LONDON BOROUGH OF BARKING AND DAGENHAM

Net Zero Roadmap

Mar 2022

V2.0

Anthesis

APPENDIX 2

CONTENTS

Anthesis

01 Executive Summary

1. EXECUTIVE SUMMARY
CLIMATE CHANGE STRATEGY AND ACTION PLAN

Climate Change Commitment

In 2019, the London Borough of Barking and Dagenham ("LBBD" or "the Council") declared a motion on climate change, recognising the growing urgency for climate action across the borough. The Council has set an ambition for the borough to be carbon neutral by 2050 and for the council's own footprint by 2030. This roadmap explores the action the borough will need to consider to meet its net zero ambition.

Emissions Profile

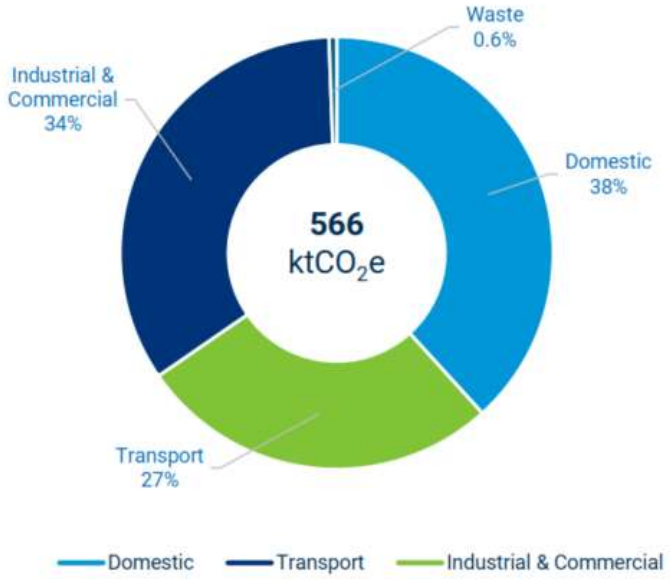


Figure 1.1: Emissions profile.

Emissions Reduction Pathways

The graph below shows two possible future emissions pathways for LBBD as modelled by the SCATTER Pathways Tool. This is compared against the reductions required by the Paris Agreement. Despite applying the most ambitious interventions in SCATTER, emissions remain in the energy system. The High Ambition Pathway indicates **245 ktCO₂e** will remain in the energy system in 2030 and **120 ktCO₂e** remain at 2050. This signals the need for radical action, focussing on the interventions outlined in SCATTER, but also going beyond. Carbon offsetting may also be explored after other actions.

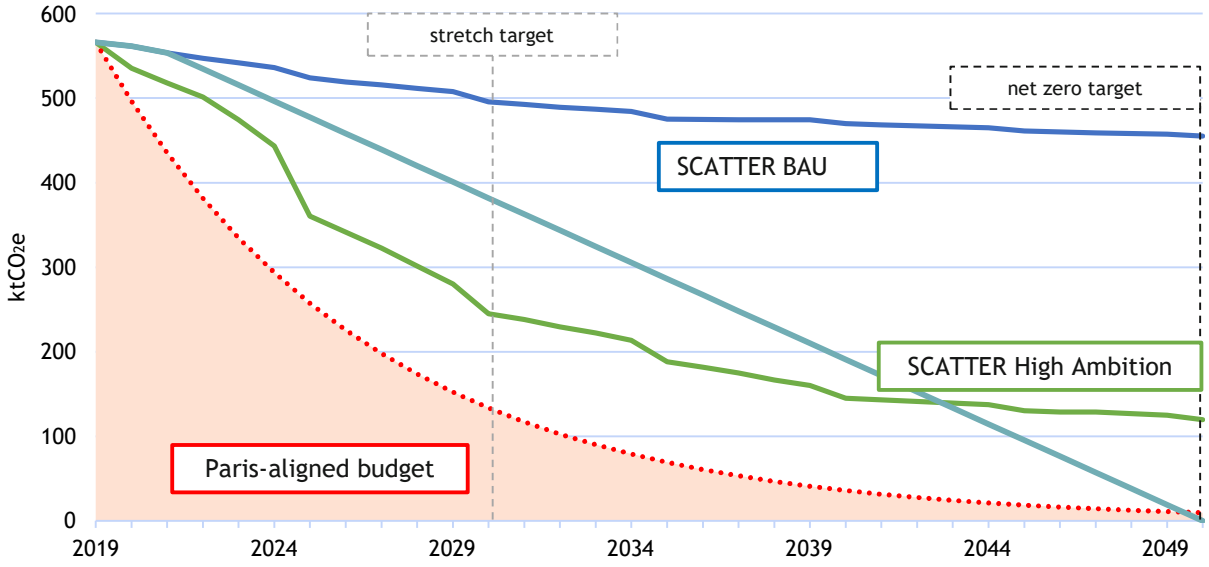


Figure 1.2: Emissions pathways as modelled by Anthesis' SCATTER Pathways Tool

1. EXECUTIVE SUMMARY
NET ZERO ROADMAP - BOROUGH

Delivering Climate Action

The plan sets out recommendations for action across several areas:

Buildings
- Improved energy efficiency
- Shifting off 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

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

Industry
- Innovative technologies
- Industry support

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

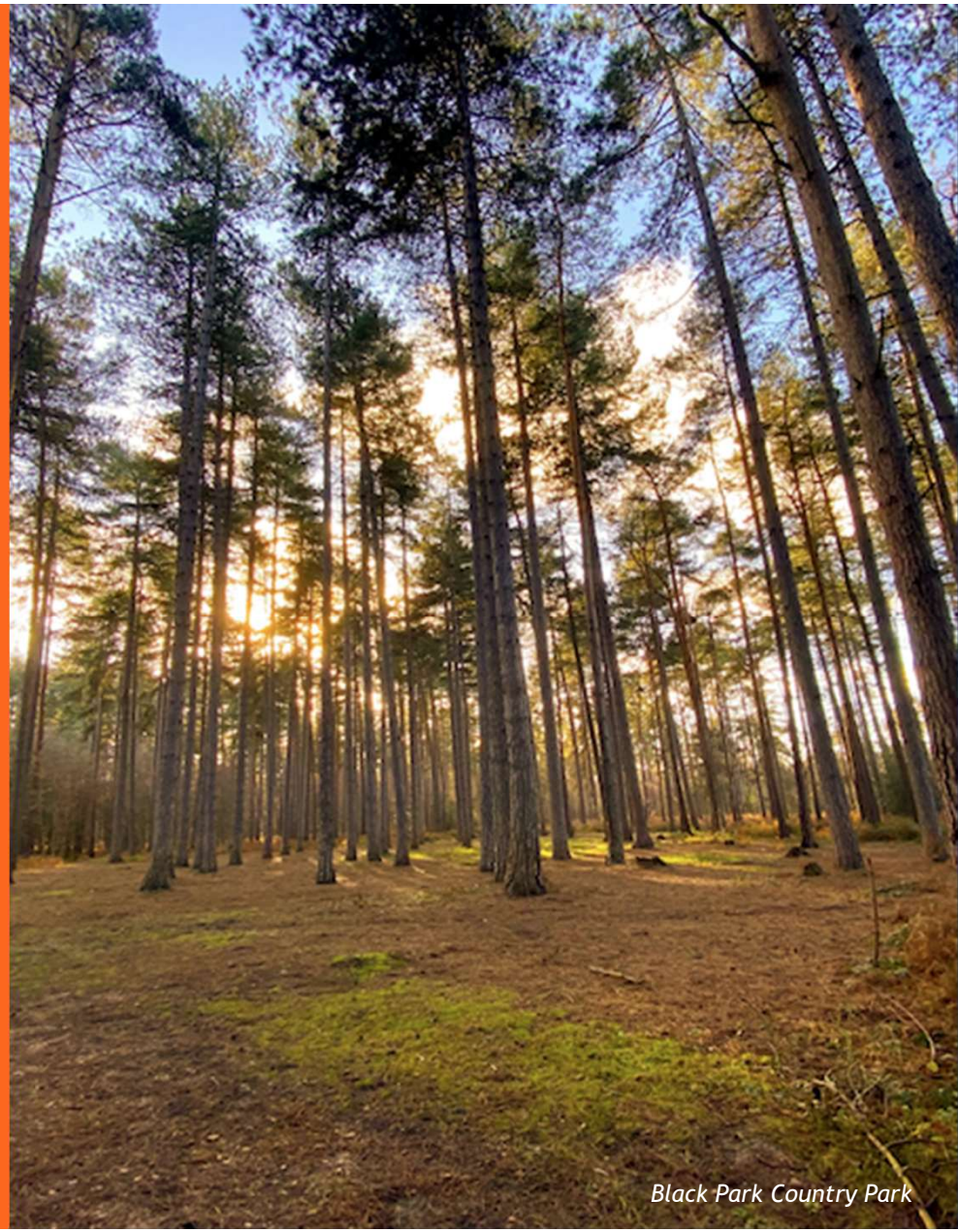
Energy Supply
- Increased wind capacity
- Increase solar photovoltaic (PV) capacity
- Increase the capacity of other renewable technologies

Implementing the actions

LBBD cannot meet its target on its own and will need input from stakeholders across the borough. Actions in the plan are divided into those for which the council is solely responsible, and those where the council has a role in engaging and influencing others. Key stakeholders are also indicated.

Decarbonising will offer co-benefits across wider economic, social and environmental spheres. It is essential that these savings and co-benefits are considered in making the case for action.

02 Background & Context



Black Park Country Park

2. BACKGROUND & CONTEXT
INTRODUCTION

Overview & Scope

This report was commissioned by LBBD, who have committed to becoming a carbon neutral council by 2030 and district by 2050.

The roadmap is designed to demonstrate the impact of existing programmes of work on the emissions trajectory for LBBD and provide an outline for further work or offsets to achieve the target.

The report is structured as follows:

- **Chapters 2 & 3** outline the current context for climate change action and provide an overview of LBBD's baseline emissions
- **Chapters 4 & 5** set out LBBD's carbon budget and emission reduction pathways.
- **Chapter 6** introduces the Action Plan for a zero-carbon trajectory based on the high ambition SCATTER pathway for domestic buildings, transport, waste, industry, energy supply and natural environments.

Objectives

1. Provide an understanding of LBBD'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;
3. Collate existing projects and understand their impact on the emissions profile of the Council and the Borough;
4. Identify further emissions reduction measures, milestones and actions for LBBD to implement;

This will help LBBD to:

- Provide a more informed evidence base for climate change action
- Pull together the existing strands of action and visualise their cumulative impact and the remaining gap in reductions

2. BACKGROUND & CONTEXT
OVERVIEW OF POLICY CONTEXT

A Motion on Climate Change

On 29 January 2020, LBBD's Council declared a motion on Climate Change. The motion stated: "This Council notes:

- That a changing climate will have severe and enduring social, economic and environmental implications, and that tackling climate change is an issue of inequality as the greatest impact will be on the most vulnerable and those least able to protect themselves.
- That the 'Special Report on Global Warming of 1.5°C', published by the Intergovernmental Panel on Climate Change in October 2018, (a) describes the enormous harm that a 2°C average rise in global temperatures is likely to cause compared with a 1.5°C rise, and (b) confirms that limiting Global Warming to 1.5°C may still be possible with ambitious action from national and sub-national authorities, civil society and the private sector.
- That strong policies to cut emissions also have associated health, wellbeing and economic benefits."

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 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 April 2021, the government committed to reducing emissions by 78% by 2035 compared to 1990 levels.

The London Plan 2021 sets out an integrated economic, environmental, transport and social framework for the development of London over the next 20-25 years. In addition to this, the London Mayor has set a target for London to become a zero-carbon city by 2050.

In 2020, LBBD set a motion on climate change and committed to tackling 8 key action objectives.[1] Following the motion, the Council set a borough-wide net zero target of 2050, and an operational target of 2030.

[1] LBBD Motions from Meeting of Assembly, Wednesday, 29 January 2020.

2. BACKGROUND & CONTEXT
KEY POLICIES RELATING TO CLIMATE CHANGE

The following sections detail key relevant polices across the following areas:

Buildings

Industry

Transport

Energy supply

Waste

Natural environment

1. BUILDINGS
KEY 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).
- Gas boilers will be banned in **new** homes from 2025 - see Future Homes Standard
- UK Green Building Council Advancing Net Zero programme provides guidance to the construction and property sectors
- MEES in the domestic private rented sector currently prevents landlords from letting properties rated below EPC band E. This will likely rise to C by 2025.

GLA

- The London Plan outlines net zero targets for new developments and further targets for emissions reductions beyond national policy for domestic buildings. Policy SI 2 requires all major development to be net zero and achieve a minimum 35% improvement on Building Regulations 2013 standards, with strict criteria on when offsetting via borough level funds is allowed. This policy may be updated following planned Part L update.
- London's draft 'Be seen' plan requires new developments to monitor and report on their actual operational energy performance for up to 5 years after completion
- London's draft whole life-cycle carbon assessment sets out guidance for tackling the embodied carbon of buildings

Barking and Dagenham

- Under the new draft Local Plan, the council's buildings standards require:
  - All new non-residential development and refurbishment over 500 sqm floor space (gross) to be designed and built to meet or exceed a BREEAM 'Excellent' rating (or updated equivalent)
  - All residential refurbishment development of 10 dwellings or more to be designed and built to meet or exceed a BREEAM Domestic Refurbishment 'Excellent' rating (or updated equivalent).
  - New residential development to meet BRE Homes Quality Mark 3 star rating.
- Cosy Homes programme LBBD partnered with Eon to roll out heating and energy efficiency measures to qualifying households up to mid-2022.
- Energiesprong Deep Retrofit £2m pilot for 36 council homes to undergo deep retrofit, involving D-rated and below properties elevated to A. The aim is to stimulate a deep retrofit construction market to drive up scale and drive down costs.

