴. Despite its potential, National Voices and Social Enterprise UK discovered that only 13% of Clinical Commissioning Groups “can clearly show they are actively committed to pursuing social value”⁶⁵. Co-ordinating public spending and ensuring all those responsible for spending public money are aware of the requirements (and potential) could have a cumulative impact, helping to reshape the private sector in Winchester around sustainable, socially conscious procurement decisions.

WCC could organise workshops for internal and external public sector procurers (schools, hospitals, police, fire etc.) to emphasise the value that could be attained locally with strategic use of public funds. This measure is challenging to quantify as decisions are unknown but greater awareness will support local industry to decarbonise by both rewarding industries that do with new contracts and incentivising those who have not. Small measures, such as encouraging staff to consider the shops they use for coffee or lunch can also spark behaviour changes.

⁶² Public Services (Social Value Act) 2012. Available online at: [newbook.book \(legislation.gov.uk\)](https://www.newbook.book (legislation.gov.uk))

⁶³ Government Commercial Function, 2020, The Social Value Model. Available online at: [Social-Value-Model-Edn-1.1-3-Dec-20.pdf \(publishing.service.gov.uk\)](https://www.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/531133/Social-Value-Model-Edn-1.1-3-Dec-20.pdf)

⁶⁴ AdviceGov, 2021, Social Value Model: Evaluating social value in tenders. Available online at: [Social Value Model: Evaluating social value in tenders | Advice Gov \(advice-gov.co.uk\)](https://www.advice-gov.co.uk/social-value-model/evaluating-social-value-in-tenders)

⁶⁵ National Voices & Social Enterprise UK, 2017, Healthy commissioning: How the Social Value Act is being used by Clinical Commissioning Groups. Available online at: [Healthy commissioning: How the Social Value Act is being used by Clinical Commissioning Groups | National Voices](https://www.nationalvoices.org.uk/healthy-commissioning)

9 CONCLUSIONS

In 2019, Winchester City Council declared a Climate Emergency and set the goal of becoming a carbon neutral council by 2024 and a carbon neutral district by 2030. This Roadmap to Carbon Neutrality has been developed for the Winchester District to enable stakeholders across the district to work towards meeting this ambitious 2030 target.

A key finding of this analysis has been that the existing CNAP actions are not sufficient to reach carbon neutrality by 2030. To address this, WSP have drawn on qualitative and quantitative data to identify, model, and quantify 16 interventions needed to achieve the 2030 target. These interventions cover the domestic, commercial, industrial, transport, land-use and waste sectors. Alongside these additional interventions, Winchester will need to offset 377 KtCO₂ emissions in 2030. At the current market rate of £20/tCO₂ this will cost £7.54m to offset in 2030. However, carbon prices are estimated to reach up to \$360 by 2030⁶⁶.

The three most impactful interventions based on carbon emissions reduction potential are:

- Invest in EV charging to decarbonise private cars (eliminating 600 KtCO₂ emissions by 2030);
- Generating 50MW of utility scale solar PV installed on poorer quality land and onshore wind potential (eliminating 147 KtCO₂ emissions by 2030), and
- Install renewable heating measures to provide heating and hot water within domestic dwellings (eliminating 68 KtCO₂ emissions by 2030).

By 2030, the district should have installed 50 MW of solar and wind power, generating the average annual energy demand of 3,100 UK households. A network of EVCP should also be installed throughout the district to facilitate the uptake of EV cars as the ICE ban comes in from 2030. This intervention also provides the greatest potential for emission reductions and financial savings.

While the WCC plays a key role in many of the interventions set out in this roadmap, collaboration across sectors and scales of governance is vital in achieving carbon neutrality targets. Each intervention set out in this document includes information on what organisation/s is best placed to lead its implementation as well as highlighting key partners and co-benefits.

It is also important to note that although this roadmap will play a key role in guiding decarbonisation it must sit within a broader policy framework that connects with issues such as wellbeing, inequality, and biodiversity.

This roadmap should be treated as a living document; actions should be monitored and transparently reported to ensure delivery. Actors across the district (public, private, third sector and individuals) need to take responsibility and ownership for reducing their own emissions, with support from WCC.

⁶⁶ [Carbon Prices to reach \\$360 by 2030 • Carbon Credits](#)

APPENDIX A: BEST PRACTICE CASE STUDIES

9.1 INTRODUCTION

This appendix provides high level case studies of decarbonisation efforts in the UK and internationally. It is intended to provide real-world examples of projects that could inspire similar initiatives in Winchester. It is split into sections on domestic energy efficiency, industry and commerce, natural capital, transport, energy, pensions and waste management. These projects are a starting point for WCC and partners to consider how they could be adapted to local conditions. Links are provided within the text to allow more detailed exploration of specific projects if desired.

9.2 RETROFIT & ENERGY EFFICIENCY

The UK has some of the [‘leakiest’ housing stock in Western Europe](#). As the energy and climate crisis worsens, building retrofitting projects are becoming an increasingly important issue for local authorities. In Cornwall the Council has embarked on a Whole House Retrofit Innovation project which is making improvements to council homes that will reduce emissions, heat loss and running costs. Improvements include: flood, loft and wall insulation, solar panels, single room ventilation and ground source heating. These interventions aim to reduce carbon emissions by up to 80% and heating costs by up to 50% per home.

In Oldham and Liverpool, the local authorities are taking action to tackle the link between housing and poor health through [Warn Home Schemes](#). Set up partnership with local stakeholders such as the NHS, Citizens Advice and Housing Investment groups, these schemes offer advice, support and resources to residents in fuel poverty. In Liverpool it is estimated that the scheme could save the NHS and wider society £55m over 10 years, while in Oldham the Council’s investment of £250,000 has resulted in a monetary benefit from an increase of Quality Adjusted Life Years (QALYs) of between £399,000 and £793,000.

- Poorly insulated housing stock increases energy waste, bills and ill health
- Local authorities should support retrofits to immediately reduce emissions, bills and improve life quality

9.3 15-MINUTE NEIGHBOURHOODS

The 15 (or 20) minute neighbourhood concept has attracted increasing [attention in recent years](#). By having key services and facilities within a short distance (roughly one mile) of residents’ front doors the need to drive is reduced, communities strengthened, and the local economy developed. By locating shops, education, leisure and employment opportunities nearby a host of co-benefits, including improved health, reduced traffic, better air quality, thriving local businesses, and enhanced social capital, can be enjoyed.

[The Royal Town Planning Institute Cymru has assessed](#) the role of 15-minute neighbourhoods in rural Wales, which has useful insights for the rural areas of Winchester district. Targeted funding to connect rural locations to services, enhancing public rights of way and public transport, supporting community-led Place Plans and developing technological and digital advancements, planning policies and training around local communities rather than regional centres they consider central to delivering sustainable local outcomes.

9.4 INDUSTRIAL & COMMERCIAL ENERGY

9.4.1 WASTE-TO-ENERGY

CopenHill, also known as [Amager Bakke](#), is a combined heat and power waste-to-energy plant located on an industrial waterfront in Copenhagen that is capable of converting 440,000 tons of waste into clean energy annually. Claiming to be the cleanest incineration plant in the world, Amager Bakke curbs 100,000t of CO₂ emissions a year.

The plant produces low-carbon electricity to 550,000 people and district heating to 150,000 households. It also allows the city to reuse 90% of its metal waste, recover 100 million litres of water and reuse 100,000t of bottom ash as road material.

