SLOUGH BOROUGH COUNCIL

Climate Change Strategy and Action Plan

December 2021

Anthesis

www.slough.gov.uk
Slough Borough Council

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01 Executive Summary

1. EXECUTIVE SUMMARY
CLIMATE CHANGE STRATEGY AND ACTION PLAN

The need to act

It is now widely agreed that climate change poses an unprecedented threat, and that action is required across all aspects of society. Most recently, scientists in the Intergovernmental Panel on Climate Change (IPCC) stated that a 1.5˚C increase in average global temperatures is now unavoidable. However, with radical action to reduce atmospheric concentrations of greenhouse gasses (GHGs), we can still limit further climate change, and temperatures could stabilise in 20-30 years. Temperature increases above 1.5˚C are widely considered to be particularly dangerous.

Action to reduce GHG emissions (i.e., the release of GHGs into the atmosphere) is taking place across all levels of society, including locally, where authorities can use their influencing powers to facilitate action. Since the impacts of climate change are already being felt, action to adapt to these impacts is also necessary. Climate action offers potential social and economic benefits and could support our recovery from the COVID-19 pandemic.

Slough's Climate Change Commitment

In 2019, Slough Borough Council ("SBC" or "the Council") declared a motion on climate change, recognising the growing urgency for emission reductions and climate adaptation action across the borough. Following this, **the Council set an ambition for the borough to be carbon neutral by 2040, with a stretch target of 2030**. The council also committed to supporting council services, residents, and businesses to **adapt to the impacts of climate change**. This report was commissioned to provide a strategy and action plan detailing the steps needed for the borough to meet these ambitions.

Slough's greenhouse gas emissions

We used GHG modelling tools to understand the scale of emissions in Slough, and their key sources. Our analysis was based on 2018 data, which was the most recent available. In 2018, the Slough area was responsible for emissions totalling 1,177 kilo tonnes (kt) carbon dioxide equivalent (CO_2e). Carbon dioxide equivalent is a metric for emissions which includes the impact of multiple greenhouse gasses.

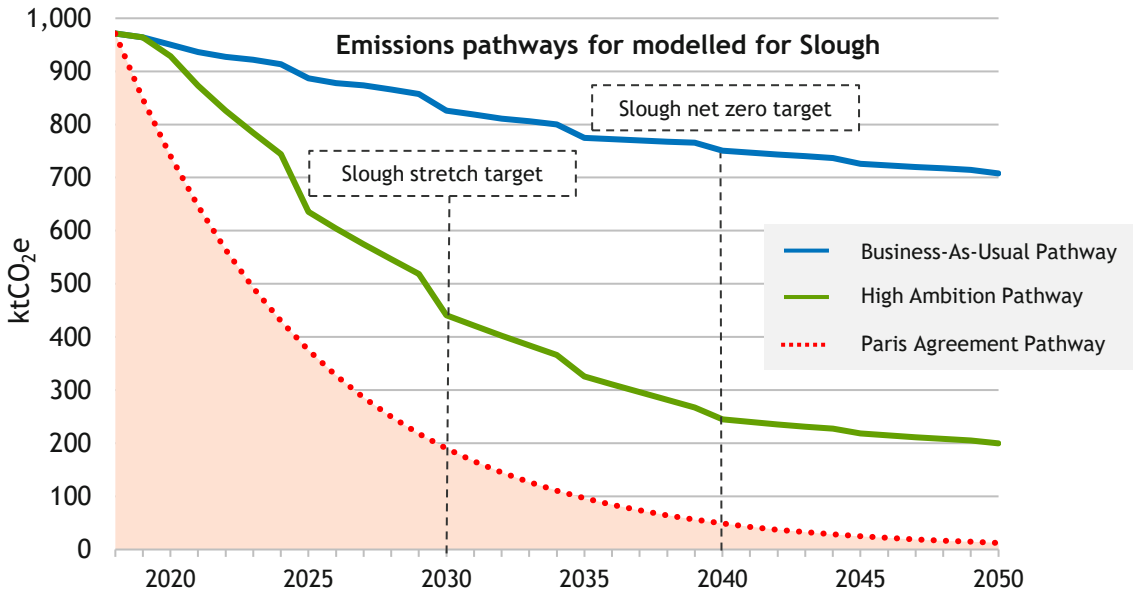
Most emissions resulted from energy consumption in buildings & facilities (57.7%) and transport (30.8%). Other sources include emissions arising from industrial processes (10.9%) and waste management (0.7%). The natural environment, including the Slough's trees and ecosystems, can absorb carbon from the atmosphere, and contribute to a net reduction in emissions (-0.2%). Understanding GHG emissions sources in this way is valuable in helping us to target emissions reduction actions.

1. EXECUTIVE SUMMARY
CLIMATE CHANGE STRATEGY AND ACTION PLAN

Anticipating future emissions reductions

Emissions reduction "pathways" can be modelled to show us possible scenarios for future GHG emissions based on differing levels of action to reduce emissions. In the graph across, we model the impacts of two potential pathways. The blue line shows anticipated emissions in Slough should no direct action be taken in the borough. The green line shows anticipated emissions should the borough implement an ambitious suite of measures, demonstrating "High Ambition". The dotted line shows the emissions reductions required by the Paris Agreement, a treaty which aims to limit warming to 2°C.

These pathways show the impact of specific emissions reduction actions in Slough, and how these contribute to the borough meeting its targets. The data shows that despite applying an ambitious set of actions, **441 $ktCO_2e$** will remain at 2030 and **245 $ktCO_2e$** at 2040. This signals the need for radical action, focussing on the measures outlined in the "High Ambition" pathway, but also going beyond these. This informs our recommendations for action in Slough.



Delivering Climate Action: The plan sets out detailed action recommendations for Slough to reduce emissions across several areas:

Buildings
- Improved energy efficiency
- Moving away from gas heating systems
- Low carbon and energy efficient cooking, lighting and appliances

Transport
- Travelling shorter distances
- Driving less
- Switching to electric vehicles
- Improving freight emissions
- Reducing aviation emissions

Waste
- Reducing the quantity of waste
- Increasing the recycling rate

Industry
- Innovative technologies
- Industry support

Energy Supply
- Increased wind capacity
- Increase solar photovoltaic (PV) capacity
- Increase the capacity of other renewable technologies

Natural Environments
- Increased tree coverage & tree planting
- Land use management
- Sustainable consumption
- Carbon offsetting strategy

SBC's Wider Influence
- Council behaviour change and influencing suppliers
- Leading change in the borough
- Lobbying national government

1. EXECUTIVE SUMMARY
CLIMATE CHANGE STRATEGY AND ACTION PLAN

Adaptation to climate change

The impacts of climate change are already being felt and are anticipated to worsen. Supplementing the recommendations around reducing emissions, a separate analysis was carried out to understand key risks around climate impacts and provide recommend actions to improve resilience to these risks.

Three priority climate impact areas were identified: flooding, high temperatures, and water shortages. For each area, we considered historic risks, projections, and potential future risks, the latter focused on impacts to the economy, people, and the natural environment.

Specific recommendations are provided to address these risks. These include improved data, better infrastructure, citizen engagement, and more. A full study of the cost of adapting could also be undertaken. The cost of adaptation should always be considered in the context of the cost of not acting.

Implementing the actions

The Council cannot achieve the actions set out in the plan on its own and will need input from residents, businesses and other organisations across the borough. Actions in the plan are divided into those for which the council is solely responsible, and those where the council is engaging and influencing others. Key teams or organisations are also indicated.

The capital cost of achieving all the carbon reduction actions is estimated to be over £3 billion, but the actions could also result in savings in excess of £4 billion arising from reductions in operating costs. Dedicated SBC staff time will also be needed to achieve the actions.

The actions will offer positive impacts across wider economic, social and environmental spheres, termed “co-benefits”. It is essential that these savings and co-benefits are considered in making the case for action.

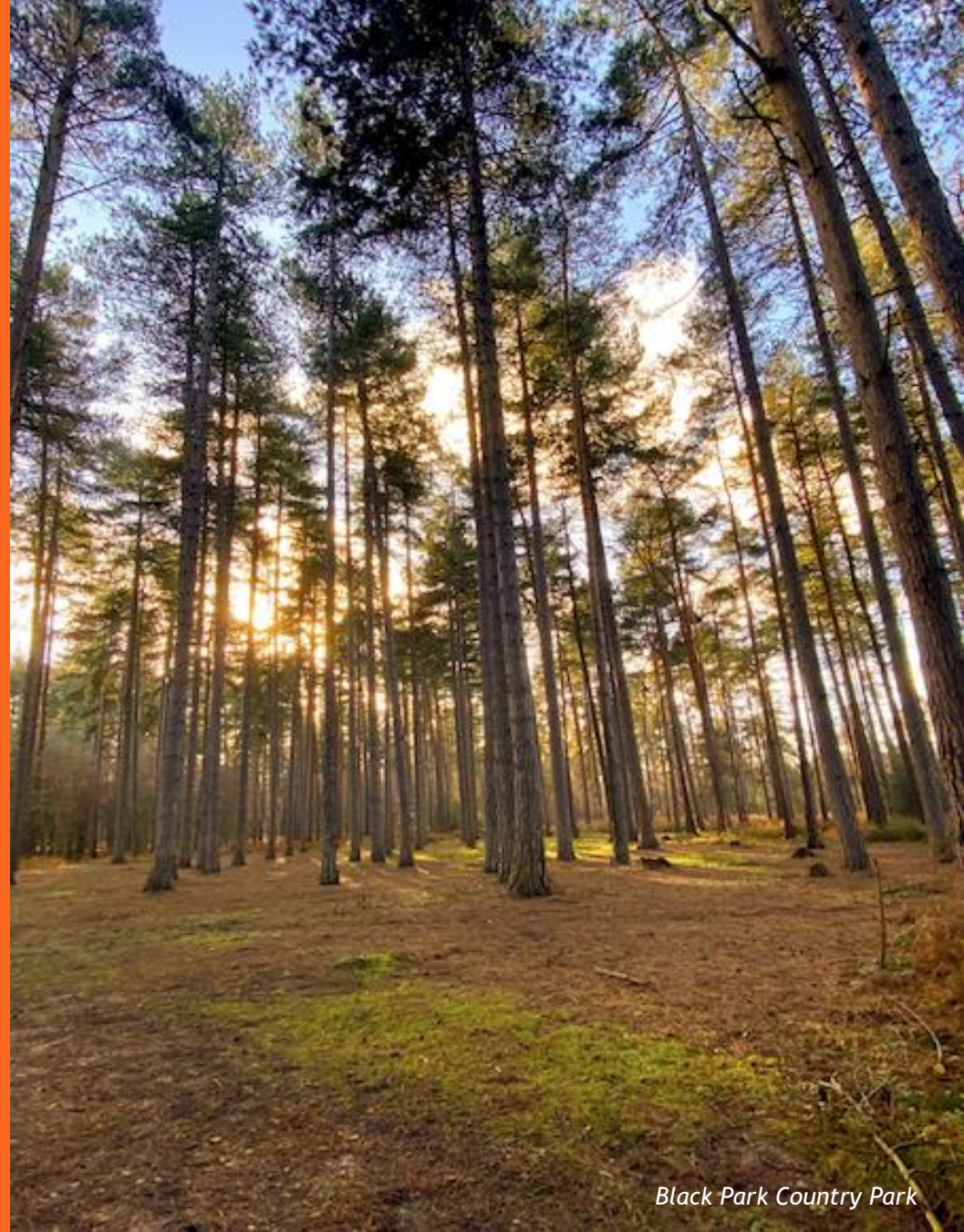
Next steps

Based on carbon savings potential, the priority areas for action around carbon reduction are improving building efficiency, reducing emissions from road transport, and increasing renewable energy supply. The council should act as a leader in the borough to facilitate wider change. Adaptation to the impacts of climate change is also considered high priority.

It is highly recommended that the council now undertake a full action prioritisation exercise based on the metrics provided in the plan.

Progress against the plan should be monitored regularly, including tracking the progress of responsible organisations and teams, and reviewing the impact of the actions taken. Progress against the plan should be publicly reported.

02 Background & Context



Black Park Country Park

2. BACKGROUND & CONTEXT
INTRODUCTION

Overview & Scope

This report was commissioned by Slough Borough Council, who have committed to becoming a carbon neutral borough by 2040, with a stretch target of 2030. Slough Borough Council will use this report to help inform the nature and extent of interventions needed to quickly and effectively achieve emissions reductions within Slough. In the context of this work, an "intervention" is measure designed to mitigate carbon emissions, including specific, quantifiable steps outlined in SCATTER Pathways (see page. 23). The report is structured as follows:

- **Chapters 2 & 3** outline the current context for climate change action and provide an overview of Slough's baseline emissions.
- **Chapters 4 & 5** outline Slough's carbon budget and present future emissions pathways defined by a range of measures within the SCATTER Pathways Tool.
- **Chapter 6** identifies a series of emission reduction interventions and provides an analysis of recommended actions to enable the delivery of Slough's net zero target.
- **Chapter 7** explores the physical risks associated with climate change and presents climate change adaptation actions.
- **Chapter 8** explores the importance of tracking and monitoring progress towards various climate goals and objectives.
- **Chapter 9** provides conclusions and recommendations for next steps in taking the Climate Change Strategy and Action Plan forward.

The data provided in this report is indicative and highlights the scale and speed of change needed across Slough to meet the net zero 2040 ambition or 2030 stretch target.

Objectives

1. Provide a better understanding of Slough's carbon footprint using a location-based accounting approach and build on existing work to date.
2. Explore the science-based carbon budget and emissions reduction pathways for Slough.
3. Reaffirm and identify a number of emissions reduction measures, milestones and actions for Slough Borough Council to implement.
4. Explore Slough's physical risk to climate change and identify a number of adaptation actions.

This will help Slough Borough Council to:

- Provide a more informed evidence base for climate change action.
- Make the most of the benefits of reducing emissions, including better air quality, greener natural environments, warmer homes as well as cost savings and new green jobs.
- Increase confidence in the mandate for climate action and aid delivery of a robust local strategy, which can deliver objectives over a long-term cycle.

2. BACKGROUND & CONTEXT
A CALL TO ACTION

A Growing Consensus

It is now widely agreed that climate change poses an unprecedented threat, and that action is required across all aspects of society. Most recently, this has been communicated by the Intergovernmental Panel on Climate Change's (IPCC) Sixth Assessment Report, which states that 1.5ºC of warming is now unavoidable, but that strong action can still limit climate change, and with radical action, temperatures could stabilise in 20-30 years. The recognition of urgency is no longer just a message from environmental groups, but is being reiterated across a variety of sectors:

- **UK Local Authorities:** The majority of Local Authorities in the UK have now declared a climate emergency or a motion on climate change, including Slough Borough Council. Climate Emergency Declarations were first issued following the IPCC's special report, published in October 2018.
- **UK Climate Strike Action:** Several climate strikes have occurred across Berkshire in recent years, with some driven by climate groups such as Extinction Rebellion.
- **Global Businesses:** Nearly 800 companies globally are setting Science Based Targets. As part of the lead up to COP26, the campaign 'Race to Zero' was launched across businesses, cities and nations.

Dangerous Impacts

The UK Climate Projections Report is the latest generation of national climate projections in the UK, which helps to predict the changes that will occur with future climate change. The main trends from the projections are increasing warmer, wetter winters and hotter, drier summers along with an increase in the frequency and intensity of extreme weather events.

Communities across Slough are already seeing more extremes in weather events, with floods, heavy storms and extreme heat being particularly problematic. In January 2020, Storm Brendan brought significant rain and wind that led to significant damage to the high street of Slough. The damage included an entire roof blown off a block of flats, fallen walls and trees, road blockages, and severe flooding around Colne Brook.

In the 2018 Emissions Gap Report, the UN identified local action as a key driver for change: *"…non-state and subnational action plays an important role in delivering national pledges. Emission reduction potential from non-state and subnational action could ultimately be significant, allowing countries to raise ambition."*

2. BACKGROUND & CONTEXT
OVERVIEW OF POLICY CONTEXT

A Motion on Climate Change

On 23 July 2019, Slough Borough Council's full Council declared a motion on Climate Change. The motion stated: "This Council notes the UK Government and Local Government Association's declaration of a national 'climate emergency', recognises that there is a growing urgency for national and international action to combat climate change, and commits to developing a Climate Change Strategy and Action Plan that will address the causes and consequences of climate change in Slough by tackling 5 key objectives:

- Reducing emissions from our estate and operations
- Reducing energy consumption and emissions by promoting energy efficiency measures, sustainable construction, renewable energy sources, and behaviour change
- Reducing emissions from transport by promoting sustainable transport, reducing car travel and traffic congestion, and encouraging behaviour change
- Reducing consumption of resources, increasing recycling and reducing waste
- Supporting council services, residents and businesses to adapt to the impacts of climate change."

National, Regional and Local Commitments

Commitments have been made and targets have been set at all levels of government in response to the growing consensus and evidence around climate change.

The Paris Agreement, signed in 2016, set the international target to limit global temperature rise to well below 2°C with the aim of 1.5°C above pre-industrial levels. The IPCC's follow up report stated that this requires a global reduction in GHG emissions of 45% by 2030.

The Climate Change Act 2008 introduced a legally binding target for the UK to reduce GHG emissions by 80% by 2050. In June 2019, the target was updated to reach net zero by 2050. In June 2021, the government committed to reducing emissions by 78% by 2035 compared to 1990 levels.

In 2019, all 6 local councils in Berkshire declared a climate emergency or a motion on climate change. The pledges included calls on the government to provide the powers and resources for local authorities to make a 2030 or 2040 target possible, and the need for increased collaboration across Berkshire's local authorities.

In 2019, Slough Borough Council set a motion on climate change and committed to tackling 5 key action objectives. Following the motion, the Council set a borough-wide target of carbon neutrality by 2040, with a stretch target of 2030. This target was adopted by the Council in June 2021 with the Climate Change Strategy Vision statement.

2. BACKGROUND & CONTEXT
STAKEHOLDER ENGAGEMENT

As part of the Climate Change Strategy and Action Plan development, Slough Borough Council in partnership with Anthesis carried out a series of online engagement workshops to gain stakeholder views on the actions proposed, as well as identify key barriers and enablers to climate change action. The workshop series sought to include individuals from a wide range of backgrounds across the community to ensure that attendance was diverse. The workshops aimed at engaging the following key stakeholders:

- Council service teams including Housing, Planning, Transport and Waste Services
- Schools and Colleges across the borough
- Public services
- Residents and community organisations
- Private sector organisations including Small Medium Enterprises (SMEs) and larger corporations

Each two hour workshop consisted of a brief introduction to Slough's climate change commitment and the borough's current emissions profile, followed by three breakout sessions where themes of action were discussed. The outcomes of the workshop series fed directly into shaping the borough's action plan. Key outputs of these stakeholder discussions are summarised following the intervention milestone detail within Chapter 6.

Workshop Theme	Key Invitees
1. Buildings, Planning & Energy Supply	The Council's Planning and Asset Management Teams, Slough Urban Renewal, MUSE, James Elliman Homes, National Grid, SSE, Greater South East Energy Hub, Historic England.
2. Transport	The Council's Transport, Planning and Environment Teams, Highways England, National Rail, GWR, First Group, Thames Valley Buses, Redline Buses, Reading Buses.
3. Waste & Circular Economy	The Council's Waste and Refuse Services, Planning and Environment Teams, SSE, Grundon Waste Management, Viridor, Thames Water.
4. Natural Environments	The Council's Asset Management Team (Parks & Environment) and Planning Teams, Berks Bucks & Oxon Wildlife Trust, Wildfowl and Wetland Trust, Canal & River Trust, Thames Water.
5. Residents, Community Groups and Youth Groups	A proportionate representation of Slough's residents encompassing different backgrounds such as age and religion, Youth Parliament, Young Inspectors, Climate Action Groups.
6. Public Services	NHS Trusts, Thames Valley Police, Royal Berkshire Fire and Rescue, Thames Water, Paradigm Housing, Sovereign Housing Association, Schools and Colleges, Slough Council for Voluntary Service.
7. Businesses & Private Services	Thames Valley Chamber of Commerce, Slough Business Community Partnership, Slough Business Improvement District (BID), Thames Valley Berkshire LEP, Berkshire Business Growth Hub and several other key private businesses.

2. BACKGROUND & CONTEXT
KEY POLICIES RELATING TO CLIMATE CHANGE

To date, Slough Borough Council have developed several responses to the motion on climate change:

Carbon Management Plan 2020-2030: Following the motion on climate change, the Carbon Management Plan introduces measures to reduce carbon emissions across the council's own estate and operations to achieve carbon neutrality by 2030.

Climate Change Strategy Vision: The Climate Change Strategy Vision statement was adopted by the Council in June 2021. The statement outlines both the 2030 stretch and 2040 carbon neutrality targets.

Slough 2040 Vision: The Slough 2040 Vision outlines the ambitions for the future of Slough. The vision outlines that Slough will be a carbon neutral and sustainable town and addresses the ambition for the borough to become more environmentally friendly, from tackling carbon emissions to improving biodiversity and expanding renewable energy capacity.

The Slough 2040 Vision states that Slough will:

- Have attractive, green neighbourhoods, which bring people together
- Be a globally connected town, with a transport system which prioritises public and active transport
- Have a strong, globally renowned economy, which supports its people to prosper and live well
- Be a healthy town, where people are supported to live empowered lives

Other relevant policies produced by Slough Borough Council include:

Slough's Local Plan 2040: The new Local Development Plan for Slough (not yet published) will set out the long-term overall vision for how the borough should develop. The new Local Plan will update building design and have policies to help tackle climate change and adaptation.

Five Year Plan 2025: Outcome two of the Five Year Plan 2025 prioritises the health and wellbeing needs of residents through increased activity, the improvement of outdoor and indoor leisure facilities. Additionally, outcome five prioritises a modal shift to sustainable forms of transport across the borough.

Slough Inclusive Growth Strategy 2020-2025: Slough's Inclusive Growth Strategy focuses on quality employment and education augmented by a greater living and working environment. The Strategy also includes Slough's Climate Challenge, which provides a platform to showcase climate change progress by activating local innovators to tackle pressing issues and leveraging local entrepreneurs and established businesses.

Slough's Covid Recovery Strategy: In March 2021, Slough Borough Council outlined the Council's pathway for recovery following the COVID-19 pandemic. The strategy detailed the Council's plan for renewal, which will also contribute to Slough becoming a carbon-neutral and sustainable town.

2. BACKGROUND & CONTEXT
SECTOR SPECIFIC STRATEGIES

Slough Borough Council have to date produced several strategies and plans relevant to the six key different sectors covered in this report. These include:

Housing Strategy 2016-2021
Theme 2 outlines the need for energy efficient homes across the borough. The strategy outlines that older private sector stock in the owner-occupied and private rented sector have the highest proportion of poorly insulated and energy efficient buildings.

Local Transport Plan (LTP3) 2011-2026
The Local Transport Plan details Slough's long-term strategy for transport and includes the reduction of carbon emissions and climate change adaptation as key priorities.

Low Emission Strategy 2018-2025
The strategy aims to improve air quality and health across the borough, embed innovative approaches to vehicle emission reduction and provide a platform for inward investment to assist the transition to a low emission economy.

The Waste Strategy 2015-2030
The Waste Strategy sets out a borough wide vision to move from waste disposal to waste management, which can also be applied to corporate waste.

The Slough Urban Renewal Scheme
The Slough Urban Renewal scheme seeks to enhance business connectivity, local schooling and provide high quality homes and leisure facilities.

Protecting the Suburbs Strategy and the Spatial Strategy
The Protecting the Suburbs Strategy supports the emerging Spatial Strategy for the Local Plan for Slough. The Spatial Strategy outlines the vision for more green infrastructure across the borough, to provide a greater quality of life for communities and biodiversity, as well as remove harmful pollutants.

Local Development Framework Core Strategy 2006-2026
Policy 8 of the Slough Local Development Framework Core Strategy outlines the need for a reduction in the unnecessary use of non-renewable energy and the vision for energy generation from renewable resources where feasible.

2. BACKGROUND & CONTEXT
COVID-19 AND A GREEN RECOVERY

COVID-19 & Climate Change

The global disruption and impacts of the COVID-19 pandemic have forced governments, businesses and citizens to radically reassess their policy decisions, operations and lifestyles respectively.

The ongoing restrictions offer the chance to reflect on what is important to local communities. This time also presents the opportunity to shift our collective values and review the demands of "emergency action" in a climate context. Local and national commitments to emissions reductions have not changed as a result of the COVID-19 crisis and the cost of delaying action has been felt in many countries during the pandemic. Decisiveness will be required in the wake of this crisis, to lead a recovery which revolves around the resilience, health and sustainability of local communities.

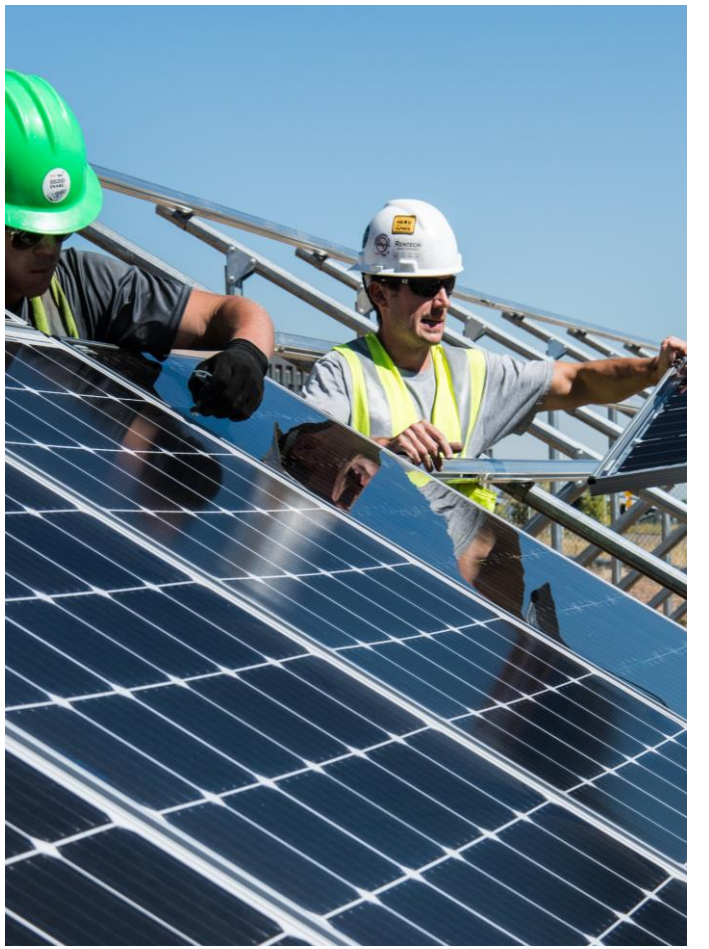
The next few years will be pivotal for climate change mitigation as we enter the decisive decade for action. The urgency of the situation is growing as we push parts of the Earths system into abrupt or irreversible change and we are held to account as a nation against international climate targets.

A Green Recovery

To maintain the prospect of meeting the commitments set out in the Paris Agreement, it is essential that government policies in response to the economic crisis avoid locking nations into carbon intensive pathways, and instead steer economies towards a resilient *Green Recovery*. In May 2020, the Committee on Climate Change called for government to use the economic recovery as an opportunity to accelerate the shift towards a low-carbon economy. This would stimulate jobs, stabilise future economic resilience, and mitigate climate related risks. Business and health professionals are also making similar calls.

The C40 Cities group has published an overview of principles which it recommends should inform this Green Recovery. Decisiveness will be required as we recover from this crisis, responding with policy that is centred around the resilience, health and wellbeing of local communities.

Thames Valley Berkshire has outlined the need to become truly sustainable and reduce inequality as two key areas in COVID-19 recovery priorities in the LEP Recovery and Renewal Plan.



03 Slough's Borough Wide Emissions Baseline

3. SLOUGH'S EMISSIONS BASELINE
INTRODUCTION TO SCATTER

SCATTER Overview

The emissions modelling in this report has been achieved through the application of Anthesis' SCATTER Inventory and Pathways Tool.

The SCATTER Tool is an information source designed to help local authorities understand their emissions profile and inform priorities for emissions reduction. The tool was developed by Anthesis in partnership with the Department for Business Energy & Industrial Strategy, The Tyndall Centre for Climate Change Research, Nottingham City Council and others and it has been used by over 300 local authorities to date. The tool offers two key functions for Slough:

- **Emissions Inventories:** The tool provides an exportable greenhouse gas emissions inventory for any local authority in the country, covering scope 1, scope 2 and scope 3 emissions sources.
- **Emissions Pathways:** The tool provides a range of visual, easy to understand emissions scenarios up to 2050. This is explored further in Chapter 5.

What is the difference between Scope 1, 2 and 3 emissions?

- **Scope 1** describes emissions associated with direct in-boundary consumption of fossil fuels, such as tailpipe emissions from on-road transport.
- **Scope 2** describes emissions from the use of grid-supplied electricity. The national energy grid mix is supplied by a variety of sources; natural gas, solar PV, wind and nuclear etc. The carbon impact of burning gas to create electricity is captured and recorded as scope 2 emissions.
- **Scope 3** describes emissions that are the result of in-boundary activity, but that arise as a direct result of activity outside of a local authority boundary, such as out-of-boundary transportation for goods and services delivered locally.

Basic principles of SCATTER

Sir David MacKay's "Sustainable Energy - Without Hot Air (2009)" provides the basis for the pathways modelling. As a scientific advisor to the Department for Energy & Climate Change (DECC), MacKay's work led to the development of the 2050 Pathways Calculator.[1]

Two key modifications were made by Anthesis:

1) We scaled it down for sub-national regions: Scaling assumptions and localised data sets were built into the tool so that results were representative of cities and local authority regions, rather than the UK as a whole.

2) We pushed ambition further: Technologies within the tool were reviewed and updated where judged to be out of date and constraining ambition. Given that almost a decade had passed between MacKay's publication and the release of the 2050 Pathways Tool, we sought the counsel of a technical panel to make these updates.

Many other sector specific aspects of modelling treatment and assumptions have required consideration and interpretation as we have applied the model to various cities and local authorities.

Please be aware that SCATTER Pathways applies a calculated electricity factor based on renewable energy generated within the local boundary, which is not applied in the calculation of your area's inventory. **This results in a slightly different starting point for SCATTER pathways compared to the baseline inventory.**

[1] DECC responsibilities were reformed into BEIS in 2016

3. SLOUGH'S EMISSIONS BASELINE
SCATTER EMISSIONS PROFILE

In 2018, Slough's energy system was responsible for net emissions totalling 1,177 $ktCO_2e$. The majority resulted from buildings & facilities (57.7%) and transport (30.8%).

The current emissions profile for the area administered by Slough Borough Council is shown opposite, based on the SCATTER Tool. This covers three greenhouse gases: carbon dioxide, nitrous oxide and methane and relates to the 2018 reporting year. Throughout this report, emissions are given as a single figure measured in kilotonnes of carbon dioxide equivalent (kt CO_2e) and this accounts for other greenhouse gases based on a global warming potential.

The emissions profile covers emissions generated within the borough boundary (scopes 1 & 2), as well as some emissions that occur outside of the borough as a result of activities taking place within the borough (scope 3). Not all subsectors can be neatly summarised as a "slice" of this chart. Emissions from land use act as a carbon sink for the region, sequestering carbon from the atmosphere.

Considering the Footprint Boundary

The SCATTER emissions inventory is aligned to global reporting standards set out by the Global Protocol for City-wide (GPC) Greenhouse Gas Emissions. A selected range of scope 3 emissions sources are included within the SCATTER Tool (in line with the BASIC+ emissions reporting principle), and these notably include emissions from aviation and freight. It is important to include such sources in scope for action to offer a more complete picture of emissions across the borough and explore ways of reducing these.

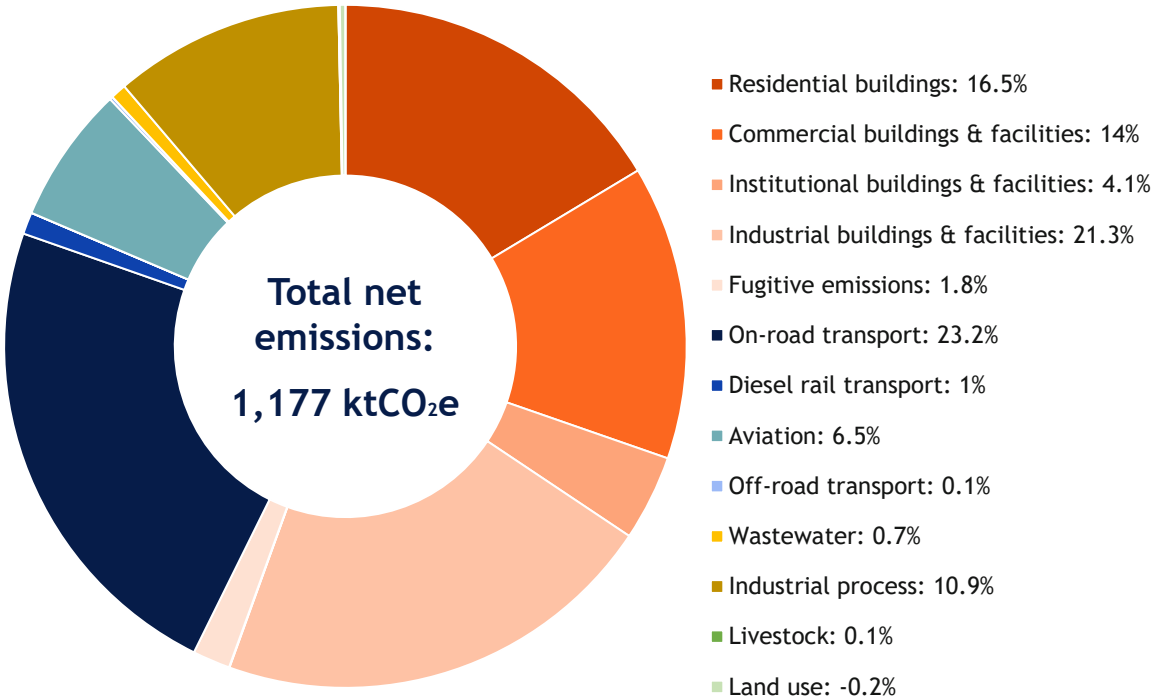


Figure 3.1: SCATTER 2018 inventory for Slough shown by sub-sector

Continuous Improvement: The SCATTER tool has been enhanced this year to offer the council greater visibility of emissions sources associated with the borough. The council's emissions baseline data should be continually revisited and revised as is appropriate, allowing the council to track progress against its commitments.

3. SLOUGH'S EMISSIONS BASELINE
SCATTER EMISSIONS SUBSECTORS

Building on the data given on the prior page, these tables demonstrate the profile of each emissions sector and explain the sources of emissions included in each:

57.7% of emissions in Slough come from buildings

- **Residential buildings (16.5%):** Domestic households of all tenure types.
- **Institutional buildings & facilities (4.1%):** Public sector buildings including schools, collages and educational buildings, health centres, hospitals, leisure centres, Council buildings etc.
- **Industrial buildings & facilities (21.3%):** Larger industrial facilities, including factories, warehouses and workshops associated with manufacturing and engineering.
- **Commercial buildings & facilities (14%):** Buildings from which commercial businesses operate e.g. shops, shopping centres, offices, restaurants etc.
- **Fugitive emissions (1.8%):** Fugitive emissions are leaks and releases of gases from a pressurized containment - such as appliances, storage tanks and pipelines.

0.1% of emissions in Slough come from livestock and land use acts as a net carbon 'sink' of -0.2%

- **Livestock (0.1%):** Including emissions from both dairy and non-dairy cattle as well as other farm livestock.
- **Land use (-0.2%):** These emissions estimations rely heavily on DEFRA estimations on land use types and include emissions produced as well as sequestration. Only CO_2 is considered for land use, so the figure quoted for sequestration is likely to be an underestimate.

30.8% of emissions in Slough come from transport

- **On-road transport (23.2%):** Emissions from all forms of on-road passenger vehicle, including cars, vans, motorcycles, buses and taxis.
- **Diesel rail (1.0%):** Emissions from diesel-fuelled rail transport. Emissions from electricity consumption within the rail sector are included in the commercial and industrial sectors as it is not possible to separate these emissions.
- **Aviation (6.5%):** Emissions from flying are allocated to local authorities based on the percentage of the population, assuming that flying is uniformly distributed.
- **Off-road (0.1%):** A base assumption of 1% of total on-road emissions.

0.7% of emissions in Slough come from waste disposal

- **Solid waste disposal (0.001%):** Incorporates various waste streams across commercial, industrial and municipal sources.
- **Wastewater (0.7%):** Scaled directly from national wastewater data by population.

10.9% of emissions in Slough come from industry

- **Industrial processes (10.9%):** National industrial processing emissions associated with heavy industry, such as iron & steel and chemicals, have been scaled down for Slough.

04 Slough's Carbon Budget

4. SLOUGH'S CARBON BUDGET
CARBON BUDGET SCOPE

What is a carbon budget?

A carbon budget is a fixed limit of cumulative emissions that are allowed over a given time in order to keep global temperatures within a certain threshold.

Introduction

The current emissions profile offers the baseline from which to measure progress towards carbon neutrality. The Paris Agreement aims of remaining *"…well below 2°C"* of warming dictate an upper limit of greenhouse gas emissions that are allowed and we can join these ideas together in the form of a *carbon budget* which guides a trajectory for emissions reduction.

The Tyndall Centre Carbon Budget

The Tyndall Centre for Climate Change Research, based at the University of Manchester, have translated the Paris Agreement targets of limiting temperature change below 2°C into a fixed emissions 'carbon budget' for each local authority. There are two key ideas underpinning their research:

1. The carbon budget is a fixed amount: A global emissions limit represents the total emissions allowed before the 1.5°C threshold for greenhouse gas concentration is crossed. This global "budget" can then be scaled down to a national level, and finally, a regional level. See Appendix 3 for more detail.

2. Emissions now mean impacts later: The most crucial element of this approach is understanding the importance of cumulative carbon emissions. Once emitted, carbon dioxide remains in the atmosphere for many years, contributing to increasing the average global temperature. The carbon budget does not reset; it represents a fixed upper limit to emissions.

These two principles mean that the annual reduction rate of emissions becomes very important. Cumulative emissions and the scale & speed of action in the short-term are crucial in meeting the targets of the Paris Agreement.

Emissions covered by the Tyndall carbon budget

The Tyndall Centre carbon budget has a different scope to the emissions profile within SCATTER:

- **This budget can be defined as energy-only** which means that the budget accounts for emissions from within Slough's energy system.
- **Land use, land use change and forestry** is not incorporated into this budget analysis.
- **Only CO_2 emissions are assessed** and contributions from all other greenhouse gases, such as methane and nitrous oxide, are excluded.
- **Aviation, shipping, and other Scope 3 emissions are omitted** given the nature of these emissions. Responsibility is not attributed to individual authorities but is instead accounted for at the UK level as a "national overhead". The Tyndall Centre analysis assumes that UK emissions from aviation remain constant up until 2030, followed by a steady reduction towards net zero carbon by 2075 . Whilst emissions from aviation in 2020 have been significantly reduced, the extent of a potential "emissions rebound" post-COVID remains uncertain.

4. SLOUGH'S CARBON BUDGET
KEY STATISTICS

Budget Milestones

To demonstrate a carbon budget for the borough of Slough, the Tyndall Centre recommends an emissions reduction rate of **12.7%** per year. This provides a pathway which keeps Slough aligned with the Paris Agreement.

Slough's recommended carbon budget for the period 2020 to 2100 is **6,300 $ktCO_2$**. Figure 4.1 illustrates carbon budget milestones based on the annual reduction rate for Slough.

Slight differences in scope mean that direct comparisons of this budget with the cumulative emissions from SCATTER Pathways trajectories (detailed in Chapter 5) should be taken as an estimate only.

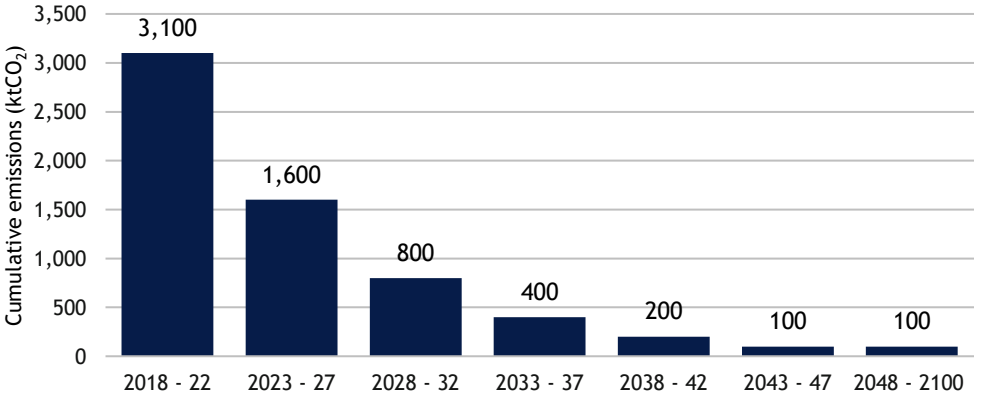


Figure 4.1: The bar chart above describes the carbon budget targets based on the recommended annual reduction rate. These have been broken down into the periods set out in government reporting frameworks.

Key statistics for Slough

To keep Slough aligned with the Paris Agreement, emissions must be reduced by 12.7% per year.

Between 2005 and 2017, the average annual emissions reduction rate in Slough was just under 1%, highlighting the ambitious action required to meet the Paris Agreement targets.

If Slough continues along a business-as-usual pathway, the carbon budget (2020 – 2100) will be exceeded by 2027.

By 2042, 5% of the budget remains, provided that Slough achieves the recommended annual reduction rate.

05 Emissions Reduction Pathways

5. EMISSIONS REDUCTION PATHWAYS
SCATTER PATHWAYS MODELLING

Introduction

Whilst the Tyndall Centre's Paris-aligned carbon budget in Chapter 4 covers what the science says must be achieved, it is also useful to look at other tangible intervention-based pathways. Reviewing these pathways helps us to understand the impact of differing levels of action, or inaction, in relation to goals set, and in the context of macro-factors such as grid-decarbonisation and policy.

Interpreting this analysis

As well as the inventory presented in Chapter 3, SCATTER also includes a Pathways model designed to help local authorities inform priorities for emissions reduction. It is intended to focus on '*what is required*' rather than '*how to get there*'.

The pathways are based on a combination of 30+ interventions or carbon reduction measures which can be implemented to various extents. These modelled pathways are intended to act as 'lines in the sand' for Slough. They serve as an indication of whether the adoption of certain interventions can drive the transition to a low carbon economy and help to guide target-setting and key performance indicators.

SCATTER pathways run up to 2050 and "checkpoint" targets are given for 2025, 2030, 2040 and 2050 to guide progress towards Slough's 2030 stretch target and 2040 net-zero carbon ambition, as well as the UK's 2050 net zero target. A summary of these intervention targets are detailed in Appendix 6.

It is important to note that SCATTER does not intend to prescribe certain technologies or policies, nor does it intend to discount other means of arriving at similar outcomes just because they do not feature in the model.

The feasibility of implementation is also not considered as this is dependent on action from national government and all actors. Is it intended to serve as an evidence base to help Slough understand their current influence and offer challenge as to whether this influence can be applied in new, innovative and more ambitious ways.

Considerations in SCATTER

Considered in SCATTER

- All current known technologies for emissions reduction
- Measures across all key sectors
- Scale and speed of change needed

Not considered in SCATTER

- New and emerging technologies
- Feasibility or policy limitations of implementation
- Availability of skills or funding

5. EMISSIONS REDUCTION PATHWAYS
SCATTER PATHWAYS RESULTS

Key

SCATTER BAU Pathway: Assumes Slough continues along current "business-as-usual" (BAU) trajectory in terms of nationally-led policy and behavior change. Reductions are largely the result of continued grid decarbonisation.

SCATTER High Ambition Pathway: Assumes Slough goes significantly beyond national policy and National Grid assumptions. It is the result of all interventions modelled by SCATTER at maximum ambition levels.

Paris-aligned Reduction Rate: Based on the Tyndall Centre's recommended annual reduction rate of 12.7%. This is not based on tangible policy or implementation, but informs the action required to meet Paris Agreement targets.

Paris-aligned Carbon Budget: A representative area equal to the cumulative emissions budget for Slough, based on research by the Tyndall Centre for Climate Change Research.

The graph below shows two possible future emissions pathways for Slough as modelled by the SCATTER tool (scopes 1, 2 and 3), compared against the Tyndall Centre's recommended 12.7% annual reduction pathway.

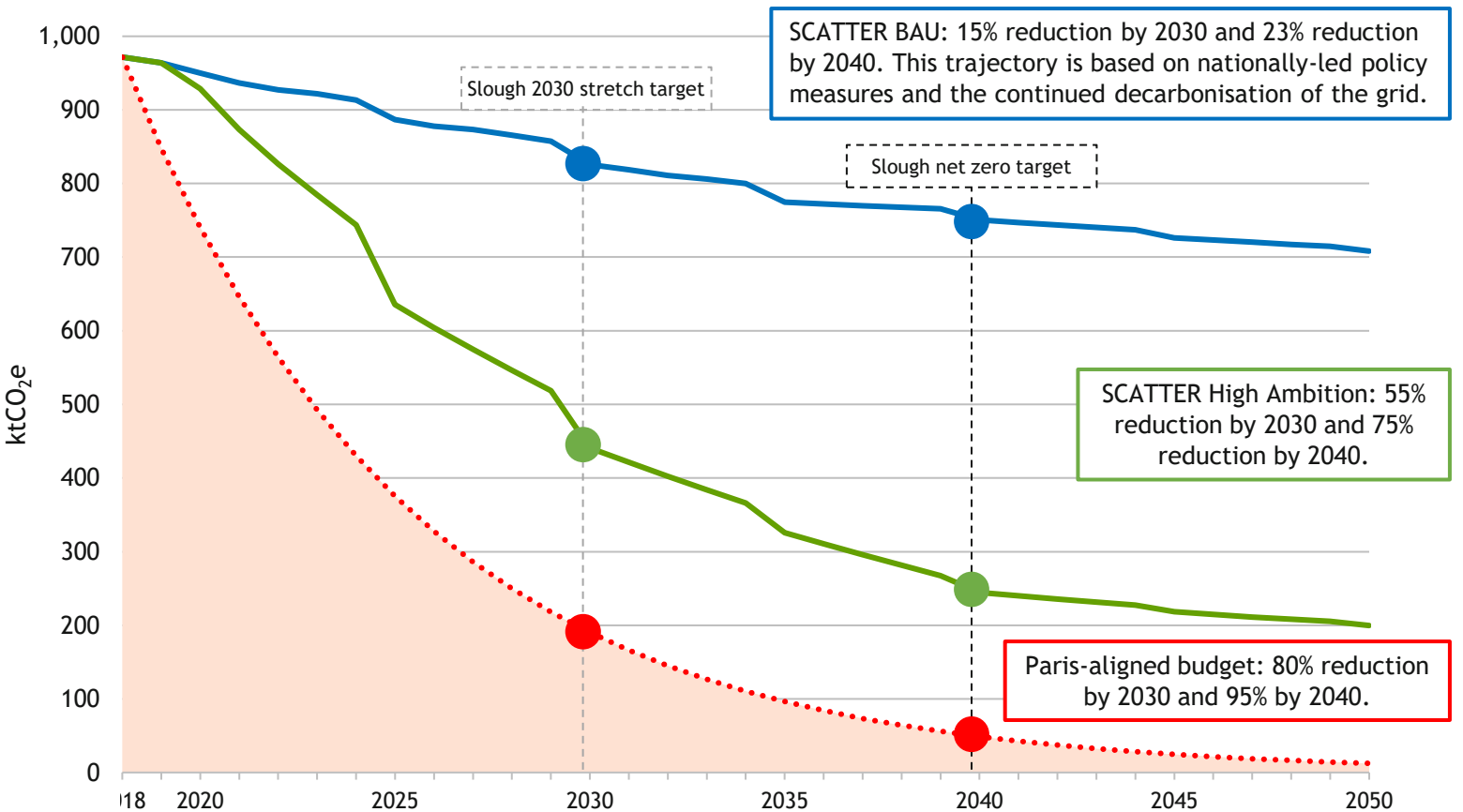


Figure 5.1: Future emissions pathway for Slough (2019 – 2050), with Slough's 2030 stretch target and 2040 target highlighted.

5. EMISSIONS REDUCTION PATHWAYS
SLOUGH'S HIGH AMBITION PATHWAY

Despite applying the most ambitious interventions in the SCATTER Tool for Slough, emissions remain in the energy system. Along Slough's High Ambition Pathway, **441 ktCO2e** remain in the energy system in 2030 and **245 ktCO2e** remain in the energy system by 2040.

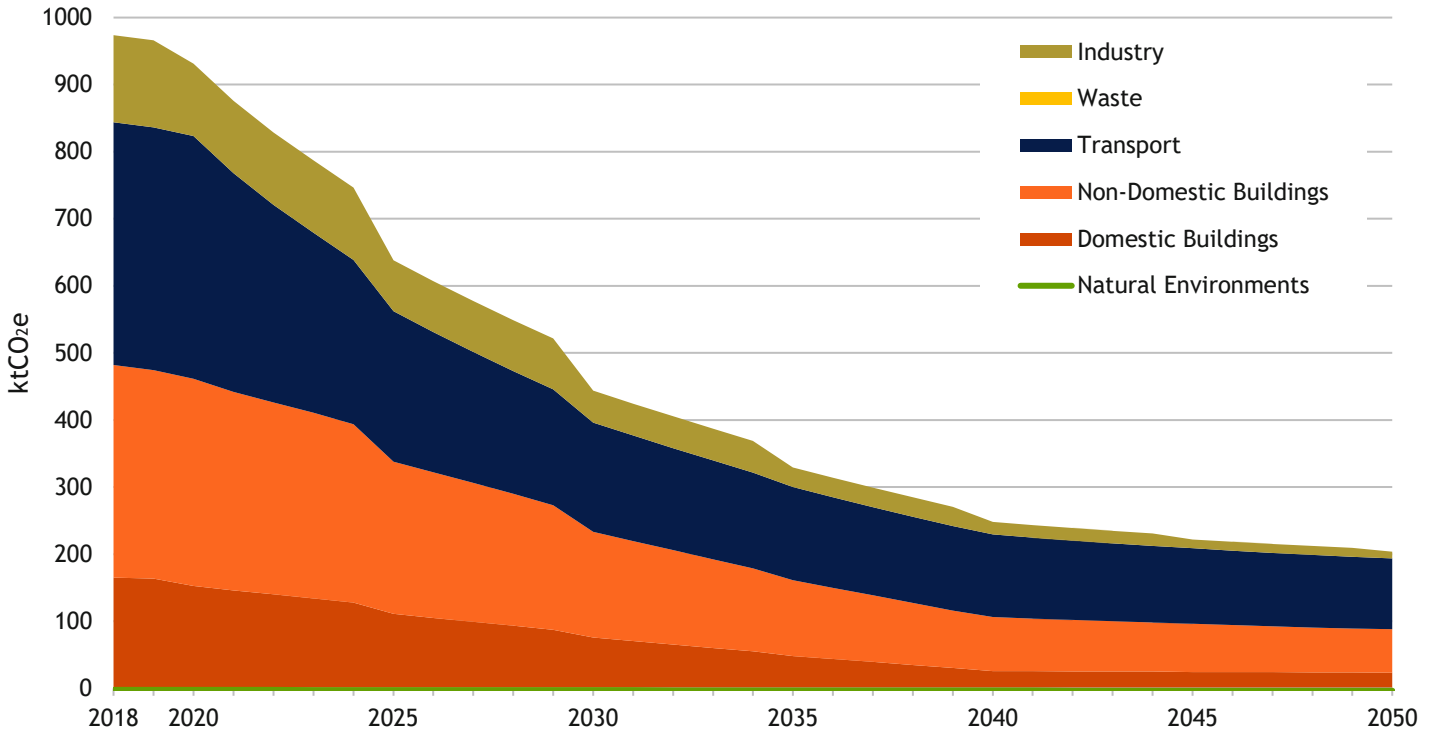


Figure 5.2: SCATTER high ambition pathway for the borough of Slough, broken down by sector. Shaded areas correspond to residual emissions (those remaining after reductions). The agriculture and land use sector represents "negative emissions" which increases over time due to increased sequestration of carbon as a result of new trees and the management and growth of existing features.

The High Ambition Pathway demands for ambitious and urgent reduction interventions. The scale of the actions necessary to reduce emissions by 55% for the 2030 stretch target and then 75% by 2040, requires immediate radical changes across all areas of activities for Slough. Chapter 6 of this report defines these interventions to reduce carbon emissions across all sectors. They can be thought of as falling into two groups; interventions focused on reducing energy demand, and interventions that focus on decarbonizing energy supply. However, with the advances of technologies such as electrification of cars and smart systems in buildings, future electrical demand is likely to increase. The modelling therefore follows electrification assumptions from the UK's Future Energy Scenarios.

Adoption of the High Ambition Pathway still does not achieve Slough's carbon neutrality target of 2040. Even with the most ambitious interventions in the SCATTER tool, 245 ktCO2e emissions remain in the energy system at 2040.