2. TRANSPORT
KEY 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.
- Ten Point Plan for a Green Industrial Revolution includes ending the sale of new petrol and diesel cars and vans by 2030.
- 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 environmental enhancement; and sustainable communities.

GLA

- Mayor's Transport Strategy aims for 80% of all London journeys to be completed on foot, by bike or public transport by 2041. The plan will also see action to make it easier to own an electric vehicle in London, and sets out targets for installation of rapid EV charging points.
- Vehicle usage and emissions within London are regulated by TfL's LEZ, ULEZ, and CC Zone
- The Mayor is committed to supporting boroughs to create town centres Zero Emission Zones, with plans to create central London a ZEZ from 2025
- TfL's Healthy Streets Approach includes provision for improvements to the city's green infrastructure

Barking and Dagenham

- Under the new draft Local Plan, Barking and Dagenham are promoting ambitious targets in line with the London Plan 2021. The Plan also states that the council will:
  - Identify and safeguard new sites, space and route alignments, as well as supporting infrastructure which allow for modal shift of freight from road to rail or river
  - Improve public transport access and identify locations for bus priority infrastructure
  - Provide wider footpaths, good cycling infrastructure and well-designed public realm walking and cycling routes.
- The council's targets (in line with the London Plan 2021) includes:
  - 75% of all trips (based on the citywide target of 80%) in Outer London to be made by walking, cycling or public transport
- The council is also implementing a Walking and Cycling strategy

3. WASTE
KEY 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.

GLA

- The London Plan - Policy SI 7 Reducing waste and supporting the circular economy and Policy SI 8 Waste capacity and net waste self-sufficiency include targets to:
  - Ensure that there is zero biodegradable or recyclable waste to landfill by 2026
  - Meet or exceed the municipal waste recycling target of 65 per cent by 2030
  - Meet or exceed the targets for each of the following waste and material streams: construction and demolition - 95 per cent reuse/recycling/recovery; excavation - 95 per cent beneficial use
  - Manage the equivalent of 100 per cent of London's waste within London (i.e. net self-sufficiency) by 2026
- Circular Economy Statement Guidance sets out how applications required by the London Plan should be designed.

Barking and Dagenham

- Under the new draft Local Plan, Barking and Dagenham support the waste-related targets in the London Plan 2021 to:
  - manage 100% of its own waste by 2026. This includes the borough-level apportionment of 6.1% for the London Borough of Barking and Dagenham (LBBD) for all household, commercial and industrial waste between 2021 and 2041 (505,000 tonnes by 2021 and 537,000 tonnes by 2041).
- Under Policy SP 2, the Council also states it will promote the adoption of circular economy principles in development, with a Circular Economy Statement expected to be submitted in line with the London Plan.
- The Council's Reduction and Recycling Plan includes actions to take enforcement action against residents who produce excess residual waste and to help drive resource efficiency.
- ELWA Waste Strategy - which includes an estimated 30% reduction in emissions from waste

4. INDUSTRY
KEY POLICIES

National

- In the UK's Industrial Strategy, one of the grand challenges set is clean growth, which refers to driving economic growth whilst reducing carbon emissions, and maximising the advantages for UK industry.
- The Clean Growth Strategy includes 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, including the food and drink sector.
- The Ten Point Plan for a Green Industrial Revolution includes plans to invest in carbon capture for industries that are particularly difficult to decarbonise.

GLA

- Under the London Environment Strategy, numerous industries will be encouraged to reduce their use of fossil fuels to reduce pollution. The development of alternative fuels, such as hydrogen, by industry is also encouraged under the Strategy.
- London's Climate Action Plan states that negative emissions technologies, such as carbon capture storage, will be needed to eliminate residual emissions from some parts of industry.

Barking and Dagenham

- Under the new draft Local Plan, the Council states that:
  - It has ambitions to attract investment in the decarbonisation sector
  - It will promote efficient use of industrial land to support the green technology sector
- Barking and Dagenham's Industrial Land Strategy outlines that London Sustainable Industries Park will be developed within the borough.

5. ENERGY SUPPLY
KEY POLICIES

National

- The UK's National Planning Policy Framework (2019) states as a core planning principle 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.

GLA

- The Mayor's Solar Action Plan sets the ambition for London to have 1GW of installed solar capacity by 2030 and 2GW by 2050
- As part of the Mayor of London's commitment to 100% renewable supply for the London underground by 2030, the mayor will also review opportunities to meet other public sector energy demand with renewables
- The London Plan - Policy SI 3:
    - Requires boroughs and developers to engage at an early stage with relevant energy companies and bodies to establish the future energy and infrastructure requirements
    - Requires opportunities for renewable energy generation to be maximised
    - Outlines heat network priority areas

Barking and Dagenham

- Under the new draft Local Plan:
    - All development proposals will be expected to address an area's energy infrastructure requirements, prioritise decentralised energy, and adhere to the London Plan's heating hierarchy (Policy SI 3)
    - All new large-scale development (over 500 dwellings) should liaise with the Council about the creation of a new District Energy Network (DEN)
- Under the Council's Energy Strategy, the council established B&D Energy Limited to produce and supply renewable energy for the local area and will install solar panels on council buildings, schools and children's centres.

6. NATURAL ENVIRONMENT
KEY 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.
- Environment Act is a wide ranging act with implications for waste, waste, air quality and biodiversity.

GLA

- London Environment Strategy sets out a target of increasing London's tree cover by 10% by 2050
- Mayor of London's Greener City Fund - £12m fund to support community initiatives, strategic green infrastructure, woodland development, and community engagement
- The London Plan policies covering Urban Greening and Biodiversity

Barking and Dagenham

- Under the new draft Local Plan:
  - Trees, shrubs or vegetation must be retained if it is of significant value, including ecological value, as per an agreed appropriate arboriculture valuation system (such as i-tree or C AVAT) and subject to consultation with the Council, makes a significant contribution to amenity or local character, or it is of special character, age, or has scope for screening other properties or features
  - Major residential-led developments are expected to provide community food growing opportunities
- In 2020, Barking and Dagenham joined the international Tree Cities of the World programme.
- Parks and Open Spaces Strategy highlights masterplans for 10 of LBBD's main parks. The strategy includes programmes for repair, maintenance and development of the Borough's green spaces.
- LBBD Green Infrastructure and Biodiversity Strategy includes action across these areas

03 LBBD's Emissions Baseline

3. EMISSIONS BASELINE
EXECUTIVE SUMMARY

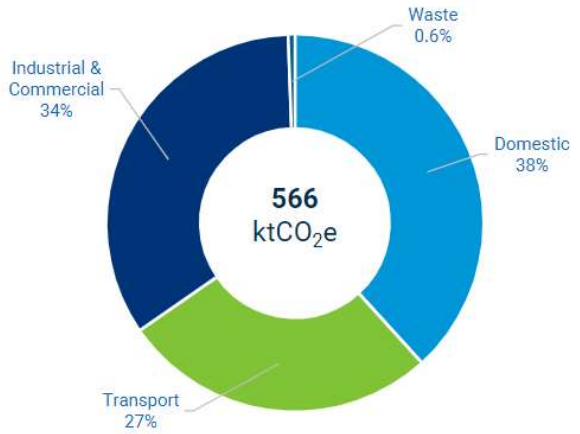
Carbon Footprint Summary

Barking and Dagenham's borough wide carbon footprint for the baseline year 2018 was calculated to be **566 $ktCO_2e$**. The footprint boundary was aligned with the BASIC emissions reporting framework which includes Scope 1, Scope 2 and selected Scope 3 (waste) emissions. These emissions were split across the following sectors, in line with the BEIS sub-national emissions data:

1. Domestic emissions: **217 $ktCO_2e$** (38%)
2. Industrial and commercial emissions: **192 $ktCO_2e$** (34%)
3. Transport emissions: **154 $ktCO_2e$** (27%)
4. Waste emissions: **3 $ktCO_2e$** (0.6%)

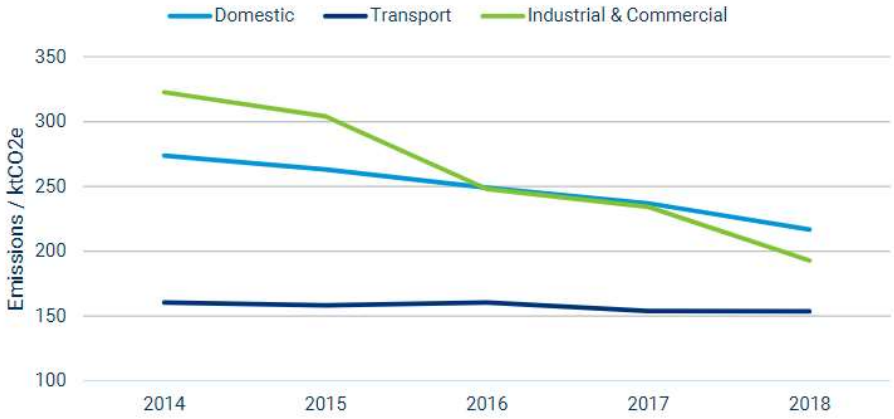
The greatest reduction in emissions since 2014 was seen for the industrial and commercial sector, which decreased by 40%. Emissions from the domestic sector have declined more slowly, falling by 21% between 2014 and 2018. In contrast transport sector emissions have remained relatively constant over the five-year period.

Please see the full report for further detail:
"LBBD_area_wide_footprint_v0.1(d).pdf



The pie chart above shows the split of emissions in the borough.

The line graph below shows the change over time.



04 LBBD's Carbon Budget

3. EMISSIONS PATHWAYS
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 inform priorities for emissions reduction. It has been used by over 300 local authorities to date. The tool offers this key function:

- **Emissions Pathways:** The tool provides a range of visual, easy to understand emissions scenarios up to 2050. This is explored further in Chapter 5.

The pathway takes the baseline calculated and reported with the Carbon Trusts' report LBBD_area_wide_footprint v0.1(d).pdf and the projects this out to 2050 under several pathway scenarios. These are then compared to the carbon budget.

The carbon budget and the pathway scenarios are explained below.

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),[1] MacKay's work led to the development of the 2050 Pathways Calculator.

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.

[1] DECC responsibilities were reformed into BEIS in 2016

4. LBBD'S CARBON BUDGET
CARBON BUDGET SCOPE

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 2 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.

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.

These two principles mean that the annual reduction rate of emissions becomes very important. Cumulative emissions and the scale and 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 LBBD'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. LBBD'S CARBON BUDGET
KEY STATISTICS

Budget Milestones

To demonstrate a carbon budget for the borough of Barking and Dagenham, the Tyndall Centre recommends an emissions reduction rate of **12.3%** per year. This provides a pathway which keeps LBBD aligned with the Paris Agreement.

LBBD's recommended carbon budget for the period 2022 to 2100 is **3,035 $ktCO_2$**. Figure 4.1 illustrates carbon budget milestones based on the annual reduction rate for LBBD.

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.

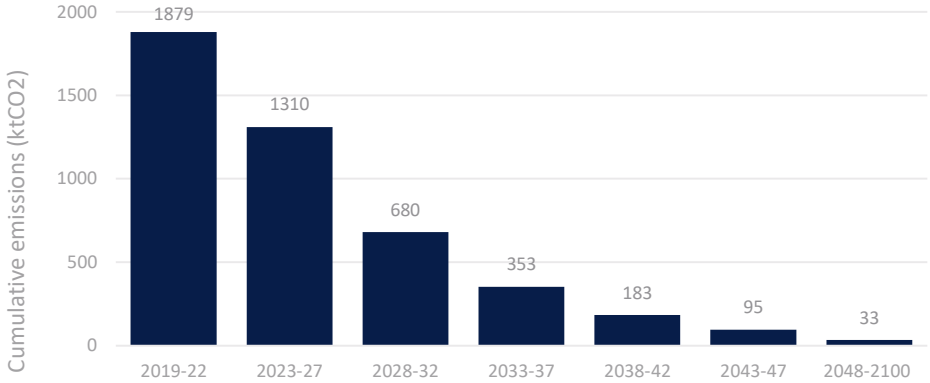


Figure 4.1: The bar chart above describes the carbon budget targets based on the recommended annual reduction rate. These have been broken down into the periods set out in government reporting frameworks.

Key statistics for LBBD

To keep LBBD aligned with the Paris Agreement, emissions must be reduced by 12.3% per year.

If LBBD continues along a business-as-usual pathway, the carbon budget (2020 – 2100) will be exceeded by 2026.

By 2042, 4.5% of the budget remains, provided that LBBD 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

SCATTER provides 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 LBBD. 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 LBBD's 2030 stretch target and 2050 net-zero carbon ambition, as well as the UK's 2050 net zero target. A summary of these intervention targets are detailed in the Appendix.