The powerplant also doubles as a public sports facility with an 85m tall, sloped roof which has been transformed into an artificial ski slope, the world's tallest artificial climbing wall and hiking trails.

- 100,000t of CO₂ saved annually providing low carbon electricity to 150,000 households
- Doubles as a sports facility, improving the perception of a traditional waste treatment plant
- Incinerating municipal solid waste provides 20% of Danish heat across 400 district heating networks

9.4.2 ANAEROBIC DIGESTION

The Greater Lincolnshire LEP has been working with Lincolnshire Verge Harvesting and Scotts Precision Manufacturing to develop a machine that collects plant cuttings, to be reused in anaerobic digestors to produce energy. AD plants produce biogas and fertiliser renewably, however if food crops or land are used this could potentially increase food prices for the poorest. Dall Energy in Sorø Fjernvarme, Denmark are running a 12MWth / 1 MWe CHP plant from local woody green waste from parks, gardens and hedges to power the town.

Also in Denmark are biogas facilities, connected to local district heating networks, which utilise slurry from farms and food waste. Slurry is piped from neighbouring farms who receive high quality fertiliser from the waste digestate that is produced. This prevents nitrogen leaching into soils and waterways, produces a higher quality of fertiliser, lessens foul odours, diversifies farming incomes and creates a sustainable source of energy. These schemes avoid AD needing to use food crops and creates circular economies by using previously waste materials.

- Facilitates circular economies
- Can create a perverse incentive to continue creating waste or food insecurity
- Multiple benefits

9.4.3 DISTRICT HEATING

On the continent district heating schemes are more utilised, however in the UK their efficiency benefits are being increasingly realised. The [HeatNet NWE project in Plymouth](#) has developed a 5th generation heating and cooling masterplan to link an existing small scheme with a new events and housing development. Heat from a limestone 'principal aquifer' underneath the city, combined with waste heat recovery is predicted to save up to 40,000 tonnes of carbon over the next 15 years.

Fifth generation district heating/cooling minimises heat losses by recycling heat through the network whereas individualised heating systems tend to release heat through external vents – increasing consumption, bills and exacerbating the urban heat island effect. Producing energy locally helps to reduce transmission losses. Ground source heat pumps can be particularly effective for these schemes as below ground temperatures are stable and predictable whilst the infrastructure requirements of ground source heat pumps favours their deployment on larger networks, rather than individual properties.

- District heating highly efficient as waste heat is recycled in the system
- New builds should be constructed with district heating
- Microgrids and district heating networks are complementary systems

9.4.4 INDUSTRIAL SYMBIOSIS

Also in Denmark, is the [Kalundborg Symbiosis](#). Kalundborg's development strategy is based on being the "Green Manufacturing Municipality" by creating a circular economy within the industrial zones, which is now one of the largest concentrations in Denmark outside of Copenhagen. Waste products, such as heat or gypsum, from one business are reused by another and a network of pipes facilitates heat, water and energy transfers. This system first developed organically, as companies sought to enjoy the mutual benefits of lowering costs by reusing one another's unneeded materials.

- Industrial symbiosis and circular economies can reduce waste and costs for businesses
- Reputational benefit for participating firms

9.5 NATURAL CAPITAL

9.5.1 FOOD

Winchester is located partly within the South Downs National Park and its extensive rural hinterland provides the basis for the BAP, offsetting and the mental and physical wellbeing benefits for residents and visitors. The South Downs has been shaped by human activity since at least the Bronze Age, creating a landscape and habitats indelibly moulded by interactions between farming, forestry and wildlife. Food is an important part of climate resilience and decarbonisation, accounting for almost 1/3 of global emissions, and there is increasing consumer awareness and desire to have sustainably grown local food at affordable prices.

Sustainable Food Places Network

Local authorities across the country are developing sustainable food plans, networks and partnerships to cut emissions, support local farmers and address food poverty. In the UK, the Sustainable Food Places Network has been supporting local authorities to form partnerships and develop a more sustainable local food system. One example of this has been the [Nottingham Good Food Partnership](#) which is part-funded by Nottingham City Council as part of its goal to become carbon neutral by 2028. The partnership is focusing on six key issues including: promoting the importance of healthy, sustainable food within local communities and working towards a circular food economy. Among the projects developed through the partnership are groups that offer a weekly local veg box and a food waste project that turns surplus or discarded food into soups for community members.

Another member of the Sustainable Food Places Network is Edinburgh which has recently been [awarded silver city status by the Network](#). Edible Edinburgh has coordinated action in the city including providing 65,000 fresh, free and nutritious meals to vulnerable communities during the pandemic, signing the Glasgow Food Declaration, launching a Sustainable Food Directory and increasing food growing activity in the city through Edinburgh's first growing strategy.

Local and Community Food

Other cities taking action include Oxford, where the [council passed a plan](#) to only serve locally-sourced, vegan food at council catered events. Supermarkets and businesses should be encouraged to end the practice of bleaching unsold food and instead donating this to food banks and charities. In Bristol, a weekly '[pay what you can](#)' community meal is run by Baggator with food donations from local business as well as Tesco, M&S and Lidl. This can help reduce food waste, build community cohesion and support those struggling with living costs.

Groups like Incredible Edible have also been pioneering growing food in under-utilised urban spaces which can help to connect consumers to the food system, produce locally grown alternatives and raise awareness about food, diet and their impact on the climate.

Agriculture and Decarbonisation

Combining food production with decarbonisation will be vital and soil has an under-appreciated potential to sequester significant quantities of carbon. Local producers and farmers will need a meaningful role in any strategy development to avoid imposing policies onto rural communities. Regenerative agriculture has gained increasing attention both in the UK and internationally as awareness has grown of the impact agriculture has on ecosystems. Many consumers are now seeking more environmentally friendly production methods, with significant added value for the producer.

The [Knepp Estate](#) and [Wild Ken Hill](#) offer a vision of agriculture and rewilding whilst [sustainable intensification](#) focuses on producing more per unit and can include vertical and indoor farming, agroforestry or even innovative land use, such as [agrivoltaics](#). Honeybees have been championed as a potential solution to the pollinator crisis, but this can have the unintended consequence of out-competing other bee species and the focus instead should be on reducing the use of pesticides and managing hedges and verges as biodiversity hotspots.

- Food sharing schemes can reduce food waste, build community cohesion and resilience, mitigate cost-of-living increases, engage people with food and reduce emissions
- Regenerative agriculture can combine food production with decarbonisation, biodiversity and soil sequestration
- Important policy is developed with rural stakeholders, producers and consumers

9.5.2 BIODIVERSITY

Local Nature Recovery Strategies (LNRS)

Biodiversity is also becoming a key issue for local authorities. In England all local authorities are now required to develop a [Local Nature Recovery Strategy](#) with the aim of setting out a local vision and priorities for nature's recovery and the practical actions needed to restore declining species and habitats.

[Greater Manchester](#) was one of five areas selected to pilot the development of a LNRS before they became a statutory requirement in 2022. The strategy has helped to map key locations and identify important drivers of biodiversity as well as support local collaboration, direct local policy, provide better access to nature, increase and direct funding for nature-based projects.