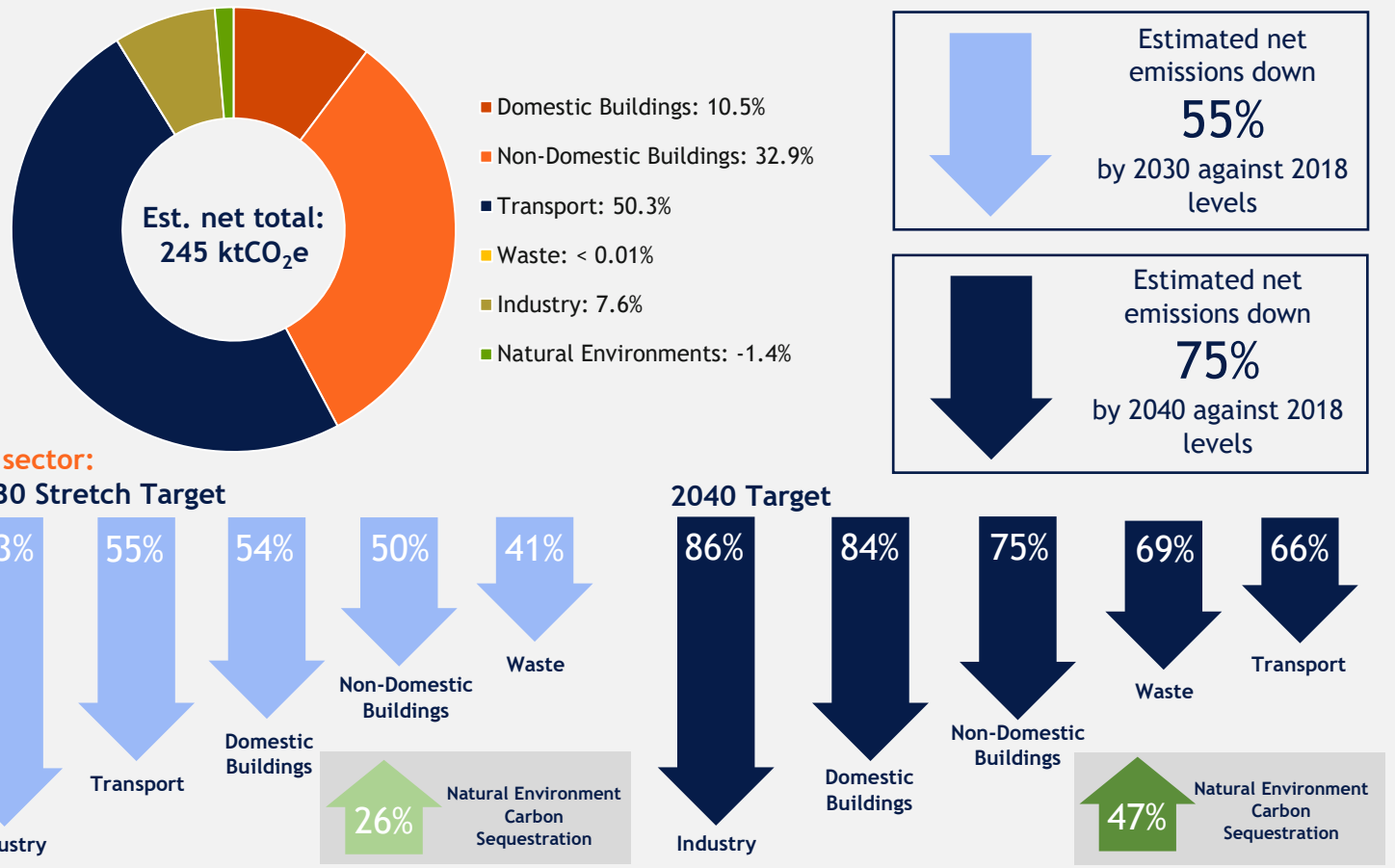
5. EMISSIONS REDUCTION PATHWAYS
SLOUGH'S HIGH AMBITION PATHWAY

Adoption of the SCATTER High Ambition Pathway interventions delivers emissions reductions of 75% by 2040.

By 2040, the emissions profile for Slough is predicted to look very different from today. Concerted local actions can have a significant effect on borough-wide emissions. Emissions from transport dominate the 2040 profile whilst energy efficiencies in buildings have heavily decreased domestic and non-domestic building emissions. Agriculture and land use emissions are a negative value, with sequestration increasing to 0.6 $ktCO_2e$ by 2030 and 1.1 $ktCO_2e$ by 2040.

Despite aggressive action, 245 $ktCO_2e$ of residual emissions remain in 2040. Though emissions from industry, buildings and transport have been heavily reduced, the scale of improvements is not enough to achieve net zero by 2040. Further ambition and a variety of additional technologies and nature-based solutions will need to be considered to close this gap. These are explored on the next page.

Figure 5.3: Estimated 2040 emissions profile (top). Emissions reductions across key sectors under the High Ambition Pathway (bottom).



5. EMISSIONS REDUCTION PATHWAYS
THE GAP TO TARGET

How can we go beyond the High Ambition Pathway?

Even with the successful implementation of the interventions which will be discussed in further detail in Chapter 6, some emissions are "left over". Defining the scale and nature of this gap to target is an important process to meeting reduction targets and goals.

There is an emissions gap of **250 $ktCO_2e$** to meet the Paris Agreement aligned target at 2030 and **441 $ktCO_2e$** to meet the 2030 stretch target for carbon neutrality. By 2040, there is a gap of **229 $ktCO_2e$** to the Paris Agreement aligned target and **245 $ktCO_2e$** to reach the 2040 carbon neutrality target.

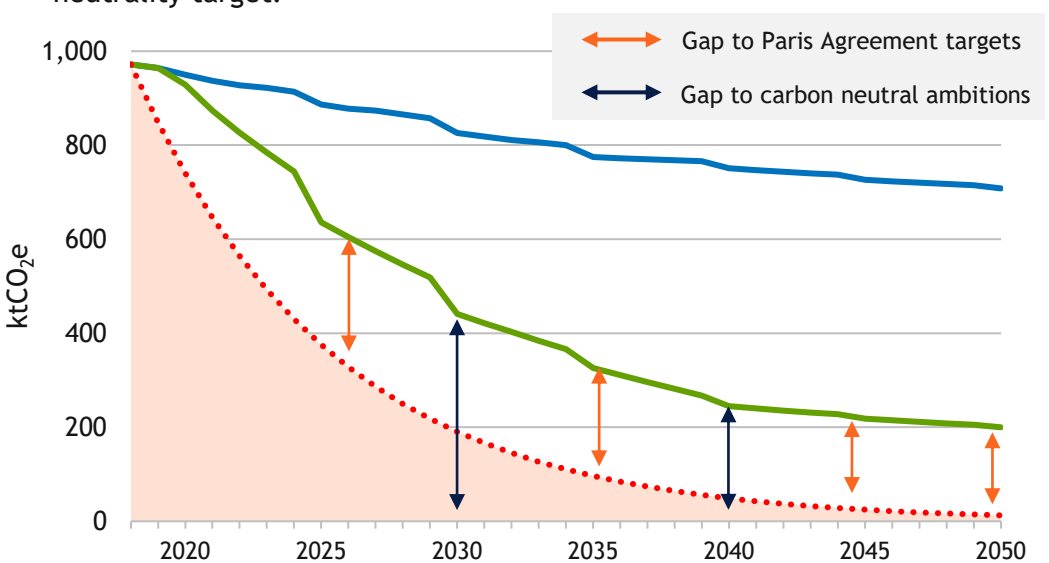


Figure 5.4: SCATTER pathways, with indicators given for the gap to target.

Closing the gap

The actions outlined in this report are largely rooted in SCATTER's "High Ambition" pathway, and such options should be prioritised for reasons of reliability, cost, and impact. The actions also provide scope for Slough to look to "close the gap" in emissions and "go further" than the high ambition pathway. Three ways this could be achieved are outlined below, and can be considered in relation to the recommendations in the plan:

Accelerated and increased deployment

Slough may consider action 'above and beyond' the interventions outlined in this report. For example, rather than a deep retrofit of 80% of homes as per SCATTER, stakeholders may aim for a deep retrofit of 90% of homes. Slough may also seek to deliver the actions given in the plan at an earlier date in order to accelerate emissions reductions. It is important to approach this with an understanding of the challenge associated with reaching the maximum ambition level presented in SCATTER, and the dependency on such developments.

Technological innovation and marginal improvements

Improvements to technology, such as solar PV, has moved forward at an unpredictably rapid rate in the past twenty years. Technological efficiency improvements in different areas may dramatically improve the feasibility for emissions reduction in different sectors. The development of a thriving hydrogen sector in the UK also presents opportunities, as highlighted in the recently published Hydrogen Strategy. The modelling of hydrogen is currently discounted from SCATTER pathways due to the limited availability of large-scale datasets.

Offsetting & Insetting

This approach would emphasise nature-based solutions such as tree planting and the restoration of other ecosystems. Other nascent technologies such as carbon capture and storage (CCS) and negative emissions technologies (NETs) may also be considered. Offsetting is explored further in Chapter 6. Insetting may also be considered. This is an alternative to traditional offsetting where instead of offsetting using an emissions reduction activity outside of the organisations scope, the organisation targets emissions that are within its value chain. For a local authority, these could be emissions within its borough boundaries.

06 Action Plan

Tree planting in Scafell Park

6. ACTION PLAN
INTRODUCTION

This chapter provides the basis for the strategic response to the borough's commitment to carbon neutrality. It is intended to underpin the delivery of projects and actions needed within Slough in line with the 2040 target. Our recommendations are based upon outputs from the SCATTER Pathways Tool in conjunction with a series of workshops and research by Anthesis to understand specific opportunities for action in the borough.

SCATTER Pathways: Defining targets for a zero-carbon trajectory

The SCATTER Pathways Tool models future emissions pathways based upon defined activity levels within Slough. The more ambitious the level of defined activity in each area, the closer the emissions trajectory tracks towards zero carbon. When taken together, these interventions define future emissions projections (i.e., the green line on Page 24).

Within this chapter, the activities described are those which correspond to the SCATTER High Ambition Pathway.

We give targets indicating ***what is needed*** to achieve carbon reductions across a number of intervention or action groupings, by 2040, for each action "sector". We also provide cumulative emissions savings, and an indication of current (i.e., 2020) performance in the borough, in line with these targets. This is followed by detail around ***how to achieve*** the targets outlined (across).

The pathways and intervention data provided includes scope 1, 2 and 3 emissions (see pg. 17 for explanation of these emission types). Our action planning measures are intended to address all emissions sources. Occasionally, we have identified opportunities for action relating predominantly to scope 3 emissions, such as those around aviation emissions. Actions presented in Chapter 6 relate to opportunities for climate change mitigation and actions relating adaptation to climate change adaptation are provided in Chapter 7.

Action Planning Measures

Within each sector, we present recommended actions for Slough aligned with each of the SCATTER interventions. Measures may be focused on demand-side reductions, such as switching to electrified systems, or greening of the energy supply. Naturally, some measures carry more "weight" within the model than others- this is explored further on page 32. The plan also contains recommendations on the Council's role enabling wider action – see chapter 6.7. Goals in this area are based on Anthesis judgement, rather than SCATTER modelling.

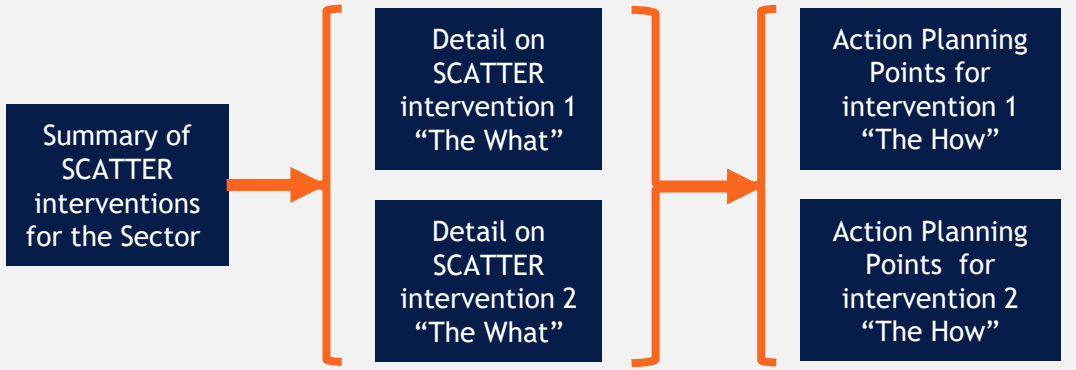


Figure 6.1: Illustration of detail provided on SCATTER intervention pathways and action planning later in this chapter. In each sector, we provide a summary of the SCATTER interventions, before providing a "deep dive" on each. Later, we provide our Action Planning recommendations for the sector, in line with the opportunities identified in SCATTER. In this example, there are two interventions.

6. ACTION PLAN
DEFINING RESPONSIBILITY

Defining a role for the Council is an important step towards implementing the action plan. The council is directly responsible for just over 1% of emissions in the borough (Figure 6.2). However, using its influence and ability to empower other stakeholders, the council's ability to influence emissions across the borough extends much further. The council is not fully responsible for the delivery of all actions set out in this plan, and it is imperative to involve other stakeholders. Under each goal in the action plan, we present the actions in two groupings:

Responsibility	Description
Slough Borough Council Actions ("SBC")	Actions are aimed **exclusively at the council**, and the council is expected to take the lead in their implementation. This includes: • Actions aimed at the council's own operations, such as reviewing opportunities for low carbon heating systems in the council's buildings • Actions aimed at influencing the wider borough that the council could complete with little or no involvement from external stakeholders, (e.g. via the Council's regulatory role such as planning policy). Note, there are still limits to the council's ability to influence via regulations- the significance of government and other regulators may be a factor in the council's ability to act.
Borough Wide Influence Actions ("Borough")	Actions which **leverage the council's ability to convene, engage and inspire other stakeholders**, indirectly influencing emissions in the wider borough. The council would be expected to take some responsibility in leading with the roll out of these actions, but their success is equally dependent on external stakeholder contributions. For example, the council can support households in accessing funding for installation of heat decarbonisation measures, but the success of the action is dependent on the engagement of residents.

These groupings are based on Anthesis' judgment and are by no means definitive. In the action plan, we identify stakeholders against each action. Internal council teams are typically fully responsible for "Slough Borough Council Actions", while those categorised as "Borough-wide Influence Actions" involve a mix of the council and external stakeholders.

A strategy for the whole borough

In 2020, Anthesis completed an inventory of GHG emissions for Slough Borough Council. For the 2018/19 reporting year, scope 1,2 and 3 emissions totalled 10,224 tCO_2e, just under 1% of the borough-wide total (Page 17). This informed the development of the Carbon Management Plan; the council's strategy for reducing emissions from its own estate and operations.

This report is intended to address all emissions in the borough. Naturally, given the high proportion of emissions arising outside of the council's direct control, many of the recommendations focus on ways the council can influence other stakeholders in the borough. However, learnings have also been taken from the Carbon Management Plan and some recommendations are made relating to the council's own operations, particularly where this presents an opportunity for the council to lead and to demonstrate innovation.

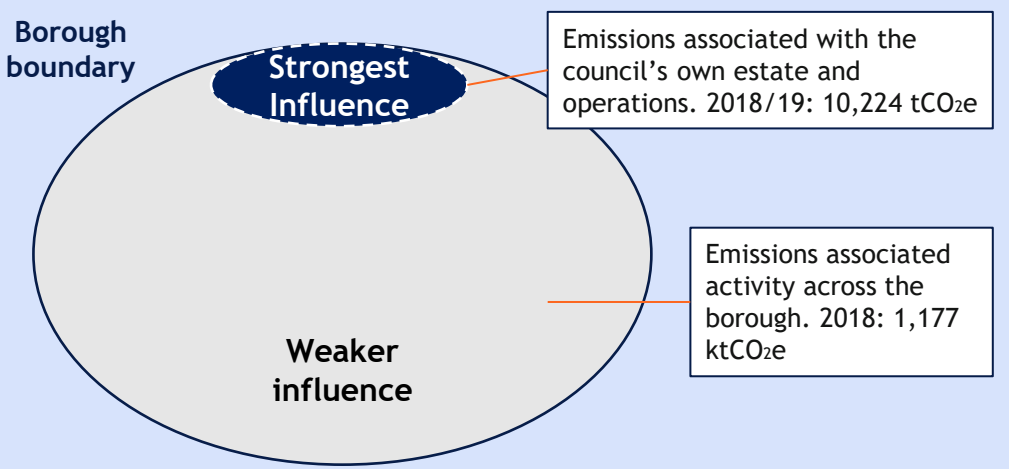


Figure 6.2: The council is only able to directly influence as small proportion of emissions in the borough. The diagram is illustrative only and not to scale.

6. ACTION PLAN
CONSIDERING COST

Indicative costings for different activities have been given where possible for each sector within the plan. Estimates are based on successful delivery of the level of action set out by the SCATTER High Ambition Pathway.

There are different types of cost to consider when evaluating carbon reduction actions, which can be helpful to define:

- **Capital expenditure (capex)** represents funds used to acquire, replace or upgrade a fixed asset e.g., the showroom price of an electric vehicle
- **Operational expenditure (opex)** represents funds spent or earned in the use and maintenance of that asset throughout its life e.g., the price of charging point electricity used to power the electric vehicle
- **Marginal cost** represents *additional* expenditure incurred as a result of choosing a low-carbon option over a higher-carbon alternative e.g., the difference between the showroom price of an electric vehicle versus a diesel equivalent
- **Annualised costs** represent a combined yearly capex and opex cost associated with a given initiative. The upfront capex is averaged over the lifetime of the project/asset (equivalent to a depreciation charge) and combined with any in-year operational cost/savings to provide a single number to compare assets like for like.

Each of these financial metrics represents an important consideration for the business case for different actions and are not always directly comparable. Estimates given within the plan reflect this, with an attempt made to clearly define the type and specific nature of each cost.

It should be noted that costs given in this plan are high-level estimates only and that forward-looking cost models are inherently limited in accuracy. Estimates are not intended to act as definitive costings and are instead better used as a means of appreciating the scale and nature of the financial implications of different activities. The method for the costings calculations are outlined in Appendix 8.

Methodology

Estimates are based on a comparison between the cost of a baseline case (the "BAU") and the High Ambition equivalent within SCATTER for each sector. Estimates have been made in isolation for different interventions based on specific research and data contexts. Where possible, an attempt has been made to enable like-for-like comparison between estimates made for different activities within the same sector. Cost assumptions are themselves based on government datasets and underlying research papers, most notably the Climate Change Committee's Sixth Carbon Budget.

Costs have also been aligned to Slough's 2040 target where appropriate. For a full description of the method used for each costing, please see Appendix 8.

Staff resourcing costs are also presented within each sector. A specific type of operational cost, staff resourcing, is expressed in terms of the number **of full-time employees (FTE)** needed . When a figure is given for FTE, this Indicates staff resource would need to be assigned. This could be acquired through a dedicated recruitment campaign, or repurposing of existing roles using current staff resource. Some actions can be achieved within current staff roles and capacity- where this is the case, we indicate **"Existing Staff Time & Resources".**
Staff resourcing was estimated at the level of individual actions before being aggregated to align with broader costings and carbon savings analysis. A full breakdown of council resource needs at the action level is detailed within the supplementary Action Plan Excel document.

6. ACTION PLAN
CARBON SAVINGS

Understanding carbon impact potential

Figure 6.3 provides a visual overview of the estimated carbon savings that would result if the interventions detailed in this chapter were achieved. Savings provided are cumulative, for the period 2020-2040.

- The diagram illustrates the high variance between the impact potential of the action areas
- Mirroring the trend observed in the emissions inventory, the largest savings potential is found within the buildings and transportation sectors
- Specifically, actions associated with on-road transportation and building energy efficiency offer the biggest potential carbon savings

Indicative carbon savings are given throughout the action plan within the interventions overview at the start of each sector. A calculation methodology is outlined in Appendix 4 and full detail of the cumulative carbon savings can be found in Appendix 5.

In seeking to achieve your carbon neutrality target, we recommend prioritising action with the largest carbon saving potential. This is detailed further in our recommendations.

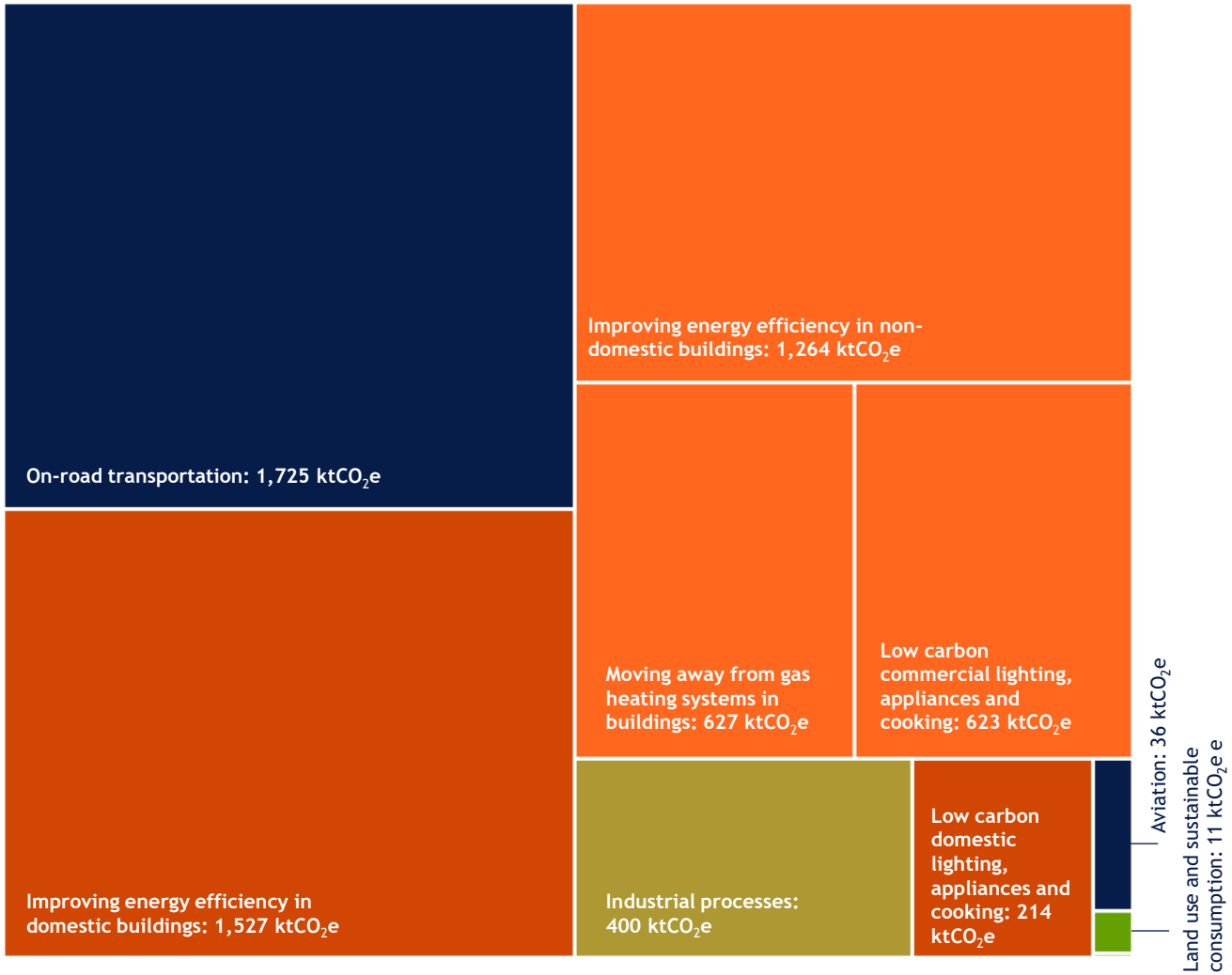


Figure 6.3: Cumulative carbon savings for Slough (2020-2040), in line with the SCATTER interventions

6. ACTION PLAN
NAVIGATING THIS CHAPTER

The subsequent sector specific subchapters are comprised of the following information:

- **Sector Overview:** Introductory contexts within each sector. This includes a breakdown of key emissions sources based on SCATTER, along with an overview of opportunity areas for action, and relevant considerations related to the recovery from the COVID-19 pandemic.
- **Key Plans and Policies:** A summary of current plans and policies, at the national, regional and borough levels.
- **Interventions:** An overview of outputs from the SCATTER Pathways Tool which, when taken together, define the High Ambition Pathway. We also provide modelled carbon savings aligned with each SCATTER intervention to provide an indication of the potential scale of impact. Each intervention is explored further in the "Intervention Milestones" pages.
- **Intervention Milestones:** For each intervention, we explain the *what* needs to be achieved in order to reach the High Ambition Pathway by 2030. We also provide further "current context" relating to 2020 performance in line with these targets.
- **Key Stakeholder Views:** A summary of key stakeholder views relating to barriers, enablers and implementation considerations from each of the workshop series.
- **Action Plan:** Specific actions are provided in line with each SCATTER Intervention, indicating specifically *how* Slough can achieve the goals outlined. See overleaf for further details.
- **Co-benefits:** For each sector, we give an overview of the co-benefits of action. A co-benefit is a positive result in one area brought about by a given policy or measure aimed at an objective in another area. Considering co-benefits is useful in helping stakeholders build the case for action.
- **Local and National Case Studies:** Relevant examples of action in the sector are provided.

Figure 6.4: Sectors considered in SCATTER discussed in this section of the report. All actions are focused on reducing emissions arising in the borough. Click the icons to view the chapter. Adaptation to the impacts of climate change is considered in Chapter 7.

6. ACTION PLAN
NAVIGATING THE ACTION PLAN

Recommended actions are presented in tables throughout the following chapters. A supplementary document is also available to council officers offering additional detail on the recommendations.

Sequencing the Actions in this report

The action plan is presented within each emissions sector. Recommendations are presented against each SCATTER Intervention, in groupings of "goals" aligned across a common theme or objective. Within each Intervention, Slough Borough Council Actions are presented first, followed by Borough-Wide Influence actions (this distinction is further detailed on page 30).

Prioritising Action

In taking the action recommendations forward, stakeholders may seek to prioritise actions. Approaches to prioritisation vary, and the council has a role to play in choosing by which metrics the actions should be prioritised. These could include those listed across the page.

Given the objectives of this strategy, carbon impact should be considered first in any assessment of priority actions. The actions in this plan are not presented in order of priority, but the results of a high-level assessment priority action areas based on carbon impact is given in the conclusion.

The carbon impacts of action around the Council's Wider Influence (Chapter 6.7), and Adaptation (Chapter 7) actions cannot be calculated, but these should be considered high priority.

Additional Metrics within the Action Plan:

Slough Borough Council's Role
Defines the Council's role in delivering action with relative categories including Research & Design, Implementation, Communication & Engagement, Policy & Strategy.

Key Stakeholders
The Council is expected to lead on all actions detailed within the action plan and relevant internal teams have been outlined. For Borough-wide actions, supporting stakeholders have been identified.

Action Impact
Actions are distinguished between strategic (governance or operational), indirect (supporting actions which can facilitate future carbon savings) and direct (actions which lead directly to reducing carbon emissions).

Timescale
Actions are categorised into immediate (actions that should begin immediately), short (actions that should be delivered in the next 2 years), medium (delivered in the next 3-6 years), and long (7+ years).

Level of Complexity
Categorised into high, medium and low based on the level of investment, engagement and complexity of stakeholders.

6.1 Buildings

6.1 BUILDINGS
SECTOR OVERVIEW

Scope of Section

The built environment sector represents the majority of Slough's emissions, totalling 57.7% of baseline emissions. This is then further split into emissions from domestic buildings which represent 16.5% of total emissions and non-domestic buildings, which account for 41.2% of emissions. This section discusses measures relating to both building types and suggests actions for accelerating progress in reducing their carbon impact.

Key Emissions Sources

The challenge requires looking at not only improving new-build developments, but also retrofitting and improving efficiency in existing buildings, given that 80% of the homes we will use in 2050 (the UK's net zero target date) already exist.[1] Industrial buildings and facilities contribute to 21.3% of Slough's emissions, followed closely by residential buildings at 16.5% and commercial buildings at 14%. These figures are not surprising given the highly urban nature of Slough and the presence of Slough's Trading Estate, which hosts Europe's largest data centre conurbation currently hosting 29 data centres.[2] The large range of warehouses and industrial units for rent on the Slough Trading Estate also significantly contributes to industrial buildings and facility emissions.

Green Recovery Considerations

- Point 2 of the Government's 10 Point Plan for a Green Industrial Revolution prioritises low carbon heating and scaling up the electric heat pump market.
- Households and small non-domestic buildings will be eligible for the UK Clean Heat Grant, which will replace the Domestic Renewable Heat Incentive from April 2022, providing funding for heat pump and biomass installation.

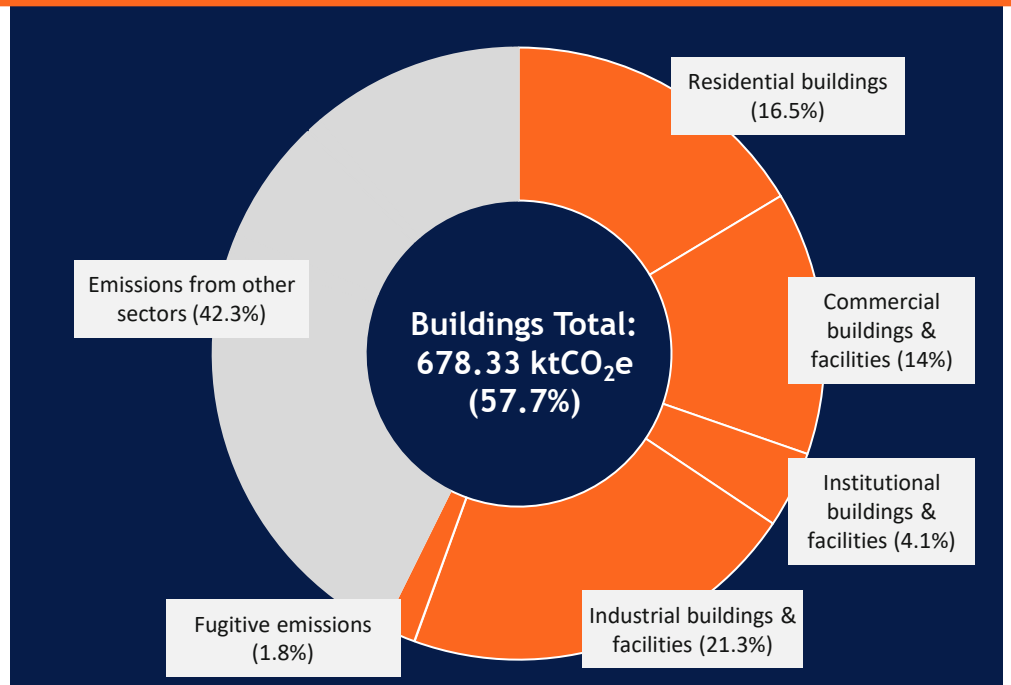


Figure 6.1.1: SCATTER 2018 inventory for the buildings sector in Slough.

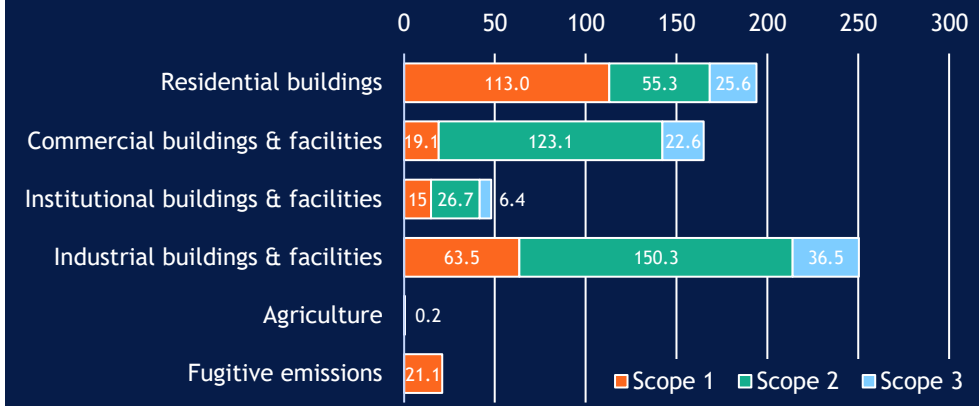


Figure 6.1.2: SCATTER 2018 scope 1, 2 & 3 building emissions in Slough

[1] UK Green Building Council
[2] Thames Valley UK

6.1 BUILDINGS
KEY PLANS AND POLICIES

National

- The Clean Growth Strategy set targets to upgrade as many houses to EPC band C by 2035 (2030 for all fuel-poor households). The Government's preferred target is that non-domestic property owners in the private sector achieve EPC band B ratings by 2030.
- The Future Homes Standard provides an update to Part L of the building regulations and will include the future ban on gas boilers by 2025 (which may be brought forward to 2023 under the recent 10-Point Plan).
- The third phase of the Energy Company Obligation (ECO3) will conclude in 2022.
- The UK Green Building Council was set up in 2013 to investigate and recommend new ways forward to reach zero-carbon buildings.
- Salix Finance offers 100% interest-free capital to deliver energy-saving measures across public sector organisations.

Berkshire

- The Berkshire Local Industrial Strategy 2019 prioritises enhancing productivity within Berkshire's enterprises and is to be supported by building vibrant places that accelerate the shift towards sustainable living.
- The Wider Area Growth Study relates to the future housing needs of the cluster of 'core places', comprising the urban areas of Slough, Windsor and Maidenhead. Slough currently considers it will not be able to meet all of its existing and future housing needs within its boundary. The study identifies areas where this 'need' can be accommodated regardless of administrative boundary.
- The Thames Valley Berkshire Energy Strategy (2019) explores the LEP's responsibility in supporting a low carbon transition across Thames Valley Berkshire and managing the future impacts of growth in energy infrastructure, especially renewables, across the region.

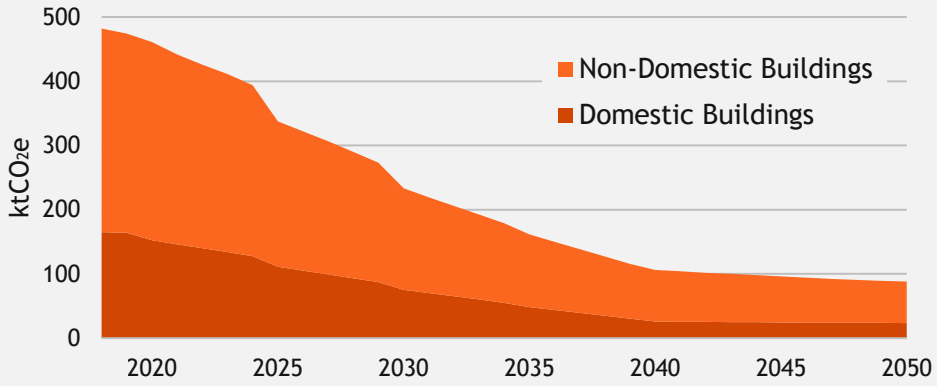
Slough

- The Housing Strategy 2016-2021 targets the need for energy efficiency of homes specifically in the private sector, which has the highest proportion of energy inefficient buildings.
- The Slough Carbon Management Plan 2020-2030 includes stringent energy efficiency standards on property development e.g. all new build projects will be built to a minimum BREEAM very good standard.
- The Slough Urban Renewal Scheme seeks to enhance business connectivity, local schooling and provide high quality homes and leisure facilities. The various projects under the SUR scheme are following national and local environmental standards that minimise environmental impacts, whilst enhancing social cohesion.
- The "Initial Zero Carbon Study Report - December 2020" sets out recommendations for improvements to Slough's owned stock.

6.1 BUILDINGS
INTERVENTIONS OVERVIEW

The following interventions relate to domestic households, commercial properties and institutional buildings, as well as industrial property. The interventions consider both decreasing the demand for energy, as well as the effects of electrifying heating systems and appliances.

1. **Improving energy efficiency:** This measure considers changes in the energy demand for heating and cooling our buildings. Retrofit options, energy use practices and the performance of new builds are considered.
2. **Moving away from gas heating systems:** Considers the uptake of non-fossil fuel sources for heating within homes and commercial properties, including heat pumps, district heating and combined heat and power networks (CHP). The impact of the fuel mix will be heavily influenced by the increased availability of renewable energy. Hydrogen technology is not modelled in the tool due to the limited availability of large-scale data.
3. **Low carbon and energy efficient cooking, lighting and appliances:** Considers the reduction in energy demand from more efficient domestic and commercial cooking, lighting and appliances, including electrical devices. Additionally, considers the increased uptake in electrical cooking systems.



Implementing the SCATTER interventions for buildings at the highest ambition leads to:

78 % reduction in emissions from buildings by 2040

106 $ktCO_2e$ of buildings emissions remaining at 2040

Figure 6.1.3 : Slough's SCATTER High Ambition Pathway broken down by sector.

SCATTER Intervention	Cumulative Emissions Savings (2020 - 2040)	Staff Costs	Indicative costings (£m)
1. Improving energy efficiency	Heating, cooling and hot water: **3,418 $ktCO_2e$ for both pt 1& 2**	3.5 FTE	**490.3** (capex required for retrofit on existing households) **90.4** (marginal capex required to retrofit domestic heating systems) **-87.8** (marginal opex as a result) **4.0** (marginal opex as a result of switching to electric cookers in households) **35.8** (marginal cost of building to PassivHaus standard during construction) *For non-domestic buildings costings please see Appendix 8*
2. Switching off gas heating systems	Heating, cooling and hot water: **3,418 ktCO2e for both pt 1 & 2**	2.3 FTE	
3. Low carbon and energy efficient cooking, lighting and appliances	Lighting, appliances and cooking: **837 $ktCO_2e$**	0.55 FTE	

Table 6.1.1: Cumulative carbon savings (2020-2040) and cost considerations.

6.1 BUILDINGS
INTERVENTION MILESTONES

1. Improving energy efficiency

a) Domestic Buildings

This measure considers changes to the energy demand for heating homes, in both existing properties and newly built homes. Different retrofit options are considered for existing households, as well as the performance of new builds.

The aim of retrofit is to drive down the energy demand for heating and hot water in buildings; typical measures include insulation for floors, windows and ceilings, as well as improved ventilation. Currently household retrofit is led largely by government-supported schemes, such as ECO3 retrofit measures and the Domestic Renewable Heat Incentive (RHI). SCATTER models future energy demand based on the uptake of two "modes" of retrofit:

- Medium – a 66% reduction in annual average energy demand through inner wall insulation.
- Deep – an 83% reduction in annual average energy demand, through inner & external wall insulation.

New builds must also be constructed to extremely high energy performance standards, and this is of great significance to the borough given the anticipated increase of around 20,000 households by 2036. Achieving low-carbon and energy efficient standards for new builds now avoids costly retrofit in the near future. The Association for Environmentally Conscious Builders (AECB) deems a "high performance" building as requiring 25% of the average energy demand for heating, Passivhaus standards are typically 10% of average demand.

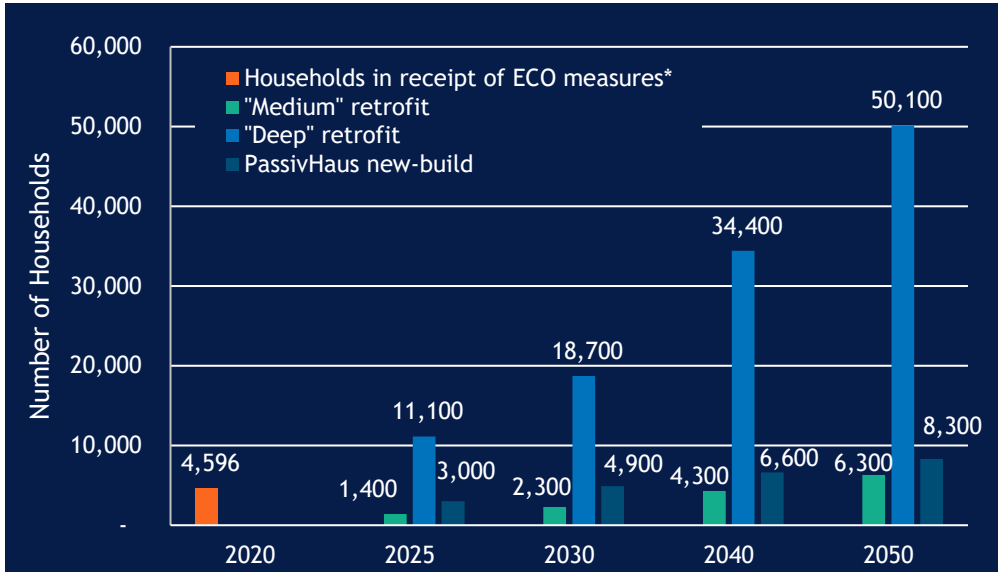


Figure 6.1.4 : Retrofit rates and new build standards for Slough.
*ECO measures are included as a proxy for comparison, though the average improvements to energy demand fall well short of medium retrofit in practice.

Current Context 2020	By 2040
• 4,596 households in Slough have received ECO measures [1] • 4,815 households in Slough are in fuel poverty [2] • 41% of EPC-rated domestic properties are rated D or below [3]	• 4,300 houses "medium" retrofit, 34,400 houses "deep" retrofit • All of the 6,600 new houses projected in SCATTER to be built to Passivhaus standards • 32% reduction in domestic energy demand

Table 6.1.2: Current context and 2040 intervention milestones for improving energy efficiency in domestic buildings.

[1] Household Energy Statistics
[2] Fuel Poverty Data
[3] EPC in England and Wales

6.1 BUILDINGS
INTERVENTION MILESTONES

b) Non-domestic buildings

This measure describes energy demand reduction for space heating and hot water heating as a result of improvements to building fabric and positive behaviour changes. "Retrofit" in this context refers to insulation, draughtproofing, double glazing etc., as opposed to the installation of renewable energy technologies. The demand-side reductions are focused on changes to the building fabric, which are considered separately to any changes to electrified systems. Similarly to domestic buildings, getting energy efficient standards right for non-domestic buildings now avoids costly retrofit in the near future.

The reductions in emissions modelled by SCATTER:

- Consider improvements to the efficiency of new water heating systems.
- Are calculated in terms of an overall reduction in net energy demand without prescribing specific targets for numbers of buildings to be retrofitted.
- Are applied to whatever fuel the building is using i.e., accounting for more efficient gas boilers or electrical heating systems.

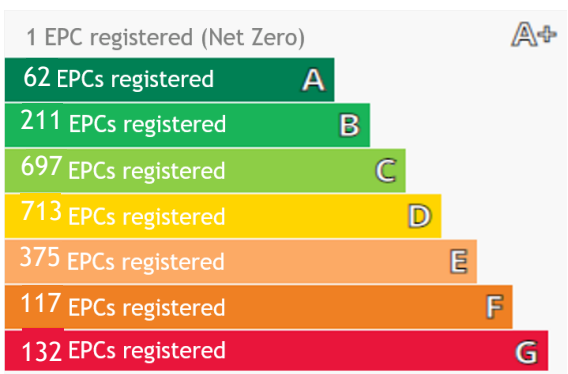


Figure 6.1.7: Non-domestic EPCs issued from 2008 to June 2021 across the borough. The average non-domestic EPC rating in Slough equates to a band D. Data is provided by the Ministry of Housing, Communities and Local Government.[1]

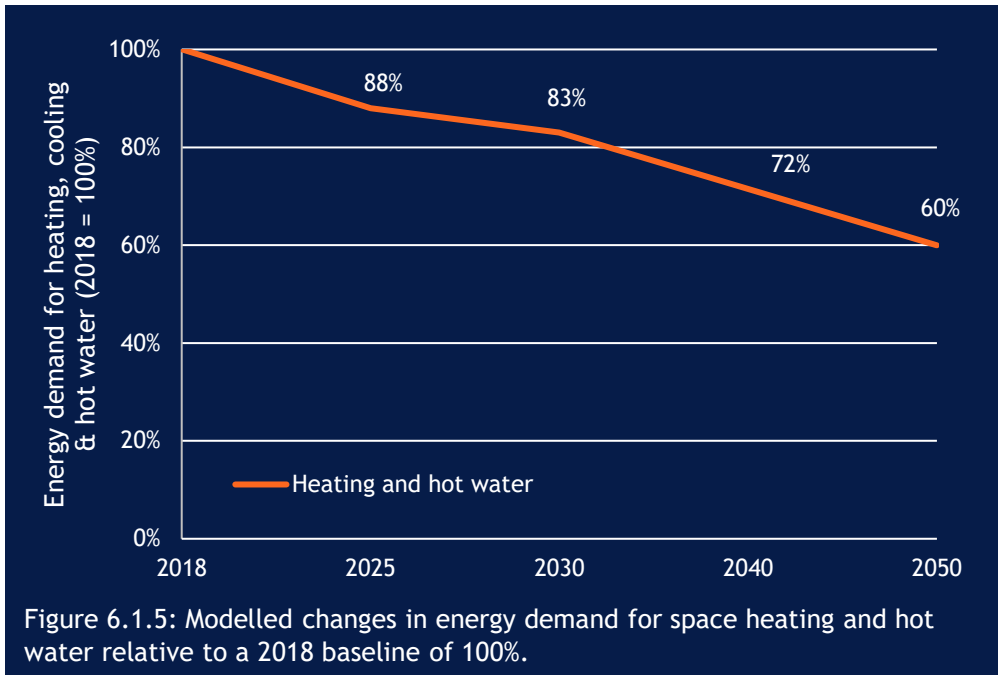


Figure 6.1.5: Modelled changes in energy demand for space heating and hot water relative to a 2018 baseline of 100%.

Current Context 2020	By 2040
58% of DEC rated non-domestic properties are rated D or below [1]	28% reduction in non-domestic energy demand

Table 6.1.3: Current context and 2040 intervention milestones for improving energy efficiency in non-domestic buildings.

[1] Energy Performance of Buildings Certificates, Ministry of Housing, Communities and Local Government.

6.1 BUILDINGS
INTERVENTION MILESTONES

2. Moving away from gas heating systems

This measure represents a transition from fossil fuel-source heating technologies to less carbon-intensive systems. The technology mix under the High Ambition Pathway includes heat pumps for domestic buildings, and a mix of community-scale district heating and heat pumps for non-domestic buildings. Hydrogen technology is not modelled due to the limited availability of large-scale data.

Heat pumps are modelled in SCATTER to deliver the greatest emissions reduction for domestic and non-domestic building. Heat pumps are an effective and energy efficient way to produce hot water to heat homes and they work by absorbing heat from the environment and transferring it to a fluid, which is then compressed to further increase its temperature. The difference between a ground source heat pump (GSHP) and an air source heat pump (ASHP) is simply where the heat is absorbed from.

Transitioning to district heating technologies for non-domestic buildings, which includes community scale CHP, is modelled in SCATTER to deliver a significant amount of emissions reduction. Community scale CHP systems are a low-carbon alternative to individual gas/grid systems since they more efficiently convert fuel into electricity and heat. CHP systems can also be fed by renewable technologies, meaning that they also offer a long-term zero-carbon option for heating systems.

The impact of this measure on emissions is heavily influenced by the availability of green electricity supplied by renewable energy sources. The transition toward electrified heating brings an added demand for electricity, which will have associated carbon emissions until the national grid is fully "greened". The more rapidly the grid greens, the greater the impact on emissions reduction.

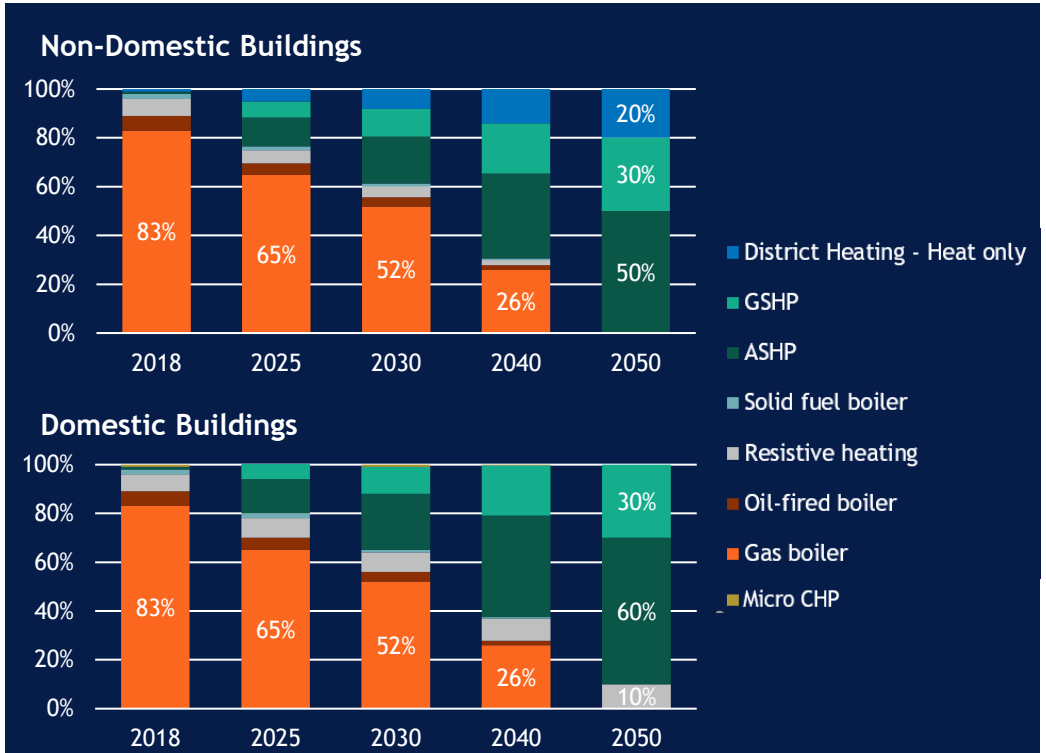


Figure 6.1.6: Modelled changes in the technology mix used for heating domestic and non-domestic buildings.

Current Context 2020	By 2040
According to MSOA estimates, 13.7% of properties in Slough are not connected to the gas grid. Since 2013, gas consumption across the borough has fallen by 6.3%	• 14% of non-domestic heating systems are district heating • 63% of domestic heating systems are heat pumps

Table 6.1.4: Current context and 2040 intervention milestones for improving energy efficiency in non-domestic buildings.

6.1 BUILDINGS
INTERVENTION MILESTONES

3. Low carbon and energy efficient cooking, lighting and appliances

a) Appliance and lighting efficiency

This intervention considers the reduction in energy demand due to the installation of more efficient lighting and appliances, including electrical devices. It also considers all types of cookers and catering equipment, regardless of their source fuel.

Energy demand reductions are applied to whatever fuel the building is using, such as mains electricity or gas-fired CHP. Lighting, cooling and appliances use approximately 45% of the total building's day to day use energy, heating and hot water use approximately 46% of the total building's day to day use of energy.[1]

Modelled changes in MWh energy demand for lighting and appliances uses the 2018 SCATTER inventory as a baseline value.

Current Context 2020	By 2040
In the UK, consumption by domestic lighting decreased 25% between 2010 and 2019.[2]	• 52% reduction in domestic energy demand for appliances, lighting and cooking • 18% reduction in non-domestic energy demand for appliances, lighting and cooking

Table 6.1.5: Current context and 2040 intervention milestones for appliance and lighting efficiency

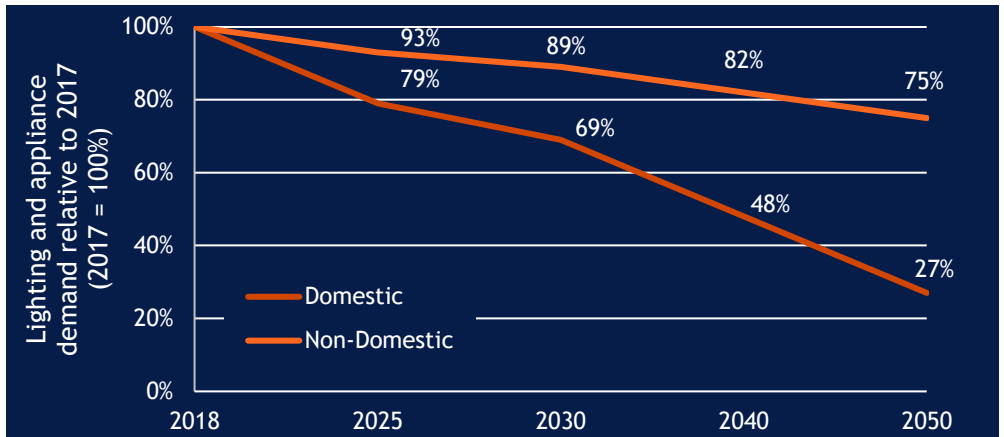


Figure 6.1.7: Modelled energy demand reduction for changes for appliances, lighting and cooking defined against a 2018 baseline.

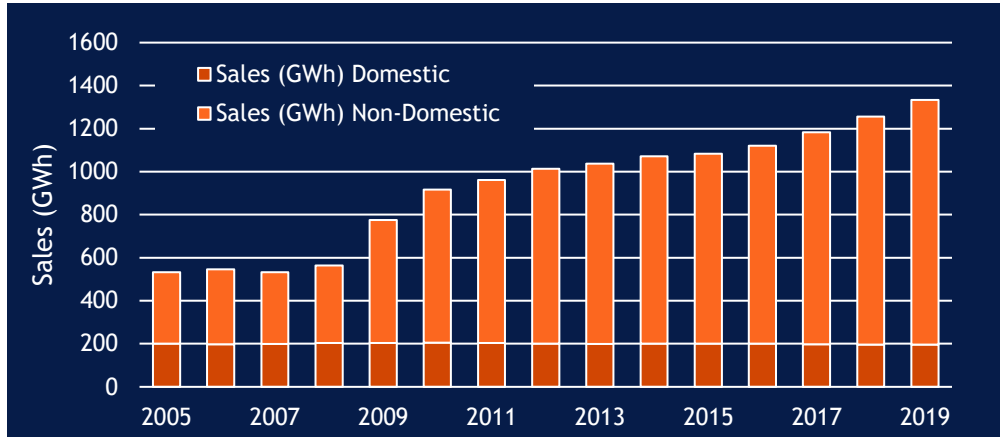


Figure 6.1.8: Historic sub-national electricity consumption in Slough (Sales GWh). Source: Sub-national electricity sales.