For LBBD, considering the target of net zero by 2050, only the high ambition pathway has been modelled.

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 LBBD 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 LBBD continues along current "business-as-usual" (BAU) trajectory in terms of national policy, grid decarbonisation and behavior change.

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

Zero emissions by 2050: Illustration of the reductions line to meet zero by 2050 and resultant additional emissions above budget.

Paris-aligned Reduction Rate: Based on the Tyndall Centre's recommended annual reduction rate of 12.3%. 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 LBBD, based on research by the Tyndall Centre for Climate Change Research.

The graph below shows two possible future emissions pathways for LBBD as modelled by the SCATTER tool (scopes 1, 2 and 3), compared against the Tyndall Centre's recommended 12.3% annual reduction pathway.

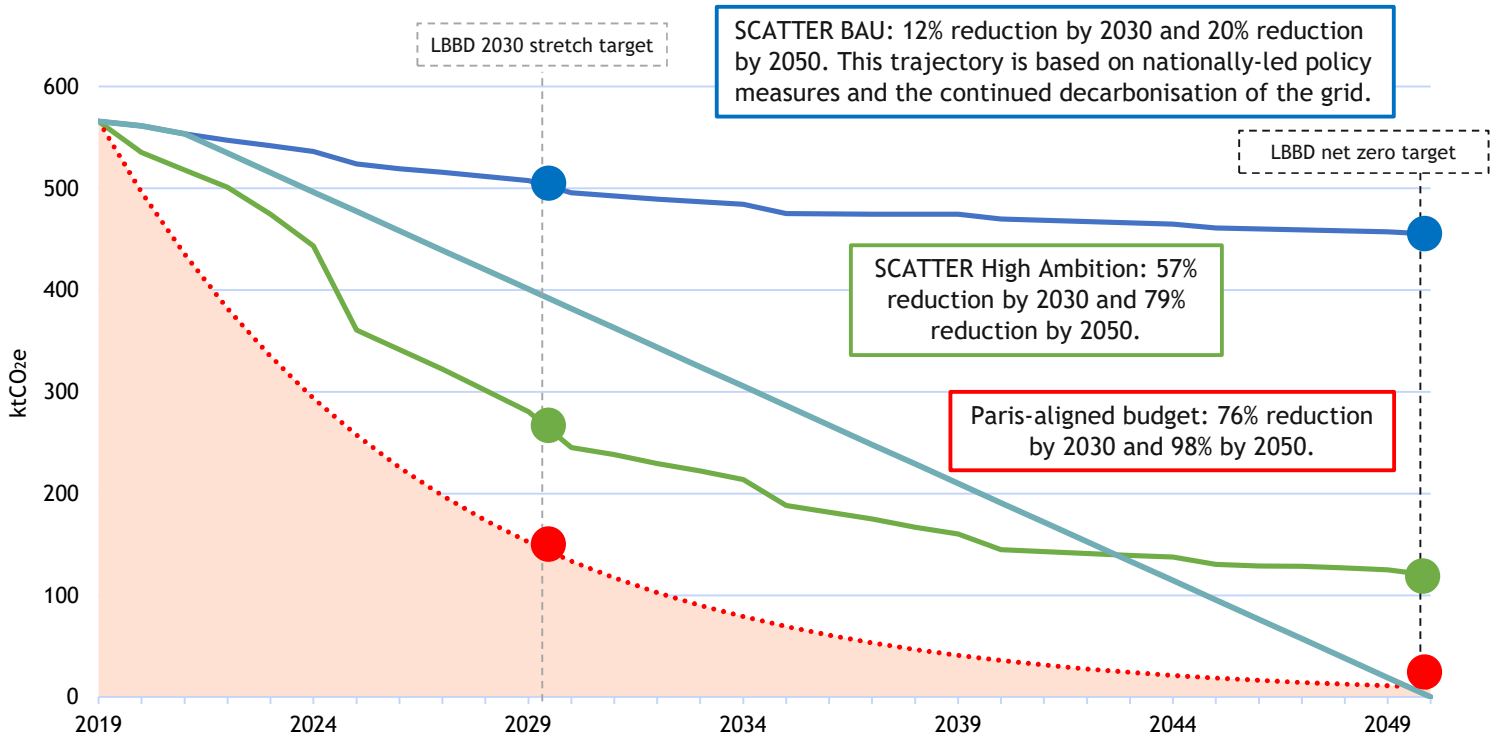


Figure 5.1: Future emissions pathway for LBBD (2019 – 2050), with LBBD's 2030 stretch target and 2050 target highlighted.

5. EMISSIONS REDUCTION PATHWAYS
LBBD'S HIGH AMBITION PATHWAY

Despite applying the most ambitious interventions in the SCATTER Tool for LBBD, emissions remain in the energy system. Along LBBD's High Ambition Pathway, **245 ktCO2e** remain in the energy system in 2030 and **120 ktCO2e** remain in the energy system by 2050.

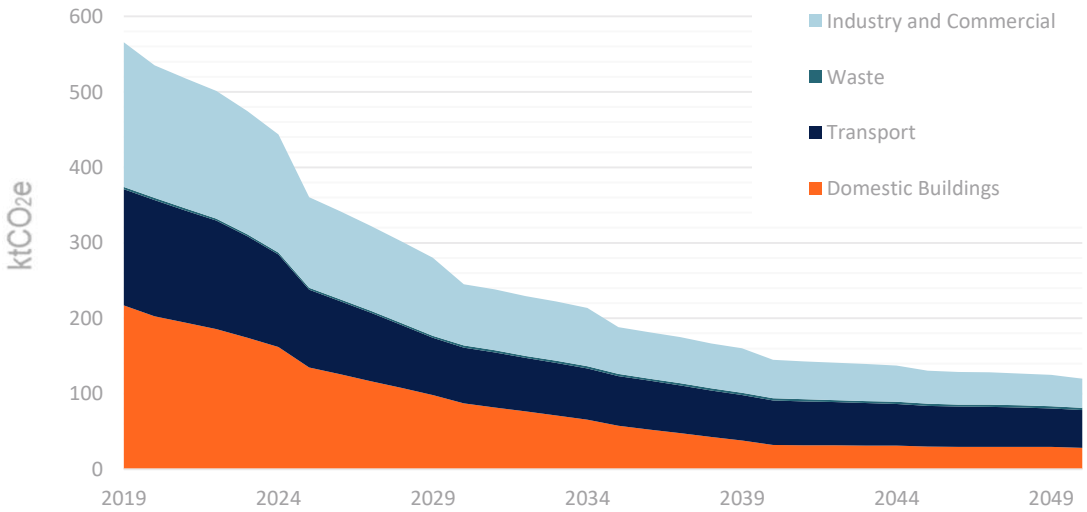


Figure 5.2: SCATTER high ambition pathway for the borough of LBBD, broken down by sector. Shaded areas correspond to residual emissions (those remaining after reductions).

The High Ambition Pathway demands for ambitious and urgent reduction interventions. The scale of the actions necessary to reduce emissions to net-zero by 2050 requires immediate radical changes across all areas of activities for LBBD.

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 LBBD's carbon neutrality target of 2050. Even with the most ambitious interventions in the SCATTER tool, 120 ktCO2e emissions remain in the energy system in 2050.

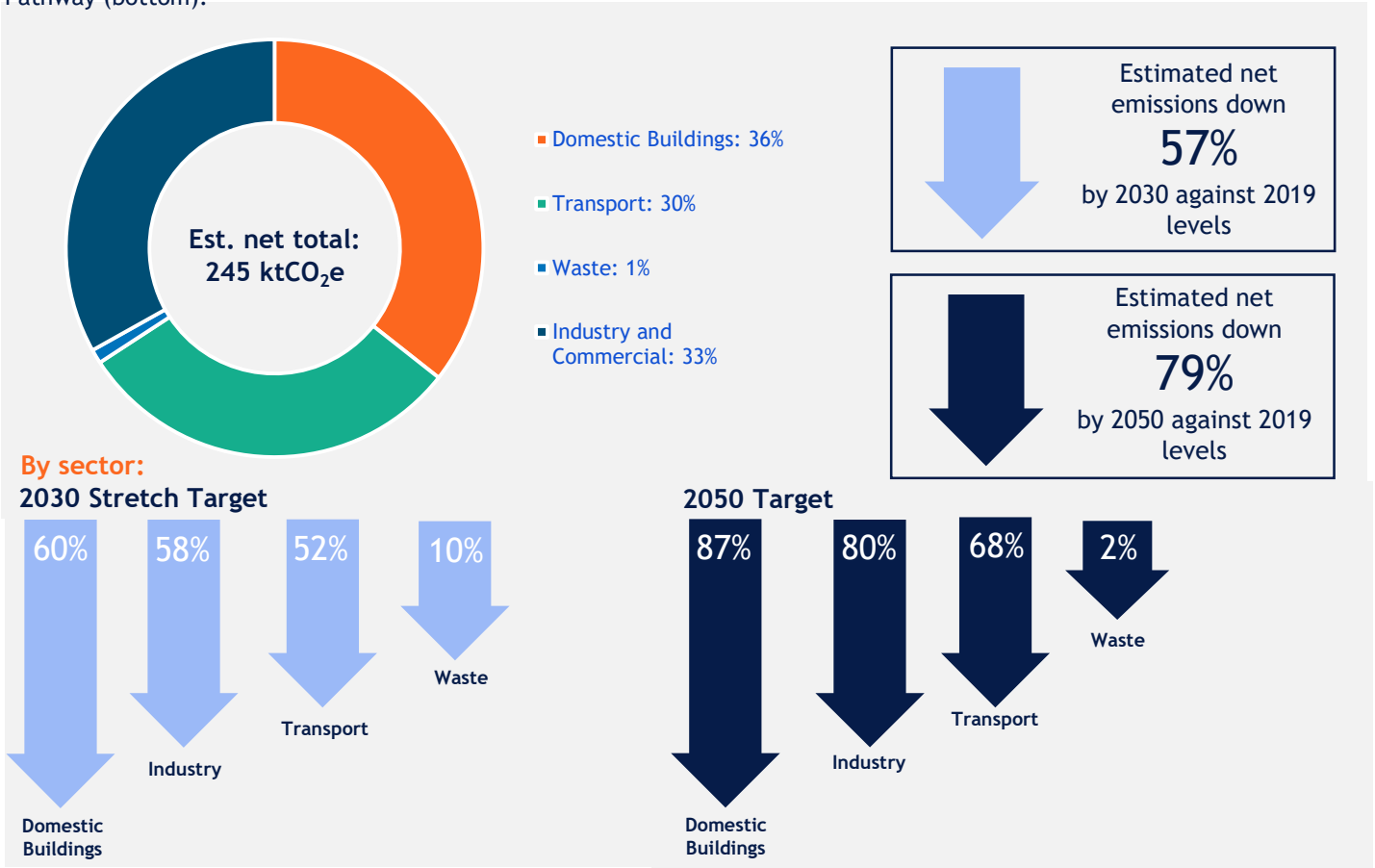
5. EMISSIONS REDUCTION PATHWAYS
LBBD'S HIGH AMBITION PATHWAY

Adoption of the SCATTER High Ambition Pathway interventions delivers emissions reductions of 79% by 2050.

By 2050, the emissions profile for LBBD is predicted to look very different from today. Concerted local actions can have a significant effect on borough-wide emissions. Increased building energy efficiency leads to emissions from domestic buildings dominating the 2030 profile.

Despite aggressive action, 245 $ktCO_2e$ of residual emissions remain in 2030 and 120 $ktCO_2e$ in 2050. Though emissions from industry, buildings and transport have been heavily reduced, the scale of improvements is not enough to achieve net zero by 2050. 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 2050 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.

If the borough achieves the interventions outlined in the High Ambition Pathway, it is left with an emissions gap of **245 $ktCO_2e$** to meet the 2030 stretch target for carbon neutrality, and **120 $ktCO_2e$** to reach the 2050 target. By 2030 there is a gap of **112 kt CO_2e** to meet the Paris Agreement-aligned target, dropping to **110 $ktCO_2e$** by 2050.

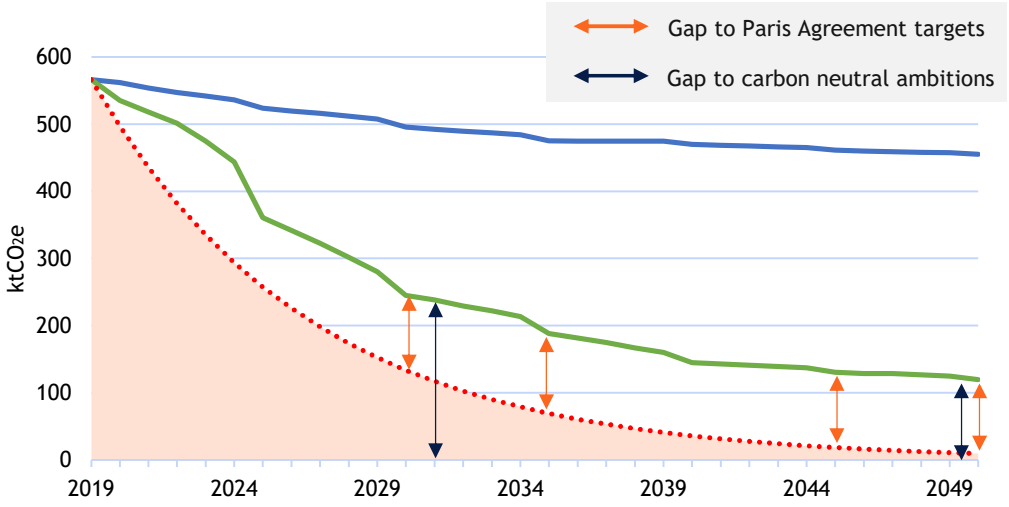


Figure 5.4: SCATTER pathways, with indicators given for the gap to target.