Tree Planting

Much rewilding, offsetting and biodiversity work has focused on planting trees, and “right tree, right place” is an essential component of this – trees that are felled for timber or do not survive do not offset the emissions that some schemes claim. Tree planting usually uses plastic tree guards to protect saplings, a method being phased out by the National Trust and Woodland Trust. Significant concern has been raised that if reforestation targets are met, under current planting strategies, this will result in single-use plastics polluting woodlands. [The plastic guards also undermine the positive climate effects from forestry](#). If plastic guards are used, they must be collected and recycled after their 5-year lifespan to limit negative environmental impacts.

Natural Regeneration

[Monks Wood](#), Cambridgeshire is an experiment in natural regeneration since a four-hectare barley field was abandoned in 1961. A non-interference policy was adopted and over the next 60 years the progression has been observed – a shrubland dominated by bramble and hawthorn replaced a wildflower meadow that had developed with brambles protecting ash, oak and maple tree saplings from browsers, such as deer and rabbits. This has created a structurally complex woodland with multiple habitats over time and provided for more and different species than a traditional planting programme. Monks Wood benefited by being near an existing ancient woodland, ensuring native seeds could disperse. Natural progression woodlands will not be appropriate everywhere, and their carbon sequestration potential has not been formally modelled, but in the right locations near native woodland they can be a cost-effective and biodiverse alternative.

Athens Tree City

Southern Europe has long had to adapt to hot, dry summers – conditions becoming familiar in northern Europe and more extreme globally. [Athens](#) was the first city to receive a Natural Capital Finance Facility (NCF) to develop urban forests in low-income neighbourhoods. Creating green corridors throughout the city will provide shelter from summer heat and make the city more accessible. Urban forests can improve air quality, biodiversity, create shady environs, mitigate urban heat islands and make areas more pleasant spaces.

- Biodiversity is crucial to human wellbeing and planetary health
- Tree planting schemes risk being undermined by single-use plastic sapling guards
- Green infrastructure has important co-benefits, including shade against urban heat islands, pollinator pitstops and more desirable cityscapes

9.6 TRANSPORT

9.6.1 BUS PRIORITISATION

The Department for Transport (DfT) predicts a 55% growth in traffic and 85% increase in congestion by 2040. This leads to air pollution, stress, stalled economic development and makes areas less appealing to residents, employers and employees, tourists and investors. Children, the elderly and

poorly are disproportionately impacted. Councils have a statutory duty of “securing the expeditious movement of traffic.” Councils are often constrained by powers and resources so the Local Government Association has compiled a list of [nine innovative programmes](#) local authorities are implementing. EVs will reduce the impacts of air pollution but will do little to ease congestion.

Brighton & Hove City Council has reversed the national trend of declining bus use by prioritising user convenience and experience. The council identified five key factors: (1) prioritising road space for buses; (2) improved passenger waiting areas; (3) real time information displays; (4) Intelligent Transport System (ITS); (5) bus lane and traffic enforcement. A full bus can remove up to 75 cars off the road and research by Greener Journeys found a 10% increase in congestion decreased bus journeys by 10% as congestion caused buses to be slower and less reliable, leading users to switch behaviour, further increasing congestion. To overcome this negative feedback loop, Brighton city council has developed 20km of bus lanes around the city and identified key routes in and out of the city to maximise appeal to passengers. Fixed penalty notices for drivers who enter bus lanes has been in place since 2005. Providing real time information to passengers has increased confidence in the timetable which encourages more road users to switch from their cars to reliable buses.

- Buses are essential to reduce congestion, air pollution and emissions but COVID-19 has made many reluctant to use public transport
- Routes must be convenient and buses regular and reliable. Providing live information at stops and priority lanes to avoid congestion significantly increase usage
- Mobility should be integrated with bus stops, train stations, cycle lanes and destinations holistically designed

9.6.2 CLEAN AIR

[Southampton](#) has successfully cut emissions without charging drivers through supporting the introduction of green taxis, buses and deliveries. After a consultation process with local stakeholders the council launched its Local NO₂ plan which aims to reduce emissions without introducing charges. Key measures include: retrofitting 145 of the city’s licensed buses with emission reduction technology, bringing them in line with the highest and best diesel emission standards; creating a low emission taxi incentive scheme that installs taxi-only rapid charging points and offers drivers £3,000 towards switching their vehicle to electric or low emission; and expanding the use of sustainable distribution centres that combine deliveries to ensure there are fewer lorries on the roads. In 2022 Southampton began piloting a bus fitted with a filtration system designed to remove ultra-fine, harmful particles and releases cleaner air behind it.

The impact of these changes has been an improvement of local air quality including cutting average emissions for the city’s taxi and private fleet from 0.144g/km to 0.092g/km between 2019 and 2021. Particulate pollution from vehicles fell between 2012 and 2019 with annual average concentrations of Nitrogen Dioxide have declined by approximately 12% in key areas.

- Air pollution disproportionately falls on lower income neighbourhoods
- Southampton procured buses that filtered air as part of an innovative trial
- Air pollution makes people less willing to walk and cycle

9.6.3 BOGOTÁ BICYCLE CITY

Bogotá, Colombia has transformed itself into South America's cycling capital through its innovative [ciclovía](#) programme. Cycle paths cover more than 360km, enabling citizens to travel throughout the city safely and cheaply. This has reduced the need for costly automobile infrastructure and has increased retail density as less space is used by roads and parking. Bogotá has recently launched the CAMEP bike sharing scheme, where private operators have provided 3,300 bicycles to neighbourhoods in the city. Revenue from CAMEP has been used to secure the long-term sustainability of cycling infrastructure.

The city has also provided 1,500 assisted-EV bikes and hand-pedal bikes to improve accessibility for disabled users, children and those with young families. Since 1974, Bogotá has been closing streets to cars on certain days to encourage social and economic activity by returning streets to pedestrians. Often Sundays, these days have proved highly popular with street markets, fairs and children's games enjoying the newly free space. The cycling network has facilitated residents moving freely throughout the city, opening new job opportunities to people without taking costly public transport or congested cars. 85% of journeys in Bogotá are now done by foot, bicycle or bus, with up to 1 million daily bicycle journeys.

- 360km of cycle lanes connects the city, providing residents cheap ways to travel safely
- Bicycle rentals create revenue to reinvest into the scheme
- Car-free days open streets to retail, leisure and socialising opportunities

9.6.4 RURAL CAR SHARING

Arloesi Gwynedd Wledig have launched an electric community car scheme with two cars to support the mobility of people within the local community. One is based at the local library – Dyffryn Ogwen Community Library, Bethesda – and the other at the community centre in Abergynolwyn. These cars should allow local residents greater access to mobility options without requiring their own car. This can both save money for residents, incentivise public transport or active travel where possible and still provide the opportunity to use a car as and when required. Car share schemes need to have a visibility and capacity that will give users confidence there will be a vehicle available when needed.

- Provides mobility without requiring personal vehicle
- Can save money and emissions for users
- Requires sufficient capacity for reliable availability (this can make schemes less viable if run on a commercial basis)

9.7 ENERGY

9.7.1 MICROGRIDS

As energy travels from where it is produced to where it is needed, transmission losses occur – meaning the further away energy is produced, the more losses are incurred. A potential way to resolve this whilst empowering communities is [energy microgrids](#). As increasing parts of our energy system are electrified, this will put substantial pressure on the National Grid. Microgrids can support local efforts to decarbonise without waiting for national infrastructure.