[1] Per BEIS analysis
[2] Energy Consumption in the UK: Final Energy Consumption Tables

6.1 BUILDINGS
INTERVENTION MILESTONES

b) Increase uptake of electric cooking systems

This measure describes the uptake of electrical cooking systems and discontinuation of gas cookers. It accounts for a transition to fully electrified systems by 2050. For the most part, the uptake of electrified cooking systems directly reduces other fossil fuel usage, though this does constitute an overall increase in electricity consumption.

As with the heating systems measure, the projected change towards electric systems delivers emissions savings in tandem with decarbonisation from the grid.

Current Context 2020	By 2040
Nationally in 2016, it was estimated that around 45-50% of domestic cooking was electrified [1]	• 57% increase in electric fuel usage for domestic cooking • 22% increase in electric fuel usage for non-domestic cooking

Table 6.1.6: Current context and 2040 intervention milestones for appliance and lighting efficiency

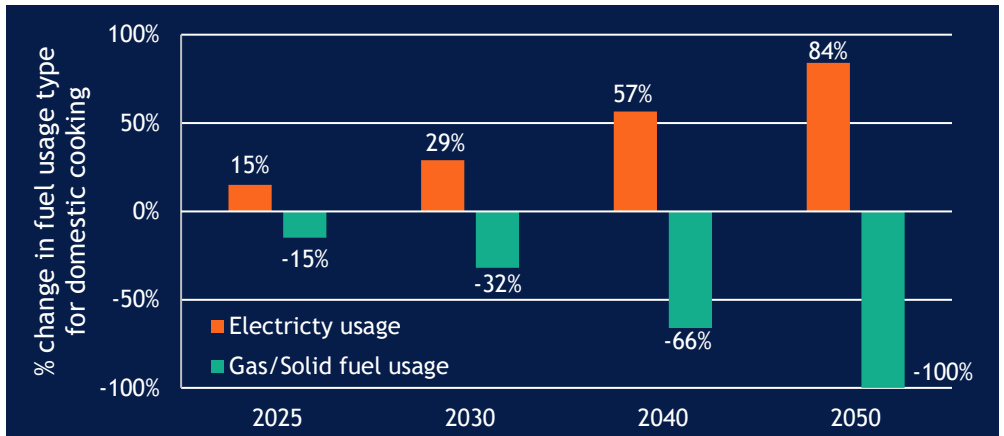


Figure 6.1.9: Modelled changes in fuel usage for domestic cooking. By 2050, all cookers will be electrified under this scenario.

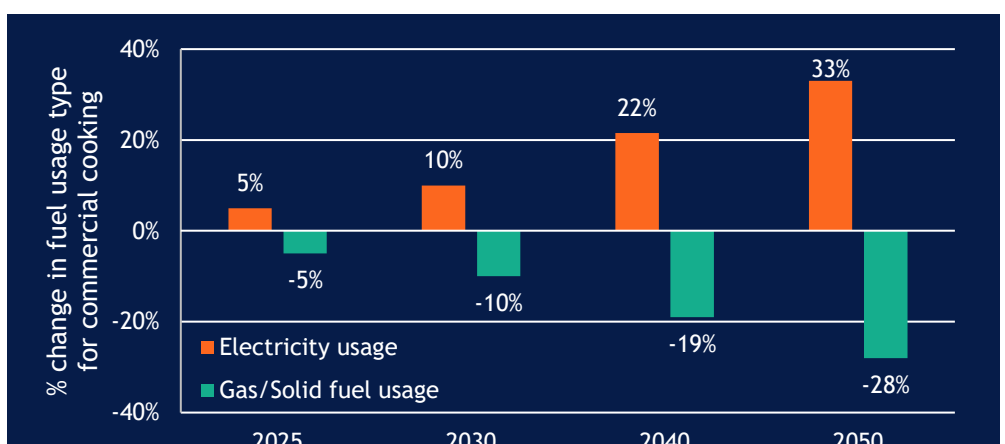


Figure 6.1.10: Modelled changes in fuel usage type for commercial cooking.

[1] Based on underlying fuel consumption data within SCATTER

6.1 BUILDINGS
KEY STAKEHOLDER VIEWS

As part of the Climate Change Strategy & Action Plan development, a series of seven workshops were held online to gain stakeholder views on the actions proposed, key barriers and enablers to their implementation and further implementation considerations. A summary of the key stakeholder views relating to buildings are detailed below.

Intervention	Barriers	Enablers	Implementation Considerations
1. IMPROVING ENERGY EFFICIENCY	*"Policy will vary greatly between now and 2050, there is a need for greater consistency"* *"Residents want to see a simplified process for grants or products associated with energy efficiency"*	*"The development of energy efficiency education can improve public awareness"* *"Slough Borough Council are already reviewing its property portfolio to improve energy efficiency"*	*"Retrofitting existing stock in buildings is key to upgrading energy efficiency measures and maximising their effect"* *"The consistency of metrics is important to ensure reporting is accurate and consistent across all industries"*
2. MOVING AWAY FROM GAS HEATING SYSTEMS	*"The cost of heat pump installation and maintenance can be very high, especially for low-income homes"* *"Businesses can move faster with heating action, but are waiting on consistent government policy"*	*"Data centre cooling software 'Ekko Sense' minimises the use of refrigerants and enables data storage machinery to waste less energy through excessive heating. This offers a significant improvement to energy efficiency in data centres"*	*"Push the agenda on district heating schemes to improve heating supply and energy efficiency"* *"Be aware of the interaction between domestic and non-domestic buildings and not see them in isolation"*
3. LOW CARBON AND ENERGY EFFICIENT COOKING, LIGHTING AND APPLIANCES	*"Businesses need financial support to shift to energy efficient low carbon appliances. For example, a shift to halogen lightbulbs need to be funded and life cycle cost needs to be considered in order to encourage businesses to implement this"*	*"There is a high demand for council estate renovation, this could be an ideal opportunity to implement low carbon and energy efficiency appliances"*	*"There is a need to identify trusted local partners to help support members of the public who are unsure about installing low carbon appliances"*

6.1 BUILDINGS
1) IMPROVED ENERGY EFFICIENCY IN BUILDINGS

Goal: Opportunities to improve energy efficiency across all private sector buildings maximised

Responsibility	Action	SBC's role	Key Stakeholders	Action Impact	Timescale	Complexity
SBC	Investigate using Section 106 developer contributions to deliver net zero infrastructure or affordable housing projects	Implementation	Lead: Council's Planning Policy Team, Other: Developers.	Direct	Long	High
SBC	Develop a Sustainable Design and Construction Supplementary Planning Document to dispel cost misconceptions, promote whole life cost models and support higher development standards	Policy & Strategy	Lead: Council's Planning Policy Team, Other: Council's Housing Regulation Team	Strategic	Medium	Medium
Borough	Ensure the operational carbon of new developments is accurately reported following building completion	Communication & Engagement	Lead: Council's Building Control and Planning Team, Other: Property Owners and Developers.	Indirect	Medium	High
Borough	Encourage the use of recycled materials in new developments as a means of reducing the embodied carbon of new-build (scope 3 action). Record this through a Building Life Cycle Assessment or Carbon Statement.	Communication & Engagement	Lead: Council's Building Control and Planning Team, Other: Developers.	Direct	Medium	High
Borough	Signpost and promote retrofit opportunities and funding, initially targeting business sectors or domestic housing areas with the most need	Communication & Engagement	Lead: Council's Environment Management Team and Council's Communications Team , Other: Slough Business Community Partnership and Property Owners.	Indirect	Short	Low

6.1 BUILDINGS
1) IMPROVED ENERGY EFFICIENCY IN BUILDINGS

Goal: Opportunities to improve energy efficiency across all private sector buildings maximised

Responsibility	Action	SBC's role	Key Stakeholders	Action Impact	Timescale	Complexity
SBC	Implement standardised performance measurement and reporting requirements for all existing and new commercial developments aligning with the Local Plan	Implementation	Lead: Council's Building Control and Planning Team, Other: Commercial Property Owners and Developers	Strategic	Long	High
SBC	Investigate integrating additional energy efficiency reporting during ISO50001 and ESOS certification requirements	Research & Design	Lead: Council's Building Control Team , Other: Council's Business Support Team and SEGRO	Indirect	Medium	High
Borough	Encourage annual energy reporting requirements across the borough's non-domestic buildings	Communication & Engagement	Lead: Council's Environment Management Team , Other: Property Owners and Developers	Indirect	Medium	High
Borough	Set up a mechanism through which business stakeholders can achieve sustained collaboration and showcase leading examples of decarbonisation	Communication & Engagement	Lead: Council's Business Support Team, Other: Slough Business Community Partnership	Indirect	Short	Medium
Borough	Support businesses in accessing green finance by providing staff resources for guidance and advice via business networks	Communication & Engagement	Lead: Council's Business Support and Strategic Finance Team, Other: Slough Business Community Partnership	Indirect	Short	Low
Borough	Investigate how the Council might implement strict energy efficiency standards (e.g. BREEAM outstanding) for new data centre sites built in the borough	Implementation	Lead: Council's Building Control and Planning Team, Other: Data Centres	Direct	Medium	High

6.1 BUILDINGS
1) IMPROVED ENERGY EFFICIENCY IN BUILDINGS

Goal: Improve energy efficiency in privately owned and rented properties

Responsibility	Action	SBC's role	Key Stakeholders	Action Impact	Timescale	Complexity
SBC	Encourage all new dwellings to seek a 90% energy reduction beyond Part L of the 2013 Building Regulations	Communication & Engagement	Lead: Council's Planning Policy Team, Other: Developers and Property Owners	Strategic	Long	High
SBC	Consider green accreditation schemes for private landlords including access to finance, suppliers, installers and discounted EPC surveys as an incentive to the private rental sector to improve energy efficiency	Communication & Engagement	Lead: Council's Housing Regulation Team, Other: Landlords	Strategic	Long	High
SBC	Raise the minimum energy efficiency standards (MEES) from the current D up to a C for private rented properties and improve its enforcement to capture non-compliance, providing support to tenants and landlords where needed	Implementation	Lead: Council's Housing Regulation Team, Other: Landlords	Strategic	Long	High
SBC	Utilise household fuel poverty data to identify 'hotspots' of low energy efficiency properties and target engagement and financing opportunities to these households	Research & Design	Lead: Council's Housing Regulation Team, Other: Registered Social Landlords	Indirect	Medium	Medium
SBC	Ensure new houses built through Slough's House Building Programme incorporate an uplift in energy efficiency standards in alignment with progression towards the Future Homes Standard	Implementation	Lead: Council's Housing Regulation Team, Other: House Building Programme Contractors	Direct	Long	High

6.1 BUILDINGS
1) IMPROVED ENERGY EFFICIENCY IN BUILDINGS

Goal: Improve energy efficiency in privately owned and rented properties (Cont..)

Responsibility	Action	SBC's role	Key Stakeholders	Action Impact	Timescale	Complexity
Borough	Set up a mechanism for residents to collaborate and showcase leading examples of decarbonisation e.g., Bristol Green Doors Open Home Events	Implementation	Lead: Council's Housing Regulation Team and Council's Environmental Management Team, Other: Residents	Indirect	Long	Medium
Borough	Publicise opportunities associated with improving energy efficiency standards and provide communications to owner-occupied homes	Communication & Engagement	Lead: Council's Housing Regulation Team and Council's Environmental Management Team, Other: Council's Comms Team, Residents	Indirect	Short	Low
Borough	Set up a system where tenants could anonymously report landlords who do not meet MEES or EPC standards	Implementation	Lead: Council's Housing Regulation Team, Other: Residents	Indirect	Medium	High
Borough	Support households in accessing ECO3 funding by providing guidance and advice. Utilise powers under ECO3 Local Authority Flexible Eligibility to enable the Council to qualify private sector residents as eligible for funding.	Communication & Engagement	Lead: Council's Housing Regulation Team, Other: Council's Environment Management Team	Strategic	Long	Low

6.1 BUILDINGS
1) IMPROVED ENERGY EFFICIENCY IN BUILDINGS

Goal: Improve energy efficiency in public sector buildings

Responsibility	Action	SBC's role	Key Stakeholders	Action Impact	Timescale	Complexity
SBC	Encourage new public sector buildings to be built to the highest energy efficiency standards e.g. Passivhaus standards	Communication & Engagement	Lead: Council's Planning Policy Team, Other: Public Sector Organisations	Strategic	Short	Medium
SBC	Provide guidance and communicate financing opportunities for energy efficiency measures and DEC scoring in existing public sector buildings	Communication & Engagement	Lead: Council's Environment Management Team , Other: Council's Strategic Finance Team	Indirect	Short	Low
SBC	Encourage annual energy audits of all public sector buildings, to assist with monitoring and reporting of annual emissions	Communication & Engagement	Lead: Council's Environment Management Team , Other: Public Sector Organisations	Indirect	Short	Medium

Goal: Improve energy efficiency in council-owned or affiliated housing*

Responsibility	Action	SBC's role	Key Stakeholders	Action Impact	Timescale	Complexity
Borough	Prioritise energy efficiency improvements and maximise funding for the worst-performing houses within council's portfolio, i.e. those with EPC rating D-G*	Implementation	Lead: Council's Asset Management Team , Other: Herschel Homes /James Elliman Homes	Direct	Medium	High
Borough	Require all new homes built on council land to be built to the highest energy efficiency standards (e.g. Passivhaus or Net Zero standards)	Implementation	Lead: Council's Asset Management Team , Other: Herschel Homes /James Elliman Homes	Direct	Medium	High

*Refer also to the "Initial Zero Carbon Study Report - December 2020" for further recommendations around the council's stock

6.1 BUILDINGS
1) IMPROVED ENERGY EFFICIENCY IN BUILDINGS

Goal: Improve energy efficiency in council-owned or affiliated non-domestic buildings

Responsibility	Action	SBC's role	Key Stakeholders	Action Impact	Timescale	Complexity
SBC	Update policy to ensure any new properties built in the council's portfolio are built to the highest energy efficiency standards e.g. Passivhaus standard	Policy & Strategy	Lead: Council's Asset Management Team , Other: Council's Housing Regulation Team, Developers	Strategic	Long	Medium
SBC	Develop a decarbonisation plan for all council owned buildings to identify the most viable solutions to achieving Slough Borough Council's own net zero 2030 target, tailor support to worst performing properties	Implementation	Lead: Council's Asset Management Team , Other: N/A	Strategic	Short	Low
SBC	Implement annual reporting of energy use and results of Display Energy Certificates (DEC) at all Council sites	Implementation	Lead: Council's Asset Management Team , Other: N/A	Indirect	Short	Low
Borough	Carry out energy audits on community schools (as part of the Ashden Low Carbon Schools Programme)	Implementation	Lead: Council's Asset Management Team , Other: Schools	Indirect	Short	Low

6.1 BUILDINGS
2) MOVING AWAY FROM GAS HEATING SYSTEMS

Goal: Low carbon heating opportunities are maximised in private sector buildings

Responsibility	Action	SBC's role	Key Stakeholders	Action Impact	Timescale	Complexity
SBC	Ensure that all new developments assess the opportunities for connection to a heat network	Policy & Strategy	Lead: Council's Planning Team Other: Developers	Indirect	Short	Low
SBC	Support the expansion or greater utilisation of district heat networks at Slough Trading Estate and explore feasibility of district heat networks in the Town Centre and in Langley. These could utilise waste heat from energy from waste plants and data centres in the town.	Research & Design	Lead: Council's Environment Management Team , Other: SEGRO (owners and managers of trading estate), and other major development sites/developers	Indirect	Short	Low
SBC	Conduct wider feasibility study for additional low-carbon energy networks, such at the Ice Arena, Wexham Hospital, and other micro-networks, such as dense residential areas across the borough	Research & Design	Lead: Council's Environment Management Team , Other: Everyone Active (owners of ice arena), NHS, Developers	Indirect	Short	Low
Borough	Mandate that data centres of a certain size are required to investigate heat network opportunities. Incorporate this action into planning guidance and the new Local Plan.	Policy & Strategy	Lead: Council's Planning Team, Other: Data Centres	Direct	Long	High
Borough	Ensure developers have the knowledge and resources to install non-gas heating systems in new developments	Communication & Engagement	Lead: Council's Planning Team, Other: Developers	Direct	Long	Medium
Borough	Encourage and provide guidance to businesses on low carbon heating solutions	Communication & Engagement	Lead: Council's Environment Management Team, Other: Slough Business Community Partnership	Indirect	Short	Low
Borough	Support households in accessing funding for installation of heat decarbonisation measures	Communication & Engagement	Lead: Council's Housing Regulation Team, Other: Residents	Indirect	Long	Medium

6.1 BUILDINGS
2) MOVING AWAY FROM GAS HEATING SYSTEMS

Goal: Maximise low carbon heating opportunities in public sector and council owned buildings*

Responsibility	Action	SBC's role	Key Stakeholders	Action Impact	Timescale	Complexity
SBC	Review the opportunities for low-carbon heating systems within the Council's own buildings	Implementation	Lead: Council's Asset Management Team , Other: N/A	Direct	Medium	Medium
SBC	Review the installation of low-carbon heating systems such as air and ground source heat pumps, within the Council's own housing portfolio	Research & Design	Lead: Council's Asset Management Team , Other: Herschel Homes /James Elliman Homes	Direct	Long	Low
Borough	Ensure guidance and finance opportunities are provided to public services to encourage uptake of low carbon heating	Communication & Engagement	Lead: Council's Environment Management Team , Other: Public Sector Organisations	Indirect	Long	Medium

*Refer also to the "Initial Zero Carbon Study Report - December 2020" for further recommendations around the council's stock

6.1 BUILDINGS
3) LOW CARBON AND ENERGY EFFICIENT COOKING, LIGHTING AND APPLIANCES

Goal: Maximise low carbon heating opportunities in public sector and council owned buildings

Responsibility	Action	SBC's role	Key Stakeholders	Action Impact	Timescale	Complexity
Borough	Provide guidance and support to businesses, residents and public services on low carbon energy efficiency appliance and lighting improvements	Communication & Engagement	Lead: Council's Environment Management Team , Other: Businesses, Residents and Public Services	Indirect	Short	Medium
Borough	Encourage Slough's existing data centres to carry out annual reporting of Power Utilisation Effectiveness (PUE) to target improvements in appliance efficiency	Communication & Engagement	Lead: Council's Business Support Team, Other: Data Centres	Indirect	Short	Medium

6.1 BUILDINGS
3) LOW CARBON AND ENERGY EFFICIENT COOKING, LIGHTING AND APPLIANCES

Goal: Improve energy efficiency of appliances and lighting in council owned buildings

Responsibility	Action	SBC's role	Key Stakeholders	Action Impact	Timescale	Complexity
SBC	Develop and implement an appliance and lighting energy efficiency review for all council owned buildings	Implementation	Lead: Council's Asset Management Team , Other: N/A	Direct	Long	Medium
SBC	Carry out lighting and appliance improvements to Council affiliated housing	Implementation	Lead: Council's Asset Management Team , Other: Herschel Homes /James Elliman Homes	Direct	Medium	Low
Borough	Undertake audits to identify opportunities to deliver improvements to lighting and appliances in community schools and leisure centres	Research & Design	Lead: Council's Asset Management Team , Other: Schools and Leisure Centres	Strategic	Long	Medium

6.1 BUILDINGS
CO-BENEFITS OF ACTIONS

It can be helpful to consider the added co-benefits of given measures when planning climate action. The decarbonisation of buildings in Slough will offer co-benefits across economic, social and environmental spheres:

ECONOMIC

- Reduced energy bills - If Slough invested in all profitable energy efficiency and low carbon options for schools, hospitals, offices, shops and restaurants, the borough would save £47m a year in energy bills
- Creation of local jobs - Energy efficiency retrofit programmes can provide opportunities for the creation of local jobs (e.g. local installers of insulation measures) and wider economic regeneration

SOCIAL

- Reduced usage of gas and solid fuels in heating and cooking has indoor air quality benefits, and as we in the UK spend most of our time indoors, this in turn will improve health and wellbeing
- Improving the energy efficiency of domestic buildings will reduce fuel poverty across the borough. Currently 8.9% of households, equal to approximately 4,815 households, across Slough are classified as fuel poor
- Children living in inadequately heated homes are more than twice as likely to suffer from conditions such as asthma and bronchitis than those living in warm homes

ENVIRONMENTAL

- More sustainable design can help to enhance surrounding natural assets and make better use of nature to enhance building resilience to a changing climate. This is explored further in the Adaptation section of the plan
- Some energy efficient appliances can also save water

6.1 DOMESTIC BUILDINGS
NATIONAL CASE STUDIES

IMPROVED ENERGY EFFICIENCY IN BUILDINGS

Nottingham City Homes was the first housing association in the UK to pilot net zero retrofits of social housing using the Energiesprong approach. They undertook a pilot project to improve 10 inefficient homes and deliver a more comfortable indoor climate for residents.

The Manchester Housing Provider's Partnership brings together housing providers and Manchester City Council to work collectively to support the City's net zero targets. Various members have embarked on the development of zero carbon strategies and asset management plans as a result (with further actions planned). The partnership is responsible for approximately 70,000 homes in the local authority.

Warwick District Council partnered with Act on Energy to form Warm and Well in Warwickshire, which offers free advice for switching energy suppliers as well as grants for insulation and boilers. It provides a number of advisory services, practical support for boiler or heating replacements, emergency heaters, boiler servicing and support for loft and cavity wall insulation especially for those with cold homes, low incomes and health conditions.

MOVING AWAY FROM GAS HEATING SYSTEMS

Manchester City Council are electrifying domestic heating in a new-build development in West Gorton, Greater Manchester. The affordable houses were equipped with modern, digital and renewable energy solutions that can deliver reductions to energy bills of up to 90% for tenants.

APPLIANCE AND LIGHTING EFFICIENCY

Southampton City Council's energy provider, CitizEn Energy, has been providing free low energy LED light bulbs for installation in vacant council homes. The Council plans to install LED light bulbs in approximately 100 homes.

6.1 NON-DOMESTIC BUILDINGS
NATIONAL CASE STUDIES

IMPROVED ENERGY EFFICIENCY IN BUILDINGS

Exeter Passivhaus Leisure Centre is part of Exeter City Council's city centre master plan and is set to be a world first Passivhaus Leisure Centre. It is the first commercial Passivhaus development from the council who have delivered several renowned domestic schemes. The design includes a 70% saving on energy costs when compared to a current good practice pool and a 50% reduction in water use. Local news reports suggest that the leisure centre will cost c.£44 million.

Southampton District Energy Scheme delivers energy to over 45 energy users in the public and private sector. The scheme is currently saving around 10,000 tonnes of CO_2 emissions per annum, using heat from a large-scale combined heat and power (CHP) plant, supplemented by geothermal energy and conventional boilers.

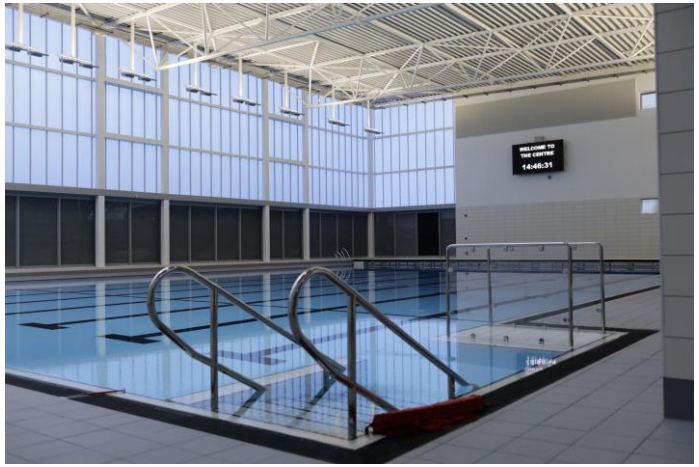
Oxford City Council upgraded their internal air conditioning systems which was estimated to save 161 tCO_2/year and repaid its £45,000 spend in 1.2 years through reduced energy costs.

MOVING AWAY FROM GAS HEATING SYSTEMS

The UK Government conducted research on the shift for non-domestic consumers to low carbon heating systems. 76% of non-domestic consumers thought that banning the installation of fossil fuel heating systems was an effective measure. The biggest concern involved lowering installation costs.

APPLIANCE AND LIGHTING EFFICIENCY

The Energy Technology List (ETL) is a government list of energy efficient plant and machinery to help organisations select equipment with a high standard of energy efficiency - typically set at the top 25% of products in the market. The list functions as an easy-to-use procurement tool for energy managers and reduces operational costs.

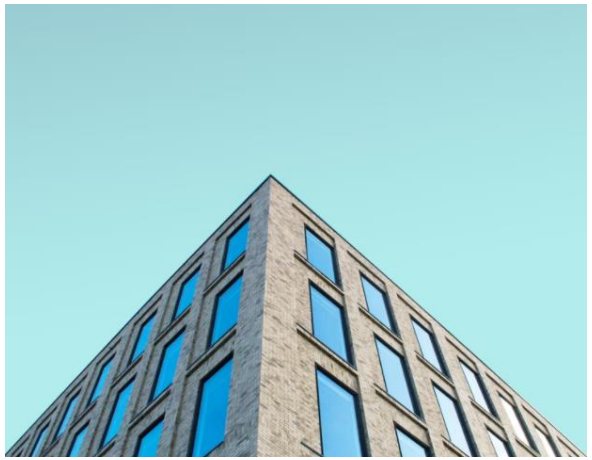


6.1 DOMESTIC BUILDINGS
LOCAL CASE STUDIES

IMPROVED ENERGY EFFICIENCY IN BUILDINGS

Greenwatt Way is a development of ten residential homes completed in 2010 by a partnership led by SSE (Scottish and Southern Energy). At the time of completion, all homes were designed to meet the Code for Sustainable Homes (CSH) level 6 zero carbon requirements and included energy efficient lighting and appliances, roof lighting and renewable technologies.

Slough Borough Council - Slough Forward has worked with Global Action Plan, an EDF Energy charity partner, to establish a number of Eco Teams across the borough. A typical household taking part in Eco Team project usually reduces their CO_2 emissions by 16.6% a year, reduces their energy bills by £170 a year, reduces waste by 20% and reduces their water consumption by 15%.



MOVING AWAY FROM GAS HEATING SYSTEMS

Greenwatt Way set the benchmark for zero carbon homes by implementing four different renewable technologies: biomass, solar thermal panels, air source heat pumps and a ground source heat pumps. These homes are installed with a zero carbon 350kW wood pellet biomass boiler. Studies have already shown that Vital Energi's biomass boiler well exceeds the Dwelling Emission Rates (DER) required for a zero-carbon community.

APPLIANCE AND LIGHTING EFFICIENCY

Slough Borough Council have held Energy Saving Weeks. The week offered staff the chance to take control of their energy consumption by encouraging them to consider cutting their energy use at work, at home and in the way that they travel around the borough.

The Council is required to complete an EPC each time one of its properties is built, sold or rented. EPCs contain information about a property's energy use and typical energy costs, with recommendations on how to reduce energy use and save money. An EPC gives a property an energy efficiency rating from A (most efficient) to G (least efficient) and it is valid for 10 years.

6.1 NON-DOMESTIC BUILDINGS
LOCAL CASE STUDIES

APPLIANCE AND LIGHTING EFFICIENCY

Slough's LED Street Lighting Project replaced street lighting across the borough with more efficient LED bulbs, which has significantly reduced energy costs and associated carbon emissions. Emissions from street lighting were 2,657 tonnes CO_2e in 2014/15 and fell 58% to 1,112 tonnes CO_2e in 2017/18.

MOVING AWAY FROM GAS HEATING SYSTEMS

The Slough Heat and Power Plant located on the Slough Trading Estate, was acquired by SSE in January 2008. In August 2018, decommissioning and demolition works began to facilitate the development of a new ~50MW energy-from-waste facility, known as Slough Multifuel, at the site. The facility produces electricity and heat through burning waste-derived fuels made from various sources of municipal solid waste, commercial and industrial waste, and waste wood.

IMPROVED ENERGY EFFICIENCY IN BUILDINGS

O2 was the first major mobile network operator to roll out 'Ekko Sense' in data centres, minimising the use of refrigerants. Ekko Sense is a software platform that helps with cooling and energy savings in data storage devices. This upgrade is set to save 1m kilos of CO_2 per year.

The RE:FIT Programme is an energy efficiency and renewable energy refurbishment scheme. The Council has been enacting the programme to improve the energy efficiency of its corporate building estate. The programme guarantees to reduce energy consumption by at least 20%, reducing carbon emissions and energy costs. The first phase is saving Slough Borough Council £28,053 and 138 tonnes of CO_2 annually.

6.2 Transport

6.2 TRANSPORT
SECTOR OVERVIEW

Scope of Section

This section on transport assesses SCATTER high ambition targets for a range of activities including modal share, travelling shorter distances, uptake of electric vehicles (EV), domestic freight transport and emissions from aviation.

Key Emissions Sources

Emissions from transport represent 30.8% of Slough's emissions profile, making them a fundamental source to target action. In particular on-road transport accounts for 23.2% of Slough's overall emissions. The dense road network across the borough and the vicinity of the M4 corridor is likely to further encourage the uptake of on-road travel. Approximately 18,000 Slough residents also rely on Heathrow for work, driving up emissions from commuting. Although no major airports exist within Slough's local authority boundary, aviation emissions do occur and these are an apportion of scope 3 national aviation emissions allocated to each borough.

Green Recovery Considerations

- More than £7.5 billion is being spent on electrifying rail routes from London to Newbury and Cardiff, station improvements, and track upgrades.
- The development of the £848m Smart M4 motorway is more than halfway to completion.
- Crossrail is due to come on stream in the first half of 2022 and will greatly improve connectivity to central London by removing the need for interchange.
- The Gear Change - A bold vision for cycling and walking strategy provides a £2 billion investment for increasing the number of people walking and cycling for travel.

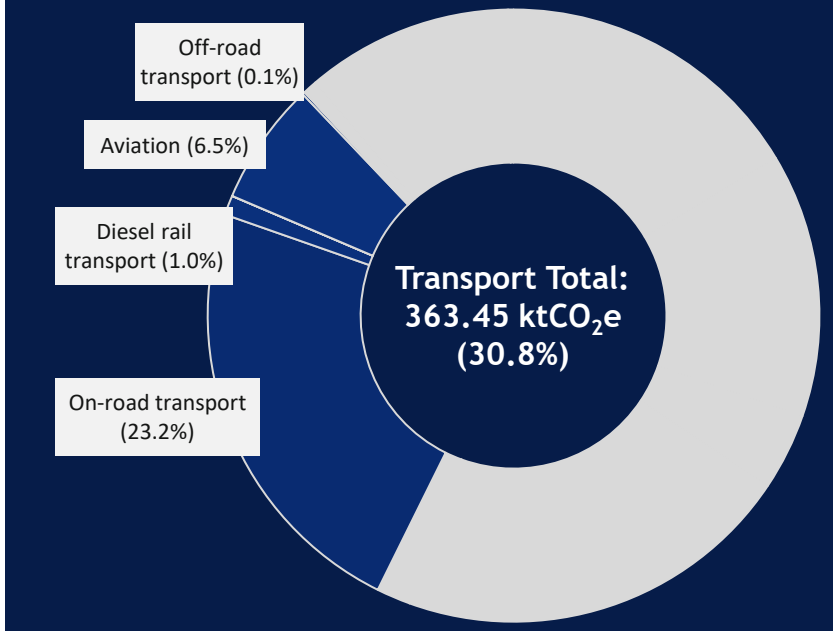


Figure 6.2.1: SCATTER 2018 inventory for the transport sector in Slough.

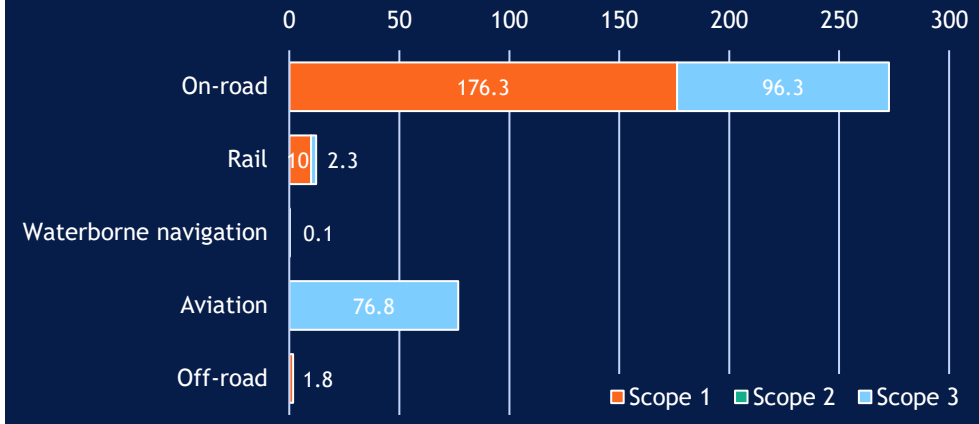


Figure 6.2.2: SCATTER 2018 scope 1, 2 & 3 transport emissions in Slough

6.2 TRANSPORT
KEY PLANS AND POLICIES

National

- The Road to Zero Strategy 2018 sets out new measures to establish the UK as a world leader in development, manufacture and use of zero emission road vehicles.
- The Ten Point Plan for a Green Industrial Revolution includes ending the sale of new petrol and diesel cars and vans by 2030.
- The Moving Forward Together strategy commits bus operators to only purchase ultra-low or zero carbon buses from 2025.
- Well Managed Highway Infrastructure – A Code of Practice advocates sustainability through; sustainable consumption and production, climate change and energy, natural resource protection and sustainable communities.
- London Heathrow Expansion Consultation 2 Heathrow provides employment for 7,000 Slough residents (prior to the COVID-19 pandemic) and supports the regional economy. However, noise and air pollution from the airport can be detrimental to the borough.

Berkshire

- The Thames Valley Berkshire Energy Strategy (2019) forms part of the Net Zero 2050 strategy across the Berkshire and the Thames Valley, advocating for smart infrastructure providing real-time data to optimise traffic flow, energy use, air quality and road surfaces.
- Slough Borough Council is a member of the Berkshire Strategic Transport Forum where a 2009 DaSTS study identified a regional necessity to ease growing congestion on roads and overcrowding on rail services. The study recommended improved public transport, cycling and walking abilities with express bus or coach services to infill missing rail links.
- Rail connectivity has been rejuvenated across the region recently by the development of the Crossrail project, set to open Autumn 2022. A Western Rail Link to Heathrow is currently being proposed, providing a rapid rail connection from Slough to Heathrow airport.

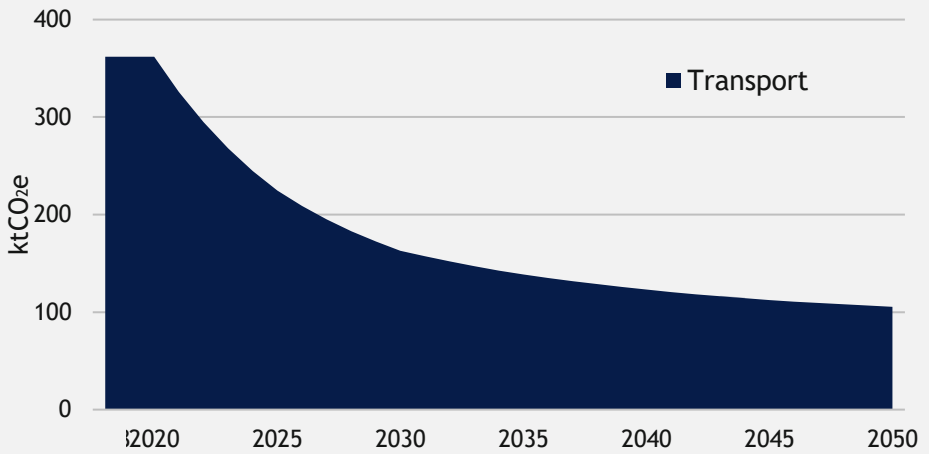
Slough

- The Third Local Transport Plan (LTP3) (2011-2026) establishes a framework to maintain and improve transport network and service capabilities, which are shaped by the priorities in the Sustainable Community Strategy and the 2011 EU White Paper on Local Transport.
- The Local Cycling and Walking Infrastructure Plan aims to make cycling and walking the natural choice for short journeys by 2040.
- The Low Emission Strategy 2018-2025 aims to improve air quality and health, embed innovative approaches to vehicle emissions and transition to a low emission economy.
- Strategic Transport Infrastructure Plan (2021) encourages more walking and cycling corridors across and beyond the borough boundaries.

6.2 TRANSPORT
INTERVENTIONS OVERVIEW

The transport measures in SCATTER consider changes in behaviour around transport, as well as the adoption of more electric vehicles for our journeys.

1. **Travelling shorter distances:** A change in the overall mileage travelled per passenger across all forms of transport. Increases in population are also considered in this measure.
2. **Driving less:** Changes to the mode by which passengers travel, defined by miles travelled. These are broken down into car (which includes petrol, diesel, hybrid and electric vehicles), active (walking and cycling) and public (train and bus).
3. **Switching to electric vehicles:** Considers the speed of the uptake of electric cars, trains and buses and phasing out of petrol and diesel vehicles. The impact of this measure is influenced by both the demand-side reductions and grid supply from renewable energy supply. The tool does **not** consider hydrogen-fuel vehicles.
4. **Improving freight emissions:** Considers changes to both the fuel efficiency and mode of travel for freight and commercial journeys.
5. **Reducing aviation emissions:** Considers the reduction of apportioned national aviation emissions allocated to each borough.



Implementing the SCATTER interventions for transport at the highest ambition leads to:

66 % reduction in emissions from transport by 2040

123 $ktCO_2e$ of transport emissions remaining at 2040

Figure 6.2.3 : Slough's SCATTER High Ambition Pathway broken down by sector.

SCATTER Intervention	Cumulative Emissions Savings (2020 - 2040)	Staff Costs
1. Travelling shorter distances	For all on-road transport: **1,725 $ktCO_2e$**	**1.95 FTE**
2. Driving less	For all on-road transport: **1,725 $ktCO_2e$**	**2.7 FTE**
3. Switching to electric vehicles	For all on-road transport: **1,725 $ktCO_2e$**	**2.5 FTE**
4. Improving freight emissions	For all on-road transport: **1,725 $ktCO_2e$**	**1 FTE**
5. Reducing aviation emissions	Aviation: **36 $ktCO_2e$**	**0.5 FTE**

Table 6.2.1: Cumulative carbon savings (2020-2040) and cost considerations.

Type of cost	Assessed cumulative cost (£m) - Capex	Assessed cumulative cost (£m) - Opex
Cars/ vans/ motorcycles	183.1	-
HGVs/ buses	94.0	-
Rail	9.1	-
Total infrastructure	286.2	-
Cars/ vans/ motorcycles	1,065.8	-3,542.9
HGVs/ buses	228.3	-50.2
Rail	75.0	-314.0
Total new vehicles	1,369.2	-4,345.5

Table 6.2.2: Cost considerations.

6.2 TRANSPORT
INTERVENTION MILESTONES

1. Travelling shorter distances

This measure models the reduction in total travel demand per person, across all transport modes. Travelling shorter distances can be achieved in a number of ways. The COVID-19 pandemic has certainly encouraged large numbers of people to find remote home working solutions. The future of office working remains uncertain, as many businesses become receptive to future working patterns which incorporate home-working. Following the introduction of lockdown measures in March 2020, road traffic fell to around one third of pre-pandemic levels on weekdays, however following the re-opening of office spaces and schools in September, this number recovered to approximately 90% of typical levels.[1]

Changes to transport infrastructure, public transport services and traffic management can also drive reductions in the average distance travelled per person. This intervention also considers increases in population between 2030 and 2050.

With Slough being a small and densely packed urban authority, distances travelled within the borough are usually short, with about half of residents travelling less than 3 miles to get to work.[2] However, many journeys either begin or end outside of the borough, highlighting the need to work closely with neighbouring local authorities in the Thames Valley region and London to reduces the average distance travelled per person.

Slough's Spatial Strategy includes 'Living Locally' as a key theme for future policy to follow. The Strategy identifies the importance of retention and promoting access to key facilities within neighbourhoods.

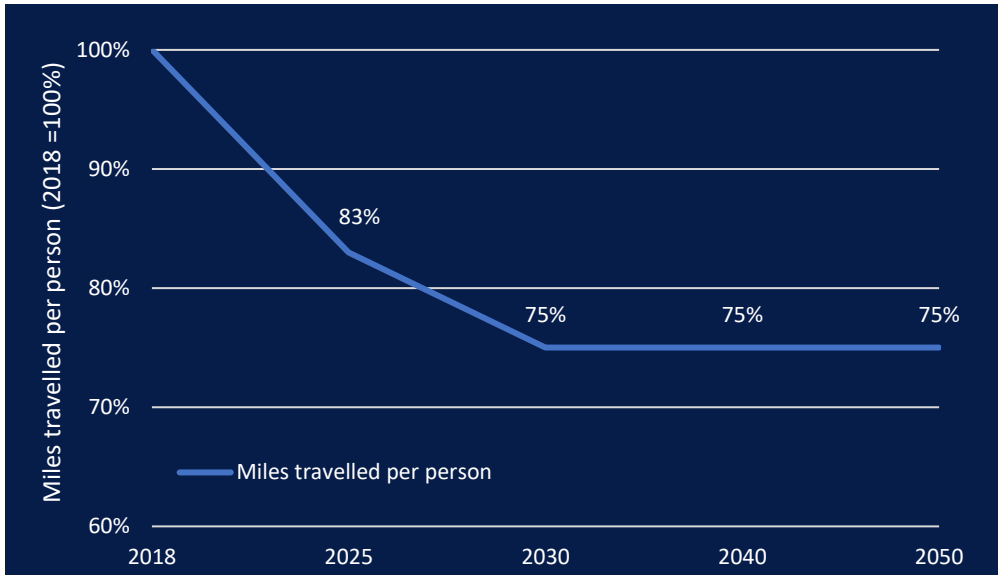


Figure 6.2.4.: Modelled shortening of the average number of miles travelled per passenger across all modes within Slough.

Current Context 2020	By 2040
The average distance travelled to work has increased in all regions of England and Wales. In 2011, the average distance travelled to work in Slough was 7.6mi.[3] In 2019, there were 537.6 million total vehicle miles within Slough.[4]	25% reduction in the average number of passenger miles travelled per person

Table 6.2.3: Current context and the 2040 intervention milestones for travelling shorter distances.

[1] DfT Statistics on transport during the COVID-19 pandemic.
[2] Slough's Third Local Transport Plan
[3] Distance travelled to work, 2011 Census.
[4] DfT Statistics on road traffic in vehicle miles.

6.2 TRANSPORT
INTERVENTION MILESTONES

2. Driving Less

As well as reducing the average distance travelled per passenger, SCATTER also considers changes to the *mode* of travel i.e. the means by which the journey was completed. SCATTER breaks these modes of transport into private vehicle (i.e. cars), public (which includes buses and trains) and active (i.e. walking and cycling). The 2019 modal split in figure 6.2.5 is taken from the Department for Transport (DfT) National Travel Survey data. According to 2011 census data, 70% of residents in Slough utilise road travel to get to work, 17% use public transport, 10% walk to work and 3% travel by bicycle.[1]

The Council's Third Local Transport Plan, the Health and Wellbeing Strategy and the Slough 2040 Vision all highlight the need for greater active and public travel, with Slough's public transport system highlighted as the top commonly discussed theme by partners during the Slough 2040 Vision consultation. The 2040 Vision highlights that the Slough of the future will be an internationally connected town with a world-class public transport system which meets the needs of residents by being well-connected, reliable and affordable.

Promoting and facilitating active travel is also prioritised throughout the council's strategies, with the Slough 2040 Vision highlighting that cycling and walking infrastructure will be improved, with safe cycling and walking routes embedded across the borough.

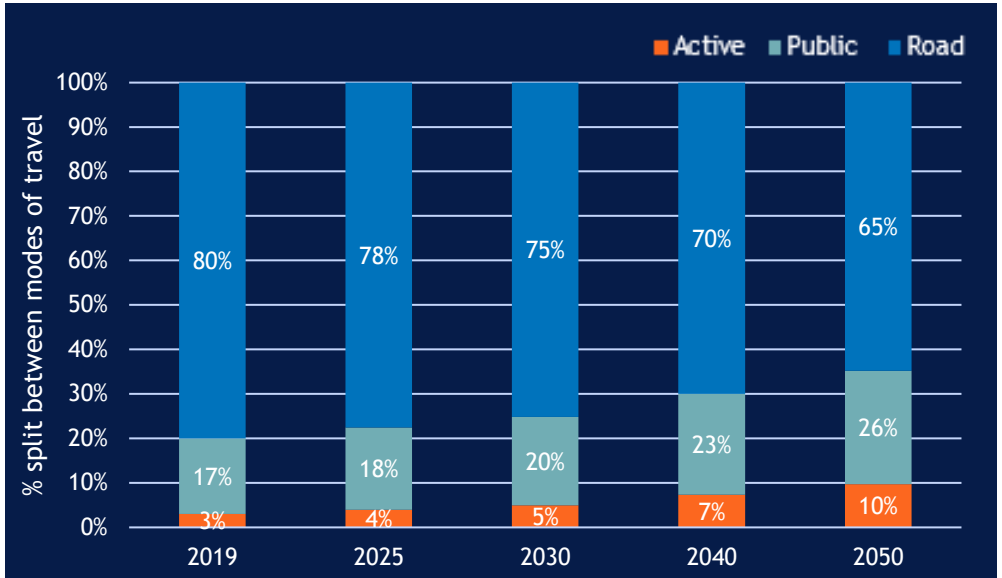


Figure 6.2.5.: Modelled changes in mileage share for different modes of transport along the High Ambition Pathway. The data for 2019 is the national average modal share (Source: Modal comparisons, DfT)

Current Context 2020	By 2040
In 2011, 70% of commutes to work were by car or van and 13% by active travel (walking and cycling).[1] In 2019. there were 4.2 million miles of passenger journeys on local bus services in Slough.[2]	• 13% reduction in road transport use • 34% increase in rail transport • 133% increase in active travel

Table 6.2.4: Current context and the 2040 intervention milestones for driving less.

[1] Method of travel to work, Census 2011.
[2] Passenger Journeys on local bus services by Local Authority.

6.2 TRANSPORT
INTERVENTION MILESTONES

3. Switching to electric vehicles

One of the most important steps to reducing transport emissions in Slough is the transition to electric vehicles. As with other interventions around electrification, the success of a borough-wide switch to EV relies heavily on grid decarbonisation and renewable electricity supply. Data from the DfT and DVLA indicates that in 2020 there were 18,294 licensed ULEV vehicles across the borough, of which just 360 were privately owned and 17,934 were company owned. Slough is home to two major vehicle lease company HQs and nearly two-thirds of cars licensed to Slough are in company ownership, therefore borough-wide statistics should be interpreted with caution.

The Council's Low Emission Strategy (2018 – 2025) will support the new Transport Strategy in targeting reductions in vehicle emissions through accelerating the uptake of cleaner vehicles and technologies. Key strategies measures include looking at the feasible implementation of Clean Air Zones (CAZ) and the promotion of ULEV vehicles.

Current Context 2020	By 2040
In 2020, there were 360 privately owned ULEVs registered in Slough.[1]	• 100% of private vehicles are EV or HEV • 100% of buses and trains are electric

Table 6.2.5: Current context and the 2040 intervention milestones for switching to EVs. EV registrations figure includes both privately owned vehicles, and those registered under large vehicle leasing companies.

Transport glossary
ICE – Internal combustion engine (petrol and diesel vehicles)
HEV – Hybrid electric vehicle
ULEV - Ultra-low emission vehicle (currently defined as a vehicle which emits <75 gCO_2/km travelled).

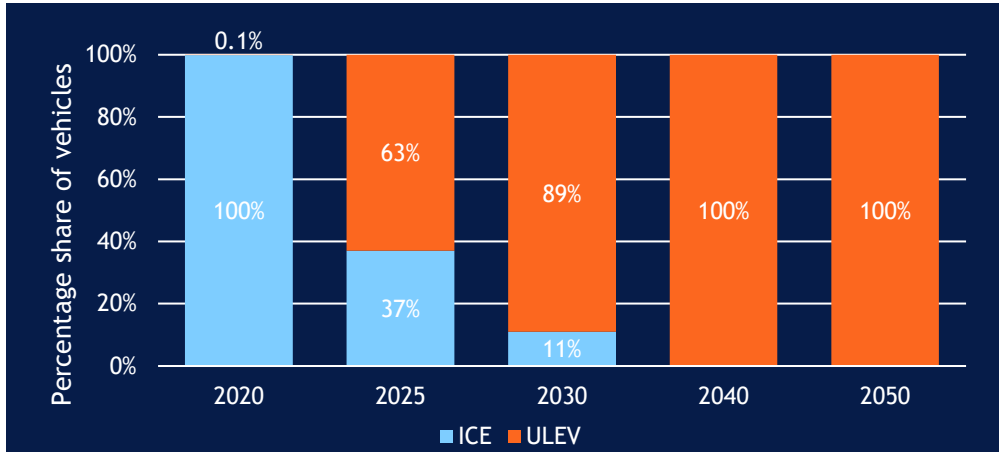


Figure 6.2.6: Transitioning away from fossil-fuel powered internal combustion engines (ICE) private vehicles to ULEV.

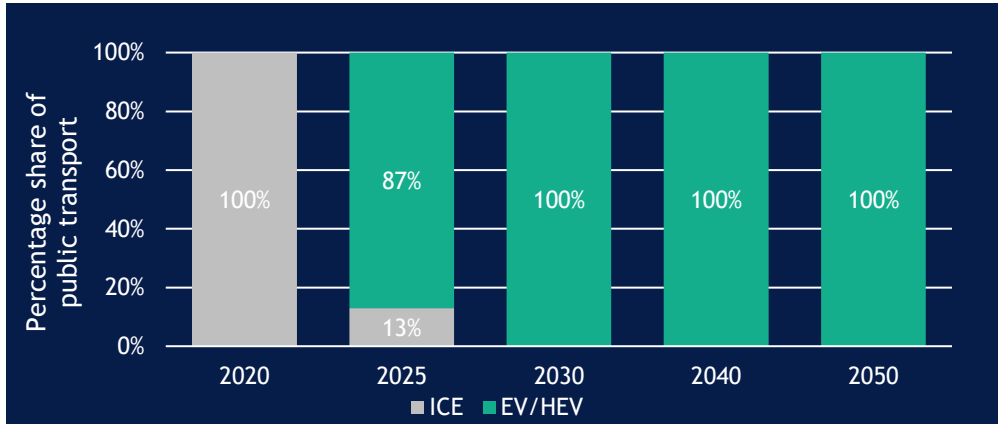


Figure 6.2.7: Transitioning away from fossil-fuel powered buses to electric vehicle (EV) or hybrid electric vehicle (HEV). By 2025, all diesel rail networks are electrified.

[1] Number of ULEVs licensed by Local Authority.

6.2 TRANSPORT
INTERVENTION MILESTONES

4. Improving freight emissions

Freight emissions are difficult to tackle, posing challenges both in terms of operational technology and emissions accounting. SCATTER operates on three metrics which reduce freight emissions:

1. Improved journey efficiency: reducing the mileage travelled by HGVs through more efficient infrastructure and fewer "empty-trailer" journeys.
2. Improved efficiency of freight vehicles themselves i.e., reduction in energy used per mile travelled as more fuel-efficient (and eventually electric) vehicles are used.
3. A modal shift from road freight to waterborne transport (scope 3 emissions).

Current Context 2020	By 2040
In 2019, there were 96 million miles of freight emissions in Slough from Light Commercial Vehicles and Heavy Goods Vehicles.[1]	• 15% reduction in road freight mileage • 73% increase in efficiency per mile travelled

Table 6.2.6: Current context and the 2040 intervention milestones for improving freight and aviation emissions.

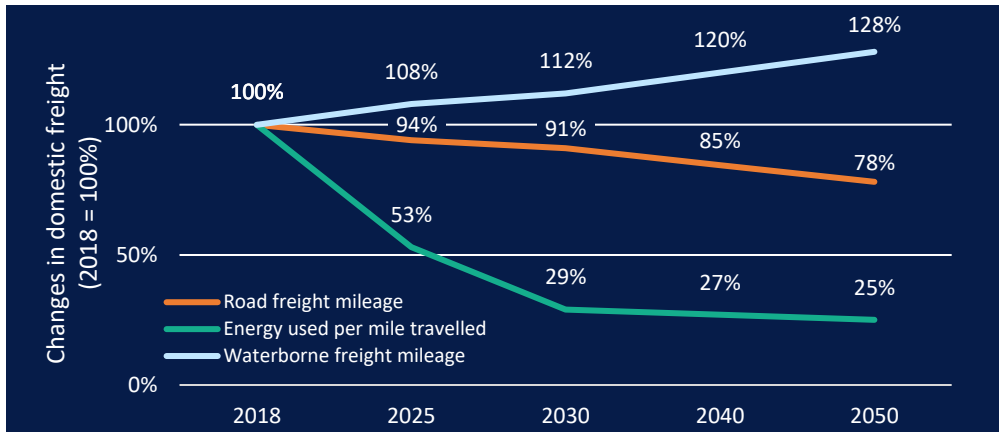


Figure 6.2.8: Improving freight emissions across three areas of activity. Percentage changes are relative to a 2018 baseline at 100%.