Closing the gap

For reasons of reliability, cost, and impact, LBBD will need to prioritise the actions detailed in this report, which are based on a calculated "High Ambition" pathway. Detailed below are some of the ways it may be possible to "close the gap" in emissions:

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. However, no "silver bullet" transformational technology should be relied upon or anticipated.

Accelerated and increased deployment
LBBD 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. LBBD may also seek to deliver actions 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.

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 organisation's 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

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 LBBD in line with the 2050 target. Our recommendations are based upon outputs from the SCATTER Pathways Tool in conjunction with 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 LBBD. 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 23).

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 2050, 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, and 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.

Action Planning Measures

Within each sector, we present recommended actions for LBBD 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 31. 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.

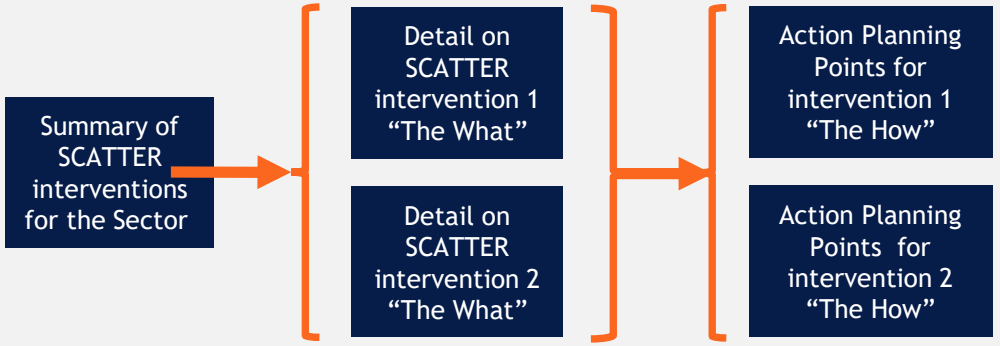


Figure 6.1: Illustration of detail provided on SCATTER intervention pathways and action planning later in this chapter. In each sector, we provide a summary of the SCATTER interventions, before providing a "deep dive" on each. Later, we provide our Action Planning recommendations for the sector, in line 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 5% of emissions (scope 1&2) in the borough (Figure 6.2). This rises to 21% when including S3. 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
LBBD Council Actions ("LBBD")	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. planning policy for new developments.
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 "LBBD 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 2021, Anthesis completed an inventory of GHG emissions for LBBD. For the 2018/2019 reporting year, scope 1,2 and 3 emissions totalled 119 $ktCO_2e$, just over 21% of the borough-wide total (Page 16). This informed the development of the council's own Net Zero Roadmap, which is delivered alongside this report.

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.

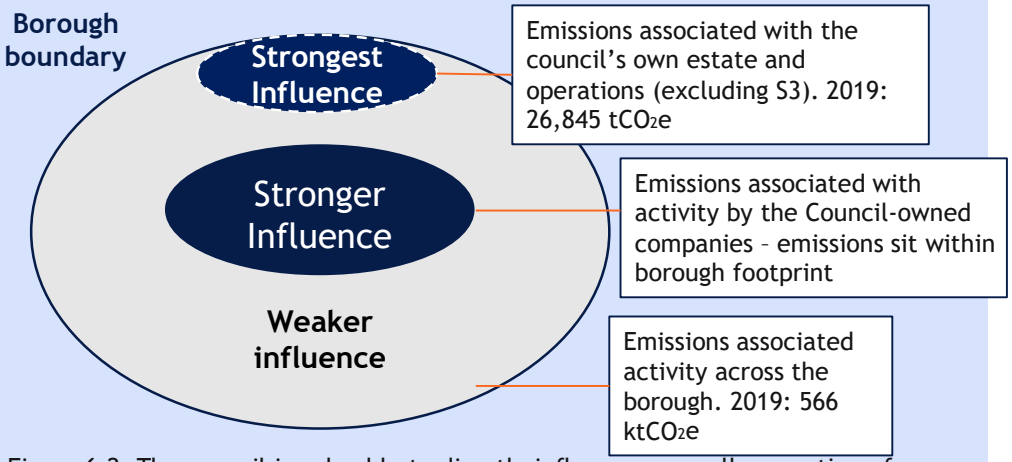


Figure 6.2: The council is only able to directly influence as small proportion of emissions in the borough. The diagram is illustrative only and not to scale.

6. ACTION PLAN
CARBON SAVINGS

Understanding carbon impact potential

Figure 6.3 provides a visual overview of the estimated carbon savings for each sector that would result if the interventions detailed in this chapter were achieved. Savings provided are cumulative, for the period 2020-2050.

- The graphs illustrates the high variance between the savings potential of each sector
- The largest savings potential is found within the domestic buildings sector. Waste represents a significantly lower savings potential, attributed to having the lowest level of baseline emissions.

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 3.

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

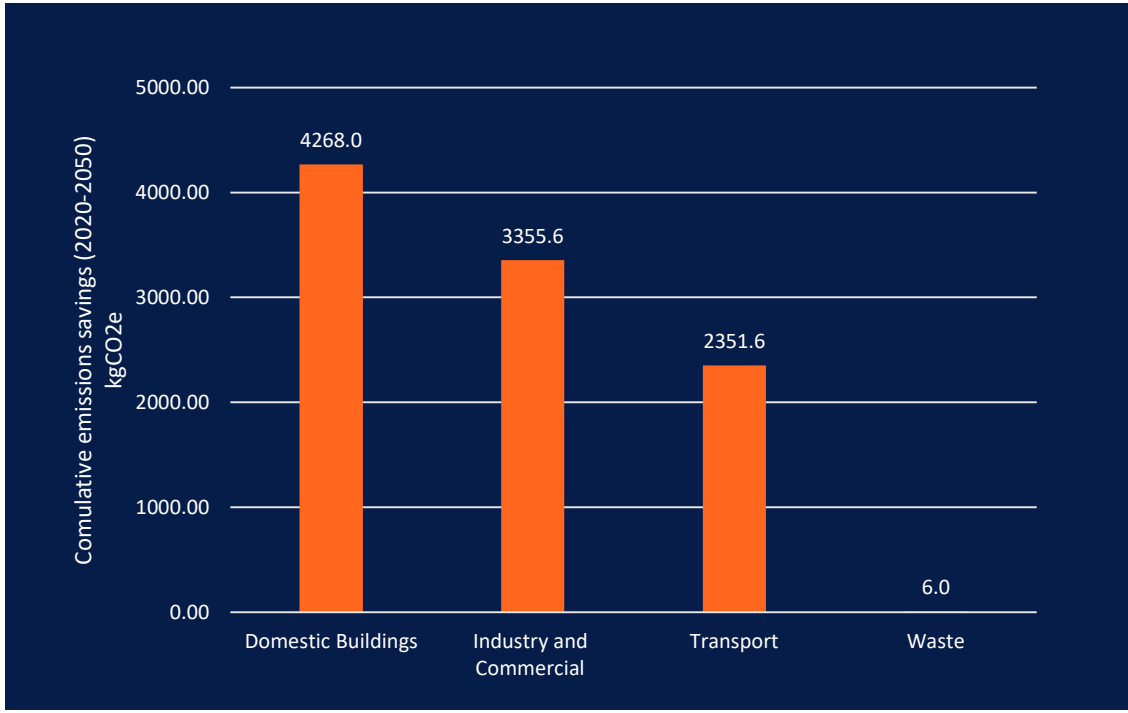


Figure 6.3: Cumulative carbon savings for the domestic, Industry and commercial, transport and waste sectors in LBBD (2020-2050).

6. ACTION PLAN
NAVIGATING THIS CHAPTER

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

- **Sector Overview:** Introductory contexts within each sector. This includes a breakdown of key emissions sources, along with an overview of opportunity areas for action, and relevant considerations related to the recovery from the COVID-19 pandemic.
- **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.
- **Action Plan:** Specific actions are provided in line with each SCATTER Intervention, indicating specifically *how* LBBD 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.

6. ACTION PLAN
NAVIGATING THE ACTION PLAN

Recommended actions are presented in tables throughout the following chapters.

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, LBBD Borough Council Actions are presented first, followed by Borough-Wide Influence actions.

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 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:

LBBD 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

Anthesis

6.1 BUILDINGS
SECTOR OVERVIEW

Scope of Section

The built environment sector represents the majority of LBBD's emissions, with domestic buildings accounting for 38% of baseline emissions. This section discusses measures relating to both domestic and non-domestic building types (although non-domestic buildings were not covered in the CT footprint, and therefore not included in the figures) and suggests actions for accelerating progress in reducing their carbon impact.

Key Emissions Sources

For new developments by BeFirst, the council's development arm, buildings will target LETI design guide standards. Planning policy in London requires a 35% minimum onsite carbon reduction, and connection to a low carbon heat network with the some of the remaining 'offset' via carbon fund payments. So strategies are already in place to ensure emissions from additional buildings do not result in a significant net increase in emissions. The current carbon fund is small and not expected to be large enough to be a significant area of activity.

However, the challenge requires looking at not only improving new-build developments, but retrofitting and improving efficiency in existing buildings, given that 80% of the homes in LBBD in 2050 already exist.[1] Domestic energy consumption is mainly a result of space and water heating and electricity for appliances and lighting.

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.

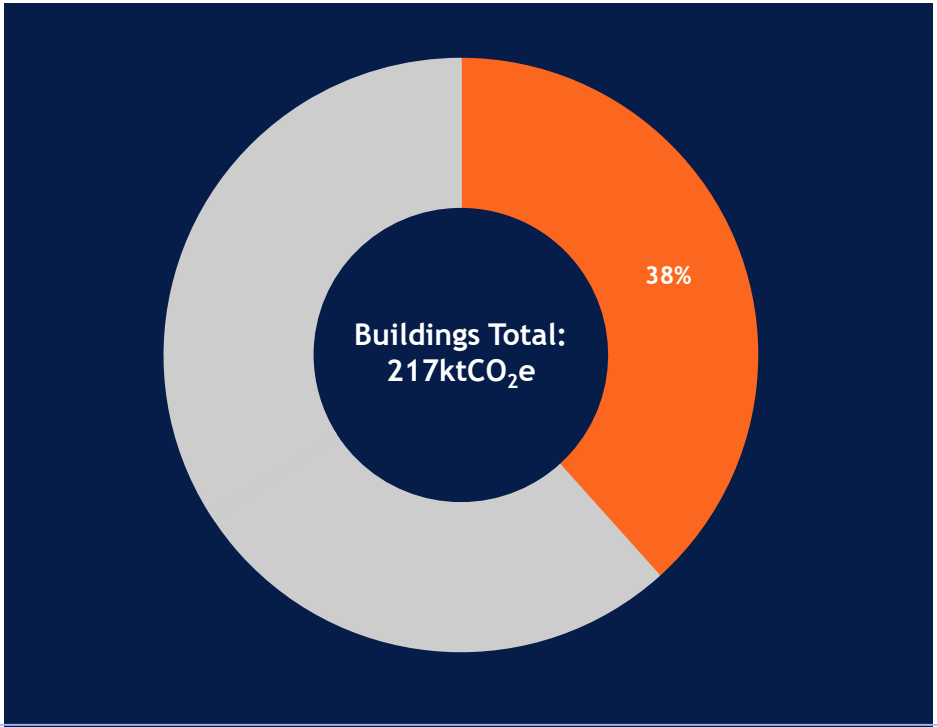


Figure 6.1.1: 2019 emissions for the domestic buildings in LBBD.

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

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. **Shifting off 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.

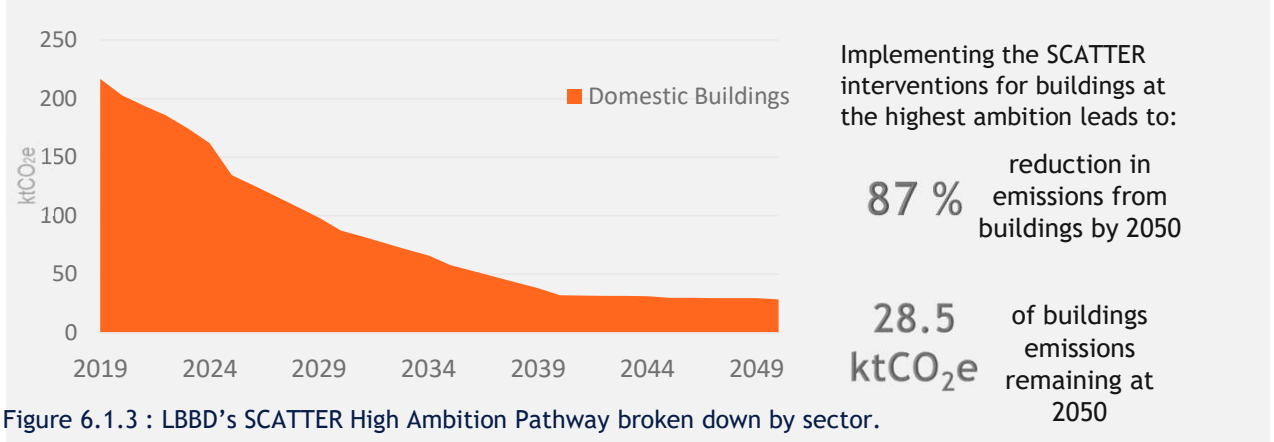


Figure 6.1.3 : LBBD's SCATTER High Ambition Pathway broken down by sector.