Microgrids are usually connected to the main grid but have independent generation and transmission networks which enhances their resilience during storms or power outages. The Owen Square heat pump is an example of a community microgrid (see below). Microgrids in combination with community energy projects can be an effective tool to decentralise energy systems, stimulate activity without waiting for central or national approval, build resilience into systems and decarbonise supplies whilst engaging with local communities. These projects can also be used to support local employment and those in fuel poverty. Microgrids can also be ideal for connecting rural communities to the electricity grid rather than rely on costly or carbon intensive oil, coal or wood-based alternatives.

- Microgrids can overcome National Grid capacity issues and shorten installation times
- Locally produced renewable energy reduces transmission losses
- Revenues can be invested into communities or expanding renewables

9.7.2 RENEWABLES

Land-use and competition with development and farming is a major constraint on renewable energy. There are often land-use conflicts and concerns raised during planning applications and as energy demands increase these will become more pressing. WinACC estimated that Winchester district's electricity demand could be met by 2,500 acres of solar installations or roughly 4 square miles (1.6% of the district's total 250 square miles). This accounts for 22% of the fuel mix, which will rise due to grid electrification and increasing uptake of EVs, heat pumps and other smart technologies. Exciting solutions have been developed to more efficiently utilise limited supplies of land.

[Floating solar](#) and [agrivoltaic installations](#) both offer complementary benefits when appropriately deployed. Floating solar arrays can be installed on reservoirs, reducing the evaporation rates of the now covered water as well as providing cooling for the panels which helps them to run more efficiently. [Agrivoltaic](#) arrays can resolve elements of the food / energy dilemma. By raising the height of the panels, agricultural activities, such as grazing or crop growing, can be continued under and between the panels. As temperatures increase and water management becomes ever more important, the shading provided by the panels can increase yields for particular crops, such as lettuce, broccoli, tomatoes, potatoes, spinach, beets, carrots and strawberries. Wheat is not effective, but trials are being conducted on apples and pears. The panels can also protect crops and animals from heavy rains, hail and strong winds whilst rainwater can be collected and stored for drier periods, water from evapotranspiration cools the panels, improving efficiency, and reducing crop irrigation needs and water use.

- Land-use conflicts can be resolved with creative complementary dual or triple uses
- Floating solar and agrivoltaics can produce energy and mitigate extreme temperatures
- Important to ensure installation where appropriate to maximise co-benefits

9.7.3 COMMUNITY ENERGY

Community energy groups can offer councils vital support, both in terms of capacity and outreach, to expand energy efficiency and generation projects. Community energy focuses on people and neighbourhoods and so initiatives that may not appeal to larger energy companies can be made to work locally. This is also key to the Just Transition as revenues generated can be reinvested into local communities through training, apprenticeships, retrofitting and energy advice or additional



projects. Community Energy England [research](#) has identified that since 2010, its members have used £7.4m in public funds to leverage over £50m in private investment.

In Bristol, two innovative energy schemes have been led by community groups: the Ambition Lawrence Weston (ALW) wind turbine and the Owen Square solar heat pump and microgrid.

Ambition Lawrence Weston Wind Turbine

The [ALW wind turbine](#) is the tallest in the UK, with an estimated annual carbon saving of 4,457 tonnes and serves 3,500 people in an area with high levels of fuel poverty. Bristol City Council allowed ALW to develop the turbine on its land and supported initial business case development to facilitate ALW in applying for funding from non-council sources. Revenues from the turbine are used to insulate homes, fund a renewable energy skills training centre and help residents in fuel poverty.

Owen Square Solar Heat Pump

The [Owen Square network](#) is a microgrid that connects 358 homes, 9 businesses, a community centre and mosque, providing energy at 5.69p kWh. Solar energy is stored in thermal boreholes in the summer for an air-source heat pump to use in the winter. Integrated in a local playground, the project was funded by the Department of Energy and Climate Change (DECC). Costs are kept low as the network does not rely on insulated piping and requires little ongoing maintenance. The project offers commercially sustainable low carbon energy at affordable prices to a deprived community in Bristol.

- Community Energy groups can support council priorities and implement schemes less attractive to large energy companies and access expertise and funds not available to local authorities
- Revenues are reinvested into retrofits, fuel poverty, expanding generation and skills training
- Councils can support Community Energy groups through seed funding, business case development, favourable rents on land or office space and organising joint learning sessions

9.8 PENSIONS

The Local Government Pension Scheme (LGPS) is one of the largest pension schemes in the UK, with a market value of £332.7bn in March 2021. The fund is administered locally by 86 local funds and can [invest into ESG](#) as long as members' financial interests continue to be prioritised. Pensions have access to significant investment capital and can be used to support decarbonising and social value enterprises.

There are generally four types of alternative investment strategies pension funds can adopt and WCC can pressurise the local Hampshire LGPS committee to consider strategic use of funds, whilst still making returns for members. The strategies are: activist; impact; divestment; and, place-based. Activist funds, such as Aviva and the Church of England, use their shareholdings to pressure companies to adopt decarbonisation agendas and move away from fossil fuels. Impact schemes seek to invest in companies, such as innovative green technologies, that provide long-term returns for investors whilst utilising capital for wealth creation with complementary environmental and social goals. Divestment funds are the most straightforward and avoid investing in pre-specified markets ('sin stocks'), such as oil, tobacco, gambling and arms manufacturing. Place-based funds take a targeted approach, seeking to invest in specific locations to stimulate economic development. In

Winchester, this could involve creating a fund to invest in local firms with robust business cases to advance objectives in the Green Economic Development Strategy.

- Pension funds have access to huge investment capital which can be utilised for ESG benefits
- LGPS is valued at £332.7bn (March 2021) and there is scope for local fund managers to invest capital in projects that produce long-term environmental and social returns, alongside value of money

9.9 WASTE MANAGEMENT

9.9.1 RECYCLING COLLECTIONS

By moving to [three-week refuse collection](#), Cyngor Sir Powys County Council has reported £482,000 per annum in waste management cost savings, Bury Council has seen a 10% increase in recycling and a 9% decrease in refuse volume whilst Somerset County Council saw a 45% increase in food waste collected.

Local authorities can often be reluctant to change collection schedules due to perceived pushback from residents. A key concern often raised is fear that refuse bins will smell, overflow or become unhygienic if left uncollected for an extended period. The lessons learnt by early moving authorities, however, is that when coupled with food and hygiene collections the items that cause anxiety are removed regularly, overcoming worries, saving money and increasing recycling. Public education needs to be combined with collection changes to ease residents' anxieties and ensure correct use.