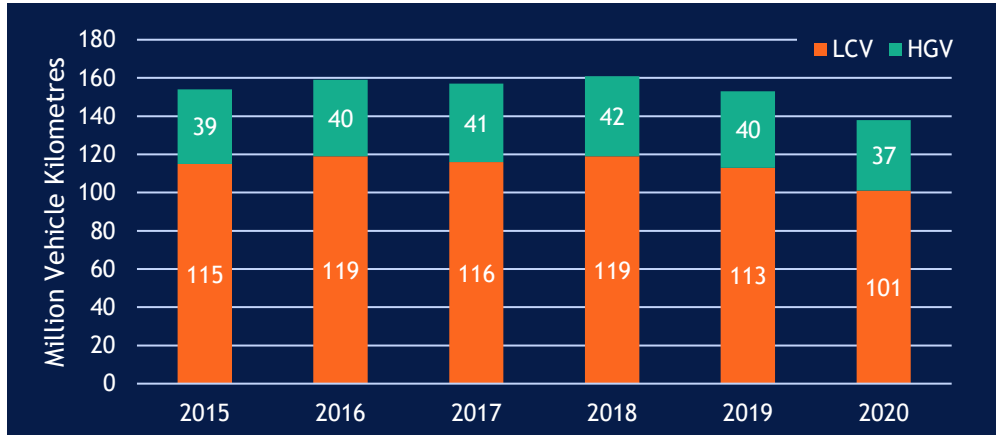


Figure 6.2.9: Historic Light Commercial Vehicle (LCV) and Heavy Goods Vehicle (HGV) annual traffic across Slough from 2014 - 2019, in million miles. (Source: DfT Traffic).

[1] Department for Transport: Dataset on road traffic by road and vehicle type.

6.2 TRANSPORT
REDUCING AVIATION EMISSIONS

5. Reducing aviation emissions

Emissions from aviation account for 6.5% (76.8 $ktCO_2e$) of Slough's emissions profile. Although no airport exists within Slough's local authority boundary, these emissions are scope 3 cruise impact emissions which are allocated to all local authorities to account for national passenger air travel. Cruise impact emissions are based on the percentage of the population within each local authority, assuming that flying is uniformly distributed across the whole of the UK population. Cruise tonnes of fuel consumed are calculated from the total impact of UK aviation using the BEIS emission factors.

To model aviation emissions scenarios, SCATTER pathways uses the Department for Transport's UK Aviation Forecasts which are detailed in Table 6.2.7. Figure 6.2.10 models the impact of these different aviation forecasts on Slough's emission pathway.

Whilst Slough Borough Council may not have direct control over these emissions, the council has a role in both engaging with the public and key businesses in the borough to reduce emissions from aviation, as well as lobbying national government to invest in and develop green aircraft technologies and sustainable aviation fuels. Given the proximity of Heathrow Airport, Heathrow's plans for expansion and the number of Slough's residents who work at Heathrow, the council can continue to work closely with Heathrow Airport to support the Heathrow 2.0 Sustainability Strategy.

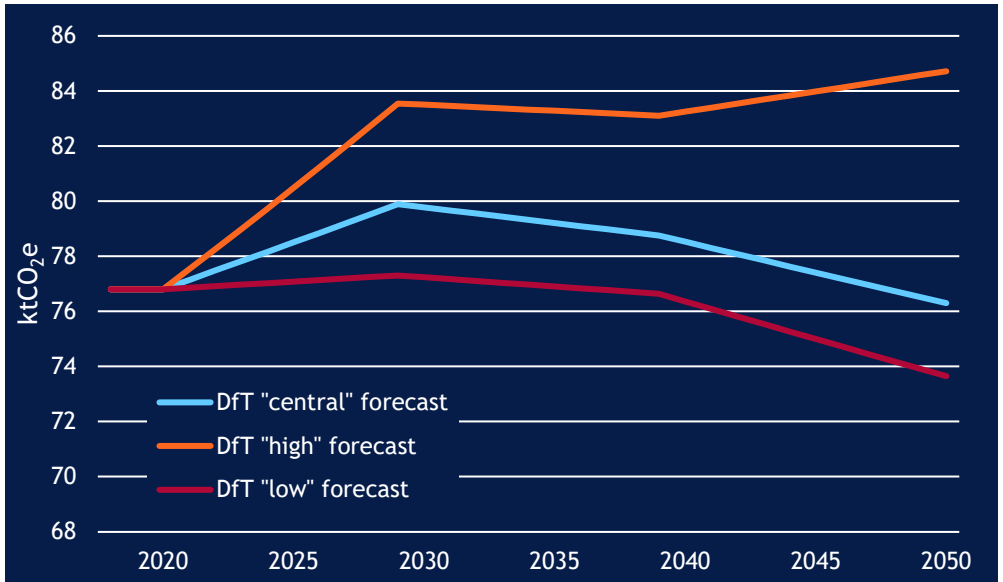


Figure 6.2.10: Modelled changes in Slough's High Ambition SCATTER pathway emissions under the DfT's low, central and high aviation emissions forecasts.

DfT forecast	Scenario explanation
DfT "high" forecast	The "high" scenario projects higher passenger demand from all world regions, lower operating costs and a global emissions trading scheme.
DfT "central" forecast	The "central" forecast represents the DfT base-case.
DfT "low" forecast	The "low" forecast encapsulates lower economic growth worldwide with restricted trade, coupled with higher oil prices and failure to agree a global carbon emissions trading scheme.

Table 6.2.7: DfT's growth forecasts for international aviation (Source: DfT UK Aviation Forecasts 2017)

6.2 TRANSPORT
KEY STAKEHOLDER VIEWS

As part of the Climate Change Strategy & Action Plan development, a series of seven workshops were held online to gain stakeholder views on the actions proposed, key barriers and enablers to their implementation and further implementation considerations. A summary of the key stakeholder views relating to transport are detailed below.

Intervention	Barriers	Enablers	Implementation Considerations
1. TRAVELLING SHORTER DISTANCES	*"There are some geographical issues with the west and east split within the borough"*	*"Slough is already a small borough, and many journeys are already relatively short in distance"*	*"There is a need to consider long-term agile working outside of the COVID-19 pandemic recovery"*
2. DRIVING LESS	*"Public transport is often slower, unreliable and more expensive than car journeys, making it difficult for public transport to compete with car travel"*	*"Schools across the borough have acquired public transport 'tokens' which has massively increased public transport uptake amongst students. Tokens offer discounted public transport for students"*	*"We must reduce the price of public transport to make it more affordable for individuals"*
3. SWITCHING TO ELECTRIC VEHICLES	*"Electric vehicles have a high upfront cost and there is a lack of widespread charging infrastructure"*	*"Rail infrastructure within the last 5 years is no longer diesel and has now turned to electric providing an example of how quickly electrification change can occur"*	*"Partnering with EV providers can boost EV infrastructure development and increase the use of EVs locally"*
4. IMPROVING FREIGHT EMISSIONS	*"Slough's economy is dependent upon freight, so it will be difficult to shift away from this industry or significantly reduce emissions from freight"*	*"In the redevelopment of the town centre, distribution hubs are being looked at to reduce last mile delivery emissions"*	*"Heathrow is one of the biggest ports for freight and it is essential to link rail freight to the airport to help reduce freight delivery miles"*
5. REDUCING AVIATION EMISSIONS	*"Slough Borough Council are supportive of the Heathrow expansion, which is likely to increase aviation activity"*	*"Slough's proximity to Heathrow and the high population of residents who work at Heathrow"*	*"Promote staycations and make surrounding area accommodating by promoting local tourism in partnership with neighbouring Berkshire councils"*

6.2 TRANSPORT
1) TRAVELLING SHORTER DISTANCES

Goal: Neighbourhoods and community areas designed and modified to reduce distance to essential services

Responsibility	Action	SBC's role	Key Stakeholders	Action Impact	Timescale	Complexity
SBC	Implement planning policy and support developers to build developments that reduce the need for travel, making sure people can access amenities without a car e.g. walkable, or "15 minute" neighbourhoods	Policy & Strategy	Lead: Council's Transport Planning Team, Council's Planning Policy Team, Other: Developers	Strategic	Long	High
Borough	Strategically locate core services (such as shops, hospitals and schools) to reduce length of journeys	Policy & Strategy	Lead: Council's Transport Planning Team, Other: Developers	Strategic	Long	High

Goal: Consolidation of journeys is encouraged

Responsibility	Action	SBC's role	Key Stakeholders	Action Impact	Timescale	Complexity
SBC	Equip any drivers of council vehicles with the necessary knowledge to more appropriately plan journeys in order to minimise disruption and maximise carbon savings	Implementation	Lead: Council's Fleet Operations Team	Direct	Short	Low

6.2 TRANSPORT
1) TRAVELLING SHORTER DISTANCES

Goal: Consolidation of journeys is encouraged (Cont…)

Responsibility	Action	SBC's role	Key Stakeholders	Action Impact	Timescale	Complexity
Borough	Set up a car sharing scheme in the borough to reduce number of journeys. The council could have their own group for employees	Implementation	Lead: Council's Environment Management Team , Other: Residents & Community Groups	Direct	Short	Medium
Borough	Support and require large fleets operating in the borough, such as waste services, to practice journey optimization	Communication & Engagement	Lead: Council's Fleet Operations Team, Other: Organisations with large fleets	Indirect	Medium	Low
Borough	Engage with schools to identify opportunities for new or extended school bus routes, reducing the need for children to travel to school by car	Communication & Engagement	Lead: Council's Transport Planning Team, Other: School bus operators	Strategic	Medium	Medium
Borough	Engage with school bus route operators to carry out route optimisation and minimise multi-stop journeys	Communication & Engagement	Lead: Council's Transport Planning Team, Other: School bus operators	Direct	Medium	Medium

Goal: Employees are supported in working from home

Responsibility	Action	SBC's role	Key Stakeholders	Action Impact	Timescale	Complexity
SBC	Develop a Digital Infrastructure Strategy to encourage and facilitate the deployment of telecommunications networks across the Borough	Policy & Strategy	Lead: Council's Strategy and innovation Team, Council's HR Team, Other: Council's Business Support Team	Strategic	Short	Low
SBC	Continue to support long-term agile working for council employees	Implementation	Lead: Council's HR Team, Other: Council's IT Operations Team	Indirect	Long	Low

6.2 TRANSPORT
1) TRAVELLING SHORTER DISTANCES

Goal: Employees are supported in working from home (Cont…)

Responsibility	Action	SBC's role	Key Stakeholders	Action Impact	Timescale	Complexity
Borough	Use the Digital Infrastructure Strategy to facilitate the provision of widespread Wi-Fi and high-speed internet to less-well connected areas across the borough to facilitate agile/teleworking	Implementation	Lead: Council's Strategy and innovation Team, Other: Council's Business Support Team	Indirect	Medium	High
Borough	Provide guidance and support to businesses/large employers to maintain recent behaviour change on working from home and reduced business travel	Communication & Engagement	Lead: Council's Business Support Team, Other: Businesses	Indirect	Short	Low
Borough	Provide support to businesses to help them access funding to adopt technology enabling hybrid remote and office working patterns	Communication & Engagement	Lead: Council's Business Support Team, Other: Slough Business Community Partnership	Indirect	Short	Low
Borough	Collaborate with nearby Councils where a significant number of Slough's residents work to support businesses overcome barriers to increased remote working	Communication & Engagement	Lead: Council's Business Support Team, Other: Neighbouring Local Authorities	Indirect	Medium	High

6.2 TRANSPORT
2) DRIVING LESS

Goal: Infrastructure and policy are designed to facilitate active travel

Responsibility	Action	SBC's role	Key Stakeholders	Action Impact	Timescale	Complexity
SBC	Further encourage active commuting for all council staff	Communication & Engagement	Lead: Council's HR Team, Other: All council staff	Direct	Short	Low
SBC	Deliver the Slough Local Cycling and Walking Infrastructure Plan to identify a long-term Cycling Network Plan and key Core Walking Zones (CWZs), considering street space allocation in favour of active travel	Implementation	Lead: Council's Transport Planning Team, Other: Residents	Strategic	Long	High
SBC	Include requirements in building and planning policy which further incentivise active travel, such as the provision of secure storage and drying rooms	Policy & Strategy	Lead: Council's Planning Policy Team, Other: Developers	Strategic	Medium	High

6.2 TRANSPORT
2) DRIVING LESS

Goal: Infrastructure and policy are designed to facilitate active travel (Cont..)

Responsibility	Action	SBC's role	Key Stakeholders	Action Impact	Timescale	Complexity
Borough	Continuous delivery of a behaviour change program on cycling and walking to encourage non-car modes the best choice for short journeys	Communication & Engagement	Lead: Council's Transport Planning Team, Residents	Strategic	Long	Medium
Borough	Further encourage cycling through accelerating the development of strategic high-quality walking and cycling routes across the Borough	Implementation	Lead: Council's Transport Planning Team, Other: Council's Environment Management Team	Strategic	Short	High
Borough	Set a commitment to increase the amount of active travel infrastructure in the borough	Policy & Strategy	Lead: Council's Transport Planning Team, Other: Council's Environment Management Team	Strategic	Immediate	Low
Borough	Work with all schools and academies in the borough to set up walking buses and provide cycle workshops	Communication & Engagement	Lead: Council's School Services Team, Other: Schools & Academies	Indirect	Short	Low
Borough	Identify sites of high levels of cycling/walking and introduce Low and Slow Traffic Neighbourhoods (LTNs & STNs), time restricted street closures or speed limits at these sites	Research & Design	Lead: Council's Transport Planning Team, Other: Council's Environment Management Team	Strategic	Short	High
Borough	Identify key areas of inequality and poverty within the borough and prioritise engaging with these communities on active travel	Communication & Engagement	Lead: Council's People (Adults) Team, Other: Council's Environment Management Team	Direct	Short	Medium

6.2 TRANSPORT
2) DRIVING LESS

Goal: Accessibility of public transport is improved

Responsibility	Action	SBC's role	Key Stakeholders	Action Impact	Timescale	Complexity
Borough	Build regular bus stops for easy access, set a maximum distance between stops and improve signage to encourage uptake. Consider also the interconnectivity between transport options- for example, ensure busses serve railway stations in line with the railway timetable.	Implementation	Lead: Council's Transport Planning Team, Other: Council's Highway Maintenance Team	Indirect	Long	Medium
Borough	Ensure that public transport infrastructure is provided in new developments	Implementation	Lead: Council's Transport Planning Team, Other: Developers	Indirect	Long	Medium
Borough	Assess the viability of a continental-style bus rail interchange using the Stoke Road bridge as a bus stop and stairs/elevators leading straight onto rail platforms to shorten interchange distances	Research & Design	Lead: Council's Transport Planning Team, Other: Council's Highway Maintenance Team	Indirect	Long	High
Borough	Collaborate with Berkshire Strategic Transport Forum to improve the connection of less well-connected areas of the borough to the public transport network	Communication & Engagement	Lead: Council's Transport Planning Team, Other: Berkshire Strategic Transport Forum	Strategic	Short	Medium
Borough	Assess the viability and feasibility of Rapid Transit routes across the Borough in line with the emerging Local Plan, such as a tram line from Langley to Maidenhead	Research & Design	Lead: Council's Transport Planning Team, Other: Berkshire Strategic Transport Forum	Strategic	Long	High

6.2 TRANSPORT
2) DRIVING LESS

Goal: Reduce private vehicle use and influence behavioural patterns

Responsibility	Action	SBC's role	Key Stakeholders	Action Impact	Timescale	Complexity
SBC	Conduct regular surveys of Council staff commuting and business travel to target actions and develop guidance on sustainable travel	Research & Design	Lead: Council's HR Team, Other: All staff	Indirect	Long	Low
SBC	Set targets to improve air quality across the borough and report progress in line with current air quality metrics	Policy & Strategy	Lead: Council's Environment Management Team, Other: N/A	Indirect	Long	Low
Borough	Assess viability of imposing a surcharge/congestion charge for the worst-performing/most polluting vehicles whilst avoiding penalising lower-income households. Explore the option of free or subsidised bus travel passes for residents to ease this transition.	Research & Design	Lead: Council's Transport Planning Team, Other: Council's People (Adults) Team	Strategic	Short	High
Borough	Enforce restrictions on idling whilst running an anti-idling campaign, introduce parking zones and road closures near schools during peak hours	Implementation	Lead: Council's Transport Planning Team, Other: Schools	Indirect	Short	High
Borough	Actively campaign to limit short trips to discourage driving for commute or school run	Communication & Engagement	Lead: Council's Environment Management Team , Other: Residents and Schools	Indirect	Short	High
Borough	Enforce more mandatory red routes within the borough to reduce congestion, especially around schools	Implementation	Lead: Council's Transport Planning Team, Other: Residents and Schools	Direct	Medium	Medium
Borough	Implement lower speed limits across residential areas to encourage active travel and discourage private vehicle use	Implementation	Lead: Council's Transport Planning Team, Other: Residents	Indirect	Short	Low

6.2 TRANSPORT
3) SWITCHING TO ELECTRIC VEHICLES

Goal: Increase EV uptake

Responsibility	Action	SBC's role	Key Stakeholders	Action Impact	Timescale	Complexity
SBC	Continue to decarbonise SBC owned fleet and reduce emissions from 'grey fleet' through the Fleet Challenge Programme	Implementation	Lead: Council's Fleet Operation Team, Other: Council's Environment Management Team	Strategic	Medium	Medium
SBC	Implement a strategic plan to introduce low emissions vehicles into Slough Borough Council's transport fleet, in line with the ambitions outlined in the Low Emissions Strategy	Policy & Strategy	Lead: Council's Fleet Team, Other: Council's Highways and Waste Services Teams	Strategic	Medium	High
SBC	Continue to identify CAZ areas, standards and enforcement mechanisms in line with the National CAZ Framework as detailed in the Council's Low Emissions Strategy	Research & Design	Lead: Council's Environment Management Team, Other: Council's Transport Planning Team	Strategic	Short	Medium
Borough	Roll out emissions-based parking permits and ULEV zones in Slough Town Centre, and publicise this strategy to encourage uptake of EVs among residents	Implementation	Lead: Council's Transport Planning Team, Other: Council's Highway Maintenance Team	Strategic	Medium	High
Borough	Organise EV leasing opportunities and funding schemes to enable all communities access to EVs, especially lower-income communities across the borough	Research & Design	Lead: New team lead required , Other: Community Groups	Indirect	Short	High

6.2 TRANSPORT
3) SWITCHING TO ELECTRIC VEHICLES

Goal: Increase EV uptake (Cont..)

Responsibility	Action	SBC's role	Key Stakeholders	Action Impact	Timescale	Complexity
Borough	Continue to incentivise and support taxi drivers in switching to EVs through interest-free loans or other mechanisms, building on the work achieved with the Defra Air Quality Grant Fund and within the Council's Low Emissions Strategy	Communication & Engagement	Lead: Council's Transport Planning Team, Other: Taxi companies	Indirect	Medium	Medium
Borough	Encourage and incentivise public services within the borough to use pool EVs rather than private vehicles	Communication & Engagement	Lead: Council's Environment Management Team , Other: Public Services	Direct	Long	Medium
Borough	Encourage and support the use of electric buses to schools in the borough through financial mechanisms such as funding and opportunities to trial EVs	Implementation	Lead: Council's School Services Team, Other: Schools	Direct	Medium	Medium
Borough	Work in partnership with Berkshire Strategic Transport Forum and local bus operators to accelerate the switch to electric buses in Slough and prioritise key routes e.g. route to Heathrow	Communication & Engagement	Lead: Council's Transport Planning Team, Other: Berkshire Strategic Transport Forum	Direct	Medium	High
Borough	Continue to work closely with Neuron Mobility and other providers to facilitate the roll-out of e-scooters across the borough	Communication & Engagement	Lead: Council's Transport Planning Team, Other: Neuron Mobility and other partners	Direct	Immediate	Low

6.2 TRANSPORT
3) SWITCHING TO ELECTRIC VEHICLES

Goal: Improve EV infrastructure

Responsibility	Action	SBC's role	Key Stakeholders	Action Impact	Timescale	Complexity
SBC	Review opportunities for the installation of EV charging points on council premises	Research & Design	Lead: Council's Fleet Operations Team, Other: Council's Transport Planning Team	Indirect	Short	Medium
SBC	Lobby national government for improved support for electric vehicle infrastructure, including electrification of the rail network	Policy & Strategy	Lead: Council's Transport Planning Team, Other: Council's Fleet Operations Team	Indirect	Short	Low
SBC	Implement planning policy to ensure that developers put in EV charging points; EV-ready parking areas (for future expansion) and controls for preferential EV parking	Policy & Strategy	Lead: Planning Policy, Other: Developers	Strategic	Long	High
Borough	Identify sites for EV infrastructure through consultation and a strategic assessment, such as car parks and taxi ranks	Research & Design	Lead: Council's Transport Planning Team, Other: Community Groups	Strategic	Short	Medium
Borough	Install EV infrastructure in identified strategic sites across the borough	Implementation	Lead: Council's Transport Planning Team, Other: Council's Highway Maintenance Team	Indirect	Medium	Medium

6.2 TRANSPORT
4) IMPROVING FREIGHT EMISSIONS

Goal: Consolidate and reduce impact of freight journeys

Responsibility	Action	SBC's role	Key Stakeholders	Action Impact	Timescale	Complexity
SBC	Strengthen procurement policies for Council suppliers who provide services using freight vehicles	Policy & Strategy	Lead: Council's Procurement Team, Other: Council's Fleet Operations Team	Indirect	Short	Low
Borough	Assess the feasibility of local distribution hubs for home deliveries in Slough town centre which utilise low-carbon "Last Mile" deliveries	Research & Design	Lead: Council's Transport Planning Team, Other: Berkshire Strategic Transport Forum	Strategic	Short	Medium
Borough	Create forums & groups for businesses to explore consolidating journeys e.g. restaurants based near each other could utilise the same supplier	Communication & Engagement	Lead: Council's Business Support Team, Other: Businesses	Indirect	Short	Low
Borough	Encourage and support council suppliers and other businesses to utilise rail freight opportunities as opposed to HGVs	Communication & Engagement	Lead: Council's Transport Planning Team, Other: Businesses	Direct	Long	High
Borough	Develop an e-cargo bike scheme for local deliveries	Implementation	Lead: Council's Transport Planning Team, Other: Council's Environment Management Team	Direct	Medium	Medium

6.2 TRANSPORT
4) IMPROVING FREIGHT EMISSIONS

Goal: Use local suppliers to reduce miles travelled

Responsibility	Action	SBC's role	Key Stakeholders	Action Impact	Timescale	Complexity
SBC	Council should opt where possible for local suppliers i.e. using local produce if providing food	Implementation	Lead: Council's Building Management Team, Other: N/A	Indirect	Short	Medium
Borough	Encourage residents to consider "miles travelled" in their purchasing decisions and buy locally where possible	Communication & Engagement	Lead: Council's Environment Management Team , Other: Residents	Indirect	Short	Low
Borough	Encourage businesses across the borough to use procurement policies to favour local suppliers i.e. using local produce if providing food	Communication & Engagement	Lead: Council's Business Support Team, Other: Businesses	Indirect	Medium	Medium

6.2 TRANSPORT
5) REDUCING AVIATION EMISSIONS

Goal: Reduce unnecessary flights

Responsibility	Action	SBC's role	Key Stakeholders	Action Impact	Timescale	Complexity
Borough	Undertake more refined baselining to understand which groups contribute most significantly to aviation emission and target actions to reduce flight use (Scope 3 action)	Research & Design	Lead: Council's Environment Management Team , Other: N/A	Strategic	Short	Low
Borough	Promote reduction of flights (targeted more at frequent fliers) and promote alternative means of transport (rail) (Scope 3 action)	Communication & Engagement	Lead: Council's Environment Management Team , Other: N/A	Indirect	Medium	High
Borough	Work with Berkshire Strategic Transport Forum and local businesses to share examples of reducing reliance on business air travel and innovations in alternatives (Scope 3 action)	Communication & Engagement	Lead: Council's Environment Management Team, Other: Berkshire Strategic Transport Forum	Indirect	Medium	High

Goal: Improve efficiency of flights

Responsibility	Action	SBC's role	Key Stakeholders	Action Impact	Timescale	Complexity
Borough	When other technologies become more widely available, lobby for electric or hydrogen to be a standard for the aviation and shipping sectors (Scope 3 action)	Communication & Engagement	Lead: Council's Environment Management Team, Other: All	Strategic	Long	High
Borough	Encourage Heathrow Airport to push for reduced aviation emissions, building on the airport's plan for Sustainable Growth, Heathrow 2.0 (Scope 3 action)	Communication & Engagement	Lead: Council's Environment Management Team, Other: Heathrow Airport	Strategic	Long	High

6.2 TRANSPORT
CO-BENEFITS OF ACTIONS

It can be helpful to consider the added co-benefits of given measures when planning climate action. The decarbonisation of transport in Slough will offer co-benefits across economic, social and environmental spheres:

ECONOMIC

- Improved public transport links can save households money as they do not need to own a car
- Electric vehicles are cheaper to run, costing £2-4 to charge for 100 miles whereas diesel cars cost around £13-£16 for 100 miles - pure EVs are also usually cheaper to service and maintain
- Increasing active travel could save the NHS £17 bn within 20 years by reducing the prevalence of conditions such as type 2 diabetes, dementia, heart disease and cancer
- Good transport accessibility can reduce the densification of an area, creating potential for the promotion of economic activity as well as improving local service provision

SOCIAL

- Increased physical activity due to active travel will help to reduce obesity figures. It is estimated that 24.9% of 10-11-year-olds in Slough are classed as overweight or obese, compared to the UK average of 21%
- Improving air quality helps to reduce health inequalities as air pollution levels have been found to have a strong association with deprivation levels
- A reduction in NO_2 and other pollutants from vehicle exhaust fumes leads to a reduction in air pollution and associated health benefits. Poor air quality is linked to ~40,000 deaths a year in the UK

ENVIRONMENTAL

- Reducing air pollution can positively affect natural habitats, ecosystems and processes, and plants and animals. Serious environmental impacts of air pollution occur as a result of nitrogen deposition, acid deposition and direct toxic effects of pollutants in the air

6.2 TRANSPORT
NATIONAL CASE STUDIES

TRAVELLING SHORTER DISTANCES

Poundbury in Dorset is a development designed to reduce the need for cars. The key to its success involves a layout which connects streets coupled with offices, small shops, cafes and pubs integrated with homes in a walkable neighbourhood.

DRIVING LESS

Oxford City Council achieved a 17% reduction in fuel use in their fleet vehicles by investing in Smarter Driving Courses for their staff, with a payback period for the project at just one month. This saved the council approximate £69,000 and 150 tCO_2 annually.

Waltham Forest Council launched their 'miniHolland' project after winning TfL funding in 2014. Project outcomes included introducing modal filters closing 43 roads to cars, 91 blended crossings and an additional 24km of stepped cycle track.

Birmingham & Solihull's Low Carbon Mobility project aims to utilise technology to reduce carbon emissions from short journeys. Examples include, adopting a low carbon delivery service in collaboration with local businesses for delivering shopping and food.

SWITCHING TO ELECTRIC VEHICLES

Royal Mail have carried out a trial of large electric delivery vehicles (up to 7.5 tonnes) which will deliver mail from central London to sites around the south-east of England. They have also purchased 100 electric vans.

British Gas has committed to fully electrifying its commercial fleet by 2025. Recently, British Gas ordered 2,000 new all-electric Vivaro e-vans. This represents the largest EV order for a commercial fleet in the UK and adds to the 1,000 other e-vans purchased in the summer of 2020.

IMPROVING FREIGHT EMISSIONS

Cheshire East Council worked with Storengy under a £1m funding scheme to trial two hydrogen-fuelled bin wagons. The hydrogen shall be produced in the least carbon-intensive way. The scheme is funded with both public and private sector money.

ClimatePerks partners with climate-conscious employers to offer at least two paid "journey days" per year to staff who travel on holiday by train, coach or boat instead of flying.

6.2 TRANSPORT
LOCAL CASE STUDIES

TRAVELLING SHORTER DISTANCES

The Fleet Challenge Programme - This is an ongoing project with the aim of decarbonising SBC's fleet by promoting low emission vehicles, while reducing revenue expenditure from mileage claims. Introduced in 2017, this project is still in the pilot phase. However, the initial feedback is very positive, and the scheme has already avoided 10 tonnes of CO_2 compared to SBC's average grey fleet leading to over £20,000 in savings.

SWITCHING TO ELECTRIC VEHICLES

Slough's brand-new Leisure Centre named 'The Centre' on Farnham Road has 10 electric car charging points available including 1 rapid charging station. It is operated under the BP pulse network.

Slough Borough Council's Management Plan highlighted that in 2018 Slough had the fourth largest number of plug-in vehicles registered in the UK per local authority*. SBC secured £157,000 in Government funding to develop a dedicated rapid charging network to support high growth in plug-in taxis and PHEVs.

DRIVING LESS

SMaRT (Slough Mass Rapid Transit) - A scheme designed to promote increased uptake of Public Transport across the borough. Activities included road widening in order to facilitate dedicated bus lanes and encourage the use of sustainable transport by commuters.

Slough Borough Council's Carbon Management Plan discussed how staff travelling to, from and during work adds a significant amount of carbon to the Council's overall operations. Staff travel surveys were used to help identify which schemes will help staff to travel more sustainably.

IMPROVING FREIGHT EMISSIONS

Cooperative Supermarket - Launched a small scale cargo bike project for delivery of products ordered via its website. The trial was initially in London but is intended to be rolled out across the UK.

* This includes both private vehicles and company leased vehicles, which make up are nearly two-thirds of the cars licensed in Slough

6.3 Waste


Trade Recycling Service
Yes please
mixed paper & card
mixed glass
plastic bottles
food tins & drink cans
Recycling must be clean, dry and loose - not in carrier bags or bin liners
No food, clothes or textiles, any other plastics or refuse
Enquiries: 01753 475111
www.slough.gov.uk/recycling
Slough
Slough
Borough Council

6.3 WASTE
SECTOR OVERVIEW

Scope of Section

Waste management represents a much smaller proportion of Slough's emissions than the sectors previously discussed, representing just 0.7% of total emissions. Waste forms one of the five key objectives in the council's motion on climate change, committing the borough to "reducing consumption of resources, increasing recycling and reducing waste", and therefore actions relating to this sector are considered of high strategic importance. The waste measures described here relates to all waste streams; reuse, open and closed-loop recycling, combustion and composting and landfill. We can think of reducing the quantity of waste as a demand-side reduction, linking it to more efficient waste collections and saved costs associated with waste processing.

Key Emissions Sources

The majority of waste emissions in Slough are associated with the treatment and processing of wastewater at 0.7% of total emissions. Wastewater is the polluted form of water generated from human activities and is typically categorised into domestic sewage, industrial sewage and storm sewage. A small proportion of Slough's overall emissions come from solid waste disposal; this figure is particularly small due to the two Energy from Waste (EfW) plants in operation within the borough's boundary. The Department for Environment, Food & Rural Affairs (DEFRA) highlights that of the solid waste accumulated within Slough, less than 1% is landfilled and over 75% is incinerated with EfW.

Green Recovery Considerations

- With the closing of household waste recycling centres, charity shops and the reduction or stoppage of local authority recycling services during lockdown, there has been a reported 300% increase in fly-tipping, with much recyclable waste at risk of ending up in landfill if people did not store recyclable waste at home.

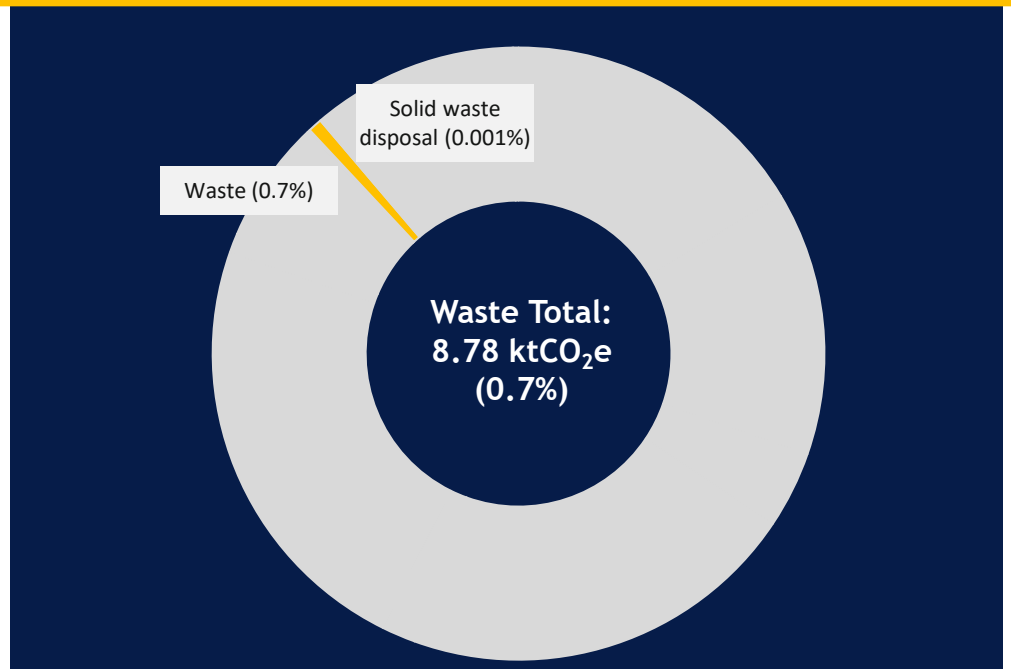


Figure 6.3.1: SCATTER 2018 inventory for the waste sector in Slough.

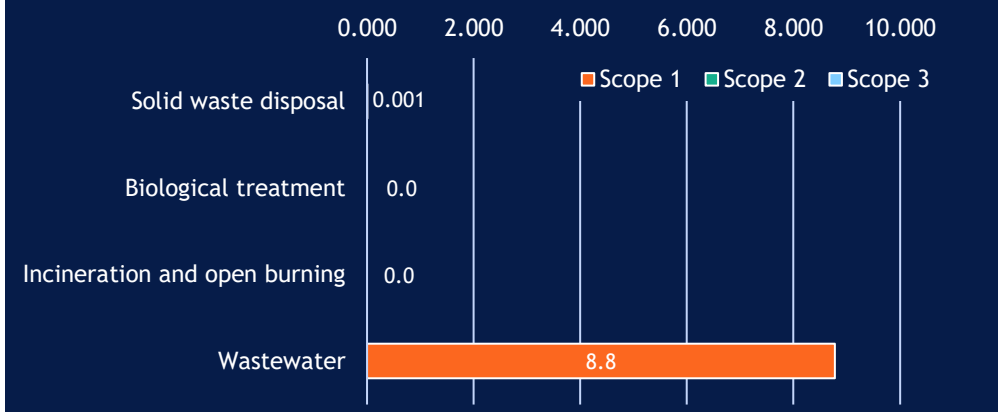


Figure 6.3.2: SCATTER 2018 scope 1, 2 & 3 waste emissions in Slough

6.3 WASTE
KEY PLANS AND POLICIES

National

- Our Waste, Our Resources: A Strategy for England (2018) sets out how the country will preserve resources by minimising waste, promoting resource efficiency and moving to a circular economy.
- Waste and Recycling: Making Recycling Collections Consistent in England (2019) The government are working with local authorities and waste management businesses to implement a more consistent recycling system in England. The measures are expected to come into effect in 2023.
- Waste Prevention Programme for England aims to supporting a resource efficient economy, reducing the quantity and impact of waste produced whilst promoting sustainable economic growth.

Berkshire

- Central and Eastern Berkshire Joint Minerals and Waste Draft Plan which establishes a five-year plan helping to ensure that local areas remain attractive places to live and work whilst optimising the reduction, reuse and recycling of materials from waste accrued from the region.

Slough

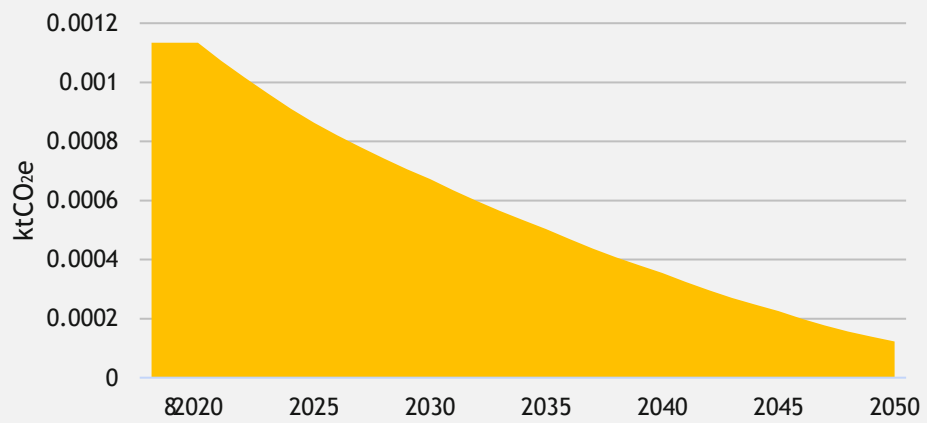
- The Waste Strategy 2015-2030 sets out the borough wide vision to move from waste disposal to waste management, which can also be applied to corporate waste, by improving the Recycling Carbon index rank of the council.
- The Slough Carbon Management Plan 2020-2030 requires the reduction of carbon emissions produced from waste processing, in order to minimise the impact on the local and global environment.
- Slough Borough Councils Five Year Plan (2020-2025) monitors street cleanliness through an A to D grading structure that calculates the percentage of household waste sent for reuse, recycling or composting.

6.3 WASTE
INTERVENTIONS OVERVIEW

The following measures relate to emissions arising from in-boundary solid waste and wastewater disposal. Despite the smaller quantity of emissions associated with solid waste disposal, it is still important to prioritise this intervention to align with the council's key objective on waste. We can think of reducing the quantity of waste as a demand-side reduction, linking it to more efficient waste collections and saved costs associated with wastewater processing and treatment. Increasing the proportion of waste sent for recycling represents the second step in the process for mitigating emissions from waste disposal.

1. **Reducing the quantity of waste and wastewater:** Considers changes in the overall weight of solid waste and density of wastewater flow produced across all streams from domestic, commercial and industrial activity. Reducing the quantity of waste is a priority when examining the waste hierarchy: reduce, reuse, recycle.

2. **Increasing recycling rates:** Considers the different destinations for waste streams, with the aim of less waste going to landfill.



Implementing the SCATTER interventions for waste at the highest ambition leads to:

69 % reduction in emissions from waste by 2040

< 0.0004 $ktCO_2e$ of waste emissions remaining at 2040

Figure 6.3.3 : Slough's SCATTER High Ambition Pathway broken down by sector.

SCATTER Intervention	Staff Costs	Cumulative Emissions Savings (2020 - 2040)	Indicative costings (£m)
1. Reducing the quantity of waste	**1.85 FTE**	Solid waste disposal: **0 $ktCO_2e$**	**-35.3** (gate fees only)
2. Increasing recycling rates	**3 FTE**		

Table 6.3.1: Cumulative carbon emissions savings (2020-2040) for waste. Costs represent marginal cost savings from gate fees based on successful implementation of volume reduction and shift to more recycling along SCATTER's High Ambition pathway in 2040.

6.3 WASTE
INTERVENTION MILESTONE

1. Reducing the quantity of waste

The first step in improving emissions from waste is a reduction in the total volume of waste or wastewater produced. This reduction covers waste from households, commercial and industrial usage, construction and demolition. Despite the lack of direct emissions from solid waste within Slough's emissions profile, it's important to still focus on the reduction of solid waste given the difficulties in directly abating emissions from wastewater and the council's key objective to reduce consumption of resources, increase recycling and reducing waste.[1]

The DEFRA dataset on local authority collected waste identified that in Slough, each household generated an estimated 733kg of waste from April 2019 to March 2020. Across the borough, 24% of this household waste was sent for reuse, recycling or composting.

Local authorities have reported large increases in household waste arisings during the COVID-19 outbreak and huge falls in commercial waste arisings, according to the results of the ADEPT COVID-19 Waste Impacts Survey.

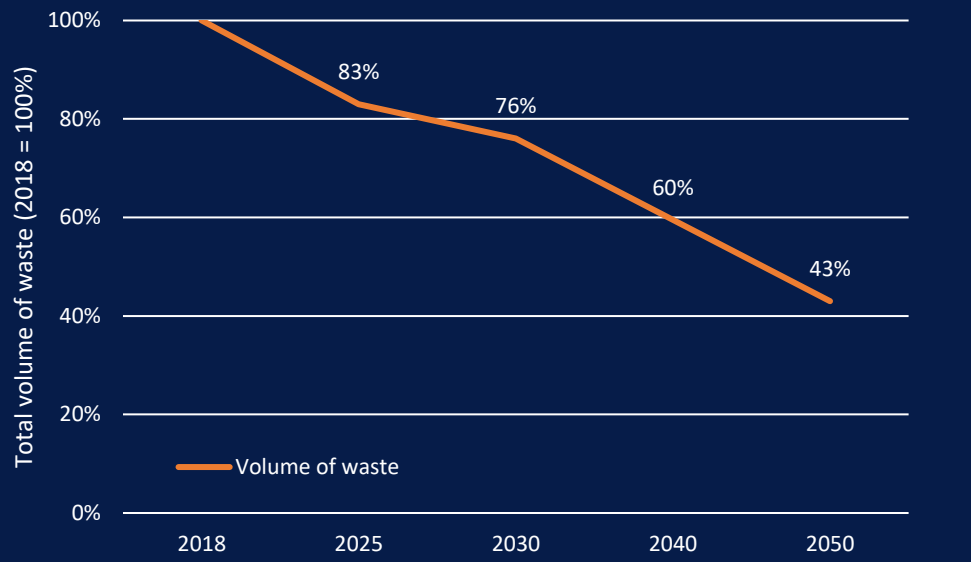


Figure 6.3.4: SCATTER 2018 inventory for the waste sector in Slough.

Current Context 2020	By 2040
In 2020, there were 52,423 tonnes of household waste and 7,091 tonnes of non-household waste collected.[2]	40% reduction in the volume of waste

Table 6.3.2: Current context and the 2040 intervention milestones for reducing the quantity of waste.

[1] The Sixth Carbon Budget, Climate Change Committee
[2] BEIS Local Authority Collected Waste.

6.3 WASTE
INTERVENTION MILESTONE

2. Increasing recycling rates

After reducing the volume of waste outright, the second SCATTER intervention considers changes to the amount of waste that is recycled. SCATTER trajectories incorporate EU targets for recycling rates, with High Ambition projecting a more rapid transition to increased rates of recycling. The growth in recycling rate across Slough needed to follow the high ambition pathway is illustrated in Figure 6.3.5.

The council's Municipal Waste Strategy 2015 - 2030 highlights the need for widespread recycling and details the council's commitment to recycle 60% of waste across the borough by 2028. The strategy also highlights that Slough is well placed with transport infrastructure to send recycling to more distant facilities, given the already stretched capacity at Chalvey Household Waste Recycling Centre.

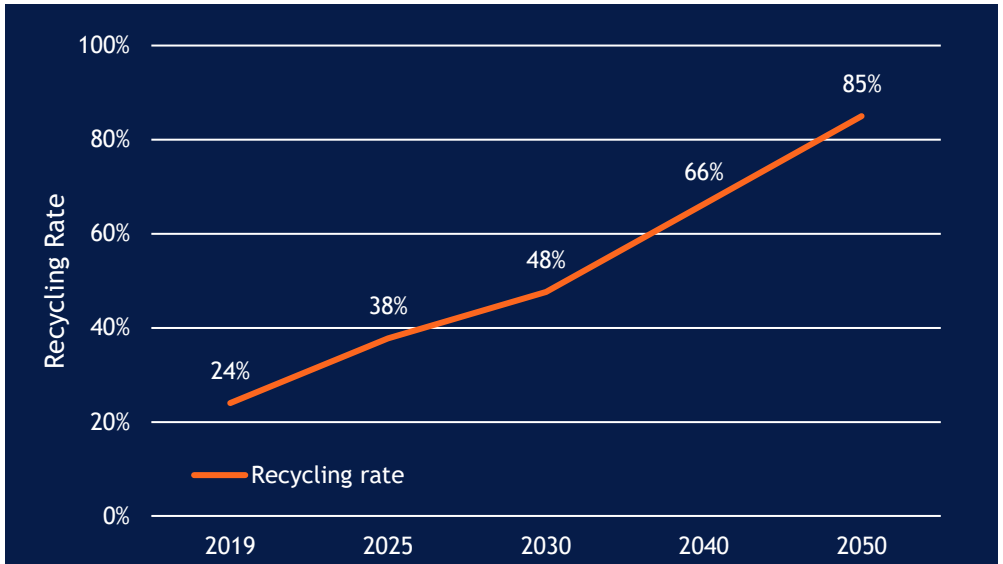


Figure 6.3.5: Growth in recycling rate across Slough utilising a baseline recycling figure of 24% in 2019/20

Current Context 2020	By 2040
• The household recycling rate in 2018-19, based on Local Authority collected waste was 24%.[1] • 1,567 fly tipping incidents were recorded in Slough in 2018-19.[2]	Achieve a 66% recycling rate

Table 6.3.3: Current context and the 2040 intervention milestones for increasing recycling rates.

[1] BEIS Local Authority Collected Waste.
[2] DEFRA Fly tipping incidents and actions taken in England

6.3 WASTE
KEY STAKEHOLDER VIEWS

As part of the Climate Change Strategy & Action Plan development, a series of seven workshops were held online to gain stakeholder views on the actions proposed, key barriers and enablers to their implementation and further implementation considerations. A summary of the key stakeholder views relating to waste are detailed below.

Intervention	Barriers	Enablers	Implementation Considerations
1. REDUCING THE QUANTITY OF WASTE	*"Limited knowledge and understanding of where our household waste ends up"* *"Within the borough, there's a lack of information and signposting for existing initiatives, the Council need to prioritise signposting and engagement"*	*"There is already effective waste management across many of the data centres in Slough, we already monitor, measure and report on our waste"* *"Introduce some zero waste refill stores to prompt behaviour change"*	*"Use of nudge theory needed to change individuals' mindsets on waste reduction"* *"Implement a 'green rating' system for waste, similar to a food safety rating"* *"Reduce the number of landfill collections and increase the number of recycling collections"*
2. INCREASING RECYCLING RATES	*"No UK-wide consensus on what can and can't be recycled, the information is unclear"* *"Minimum room for residents to recycle, especially those who have communal recycling bins within flats - the recycling system is designed for houses"* *"Limited opportunity to recycle, recycling bins aren't big enough and collection needs to be more frequent"*	*"Share data with households on recycling statistics to allow them to understand how they are doing compared to other areas of the borough"* *"Work closely with schools to run education campaigns as students are able to exert behaviour change at the household level"*	*"The Council loses about 10% of recycling through contamination, it's worth looking into why this is occurring"* *"Internal recycling campaigns are needed for the public sector"* *"The Council need to target recycling campaigns in the borough where recycling rates are especially low"*

6.3 WASTE
1) REDUCING THE AMOUNT OF WASTE

Goal: Encourage citizens to reduce waste and wastewater

Responsibility	Action	SBC's role	Key Stakeholders	Action Impact	Timescale	Complexity
Borough	Signpost zero waste cafes and plastic free business to residents to encourage behaviour change to low waste services	Communication & Engagement	Lead: Council's Community Development Team, Other: Residents & Community Groups	Indirect	Immediate	Low
Borough	Organise a food waste campaign using community growing projects and education in schools	Communication & Engagement	Lead: Council's Community Development Team, Other: Residents & Community Groups	Indirect	Short	Low
Borough	Provide information on minimising waste of water to residents	Communication & Engagement	Lead: Council's Waste and Street scene Team, Other: Thames Water	Indirect	Short	Low

6.3 WASTE
1) REDUCING THE AMOUNT OF WASTE

Goal: Encourage businesses to reduce waste and wastewater

Responsibility	Action	SBC's role	Key Stakeholders	Action Impact	Timescale	Complexity
SBC	Support innovation in reducing construction waste through new materials specifications in planning policy	Communication & Engagement	Lead: Council's Planning Policy Team, Other: Council's Waste and Street scene Team	Strategic	Short	Medium
Borough	Provide better incentives to commercial sites and workplaces to adopt improved waste management measures	Implementation	Lead: Council's Waste and Street scene Team, Other: Businesses	Indirect	Short	High
Borough	Expand waste and recycling reporting by developing a standardised waste reporting framework for businesses in the borough	Implementation	Lead: Council's Waste and Street scene Team, Other: Businesses	Indirect	Medium	Medium

Goal: Encourage public services to reduce waste and wastewater

Responsibility	Action	SBC's role	Key Stakeholders	Action Impact	Timescale	Complexity
Borough	Consider opportunities for partnerships to develop waste reduction programs within schools	Communication & Engagement	Lead: Council's School Services Team, Other: Schools	Direct	Short	Medium
Borough	Continue to encourage and support monitoring, measuring and reporting of waste across the public sector	Communication & Engagement	Lead: Council's Waste and Street scene Team, Other: Public Services	Indirect	Long	Medium

6.3 WASTE
1) REDUCING THE AMOUNT OF WASTE

Goal: Improve council's waste collection and council's own waste management

Responsibility	Action	SBC's role	Key Stakeholders	Action Impact	Timescale	Complexity
SBC	Consider decreasing the number of general waste collections and increasing recycling collections, and ensure suitable waste storage is provided	Implementation	Lead: Council's Waste and Street scene Team, Other: N/A	Direct	Medium	High
SBC	Lead by example and report publicly on the council's own waste	Communication & Engagement	Lead: Council's Waste and Street scene Team, Other: N/A	Indirect	Long	Low
SBC	Ensure emissions reduction and waste reduction is a key priority in the council's waste strategies, decisions and investments	Policy & Strategy	Lead: Council's Waste and Street scene Team, Other: Council's Environment Management Team	Strategic	Long	Low
SBC	Consider banning single use plastics within the council's buildings and events and develop a Plastic Free Strategy across the organisation	Policy & Strategy	Lead: Council's Waste and Street scene Team, Other: Council's Building Management Team	Strategic	Short	Low
Borough	Explore options for smart bins in public areas to improve the efficiency of waste collections	Implementation	Lead: Council's Waste & Street scene Services Team, Other: N/A	Direct	Medium	Medium

6.3 WASTE
2) INCREASING THE RECYCLING RATE

Goal: Residents are supported to improve rates of re-use and recycling

Responsibility	Action	SBC's role	Key Stakeholders	Action Impact	Timescale	Complexity
SBC	Where feasible, ensure households across Slough have access to a food waste bin	Implementation	Lead: Council's Waste and Street scene Team, Other: Waste contractor	Direct	Medium	High
SBC	Once all suitable households have a food bin, consider setting borough wide targets for food waste and ensure infrastructure and engagement supports this	Implementation	Lead: Council's Waste and Street scene Team, Other: Council's Environment Management Team	Strategic	Medium	Medium
Borough	Develop further education campaigns for residents to raise awareness of what can be recycled	Communication & Engagement	Lead: Council's Waste and Street scene Team, Other: Council's Environment Management Team	Indirect	Short	Low
Borough	Support community groups to develop sharing /circular economy e.g. repair café, library of things, community fridge, food redistribution centres	Communication & Engagement	Lead: Council's Community Development Team, Other: Community Groups	Indirect	Medium	Medium
Borough	Work with Household Waste Recycling Centres (HWRCs) to enable individuals without a car to safely access the site and dispose of their household waste and recycling	Implementation	Lead: Council's Waste and Street scene Team, Other: Household Waste Recycling Centres	Indirect	Long	High
Borough	Use information on levels of recycling in different areas of the borough to launch targeted communication/educational campaigns on recycling with the support of community leaders	Communication & Engagement	Lead: Council's Waste and Street scene Team, Other: Community Leaders	Indirect	Short	Low

6.3 WASTE
2) INCREASING THE RECYCLING RATE

Goal: Businesses are supported to increase recycling

Responsibility	Action	SBC's role	Key Stakeholders	Action Impact	Timescale	Complexity
Borough	Work with the 5 other Berkshire unitary authorities to share case studies from businesses on circular economy practices to maximise environmental and economic opportunities	Communication & Engagement	Lead: Council's Business Support Team, Other: Other Berkshire local authorities	Indirect	Short	Low
Borough	Encourage the re-use of electronic equipment within data centres and implement systems which allow for replacement of small components rather than entire units	Communication & Engagement	Lead: Council's Business Support Team, Other: Data centres	Indirect	Long	High
Borough	Consider policies to reduce or repurpose waste in construction, demolition and excavation of buildings through circular economy models	Policy & Strategy	Lead: Council's Business Support Team, Other: Businesses & Developers	Strategic	Short	High
Borough	Expand networks facilitating the donation of edible surplus food to food banks across the borough	Implementation	Lead: Council's Business Support Team, Other: Community Groups	Indirect	Short	Medium
Borough	Encourage businesses to segregate their waste including their commercial organic waste to reduce food waste through incentives and sharing best practice	Implementation	Lead: Council's Business Support Team, Other: Businesses	Indirect	Medium	Low

6.3 WASTE
2) INCREASING THE RECYCLING RATE

Goal: Public services are encouraged to increase recycling

Responsibility	Action	SBC's role	Key Stakeholders	Action Impact	Timescale	Complexity
Borough	Encourage public services to segregate their waste through incentives and sharing best practice	Communication & Engagement	Lead: Council's Communications Team, Other: Public Services	Indirect	Medium	Low
Borough	Develop a recycling and circularity education campaign in schools	Communication & Engagement	Lead: Council's School Services Team, Other: Schools	Indirect	Short	Low

Goal: The council demonstrates leadership in the circular economy

Responsibility	Action	SBC's role	Key Stakeholders	Action Impact	Timescale	Complexity
SBC	Develop a circular economy roadmap for the borough, mapping material flows within the area to identify opportunities for circularity and co-location	Policy & Strategy	Lead: Council's Waste and Street scene Team, Other: Businesses	Strategic	Medium	Medium
Borough	Encourage suppliers to adopt circular economy principles through procurement policies	Policy & Strategy	Lead: Council's Procurement Team, Other: Council's Waste and Street scene Team	Indirect	Short	Medium

6.3 WASTE
CO-BENEFITS OF ACTIONS

It can be helpful to consider the added co-benefits of given measures when planning climate action. The decarbonisation of waste in Slough will offer co-benefits across economic, social and environmental spheres:

ECONOMIC

- Reducing waste generation and increasing diversion through recycling, recovery and treatment reduces the costs of disposal and disposal site maintenance
- On average, zero waste strategies create 10 times more jobs than landfill or incineration, which are more technology intensive
- Increased recycling rates have the potential to create more jobs. If a target of a 70% recycling rate is reached in the UK, 50,000 new jobs could be created

SOCIAL

- Initiatives such as community composting, repair shops, cafés that cook with surplus edible food, and 'sharing economy' initiatives such as lending libraries for tools and equipment, help to bring communities together
- Working towards zero waste also helps to mitigate food poverty and hunger by enabling edible surplus food to be recovered and shared through food banks and charities in local areas

ENVIRONMENTAL

- Increased recycling rates can lead to cleaner streets and community areas. For example, using recycled glass decreases air pollution by 20% and related water pollution by 50%
- In addition to reduced greenhouse gas (particularly methane) emissions, zero-waste systems reduce impacts on surface and groundwater, odours and the presences of vermin, birds and other carriers of communicable disease at dumpsites
- Alongside reduced air pollution and water pollution, recycling can reduce raw material mining waste created in the manufacture of resources

6.3 WASTE
NATIONAL CASE STUDIES

REDUCING THE QUANTITY OF WASTE

Bracknell Forest Council encouraged residents to improve recycling and reduce contamination by awarding households points per each collection of uncontaminated recyclables. The scheme uses smartcards which are used to redeem the points from council-run premises, such as leisure centres.