SCATTER Intervention	Cumulative Emissions Savings (2020 - 2050)
1. Improving energy efficiency	**4268 $ktCO_2e$**
2. Replacing gas heating systems	
3. Low carbon and energy efficient cooking, lighting and appliances	

Table 6.1.1: Cumulative carbon savings (2020-2050)

6.1 BUILDINGS
INTERVENTION MILESTONES

1. Improving fabric efficiency

a) Domestic Buildings

This measure considers changes to the energy demand for heating homes, in existing properties.

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

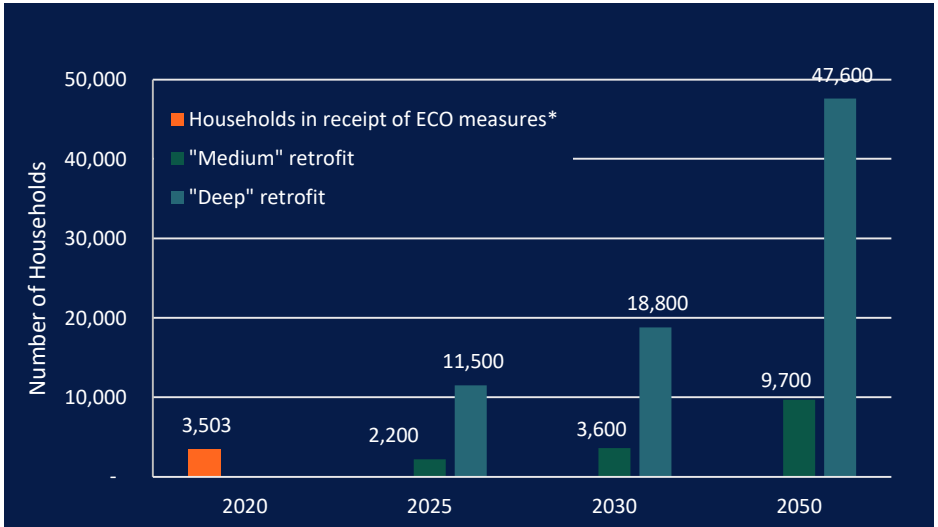


Figure 6.1.4 : Retrofit rates and new build standards for LBBD. *ECO measures are included as a proxy for comparison, though the average improvements to energy demand fall well short of medium retrofit in practice.

Current Context 2020	By 2050
• 7,549 households in LBBD have received ECO measures [1] • 9,008 households in LBBD are in fuel poverty [2]	• 9,700 houses "medium" retrofit, 47,600 houses "deep" retrofit • All of the new houses between 2030 and 2050 to be built to Passivhaus standards • 73% reduction in domestic energy demand for lighting, appliances and cooking. 43% reduction for heating and hot water.

Table 6.1.2: Current context and 2050 intervention milestones for improving energy efficiency in domestic buildings.

[1] Household Energy Statistics
[2] Fuel Poverty Data

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.

The reductions in emissions :

- 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.

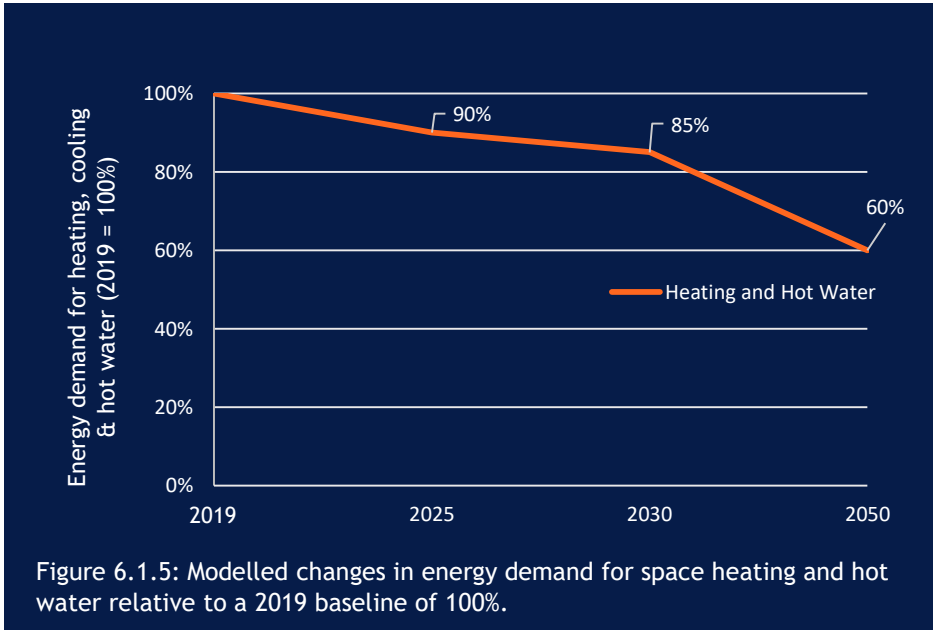


Figure 6.1.5: Modelled changes in energy demand for space heating and hot water relative to a 2019 baseline of 100%.

Current Context 2021	By 2050
76% of EPC rated non-domestic properties are rated D or below [1]	40% reduction in non-domestic energy demand

Table 6.1.3: Current context and 2050 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. Shifting off 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 and CHP heat-networks and offers the most significant emissions reductions. Hydrogen technology is not modelled due to the limited availability of large-scale data.

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 decarbonised.

Moving heat demand to heat networks allows for CHP connected heat networks. LBBD are considering supplementing the existing gas-fired CHP heat network with large-scale heat pumps.

Switching to an electrified heating system can also often provide incentive to property owners to install on-site electricity generation technologies (such as solar PV). However, in these cases it can be more beneficial to install the panels on east and west facing roofs in order to match generation to usual domestic consumption patterns.

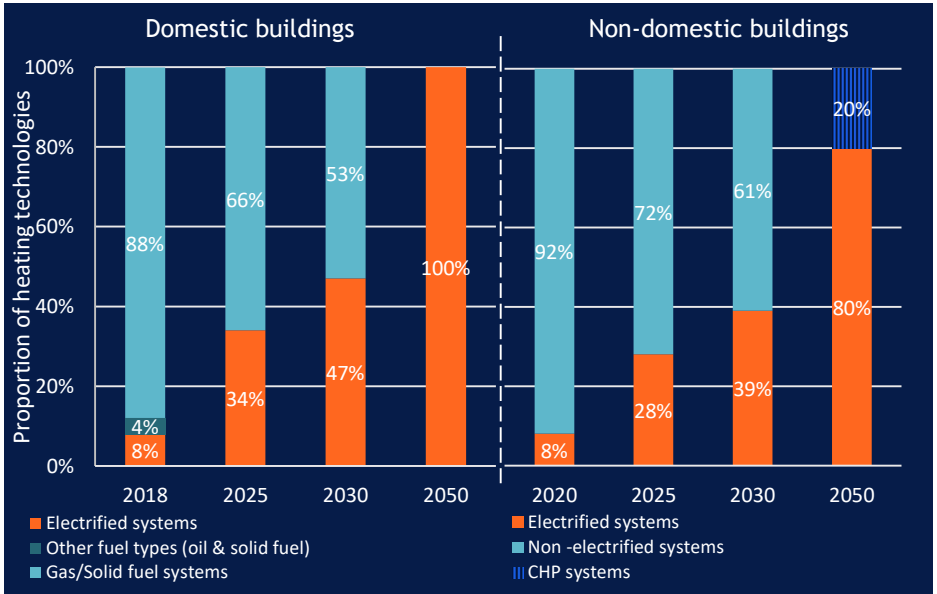


Figure 6.1.6: Modelled changes in the technology mix used for heating domestic and non-domestic buildings.

Current Context 2020	By 2050
According to MSOA estimates, 11% of properties in LBBD are not connected to the gas grid [1] Since 2013, gas consumption across the borough has increased by 6.2% [2]	• 100% of heating systems in domestic buildings are electrified • 80% of heating systems in non-domestic buildings are electrified

Table 6.1.4: Current context and 2050 intervention milestones for improving energy efficiency in non-domestic buildings.

[1] MSOA estimates of properties not connected to the gas network, BEIS
[2] Sub national gas consumption statistics

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 energy, heating and hot water use approximately 46% of the total building's energy.[1]

Current Context 2020	By 2050
In the UK, consumption by domestic lighting decreased 25% between 2010 and 2019.[2]	• 73% reduction in domestic energy demand for appliances, lighting and cooking • 25% reduction in non-domestic energy demand for appliances, lighting and cooking

Table 6.1.5: Current context and 2050 intervention milestones for appliance and lighting efficiency

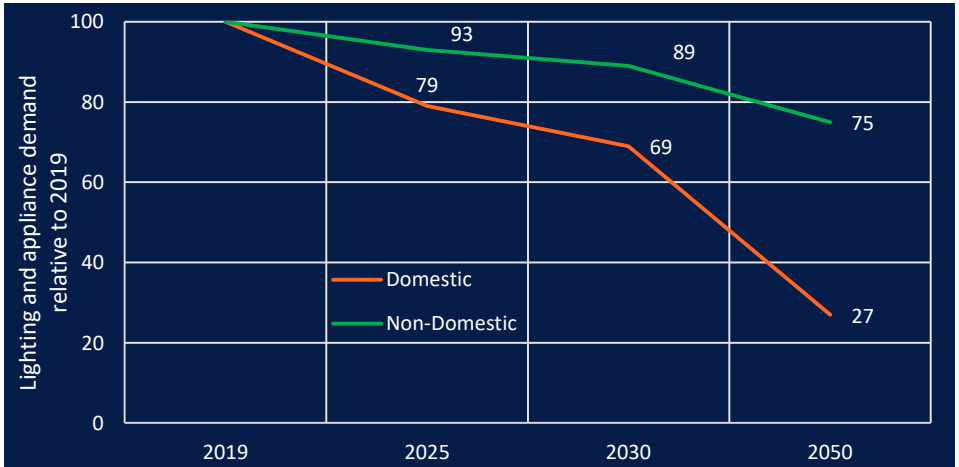


Figure 6.1.7: Modelled energy demand reduction for changes for appliances, lighting and cooking defined against a 2019 baseline.

[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. If replaced with induction systems, in addition the overall kWh demand will also reduce as well as switching from fossil fuel to grid electricity. While more expensive initially, induction systems will result in lower cost cooking over the lifetime of the equipment.

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 2050
Nationally in 2016, it was estimated that around 45-50% of domestic cooking was electrified [1]	• 84% increase in electric fuel usage for domestic cooking • 33% increase in electric fuel usage for non-domestic cooking

Table 6.1.6: Current context and 2050 intervention milestones for appliance and lighting efficiency

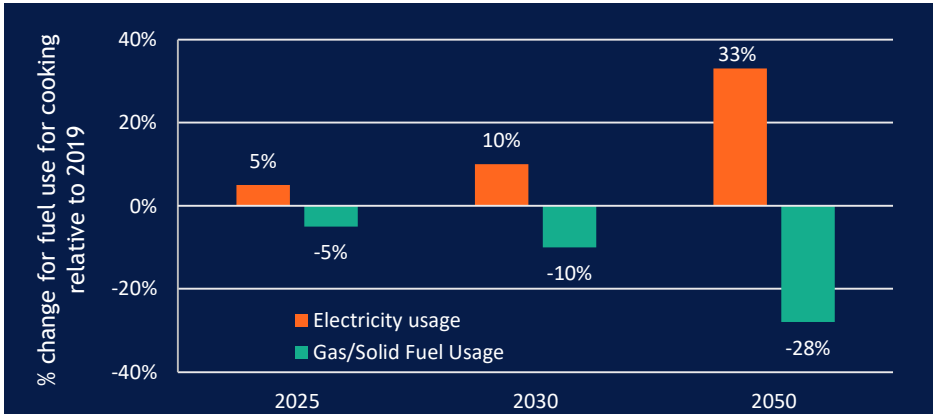


Figure 6.1.9: Modelled changes in non-domestic fuel usage for domestic cookers relative to a 2019 baseline of 100%.