- Collection changes can meet resistance so meaningful engagement and awareness-raising is crucial to ensure residents understand changes and how to properly use bins to avoid smell and hygiene concerns

APPENDIX B: LIST OF DOCUMENTS REVIEWED

LIST OF DATA SOURCES

1. Sub-national total final energy consumption data BEIS (2021)
<https://www.gov.uk/government/collections/total-final-energy-consumption-at-sub-national-level>
2. Climate Change 2021: The Physical Science Basis | Climate Change 2021: The Physical Science Basis (ipcc.ch): <https://www.ipcc.ch/report/ar6/wg1/>
3. Climate Change 2022: Mitigation of Climate Change (ipcc.ch):
<https://www.ipcc.ch/report/ar6/wg3/>
4. Top IPCC Climate Change Mitigation Report Findings | World Resources Institute (wri.org):
<https://www.wri.org/insights/ipcc-report-2022-mitigation-climate-change>
5. Hampshire-Climate-Change-strategy-2020-2025.pdf (hants.gov.uk):
<https://documents.hants.gov.uk/environment/Hampshire-Climate-Change-strategy-2020-2025.pdf>
6. HCC: About our Local Transport Plan: <https://www.hants.gov.uk/transport/localtransportplan>
7. HCC City of Winchester Movement Strategy:
<https://documents.hants.gov.uk/transport/Winchester-Movement-Strategy.pdf>
8. HCC Local Cycling and Walking Infrastructure Plan:
<https://documents.hants.gov.uk/transport/WMS-NextStepsProposals-LCWIP-EngagementFindingsReport.pdf>
9. Subnational Consumption Statistics: methodology and guidance (publishing.service.gov.uk):
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1050290/subnational-methodology-and-guidance-2022.pdf
10. National Statistics Energy consumption in the UK 2020 - GOV.UK (www.gov.uk):
<https://www.gov.uk/government/statistics/energy-consumption-in-the-uk-2020>
11. Greenhouse gas emissions in Winchester District: Part XI, WinACC (2021) greenhouse-gas-emissions-in-winchester-district-2021-web-version.pdf (winacc.org.uk):
<https://www.winacc.org.uk/wp-content/uploads/2021/10/greenhouse-gas-emissions-in-winchester-district-2021-web-version.pdf>
12. Green Book supplementary guidance: valuation of energy use and greenhouse gas emissions for appraisal BEIS (2021) <https://www.gov.uk/government/publications/valuation-of-energy-use-and-greenhouse-gas-emissions-for-appraisal>
13. Special Report on Global Warming of 1.5 °C. IPCC (2018). Source:
<https://www.ipcc.ch/report/ar6/wg3/>
14. Carbon Storage and Sequestration by Habitat 2021 - NERR094 (naturalengland.org.uk):
<http://publications.naturalengland.org.uk/publication/5419124441481216>

15. 3.3 Project carbon sequestration - UK Woodland Carbon Code:
<https://woodlandcarboncode.org.uk/standard-and-guidance/3-carbon-sequestration/3-3-project-carbon-sequestration>
16. HIS Definitions: <https://www.somerc.com/wp-content/uploads/2019/01/HIS-Definitions.pdf>
17. Sub-national total final energy consumption data BEIS (2021)
<https://www.gov.uk/government/collections/total-final-energy-consumption-at-sub-national-level>
18. National Statistics Energy consumption in the UK 2020 - GOV.UK (www.gov.uk):
<https://www.gov.uk/government/statistics/energy-consumption-in-the-uk-2020>
19. Sub-national road transport fuel consumption in the United Kingdom, 2005 to 2020 (BEIS, 2022) Sub-national road transport consumption data - GOV.UK (www.gov.uk):
<https://www.gov.uk/government/collections/road-transport-consumption-at-regional-and-local-level>
20. UK local authority and regional greenhouse gas emissions national statistics:
<https://www.gov.uk/government/collections/uk-local-authority-and-regional-greenhouse-gas-emissions-national-statistics>
21. BEIS, 2021, Green Book supplementary guidance: valuation of energy use and greenhouse gas emissions for appraisal. Available online at:
<https://www.gov.uk/government/publications/valuation-of-energy-use-and-greenhouse-gas-emissions-for-appraisal>
22. BEIS, 2022 (accessed), Domestic private rented property: minimum energy efficiency standard - landlord guidance. Available online: <https://www.gov.uk/guidance/domestic-private-rented-property-minimum-energy-efficiency-standard-landlord-guidance>
23. National Grid, 2020, FES Documents archive. Available online:
<https://www.nationalgrideso.com/future-energy/future-energy-scenarios/archive>
24. BEIS, 2021, Green Book supplementary guidance: valuation of energy use and greenhouse gas emissions for appraisal. Available online at:
<https://www.gov.uk/government/publications/valuation-of-energy-use-and-greenhouse-gas-emissions-for-appraisal>
25. UK hydrogen strategy: <https://www.gov.uk/government/publications/uk-hydrogen-strategy>
26. Solar resource maps and GIS data for 200+ countries | Solargis: <https://solargis.com/maps-and-gis-data/download/united-kingdom>
27. Deep Geothermal Review Study Final Report Final:
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/251943/Deep_Geothermal_Review_Study_Final_Report_Final.pdf
28. Keeping warm: a review of deep geothermal potential of the UK - JG Gluyas, CA Adams, JP Busby, J Craig, C Hirst, DAC Manning, A McCay, NS Narayan, HL Robinson, SM Watson, R Westaway, PL Younger, 2018:
<https://journals.sagepub.com/doi/10.1177/0957650917749693>

29. Renewable energy - Winchester City Council: <https://www.winchester.gov.uk/climate-change-and-energy/climate-emergency-what-we-are-doing-now/investing-in-100-renewable-energy>
30. WinACC, 2021, Greenhouse gas emissions in Winchester District: Part XI. Available online: <https://www.winacc.org.uk/wp-content/uploads/2021/10/greenhouse-gas-emissions-in-winchester-district-2021-web-version.pdf>
31. Induced travel demand: an evidence review: <https://www.gov.uk/government/publications/induced-travel-demand-an-evidence-review>
32. Lessons from the Green Lanes: Evaluating Protected Bike Lanes in the U.S: <https://nitc.trec.pdx.edu/research/project/583>
33. Hampshire County Council, 2021, H&EP Committee Update on Decarbonising Transport. Available online at: <https://democracy.winchester.gov.uk/documents/s17124/HEP%20presentation%20on%20Transport%20Decarbonisation%2030%20Sept%202021.pdf>
34. Hampshire Rights of Way online | Hantsweb: <https://maps.hants.gov.uk/rightsofwaydefinitivemap/largemap>
35. Electric vehicles - Winchester City Council: <https://www.winchester.gov.uk/climate-change-and-energy/climate-emergency-what-you-can-do-to-help/actions/electric-vehicles>
36. Project Integra: <https://www.hants.gov.uk/wasteandrecycling/projectintegra/aboutprojectintegra>
37. Tackling contamination in dry recycling | WRAP: <https://wrap.org.uk/resources/guide/tackling-contamination-dry-recycling>
- How carbon-smart farming can feed us and fight climate change | World Economic Forum (weforum.org): <https://www.weforum.org/agenda/2020/08/how-carbon-smart-farming-tackles-climate-change/>
38. BEIS, 2022, Sustainable Warmth Competition: successful local authorities. Available online at: <https://www.gov.uk/government/publications/sustainable-warmth-competition-successful-local-authorities>
39. GLA, Solar Together London. Available online at: <https://www.london.gov.uk/what-we-do/environment/energy/solar-together-london>
40. Ofgem provides advice, grants and loans to for businesses: <https://www.ofgem.gov.uk/information-consumers/energy-advice-businesses/find-business-energy-efficiency-grants-and-schemes>
41. InnovateUK offer funding for businesses to test innovate ideas: <https://www.gov.uk/apply-funding-innovation>
42. Decarbonisation road map for the European food and drink manufacturing sector: https://www.fooddrinkeurope.eu/wp-content/uploads/2021/09/Decarbonising-the-European-food-and-drink-manufacturing-sector_v2.pdf