London's Library of Things - This project promotes a 'borrow not buy' movement for rarely-used items, to discourage waste. 80% of household items are used less than once per month and 90% of borrowers say they now have more money to spend on things important to them. The most popular items to borrow at the London Library of Things are sewing machines, bread makers, steam cleaners and cordless hedge trimmers.

The Birmingham & Solihull Industrial Symbiosis (BASIS) - This project connects a network of small and medium sized businesses, charities and academic to institutions to allow organisations to share waste and other resources that are useful to others. This process aims to reduce the amount of waste generated in the region, efficiently use resources, support cost savings and identify potential investment opportunities while reducing energy and waste disposal costs.

INCREASING RECYCLING RATES

Cheshire West & Chester Council finished top of the Eunomia Recycling Carbon Index 2020, making it the highest scoring council in England, Wales and Northern Island in terms of avoided carbon emissions in 2018/19. Cheshire West & Chester Council saved 120 $kgCO_2e$ per capita. The improved performance was largely due to a 3% increase in curb side collected recycling.

Waverley Borough Council worked with Biffa to review its collections and has optimised routes for waste collection from 44,000 households.

6.3 WASTE
LOCAL CASE STUDIES

INCREASING RECYCLING RATES

Red Bin Recycling Scheme - Introduced in 2008, the implementation of the red bin recycling scheme allowed SBC to close 30 of their 33 recycling centres in 2011 due to the improvement of localised household recycling infrastructure.

This also saved the council around £50,000 per year. Participation monitoring at the time suggested an 87.2% participation. These collection systems are important in gaining greater value from recyclable materials.

The Berkshire Recycle bank introduced a scheme that provides reward points to participants in exchange for collection of dry recyclables. This is executed through bins being fitted with Radio Frequency Identification Device(s) (RFID), allowing data to be collected on the weight of recycled materials and points being awarded accordingly.

Working Out Waste - A Key Stage 2 waste and recycling resource pack specific to Slough. The pack has been written as part of the Keep Slough Green and Tidy campaign in conjunction with Groundwork South and funded by the Norland's Foundation and Ernest Cook Trust. Working Out Waste contains 17 lesson plans and activities covering composting, waste, recycling and citizenship.

REDUCING THE QUANTITY OF WASTE

According to the Slough Borough Council Municipal Waste Strategy, in 1999/00, 56,610 tonnes of household waste was produced in Slough, of which 5,646 tonnes was recycled generating a recycling rate of 10%. By contrast, over the 2011/12 period, 50,319.67 tonnes of waste was generated, and 15,443 tonnes were recycled generating a recycling rate of 31%.

6.4 Industry

Anthesis

6.4 INDUSTRY
SECTOR OVERVIEW

Scope of Section

Industry emissions represent a small proportion of Slough's baseline inventory, with around 10.9% of emissions arising from industrial processes. Tackling industrial emissions can be very challenging, particularly the decarbonisation of very energy intensive processes. The emissions associated with industrial buildings are considered as part of the buildings sector as a form of stationary energy. Therefore, this section relates to emissions arising directly from industrial processes where materials are chemically or physically transformed. Examples of industrial processes include production and use of mineral products, chemicals, metals and electronics. Further information on the emission sources included under Industrial Processes and Product Use (IPPU) can be viewed in the GHG Protocol for Cities.

Key Emissions Sources

All of Slough's industry emissions are produced by industrial processes, which contribute to 10.9% of Slough's overall emissions. Industrial emissions in Slough rose between 2005 and 2017, as a likely result of changes to its local economy and development within Slough Trading Estate.

Green Recovery Considerations

- The Thames Valley Berkshire LEP Recovery and Renewal Plan highlights Berkshire's enviable location for attracting foreign direct investment and the strength of its industries as a key opportunity for the regions COVID recovery.
- Point 8 of The 10 Point Plan for a Green Industrial Revolution outlines the Government's ambition to capture 10Mt of carbon dioxide a year by 2030 using Carbon Capture, Usage and Storage (CCUS) technologies. The Government aims to establish CCUS in two industrial clusters by mid 2020s, with four sites by 2030.

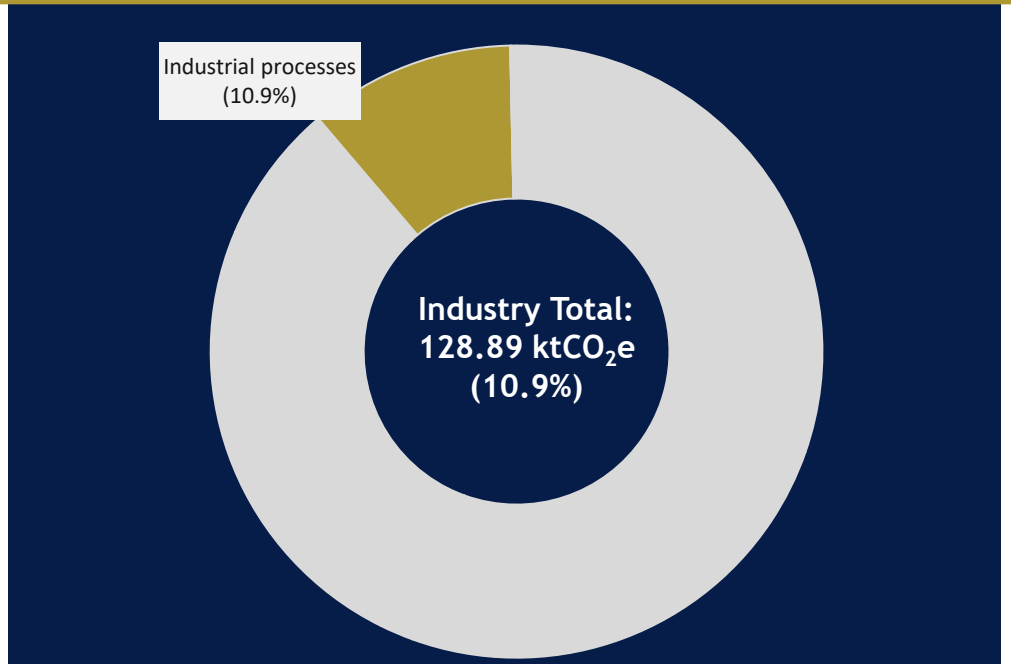


Figure 6.4.1: SCATTER 2018 inventory for the industrial sector in Slough.

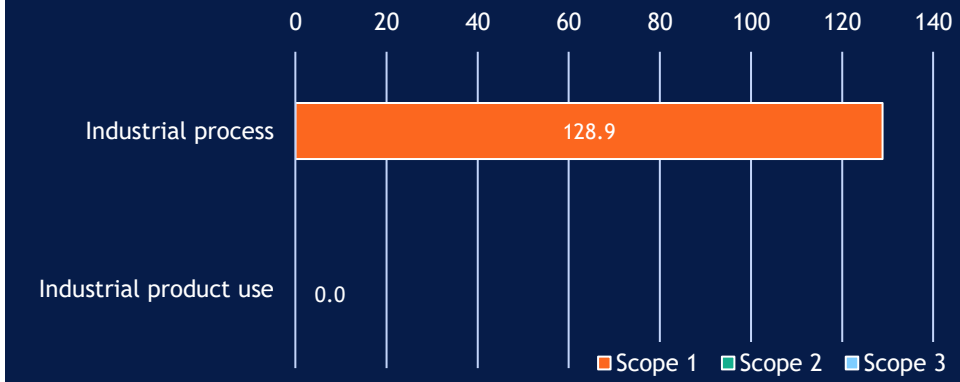


Figure 6.4.2: SCATTER 2018 scope 1, 2 & 3 industry emissions in Slough

6.4 INDUSTRY
KEY PLANS AND POLICIES

Owing to the need for collaborative regional and national action to reduce emissions from industrial processes, key plans and policies have been identified at a UK-wide and Berkshire level.

National

- The UK's Industrial Strategy is a long-term plan for boosting the productivity and earning power of people throughout the UK. The strategy sets out a number of grand challenges to put the UK at the forefront of the industries of the future and highlights the importance of technological innovation in reducing carbon emissions.
- The Clean Growth Strategy provides an ambitious blueprint for Britain's low carbon future, including improving business and industry efficiency. Alongside the strategy, BEIS published joint industrial decarbonisation and energy efficiency action plans with seven of the most energy intensive industrial sectors.
- The Ten Point Plan for a Green Industrial Revolution includes plans to invest in carbon capture, usage and storage for industries that are particularly difficult to decarbonise. The Government set the ambition within the plan to capture 10 megatonnes of carbon dioxide by 2030 and will invest £1 billion to support the establishment of CCUS in 4 industrial clusters across the UK.

Berkshire

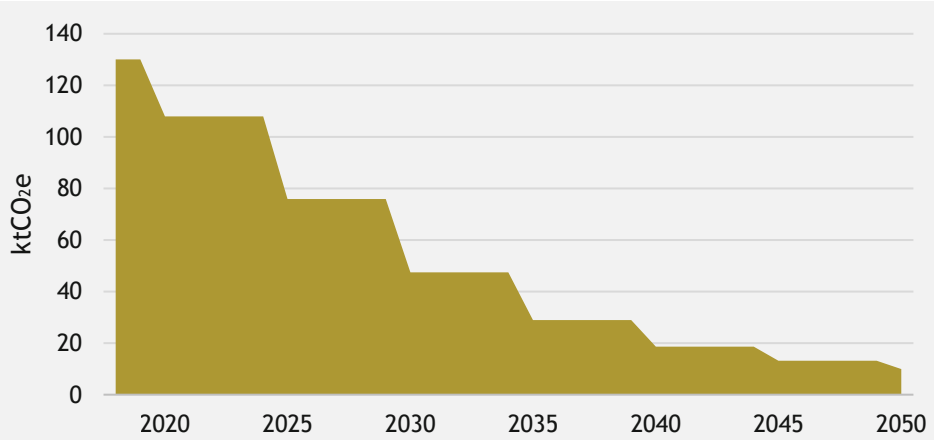
- The Berkshire Local Industrial Strategy (BLIS) was developed by Thames Valley Berkshire Local Enterprise Partnership (LEP) following the release of the UK Industrial Strategy. The strategy has been developed through an evidence-based approach and outlines key delivery commitments and alliances needed to maximise industry development.
- The Thames Valley Berkshire Local Enterprise Partnership Delivery Plan (2020-2021) sets outs the projects benefiting from increased government funding to regenerate local areas following the COVID-19 pandemic.
- Thames Valley Berkshire Energy Strategy (2019) asserts that clean growth should promote productivity by enabling low carbon transitions that are fulfilled through the development of a clean growth strategy. The aim is to establish funding routes to support clean growth, whilst coordinating and facilitating stakeholder collaboration including between service providers including Scottish and Southern Electricity Networks (SSEN) and Southern Gas Networks (SGN).

6.4 INDUSTRY
INTERVENTIONS OVERVIEW

The industrial sector represents a relatively small proportion of emissions in Slough, and most of the action in this area will be delivered through the Thames Valley Berkshire LEP in partnership with other Berkshire local authorities. The following industrial measures are defined within the SCATTER tool.

1. **Shifting away from fossil fuels:** Considers changes to the energy consumption in industrial processes and activity. Trajectories measures the changing fuel used – and what proportion of processes can be powered with electricity and natural gas rather than heavier fossil fuels.

2. **More efficient processes:** Considers annual reductions in process emissions via a reduction in the production index of various industries. Separate trajectories are included for chemical, metal, and mineral sectors, with all other industrial activity grouped together (labelled as “other industry”).



Implementing the SCATTER interventions for industry at the highest ambition leads to:

86 % reduction in emissions from industry by 2040

19 $ktCO_2e$ of industry emissions remaining at 2040

Figure 6.4.3 : Slough’s SCATTER High Ambition Pathway broken down by sector.

SCATTER Intervention	Staff Costs	Cumulative Emissions Savings (2020 - 2040)	Indicative costings (£m)
1. Shifting away from fossil fuels	0 FTE	Industrial processes: **400 $ktCO_2e$**	**9.1**
2. More efficient processes	1 FTE		

Table 6.4.1: Cumulative carbon emissions savings (2020-2040) for industrial processes. Costs represent marginal capex required to meet a representative portion of nationally-led decarbonization of industry.

6.4 INDUSTRY
INTERVENTION MILESTONES

1. Shifting from fossil fuels

This intervention considers changes to the energy consumption in industrial processes, with the trajectories focused on the electrification of industry and the transition away from carbon-intensive fuels. For the chemicals, metals and minerals industries, SCATTER models the changing use of fuels for these processes, shifting off the most high-carbon fuels (i.e., fuel oil) in favour of transition fuels such as natural gas and electricity. Progress to date indicates that in the UK, 35% of energy consumed by the industrial sector in 2019 was electric.[1]

The Berkshire Local Industrial Strategy outlines the development of low carbon technology and clean energy generation as a priority for industry across the Thames Valley region. Working collectively with the Thames Valley LEP, Slough Borough Council can support businesses with accessing regional and national funding for low to zero carbon product and process development for small-scale industry.

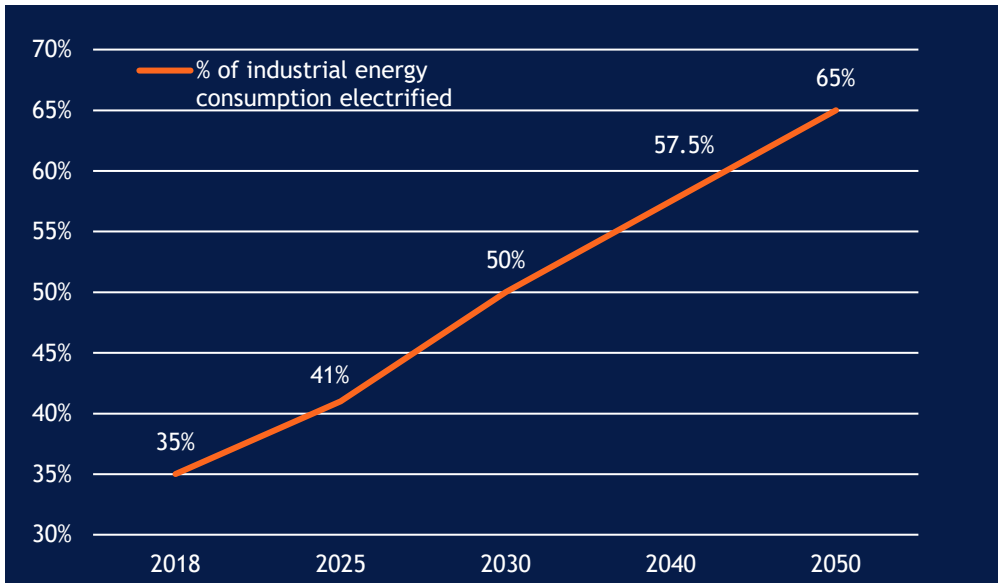


Figure 6.4.4: Modelled changes in industrial energy consumption electrified

Current Context 2020	By 2040
In the UK, 35% of energy consumed by the industrial sector in 2019 was electric.[1]	• Electricity consumption is 57.5% of total industrial energy consumption by 2040

Table 6.4.2: Current context and the 2040 intervention milestones for shifting off fossil fuels.

[1] DUKES Energy Consumption by final user

6.4 INDUSTRY
INTERVENTION MILESTONES

2. More efficient processes

This intervention considers the growth of different industries' greenhouse gas emissions that result from the industrial processes themselves. Process emissions arise from the manufacture and/or production of materials, chemicals and other products e.g. through combustion. As with some freight emissions, the direct impact of certain industries within Slough is limited, but are given here to illustrate the necessary actions in the industrial sector. This relies on a national shift in energy and industrial processes.

Separate trajectories are included for chemical, metal and mineral sectors, with all other industrial activity grouped together (labelled as "other" industry.

Slough Borough Council can ensure that the council has a programme in place for supporting efficiency improvements within local industry. Across the borough, businesses need to review procurement policies and ensure products and services are sourced with a view of reducing overall supply chain emissions. Following this, businesses can identify areas where efficiencies in production can be improved, such as the adoption of a circular economy model.

(Right) Table 6.4.3: Current context and the 2040 intervention milestones for shifting off fossil fuels.

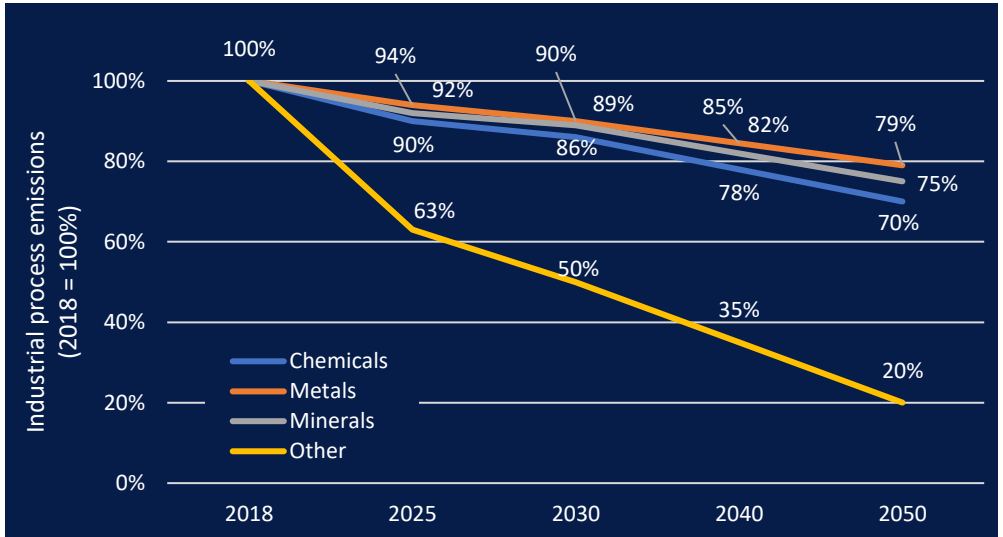


Figure 6.4.5: Modelled changes in industrial process emissions by sector

Current Context 2020	By 2040
• Industrial carbon emissions in the UK, including those from energy-intensive industries, have halved since 1990, which has mainly been due to efficiency gains, fuel switching, a change to industrial structure of the UK and re-location of production overseas.[1] • Since 1990 the chemical sector has improved its energy efficiency by 35%.[2]	Process emissions reduced: • 22% for chemicals • 15% for metals • 18% for minerals • 65% other industries

[1] BEIS. Oil Refining - Industrial Decarbonisation and Energy Efficiency Roadmap Action Plan
[2] BEIS. Chemicals Sector - Industrial Decarbonisation and Energy Efficiency Roadmap Action Plan

6.4 INDUSTRY
KEY STAKEHOLDER VIEWS

As part of the Climate Change Strategy & Action Plan development, a series of seven workshops were held online to gain stakeholder views on the actions proposed, key barriers and enablers to their implementation and further implementation considerations. As there was no specific workshop relating to industry, stakeholder views were predominately taken from the Businesses and Private Sector workshop.

Intervention	Barriers	Enablers	Implementation Considerations
1 & 2. SHIFTING FROM FOSSIL FUELS AND MORE EFFICIENT PROCESSES	*"Development of low-carbon infrastructure can have a high associated cost"* *"Businesses may not have significant available funds due to setbacks from COVID-19"* *"May face resistance to a low-emissions zone from industry without adequate support"* *"It's difficult for businesses to innovate when national policy doesn't always keep up with the latest opportunities"* *"Cross boundary work will be essential; Slough doesn't operate in isolation"*	*"The COVID Recovery Loan Scheme from the Government is set to help industries hit particularly hard by the pandemic and provides an opportunity for building back better and driving low-carbon growth and low-carbon infrastructure"* *"Business partnerships, such as Slough Business Community Partnership, already exist, savings officers time and resource"* *"Through the Thames Valley Berkshire Local Enterprise Partnership (LEP) there is regional policy support for the development of low-carbon, 'clean' growth and infrastructure"* *"External reporting mechanisms have high credibility and reflect well on businesses"*	*"This will require officer time to work with Thames Valley Berkshire LEP, neighbouring Berkshire local authorities, key stakeholders at Slough Trading Estate and other industry in the borough"*

6.4 INDUSTRY

1) SHIFTING FROM FOSSIL FUELS AND MORE EFFICIENT PROCESSES

Goal: Clean growth and low-carbon technology are advanced in the borough

Responsibility	Action	SBC's role	Key Stakeholders	Action Impact	Timescale	Complexity
Borough	Work collaboratively with the Thames Valley Berkshire LEP to deliver the industrial strategy, particularly focusing on the clean growth challenge	Implementation	Lead: Council's Economic Development Team, Other: Thames Valley Berkshire LEP	Strategic	Medium	Medium
Borough	Develop refresh of the Borough's economic growth vision and strategy to put Slough and the region on the map for investors and investment in low carbon technologies and industries, building on opportunities for a green recovery from the impacts on COVID-19	Policy & Strategy	Lead: Council's Economic Development Team, Other: Thames Valley Berkshire LEP	Strategic	Short	Low

6.4 INDUSTRY

1) SHIFTING FROM FOSSIL FUELS AND MORE EFFICIENT PROCESSES

Goal: Industry is supported to decarbonise

Responsibility	Action	SBC's role	Key Stakeholders	Action Impact	Timescale	Complexity
SBC	Set guidance and provide training for promoting zero and low-carbon infrastructure when assessing industrial/commercial planning applications	Implementation	Lead: Council's Planning Team, Other: Businesses	Indirect	Short	High
Borough	Support setting up of a forum through which industry can achieve sustained collaboration, showcase leading examples of industrial decarbonisation and signpost carbon reduction support	Communication & Engagement	Lead: Council's Economic Development Team, Other: Businesses	Indirect	Short	Medium
Borough	Encourage local industry to measure and understand emissions, develop a carbon reduction strategy and share best practice by providing support and guidance in collaboration with regional approaches	Communication & Engagement	Lead: Council's Economic Development Team, Other: Businesses	Strategic	Short	Low

6.4 INDUSTRY
CO-BENEFITS OF ACTIONS

It can be helpful to consider the added co-benefits of given measures when planning climate action. The decarbonisation of industry in Slough will offer co-benefits across economic, social and environmental spheres:

ECONOMIC

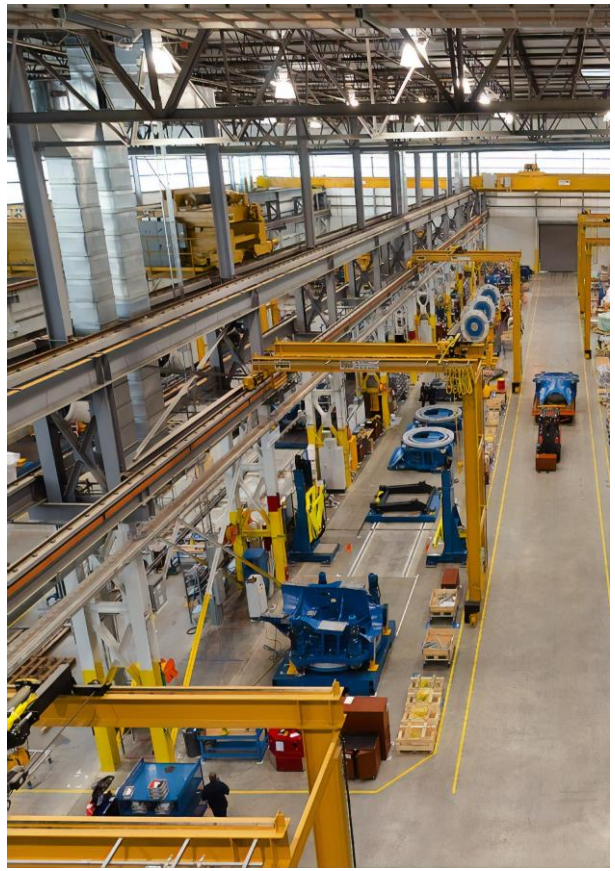
- CCUS and associated negative emissions technologies provides an opportunity for job creation in Slough. The UK government announced investments of £1m to establish two new carbon capture storage clusters by the mid-2020s, which have the potential to create an estimated 50,000 jobs UK wide
- Improved efficiency of industrial processes will likely see cost and energy use savings. Encouraging businesses to make changes now can also help to protect them and increase resilience as the economy shifts to lower carbon activities

SOCIAL

- Advancements in technology through the use of AI and the industrial internet of things (IoT) can also help to improve worker safety in factories
- Working with industries in Slough to reduce their own carbon emissions and those in the supply chain may also contribute to the reduction in emissions of the wider area

ENVIRONMENTAL

- Reductions in fossil fuel extraction and burning can lead to vast biodiversity benefits



6.4 INDUSTRY
NATIONAL CASE STUDIES

SHIFTING FROM FOSSIL FUELS

A collective project, Teesside Collective, aimed at creating one of Europe's first clean industrial zones. The area has one of the highest concentrations of industry in the country and the cluster of industries are working together to develop carbon capture and storage. The group is made up of five large industrial companies in the region and has the potential to help to retain the UK's industrial base, attract new investments and jobs as well as meet the UK's climate change targets.

The Zero Carbon Humber Partnership aims to build a net-zero industrial cluster whilst delivering economic growth. The partnership hopes to develop carbon capture usage and storage, low carbon hydrogen technology and shared regional pipelines and infrastructure.

MORE EFFICIENT PROCESSES

The City of Manchester used their borough-wide target as a short-hand way of indicating the scale of change needed for a variety of suppliers, businesses and organisations within the city. Some businesses have subsequently sought a Science Based Target through the Science Based Target Initiative (SBTi) aligned with the city's ambition.

SCIENCE BASED TARGETS
DRIVING AMBITIOUS CORPORATE CLIMATE ACTION

6.4 INDUSTRY
LOCAL CASE STUDIES

SHIFTING FROM FOSSIL FUELS

The Thames Valley Berkshire Local Enterprise Partnership's (LEP) Energy Strategy highlights the importance of decarbonising energy in Thames Valley Berkshire. In 2012, Berkshire generated 4% of its energy from renewable resources. The report indicated that this picture was heavily influenced by landfill gas and SSE's Biomass Facility.

The capacity for the delivery of large-scale renewable energy within the Thames Valley is restricted due to the region's geography. In 2019, Berkshire had over 109MW of renewable energy generation capacity installed, of which the majority relate to 51MW of solar arrays and the 50MW SSE Biomass Facility. However, this is a small proportion of Thames Valley Berkshire's energy demand and significantly below the Government's targets of 30% of electricity by 2020.

MORE EFFICIENT PROCESSES

Berkshire's Local Industrial Strategy outlines improvements in the sustainability and efficiency of resource use as a key priority within the strategy. There are substantial constraints in relation to key resources in Berkshire and this has widespread implications in relation to sectoral growth possibilities. The strategy highlights the need for more investment in capacity infrastructure and smarter, more efficient solutions.

6.5 Energy Supply

Anthesis

6.5 ENERGY SUPPLY
SECTOR OVERVIEW

Scope of Section

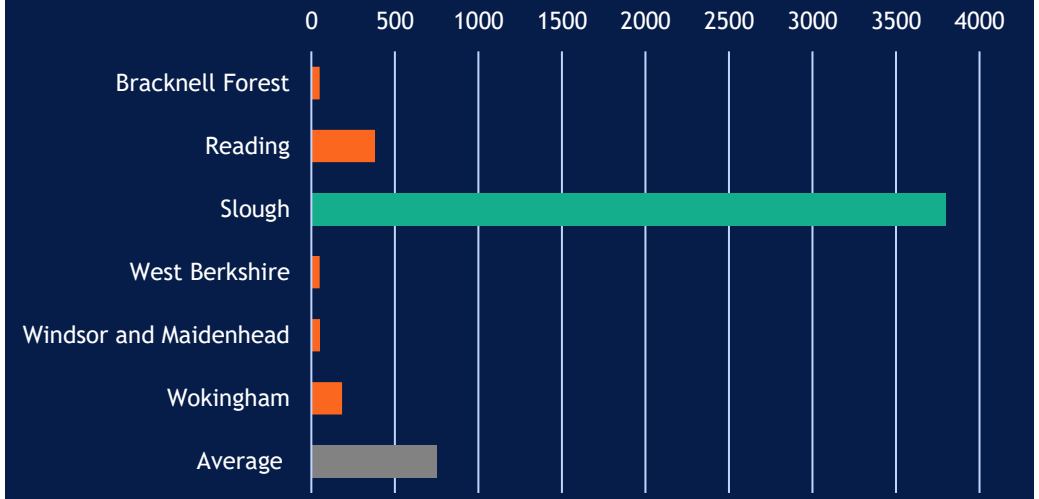
Throughout this chapter, reference has been made to the importance of providing decarbonised electricity to Slough. This is to ensure the benefits of moving away from fossil fuels and switching to electric supply are fully realised. The following analysis provides details for the scale and ambition required to meet Slough's energy consumption with renewable sources. The method by which SCATTER apportions local renewable capacity is based upon the scaling up of installed capacity in a given local authority. These are based on the National Grid's Two Degree Scenario and weighted according to current installed capacity.

Key Emissions Sources

Compared to other local borough's, Slough has the greatest renewable capacity per unit land area at 3,798 kW/km^2. Despite Slough having the lowest solar and wind capacity installations across Berkshire, Slough has 120,100 kW of organic fuels. The main two contributors to energy generated from organic fuels in Slough include municipal solid waste (53,100 kW) and plant biomass (63,000 kW), which are the product of the two Energy from Waste (EfW) plants in the borough. Thames Water also state that the £1.5M Slough Sewage Works sludge dryer will reduce carbon emissions by more than 500t annually by producing renewable fuel from municipal solid waste.

Green Recovery Considerations

- An overall decrease in electricity demand during the COVID-19 lockdown allowed higher penetration of renewables in the energy network.
- The UK Climate Change Committee's Sixth Carbon Budget states that as part of a green recovery, the UK should be deploying low-cost renewables at scale and developing the markets for gas carbon capture storage and hydrogen - electricity generation should be entirely low-carbon by 2035.



Berkshire Local Authorities	Solar PV (kW)	Local Wind (kW)	Hydro (kW)	Organic fuels (kW)	Total	Renewable capacity per unit land area (kW/km^2)
Bracknell Forest	4,600	0	0	800	5,400	49
Reading	5,700	0	0	9,700	15,400	381
Slough	3,500	0	0	120,100	123,600	3,798
West Berkshire	33,400	500	100	600	34,600	49
Windsor and Maidenhead	8,500	0	300	1,100	9,900	50
Wokingham	28,600	2,000	100	2,000	32,700	183
Average	14,050	417	83	22,383	36,933	752

Figure 6.5.1: Comparison of installed renewable energy capacity within Slough compared to other Berkshire Local Authorities (Source: BEIS Regional Renewable Statistics).

6.5 ENERGY SUPPLY
KEY PLANS AND POLICIES

National

- The UK's National Planning Policy Framework (2019) states that planning should support the transition to a low carbon future.
- UK National Energy and Climate Plan sets out integrated climate and energy objectives, targets, policies and measures for the period 2021-2030.
- Contracts for Difference scheme is the governments principal mechanism for encouraging investment in larger scale renewables.
- The Renewable Heat Incentive and Smart Export Guarantee reward the use of community and domestic scale renewable energy technologies.
- Energy White Paper outlines the latest plans on decarbonising the UK's energy system consistent with the 2050 net zero target.

Berkshire

- The Thames Valley Berkshire Local Enterprise Partnership Recovery and Renewal Plan (2021) asserts the need to prioritise clean growth by collaborating with energy providers, government agencies, local authorities and major companies to provide green energy and strengthen the resilience of regional and national energy systems.
- The Thames Valley Berkshire Energy Strategy (2019) explores the LEP's responsibility in supporting a low carbon transition across Thames Valley Berkshire and managing the future impacts of growth in energy infrastructure, especially renewables, across the region.

Slough

- The Slough Local Development Framework Core Strategy 2006-2026 outlines the reduction of unnecessary use of energy, especially from non-renewable sources, and the generation of energy from renewable resources where feasible.
- The Slough Carbon Management Plan 2020-2030 necessitates the reduced consumption of resources, energy and emissions whilst promoting energy efficiency and the use of renewable energy sources. This has already been enacted by Phase 1 of the RE:FIT refurbishment scheme, which guarantees reductions of energy consumption.
- The Slough 2040 Vision supports the town of Slough to become carbon neutral by 2040. Pioneering renewable power and energy efficiency technology will be incorporated throughout the built environment.

6.5 ENERGY SUPPLY
INTERVENTIONS OVERVIEW

The interventions described so far across the buildings, transport and industry sectors are heavily influenced by the provision of renewable electricity from zero-carbon sources. SCATTER considers a wide range of renewable technologies:

1. **Solar photovoltaics (PV):** Both Major Power Producer (large-scale) sites and small-scale sites are considered for Slough. Local capacity is defined as the overall maximum output of renewable energy installations of any size within the borough.
2. **Wind:** As well as local sites within the borough's boundary, which tend to be more small-scale, onshore wind sites which the borough can draw from that may lie outside of its boundary are also considered.
3. **Other renewable technologies:** This covers other potential renewable technologies, beyond solar and wind, that could be explored within Slough. Some key technologies considered within SCATTER include solar thermal, anaerobic digestion, sewage and landfill gas, municipal soil waste generation and plant biomass.

The modelled capacities are scaled to Slough by the borough's predicted energy consumption. For all of the supply technologies referenced in this section, if the technology is not deemed feasible within Slough's boundary to the suggested extent, the residual capacity is assumed to occur outside of the boundary. This is pertinent to wind capacity, as well as some of the potentially larger scale installations of solar.

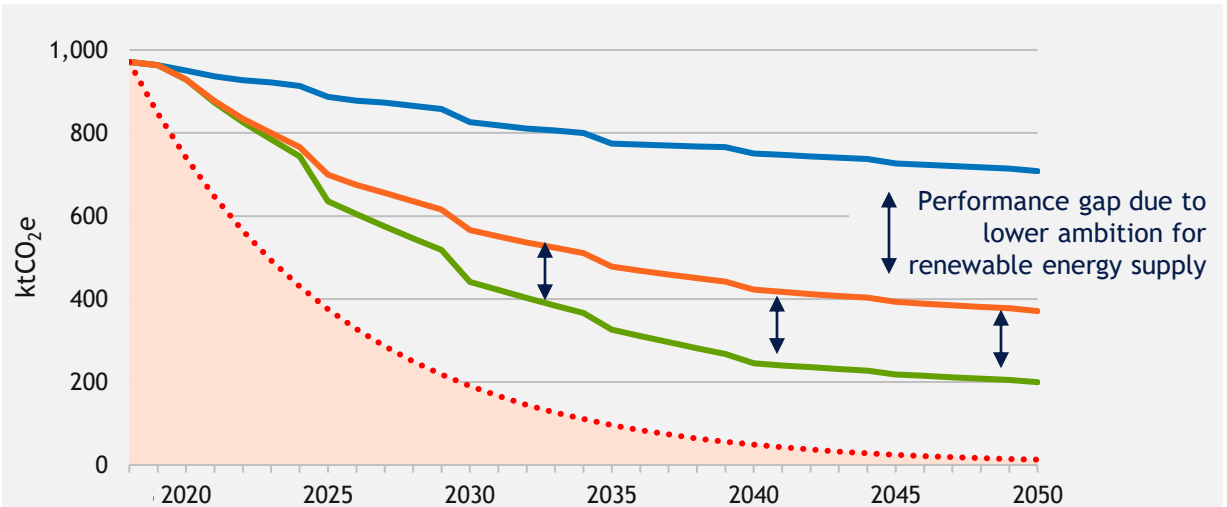


Figure 6.5.2 : The energy supply sector has been presented differently to other sectors to avoid double counting. It is not possible to separate out the savings specifically from renewable energy supply as it is interdependent with demand-side measures. The green line tracks the High Ambition Pathway, and the blue line represents BAU. The orange line tracks a High Ambition scenario for all measures **except** those which relate to renewable energy sources.

SCATTER Intervention	Cumulative Emissions Savings (2020 - 2040)	Staff Costs
1. Solar PV	Energy Supply: **4,655 $ktCO_2e$**	**1.7 FTE**
2. Wind		**1.95 FTE**
3. Other Renewables		**2.2 FTE**

Table 6.5.1: Cumulative carbon emissions savings (2020-2040)

Renewable energy source	Capex (£m) to 2030	Opex (£m) to 2030	Capex (£m) from 2030	Opex (£m) from 2030
Offshore wind	49.7	72.4	193.6	347.1
Onshore wind	71.8	44.1	33.4	23.1
Large-scale PV (>10kW)	5.4	3.6	12.7	9.2
Small-scale PV (<10kW)	81,6	16.7	238.2	45.5
Hydroelectric	1.0	0.6	12.7	7.7
Total	**209.3**	**137.3**	**490.5**	**432.5**

Table 6.5.2: Costs for energy supply (£m)

6.5 ENERGY SUPPLY
INTERVENTION MILESTONE

1. Solar PV

Solar PV technologies can be split out into local installations, and larger sites for ground- or roof-mounted arrays. According to the Energy Saving Trust, the typical household array capacity is between 2-4 kW. The current average square meter of solar PV panel provides a capacity in the region of 0.15-0.20 kW of energy.

As part of the first phase of the Council's RE:FIT Programme, renewable energy measures were deployed across 11 sites including; offices, community centres, Hatfield car park and Slough Bus Station. The New Horizons building, occupied by the Community Mental Health Team, had 54 rooftop solar PV panels installed. The Council also installed a 50 kW system of 154 solar panels on the roof of Observatory House, the Councils headquarter building. Slough Borough Council are also actively exploring opportunities for an out-of-borough solar farm, due to the lack of suitable land and space within the borough's boundary.

Local vs Large scale technology

SCATTER considers a wide range of renewable technologies, some can be implemented locally, whilst others require an out-of-boundary delivery (e.g. offshore wind). Local installation refers to solar and other renewable capacity within Slough's boundary. SCATTER also considers the installation of large-scale renewable energy projects, they are theoretically based on out-of-boundary installations delivered, managed or directly owned by Slough-based stakeholders or Major Power Producers.

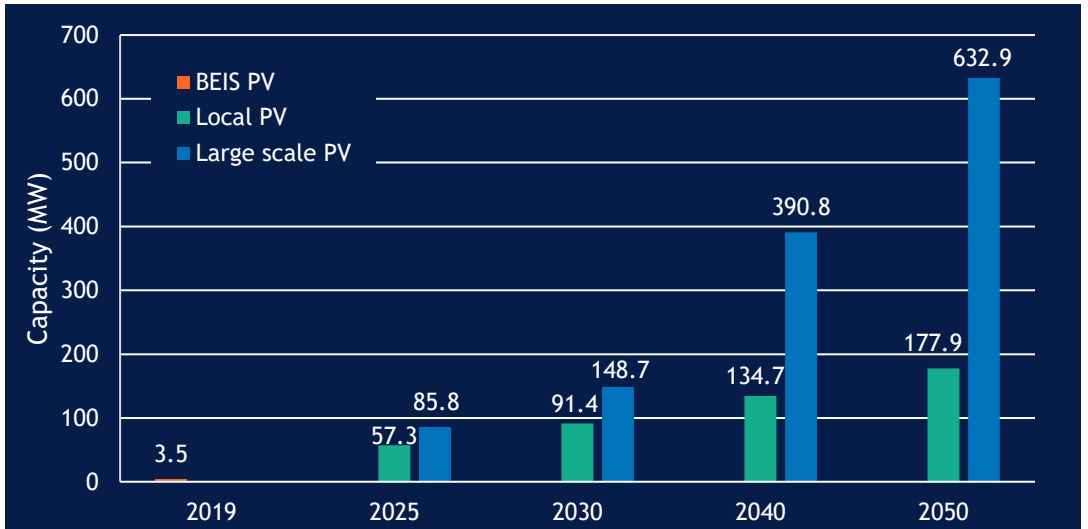


Figure 6.5.3: Comparing the SCATTER outputs against the current installed capacity from BEIS renewable energy statistics for energy generated from solar PV in Slough.

Current Context 2019	By 2040
In 2019, Slough had 703 installations with a capacity of 3.5MW and 103,226 MWh generation.[1]	• Local PV: 134.7 MW installed capacity • Large scale PV: 390.8 MW installed capacity

Table 6.5.3: Current context and the 2040 intervention milestones for Solar PV.

[1] BEIS Regional Renewable Statistics

6.5 ENERGY SUPPLY
INTERVENTION MILESTONE

2. Wind

The capacity of wind power technologies vary between local, on- or off-shore installations. Small-scale wind turbines which contribute to domestic household power typically have small capacities in the region of 15 kW. A typical on-shore wind turbine has a capacity of 2.5 MW, with off-shore turbines typically of a much higher capacity.

This modelling estimates values for the installed capacity of each supply technology, by taking a nationally assumed capacity figure and scaling down to region based on a local authority's size proxy (e.g. population, number of households, land area, fuel consumption). This serves as an indicator for the nature and extent of renewable supply required for future demand.

SCATTER does not account for the geographies and local contexts unique to a given local authority, which we acknowledge play a very important role in the viability of a given technology. Offshore capacity is flexible across other local technologies (i.e. increased solar PV or onshore wind) or via a partnership with a Major Power Producer.

Given the national commitments to offshore wind and the lobbying influence of increased numbers of offshore wind turbines, figures for offshore capacity have been included to give an indication of the potential contribution of that technology to the future energy mix within the borough.

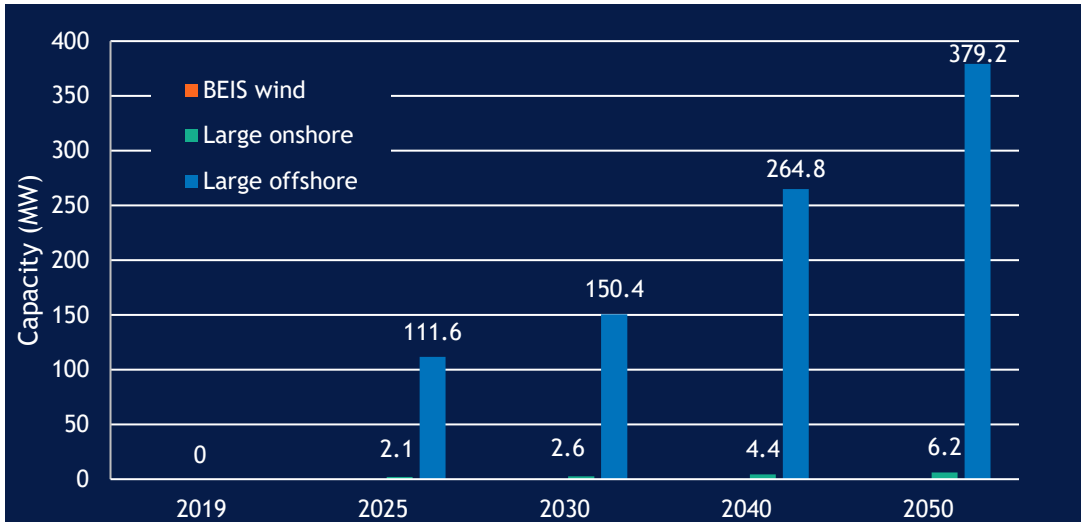


Figure 6.5.4: Comparing the SCATTER outputs against the current installed capacity from BEIS renewable energy statistics for energy generated from wind in Slough.

Current Context 2019	By 2040
In 2019, Slough had no onshore or offshore wind sites.[1]	• Large onshore: 4.4 MW installed capacity • Large offshore: 264.8 MW installed capacity

Table 6.5.4: Current context and the 2040 intervention milestones for wind.

[1] BEIS Regional Renewable Statistics

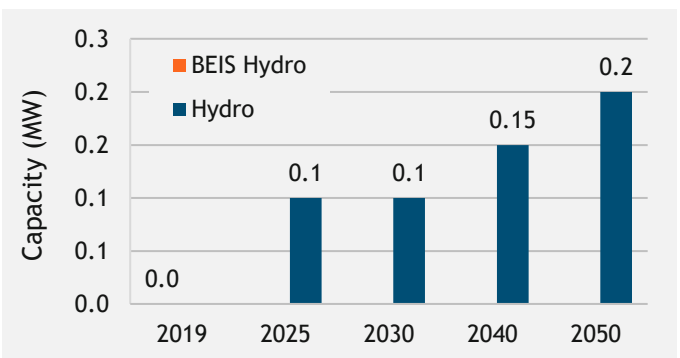
6.5 ENERGY SUPPLY
INTERVENTION MILESTONE

3. Other renewables

Slough already has a high installed capacity of other renewable sources due to the municipal solid waste and plant biomass sites located within the borough, see figure 6.5.5. Biomass within SCATTER is assumed to displace fossil fuels as an energy source for generation in power stations. The combustion of solid biomass fuels (such as woodchips or chicken litter) still releases greenhouse gases into the atmosphere, albeit with a much smaller impact than that of coal or natural gas.

For the High Ambition Pathway, generation in power stations from solid biomass fuels is modelled to increase fourfold by 2025, before dropping off to very low levels by 2050. Without the coupling of biomass generation and carbon capture and storage technology, there will always be residual emissions associated with the consumption of solid biomass fuels.

SCATTER also considers other renewable technologies, including hydroelectric power. To this end, very small amounts of small-scale hydroelectric projects may be suitable across Slough at the Jubilee River.



(Left) Figure 6.5.6: Small-capacity local hydro technologies modelled in SCATTER against current 2019 hydro installed capacity.[1]

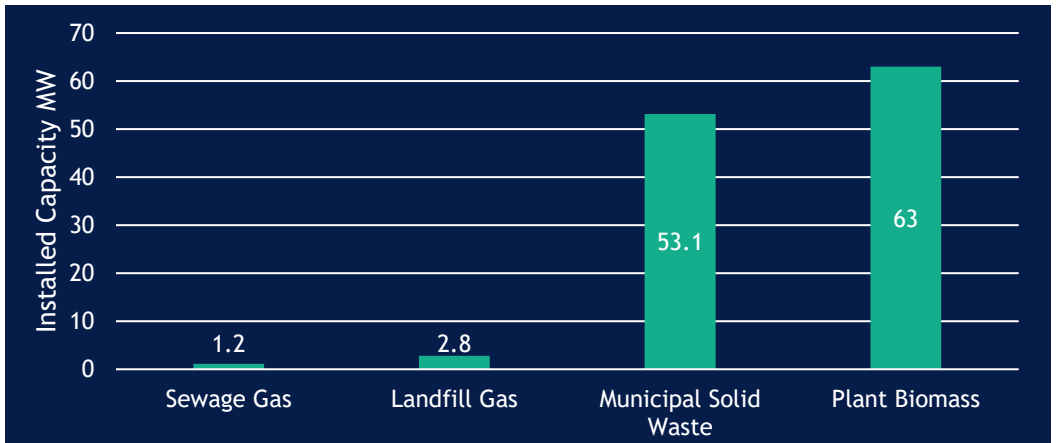


Figure 6.5.5: Current installed capacity in MW of other renewable technology types within Slough.

Current Context 2019	By 2040
• No hydro sites • No anaerobic digestion sites • One landfill gas and two sewage gas sites with a combined capacity of 4MW and 24,169 MWh generation • One municipal solid waste and one plant biomass site with a combined capacity of 116.1MW and 53,935 MWh generation[1]	• Declining usage having displaced fossil fuel sources in power stations • Local hydro: 0.15 MW installed capacity

Table 6.5.5: Current context and the 2040 intervention milestones for other renewables.

[1] BEIS Regional Renewable Statistics

6.5 ENERGY SUPPLY
KEY STAKEHOLDER VIEWS

As part of the Climate Change Strategy & Action Plan development, a series of seven workshops were held online to gain stakeholder views on the actions proposed, key barriers and enablers to their implementation and further implementation considerations. A summary of the key stakeholder views relating to energy supply are detailed below.

Intervention	Barriers	Enablers	Implementation Considerations
1. INCREASE WIND CAPACITY	*Throughout the workshop series, discussion focused solely on the increase of solar PV in the borough due to the lack of space for wind turbines*	*"Offshore or out of boundary wind projects could be considered owing to the highly urban nature of the borough and lack of space"*	*"Assess the feasibility of wind turbine installation in the borough"* *Develop partnerships to explore the feasibility of offshore or out of boundary installation"*
2. INCREASE SOLAR CAPACITY	*"Battery technology is yet to catch up with solar PV, there is a need for adequate storage"* *"The financial incentives for installing solar need to be strengthened"* *"Limited space for large solar farm in the borough"*	*"The cost of solar installation has come down significantly in the last few years"* *"The high density of buildings in Slough presents huge opportunity for solar PV roof installation"*	*"Requires significant investment from all across the borough"* *"Payback and energy bill savings should be evaluated"*
3. OTHER RENEWABLE TECHNOLOGY	*"Lack of clarity around national renewable energy policy"* *"Need for large scale additional infrastructure and space for technologies such as biomass plants"*	*"Tertiary educational system to help influence upskilling"* *"Opportunity in planning and design stages of new developments"*	*"Establish what is within the Council's remit and what is the responsibility of national government"* *"Development of other renewable technologies needs to align with the new Local Plan"*

6.5 ENERGY SUPPLY

1) INCREASE SOLAR PHOTOVOLTAIC (PV) CAPACITY

Goal: Installation of solar panels on properties are maximised

Responsibility	Action	SBC's role	Key Stakeholders	Action Impact	Timescale	Complexity
SBC	Evaluate the opportunities for solar panels within the borough's social housing	Research & Design	Lead: Council's Environment Management Team , Other: James Elliman Homes/Housing Partner	Strategic	Medium	Medium
SBC	Investigate suitable opportunities for installing solar panels on council-owned buildings or ground mounted on council owned land where feasible	Implementation	Lead: Council's Asset Management Team , Other: Council's Environment Management Team	Direct	Medium	Medium
Borough	Scope the development of solar PV installations on large commercial buildings at Slough Trading Estate	Research & Design	Lead: Council's Development Team, Other: Council's Environment Management Team	Strategic	Medium	Medium
Borough	Collaborate with local training colleges and educational centres to ensure skills to install solar panels are within the local workforce	Communication & Engagement	Lead: Council's Environment Management Team , Other: Local Training Colleges	Indirect	Long	Low
Borough	Consult with residents on the benefits of installing solar panels and the potential opportunities from initiatives like solar streets	Communication & Engagement	Lead: Council's Environment Management Team , Other: Residents	Indirect	Medium	Low
Borough	Provide a solar map for businesses and residents to indicate how appropriate their building is for rooftop solar panels	Communication & Engagement	Lead: Council's Development Team, Other: Council's Environment Management Team	Indirect	Short	Low

6.5 ENERGY SUPPLY
2) INCREASE WIND CAPACITY

Goal: Installation of wind turbines are maximised

Responsibility	Action	SBC's role	Key Stakeholders	Action Impact	Timescale	Complexity
SBC	Conduct a renewable energy feasibility study to evaluate the opportunities for wind turbines across the borough	Research & Design	Lead: Council's Environment Management Team , Other: Council's Development Team	Strategic	Immediate	Low
SBC	[Install wind turbines on council owned land where opportunities are identified by the feasibility study]	Implementation	Lead: Council's Asset Management Team , Other: Council's Environment Management Team	Direct	Long	High
Borough	Explore opportunities to invest in the development of a wind farm outside of the borough boundary	Implementation	Lead: Council's Development Team, Other: Council's Environment Management Team	Direct	Long	High
Borough	Collaborate with local training colleges and educational centres to ensure skills to install wind turbines are within the local workforce	Communication & Engagement	Lead: Council's Environment Management Team , Other: Local Training Colleges	Indirect	Long	Low
Borough	[Consult with landowners on the benefits of installing wind turbines and encourage them to install them on private land]	Communication & Engagement	Lead: Council's Environment Management Team , Other: Council's Development Team	Indirect	Long	Medium
Borough	[Provide a wind map for businesses and residents to indicate how appropriate their land is for turbines]	Communication & Engagement	Lead: Council's Development Team, Other: Council's Environment Management Team	Indirect	Short	Low

* Actions denoted in square brackets are dependent on the outcome of a renewable energy feasibility study

6.5 ENERGY SUPPLY

3) INCREASE THE CAPACITY OF OTHER RENEWABLE TECHNOLOGIES

Goal: Opportunities for renewable energy generation are identified and barriers are reduced

Responsibility	Action	SBC's role	Key Stakeholders	Action Impact	Timescale	Complexity
SBC	Review renewable potential across the borough and identify barriers through a renewable energy feasibility study	Research & Design	Lead: Council's Environment Management Team , Other: Council's Development Team	Strategic	Immediate	Medium
SBC	Use policy to prioritise the key strategic sites identified in the feasibility study to overcome the barriers identified	Policy & Strategy	Lead: Council's Planning Policy Team, Other: Council's Environment Management Team	Strategic	Medium	Medium
SBC	Increase the requirements for renewables in the new Local Plan	Policy & Strategy	Lead: Council's Planning Policy Team, Other: Council's Environment Management Team	Strategic	Medium	Low
Borough	Coordinate action with the District Network Operator (DNO) on initiatives to significantly increase the ability of the power network to meet rising demand for electricity and increases in renewable supply (as opposed to fossil fuels). Work together to identify opportunity areas for investment.	Communication & Engagement	Lead: Council's Development Team, Other: SSE (DNO)	Strategic	Medium	High

6.5 ENERGY SUPPLY
3) INCREASE THE CAPACITY OF OTHER RENEWABLE TECHNOLOGIES

Goal: Businesses are supported to maximise renewable energy installations

Responsibility	Action	SBC's role	Key Stakeholders	Action Impact	Timescale	Complexity
SBC	Explore a Power Purchase Agreement for renewable energy supply with other organisations. If this in not possible, ensure any excess demand not met by council owned renewables is from (3rd party) purchased renewables.	Research & Design	Lead: Council's Environment Management Team , Other: Businesses	Indirect	Medium	High
Borough	Explore ways to expand on or develop opportunities around large scale energy storage solutions in collaboration with key businesses	Research & Design	Lead: Council's Environment Management Team , Other: Businesses	Indirect	Medium	Medium
Borough	Provide support for SMEs to access funding and collaborate on energy projects through a shared platform	Communication & Engagement	Lead: Council's Environment Management Team , Other: Businesses	Indirect	Short	Low
Borough	Develop business-owned renewable technology projects in commercial areas through collaboration and partnerships	Communication & Engagement	Lead: Council's Environment Management Team , Other: Businesses	Direct	Medium	High
Borough	Engage with existing data centres in the borough to understand whether they are utilising green energy or have set green energy goals	Communication & Engagement	Lead: Council's Development Team, Other: Data Centres	Indirect	Medium	Medium

6.5 ENERGY SUPPLY
3) INCREASE THE CAPACITY OF OTHER RENEWABLE TECHNOLOGIES

Goal: Businesses are supported to maximise renewable energy installations (Cont..)