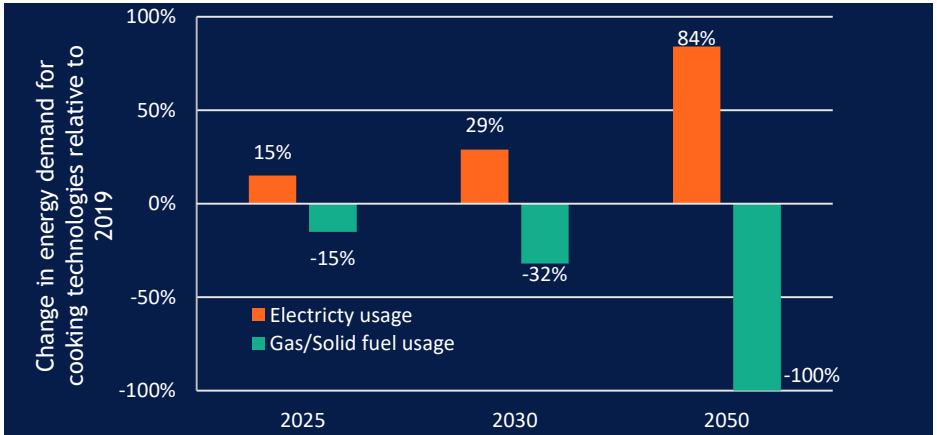


Figure 6.1.10: Modelled changes in non-domestic cooking energy demand relative to a 2019 baseline of 100%.

[1] Based on underlying fuel consumption data within SCATTER

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 LBBD will offer co-benefits across economic, social and environmental spheres:

ECONOMIC

- Reduced energy bills - Retrofitting the council housing stock and installing renewables will insulate the Council from rises in energy costs while providing higher quality homes for tenants.
- 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

- Energy efficiency in commercial buildings can help to improve the health and wellbeing for employees
- Improving the energy efficiency of domestic buildings will reduce fuel poverty across the District. Currently 12.3% of households, equal to approximately 9,008 households, across LBBD 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
- Energy efficient taps and showers will also save water

6.1 NON-DOMESTIC BUILDINGS
LOCAL CASE STUDIES

APPLIANCE AND LIGHTING EFFICIENCY

VolkerHighways £4.7m contract to upgrade 15,890 streetlights with energy efficient LED lamps. The contract started in 2017 and continued for two years, covering streetlights in LBBD. It is estimated that The new lighting will help Barking and Dagenham contribute to a £350k per annum saving on their energy bills

SHIFTING OFF GAS HEATING

B&D Energy Ltd owns the district heating networks that run through Barking and Dagenham, connected to 550 residential properties and Becontree Leisure Centre across two schemes, with plans to connect 8000 more homes over the coming years.

Currently, energy is provided via combined heat and power (CHP) generators. In the future, B&D Energy plans to add other sources of energy such as fuel cells, WSHP, solar power and energy from waste to the network.

IMPROVED ENERGY EFFICIENCY IN BUILDINGS

Industria, a new industrial development located in the River Road Employment Area in Barking, will feature multistorey light industrial units, a business centre and living walls. The development will be built to BREEAM Excellent standards and will employ an estimated 250 people on site. Industria is due for completion in November 2022 and set to open in February 2023.

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, both residential and commercial. 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.

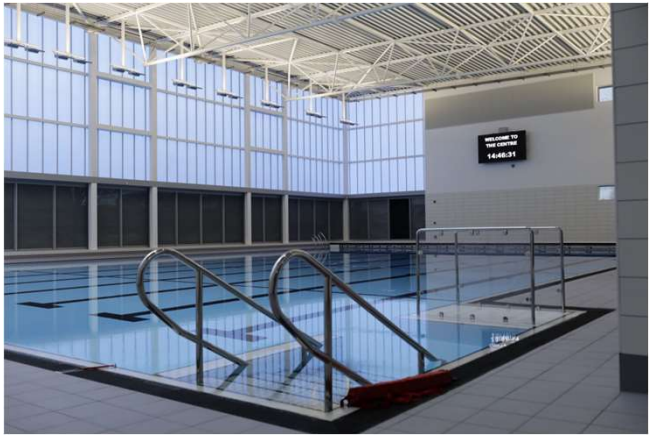
Oxford City Council upgraded their internal air conditioning systems which was estimated to save 161 tCO_2/year and repaid its £45,000 spend in 1.2 years through reduced energy costs.

SHIFTING OFF GAS HEATING

The UK Government conducted research on the shift for non-domestic consumers to low carbon heating systems. 76% of NDC's 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

'Cosy Homes' Programme - LBBD has partnered with Eon to roll out a programme of heating and energy efficient measures up to mid-2022. The programme will target qualifying households who can access ECO3 funding and develop funding and installation packages for private landlords and owner-occupiers, as well as utilising the Green Homes Grant. To date there have been 764 installs, across 671 homes, saving 9,000 tonnes CO_2.

BeFirst and Wates Residential's regeneration of Gascoigne West includes the development of 200 new homes. The estate will be connected to the Barking District Heat Network and solar panels leading to a 40% reduction in carbon emissions. The estate will also host EV charging points, 360 bike spaces, green walls and outside green spaces.

B&D Building Together states that 50,000 new homes are planned to be built by 2037 to meet the growing population of LBBD. In June 2019, the Council approved a set of criteria that will need to be met if an estate is going to be rebuilt. These state that the Council will proceed with an estate renewal scheme, which shall strongly consider quality and sustainability, including whether the same regeneration goals can be achieved by refurbishment if this is more viable and/or more sustainable.

SHIFTING OFF GAS HEATING

Local energy production - Solar panels have been fitted to 355 buildings in LBBD and every viable rooftop has been mapped out in preparation for a revolution in PV roll-out. LBBD is also investigating the feasibility of deploying a communal ground-source heat pump system, utilising the heat in natural surroundings, with the aim to trial this model on one block of flats.

Padnall Lake - A whole-life carbon assessment was carried out on the housing development to be built at Padnall Lake. To reduce the carbon impact of the homes, in addition to a passive design approach, heat pumps will be used to delivery heating and hot water to the buildings. The lake will be restored, with biodiversity, sustainable drainage and amenity benefits.

ENERGIESPRONG RETROFIT

Deep Demand Reduction PIlot-

A £2m pilot for 36 council homes to undergo deep retrofit, involving D-rated and below properties elevated to A. The aim is to stimulate a deep retrofit construction market to drive up scale and drive down costs.

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.

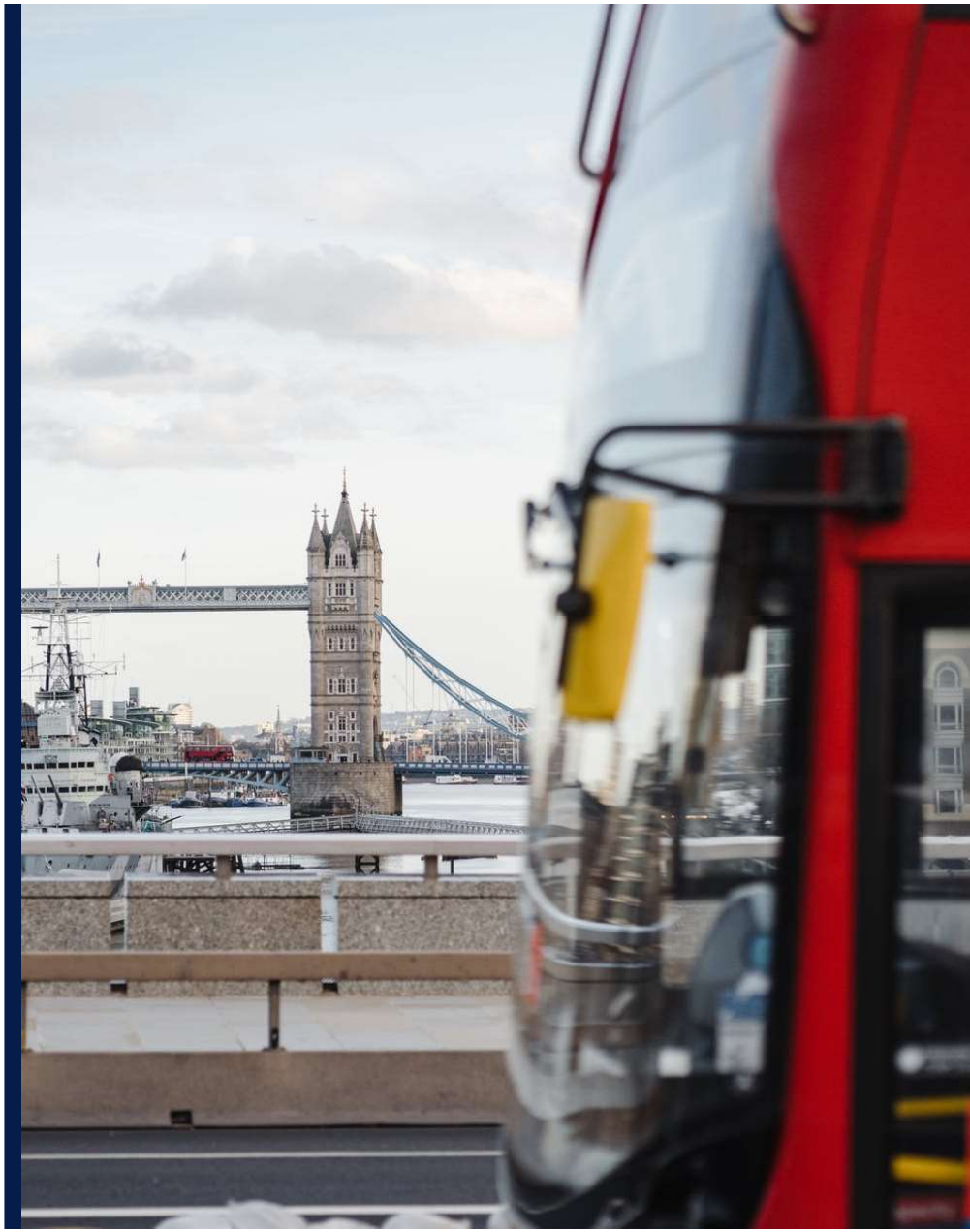
SHIFTING OFF GAS HEATING

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.

6.2 Transport



Anthesis

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 27% of LBBD's emissions profile, making them a fundamental source to target action. In particular on-road transport accounts for 24.5% of LBBD's overall emissions. Of the transport emissions, diesel cars and diesel LGVs contribute the most at 37% and 23% respectively. The road network across the borough forms part of the links between central London and Essex, and the future of transport in the borough is an important consideration. Although no major airports exist within LBBD's local authority boundary, aviation emissions do occur and these are an apportion of scope 3 national aviation emissions allocated to each local authority.

Green Recovery Considerations

- As part of the 'green recovery' in London over 594 Low Traffic Neighbourhoods and School Street schemes have been awarded funding.
- 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.

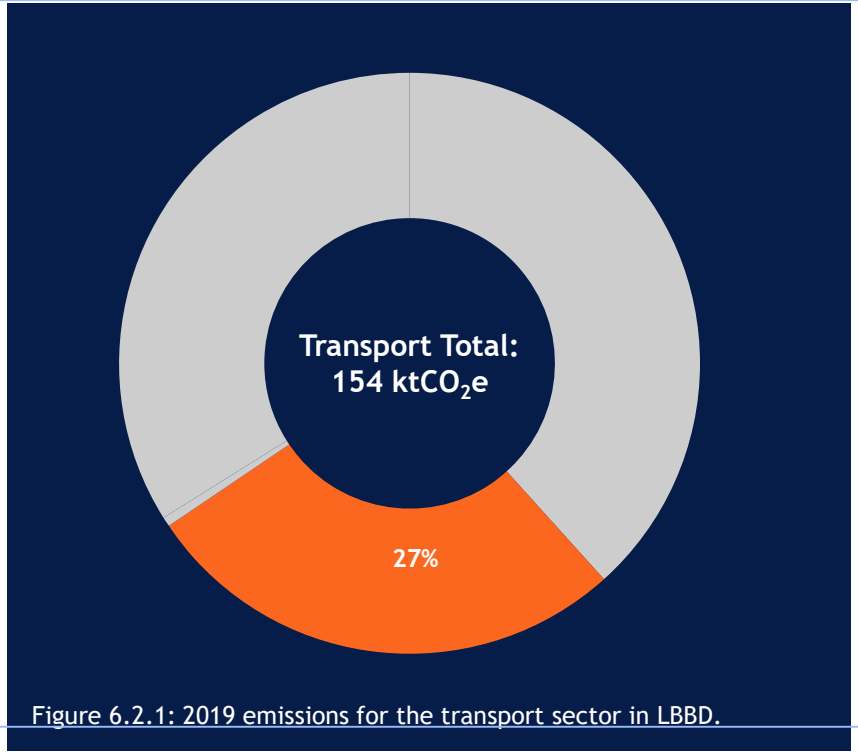
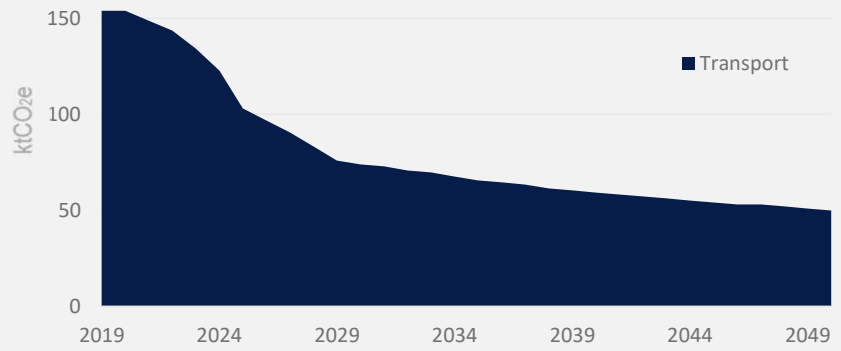


Figure 6.2.1: 2019 emissions for the transport sector in LBBD.