43. [Coronavirus and homeworking in the UK: April 2020:
https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/bulletins/coronavirusandhomeworkingintheuk/april2020#measuring-the-data](https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/bulletins/coronavirusandhomeworkingintheuk/april2020#measuring-the-data)
44. [Segregated cycleways and e-bikes - the future of urban travel:
https://policy.friendsoftheearth.uk/insight/segregated-cycleways-and-e-bikes-future-urban-travel](https://policy.friendsoftheearth.uk/insight/segregated-cycleways-and-e-bikes-future-urban-travel)
45. [Decarbonising road freight, servicing and deliveries: local authority toolkit:
https://www.gov.uk/government/publications/decarbonising-road-freight-servicing-and-deliveries-local-authority-toolkit/decarbonising-road-freight-servicing-and-deliveries-local-authority-toolkit--2](https://www.gov.uk/government/publications/decarbonising-road-freight-servicing-and-deliveries-local-authority-toolkit/decarbonising-road-freight-servicing-and-deliveries-local-authority-toolkit--2)
46. [How ready is the UK for the switch to renewables?:
https://www.geotab.com/uk/destination-ev/](https://www.geotab.com/uk/destination-ev/)
47. Scoping the role of local authorities in the provision of electric vehicle charging infrastructure | Local Government Association: <https://www.local.gov.uk/publications/scoping-role-local-authorities-EV>
48. Transition to Electric Vehicles (birmingham.ac.uk): <https://www.birmingham.ac.uk/Documents/college-social-sciences/business/responsible-future/Electric-Vehicles-final.pdf>
49. [Solar farms are essential to meet climate change targets:
https://www.winacc.org.uk/solar-farms-are-essential-to-meet-climate-change-targets/](https://www.winacc.org.uk/solar-farms-are-essential-to-meet-climate-change-targets/)
50. [Forest cover: international comparisons:
https://www.forestresearch.gov.uk/tools-and-resources/statistics/forestry-statistics/forestry-statistics-2018/international-forestry-3/forest-cover-international-comparisons/](https://www.forestresearch.gov.uk/tools-and-resources/statistics/forestry-statistics/forestry-statistics-2018/international-forestry-3/forest-cover-international-comparisons/)
51. [Richmond- The Corporate Plan 2018-22:
https://www.richmond.gov.uk/corporate_plan](https://www.richmond.gov.uk/corporate_plan)
52. [Haringey Council's Tree Sponsorship Scheme:
https://www.treesforstreets.org/haringey-councils-street-tree-sponsorship-scheme/](https://www.treesforstreets.org/haringey-councils-street-tree-sponsorship-scheme/)
53. [Winchester City Council Tree Strategy:
https://democracy.winchester.gov.uk/documents/s18706/HEP022%20-%20Appendix%201%20Tree%20Strategy%20draft%202022.pdf](https://democracy.winchester.gov.uk/documents/s18706/HEP022%20-%20Appendix%201%20Tree%20Strategy%20draft%202022.pdf)
54. New stats show Wales upholds world class recycling rates, despite pandemic | GOV.WALES: <https://gov.wales/new-stats-show-wales-upholds-world-class-recycling-rates-despite-pandemic>
55. University of Oxford (2020), 'The Oxford Principles for Net Zero Aligned Carbon Offsetting'. <https://www.smithschool.ox.ac.uk/sites/default/files/2022-01/Oxford-Offsetting-Principles-2020.pdf> [accessed 22/07/22].
56. The Woodland Carbon Code (2022), <https://woodlandcarboncode.org.uk/> (accessed 27/07/22)

57. Strategic Housing and Economic Land Availability Assessment (SHELAA) - Winchester City Council: <https://www.winchester.gov.uk/planning-policy/winchester-district-local-plan-2011-2036-adopted/evidence-base/housing/shlaa-strategic-housing-land-availability-assessment>
58. Winchester City Council (2022), Carbon Neutrality Action Plan. <https://www.winchester.gov.uk/no-listing/carbon-neutrality-action-plan> (accessed 26/07/22).
59. The Woodland Carbon Code (2022), <https://woodlandcarboncode.org.uk/> (accessed 25/07/2022)
60. Strategic Housing and Economic Land Availability Assessment (SHELAA): <https://www.winchester.gov.uk/planning-policy/winchester-district-local-plan-2011-2036-adopted/evidence-base/housing/shlaa-strategic-housing-land-availability-assessment>
61. Seddon.N., Chausson.A., Berry.P., Girardin.A., Smith.A., Turner.B., (2020) 'Understanding the value and limits of nature-based solutions to climate change and other global challenges'. Philosophical Transactions of the Royal Society Biological Sciences.
62. The Woodland Carbon Code (2022), <https://woodlandcarboncode.org.uk/> (accessed 25/07/2022)
63. IUCN, Peatland Code (2022), <https://www.iucn-uk-peatlandprogramme.org/sites/default/files/header-images/Peatland%20Code/Peatland%20Code%20v1.2.%202022.pdf> (accessed 27/07/22)
64. How to buy - UK Woodland Carbon Code: <https://woodlandcarboncode.org.uk/buy-carbon/how-to-buy>
65. Bromley.J., McCarthy.B., Shellswell.C., Plantlife (2019) 'Manging grassland road verges. A best practice guide'.
66. HM Treasury, 2013, Green Book supplementary guidance: discounting. Available online at: <https://www.gov.uk/government/publications/green-book-supplementary-guidance-discounting>
67. UK Woodland Carbon Code; <https://woodlandcarboncode.org.uk/> (accessed 25/07/22)
68. Forest Carbon, The Peatland Code. <https://www.forestcarbon.co.uk/certification/the-peatland-code> (accessed 25/07/2022).
69. WCC Statistics - UK Woodland Carbon Code: <https://woodlandcarboncode.org.uk/uk-land-carbon-registry/wcc-statistics#carbon>
70. Public Services (Social Value) Act 2012: https://www.legislation.gov.uk/ukpga/2012/3/pdfs/ukpga_20120003_en.pdf
71. Social-Value-Model-Edn-1.1-3-Dec-20.pdf (publishing.service.gov.uk): https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/940826/Social-Value-Model-Edn-1.1-3-Dec-20.pdf

- 72. Social Value Model: Evaluating social value in tenders | Advice Gov (advice-gov.co.uk): <https://advice-gov.co.uk/insights/social-value-model/>
- 73. Healthy commissioning: How the Social Value Act is being used by Clinical Commissioning Groups | National Voices: <https://www.nationalvoices.org.uk/publications/our-publications/healthy-commissioning-how-social-value-act-being-used-clinical>
- 74. Winchester City Council, Winchester District Local Plan 2018-2039 (Emerging), available from <https://www.localplan.winchester.gov.uk> (accessed October 2022)

Table 1-1

Source: Race to Zero Lexicon. [Race-to-Zero-Lexicon.pdf \(unfccc.int\)](#).

Table 3-1

Source: [Sub-national consumption statistics: methodology and guidance](#) Department for Business, Energy & Industrial Strategy (BEIS).