Responsibility	Action	SBC's role	Key Stakeholders	Action Impact	Timescale	Complexity
Borough	Encourage data centres within Slough to shift from diesel-powered generators for backup power to low-carbon standby power systems including battery storage and low carbon fuels	Communication & Engagement	Lead: Council's Development Team, Other: Data Centres	Direct	Long	High
Borough	Facilitate coordinated investment in energy infrastructure at key locations such as Slough Trading Estate, to enable developers to benefit from infrastructure required to achieve net zero buildings	Implementation	Lead: Council's Development Team, Other: Businesses	Indirect	Medium	High
Borough	Explore partnership with the South East Consortium to create a framework to allow businesses to buy power in aggregation rather than in isolation	Research & Design	Lead: Council's Development Team, Other: South East Consortium	Direct	Medium	High

6.5 ENERGY SUPPLY
3) INCREASE THE CAPACITY OF OTHER RENEWABLE TECHNOLOGIES

Goal: Residents, schools & community groups are supported to maximise renewable energy installations

Responsibility	Action	SBC's role	Key Stakeholders	Action Impact	Timescale	Complexity
SBC	Consult with residents and other key stakeholders to develop a clean energy target for the borough	Research & Design	Lead: Council's Environment Management Team , Other: Residents	Strategic	Medium	Medium
Borough	Support community energy projects and provide guidance to local residents and schools through an awareness raising program to promote renewable installation	Communication & Engagement	Lead: Council's Environment Management Team , Other: Residents & Schools	Indirect	Short	Medium
Borough	Provide support for residents and schools such as grants, loans or subsidies to install renewable technology	Communication & Engagement	Lead: Council's Environment Management Team , Other: Residents & Schools	Indirect	Long	Medium
Borough	Encourage community renewable technology projects, such as through the co-operative ownership model	Communication & Engagement	Lead: Council's Environment Management Team , Other: Community Groups	Direct	Long	Medium

6.5 ENERGY SUPPLY
CO-BENEFITS OF ACTIONS

It can be helpful to consider the added co-benefits of given measures when planning climate action. The decarbonisation of energy supply in Slough will offer co-benefits across economic, social and environmental spheres:

ECONOMIC

- Reduced energy costs (and potential income) associated with improved renewable energy supply can help tackle local fuel poverty
- Employment is created at different levels, from research and manufacturing to distribution, installation and maintenance. In the UK, low carbon and renewable energy activities generated £46.7 billion turnover in 2018, directly employing 224,800 people (full-time equivalents)
- Increasing local renewable energy supply provides resilience against future fossil fuel price increases

SOCIAL

- Improved energy affordability can also deliver health benefits by reducing the risks of illness due to living in inadequately heated homes
- Improved access to low-cost energy is also a key step to eliminating fuel poverty
- Community energy schemes have benefits such as increased autonomy, empowerment and resilience by providing a long-term income and local control over finances
- Wind, solar and hydropower produce little or no air pollution which reduces negative health impacts associated with pollution

ENVIRONMENTAL

- Renewable energies like solar help to reduce air pollution and associated long-term health risks of living in industrially polluted areas
- Improving renewable energy supply on a smaller scale, such as putting solar panels on rooftops, rather than building a large-scale solar farm, reduces the need for habitat destruction

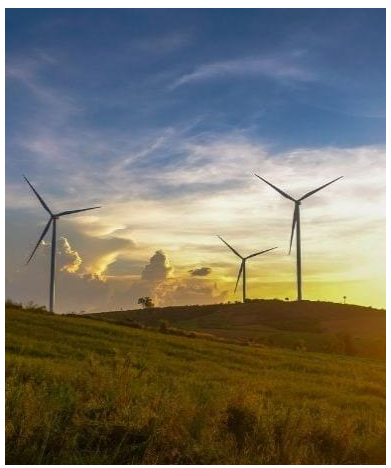
6.5 ENERGY SUPPLY
NATIONAL CASE STUDIES

SOLAR PV

Portsmouth City Council - Had 738 solar PV panels installed alongside a ten-unit battery system. Batteries are a key component of the new solar installation on one of the city council's industrial estates. It can store 135kWh of electricity enough to power the average house for 2 weeks and can be used at time of the day when electricity costs are higher.

Warrington Borough Council - Has invested in two solar farms outside of its boundary. One of the farms will supply 100% of the Council's own green energy supply, reducing its bills by up to £2m per year.

Virtu (Naked Energy) - is an innovative solar PV technology with higher energy density to regular solar PV alternatives. This technology is well suited for city usage where space is limited, and is especially beneficial for buildings with high heat demands. In 2019 Anthesis entered a partnership with Naked Energy through which to accelerate uptake of this new technology.



WIND

Caerphilly County Borough Council - is exploring options for the Council to invest in a wind farm through a shared ownership model with a private green energy company, RWE. The Council would contribute to building costs and receive a return in revenue.

OTHER RENEWABLE TECHNOLOGIES

Northumberland County Council - have approved the development of an energy-producing anaerobic digester at Northeast Grains, a cooperative of about 80 farming businesses. The facility will have an overall capacity of generating 500KW and surplus generation will be fed back to the National Grid. Additionally, the site will allow for 3 new jobs to be created in the area, while supporting the region's environmental goals.

Swindon Council - developed a wholly owned subsidiary of the council, delivering the first renewable energy community Individual Savings Account, attracting local investment of £2.4m.

6.5 ENERGY SUPPLY
LOCAL CASE STUDIES

SOLAR PV

Eco Modular Buildings, Slough - Working with The Little Green Company, Eco Modular Building developed installed 93 Solar PV panels, resulting in 21,426 kWh p/a and generating a carbon offset of 11,334 $kgCO_2$/yr.

Thames Valley Berkshire - Over 109MW of renewable energy generation capacity is now installed in Berkshire, of which the majority relate to 51MW of solar arrays and the 50MW SSE Biomass Facility.

Slough Borough Council have installed a 50 kW system of 154 solar panels on the roof of Observatory House, the Councils headquarter building.

OTHER RENEWABLE TECHNOLOGIES

The Asset Management Plan (AMP) - Slough has already identified that a greater understanding of the performance of existing assets in terms of their fitness for purpose and operational efficiency is required, as outlined in the Asset Management Plan.

Lakeside EfW facility - A joint venture project between two of the UK's leading recycling and waste management companies; Grundon Waste Management and Viridor. The facility at Colnbrook near Slough has been operational since 2010. Using advanced technology, this plant processes over 450,000 tonnes of residual waste per year, generating 306GWh of power – enough to provide electricity to every household in Slough (86,267 homes).

There is an education centre adjacent to Lakeside EfW, where schools and other groups can learn about sustainable waste management and energy from waste.

The RE:FIT Programme - Guarantees 100% of the energy saving/generation (kWh) via a contractual agreement for the payback period of the project. Building operational performance and comfort levels have been increased, a reduction in building-related complaints and maintenance backlogs, a boost to local investment through local job creation and important reductions in CO_2 emissions.

In the first phase, energy efficiency and renewable energy measures were deployed across 11 sites including; offices, community centres, Hatfield car park and Slough Bus Station. For example, the building named New Horizon, occupied by the Community Mental Health Team, had LED lighting installed, energy management systems optimised, and 54 rooftop solar PV panels installed.

6.6 Natural Environments & Offsetting

Anthesis

6.6 NATURAL ENVIRONMENTS & OFFSETTING
SECTOR OVERVIEW

Scope of Section

The use of green spaces and the natural environment has a significant role in acting as a carbon "sink" – meaning that it removes carbon emissions from the atmosphere in the form of trees and other natural features. Management of natural infrastructure can achieve significant co-benefits across Slough, such as enhancing biodiversity, improving air quality and quality of place.

Key Emissions Sources

The urban nature of the borough means that emissions from the natural environment are relatively low, with 0.1% of the borough's emissions coming from the small amount of livestock present in Slough. 0.2% of the borough's total emissions are sequestered through CO_2 uptake in trees and other land types within the borough boundary and this gives Slough a net negative value for the natural environment of -0.1%. Slough Borough Council has committed to increasing tree coverage and the developments of Upton Court Park Jubilee Wood have already captured 11 tonnes of CO_2 between 2013 and 2019. The Council has further committed to planting thousands more trees as part of the Urban Tree Challenge.

Green Recovery Considerations

- UK Government pledge in 2020 to re-forest Britain and plant 30,000 acres of trees per year by 2025.
- £40 million Green Recovery Challenge Fund available for environmental charities to work on projects which contribute to nature conservation and restoration; nature-based solutions; or connecting people with nature.

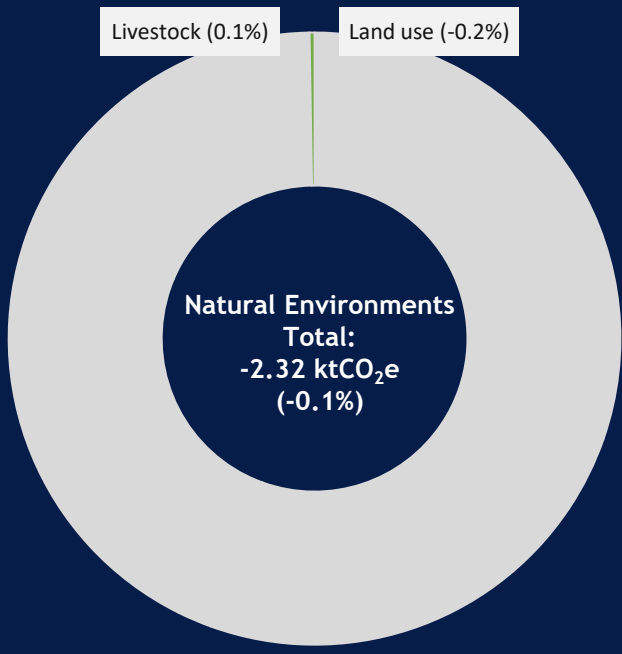


Figure 6.6.1: SCATTER 2018 inventory for natural environments in Slough.

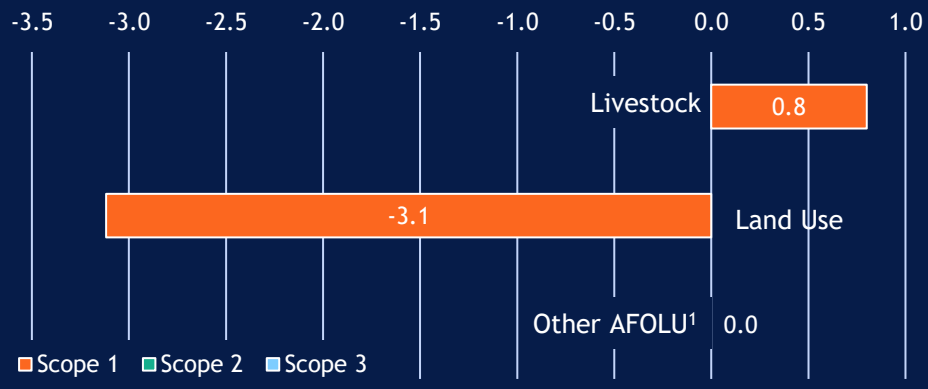


Figure 6.6.2: SCATTER 2018 scope 1, 2 & 3 natural environment emissions in Slough

[1]AFOLU refers to Agriculture, Forestry and Other Land Use

6.6 NATURAL ENVIRONMENTS & OFFSETTING
KEY PLANS AND POLICIES

National

- The 25 Year Environment Plan includes commitments to create new forests/woodlands, incentivise tree planting, explore innovative finance; and increase protection of existing trees.
- Land use: Policies for a Net Zero UK (2020) includes converting 22% of agricultural land (mostly from livestock) to forestry.
- Woodland Trust Emergency Tree Plan recommends Local Authorities write an Emergency Tree Plan and set targets for tree planting.
- The UK Environment Act 2021 mandates for an uplift of 10% in biodiversity on land associated with developer activity.

Berkshire

- The Localism Act (2011) places a requirement on Councils to meet the Duty to Cooperate on planning issues that cross administrative boundaries relating to strategic policies. This includes biodiversity and improving the historic and natural environment across Slough and the Thames Valley area.
- Bracknell Forest Borough Tree Strategy highlights that tree canopy in Bracknell Forest Borough covers 39.8% of land, making it the third highest tree cover by local authority in the UK and the importance of maintaining this resource.
- Reading Biodiversity Action Plan developed by Reading Council aims to ensure that by 2030 Reading will be richer in wildlife, be better connected to the wider landscape and that biodiversity loss will have been reversed.

Slough

- The Protecting Suburbs Strategy (2016-2030) aims to incorporate more green infrastructure across Slough for communities. The strategy highlights the need for greater amounts of green areas across the borough to counterbalance the small garden sizes, which are a consequence of dense housing layouts.
- The Slough Carbon Management Plan 2020-2030 utilise the Upton Court Park Jubilee Wood to highlight the importance of nature-based solutions. The plan raises the importance of Sustainability Impact Assessments to new buildings constructed, in terms of air, water and land pollution.
- Parks and Open Spaces Strategy is a full ten-year strategy for the maintenance and development of Slough's parks and green spaces.

6.6 NATURAL ENVIRONMENTS & OFFSETTING
INTERVENTIONS OVERVIEW

The use of green spaces and natural environments has a significant role in acting as a carbon "sink" – meaning that it removes carbon emissions from the atmosphere in the form of trees, soil and other natural features. The interventions modelled by SCATTER include:

1. **Increased tree coverage and tree planting:** Considers the increase in the proportion of land which is forest cover. Tree planting considers the changes to the coverage of trees outside of woodland, through new trees being planted and maintenance of existing trees.
2. **Land management:** Considers changes to the green belt and grassland coverage.
3. **Sustainable consumption:** Considers changes in the number of livestock in the area as well as the behaviour change of consumers when it comes to food.
4. **Considering offsets:** Despite aggressive emissions reduction actions across all sectors, some residual emissions still exist, as explored in the 'gap-to-target' discussion on page 27. Offsetting is an approach used to balance the climate impact of an organsiation, activity or individual through the purchase of tradeable units representing emissions rights, often through nature-based solutions. This is discussed further on page 137.

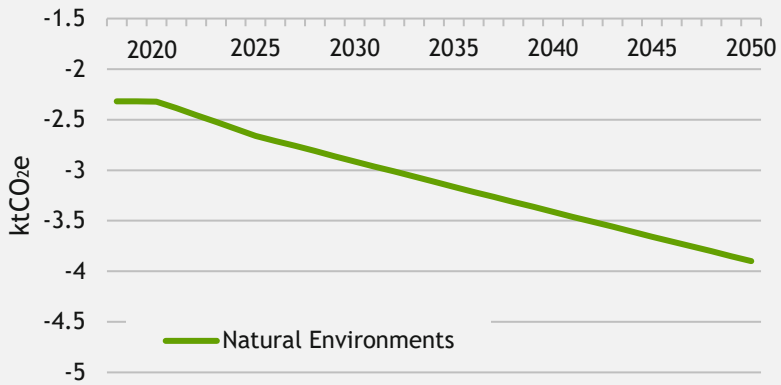


Figure 6.6.3: Slough's SCATTER High Ambition Pathway for natural environments.

Implementing the SCATTER interventions for natural environments at the highest ambition leads to:

47% Increase in carbon sequestration by 2040

- 3.4 $ktCO_2e$ Natural environment emissions remaining at 2040

SCATTER Intervention	Cumulative Emissions Savings (2020 - 2040)	Indicative costings (£m)	Staff Costs
1. Increased tree coverage and tree planting 2. Land use management	Land use: **10 $ktCO_2e$**	**0.1-0.4** (capex range depending on availability of government grant support[1])	**1.35 FTE** **2.95 FTE**
3. Sustainable consumption	Agriculture & Livestock: **1 $ktCO_2e$**	N/A	**0.5 FTE**
4. Considering offsets	**N/A**	N/A	**1 FTE**

Table 6.6.1: Cumulative carbon emissions savings (2020-2040) for natural environments. Land use savings describe savings from improved sequestration from woodland.

[1] Trees may not yet be classified as capital expenditure in some financial accounting rules, but are included here for completeness.

6.6 NATURAL ENVIRONMENTS & OFFSETTING
INTERVENTION MILESTONE

1. Increased tree coverage and tree planting

Tree coverage and the associated sequestration potential has been separated out into “forest coverage” and “lone trees”. Forest coverage relates to areas of trees which can be defined as such by a land use map. It is worth noting that the ability of existing forest stocks to sequester carbon is expected to weaken in the future due to the aging profile of trees.

Lone trees instead relate to smaller wooded areas, hedgerows, trees contained within gardens and so on.

The sequestration potential of carbon dioxide per ha of trees is based on academic research, which stipulates that for a tree whose canopy coverage extends to 25m^2, the lifetime uptake of carbon is around 750 kgCO_2.

	Current Context 2020	By 2040
Forest coverage	Trees currently cover 7.9% of Slough.[1]	The SCATTER High Ambition Pathway suggest a 24% increase in forest cover by 2040.
Tree planting outside woodlands (i.e. lone trees)	Tree planting outside woodlands is currently reported at around 200 hectares.	Tree planting outside woodlands increases by 56% from 2019 coverage to 312 hectares.

Table 6.6.2: Current context and the 2040 intervention milestones for tree coverage and tree planting.

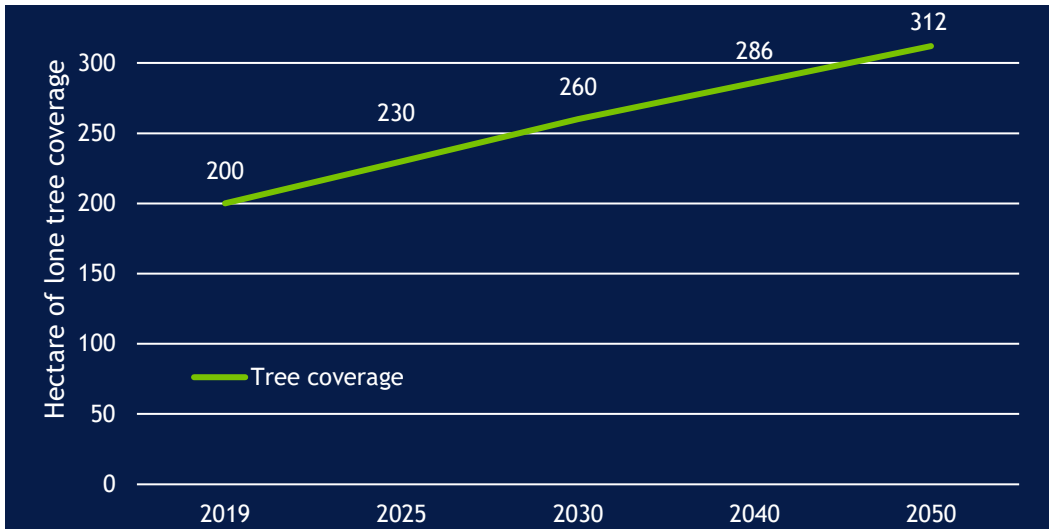


Figure 6.6.4: SCATTER High Ambition Pathway milestones for tree planting outside of woodlands (including lone trees, hedges and small woodlands).

[1] The Woodland Trust - Tree canopy cover by parliamentary constituency.

6.6 NATURAL ENVIRONMENTS & OFFSETTING
INTERVENTION MILESTONE

2. Land use management

Changes to land use types can achieve higher carbon sequestration. This is modelled within SCATTER as a transition from land use types that do not sequester carbon or act as carbon sources towards land use types that absorb more carbon into natural features. Land use change is modelled as a transition from open grassland to land which can be used to sequester greater levels of carbon. The land use trajectories from DECC 2050 emissions calculator have been mapped to Slough.

Participants in the Slough 2040 Vision consultation highlighted green spaces as the second most commonly mentioned theme by partners and residents. Green spaces are becoming increasingly important across the borough, especially as housing development density increases, and they host a number of co-benefits in relation to health and wellbeing.

Current Context 2020	By 2040
In 2018, there was approximately 33.6 ha of rough grassland in Slough.[1] In 2018, 11.3% of land use in Slough was agricultural.[1]	By 2040, there is a 2% decrease in grassland to allow for increased forestland and carbon sequestration potential

Table 6.6.3: Current context and the 2040 intervention milestones in SCATTER for land use management.

3. Sustainable Consumption

SCATTER models livestock numbers based on scenarios from the DECC 2050 emissions calculator. These scenarios assume different priorities for the future of agriculture, with the High Ambition Pathway forecasting a shift away from livestock- with a 12% reduction in livestock numbers by 2030, and a 30% reduction by 2040.

This SCATTER modelling is based on national data, scaled down to Slough. Given the nature of Slough as an urban centre, there are limited options for direct action in reducing livestock numbers. Naturally, emissions associated with livestock are also very small, and by extension, potential carbon savings are minimal.

For these reasons, actions around this intervention are focused on ways of achieving more sustainable food consumption in Slough, which will in turn influence agricultural practices. This shift will be underpinned by behavioral changes to diet. Such actions may help to achieve a reduction in the impacts of any limited agricultural operations in Slough, while also contributing to emissions reductions more widely.

[1] Ministry of Housing, Communities and Local Government - Land Use

6.6 NATURAL ENVIRONMENTS & OFFSETTING
OFFSETTING STRATEGY

4. Considering Offsets

Carbon offsetting refers to the purchase of a tradeable unit, representing emissions rights or emissions reductions, to balance the climate impact of an organisation, activity or individual. This offers a means through which the council can address any "Gap to Target" (i.e. residual emissions), as discussed on page 27.

It is important to make a distinction between carbon offsetting, and the actions outlined regarding green space and rural environments in this section of the report. The former is focused on the purchase of tradeable offsetting units that are likely to relate to projects outside of the borough (usually in developing countries). The latter provides an indication of the potential impact of direct action in the borough focused on improving the carbon sequestration of natural capital. These approaches should not be viewed as mutually exclusive- for example, the council could invest in a tree planting initiatives as a way of tracking the SCATTER trajectory and closing the residual 'gap'. Offsetting would exclusively relate to activities that go above and beyond the actions proposed above.

Carbon offsetting and Local Authorities

UK Certifiable schemes are available to councils seeking to offset their emissions, such as the Peatland Code, and Woodland Carbon Code. Offsetting schemes should align with neutrality standards such as PAS 2060. In addition, emerging Science Based Targets Institute guidance may be set stipulate that only offsets acquired through neutralisation, rather than compensation, are eligible in achieving net zero. However, such revised guidance is not expected to be published until Autumn 2021.

We have observed some common challenges and concerns that the public sector face when using 'traditional offsets'- these are explored overleaf. Such challenges have created the impetus for many authorities to explore "insetting".

Carbon Insetting

In a corporate context, carbon insetting refers to offsetting investments targeted within a business's value chain, as opposed to outside it. In a local authority context, the investment boundary is shifted from within the 'supply chain' to the local authority boundary; however, this definition is not yet formalised as such. Insetting is very different to offsetting and would be a means of accelerating and amplifying the in-boundary activities that have been proposed already (above). Insets are not tradable or readily available to purchase.

There is currently one insetting initiative in Slough, located in the Upton Court Park Woodland, but there are many more natural climate solutions which could serve as options for further initiatives, including tree and hedgerow planting, and improved management of parkland. Note that insetting could also apply to buildings, energy and waste focused projects.

Such opportunities are typically led by grassroots community groups and NGOs, where the presence of funding gaps provides a basis for investment by councils and corporate groups. Anthesis is currently pioneering the development of an Authority Based Insetting mechanism through which local authorities would be better equipped to identify and engage in such partnerships.

Next steps

In exploring offsetting opportunities, for the reasons given overleaf, Slough should prioritise those within the boundaries of the borough (insets), wherever possible. Later in this section, we provide recommended actions around offsets.

6.6 NATURAL ENVIRONMENTS & OFFSETTING
OFFSETTING STRATEGY

Key Offsetting Challenges for UK Local Authorities

We have observed some common challenges and concerns that the public sector face when using 'traditional offsets'. These include:

Increasing public scrutiny: The public is becoming better educated on climate change matters, partly due to the 'mainstreaming' of the climate emergency via school strikes and increased media coverage. This means that issues around quality (including additionality, permanence, and verification) of offsets still exist and are receiving greater scrutiny by the general public than ever before. Combined with the fact that it is taxpayer's money that will be spent, councils' offsetting activity is likely to attract significant public attention.

Difficulty in retaining co-benefits locally: Unlike corporates, local authorities need to demonstrate a social return on money invested, such as an increase in jobs and improved health, within the borough that they serve. This is difficult to achieve using existing certified offsetting schemes, as they commonly relate to projects outside of the local authority and/or outside of the UK.

Lack of taxpayer choice: Unlike the consumers of a business's products or services, whose purchasing decision may be influenced based on what type of socio-environmental cause they wish to support, taxpayers do not get a direct choice as to how their money is invested, i.e. people can't choose to not pay council tax based on the council's sustainability credentials.

Lack of international relevance: Many businesses may select an offsetting scheme based on the relevance to their global supply chains, consumer markets or alignment with other unique social values and causes. While councils may still have extended supply chains, their purpose has an inherently local focus, so it is much harder for them to justify diverting socio-economic co-benefits internationally, relative to corporates.

Limited options available in the UK: Limitations in scope of Carbon Neutrality Standards - Existing carbon neutrality standards such as PAS 2060 require 'certified' offsets to be used. However, the range of UK options is currently limited (i.e., the Peatland Code and Woodland Carbon Code). Also, with an increase in demand for UK projects, these schemes are becoming more expensive.

Current certified offsets do not offer a financial return on investment: Most conventional offsetting schemes require an annual investment with no direct financial payback. This contrasts with more 'direct' emissions reduction measures applied within an organisation that can offer a financial return through reduced energy or fuel costs. While insetting projects are slightly further removed than direct, internal projects, they still have the potential to better connect the investor to the beneficiary. This may offer an opportunity for the investor to share some of the financial, reputational and carbon saving benefit.

Limited supply and impact of UK certified options: Current options for certified UK schemes are 'nature based', i.e. tree planting and peatland restoration. While these are tremendously positive activities that offer a raft of co-benefits in addition to carbon removal, it is important to recognise the scale of the carbon reduction challenge still needed across other emissions sectors, such as transport, energy, and buildings. Therefore, even with radical investment in nature-based solutions, there may not be enough projects and savings on offer within the borough boundary, and even the UK as a whole, to bridge the 'gap' to zero. Therefore, other types of emissions saving projects may still be required.

As a result, many local authorities are now seeking to focus their investments inwardly through "carbon insetting".

6.6 NATURAL ENVIRONMENTS & OFFSETTING
KEY STAKEHOLDER VIEWS

As part of the Climate Change Strategy & Action Plan development, a series of seven workshops were held online to gain stakeholder views on the actions proposed, key barriers and enablers to their implementation and further implementation considerations. A summary of the key stakeholder views relating to natural environments and offsetting are detailed below.

Intervention	Barriers	Enablers	Implementation Considerations
1. INCREASED TREE COVERAGE AND TREE PLANTING	*"Space constraints within the Borough"* *"Funding opportunities"* *"Maintenance of trees"*	*"Desire for trees making areas more attractive"* *"Urban tree challenge- got funding* *Engage with schools to plant trees on site"*	*"Ensure protection of open space is a high priority in planning"* *"Prioritise tree species that have higher carbon sequestration"*
2. LAND USE MANAGEMENT	*"Housing demand is forcing out green space"* *"Land availability is a problem"*	*"Don't just focus on tree's, hedge rows can have a similar impact and must be explored"* *"Agri-env schemes to provide funding - i.e., ELMS"*	*"Public perception around wild meadows and wild green spaces"* *"Introduce a strategy to reduce the amount of mowing of grass, allow places to be 'wilder'"*
3. SUSTAINABLE CONSUMPTION	*"Gentrification of Slough central could spark diet change"* *"Pop-up vegan/veggie stores in the town centre"*	*"Not many accessible diet/nutrition courses"*	*"Can the council introduce community orchards or vegetable patches"*
4. OFFSETTING STRATEGY	*Biodiversity Net Gain*	*Space constraints within the Borough*	*Offsetting carbon emissions by planting outside of the borough - would this meet Slough's net zero targets?*

6.6 NATURAL ENVIRONMENTS
1) INCREASED TREE COVERAGE & TREE PLANTING

Goal: Existing tree coverage is maintained

Responsibility	Action	SBC's role	Key Stakeholders	Action Impact	Timescale	Complexity
SBC	Develop a long-term strategy to protect and manage existing urban trees and woodland in the borough, especially trees planted as part of the Urban Forest Project	Policy & Strategy	Lead: Council's Landscape & Ground Maintenance Team, Other: Council's Environment Management Team	Strategic	Short	Medium
SBC	Carry out ongoing inventory and report on tree & hedgerow abundance, diversity and cover statistics	Implementation	Lead: Council's Landscape & Ground Maintenance Team, Other: Council's Environment Management Team	Indirect	Long	Low
Borough	Engage with community groups (e.g. friends of parks groups) and schools to carry out tree monitoring and inventories through a Tree Warden programme	Communication & Engagement	Lead: Council's Environment Management Team , Other: Council's Landscape & Ground Maintenance Team	Indirect	Immediate	Low

6.6 NATURAL ENVIRONMENTS
1) INCREASED TREE COVERAGE & TREE PLANTING

Goal: Opportunities to increase tree coverage are explored

Responsibility	Action	SBC's role	Key Stakeholders	Action Impact	Timescale	Complexity
SBC	Plant trees, woodland or hedgerows on council-owned land (where appropriate) including strategic land and along grass verges or highways	Implementation	Lead: Council's Landscape & Ground Maintenance Team, Other: Council's Highway Maintenance Team	Direct	Short	Medium
SBC	Carry out opportunity mapping to assess areas of the borough which could be converted to small-scale woodland or are available for tree planting	Research & Design	Lead: Council's Landscape & Ground Maintenance Team, Other: Council's Environment Management Team	Strategic	Short	Low
SBC	Ensure tree cover is considered for all new developments through the new Local Plan by mandating for a minimum level of tree coverage in new developments, and exploring incentives for developers to retain trees	Implementation	Lead: Council's Planning Policy Team, Other: Council's Environment Management Team	Direct	Medium	High
Borough	Continue to engage with private landowners in the borough following the Urban Forest Project to identify opportunities for tree and hedge planting	Communication & Engagement	Lead: Council's Environment Management Team , Other: Council's Landscape & Ground Maintenance Team	Indirect	Short	Medium
Borough	Engage with community groups (e.g. friends of parks groups) and schools to carry out tree planting through Slough's Digital Urban Forest	Communication & Engagement	Lead: Council's Environment Management Team , Other: Council's Landscape & Ground Maintenance Team	Indirect	Short	Low

6.6 NATURAL ENVIRONMENTS
1) INCREASED TREE COVERAGE & TREE PLANTING

Goal: Opportunities to increase tree coverage are explored (Cont..)

Responsibility	Action	SBC's role	Key Stakeholders	Action Impact	Timescale	Complexity
Borough	Prioritise tree planting initiatives in more deprived and less green wards of the borough, where the opportunities for, and benefits of, action are greatest	Implementation	Lead: Council's Environment Management Team , Other: Council's Landscape & Ground Maintenance Team	Indirect	Long	Medium
Borough	Prioritise hedge and tree planting near to schools to act as an effective barrier to pollution	Implementation	Lead: Council's Environment Management Team , Other: Schools	Indirect	Long	Medium
Borough	Consider financial incentives to residents to plant more trees on private property, such as discounts on council tax for every tree planted	Research & Design	Lead: Council's Environment Management Team , Other: Council's Revenues Team	Indirect	Medium	Medium

6.6 NATURAL ENVIRONMENTS
2) LAND MANAGEMENT

Goal: Maintain and enhance green space

Responsibility	Action	SBC's role	Key Stakeholders	Action Impact	Timescale	Complexity
SBC	Continue current investment and source further funding for greater enhancement of existing green spaces as housing development density increases	Implementation	Lead: Council's Environment Management Team , Other: Council's Landscape & Ground Maintenance Team	Indirect	Long	Medium
SBC	Restore, retain and protect existing land uses which store CO_2 on council-owned land	Implementation	Lead: Council's Landscape & Ground Maintenance Team, Other: Council's Environment Management Team	Direct	Long	Low
SBC	Impose more ambitious green space requirements in planning policy for development and ensure that green spaces are at the heart of planning. Also consider imposing living wall and green roof planning requirements for all commercial developments in the borough.	Policy & Strategy	Lead: Council's Planning Policy Team, Other: Council's Environment Management Team	Direct	Long	Medium
Borough	Carry out a mapping exercise to assess which areas of the borough could be designated, protected and enhanced as green space, ensuring equitable access for communities in Slough	Implementation	Lead: Council's Environment Management Team , Other: External mapping consultants	Strategic	Immediate	Low
Borough	Enhance greenery including shrubs and hedgerows within streets, where it is practical to do so, in line with public realm works and the Proposed Spatial Strategy	Implementation	Lead: Council's Environment Management Team , Other: Council's Planning Policy Team	Direct	Long	Medium

6.6 NATURAL ENVIRONMENTS
2) LAND MANAGEMENT

Goal: Maintain and enhance green space (Cont..)

Responsibility	Action	SBC's role	Key Stakeholders	Action Impact	Timescale	Complexity
Borough	Maintain and increase where possible the number of Green Flag status parks across the borough	Communication & Engagement	Lead: Council's Environment Management Team , Other: Council's Landscape & Ground Maintenance Team	Indirect	Medium	Low
Borough	Develop a toolkit for green community schemes that small and medium-sized enterprises (SMEs) could refer to in looking for community engagement or philanthropy opportunities	Communication & Engagement	Lead: Council's Environment Management Team , Other: Community Groups	Indirect	Long	Low

6.6 NATURAL ENVIRONMENTS
2) LAND MANAGEMENT

Goal: Improve biodiversity in the local area

Responsibility	Action	SBC's role	Key Stakeholders	Action Impact	Timescale	Complexity
SBC	Embed building technologies such as living roofs and green facades into planning policy	Policy & Strategy	Lead: Council's Planning Policy Team, Other: Property Owners and Developers	Strategic	Medium	Medium
SBC	Rewild verges, reduce mowing and plant and/or sensitively manage hedgerows to connect and enhance wider ecological networks	Implementation	Lead: Council's Landscape & Ground Maintenance Team, Other: Berkshire LNP, Berkshire, Buckinghamshire, Oxfordshire Wildlife Trust	Direct	Short	Low
SBC	Develop a long-term biodiversity strategy for the borough which prioritises wildlife friendly planting, reduced pesticide and herbicide use and the protection and management of Slough's existing nature reserves	Policy & Strategy	Lead: Council's Environment Management Team , Other: Berkshire LNP, Berkshire, Buckinghamshire, Oxfordshire Wildlife Trust	Strategic	Short	Medium
SBC	Embed a minimum of 10% Biodiversity Net Gain into planning policy for new developments	Policy & Strategy	Lead: Council's Planning Policy Team, Other: Berkshire LNP, Berkshire, Buckinghamshire, Oxfordshire Wildlife Trust	Strategic	Long	Medium
Borough	Engage with residents on the value of land use and habitats within private gardens	Communication & Engagement	Lead: Council's Environment Management Team , Other: Residents and Community Groups	Indirect	Short	Medium
Borough	Run a campaign/training on Biodiversity Net Gain in partnership with Berkshire LNP	Communication & Engagement	Lead: Council's Environment Management Team , Other: Berkshire LNP	Indirect	Short	Medium
Borough	Encourage the use of open green spaces at the Curve and other public facilities for gardening clubs and community gardens	Implementation	Lead: Council's Environment Management Team , Other: Public Facilities	Indirect	Medium	Low

6.6 NATURAL ENVIRONMENTS
3) SUSTAINABLE CONSUMPTION

Goal: Consumption patterns of diets in the borough are more sustainable

Responsibility	Action	SBC's role	Key Stakeholders	Action Impact	Timescale	Complexity
SBC	Provide locally sourced, vegetarian or vegan meals in council offices and council led events	Implementation	Lead: Council's Building Management Team, Other: Council suppliers	Direct	Immediate	Low
Borough	Set up procurement contracts with local producers or Meat Free Mondays in schools across the borough	Implementation	Lead: New team lead required, Other: Schools	Direct	Short	Low
Borough	Identify key partners/stakeholders in the borough or neighbouring boroughs to increase the sustainability of local diets, e.g., more local products for shorter supply chains	Communication & Engagement	Lead: New team lead required, Other: Neighbouring boroughs	Strategic	Short	Low
Borough	Commit to a target or pledge for more climate-friendly diets across the borough and set up a campaign to encourage residents to eat less meat and more locally sourced food	Implementation	Lead: New team lead required, Other: Residents and Community Groups	Indirect	Short	Medium

6.6 NATURAL ENVIRONMENTS
4) CONSIDERING OFFSETS

Goal: Residual emissions are addressed through offsetting

Responsibility	Action	SBC's role	Key Stakeholders	Action Impact	Timescale	Complexity
SBC	Develop an offsetting strategy to address residual emissions not tackled by direct actions in the borough with a validated offsetting method	Policy & Strategy	Lead: Council's Environment Management Team , Other: All council	Strategic	Short	High
SBC	Assess the carbon sequestration of current council land and identify opportunities to increase sequestration, looking into different natural carbon capture options	Research & Design	Lead: Council's Asset Management Team , Other: Council's Environment Management Team	Direct	Short	Low
Borough	Encourage businesses to support borough-wide offsetting initiatives where possible through Authority Based Insetting	Communication & Engagement	Lead: Council's Environment Management Team , Other: Businesses	Indirect	Medium	High

6.6 NATURAL ENVIRONMENTS & OFFSETTING
CO-BENEFITS OF ACTIONS

It can be helpful to consider the added co-benefits of given measures when planning climate action. Taking climate action around the green space and rural environments in Slough will offer co-benefits across economic, social and environmental spheres:

ECONOMIC

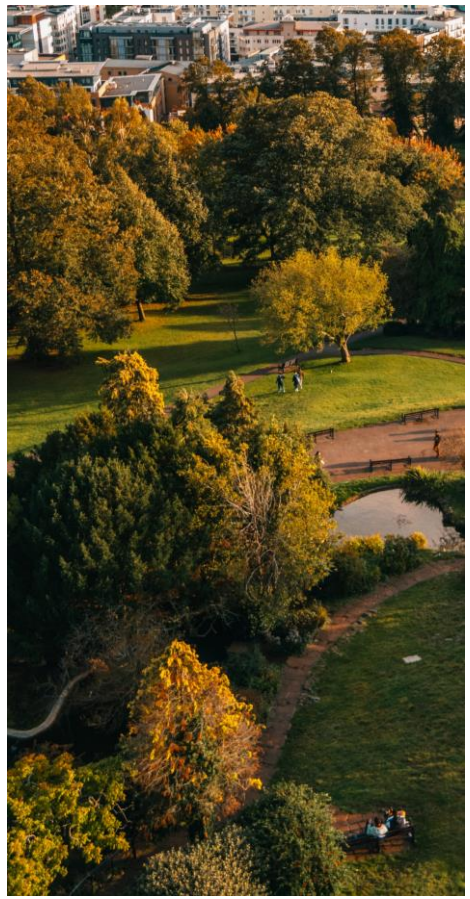
- Industrial areas and employment sites with access to natural greenspace can have more productive employees and these employees tend to have greater job satisfaction. Retail areas with trees perform better than shopping centres without them, as customers are found to spend both more time and money
- On average, house prices increase between 5 – 18% when a property is associated with mature trees
- If everyone has access to sufficient green space, the benefits associated with increased physical activity could save the health system £2.1 billion per year

SOCIAL

- Recreational outdoor spaces such as Upton Court Park encourage locals to get active, which can improve mental and physical health and reduce obesity rates
- Green spaces can provide a space for communities to engage, which can improve community cohesion, walkability of neighbourhoods, reduce crime and develop a connection to local place

ENVIRONMENTAL

- The average reduction of particulate matter near a tree is between 7% and 24%, while the cooling effect of trees is up to 2ºC
- Trees can reduce noise pollution by up to 6-8 decibels, particularly relevant for communities located next to the M4 and Heathrow
- Enhancing biodiversity supports many ecosystem services, including the supply of oxygen, plant pollination and healthy food chains that benefits birds and mammals, a mature oak for example can host up to 5,000 difference species of invertebrates



6.6 NATURAL ENVIRONMENTS & OFFSETTING
NATIONAL CASE STUDIES

INCREASED TREE COVERAGE

Solihull's Wildlife Ways Project - A £16.8 million project supporting the planting of over a thousand trees from 2018-2020. The project will help achieve Solihull's goal of planting 250,000 trees over the next 10 years. The WMCA Virtual Forest allows individuals from the public to record trees they plant across the region enabling better tracking of collective efforts.

Hinckley and Bosworth Borough Council sought Government support for its ambitions to extend the National Forest across Leicestershire, in line with the region's carbon neutrality goals. The council will be working to find grants to buy land and engage with local landowners to provide tree planting space.

Cheshire East Council has assessed the role of offsetting in their achievement of carbon neutrality by considering the associated costs, scope and boundary of carbon offsetting. Their work also considered introducing Authority-based insetting and tree planting opportunities within the borough.

The Greater Manchester City Tree Planting Initiative planted 59,929 trees and involved 12,538 people. It is aiming to plant 3 million trees and bring 2,000 hectares of unmanaged woodland back into community use.

LAND MANAGEMENT

Neighbourhoods Green is a partnership between environmental and social organisations to improve green space management in the housing sector. Neighbourhoods Green offered guidance, support and tools to landlords, housing and resident associations and community groups.

Newcastle City Council's Green Infrastructure Delivery Framework highlights the co-benefits of green and blue infrastructure, particularly building on strategies to reduce flood risk. The Green Infrastructure Strategy identifies priorities for green infrastructure protection, enhancement and new provision. Green Infrastructure Assets include accessible urban green space, natural and semi natural habitats, transport links (cycleways and footpaths), wildlife corridors, street trees and green roofs.

SUSTAINABLE CONSUMPTION

Nottingham's Good Food Partnership part funded by Nottingham City Council, work to promote the sustainability of Nottingham's local food system and work towards a circular food economy, reducing the ecological footprint of the food system and aim for zero edible food waste.

6.6 NATURAL ENVIRONMENTS & OFFSETTING
LOCAL CASE STUDIES

INCREASED TREE COVERAGE

Urban Tree Challenge - Slough has the lowest level of tree canopy in Berkshire and is below the national minimum target of 20% tree cover. 9000 trees are now being planted and digitally linked/mapped across 31 sites. Slough's Digital Urban Forest is part of a nationwide initiative partly funded by DEFRA.

Slough Woodland Project - Upton Court Park was used between the 1940's and 1970's as a site for tipping waste and suffered accordingly with high levels of contamination. This project sought to reverse this environmental decline by creating this new woodland and creating an oasis for wildlife in an urban location. A total of 8,585 native trees were planted on the site. Initiated in 2013, the woodland has sequestered 11 tonne of CO_2. As the woodland growth accelerates with age, this is forecast to reach over 700 Tn after 25 years and over 1,300 tonnes after 50 years.

LAND MANAGEMENT

Ecological corridors – The council's parks team have planted wildflower meadows within Slough in areas designed to facilitate development of "ecological corridors" through which to connect communities of bees and other wildlife.

The Salt Hill Project works with local communities in Slough to improve surroundings and generate a cleaner healthier watercourse. The project has received over 400 hours from volunteers working on Temple Wood renovation and taught over 1,600 children the importance of wetlands.

Roof-top gardens -These have been implemented on top of renovated Horlicks Factory new development properties to improve green space and biodiversity.

6.7 The Council's Wider Influence

Anthesis

6.7 THE COUNCIL'S WIDER INFLUENCE
SECTOR OVERVIEW

Context

As Slough Borough Council strive towards their Net Zero goal by 2040, the council will have to adapt both internally and externally to ensure changes outlined in this report are implemented and achieved. Slough council is directly responsible for just over 1% of emissions in the borough, which means how it influences those responsible for the remaining 98% of emissions is critical to the council's success in achieving their target.

As such, the council need to consider how they leverage their wider degree of influence across these stakeholders. This chapter considers actions relating to the council's ability to influence. There are no SCATTER interventions for this sector, however qualitative targets can be identified and set to provide an understanding of what needs to be achieved. There are outlined below, along with an indication of estimated FTE requirements:

1. Drive behaviour change in the council and improve understanding
Estimated Staff Cost: Within existing staff time & resources
Slough Borough Council can also look to enable wider change through their direct communication and engagement with the local council. This can be achieved by educating their staff and enrolling them on various training schemes – providing them with information on the subject and what they can do to help.

2. Reduce direct carbon impact of existing & future procurement contracts
Estimated Staff Cost: 0.2 FTE
Slough Borough Council need to work closely with other external stakeholders if they wish to achieve their target. A crucial component will be their ability to reduce direct carbon impact of existing and future procurement contracts; ensuring that standards are established and maintained going forward.

3. Enable wider change across the borough
Estimated Staff Cost: 1.25 FTE
Slough Borough Council can also look to enable wider change through both direct & indirect communication and engagement. This includes educating the public and businesses through training schemes, local sign posting and making information available on the subject matter widely accessible.

4. Lobby national government to deliver national policy changes
Estimated Staff Cost: 0.25 FTE
Slough Borough Council also has a responsibility to campaign for national action in collaboration with local powers that need support when trying to implement net zero initiatives. It's important that the council work towards educating their employees on the subject matter so as many council staff members can get involved.

6.7 THE COUNCIL'S WIDER INFLUENCE
KEY PLANS AND POLICIES

National

- Social Value Act – Councils are required to consider the 'social value' when implementing new legislation or policies, specifically relating to how they can also secure wider social, economic and environmental benefits.
- Sustainable procurement tools - Defines what this means in public procurement and provide guidance on good practice; like managing ahead of demand, effective on-going contract management and dealing with supply chain risk.
- Government Buying Standards – This sets out mandatory and best practice product specifications for public sector procurement.

Berkshire

- The Thames Valley Berkshire Local Enterprise Partnership Delivery Plan 2020 – 2021 - Explores the LEP's responsibility in supporting a low carbon transition, and managing the future impacts of growth in energy infrastructure, especially renewables, across the region. The plan is being executed in partnership with local businesses, supporting them through the clean growth agenda outlined in the plan.

Slough

- Slough 2040 Vision – Through collaboration with the local community and organisations, Slough developed their 2040 vision with the intention of creating a bold and ambitious shared vision of Slough's future. This includes improving public health, making Slough a sustainable town, and strengthening the town's economy.
- Slough Council procurement policy - Slough Borough Council's procurement policy seeks to make their contracts more available for local SME's as well as smaller businesses. Ultimately, the policy aims to encourage appropriate use of their legal powers including the power to promote the economic, social and environmental well-being of our community.

6.7 THE COUNCIL'S WIDER INFLUENCE
CASE STUDIES

LOCAL

Slough Climate Challenge - Action 5.4 of the Slough Inclusive Growth Strategy 2020-2025 includes the Slough Climate Challenge: an annual Climate Challenge which provides a platform to showcase climate change progress and activate local innovators to tackle pressing issues, leveraging local entrepreneurs and established businesses, positioning Slough as progressive in its pursuit of a net zero footprint.

Slough Borough Council - has been awarded £1,076,329 to fund energy efficiency and carbon reduction measures at 6 sites, including schools and community centres. The project will include installing air source heat pumps and solar panels and improving building insulation.

NATIONAL

London Borough of Waltham Forest - have pledged to divest its pension funds from oil, gas and coal over the next 5 years. The 2018 audit showed progress had already been made with a 44% reduction in the estimated value of investments in fossil fuel stocks held by the council.

Stockport Metropolitan Borough Council - have been working to develop a process of incorporating carbon impacts into investment appraisals. The aim is to support more informed decision-making. The Council have also trained 120 staff in carbon literacy and have been certified as a bronze carbon literate organisation.

Oxford City Council - All registered drivers at the council were required to complete the EST smarter driving course. This achieved a 17% reduction in fuel use in the first year. This level of reduction could save the council an estimated £69,000 and 150 tCO_2 per year.

6.7 THE COUNCIL'S WIDER INFLUENCE
ENACTING WIDER CHANGE

Goal: Drive behaviour change in the council and improve understanding

Responsibility	Action	SBC's role	Key Stakeholders	Action Impact	Timescale	Complexity
SBC	Deliver Carbon Literacy Training, or a similar programme, to all Council staff & members and incorporate this training into the staff onboarding process	Implementation	Lead: Council's Environment Management Team , Other: All Council staff & members	Indirect	Short	Low
SBC	Monitor and track progress to implement actions of the Climate Change Strategy, ensuring annual reporting and regular scheduled review of the action plan and implementation planning by the Environmental Strategic Board	Communication & Engagement	Lead: Council's Environmental Strategic Board, Other: Council's Environment Management Team, All Council staff & members	Strategic	Long	Low
SBC	Deliver the key actions outlined in the council's Carbon Management Plan	Implementation	Lead: Council's Environment Management Team , Other: All Council staff & members	Direct	Long	Low

6.7 THE COUNCIL'S WIDER INFLUENCE
ENACTING WIDER CHANGE

Goal: Reduce direct carbon impact of existing and future procurement contracts

Responsibility	Action	SBC's role	Key Stakeholders	Action Impact	Timescale	Complexity
SBC	Establish standards of effective carbon management in contracts	Implementation	Lead: Council's Procurement & Purchasing Team, Other: Suppliers	Strategic	Short	Medium
SBC	Deliver training to contract managers on sustainable procurement and how it relates to the borough's strategy	Implementation	Lead: Council's Environment Management Team , Other: Council's Procurement & Purchasing Team	Indirect	Short	Low
SBC	Introduce a net zero aligned procurement policy	Implementation	Lead: Council's Procurement & Purchasing Team, Other: Prospective Suppliers	Strategic	Medium	Medium
SBC	Require suppliers to set Science Based Targets (SBTs) or to have a climate strategy or target in line with the borough	Implementation	Lead: Council's Procurement & Purchasing Team, Other: Suppliers	Indirect	Medium	High

Goal: Enable wider change across the borough

Responsibility	Action	SBC's role	Key Stakeholders	Action Impact	Timescale	Complexity
Borough	Work with public services in the borough to signpost climate change action due to the high interaction with people within the borough	Communication & Engagement	Lead: Council's Environment Management Team , Other: Public Services	Indirect	Short	Low

6.7 THE COUNCIL'S WIDER INFLUENCE
ENACTING WIDER CHANGE

Goal: Enable wider change across the borough (Cont.)