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.



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

68 % reduction in emissions from transport by 2050

50 $ktCO_2e$ of transport emissions remaining at 2050

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

SCATTER Intervention	Cumulative Emissions Savings (2020 - 2050)
1. Travelling shorter distances	**2352 $ktCO_2e$**
2. Driving less	
3. Switching to electric vehicles	
4. Improving freight emissions	

Table 6.2.1: Cumulative carbon savings (2020-2050)

6.2 TRANSPORT
INTERVENTION MILESTONES

1. Travelling fewer miles

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.

There are significant through-routes with both the A12 and A13 connecting Central London to the East of England, however 60% of all car journeys in LBBD are under 5 km. In The London Plan, a target was set for 75% of all trips to be made by walking, cycling or public transport by 2041 (in outer London).

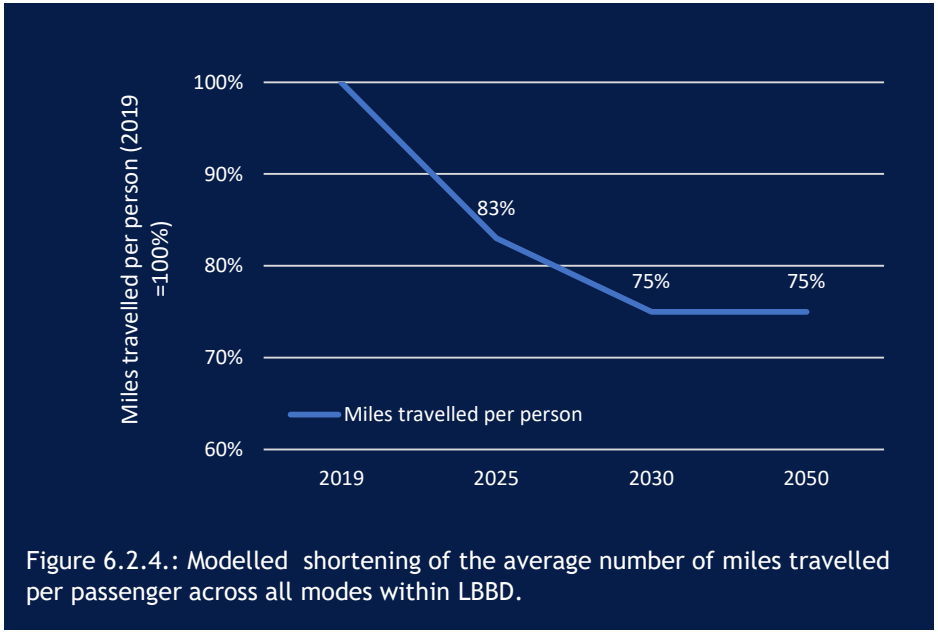


Figure 6.2.4.: Modelled shortening of the average number of miles travelled per passenger across all modes within LBBD.

Current Context 2020	By 2050
The average distance travelled to work has increased in all regions of England and Wales. In 2011, the average distance travelled to work in LBBD was 8.57mi.[3] In 2019, there were 502.9 million total vehicle miles within LBBD.[4]	25% reduction in the average number of passenger miles travelled per person

Table 6.2.3: Current context and the 2050 intervention milestones for travelling shorter distances.

[1] DfT Statistics on transport during the COVID-19 pandemic.
[2] Barking and Dagenham Borough-Wide Transport Priorities: 2021-2037
[3] Distance travelled to work, 2011 Census.
[4] DfT Statistics on road traffic in vehicle miles.

6.2 TRANSPORT
INTERVENTION MILESTONES

2. Switching Mode

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. Travel by car currently accounts for c. 40% of trips in the borough, relatively higher than in neighbouring boroughs[1].

Figure 6.2.5 shows the modal share for all transport, including daily trips but also freight and other transport. While LBBD daily trips by car is around 40-44% of the total daily trips, the remaining journey types account for the difference. Given the large impact on the trajectory of the transport measures on this slide and the next, it becomes clear that stronger ambition on public transport and active travel will be a very high priority.

The LBBD Air Quality Action Plan (2020-2025), the Borough-Wide Transport Priorities: 2021-2037, and Outline Walking and Cycling Strategy for Barking and Dagenham all highlight the need for greater active and public travel. The Borough-Wide Transport Priorities report lays out the vision from the draft Local Plan for promoting green infrastructure, promoting sustainable transport and reducing traffic.

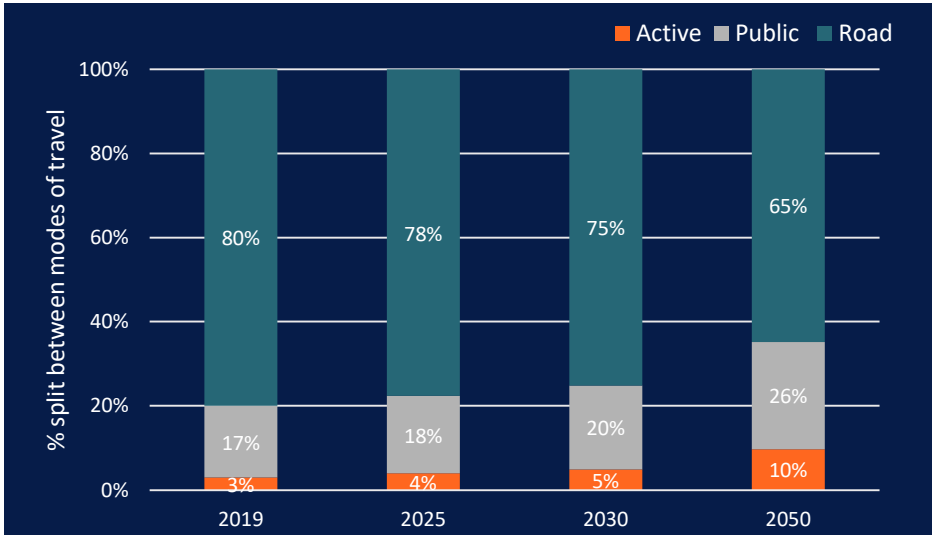


Figure 6.2.5.: Modelled changes in mileage share for different modes of transport along the High Ambition Pathway. The data for 2019 is the national average modal share (Source: Modal comparisons, DfT)

Current Context 2020	By 2050
In 2011, 42% of commutes to work were by car or van, 48% by public transport and 7.9% by active travel (walking and cycling) in LBBD.[1]	• 19% reduction in road transport use • 53% increase in rail transport • 133% increase in active travel

Table 6.2.4: Current context and the 2050 intervention milestones for driving less.

[1] Barking and Dagenham Borough-Wide Transport Strategy (lbbd.gov.uk).

6.2 TRANSPORT
INTERVENTION MILESTONES

3. Switching to electric vehicles

One of the most important steps to reducing transport emissions in LBBD 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 814 licensed ULEV vehicles across the borough, equating to approximately 3% of total vehicles.

The Council's Air Quality Action Plan will support the targeting of reductions in vehicle emissions through reducing the number of journeys, installing 10 electric charge points a year, reducing parking for ICE vehicles and electrifying the council fleet. More aggressive measures will be required to meet the high ambition pathway as rapid reduction of transport emissions are vital to achieving the pathway. Shifting from ICE vehicles to either active travel, electric public transport or private electric vehicles will all have the required impact on the trajectory and should be viewed together when making strategic decisions.

Current Context 2020	By 2050
In 2020, there were 814 ULEVs registered in LBBD.[1]	• 100% of private vehicles are EV or HEV • 100% of buses and trains are electric

Table 6.2.5: Current context and the 2050 intervention milestones for switching to EV.

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).

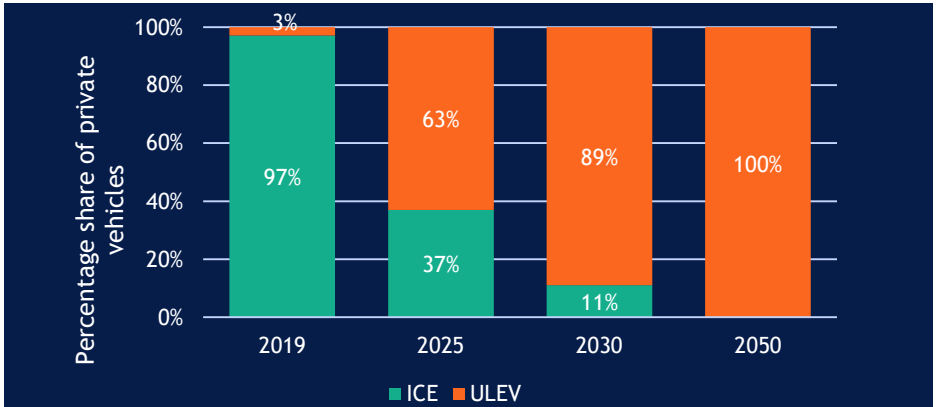


Figure 6.2.6: Transitioning away from fossil-fuel powered internal combustion engines (ICE) private vehicles to ULEV.

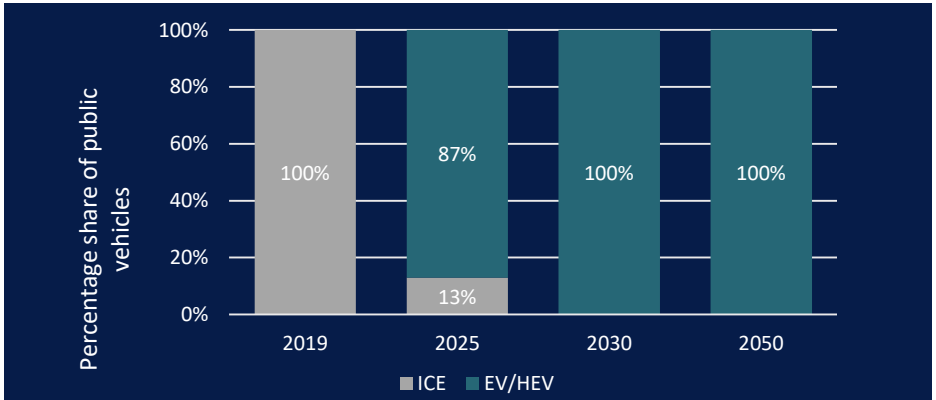


Figure 6.2.7: Transitioning away from fossil-fuel powered public transport to electric vehicle (EV) or hybrid electric vehicle (HEV). All rail networks are electrified by 2025.

[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

Current Context 2020	By 2050
In 2019, there were 93 million miles of freight emissions in LBBD from Light Commercial Vehicles and Heavy Goods Vehicles.[1]	• 22% reduction in road freight mileage • 75% increase in efficiency per mile travelled

Table 6.2.6: Current context and the 2050 intervention milestones for improving freight and aviation emissions.

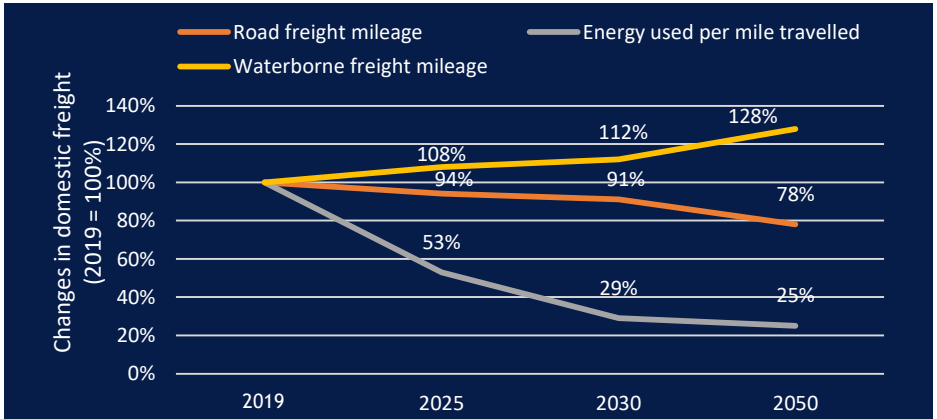


Figure 6.2.8: Improving freight emissions across three areas of activity. Percentage changes are relative to a 2019 baseline at 100%.

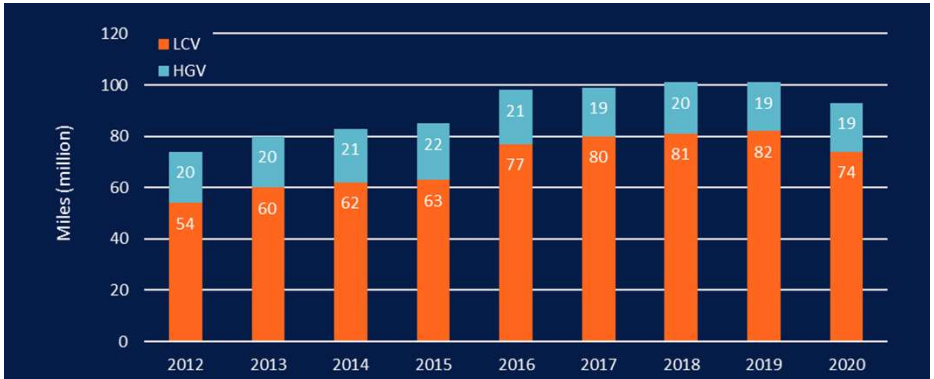


Figure 6.2.9: Total miles driven annually in LBBD by Light Commercial Vehicle (LCV) and Heavy Goods Vehicle (HGV) from 2012 – 2020. (Source: DfT Traffic).