SUMMARISING POLICY REVIEW WORK

National Policies	
Ten Point Plan for a Green Industrial Revolution (BEIS)	Focuses on driving growth of offshore wind, low carbon hydrogen, nuclear power and accelerating shifts towards EVs and active travel. £12bn in government investment and three times as much from the private sector to create 250,000 green jobs.
Sixth Carbon Budget (CCC)	Recommends 78% reduction in UK territorial emissions between 1990 and 2035 through low carbon solutions, low carbon energy, greenhouse gas removal and reducing carbon-intensive activities.
Environment Act (2021)	Post-Brexit environmental framework to clean up UK air, restore habitats, and efficient use of resources through decreased waste and circular economies.
Energy White Paper (2020)	Sets the energy policy agenda to reach UK net zero by 2050. The UK Emissions Trading Scheme replaces the EU carbon market whilst proposing £1bn for CCS and a £240m Hydrogen Fund.
Transport Decarbonisation Plan (2021)	Lays out commitments to decarbonising transport and creating healthier, quieter spaces with skilled jobs to avoid a “car-led recovery” through public transport, active travel, ridesharing, and flexible working.

Review of Net Zero: call for evidence	Chris Skidmore MP is reviewing net zero delivery for the government and WSP is feeding into this review. Policy announcements should be monitored.
Hampshire Policies	
Climate Change Strategy 2020-2025	Hampshire County Council “recognises the changing climate as the biggest threat” and there are areas of collaboration between WCC, HCC and others.
Local Transport Plan 4	Currently being drafted, the LTP4 sets out transport policies for delivering the 2050 Vision, decarbonising transport, and supporting sustainable development.
Local Walking and Cycling Infrastructure Plan	Recommends the approach for planning active travel networks to facilitate walking and cycling.
Winchester Movement Strategy	Adopted by HCC and WCC to enable growth and make Winchester healthier and accessible by reducing city centre traffic, supporting healthier choices, and investing in infrastructure.
Winchester Policies	
Carbon Neutrality Action Plan	Developed in 2019 after the climate emergency declaration, it set ambitious carbon neutrality targets. WSP’s modelling indicates current measures will avoid 7.5ktCO ₂ . This Roadmap models additional interventions.
Green Economic Development Strategy	Ensure Winchester will benefit from green economic opportunities. Designed to deliver wellbeing, reduce inequalities, develop resilience, and transition to a growing, sustainable economy.
Biodiversity Action Plan	Identifies key habitats and the strategic direction for managing the district’s biodiversity, the approach to partnership building, and securing a greener, ecologically vibrant Winchester district.
Winchester City Council, Winchester District Local Plan 2018-2039 (Emerging)	Defines the council's schedule for the production of planning policy documents that form the Winchester Local Plan. Originally produced in 2005, the emerging plan reflects the council's strategic planning program as well as new government laws and regulations.

APPENDIX C – CARBON IN HABITATS TOOL

Baseline carbon storage and flux for WCC Broad Habitats

Habitats present	Total Stored Carbon (tC)	Total Carbon flux (tCO ₂ e y ⁻¹)	Sum of SHAPE Area
Bracken	2636.2	0.0	29.6
Broadleaved mixed and yew woodland	2710409.6	-12109.1	4324.7
Dense scrub	106681.1	-1469.2	738.3
Modified grassland	2454612.0	0.0	18881.6
Neutral grassland	6001.4	0.0	100.0
Other woodland; broadleaved	273222.5	-1220.7	435.9
Other woodland; mixed	1320195.1	-5898.1	2106.5
Cereal crops	35034.3	84.7	292.0
Lowland beech and yew woodland	32711.7	-146.1	52.2
Standing open water and canals	0.0	0.0	43.4
Built-up areas and gardens	0.0	0.0	9403.4
Other coniferous woodland	763182.5	-11112.7	1098.1
Wet woodland	246417.7	-1100.9	393.2
Lowland mixed deciduous woodland	2748444.0	-12279.0	4385.4
Dwarf shrub heath	190.1	0.1	1.9
Inland rock	0.0	0.0	59.6
Other neutral grassland	44610.1	0.0	743.5

Calcareous grassland	3632.1	0.0	52.6
Acid grassland	4.8	0.0	0.1
N/A	0.0	0.0	2970.1
Rivers and streams	0.0	0.0	589.0
Arable and horticulture	0.0	14666.6	50574.5
Lowland meadows	21749.1	0.0	362.5
Lowland calcareous grassland	38825.1	0.0	562.7
Fen marsh and swamp	395921.5	0.0	200.9
Non-cereal crops	46113.1	111.4	384.3
Lowland fens	203016.0	0.0	103.0
Intensive orchards	5372.5	-583.5	97.4
Reedbeds	651.4	-59.7	11.5
Coniferous woodland	9218.9	-134.2	13.3
Built linear features	0.0	0.0	2600.9
Hedgerows	912.9	-12.6	6.3
Eutrophic standing waters	0.0	0.0	3.4
Aquatic marginal vegetation	0.0	0.0	7.1
Arable field margins	0.0	1.5	5.3
Coastal saltmarsh	926.8	-85.0	16.4
Littoral Sediment	239.8	-22.0	4.2
Littoral Rock	78.0	-3.8	11.6
Intertidal mudflats	10084.5	-359.1	258.4
Coastal vegetated shingle	0.0	-1.8	0.8

Coastal sand dunes	0.0	0.0	0.0
Lowland dry acid grassland	892.8	0.0	10.3
Temporary grass and clover leys	2077.0	0.0	16.0
Other hedgerows	3.1	0.0	0.0
(blank)			
Grand Total	11484068.1	-31733.3	101951.8

Baseline carbon storage and flux for WCC woodland habitats

Habitats present	Total Stored Carbon (tC)	Total Carbon flux (tCO₂e y⁻¹)	Sum of SHAPE Area
Broadleaved mixed and yew woodland	2710409.6	-12109.1	4324.7
Other woodland; broadleaved	273222.5	-1220.7	435.9
Other woodland; mixed	1320195.1	-5898.1	2106.5
Lowland beech and yew woodland	32711.7	-146.1	52.2
Other coniferous woodland	763182.5	-11112.7	1098.1
Wet woodland	246417.7	-1100.9	393.2
Lowland mixed deciduous woodland	2748444.0	-12279.0	4385.4
Coniferous woodland	9218.9	-134.2	13.3
Grand Total	8103802.0	-44000.9	12809.2

2030 carbon storage and flux for WCC woodland habitats

Habitats present	Total Stored Carbon	Total Carbon flux	Sum of SHAPE Area
-------------------------	----------------------------	--------------------------	--------------------------



Broadleaved (80yr)	7756851.8	-38018.0	11697.9
Conifer (80yr)	904641.3	-12713.9	1111.4
Grand Total	8661493.2	-50731.9	12809.2

2050 carbon storage and flux for WCC woodland habitats

Habitats present	Total Stored Carbon	Total Carbon flux	Sum of SHAPE Area
Broadleaved (80yr)	8314605.9	-23629.7	11697.9
Conifer (80yr)	1110052.7	-8901.9	1111.4
Grand Total	9424658.5	-32531.6	12809.2



APPENDIX D: MODELLING OVERVIEW

Intervention No.	Council 2024	District 2030	Modelled	Comments and reasons if not modelled	Carbon savings (ktco2) per year	Target year	Total kt CO2 in 2030 if target met
T-A1	All council pool cars, vans and maintenance vehicles to be ultra low emission or electric by 2022	Develop an expanded network of EV charging points across the district – starting with up to 46 points on the council's own estate by 2024, adding to existing provision and working with partners to identify where more are needed.	Modelled	Included in LA model under intervention 1 & 3 which models EV uptake in the district up to 2030 and beyond the ICE sale ban	0.104	2024	0.622
T-A2	Introduce two electric pool cars in 2020	Facilitate roll out of private charging facilities, in new commercial and housing developments.	Modelled	EV charging points covered in T-A1. Have modelled for additional electric cars by 2024.	0.004	2024	0.026