Responsibility	Action	SBC's role	Key Stakeholders	Action Impact	Timescale	Complexity
Borough	Work with neighbouring Berkshire councils and Thames Valley Berkshire Local Enterprise Partnership (TVB LEP) to support businesses in identifying what skills are required to take forward the net zero actions	Communication & Engagement	Lead: Council's Community Learning Team, Other: Local Training Colleges	Indirect	Long	Medium
Borough	Collaborate with local training colleges and educational centres to ensure sufficient, relevant skills capacity exists within the local workforce	Communication & Engagement	Lead: Council's Community Learning Team, Other: Thames Valley Berkshire LEP & neighbouring Berkshire councils	Indirect	Immediate	Low
Borough	Deliver a wider Net Zero Slough communications campaign including a micro-website detailing progress on the Council's action plan and emissions reduction	Communication & Engagement	Lead: Council's Communications Team, Other: Council's Environment Management Team	Indirect	Short	Low
Borough	Continue to develop support for SME Businesses to calculate and reduce their emissions, building on the toolkit being developed with Ealing Council	Communication & Engagement	Lead: Council's Communications Team, Other: Council's Environment Management Team	Indirect	Short	Medium
Borough	Provide guidance on how low carbon practices and embodied carbon in supply chains can be embedded into business procurement activities	Communication & Engagement	Lead: Council's Business Support Team, Other: Businesses	Indirect	Short	Low
Borough	Work with or form partnerships with businesses to both set targets to decarbonise and to identify collaborative projects	Communication & Engagement	Lead: Council's Building Support Team, Other: Businesses	Indirect	Short	Low

6.7 THE COUNCIL'S WIDER INFLUENCE
ENACTING WIDER CHANGE

Goal: Lobby national government to deliver national policy changes

Responsibility	Action	SBC's role	Key Stakeholders	Action Impact	Timescale	Complexity
SBC	Lobby central government for financial support and grants. For example, relating to the council, achieving Salix Finance to support decarbonisation of council buildings. Relating to residents, an example would be setting up a scheme offering mobility credits for alternative transport for the able-to-pay market to scrap their cars	Communication & Engagement	Lead: Environment Management Team and Planning Policy Team, Other: Council's Building Management Team	Indirect	Short	Low
SBC	Lobby central government to designate responsibility for decarbonisation for each emissions source help clarify responsibility for action	Communication & Engagement	Lead: Environment Management Team, Other: Council's Communications Team	Indirect	Short	Low
SBC	Encourage more ambitious national action in key areas relating to Slough, working with Thames Valley Berkshire LEP and neighbouring Berkshire councils to identify the local powers needed to support implementation of the net zero actions	Communication & Engagement	Lead: All Council staff & members, Other: Thames Valley Berkshire LEP & neighbouring Berkshire councils	Strategic	Long	Low

07 Climate Change Adaptation

7. CLIMATE CHANGE ADAPTATION
NATIONAL CONTEXT

In 2008, the UK passed the world's first legally binding mitigation target to reduce GHG emissions by 80% by 2050 against 1990 levels, this was later amended to 100% in 2019. Under the 2008 Climate Change Act, the UK government is also required to publish a Climate Change Risk Assessment (CCRA) every five years, aiming to identify key risks and opportunities associated with higher temperatures in the UK.

Despite rigorous reduction measures, the UK is expected to face negative impacts of global warming. The third Climate Change Risk Assessment was published in 2021- the latest evidence shows a widening gap between the level of climate risk, and adaptation measures already underway.

"Adaptation has failed to keep pace with the worsening reality of climate risk" (Climate Change Committee, 2021)

The report also points out the importance of adaptation as a complement to GHG emission reductions. Adaptation to climate change will help reduce exposure and vulnerability to climate risk, and tackle some of the uncertainty around future global warming impacts.

Adaptation Action Planning

The Carbon Disclosure Project (CDP) is a NGO working to support cities and businesses to better report their carbon impact and risk. CDP's Guidance for Local Authorities states that cities and regions developing a climate change strategy should consider mitigation and adaptation measures within the same plan. Tackling these together allows a more holistic approach that acknowledges overlaps and synergies between the two approaches.

For example, many actions intended to reduce flood risk through conservation and enhancement of the natural environment also have large carbon benefits. Such synergies are reflected in this chapter, with some actions directing the reader to other sections of this report.

Key Definitions:

Climate Risk: "The potential for adverse consequences for human or ecological systems, recognising the diversity of values and objectives associated with such systems. In the context of climate change, risks can arise from potential impacts of climate change as well as human responses to climate change. Relevant adverse consequences include those on lives, livelihoods, health and wellbeing, economic, social and cultural assets and investments, infrastructure, services (including ecosystem services), ecosystems and species." (IPCC)

Mitigation: "A human intervention to reduce emissions or enhance the sinks of greenhouse gases." (IPCC)

Adaptation: "An adjustment in natural or human systems in response to actual or expected climatic stimuli (variability, extremes and changes) or their effects, which moderates harm or exploits beneficial opportunities. (UK Climate Impact Programme)

7. CLIMATE CHANGE ADAPTATION
SLOUGH'S COMMITMENT TO ADAPTATION

In Slough Borough Council's 2019 motion on climate change, the council committed to developing this Climate Change Strategy and Action Plan. Among 5 key objectives, the plan seeks to address the need to adapt to the impacts of climate change:

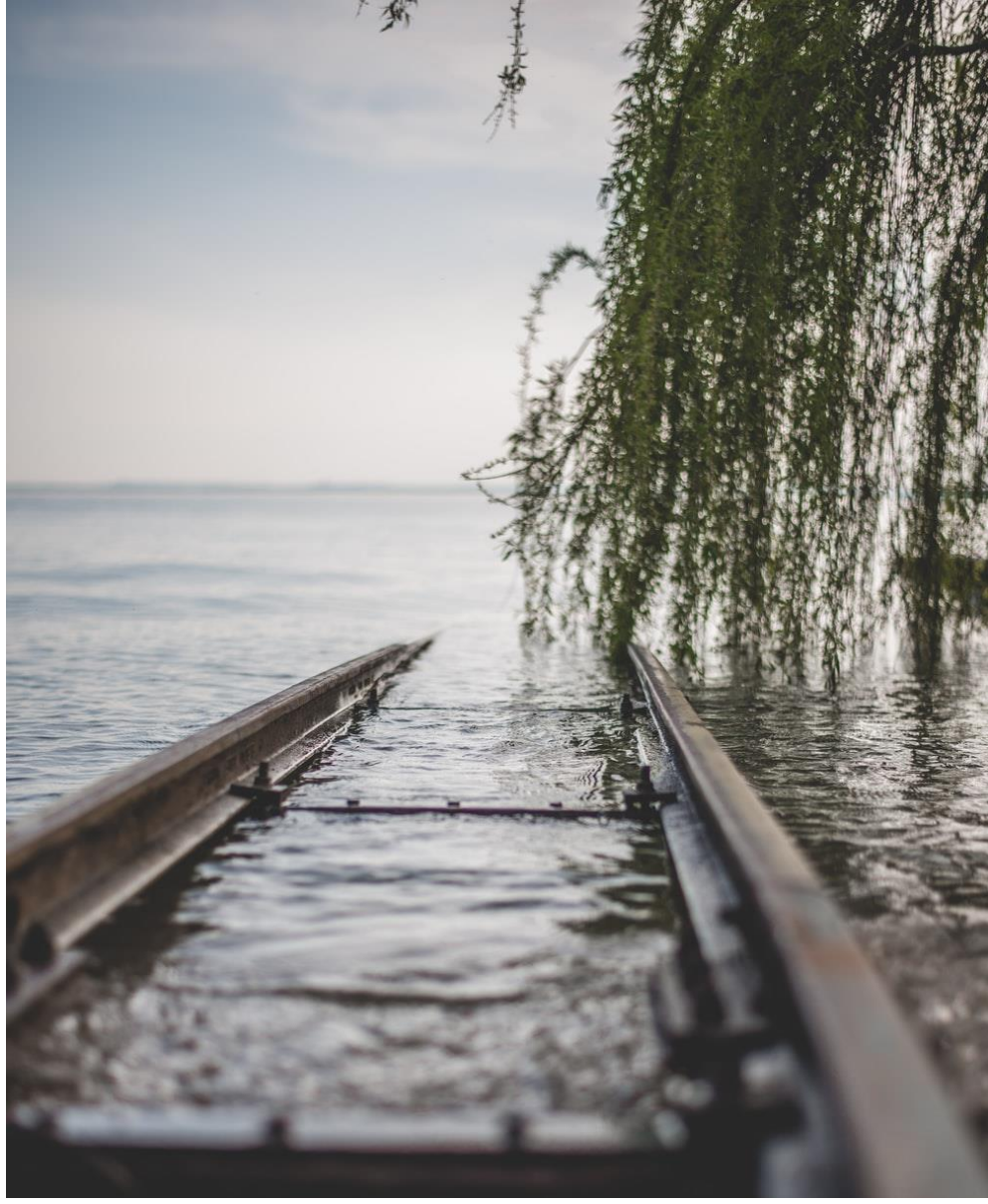
"Supporting council services, residents and businesses to adapt to the impacts of climate change."

Slough Borough Council has already engaged in adaptation measures. In 2014, the Climate Change Strategy for Slough expressed that public sector agencies must seize the opportunity and take lead in adopting adaptation measures to improve resilience to the impacts of climate change. The plan also listed several actions that could be taken to reduce the risk.

The council developed an internal risk management strategy in 2017, which included high level consideration of environmental impacts. Although a full vulnerability assessment has not been undertaken, several risk assessments into specific potential impact areas, particularly flooding, are available. Adaptation to climate change requires continuous action and development, and the recommendations of the 2014 plan, and other key documents, have informed the recommendations of this chapter.

This Chapter

This chapter provides recommendations on how stakeholders across the borough can adapt to the impacts of climate change. Because SCATTER only provides pathways for carbon mitigation, our recommendations are based on a qualitative assessment of climate risk. Our approach is outlined further overleaf.



7. CLIMATE CHANGE ADAPTATION
RISK ASSESSMENT OVERVIEW

In creating an adaptation action plan, it is essential to understand the nature as well as the magnitude of the risks to the local area from the changing climate. Completing a risk assessment informs the priority areas which the action recommendations should seek to address. In this chapter, we present the following:

1. **Historic Risks:** We have reviewed data and information on historic impacts of climate change, for example, periods of extreme weather and recurring events.
2. **Projections**: We have reviewed projections around the physical impact of future changes in the climate. Such projections contain elements of uncertainty.
3. **Key Risks:** Based on our assessment of historic risks, projections, and local factors which may contribute to Slough's vulnerability, we have provided an overview of risk areas judged most relevant to Slough.
4. **Action Recommendations:** We provide recommended actions needed to mitigate the anticipated impact of the key risks identified. Proposed actions are presented in a structure similar to our recommendations for mitigation (Page 34). Each action is aligned with an "Impact Area"- Strategic, Natural Environment, Economic, or Social.

In line with the other sections of this action plan, we also provide case studies of existing action, and a discussion of the cost of action.

Scope of this work

This risk assessment is intended to give a high-level overview of areas of key climate risk in Slough, rather than a comprehensive view of all risks. In launching this work, we reviewed the 2017 Climate Change Risk Assessment (CCRA 2017)[1] and noted six key areas of interrelated climate change risk. Of these risks, we identified three to be most relevant to Slough:

- Flooding, and risks to communities, businesses and infrastructure
- High temperatures, and risks to health, wellbeing and productivity
- Risks from shortages in public water supply

In the previous Climate Change Strategy for Slough Borough Council, these risk areas were also identified to be of high priority. These three categories have been researched further, and our action recommendations are focussed on addressing the economic, social and natural environment related risks identified in each.

Three risk areas were judged to be lower priority and have not been investigated as part of this analysis. These were: Risks to Natural Capital, Risks to Domestic and International Food production and trade, and Risks from Net and emerging pests, diseases and invasive species. Should the council develop a more detailed assessment of Climate Change Adaptation in the future, we recommend all impact categories are included.

[1] The 2017 risk assessment was the most recent available until later in the development of this work, after initial scoping was completed. The 2021 report has informed our later research and recommendations.

7. CLIMATE CHANGE ADAPTATION
FLOODING: BACKGROUND

Historic Risks

The main sources of flooding in Slough are river (fluvial) flooding, surface water flooding, sewer flooding and groundwater flooding, with over 60% caused by surface water run-off. The map in Appendix 7 shows historic flooding events in Slough. Further detail, and specific impacts and locations of historic flooding events, are presented in the 2012 Slough Surface Water Management Plan (SWMP).

Insurance losses in the UK from flooding amount to around £1.5 billion annually, with total costs of around £3.2 billion (Adaptation Sub-committee, 2012).

Projections

Under a range of scenarios described in the Climate Change Committee's 2021 Risk Assessment, it is expected that average winter precipitation will increase, both in terms of the intensity of the rainfall, and in terms of the number of wet days. Summers are expected to get drier, but the intensity of summer precipitation (when it does occur) will increase.

More properties will face the risk of flooding, and areas already at risk will face more frequent flooding. Current flood defences will be subject to additional pressure which imposes risk for further flooding events. Climate change is expected to increase the risk of flooding across all sources in the future.

These projections are at a national level. It is beyond of the scope of this work to carry out a detailed flood risk assessment. However, the Strategic Flood Risk Assessment carried out outlines future flood warning areas and zones in the borough most at risk. Approximately 15% of Slough Borough area was judged to be in an area of medium or high probability of fluvial (river) flooding.

Based on the 2012 Slough Surface Water Management Plan, a 100-year event with current flooding risks, compared to future flooding risks (including climate change), predicts an 18% increase in damages (£18 million) from future surface water flooding alone. Damages from the other main sources of flooding are also expected to increase.

A Sustainable Drainage System (SuDS) policy for Slough was in development at the time of writing.

Figure 7.1: Current and future predicted property flooding in Slough, ranging from shallow to deep flooding (SBC)

7. CLIMATE CHANGE ADAPTATION
FLOODING: KEY RISKS

Key sources:
- Slough Surface Water Management Plan (2012)
- Slough Borough Council Strategic Flood Risk Assessment
- UK Climate Risk Assessment (2017)
- UK Climate Risk Assessment (2021)
- British Ecological Society- The Impact of Extreme Events on Freshwater Ecosystems
- Environment Agency- Impact of Flooding on Urban and Rural Communities

The key flood related risks identified for Slough have been divided into risk to three themes:

ECONOMIC

- Damage to essential transport infrastructure and utility infrastructure, such as railways, electrical substations and industrial sites
- Damage to property in risk zones. Over 800 properties are judged to be at risk in Slough.
- Risk of business interruption from damage caused by flooding

SOCIAL

- Increased risk of direct injury, mortality and morbidity
- Increased risk of chemical/pollution contamination, particularly through foul water flooding
- Increased risk from infectious disease due to increase in bacteria in surface water
- Flooding incidents can influence mental health, especially in the elderly and vulnerable
- Damage to public spaces such as parks and recreational grounds

NATURAL ENVIRONMENT

- Flooding will directly impact the health of habitats and ecosystems. Conversely, healthy ecosystems, particularly around waterways, improve flood resilience

7. CLIMATE CHANGE ADAPTATION
HIGH TEMPERATURES: BACKGROUND

Historic Risks

There is much evidence of recent increases in temperatures in the UK.

- The most recent decade (2007-2017) has been on average 0.8°C warmer than the average of the years 1961-1990. The hottest day ever recorded the UK occurred in Cambridge in July 2019, measuring 38.7°C (BBC, 2020).
- All ten of the warmest years in the UK have occurred since 1990 with the nine warmest occurring since 2002 (BEIS, 2019).

High temperatures have historically resulted in thousands of excess deaths and other severe medical conditions, making adaption to high temperatures a social concern. Heat waves have a particularly high impact on already vulnerable groups, such as the elderly (Public Health England, 2020).

Projections

Committee on Climate Change Projections indicate temperature rises in decades to come, with greatest increase in the already warmer southern part of UK. Extreme weather events and heatwaves are also expected to become more frequent and more intense.

UK Climate Projections show that not every summer is expected to be hotter, but temperature records are likely to be broken regularly and heatwaves will stay longer. With temperatures above 30°C, authorities can trigger public health warnings. Projections suggest that such warnings will be triggered 4 times a year by 2070, compared to once every fourth year in the 1990s.

Nationally it is expected heat-related deaths will increase from 2000 per year to 7000 per year by the 2050s. This is due to both more frequent events of high temperatures and population increase (Climate Change Committee Adaptation Sub Committee, 2015). Heat waves are usually widespread- our research has revealed a lack of data on either historic or projected impacts of high temperatures specific to Slough.

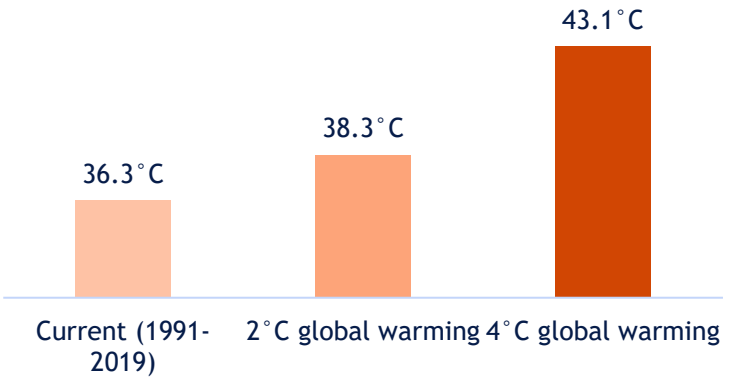


Figure 7.2: Future expected hottest temperatures in Slough for two scenarios of global warming (UK Climate Projections).

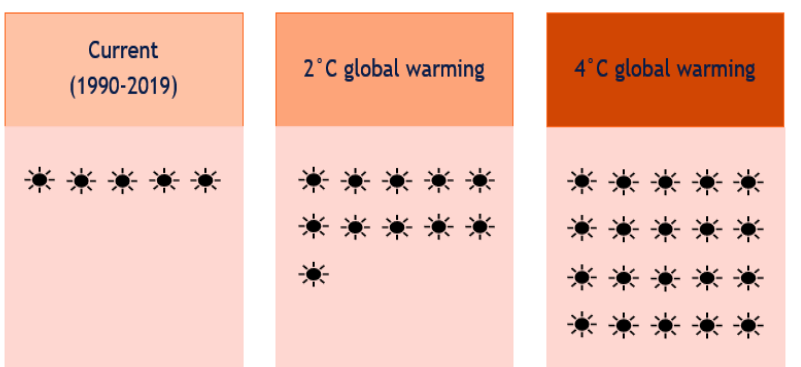


Figure 7.3: Expected number of "summer days" per summer in Slough for three different scenarios. Summer days are defined as days with temperatures above 25°C. (UK Climate Projections).

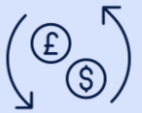
Key sources:
- UK Climate Risk Assessment (2017)
- UK Climate Risk Assessment (2021)
- Increasing Resilience to Hot Weather - London Councils

7. CLIMATE CHANGE ADAPTATION
HIGH TEMPERATURES: KEY RISKS

The key risks identified for Slough have been divided into three key themes. Due to a lack of local data on the impact of high temperatures, some of the risks were identified at national level.

ECONOMIC

- Hot summer days may damage elements of transport infrastructure, causing, for example, buckled rails and rutted roads. This carries risks in terms of repair costs and disruption to businesses and residents' activities.
- Employee productivity may be lower due to warmer temperatures impacting concentration and sleep.



SOCIAL

- Increasing temperatures carry numerous health risks. High temperatures are associated with higher levels of dehydration, heat exhaustion, heatstroke, even irreversible damage to organs. Increased exposure to the sun can also lead to skin cancers and sunburn. Ultimately, there is an increased risk of mortality associated with high temperatures.

NATURAL ENVIRONMENT

- There are direct risks to the natural environment from high temperatures. Some plants, for example, are increasingly susceptible to pathogens as genes involved in their defence fail to activate at high temperatures.
- Indirect risks to natural environments and agriculture- such as changes to soil condition, nutrient availability, and the occurrence and distribution of bacteria, fungi, and disease vectors.
- Increased prevalence of invasive species, disrupting native biodiversity.
- Decline in the quality of soils may impact productivity in agriculture and private gardens. Soils may also be hardened by extreme temperatures, increasing the risk of flash flooding immediately after periods of high temperature.

7. CLIMATE CHANGE ADAPTATION
WATER SHORTAGES: BACKGROUND

Historic Risks

Recent droughts have occurred in 2006 in the south of England, and in 2011-2012 in the central and eastern parts of England, resulting in numerous impacts on nature, and bans and restrictions on water usage. There is however no apparent trend in recent UK droughts, and uncertainties are great (LWEC, 2016).

Public water supply is designed to handle events of droughts and water shortages, but prolonged drought of two years or more will put pressure on water supply (CIWEM, 2012). According to the Environmental agency (2018),there is considerable pressure on water resources throughout England. Public concern around water shortages and droughts has been increasing over time. The report highlights that in 2017, abstraction (the process of remoting water from its source) in around 28% of groundwater bodies and 18% of surface waters was not at a sustainable level. In addition, “Around 15% of groundwater bodies are at risk of deterioration if abstraction continues to increase within licenced quantities”.

Around 20% of freshwater supply is currently lost due to water leakage. The percentage of losses could be decreased with better technology and incentives for water companies to act.

Projections

Water supply in Slough is managed by Thames Water, who provides water services for 15 million customers across London and the Thames Valley. Future projections on drought impact are therefore not limited to Slough. In addition, there is a high level of uncertainty associated with the risk of future water shortage in the UK (ASC, 2012).

The Environmental agency (2018) projects that:

- Climate change is expected to affect both the amount of, as well as the timing of, precipitation. River flows are expected to increase during winter and decrease in summer due to changes in precipitation.
- Reduced summer rainfall and increased summer evaporation would negatively affect wetland plant and animal communities, particularly in rain-fed wetlands.
- Reliability of existing reservoirs and groundwater sources will change. It is expected that groundwater supplies may decrease over the 21st century.
- Warmer summers are expected to increase demand for water resources during already water stressed periods.

Depending on level of climate change and population growth, UK water supplies by 2050 are expected to show a deficit of between 1100-3100 million litres per day (Climate Change Committee, 2018). The 2019 Thames Water Resources Management Plan forecasts that:

- Future deficits in water supply will increase, both due to climate change and population growth.
- Slough, Wycombe and Aylesbury will go into deficit in around 2033/34. It is anticipated that local resource water resource schemes will be insufficient, and that in the long term, raw water imports could be required.

Key sources:
- UK Climate Risk Assessment (2017)
- UK Climate Risk Assessment (2021)
- Environment Agency- The state of the environment: water resources
- 2019 Thames Water Resources Management Plan

7. CLIMATE CHANGE ADAPTATION
WATER SHORTAGES: KEY RISKS

The key risks identified for Slough have been divided into three key themes. Due to a lack of local data on the impact of water shortages, some of the risks have been identified at national level and our research has suggested that these would apply to Slough.

ECONOMIC

- Changes in water supply and reliability may change the use of land and affect operation of existing infrastructure such as treatment plants, pumping stations and sewers.
- Current energy generation is a major user of water. Shortages of water may affect future energy supply negatively.
- There are risks to business operations from water scarcity, particularly in industries with a heavy dependence on water supply, such as manufacturing, food, and catering.

SOCIAL

- Interruptions to public water supply due to low river flows or droughts impacting supply reserves.
- Increased areas of stagnant water, coupled with higher temperatures, could increase risk of mosquito borne diseases.

NATURAL ENVIRONMENT

- Direct impacts of water shortages threaten ecosystems, biodiversity and valuable ecosystem services. This could lead to damage due to higher vulnerability to other impacts such as flooding.

7. CLIMATE CHANGE ADAPTATION
KEY STAKEHOLDER VIEWS

As part of the Climate Change Strategy & Action Plan development, a series of seven workshops were held online to gain stakeholder views on the actions proposed, key barriers and enablers to their implementation and further implementation considerations. A summary of the key stakeholder views relating to climate change adaptation are detailed below.

Intervention	Barriers	Enablers	Implementation Considerations
FLOODING	*"Existing streams and rivers will require cleaning regularly to ensure their likelihood of flooding is limited"* *"There's a lack of motivation from landowners due to willingness, funding"* *"Building regulations are out of date"*	*"Defra resilience funding - innovations such as permeable pavements"* *"There's support due to Biodiversity net gain legislation"* *"New local plan - water standards"* *"Funding - Environmental Land Management Schemes, Biodiversity Net Gain offsetting"*	*"Innovation resilience project to adapt to flood risk"* *"Working with Department for Education to manage surface run off and educate children on water management"* *"Develop a green infrastructure policy/guidance"*
HIGH TEMPERATURES	*"Pressures for more developments- need to ensure these consider green space enough"* *"Government policy needed to support the changes in developments needed to maximise green space"*	*"Small scale retrofitting green infrastructure on buildings economically viable through funding"* *"Funding is available - Environmental Land Management Schemes, Biodiversity Net Gain offsetting"* *"There is power of scaling projects"*	*"Lighter colour buildings to consider extreme heat and urban heat island effect"* *"Tree coverage and natural shading"* *"Identify measures to make existing woodland more resilient to climate change"*
WATER SHORTAGES	*"There is a lack of public education highlighting to the importance of consuming less water"*	*"Dual flush or old 'brick' idea for reducing water in toilets"* *"Support the use of 'grey water' schemes"*	*"Opportunity to collect rainfall in wetter periods"* *"Identify measures to make existing woodland more resilient to climate change - increase diversity and structure, control pests and diseases"*

7. CLIMATE CHANGE ADAPTATION
FLOODING

Impact Area: Strategic

Goal: Enhance knowledge across the borough

Responsibility	Adaptation Action	SBC's role	Key Stakeholders	Action Impact	Timescale	Complexity
SBC	Building on the latest Strategic Flood Risk Assessment (SFRA), update the Surface Water Management Plan (2012) to set latest priority areas for flood action in Slough. This could form part of a dedicated Adaptation Strategy Report for Slough.	Research & Design	Lead: Highway Maintenance & Drainage Team, Other: External mapping consultants, Environment Agency, Thames Water	Strategic	Immediate	Medium

Impact Area: Natural Environment

Goal: Enhance and protect the natural environment to reduce flood risk

Responsibility	Adaptation Action	SBC's role	Key Stakeholders	Action Impact	Timescale	Complexity
SBC	Refer to the Natural Environments section of this report for actions relating to enhancing and protecting the natural environment, which will help protect sensitive areas from flooding	Implementation	Lead: Council's Environment Management Team , Other: All council	Indirect	Immediate	Low
Borough	Work with planners, developers and park authorities to protect and enhance vegetation around rivers to help absorb water and reduce flooding risk	Policy & Strategy	Lead: Council's Environment Management Team , Other: Council's Landscape & Ground Maintenance Team	Direct	Short	Low

7. CLIMATE CHANGE ADAPTATION
FLOODING

Impact Area: Economic

Goal: Enhance green infrastructure to reduce flood risk

Responsibility	Adaptation Action	SBC's role	Key Stakeholders	Action Impact	Timescale	Complexity
SBC	Increase green areas and tree coverage around key infrastructure and risk areas, to improve flood resilience. Invest in urban green infrastructure (such as bioswales, planter boxes, rain gardens, green roofs, and other permeable surfaces).	Implementation	Lead: Council's Environment Management Team , Other: Council's Landscape & Ground Maintenance Team	Direct	Medium	Medium

Goal: Use planning policy to reduce flood risks

Responsibility	Adaptation Action	SBC's role	Key Stakeholders	Action Impact	Timescale	Complexity
SBC	Review planning policy to ensure it takes into account long term risks of flooding for new building and infrastructure developments	Policy & Strategy	Lead: Council's Planning Policy Team, Other: Council's Environment Management Team	Strategic	Medium	Medium
SBC	Make more sustainable design a requirement for new developments in Slough, with contributions towards flood protection such as enhanced tree coverage and improved drainage	Policy & Strategy	Lead: Council's Planning Policy Team, Other: Council's Environment Management Team	Strategic	Medium	Medium

7. CLIMATE CHANGE ADAPTATION
FLOODING

Goal: Maintain and enhance flood protection infrastructure

Responsibility	Adaptation Action	SBC's role	Key Stakeholders	Action Impact	Timescale	Complexity
SBC	Review the SuDS (Sustainable Drainage Systems) maintenance schedule to ensure it is in line with increasing climate risk and takes a "proactive" rather than "reactive" approach. Explore opportunities for new SuDS, and to enhance existing infrastructure.	Implementation	Lead: Highway Maintenance & Drainage Team, Other: Council's Landscape & Ground Maintenance Team	Indirect	Immediate	Medium
SBC	Based on flood risk assessment outputs, introduce artificial structural defences where necessary, such as levees, embankments, weirs, and flood walls	Implementation	Lead: Highway Maintenance & Drainage Team, Other: Council's Landscape & Ground Maintenance Team	Direct	Medium	High
SBC	Audit drains regularly to minimise risk of drain blockage, especially in areas sensitive to sewer flooding. Ensure regular monitoring and maintenance of drains and sewers.	Implementation	Lead: Highway Maintenance & Drainage Team, Other: Council's Landscape & Ground Maintenance Team	Indirect	Immediate	Medium
SBC	Implement permeable paving in development to maximise ground water infiltration	Implementation	Lead: Highway Maintenance & Drainage Team, Other: Council's Landscape & Ground Maintenance Team	Direct	Medium	High

Goal: Improve business resilience to flood events

Responsibility	Adaptation Action	SBC's role	Key Stakeholders	Action Impact	Timescale	Complexity
Borough	Encourage at-risk businesses to develop contingency and business continuity plans to help ease the impacts of a flood emergency	Communication & Engagement	Lead: Council's Business Support Team, Other: Slough Business Community Partnership	Indirect	Short	Medium

7. CLIMATE CHANGE ADAPTATION
FLOODING

Impact Area: Social

Goal: Ensure residents are empowered to reduce the risks of flood impacts

Responsibility	Adaptation Action	SBC's role	Key Stakeholders	Action Impact	Timescale	Complexity
SBC	Install road signs that can alert pedestrians and motorists of flood risk zones, for example low-lying areas	Implementation	Lead: Council's Transport Planning Team, Other: Council's Environment Management Team	Indirect	Medium	Medium
Borough	Develop and implement a flood warning and evacuation plan for Slough. Identify ways to warn and prepare more residents for flooding events, with help from the Environmental Agency.	Communication & Engagement	Lead: Highway Maintenance & Drainage Team, Other: Environment Agency, Council's Community Development Team	Strategic	Immediate	Medium
Borough	Promote flood action groups to help tackle flooding in Slough, building on, for example, the Colnbrook Flood Action group	Communication & Engagement	Lead: Council's Community Development Team, Other: Community Groups	Strategic	Medium	Low
Borough	Encourage residents to sign up to advance flood warning services	Communication & Engagement	Lead: Council's Community Development Team, Other: Community Groups	Indirect	Medium	Low
Borough	Where possible, encourage residents and businesses in at-risk areas to purchase flood insurance	Communication & Engagement	Lead: Council's Business Support Team & Council's Community Development Team, Other: Slough Business Community Partnership, Community Groups	Indirect	Short	Low

7. CLIMATE CHANGE ADAPTATION
HIGH TEMPERATURES

Impact Area: Strategic

Goal: Enhance knowledge across the borough

Responsibility	Adaptation Action	SBC's role	Key Stakeholders	Action Impact	Timescale	Complexity
SBC	Undertake a heat risk assessment to understand the priority areas for action in Slough. This could form part of a dedicated Adaptation Strategy Report for Slough.	Research & Design	Lead: Council's Environment Management Team , Other: External mapping consultants	Strategic	Immediate	Low

Impact Area: Natural Environment

Goal: Protect and enhance the natural environment, retaining its cooling effects

Responsibility	Adaptation Action	SBC's role	Key Stakeholders	Action Impact	Timescale	Complexity
SBC	Refer to the Natural Environments section of this report for actions relating to enhancing and protecting the natural environment to improve resilience and reduce the urban heat island effect. Green and blue infrastructure, such as parks and lakes, road-side trees, green roofs or artificial shading, all have cooling effect.	Implementation	Lead: Council's Environment Management Team , Other: All council	Indirect	Immediate	Low
SBC	When maintaining natural spaces (such as parks), consider the resilience of species to high temperature and promote planting of more heat-resilient species	Implementation	Lead: Council's Environment Management Team , Other: Council's Landscape & Ground Maintenance Team	Direct	Medium	Medium

7. CLIMATE CHANGE ADAPTATION
HIGH TEMPERATURES

Impact Area: Economic

Goal: Improve the resilience of the built environment to extreme heat

Responsibility	Adaptation Action	SBC's role	Key Stakeholders	Action Impact	Timescale	Complexity
SBC	Introduce cooling systems in council buildings and other buildings that Slough Borough Council is responsible for	Implementation	Lead: Council's Environment Management Team, Other: Council's Environment Management Team	Direct	Medium	Medium
SBC	Install artificial shading structures in public spaces that are sensitive to heat islands (For example, shade sails, canopies, pergolas and trellises)	Implementation	Lead: Council's Environment Management Team, Other: Council's Landscape & Ground Maintenance Team	Direct	Medium	High
SBC	Introduce better building design to minimise interior overheating for developments by or initiated by the Council	Implementation	Lead: Planning Policy Team, Other: Developers	Direct	Long	Medium
Borough	Encourage construction of lighter colour buildings and pavements, which can reduce extreme heat by reflecting sunlight	Communication & Engagement	Lead: Planning Policy Team, Transport Planning Team, Other: Developers	Indirect	Long	High
Borough	Evaluate road and rail maintenance to consider increasing risks of accidents from melting roads and buckling rails	Implementation	Lead: Council's Transport Planning Team, Other: Network Rail, Highways England, GWR, TfL	Indirect	Short	Medium

7. CLIMATE CHANGE ADAPTATION
HIGH TEMPERATURES

Impact Area: Economic

Goal: Ensure businesses consider the impact of high temperatures on employee health

Responsibility	Adaptation Action	SBC's role	Key Stakeholders	Action Impact	Timescale	Complexity
Borough	Encourage businesses to set a maximum temperature for safe working before allowing employees to stop working	Communication & Engagement	Lead: Council's Business Support Team, Other: Slough Business Community Partnership	Indirect	Medium	Medium

Impact Area: Social

Goal: Reduce the risks of high temperatures to residents and communities

Responsibility	Adaptation Action	SBC's role	Key Stakeholders	Action Impact	Timescale	Complexity
Borough	Undertake an assessment to identify at-risk community areas (e.g. more deprived neighbourhoods), and community groups (e.g. the elderly). Focus education and safety campaigns in these locations.	Research & Design	Lead: Council's Community Development Team, Other: External mapping consultants	Strategic	Immediate	Medium
Borough	Install water fountains in public spaces, and launch an awareness campaign around the health risks of dehydration	Implementation	Lead: Senior Environmental Health Officer, Other: Council's Landscape & Ground Maintenance Team, Council's Community Development Team	Direct	Long	High
Borough	Develop engagement materials for residents giving advice on how to stay cool in high temperatures, and encouraging residents to sign up to advance high temperature alert services	Communication & Engagement	Lead: Senior Environmental Health Officer, Other: Community Groups	Indirect	Medium	Low

7. CLIMATE CHANGE ADAPTATION
WATER SHORTAGES

Impact Area: Strategic

Goal: Encourage more efficient usage of water, and reduce waste

Responsibility	Adaptation Action	SBC's role	Key Stakeholders	Action Impact	Timescale	Complexity
SBC	Investigate scope for new Local Plan policy to apply Building Regulations optional higher level water efficiency measures to new homes	Research & Design	Lead: Council's Planning Policy Team, Other: Council's Building Control Team	Indirect	Medium	Low
Borough	Encourage smart water metering among households and businesses	Communication & Engagement	Lead: Council's Business Support Team & Council's Community Development Team, Other: Slough Business Community Partnership, Community Groups	Indirect	Short	Low
Borough	Encourage households and businesses to use water saving devices such as low-flow taps, and cistern bags, to prevent unnecessary water usage	Communication & Engagement	Lead: Council's Business Support Team & Council's Community Development Team, Other: Slough Business Community Partnership, Community Groups	Indirect	Short	Low
Borough	Challenge common behaviours which waste water, such as leaving the tap running when brushing teeth and washing dishes	Communication & Engagement	Lead: Council's Community Development Team, Other: Community Groups	Indirect	Short	Low
Borough	Review the requirements for launch of water saving interventions (such as hosepipe bans) to ensure they are in line with potential increases in drought severity	Policy & Strategy	Lead: Council's Planning Policy Team, Other: Council's Environment Management Team	Indirect	Immediate	Low

7. CLIMATE CHANGE ADAPTATION
WATER SHORTAGES

Goal: Improve the resilience of water supply in the borough

Responsibility	Adaptation Action	SBC's role	Key Stakeholders	Action Impact	Timescale	Complexity
Borough	Work with Thames Water to assess the specific risks of water shortages in Slough, and the possibility of new groundwater sources. Ensure adequate plans for import of water should local solutions be unavailable. This assessment could form part of a dedicated Adaptation Strategy Report for Slough.	Research & Design	Lead: Highway Maintenance & Drainage Team, Other: Thames Water	Strategic	Long	High
Borough	Where necessary, work with Thames Water in constructing new water supply service infrastructure (WSI), such as reservoirs, pump stations, distribution infrastructure and wastewater treatment	Implementation	Lead: Highway Maintenance & Drainage Team, Other: Thames Water	Direct	Long	High
Borough	Work with Thames Water to limit sources of water leakage. Around 23% of public water supply is currently lost due to leaks.	Implementation	Lead: Highway Maintenance & Drainage Team, Other: Thames Water	Direct	Long	High

7. CLIMATE CHANGE ADAPTATION
WATER SHORTAGES

Impact Area: Natural Environment

Goal: Manage the natural environment to ensure resilience to drought

Responsibility	Adaptation Action	SBC's role	Key Stakeholders	Action Impact	Timescale	Complexity
SBC	When maintaining natural spaces (such as parks), consider the resilience of species to drought and promote planting of more drought-resistant species	Implementation	Lead: Council's Environment Management Team , Other: Council's Landscape & Ground Maintenance Team	Direct	Medium	Low

Impact Area: Economic

Goal: Improve resilience of energy supply to water shortages

Responsibility	Adaptation Action	SBC's role	Key Stakeholders	Action Impact	Timescale	Complexity
SBC	Assess potential future risks of water shortages on local energy supply	Research & Design	Lead: Council's Environment Management Team , Other: Thames Water, External Consultants	Strategic	Immediate	Low
Borough	Encourage residents and businesses to switch to renewable energy, particularly local installations where possible. Renewable supply requires less water. Refer to the energy supply section of this report for further guidance.	Communication & Engagement	Lead: Council's Business Support Team & Council's Community Development Team, Other: Slough Business Community Partnership, Community Groups	Indirect	Medium	Medium

7. CLIMATE CHANGE ADAPTATION
WATER SHORTAGES

Goal: Improve business resilience to drought

Responsibility	Adaptation Action	SBC's role	Key Stakeholders	Action Impact	Timescale	Complexity
Borough	Encourage businesses dependent on water supply to develop plans for periods of drought	Communication & Engagement	Lead: Highway Maintenance & Drainage Team, Other: Slough Business Community Partnership	Indirect	Medium	Medium

Impact Area: Social

Goal: Improve residents' resilience to drought

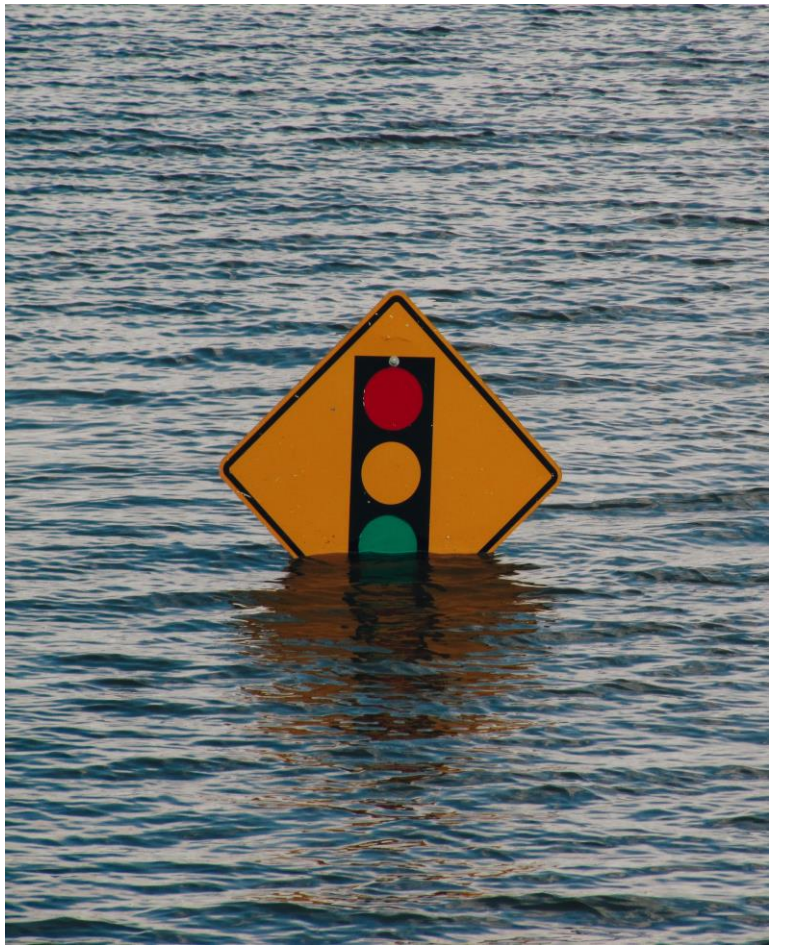
Responsibility	Adaptation Action	SBC's role	Key Stakeholders	Action Impact	Timescale	Complexity
SBC	Design a future emergency plan for events of interruption in water supply	Policy & Strategy	Lead: Highway Maintenance & Drainage Team, Other: Thames Water, External Consultants	Strategic	Immediate	Medium
SBC	Assess potential future risks of spread of mosquito borne diseases due to water shortages	Research & Design	Lead: Environmental Health Officer, Other: External specialist consultants	Strategic	Immediate	Low

7. CLIMATE CHANGE ADAPTATION
CASE STUDIES: NATIONAL & LOCAL

ADAPTION - NATIONAL

Rochdale Council - Partnered with the Environmental Agency, Rochdale Council have been progressing through a £51 million flood defense scheme. The two newly built storage reservoirs can hold up to 12,000m^3 of water, the equivalent of 4 Olympic sized swimming pools and reduce flood risk for 66 properties, as well as helping to deal with flood issues in the wider area.

Isle of Scilly - Due to recent heatwaves, the Cornish Isle of Scilly is facing increasing water shortages. In help to combat this, the Council are offering free save-a-flush bags which reduce the amount of water used each time a toilet is flushed.



ADAPTION: LOCAL CASE STUDIES

Saving Salt Hill Stream
This project focusses on working with local people, community organisations and schools in Slough who wish to improve the Salt Hill stream and its surroundings to create a cleaner, healthier watercourse. A core group of volunteers have dedicated over 400 hours renovating Temple Wood.

Flood Alleviation Schemes
To help combat the growing threat of flooding, SBC are developing schemes in three key catchments: Colne Brook, Salt Hill Stream and Chalvey Ditch. These projects are being carried out with the intention to investigate whether there are economically viable options to reduce the risk of fluvial flooding.

7. CLIMATE CHANGE ADAPTATION
COSTING CLIMATE ADAPTATION

Considering the cost of adaptation

Significant capital and operational investment will be necessary in order to achieve the adaptive measures outlined. In considering the cost of adaptive measures, stakeholders should also consider the "cost of inaction"- that is, the potential costs of climate damage should adaptive measures not be put in place. This is vital in helping to build a case for adaptive action.

The 2015-16 winter floods, for example, resulted in overall costs of £1.6 billion across the UK, while the summer heatwave of 2010 is estimated to have resulted in a productivity loss of £770 million. Analysis from the CCRA 2021 suggests that, even with only 2°C of warming, the number of individual climate risks with very high damage costs could triple. These costs will be even higher if we exceed a 2°C warming scenario. As the risk grows, calls are now being made for insurers to better account growing costs.

Financing adaptive measures

Given the above, a full cost-benefit analysis is valuable in building the case for action. An example of such analysis is given in the 2012 Slough Surface Water Management Plan regarding the construction of flood protection bunds. In the adaptation actions provided in this report, we recommend refreshing and expanding such analysis, building the evidence base for action.

In addition to reducing future costs of impact, there are also cost efficiencies to be gained by implementing adaptive measures which offer climate mitigation and generate co-benefits, and these should also be considered.

While still of limited size, the UK green finance market is growing and offers some funding avenues. For example, the Natural Environment Investment Readiness Fund (NEIRF) was a £10 million fund through which 27 conservation and climate related projects across the UK received support.

The cost of adaptation in Slough

It is beyond the scope of this work to cost each of the adaptation actions presented, or to calculate the potential cost of inaction. The UK CCRA also does not provide a total cost of climate impacts in UK (i.e. the cost of inaction) or a cost of adaptation. This is due to limitations in the scope of the work, a lack of available data, and the large uncertainties.

The UNEP Adaptation Gap Report 2020 did provide figures for the anticipated capital costs of adaptation actions. The study estimates annual adaptation spend in developing countries to be in the range of US$70 billion in 2019. There are expected to reach US$140–300 billion in 2030 and US$280–500 billion in 2050. This is based on anticipated adaptive measures required in line with a 2°C warming scenario.[1]

These figures could be scaled down to Slough to give a high level indication of costs in the borough. However, caution is advised for the above reasons. As outlined across, a more local assessment would be appropriate. Ultimately the fact that action now will result in reduced costs of inaction later should be the driver for urgent adaptive action. A new DEFRA funded study on the economics of adaptation in the UK will be completed in 2022 and should offer further guidance.

FTE Requirements for adaptation

In line with the approach taken in Chapter 6 of this report, estimated Council FTE requirements for the adaptation actions are provided across.

A full breakdown is provided in the supplementary Excel document.

Adaptation Action Area	Staff Costs
Flooding	0.65 FTE
High Temperatures	1 FTE
Water Shortages	0.6 FTE

Table 7.1: Estimated council FTE required for adaptation actions

[1] Based on adaptive measures required in line with a 2°C warming scenario. Costs would increase if action is not taken.

08 Monitoring Progress

8. MONITORING PROGRESS
INTRODUCTION

Actions defined within this plan will require a coordinated and sustained approach through delivery. An important part of that is a proper monitoring and reporting framework, to ensure that progress towards various goals and objectives is properly managed.

This chapter provides an overview of this reporting framework, which can be broken into three distinct areas:

1. **Assigning shared responsibility** - the initial coalition-building process to determine which stakeholders take "ownership" of different actions.
2. **Tracking responsibility** - this part of the framework would report against the stakeholders responsible for each action and delivery area e.g. a clear and current inventory of which actions are underway, detailing the individual(s) or organisation(s) responsible for each action.
3. **Tracking impact** - this part of the framework would provide key indicators and record progress towards end goals, underpinned by reported data and measurements.

Assigning shared responsibility

In order that the council can reliably assign responsibility for delivery of actions within the plan, the council requires a strong partnership between public and private sector organisations, both across the borough itself as well as wider networks. For this, the council is encouraged to maximise existing channels of communication and build on relationships that already provide collaborative action within Slough e.g. the Thames Valley Berkshire LEP.

Further development of the relationship between the council and its partners may take a form similar to that of a City-Business Alliance. Developed by CDP, City Business Climate Alliances provide a blueprint for successful collaboration for council officials, planners and project managers seeking to work together with local stakeholders to deliver climate action.

Case study: Manchester Climate Change Partnership (MCCP)

Originally established in 2018, the MCCP was created to oversee progress against the city's 2038 zero carbon target and hold local stakeholders to account on playing its full part on climate change. The Partnership's primary aim is to create a citywide movement for action on climate change.

The Partnership is made up representatives from the city's public & private sectors, as well as drawing upon local academic and faith communities.

Since its inception, the MCCP has published annual reports on the action undertaken by partners, citywide progress and outlined priorities for the year ahead. These annual reports also serve as a means of communicating updated emissions targets and analysis as further research is conducted.

8. MONITORING PROGRESS
TRACKING RESPONSIBILITY

Clearly understanding who is responsible for each of the actions set out within this plan is the second pillar of the monitoring and reporting framework.

The council carries a large portion of responsibility in delivery of actions within this plan, but this responsibility is also shared between businesses, residents and other organisations in order to meet the borough's climate action target.

For this reason, a robust governance structure which clearly sets out an "owner" for each action is recommended as part of the monitoring and reporting framework. Action owners would lead and coordinate activity in that area, again underlining the importance in properly identifying and engaging with stakeholders.

This relieves pressure on the council to be the sole stakeholder delivering actions within the plan, as well as enabling the commercial and social benefits that come with sustainable initiatives to be achieved across the borough.

Regularly reporting on the progress towards different actions is another important feature of this framework. Understanding which climate actions are complete, underway or off track forms a key part of the Committee on Climate Change's annual Report to Parliament. The Climate Change Committee report annually against progress relating to reducing emissions, progress in adapting to climate change, and further recommendations to Parliament.

The aim of regularly reporting the status of different actions is to ensure continued scrutiny of responsibility as well as beginning to track impacts of actions (see overleaf).

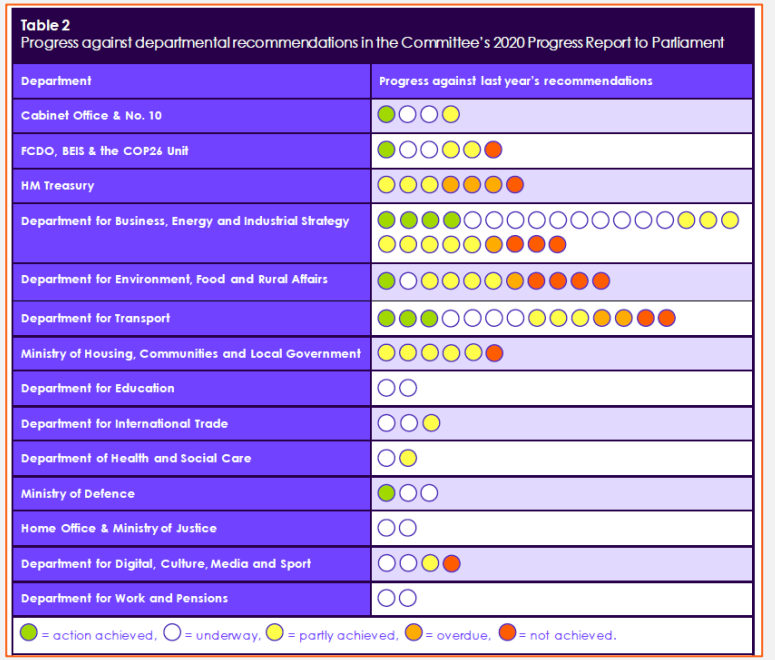


Table 2
Progress against departmental recommendations in the Committee's 2020 Progress Report to Parliament

Department	Progress against last year's recommendations
Cabinet Office & No. 10	
FCDO, BEIS & the COP26 Unit	
HM Treasury	
Department for Business, Energy and Industrial Strategy	
Department for Environment, Food and Rural Affairs	
Department for Transport	
Ministry of Housing, Communities and Local Government	
Department for Education	
Department for International Trade	
Department of Health and Social Care	
Ministry of Defence	
Home Office & Ministry of Justice	
Department for Digital, Culture, Media and Sport	
Department for Work and Pensions	

= action achieved, = underway, = partly achieved, = overdue, = not achieved.

Figure 8.1: An excerpt from the Committee on Climate Change (CCC) 2021 Progress Report to Parliament, detailing the progress of different government departments against targets set out in the CCC Pathway to Net Zero. Taken from the 2021 report: Progress in reducing emissions.

8. MONITORING PROGRESS
TRACKING IMPACT

Measuring the progress of actions defined within this plan must also incorporate some degree of "impact" analysis in quantitative terms. Broadly, progress towards the borough's emissions targets will be recorded by changes in the emissions data benchmarked by tools such as SCATTER. When attempting to measure the specific impacts of given actions within this plan, using solely emissions data to measure progress poses two main challenges:

1. Emissions data is published two years in arrears, which means that there is a time lag between project delivery and analysis of its impact.
2. Emissions data is not provided on an action-by-action level and monitoring the specific impacts of a given project in this way is difficult, particularly if multiple workstreams make emissions reductions in the same area.

This motivates the need for key performance indicators (KPIs) that publish recent-year data that can act as more useful proxies for measuring progress. The council (or whichever stakeholder is responsible for analysis of a given action) can then track year-on-year progress using these defined proxies and indicators.

A direct example of this might be analysis of EPC ratings for domestic buildings. Whilst not directly linked to emissions from the domestic housing sector, EPCs provide a useful marker for the energy efficiency of the borough's households and can be assessed for trends towards more energy efficient buildings on an annual basis.

KPIs have been identified which benchmark progress towards the different SCATTER subsectors detailed in this report. Assessing the changes in these indicators provide further context to the borough's climate action. A list of these indicators and sources can be found in Appendix 9.

Disclosing publicly

This chapter has considered steps towards a reporting and monitoring framework for the council to adopt in delivery of this plan, specifically:

- Coalition building with active and committed stakeholders to sustain delivery.
- Assigning accountability and creating governance structures that can deliver change over time.
- Assessing data and other indicators for the specific progress towards certain goals and actions.

The final piece of this framework is the disclosure of progress in an accessible and transparent way. Whilst project managers may monitor progress internally, it is also crucial for the continued buy-in and public mandate that the council reports its progress publicly and transparently.

There are a range of solutions available in terms of reporting public data, including update reports (as in the case of the Manchester Climate Change Partnership, see case study) as well as digitally-enabled solutions involving online dashboards and apps. CDP Cities offers extensive guidance on disclosure of environmental information by local authorities, including as it relates to adaptation actions.

09 Conclusions

9. CONCLUSIONS AND NEXT STEPS
TOTAL EXPENDITURE

The total capital expenditure required to achieve carbon emissions reductions on the scale required by the High Ambition pathway is in excess of £3.2bn. Operational costings analysis indicates that over £4.1bn worth of potential savings may also be realised, most significantly in the transport sector.

Table 9.1 opposite summarises the results of the costings analysis.

Meeting the demands of this significant investment in future years is not the sole responsibility of the council. Whilst a key actor in terms of leading progress and shaping the borough's emissions reductions, bearing the cost of that transition is the responsibility of the entire borough. Certain actions naturally lend themselves to public sector investment, such as public transport, whilst others are led by businesses and residents, such as renewable energy installations or purchasing electric vehicles.