Intervention No.	Council 2024	District 2030	Modelled	Comments and reasons if not modelled	Carbon savings (ktco2) per year	Target year	Total kt CO2 in 2030 if target met
T-A3	Pilot the use of electric refuse freighter and/or Park & Ride bus by 2022	Deliver key studies in 2020 to take forward the Winchester Movement Strategy which have a focus on achieving carbon emission reduction: • Walking & Cycling Strategy; • Freight Strategy; • Parking & Access Strategy.	Modelled	Only park and ride spaces increasing to 3000 having been modelled (this is the number included in carbon savings column). Some bus electrifications however, have been included for in LA model intervention 19.	0.633	2022	0.633
T-A4	Only zero-carbon/ultra low emission vehicles to be leased by the council from 2024.	Require buses and taxis to be low emission/ alternative fuel vehicles by 2030.	Covered by intervention in LA model	Intervention 19	-	-	-
T-A5	All refuse/bus fleet to be minimum Euro 6 standard by 2020 and ultra low emission by 2028	Develop additional Park & Ride facilities to increase capacity starting with the Vaultex site with 130 initial new car park spaces 2020, increasing to 3000 in 2021.	Covered by intervention in LA model	Intervention 16	-	-	-
T-A6	In additional to home working expand remote working in other / partner locations across the district	Seek investment to deliver smart mobility projects especially at Park & Ride sites	Not modelled	Duplicated by T-A5 and T-A3, enabling action	-	-	-



Intervention No.	Council 2024	District 2030	Modelled	Comments and reasons if not modelled	Carbon savings (ktco2) per year	Target year	Total kt CO2 in 2030 if target met
	to reduce unnecessary travel and the need for central office accommodation.	and key gateways to the city and district by 2021.					
T-A7		Implement differential charging for low emission vehicles in council car parks.	Not modelled	Not significant for neutrality goal. Partially accounted for in T-A1	-	-	-
T-A8		Collaborate with Hampshire County Council and private operators to expand and enhance public transport services (bus and rail), including access, frequency and affordability.	Covered by intervention in LA model	Included as part of transport shift data / public transport access	-	-	-
H-A9	Complete a "Re:Fit" review of all corporate property and determine a "retro-fit" programme of energy measures (funded directly through energy savings).	Through the LEAP programme facilitate energy efficiencies in homes in fuel poverty and support vulnerable tenants	Not modelled	Not significant for neutrality goal.	-	-	-
H-A10	To install additional energy efficiency measures (digital lighting, solar PV etc.) to communal areas of council sheltered housing schemes by 2021	Deliver campaigns to inspire people to reduce energy consumption and provide energy advice for the home, helping tenants and homeowners switch energy supplier, for example.	Covered by intervention in LA model	Intervention 9	-	-	-



Intervention No.	Council 2024	District 2030	Modelled	Comments and reasons if not modelled	Carbon savings (ktco2) per year	Target year	Total kt CO2 in 2030 if target met
H-A11	Develop a sustained campaign to provide information, advice, signposting with a platform to share ideas through the council website	Provide and share information with residents on how to live more sustainably and where local groups are so they can get further support in their communities	Not modelled	Requires further detail for quantification	-	-	-
H-A12		To develop a council led pilot Passivhaus housing scheme in Micheldever by 2021.	Covered by intervention in LA model	Interventions 4 & 5	-	-	-
H-A13		All new council homes will be built to the highest efficiency standards by 2024	Covered by intervention in LA model	As H-A12, include within intervention 4	-	-	-
H-A14		To bring forward the Local Plan update with an emphasis on low carbon housing development by 2021.	Not modelled	Target date has passed.	-	-	-
H-A15		To invest an additional £1m per annum on energy and water efficiency measures to council housing stock with the aim of all properties meeting an EPC standard of C by 2027.	Modelled	Included as part of intervention 9 of LA model	1.951	2027	5.854
E-A16	Source 100% of all electricity purchased by the council from renewable sources by 2021.	Undertake research into suitable alternatives to natural gas especially in relation to local generation potential.	Not modelled	Enabling action, no carbon quantification	-	-	-



Intervention No.	Council 2024	District 2030	Modelled	Comments and reasons if not modelled	Carbon savings (ktco2) per year	Target year	Total kt CO2 in 2030 if target met
E-A17	Install additional solar panels on council owned sites and identify sites for renewable energy generation in the Local Plan.	Build or invest in large scale renewable generation project(s), e.g. solar farms, heat pumps, solar-battery car ports, anaerobic digester, wind farm, hydropower.	Covered by intervention in LA model	Intervention 24. 43MW currently under development (planning permission obtained). Assumed another 50MW will be installed by 2030.	0		0
E-A18	Through the procurement strategy purchase/ lease only highly energy efficient/low carbon technologies/materials.	Explore the feasibility of developing a hydrogen generating plant as a source of renewable fuel and to divert waste from land fill.	Not modelled	Enabling action, no carbon quantification	-	-	-
E-A19	As leases and contracts expire renew with purchase/lease of energy efficient electrical equipment and appliances.	Engage with the district's largest businesses to work jointly on initiatives that reduce energy use or generate renewable energy, e.g. roof-top solar PV on commercial buildings	Covered by intervention in LA model	Intervention 12 (commercial buildings) and intervention 14 (industrial buildings)	-	-	-
M-A20	Develop a programme of rewilding starting with planting at least 100 trees annually on Council land.	In collaboration with partners to identify at least 100 hectares of land to support additional tree planting and/or creation of grassland/wetland habitat.	Covered by intervention in LA model	Intervention 23 - impact increases over time	0.0004	2029	0.0004
B-A21	Through the council's programme of environmental improvements to play areas include provision of green/natural features.	Ensure the design of new housing and regeneration developments include the creation of green open spaces, and the inclusion of green roofs and green corridors	Not modelled	Enabling action and not significant for neutrality	-	-	-



Intervention No.	Council 2024	District 2030	Modelled	Comments and reasons if not modelled	Carbon savings (ktco2) per year	Target year	Total kt CO2 in 2030 if target met
B-A22	Continue to deliver a programme of works which protect and support our existing tree stock.	Plant new woodlands to both increase biodiversity habitats, for health and wellbeing and to act as carbon sinks for offsetting in partnership with key stakeholders and landowners.	Not modelled	As part of M-A20	-	-	-
B-A23	Increase the number of wildflower meadows, grassland and wetland on council owned land.		Not modelled	Not significant for neutrality goal.	-	-	-
W-A24	Continue (and accelerate) the delivery of the digital transformation projects, to enable access to services online, to reduce printing.	Reduce levels of contamination in the recycling waste streams through clearer information and guidance.	Modelled	Assumptions made in W-A24 tab	0.058	2024	0.35
W-A25	Manage print runs and stock control to avoid Services waste.	Add further waste streams to introduce recycling services such as food and additional plastics.	Not modelled	Requires further detail for quantification	-	-	-
W-A26		Install recycling bins in the city centre.	Not modelled	Requires further detail for quantification	-	-	-

7.49



4th Floor
6 Devonshire Square
London
EC2M 4YE

wsp.com