Throughout the report, indications are given of the staff resource required- this totals over **30 FTE across the organisation**, should all actions be undertaken. This requirement could be met through recruitment of new staff, and/or repurposing of current roles in line with the plan.

(Right) Table 9.1: Summary of estimated operational expenditures and savings. NE (No Estimate) denotes costs that have not been estimated. Where a dash is included, this indicates no *additional* cost has been found for High Ambition action versus a baseline case. Appendix 8 contains full detail of costings methodology.

Capex (k£)	Opex (k£)	Description of cost
490,250	NE	Retrofitting existing households with wall insulation
90,350	-87,750	Retrofitting household heating systems with electrified systems over gas boilers; opex represents fuel bills
35,800	NE	Constructing new-build homes to PassivHaus standard, rather than Part L
188,250	*NE*	*Retrofitting new-build homes to PassivHaus standard having constructed to Part L*
-	3,950	Additional fuel bills as a result of switching to electrified cooking systems in domestic households
179,200	-2,750	Retrofitting non-domestic buildings with energy efficiency measures
31,000	53,000	Retrofitting non-domestic heating systems with electrified systems over gas boilers; opex represents maintenance but **not** fuel costs
286,150	-	New transport infrastructure for on-road vehicles and rail
-	-690,500	Demand reduction and efficiency gains in the transport sector
1,369,050	-3,907,000	New on-road vehicles and rail transport
699,800	569,800	Installation & maintenance of local renewable energy sources
-	-35,300	Savings in gate fees as a result of increased recycling and reduced overall volume of waste
250	150	Planting & maintenance of additional new woodland
9,050	NE	Scaled portion of UK-wide action for decarbonising industry
3,190,900	-4,109,650	Total estimated costs

9. CONCLUSIONS AND NEXT STEPS
PRIORITISING ACTION

Considering Prioritisation

Given the number of actions presented, and possible limitations in resource, the council may seek to prioritise action in certain areas. Here, we present recommendations on how to consider priority areas for action. This relative prioritisation is based on Anthesis' judgement and is intended to support Slough in more efficiently formulating next steps upon receiving this action plan, rather than eliminating any actions.

Recommendations

We recommend action areas assessed to have the highest carbon reduction impact are considered as the highest priority.

As presented throughout the report, SCATTER provides an indication of the carbon savings to be made by 2040 associated with different action areas. Based on an analysis of the potential savings, we recommend areas of higher priority are:

- **Improving Building Efficiency** in domestic and non-domestic buildings.
- **Reducing transport emissions** with a focus on road transportation.
- Increasing **renewable energy supply.**

The method was only applied to those action areas aligned with the SCATTER tool - further detail is provided in Appendix 10.

It was not possible, or appropriate, to gather carbon savings data for actions around the **Council's Wider Influence**, or **Adaptation** sections of the report. These areas are both considered of key strategic importance, and we recommend are also viewed as **higher priority.**

These recommendations are based on a high level analysis. In seeking to confirm next steps, particularly at a more granular level, we recommend the council undertake a comprehensive analysis of all the actions, including other factors such as action impact, timescale, and complexity (Page 34).

Considering cost

Naturally, council officers may also seek to factor costs into their decision making- caution is advised here. The costs presented in this report are intended to act as a guide, and offer particular value in demonstrating the potential payback and operational savings of action. The current analysis doesn't allow full consideration of the nuances of **who pays** (i.e. the split between the council, and other stakeholders), and equally, where savings will be made.

Additionally, the council, in its position as a leader in influencing others, the council has a role to play in advancing all climate action in the borough. This may include backing options that are less appealing in terms of cost, with the intention of stimulating the market so that others can follow suit.

9. CONCLUSIONS AND NEXT STEPS
NEXT STEPS

The scale and speed of the interventions outlined in this report are significant. While achieving the SCATTER High Ambition Pathway would result in a **75% reduction in emissions by 2040**, the borough would **still not reach carbon neutrality** by this time. **Additional shifts in behaviour and technology** will be needed to meet the 2040 timeline.

The cumulative investment required to achieve the high ambition pathway is in **excess of £3 billion** between now and 2040, but this could be **offset by significant savings in operational expenditure** across the borough. Similarly, the cost of adapting to the impacts of climate change will also be high but can be offset against the cost of inaction. In planning next steps, Slough Borough Council should consider the following recommendations:

- **Confirm your priority action areas:** In this report, we give recommendations on how the council should prioritise action, focussing on carbon impact. Several other metrics are also given for consideration, including the council's role and ability to influence each action.
- **Work together with other stakeholders:** The council is not expected (or able) to achieve the goals of the plan alone and must use its role in the community to lead others. Having run a series of workshops through which to shape this plan, there is already a foundation for further collaboration. It could now consider developing a charter, or similar commitment, which encourages collaboration, builds understanding, and shares expertise.
- **Monitor and report on your progress**: This is vital in ensuring action is coordinated and sustained. This should include assigning and tracking responsibility against each action and tracking impact to ensure the actions are having the desired effect.
- When making the case for climate action**, consider the impacts of climate action holistically.** Climate actions offer co-benefits to the local economy, communities and environment. Many offer a return on investment or operational cost savings, which also bolster the case for action.
- **Consider a variety of funding streams** to support financing local carbon reduction initiatives including community investment schemes and government grants.
- **Going beyond the SCATTER High Ambition Pathway** is a necessity in order to reach the borough's carbon neutral goal. Nevertheless, the interventions outlined in this report should be prioritised, as the evidence base behind them ensures these savings can be achieved most quicky and reliably.

Gap to target and carbon offsetting

Even with the successful implementation of the interventions outlined, by 2040 Slough is left with an emissions gap of **245 $ktCO_2e$** to meet the target of carbon neutrality, and a gap of **229 $ktCO_2e$** to meet the Paris Agreement-aligned target.

Tackling these residual emissions will require more radical measures in some areas- our recommended actions are compatible with this- as outlined on Page 27. Carbon offsetting is one possible method, and some actions around this are provided in Chapter 6.6.

10 Glossary

GLOSSARY OF TERMS

AFOLU: Agriculture, forestry & land use.

BEIS: UK Government Department for Business, Energy and Industrial Strategy, the successor to the Department for Energy & Climate Change (DECC).

Carbon budget: a carbon budget is a fixed limit of cumulative emissions that are allowed over a given time in order to keep global temperatures within a certain threshold.

Carbon dioxide equivalent (CO_2e): the standard unit of measurement for greenhouse gases. One tonne of CO_2 is roughly equivalent to six months of commuting daily by car or burning 1-2 bathtubs' worth of crude oil. "Equivalent" means that other greenhouse gases have been included in the calculations.

Carbon Neutral/Net Zero: these two terms typically mean the same thing in the context of CO_2-only emissions. Whilst emissions are reduced overall, those that remain (e.g. from industrial and agricultural sectors) are then *offset* through carbon dioxide removal from the atmosphere. This removal may occur through technology such as carbon capture and storage (CCS) technologies, or through natural sequestration by rewilding or afforestation.

Carbon offset: defined by the IPCC as a reduction in emissions of carbon dioxide or other GHGs made in order to compensate emissions made elsewhere.

Carbon sink: a process or natural feature that removes carbon from the local atmosphere (e.g. trees or wetlands). The carbon is said to be *sequestered* from the atmosphere.

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

Cruise Impact Emissions: Scope 3 emissions which account for national fuel usage within the aviation sector after take-off and landing. Emissions are apportioned to each local authority based on population size and assume that flying is equal across the population.

Decarbonisation: the process of changing our activities and industry practices to create an economy that sustainably reduces emissions of carbon dioxide.

Deep/Medium Retrofit: the aim of retrofit is to drive down the energy demand for heating and hot water in buildings; typical measures include things like insulation for floors, windows and ceilings and improved ventilation. Medium retrofit represents a 66% reduction in energy demand and a deep retrofit represents an 83% reduction.

Energy system: the consumption of fuel, heat and electricity across buildings, transport and industrial sectors, from solid, liquid and gaseous sources.

Gross emissions: the emissions total before accounting for local carbon sinks.

IPCC: Intergovernmental Panel for Climate Change.

Indirect emissions: GHG emissions occurring as a consequence of the use of grid-supplied electricity, heat and/or cooling within the city boundary.

Insetting/Offsetting: the action of compensating for carbon emissions by utilising an equivalent or unrelated carbon dioxide saving elsewhere. Insetting refers to more local activity within a 'sphere of influence'.

LULUCF: Land use, land use change & forestry.

SCATTER: Anthesis-developed tool which is used to set emissions baselines and reductions targets. See the SCATTER website for more information.

11 Appendices

APPENDICES CONTENTS

APPENDIX 1: SCATTER FAQS

What do the different emissions categories mean within SCATTER?

Direct = GHG emissions from sources located within the local authority boundary (also referred to as Scope 1). For example petrol, diesel or natural gas.

Indirect = GHG emissions occurring as a consequence of the use of grid-supplied electricity, heat, steam and/or cooling within the local authority boundary (also referred to as Scope 2).

Other = All other GHG emissions that occur outside the local authority boundary as a result of activities taking place within the boundary (also referred to as Scope 3). This category is not complete and only shows sub-categories required for CDP / Global Covenant of Mayors reporting.

What do the different sectors and subsectors represent within the SCATTER Inventory?

- **The Direct Emissions Summary and Subsector categories** are aligned to the the World Resource Institute's Global Protocol for Community-Scale Greenhouse Gas Emission Inventories ("GPC"), as accepted by CDP and the Global Covenant of Mayors.
- **The BEIS Local Emissions Summary** represents Local Authority level data published annually by the Department for Business Energy & Industrial Strategy (BEIS).
- **Stationary energy** includes emissions associated with industrial buildings and facilities (e.g. gas & electricity).
- **IPPU** specifically relates to emissions that arise from production of products within the following industries: iron and steel, non-ferrous metals, mineral products, chemicals. These are derived from DUKES data (1.1-1.3 & 5.1).
- **Waterborne Navigation and Aviation** relate to trips that occur within the region. The figures are derived based on national data (Civil Aviation Authority & Department for Transport) and scaled to Slough.
- The full methodology is available at http://SCATTERcities.com/pages/methodology

How does SCATTER treat future energy demand?

Future demand is hard to predict accurately. The National Grid's Future Energy Scenarios (FES) indicates that under all scenarios that meet the UK's net zero by 2050 target (including "Leading the Way", which illustrates the fastest credible rate of decarbonisation) electricity demand still increases. On the other hand, SCATTER's High Ambition Pathway assumes that electricity demand reduces due to improvements to efficiency of operation.[1] Factors such as increased electrification of heating technologies and transport are naturally big drivers for the increase, but incentives and opportunities for demand reduction and energy efficiency measures are still significant and could slow or tip trends in the other direction.

[1] It should be noted that this optimism for demand reduction is consistent with the legacy 2050 Pathways tool.

APPENDIX 2: SLOUGH SCATTER INVENTORY DATA

Notes:

- SCATTER calculates a territorial emissions profile and therefore excludes emissions from goods and services generated outside the borough (also referred to as consumption emissions).
- Within the SCATTER model, national figures for emissions within certain sectors are scaled down to a local authority level based upon a series of assumptions and factors.
- The inventory data presented here relates to the 2018 reporting year as emissions are reported two yeas in arrears.

IE	Included Elsewhere
NE	Not Estimated
NO	Not Occurring
	Included as part of profile
	Excluded as part of profile

Sub Sector	DIRECT Scope 1 $ktCO_2e$	INDIRECT Scope 2 $ktCO_2e$	OTHER Scope 3 $ktCO_2e$	TOTAL $ktCO_2e$
Residential buildings	113.04	55.30	25.62	**193.96**
Commercial buildings & facilities	19.13	123.10	22.61	**164.83**
Institutional buildings & facilities	14.86	26.73	6.37	**47.96**
Industrial buildings & facilities	63.53	150.26	36.45	**250.25**
Agricultural fuel use	0.21	0.00	0.05	**0.26**
Fugitive emissions	21.07	0.00	NE	**21.07**
On-road	176.33	IE	96.28	**272.61**
Rail	9.89	IE	2.33	**12.22**
Waterborne navigation	0.06	IE	IE	**0.06**
Aviation	NO	IE	76.80	**76.80**
Off-road	1.76	IE	NE	**1.76**
Solid waste disposal	0.00	0.00	IE	**0.00**
Biological treatment	NO	0.00	IE	**0.00**
Incineration and open burning	NO	0.00	IE	**0.00**
Wastewater	8.78	0.00	NO	**8.78**
Industrial process	128.89	0.00	NE	**128.89**
Industrial product use	0.00	0.00	NE	**0.00**
Livestock	0.80	0.00	NE	**0.80**
Land use	-3.12	0.00	NE	**-3.12**
Other AFOLU	NE	0.00	NE	**0.00**
Electricity-only generation	3.01	0.00	3.67	**6.68**
CHP generation	2.71	0.00	0.47	**3.19**
Heat/cold generation	NO	0.00	NO	**0.00**
Local renewable generation	0.90	NO	NO	**0.90**
TOTAL:	**555.24**	**355.39**	**266.52**	**1177.14**

APPENDIX 3: DERIVING THE CARBON BUDGET

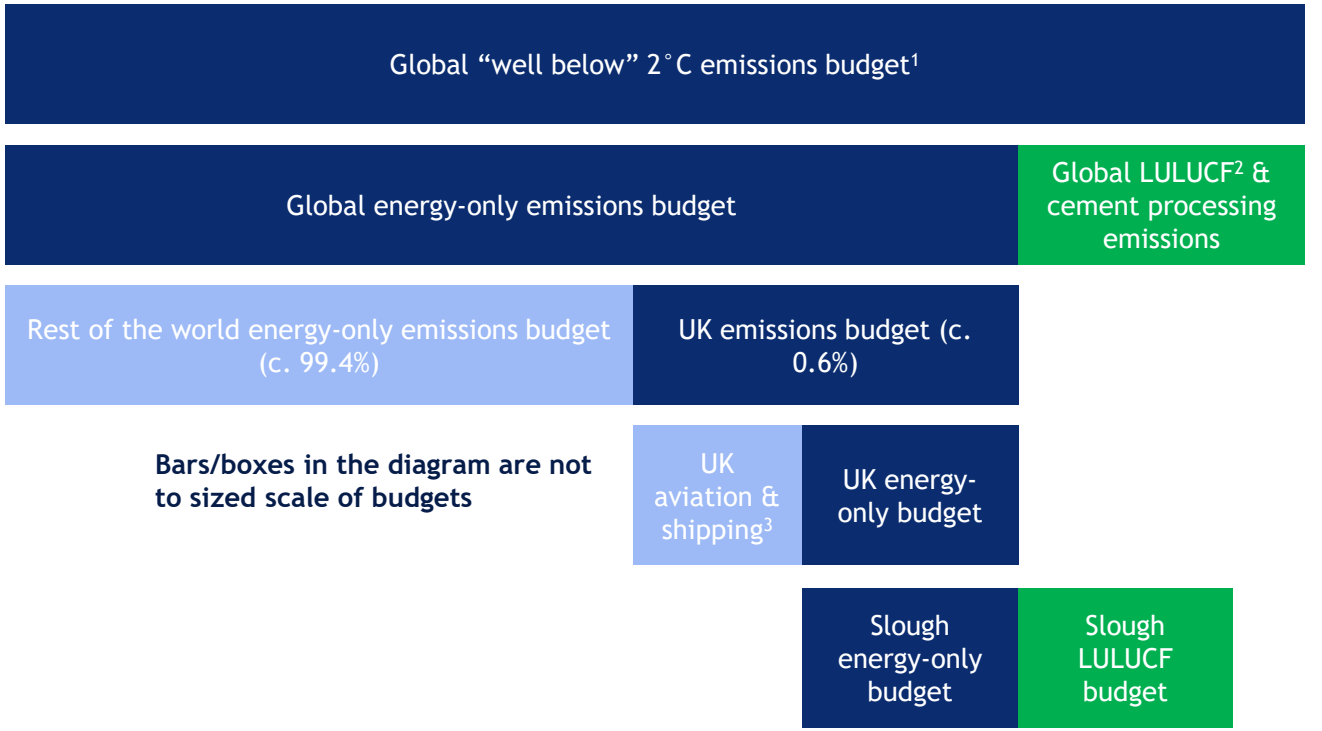
Slough's carbon budget

The carbon budget sets out a finite emissions limit that Slough should not exceeded in order that Slough remain in line with the Paris Agreement. The budget itself is derived from a 'scaling-down' approach – a full methodology is available to view for Slough in the full print version of the Tyndall Centre's research. The Tyndall Centre for Climate Change Research have based this budget on a 2°C global average temperature rise, on the basis that:

1. The Paris Agreement commits us to limiting warming to this level.
2. Global modelling for both 1.5°C and 2°C assume planetary scale negative emissions.

Negative Emissions Technologies (NETs)

NETs remain a highly speculative and uncertain development and are leaned upon heavily in IPCC models. If research, development and demonstration of NETs shows that they may work at scale, and then they are rolled out globally at unprecedented rates, 1.5°C may theoretically be achievable. However this is only made possible if rapid, deep 2°C mitigation begins now and additional feedbacks do not occur.



1 - Budget derived from IPCC AR5 synthesis report and represents a 66-100% probability of global warming not exceeding 2°C ("well below"). Due to the inertia in our energy systems and the amount of carbon we have already emitted, the Paris 1.5°C commitment is now only likely to be viable if negative emissions technologies (NETs) prove to be successful at a global scale. If the 12.7% emissions reduction rate for Slough is achieved and NETs are deployed at the scales assumed in the global models, then the targets adopted may be considered as 1.5°C compatible. This also expressly assumes that other carbon cycle feedbacks, such as methane released due to melting permafrost etc., do not occur, and that an overshoot of 1.5°C does not result in increased feedbacks that further accelerate warming at lower budgets than the IPCC budgets currently estimate.
2 - Land Use, Land Use Change & Forestry
3 - UK Aviation & Shipping is accounted for at the national level. If emissions due to aviation and shipping increases, then a smaller proportion of the UK-wide budget is available for the energy-only budget and vice versa.

APPENDIX 4: CARBON SAVINGS METHODOLOGY

Estimating emissions savings

Using the SCATTER "High Ambition" and "Business as Usual" scenarios, we can estimate emissions savings, broken down into different categories. This is done by comparing the projected emissions along each pathway from different subsectors (e.g. domestic lighting or commercial heating) for each year, and defining the difference between them.

A visual representation of this method is given opposite in Figure 11.1.

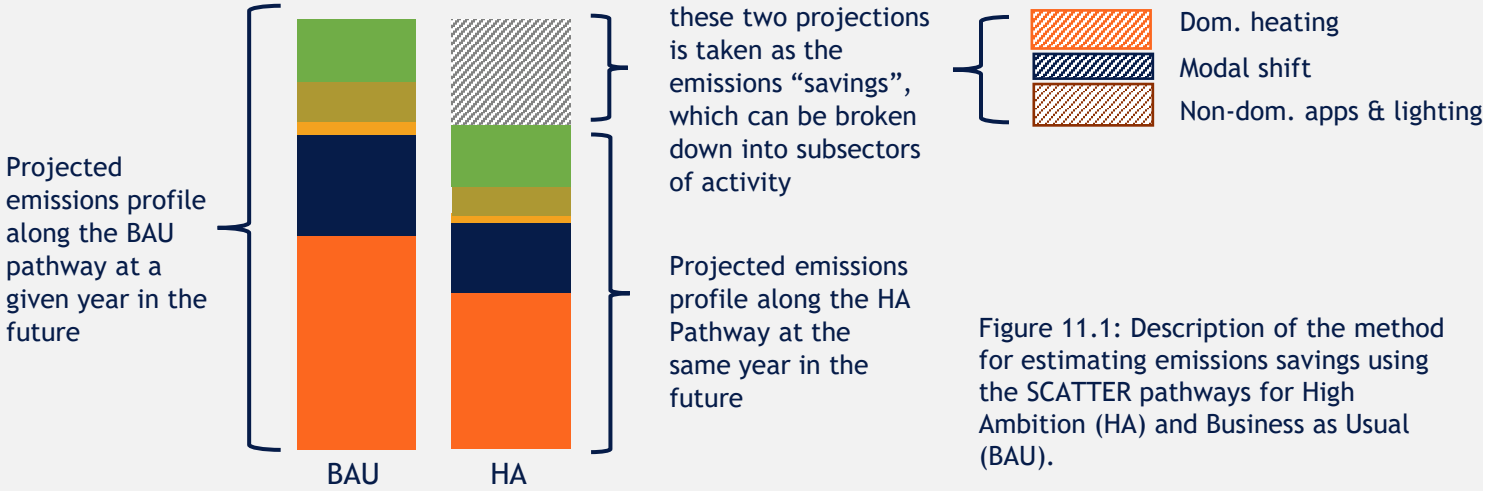


Figure 11.1: Description of the method for estimating emissions savings using the SCATTER pathways for High Ambition (HA) and Business as Usual (BAU).

Which areas of activity have been estimated?

The categories of emissions savings are broken down slightly differently to the SCATTER interventions, meaning that the savings are grouped slightly differently. This is because of the interdependency of the SCATTER interventions, where more than one intervention contributes to the same savings subcategory.
Since one action can contribute to more than one SCATTER intervention target, the savings from multiple separate interventions may be combined into one subcategory. This is illustrated below:

Interdependent SCATTER interventions	Common savings subcategory	Example activity that meets both interventions
1. Domestic heating technologies 2. Hot water demand	Domestic space heating & hot water	Installation of an efficient household heat pump

Energy supply

In order to isolate the impact of supply-side measures, a pathway of business-as-usual installation of renewables was created within SCATTER, with all demand-side measures kept at high ambition levels. The emissions were then compared along this hybrid pathway to the High Ambition Pathway, with the difference taken as savings directly from energy supply measures.

APPENDIX 5: CARBON SAVINGS SUMMARY

The estimated cumulative carbon savings related to the interventions within this chapter are listed below for the periods 2020-2030 and 2020-2040. Emissions savings are calculated relative to the BAU scenario within SCATTER. The calculation methodology is outlined in Appendix 4.

Sector	SCATTER Intervention	Subsector matching the SCATTER Intervention	Cumulative Carbon Savings 2020 - 2030	Cumulative Carbon Savings 2020 - 2040
Buildings	1. Improving energy efficiency	Domestic buildings	**435 $ktCO_2e$**	**1,527 $ktCO_2e$**
Buildings	1. Improving energy efficiency	Industrial buildings and facilities	**299 $ktCO_2e$**	**1,264 $ktCO_2e$**
Buildings	2. Moving away from gas heating systems	Space heating, cooling, and hot water	**201 $ktCO_2e$**	**627 $ktCO_2e$**
Buildings	3. Low carbon and energy efficient cooking, lighting and appliances	Domestic lighting, appliances, and cooking	**49 $ktCO_2e$**	**214 $ktCO_2e$**
Buildings	3. Low carbon and energy efficient cooking, lighting and appliances	Commercial lighting, appliances, equipment, and catering	**147 $ktCO_2e$**	**623 $ktCO_2e$**
Waste	1. Reducing the quantity of waste	Solid waste disposal	**0 $ktCO_2e$**	**0 $ktCO_2e$**
Waste	2. Increased recycling rates	Solid waste disposal	**0 $ktCO_2e$**	**0 $ktCO_2e$**

APPENDIX 5: CARBON SAVINGS SUMMARY (CONT.)

In order to isolate the impact of supply-side measures, a pathway of business-as-usual installation of renewables was created within SCATTER, with all demand-side measures kept at high ambition levels. The emissions were then compared along this hybrid pathway to the High Ambition Pathway, with the difference taken as savings directly from energy supply measures.

Sector	SCATTER Intervention	Subsector matching the SCATTER Intervention	Cumulative Carbon Savings 2020 - 2030	Cumulative Carbon Savings 2020 - 2040
Transport	1. Travelling shorter distances 2. Driving less 3. Switching to electric vehicles 4. Improving freight emissions	On-road	**689 $ktCO_2e$**	**1,725 $ktCO_2e$**
Transport	5. Reducing aviation emissions	Aviation	**13 $ktCO_2e$**	**36 $ktCO_2e$**
Industry	1. Shifting from fossil fuels	Industrial processes	**147 $ktCO_2e$**	**400 $ktCO_2e$**
Natural Environments	1. Increase tree coverage and tree planting 2. Land use management	Land use	**3 $ktCO_2e$**	**10 $ktCO_2e$**
Natural Environments	3. Sustainable consumption	Agriculture	**0 $ktCO_2e$**	**0 $ktCO_2e$**
Natural Environments	3. Sustainable consumption	Livestock	**0 $ktCO_2e$**	**1 $ktCO_2e$**
Energy Supply	1. Solar PV 2. Wind 3. Other renewable technologies	Renewable energy generation	**1,278 $ktCO_2e$**	**4,655 $ktCO_2e$**

Please note carbon savings for energy supply and demand interventions should not be aggregated

APPENDIX 6: EMISSIONS REDUCTION INTERVENTIONS

The following tables describe the scale of each interventions required to realise the emissions reductions shown in the High Ambition Pathway (Green line, Figure 5.1) for Slough Borough Council. All reductions are against a 2018 baseline unless stated otherwise. The purpose of this analysis is to understand the scale and speed of change needed to meet the High Ambition Pathway.

Sector	SCATTER Intervention	By 2025	By 2030	By 2040	By 2050
Domestic Buildings	Improved energy efficiency	• By 2025, 3000 new houses are projected compared to 2020; 100% must be built to Passivhaus standards. • By 2025, 1400 households have received medium retrofit measures, 11,100 households have additionally received deep external wall insulation	• By 2030, 4900 new houses are projected compared to 2020; 100% must be built to Passivhaus standards. • By 2030, 2300 households have received medium retrofit measures, 18,700 households have additionally received deep external wall insulation	• By 2040, 6600 new houses are projected compared to 2020; 100% must be built to Passivhaus standards. • By 2040, 4300 households have received medium retrofit measures, 34,400 households have additionally received deep external wall insulation	• By 2050, 8300 new houses are projected compared to 2020; 100% must be built to Passivhaus standards. • By 2050, 6300 households have received medium retrofit measures, 50,100 households have additionally received deep external wall insulation
Domestic & Non-Domestic Buildings	Improved energy efficiency	• 15% domestic reduction • 12% non-domestic reduction	• 21% domestic reduction • 17% non-domestic reduction	• 32% domestic reduction • 28% non-domestic reduction	• 43% domestic reduction • 40% non-domestic reduction
Domestic & Non-Domestic Buildings	Moving away from gas heating systems	• 5% of non-domestic heating systems are district heating • 20% of domestic heating systems are heat pumps	• 8% of non-domestic heating systems are district heating • 34% of domestic heating systems are heat pumps	• 14% of non-domestic heating systems are district heating • 63% of domestic heating systems are heat pumps	• 20% of non-domestic heating systems are district heating • 90% of domestic heating systems are heat pumps

APPENDIX 6: EMISSIONS REDUCTION INTERVENTIONS (CONT.)

Sector	SCATTER Intervention	By 2025	By 2030	By 2040	By 2050
Domestic & Non-Domestic Buildings	Low carbon and energy efficient cooking, lighting and appliances	• Domestic lighting & appliance energy demand decreases 21% by 2025 • Commercial lighting & appliance energy demand decreases 7% by 2025 • 15% increase in domestic electric fuel use for cooking, use of fuel reduced by 15% • 5% increase in non-domestic electric fuel use for cooking, use of fuel reduced by 5%	• Domestic lighting & appliance energy demand decreases 31% by 2030 • Commercial lighting & appliance energy demand decreases 11% by 2030 • 29% increase in domestic electric fuel use for cooking, use of fuel reduced by 32% • 10% increase in non-domestic electric fuel use for cooking, use of fuel reduced by 10%	• Domestic lighting & appliance energy demand decreases 52% by 2040 • Commercial lighting & appliance energy demand decreases 18% by 2040 • 57% increase in domestic electric fuel use for cooking, use of fuel reduced by 66% • 22% increase in non-domestic electric fuel use for cooking, use of fuel reduced by 19%	• Domestic lighting & appliance energy demand decreases 73% by 2050 • Commercial lighting & appliance energy demand decreases 25% by 2050 • 84% increase in domestic electric fuel use for cooking, use of fuel reduced by 100% • 33% increase in non-domestic electric fuel use for cooking, use of fuel reduced by 28%
Transport	Travelling shorter distances	• 17% reduction in total distance travelled per person	• 25% reduction in total distance travelled per person	• 25% reduction in total distance travelled per person	• 25% reduction in total distance travelled per person
Transport	Driving less	• Minimal reduction in road transport use • Minimal increase in rail transport	• 6% in road transport use • 17% increase in rail transport	• 13% reduction in road transport use • 34% increase in rail transport	• 19% reduction in road transport use • 50% increase in rail transport

APPENDIX 6: EMISSIONS REDUCTION INTERVENTIONS (CONT.)

Sector	SCATTER Intervention	By 2025	By 2030	By 2040	By 2050
Transport	Switching to electric vehicles	• 63% of vehicles are EV or HEV • 87% of buses and trains are electric	• 89% of cars are EV or HEV • 100% of buses and trains are electric	• 100% of cars are EV or HEV • 100% of buses and trains are electric	• 100% of cars are EV or HEV • 100% of buses and trains are electric
Transport	Improving freight emissions	• 6% reduction in road freight mileage • 47% reduction in energy used per mile travelled	• 9% reduction in road freight mileage • 71% reduction in energy used per mile travelled	• 15% reduction in road freight mileage • 73% reduction in energy used per mile travelled	• 22% reduction in road freight mileage • 75% reduction in energy used per mile travelled
Waste	Producing less waste	• 17% reduction in the volume of waste	• 24% reduction in the volume of waste	• 40% reduction in the volume of waste	• 57% reduction in the volume of waste
Waste	Increased recycling rates	• 14% increase in recycling rate	• 24% increase in recycling rate	• 42% increase in recycling rates	• 61% increase in recycling rates
Industry	Shifting from fossil fuels	• Electricity consumption is 41% of total industrial energy consumption by 2025	• Electricity consumption is 50% of total industrial energy consumption by 2030	• Electricity consumption is 57.5% of total industrial energy consumption by 2040	• Electricity consumption is 65% of total industrial energy consumption by 2050
Industry	More efficient processes	Process emissions reduced: • 10% for chemicals • 6% for metals • 8% for minerals • 37% other industries	Process emissions reduced: • 14% for chemicals • 10% for metals • 11% for minerals • 50% other industries	Process emissions reduced: • 22% for chemicals • 15% for metals • 18% for minerals • 65% other industries	Process emissions reduced: • 30% for chemicals • 21% for metals • 25% for minerals • 80% other industries

APPENDIX 6: EMISSIONS REDUCTION INTERVENTIONS (CONT.)

Sector	SCATTER Intervention	By 2025	By 2030	By 2040	By 2050
Renewable energy supply	Solar PV	• Local PV: 57.3 MW installed capacity • Large-scale PV: 85.8 MW installed capacity	• Local PV: 91 MW installed capacity • Large-scale PV: 148.7 MW installed capacity	• Local PV: 135 MW installed capacity • Large-scale PV: 390.8 MW installed capacity	• Local PV: 178 MW installed capacity • Large-scale PV: 632.9 MW installed capacity
Renewable energy supply	Other renewable technologies (solar thermal, small-scale wind, anaerobic digestors etc.)	• Other renewable technologies: 0.1 MW local wind 2.1 MW large-scale onshore wind 111.6 MW large-scale offshore wind 0.1 MW local hydro	• Other renewable technologies: 0.1 MW local wind 2.6 MW large-scale onshore wind 150.4 MW large-scale offshore wind 0.1 MW local hydro	• Other renewable technologies: 0.2 MW local wind 4.4 MW large-scale onshore wind 264.8 MW large-scale offshore wind 0.15 MW local hydro	• Other renewable technologies: 0.3 MW local wind 6.2 MW large-scale onshore wind 379.2 MW large-scale offshore wind 0.2 MW local hydro
Natural Environment	Forest coverage & tree planting	• Tree planting outside of woodlands increases by 30% from 2019, equivalent to 230 hectares	• 24% increase in forest coverage • Tree planting outside of woodlands increases by 30% from 2019, equivalent to 260 hectares	• 24% increase in forest coverage • Tree planting outside of woodlands increases by 15% from 2019, equivalent to 286 hectares	• Tree planting outside of woodlands increases by 20% from 2019, equivalent to 312 hectares
Natural Environment	Land use management	• Maintaining existing green spaces	• Maintaining existing green spaces	• 2% decrease in grassland and 4% decrease in cropland to increase forestland and carbon sequestration potential • Maintaining existing green spaces	• 2% decrease in grassland and 5% decrease in cropland to increase forestland and carbon sequestration potential • Maintaining existing green spaces

APPENDIX 7: SLOUGH FLOOD AREA MAPS

The following maps highlight both the history of flooding in Slough (Figure 11.2) as well as previous Environmental Agency flood warnings and alert areas in Slough (Figure 11.3).

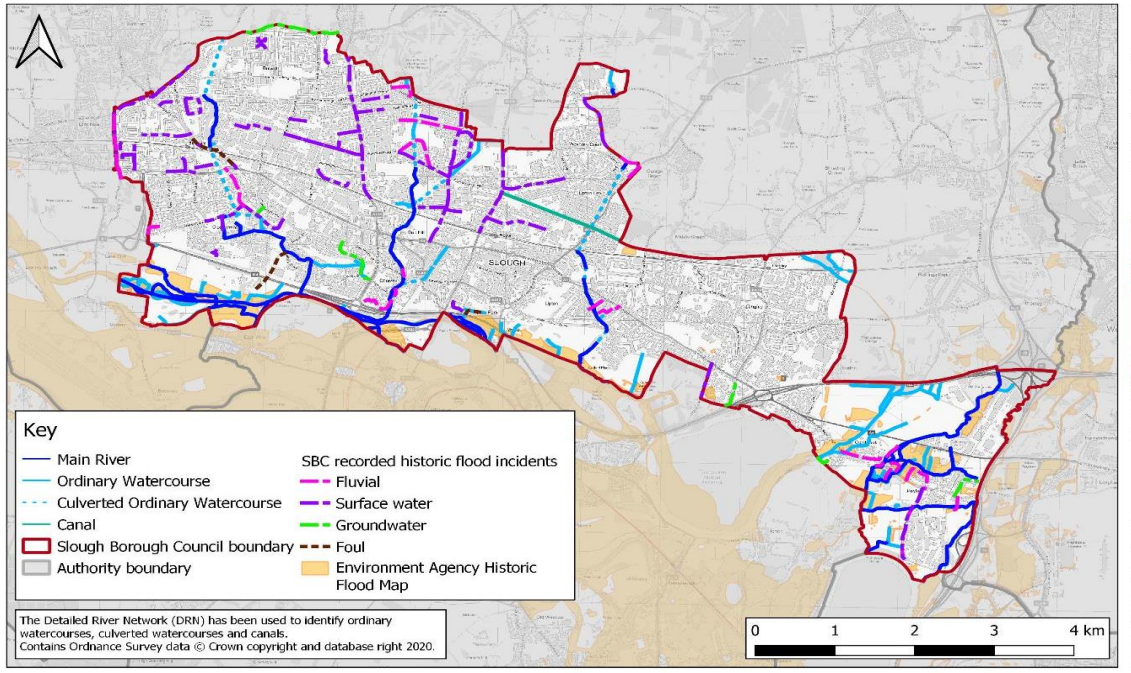


Figure 11.2. Historic flooding in Slough. Source: (Slough Borough Council, 2021)

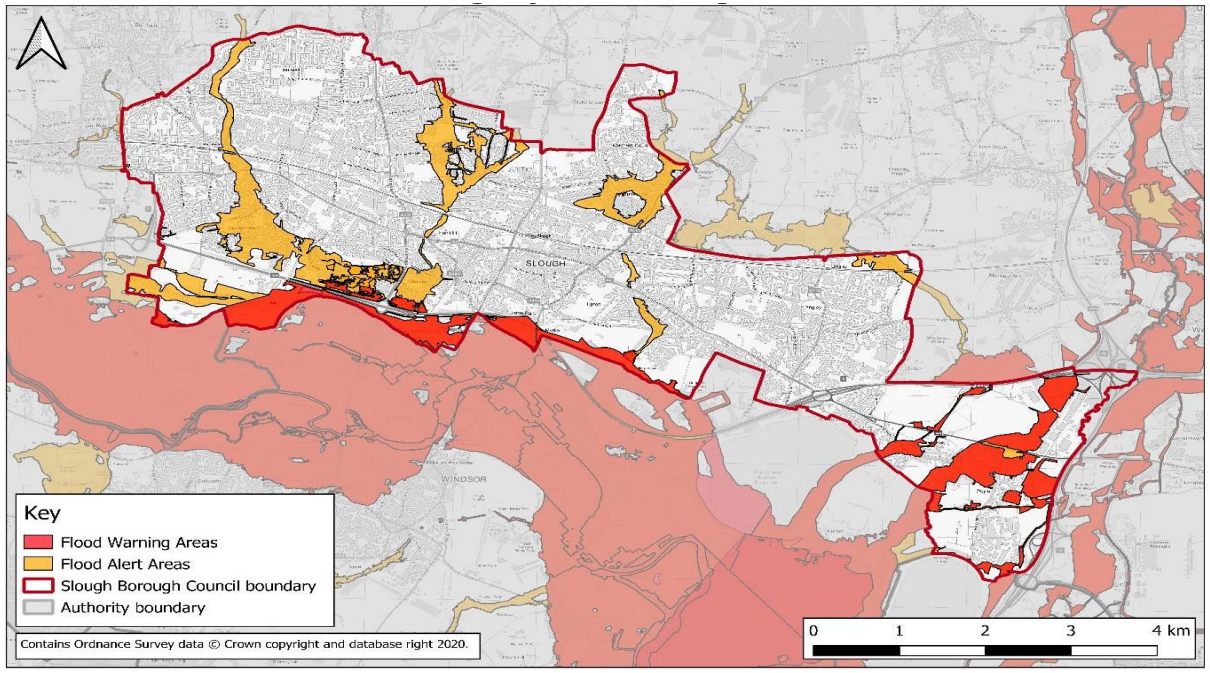


Figure 11.3. Environment agency flood warnings and alert areas in Slough. Source: (Slough Borough Council, 2021)

APPENDIX 8 – COSTINGS

SCATTER activity	Assessed cost (£m)
Switch to electric cookers	**4.0** (marginal opex as a result of switching to all-electric cooking systems)
New build standards are PassivHaus	**35.8** (marginal capex of building to PassivHaus standard during construction) **188.3** (marginal capex of retrofitting new-build Part L in the future)
Reduced household energy demand	**490.3** (capex required for retrofit on existing homes)
Switching away from gas heating	**90.4** (marginal capex for domestic electric heating systems) **-87.8** (marginal opex as a result of switching to electrified heating)

Table 11.1: Assessed costings in the domestic sector. Negative values indicate cost savings.

Notes & Caveats

Switch to electric cookers

- No additional capex assumed with the cost of installation for new electric cooking systems.
- Main cost here represents the potential added cost of fuel each year if the borough switches over time to electric systems, based on a marginal cost over a gas equivalent.
- High Ambition assumes a linear transition to electric cookers ending in 2035 – modelled as a retirement rate of 1/15th of gas systems replaced each year.
- The cost for a household that switches from a full gas to a full electric system may incur higher energy bills as a result of the higher cost of electricity. Long-run energy prices taken from the Climate Change Committee Sixth Carbon Budget.
- This analysis does not consider government subsidies for energy prices which may have a significant role to play in lowering the cost to consumers.

New build standards are to PassivHaus

- These figures are taken from a Currie & Brown and AECOM report which defines the marginal cost between building Part-L or PassivHaus standard both during construction and retrofit phases at a later date. This also accounts for heating systems (assumes air-source heat pump in a semi-detached house).
- The cost of retrofitting runs very high because retrofitting newly-built Part L to higher standards in future can cost between 3-5 times more than building to PassivHaus during construction.
- Number of new builds taken from SCATTER newbuild projections between 2020-40.

Reduced energy demand in homes

- This represents the capex required to complete inner/external wall retrofit on the numbers of households described by the HA pathway.
- Point capital costs for insulation and all other costs come from this BEIS study into the cost of domestic retrofitting. This also accounts for economies of scale, other fixed project costs and local geographical weighting, as well as a hurdle rate.
- Assumes a linear transition of completed retrofit from 2020 household numbers.

Switching away from gas heating

- Climate Change Committee Sixth Carbon Budget has data on capex and opex of a variety of domestic heating systems. An average of these systems was used to determine the cost estimate opposite.
- Number of households taken from SCATTER (2020) and split between gas/non-gas according to aggregated government estimates at LSOA level. A flat 5% assumption was made on households already served by an electric system. All other off-gas properties assumed to be oil boilers.
- All systems assumed replaced at some point (retirement rate 1/15), so replacement costs are calculated for all systems including fossil.
- Opex assumption assumes energy bills are reduced over time as a result of efficiency improvements of electric over gas.

APPENDIX 8 – COSTINGS

Building archetype	Improved building efficiency - Capex (£m)	Improved building efficiency - Annual opex (£m)	Switching away from gas heating - Capex (£m)	Switching away from gas heating - Annual opex (£m)
Arts, community and leisure	12.9	< -0.025	2.7	0.250
Education	12.3	< -0.025	4.6	0.400
Emergency services	3.5	-	1.4	0.100
Factories	46.0	< -0.050	6.9	0.600
Health	10.0	< -0.025	4.2	0.350
Hospitality	10.4	< -0.025	2.0	0.150
Offices	36.0	< -0.050	4.0	0.350
Shops	33.8	< -0.050	2.6	0.200
Warehouses	14.7	< -0.025	2.7	0.250
Total	179.2	< -0.275	31.0	2.7

Table 11.2: Assessed costings in the non-domestic sector. Negative numbers indicate cost savings.

Notes & Caveats

Improved building efficiency

- Non-domestic buildings in any area make up a very broad stock of diverse properties.
- The Non-Domestic National Energy Efficiency Database (ND-NEED) was used to find the number of rateable properties in Slough.
- Costings from Building Energy Efficiency Survey (BEES), which outlines the cost of a package of retrofit measures across different non-domestic archetypes. These were mapped onto the ND-NEED rateable properties register at the local level according to a nationally representative mix of archetypes.
- Costs represent one round of retrofit. Annualised costs relate to the annual marginal expenditure across all sectors over the lifetime of a 15-year cycle of retrofit.

Switching away from gas heating

- Average load demand for heating across different archetypes calculated based on a combination of BEES consumption data and Climate Change Committee statistics on heating systems.
- Climate Change Committee publish £/kW values for capex and opex which have been applied to a scaled figure of average load demand for space heating and hot water.
- Figures represent the capex of a new heating system, whilst opex covers routine maintenance but **not** fuel costs. Fuel costs are only projected to constitute significant additional bills in the retail and office sectors, offering cost savings to many archetypes due to more efficient systems.
- Heating systems assumed to be replaced at a rate of 1/15th each year.
- Costs expressed represent the **annualised, marginal** cost between a business-as-usual gas case and a High Ambition transition to electrified systems. They represent the annual additional cost of electric systems versus replacement like for like with gas.

APPENDIX 8 – COSTINGS

Notes & Caveats

- SCATTER High Ambition projections for installed capacity across different renewable energy types has been cost modelled according to a BEIS report on the development of new installations.
- Costs of installation and maintenance are in constant flux; two benchmark constructing years (2030 & 2050) have been chosen from BEIS data and compared against capacities within the SCATTER High Ambition Pathway.
- It is important to acknowledge that not all costs are incurred by a single stakeholder, since larger installations are government funded and smaller scale PV installations are paid for by households and businesses.
- Figures below indicate the scale of investment in renewable energy each year in order to meet the capacity targets set out by the High Ambition Pathway.

Renewable energy source	Capex (£m) to 2030	Opex (£m) to 2030	Capex (£m) to 2050	Opex (£m) to 2050
Offshore wind	49.7	72.4	193.6	347.1
Onshore wind	71.8	44.1	33.4	23.1
Large-scale PV (>10kW)	5.4	3.6	12.7	9.2
Small-scale PV (<10kW)	81.6	16.7	238.2	45.5
Hydroelectric	0.950	0.550	12.7	7.7
Total	**209.3**	**137.3**	**490.5**	**432.5**

Table 11.3: Assessed costings in the energy sector.

Period	Annualised investment (£m)
To 2030	12.3
To 2050	30.9

Table 11.4: Annualised costs give an indication for the yearly scale of investment in capex and opex for renewable energy assets.

APPENDIX 8 – COSTINGS

Type of cost	Overall investment (£m) - Capex	Overall investment (£m) - Opex
Infrastructure: cars/ vans/ motorcycles	**183.1**	**-**
Infrastructure: HGVs/ buses	**94.0**	-
Infrastructure: rail	**9,050**	-
Total infrastructure	**286.2**	**-**
New vehicles: cars/ vans/ motorcycles	**1,065.8**	**-3,542.9**
New vehicles: HGVs/ buses	**228.3**	**-50.2**
New vehicles: rail	**75.0**	**-314.0**
Total new vehicles	**1,369.2**	**-4,345.5**
Efficiency measures	**-**	**-690.5**

Table 11.5 (above): Assessed costings in the transport sector. Negative opex costs indicate a cost saving.

Notes & caveats

- Climate Change Committee Sixth Carbon Budget costings for capital expenditure and operational savings in the surface transport sector have been recast under SCATTER interventions to 2050 to give an estimate for the implications of the SCATTER High Ambition Pathway.
- Costs represent a scaled down portion of national expenditure in each area as set out in the Sixth Carbon Budget, based on vehicle registrations in Slough.
- Demand reduction and modal shift interventions have been mapped from the High Ambition Pathway onto the expenditure, assuming all costs rise proportionally.
- The vast majority of expenditure and savings related to transport is made in the purchase and operation of new electric vehicles.
- Additional costs have also been given as part of this analysis, shown below in Table X. These are sourced from DfT and Climate Change Committee Sixth Carbon Budget.
- Scaled costings have also been included for the "efficiency measures" intervention from Climate Change Committee modelling. It should be noted that whilst the costings are representative of similar changes within SCATTER, the details of this measure do differ and this figure should be taken with an added caveat.

Additional costs	Cost (£)
Capex: new cycle lane (per km, varies on type of path)	£240,000-£1,300,000
Capex: per bicycle	£350
Capex: commercial bike storage unit	£6,500
Capex: new electric bus & associated infrastructure	£162,000
Opex: lifetime savings following switch to EV	~£6,000

Table 11.6 (above): Costings for additional individual actions.

APPENDIX 8 – COSTINGS

SCATTER activity	Assessed cost (£m)
Reduce overall volume of waste & increased recycling	**-35.3** (opex savings in gate fees)
Increased forest and tree coverage	**0.1-0.4** (capex range depending on availability of government grant support)
Industrial processes	**9.1** (capex)

Table 11.8: Assessed costings in the waste, industry and natural environment sectors. Negative opex costs indicate cost savings.

Notes & caveats

Waste disposal

- This is based on simple modelling of future gate fees for recycling, landfill and incineration based on statistics in the 2019/20 WRAP gate fees report.
- SCATTER estimates for the volume and stream of waste are applied to current figures cast forwards to 2040.
- Gate fees represent the charge levied per tonne to dispose of waste by a given means e.g. landfill site or material recovery facility.
- Estimates do not cover the cost of collection and transport of waste. We have assumed there is no marginal cost between the two scenarios – lifetime cost of electric refuse collection vehicles (RCVs) is comparable to that of diesel RCV (see table opposite from DfT data).
- Not all payments for waste are handled purely through gate fees but this represents a useful proxy for comparative costs of increased recycling and reducing waste volumes versus the counterfactual.

Cost Type	Cost of RCV (£m)- Diesel	Cost of RCV (£m) - Electric
Capex	0.164	0.365
Opex	0.459	0.245
Lifetime total	0.623	0.611

Table 11.7: Assessed costings of RCVs

Increased forest and tree coverage

- Tree coverage and land area change under SCATTER interventions were modelled to 2030 in terms of increase in hectares of woodland.
- Woodland Creation & Management Grant gives costs for capex and opex per hectare of new woodland, which have been applied to the new hectares.
- Further funding opportunities for woodland creation, maintenance, management and tree health can be found here.
- Figures represent a marginal case for High Ambition over BAU; the range represents the impact government grant funding may have.

Industrial processes

- Cost represents the marginal capex of a low-carbon pathway for industry, scaled to Slough based on their share of national industrial fuel consumption.
- Government pathways can be found in the industrial pathways to decarbonisation summary report.

APPENDIX 9: TRACKING IMPACT
DATA SOURCES

In Chapter 8, we recommend the council tracks progress against the plan by assessing the impact of its carbon reduction initiatives. This can be achieved using KPIs which act as "proxies", to give an indication of on the ground impact of the plan. Examples of such KPIs are given below:

Climate Action Area	Data proxy for progress	Potential source for tracking progress
Domestic lighting, appliances, and cooking	Gas & electricity sales data	Sub national gas consumption Sub national electricity consumption *Local data on electrification of cooking systems requires a more specific research*
Domestic space heating and hot water	New build data EPC ratings Fuel poverty statistics Gas network statistics Utilities data Renewable Heat Incentive (RHI) installations	New build dwelling statistics EPC Fuel Poverty ECO measures Gas network Sub national gas consumption Sub national electricity consumption RHI
Non-domestic heating and cooling	Non-domestic EPC ratings Final energy consumption (fuel type) Gas & electricity sales data	EPCs for non-domestic properties Sub-national energy consumption Sub national gas consumption Sub national electricity consumption
Non-domestic lighting, appliances, and catering	Gas & electricity sales data	*Local data on electrification of cooking systems requires more specific research*
Volume of Waste & Recycling	Tonnes of Household and Commercial waste sent for recycling	Collected waste statistics Council-held statistics
Local renewable technologies	Renewable electricity (installations, capacity and generation) Ofgem Feed-in Tariffs (FIT) Installation Report	Regional Renewable statistics FiT Quarterly Stats *Large scale installations may require further research*

APPENDIX 9: TRACKING IMPACT
DATA SOURCES (CONT.)

SCATTER subsector	Data proxy for progress	Potential source for tracking progress
Domestic freight	Licensed vehicles by body type Road transport energy consumption	VEH0105 Fuel Consumption Statistics
Domestic passenger transport - Demand	Licensed vehicles by body type Road transport energy consumption Licensed ultra low emission vehicles Ultra low emission vehicles registered for the first time (by region) EV charging points	VEH0105 Fuel Consumption Statistics VEH0132 VEH0172 Electric vehicle charging device statistics
International aviation & shipping	National data on passengers and freight movement	Airport Data
Agriculture and land use	Land and crop areas, livestock populations and agricultural workforce Green Space Map	Structure of agricultural industry OS Map Green Space *Local data on the agricultural sector requires a more specific research*
Tree planting outside woodlands	Tree surveys	i-Tree
Industrial processes	Electricity consumption in the industrial sector Actions towards less carbon-intensive industrial processes	DUKES Energy Consumption by final user Industrial Decarbonisation and Energy Efficiency Roadmap Action Plan

APPENDIX 10 – PRIORITISATION

Understanding the potential carbon impact

The ratings of the priority as they appear in the table across are based on their estimated carbon savings potential by 2040. It is not always possible to provide carbon savings against specific interventions due to the interdependency of the actions. This is explored further in Appendices 4 and 5.

Against each action area, an order of magnitude for impact is provided, alongside a rating of Higher, Medium, or Lower priority, based on carbon savings potential. Where necessary, some additional judgement was applied (for instance, the full impact of Energy Supply measures is not quantified within the Energy Supply sector, and this has been judged to offer high impact potential).

It is important to note that this judgement of prioritisation is limited to carbon savings, and does not account for other benefits of action or implementation considerations (e.g. cost).

Prioritising actions by carbon impact potential

The Action Planning points in the report provide goals and actions for Slough Borough Council to reduce their carbon emissions across several key sectors. Across most sectors, the actions have been grouped in line with carbon reduction interventions outlined in SCATTER. Based on these groupings, it is possible to gather anticipated carbon savings data, and we recommend the council uses this as a basis for a judgement on priority action areas. Full outputs of this analysis are presented below. Actions around "The Council's Wider Influence", and "Adaptation" are not rooted in SCATTER and are not considered as part of this process.

Sector	SCATTER Intervention	Scale of Saving	Judgement of Priority
Domestic Buildings	Improved building efficiency	>1,000,000 tCO_2e	Higher
Domestic Buildings	Improved lighting and appliance efficiency	>100,000 tCO_2e	Medium
Non- Domestic Buildings	Improved building efficiency	>1,000,000 tCO_2e	Higher
Non- Domestic Buildings	Improved heating efficiency Moving away from gas heating systems	>100,000 tCO_2e	Medium
Non- Domestic Buildings	Improved lighting and appliance efficiency	>100,000 tCO_2e	Medium
Waste	Reducing the quantity of waste Increased recycling rates	<10,000 tCO_2e	Lower
Industry	Shifting from Fossil Fuels	<10,000 tCO_2e	Lower
Transport	Switching to electric vehicles Travelling shorter distances Driving less Improving freight emissions	>1,000,000 tCO_2e	Higher
Transport	International aviation and shipping	>10,000 tCO_2e	Lower
Energy Supply	Local technologies Large scale technologies	>1,000,000 tCO_2e	Higher
Natural Environments	Increased Tree Coverage & Improved Land Management	>10,000 tCO_2e	Lower
Natural Environments	Sustainable Consumption	<10,000 tCO_2e	Lower

Table 11.8: High level analysis of carbon savings impact of SCATTER Intervention areas as a basis for prioritisation.

Order of magnitude of carbon savings	Judgement of priority
>1,000,000 tCO_2e	Higher
>100,000 tCO_2e	Medium
>10,000 tCO_2e	Lower
<10,000 tCO_2e	Lower

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