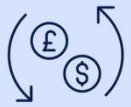
[1] Department for Transport: Dataset on road traffic by road and vehicle type.

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 LBBD 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.
- 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

- 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 has been linked to around 40,000 deaths a year in the UK
- Considerable improvements in air quality and noise reduction from vehicles and an increase in quality of life

6.2 TRANSPORT
LOCAL CASE STUDIES

SWITCHING TO ELECTRIC VEHICLES

B&D Greener Together LBBD Council aims to electrify 25% of their own vehicle fleet by 2025. The council has already bought three all-electric Renault Kango Crew Vans which will be used by Parking Enforcement Officers. There are currently around 50 publicly available charge points for EVs across the borough, with plans for 150 more by 2026.

DRIVING LESS – ACTIVE TRANSPORT

In February 2021 work began on a new 7km walking and cycling route between Barking and Barking Riverside, providing a safer, faster and more direct alternative. The route was the second new cycling route to be consulted on following TfL's Strategic Cycling Analysis, which used data to identify 25 areas which showed the best potential for growing cycling numbers.

DRIVING LESS - RAIL

Barking Riverside overground rail extension set to start services in autumn 2022. The extension - which includes 4.5km of new track - is one of several transport measures designed to serve the emerging development area at Barking Riverside.

Crossrail will provide further strong rail links across London once it is fully open in 2023, with Chadwell Heath station in particular becoming a key point of connection. Journeys direct to Reading and Heathrow in the west will be possible, as well as much quicker journeys into central London locations.

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.

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.

Leeds City Council electrified 16% of their total van fleet. It is estimated that these vehicles will travel 450,000 miles per year, leading to fuel savings of £13,500 per year and savings of 52 tCO_2 to 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.

6.3 Waste

6.3 WASTE
SECTOR OVERVIEW

Scope of Section

Waste management represents a smaller proportion of LBBD's emissions than the sectors previously discussed, representing just 0.53% of total emissions. However, given that over 23 $ktCO_2e$ of emissions are attributed to waste services within the council's own footprint, waste is still 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 vast majority of waste emissions in LBBD are associated with incineration which accounted for 46% of waste emissions by treatment, closely followed by landfill at 41%. Recycling was responsible for 10% of waste emissions and composting only 3%. Despite landfill being the second highest contributor to emissions only 2.3% of waste in LBBD was sent to landfill, compared to 73% of waste being incinerated, highlighting that incineration is a preferable treatment to landfill.

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.

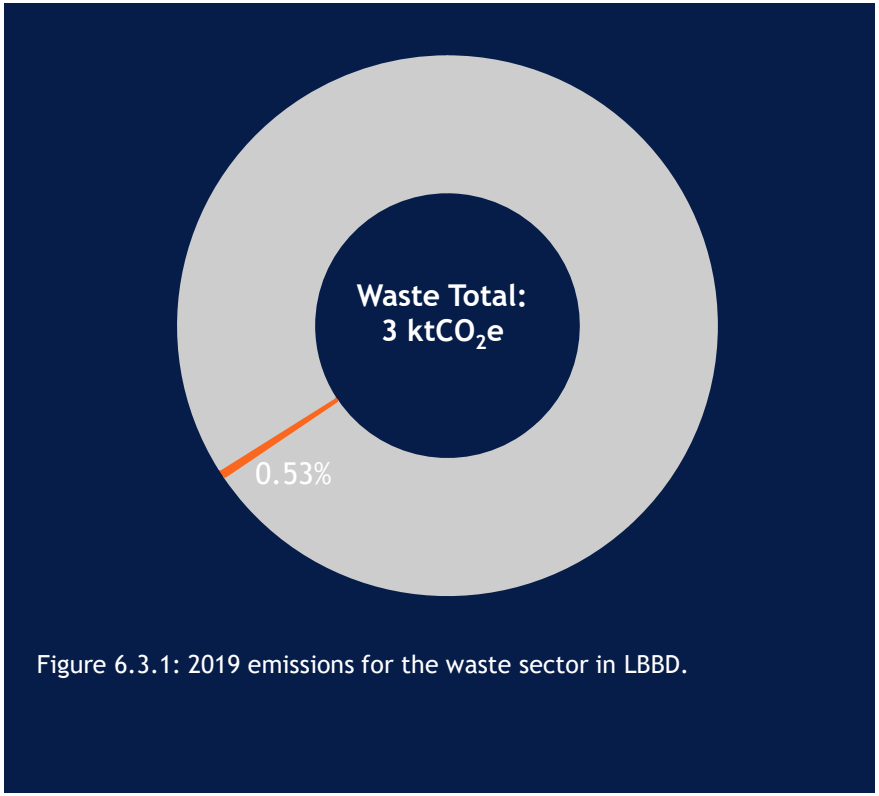
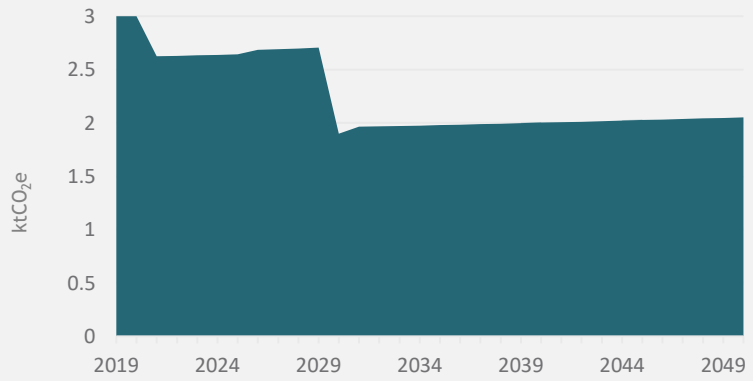


Figure 6.3.1: 2019 emissions for the waste sector in LBBD.

6.3 WASTE
INTERVENTIONS OVERVIEW

The following measures relate to emissions arising from in-boundary solid waste and wastewater disposal. Despite the minimal 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 and the ELWA strategy:

31.6 % reduction in emissions from waste by 2050

2.05 $ktCO_2e$ of waste emissions remaining at 2050

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

SCATTER Intervention	Cumulative Emissions Savings (2020 - 2050)
1. Reducing the quantity of waste	**24.1 $ktCO_2e$**
2. Increasing recycling rates	

Table 6.3.1: Cumulative carbon emissions savings (2020-2050) for waste.

6.3 WASTE
INTERVENTION MILESTONE

1. Reducing the quantity of waste

The DEFRA dataset on local authority collected waste identified that in LBBD, each household generated an estimated 850kg of waste from April 2020 to March 2021. Across the borough, c.27% 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.

The East London Waste Authority, alongside four London boroughs (including LBBD), have put together a Joint Strategy for East London's Resources and Waste, to run from 2027, when the current waste and recycling contract ends, until 2057.[1] As part of this strategy, modelling on the expected volumes of waste arising over the next few decades was carried out by Ricardo, and expected to increase by 35% by 2050 in Barking and Dagenham following current trends.[2]

A Waste Prevention Programme drawn up by the ELWA and the London Boroughs of Barking and Dagenham, Havering, Newham and Redbridge, has been implemented as a two-year trial from 2021, focusing on key areas such as food waste, furniture, clothing, nappies and electronics, with multiple projects and initiatives to help residents reduce waste, share and swap items, and repair products.[3]

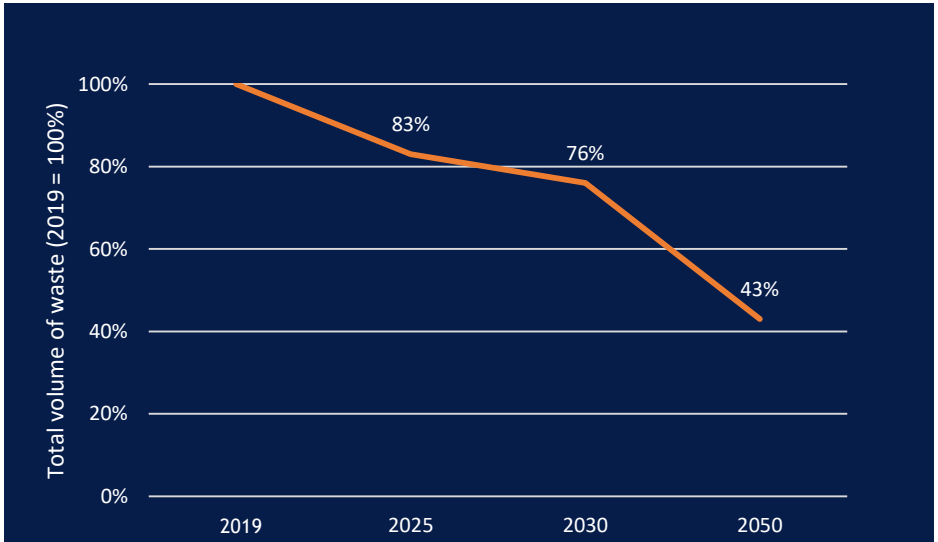


Figure 6.3.4: SCATTER 2019 inventory for the waste sector in LBBD.

Current Context 2021	By 2050
In 2020/21, there were 89,457 tonnes of household waste and 6,957 tonnes of non-household waste collected in LBBD.[4]	57% reduction in the volume of waste

Table 6.3.2: Current context and the 2050 intervention milestones for reducing the quantity of waste.

[1] ELWA Joint Waste and Resources Strategy 2027 - 2057.
[2] Ricardo Waste Flow Model – Forecasting.
[3] ELWA East London Waste Prevention Programme.
[4] 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 LBBD needed to follow the high ambition pathway is illustrated in Figure 6.3.5.

Detailed waste collection modelling was carried out by Ricardo for ELWA as part of their Joint Strategy, and a 'single stream' collection service involving a comingled recyclables collection with separate food waste is expected to lead to the greatest increase in recycling rates compared to the baseline, leading to a 30.3% drop in emissions despite the expected increase in waste volumes over time from the same Strategy.[1]

Initiatives from LBBD's own Reduction and Recycling Plan include introducing recycling bins to flatted areas, encouraging residents to retain a standard-sized bin for residual waste rather than opting for a larger size, and behaviour-change projects such as bin stickering and social media campaigns.[2]

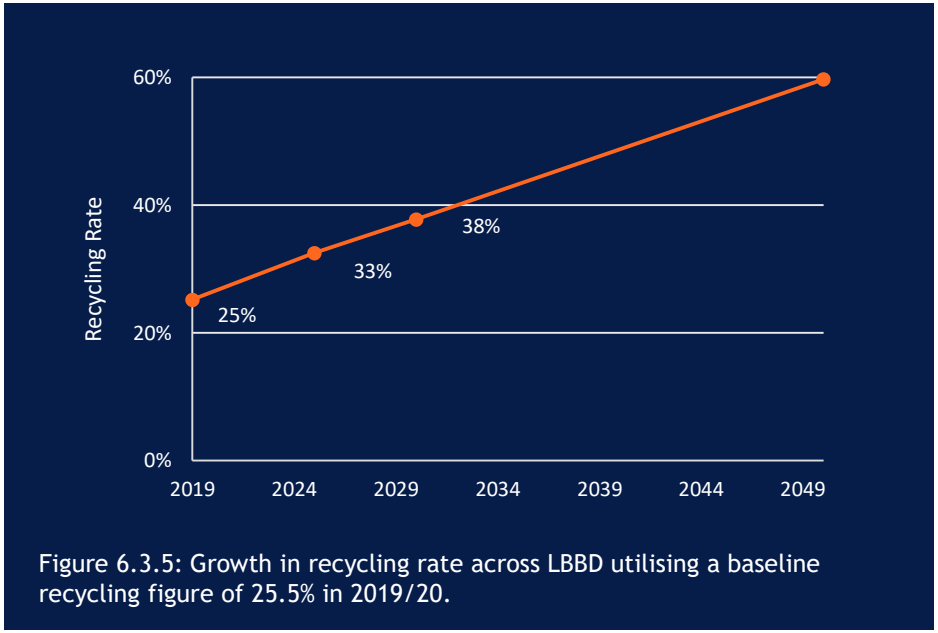


Figure 6.3.5: Growth in recycling rate across LBBD utilising a baseline recycling figure of 25.5% in 2019/20.

Current Context 2020	By 2050
• The household recycling rate for LBBD in 2019-20, based on Local Authority collected waste was 25.2%.[3] • 3,494 fly tipping incidents were recorded in LBBD in 2020-21.[4]	Achieve an 86% recycling rate

Table 6.3.3: Current context and the 2050 intervention milestones for increasing recycling rates.

[1] Ricardo Waste Flow Model - Collections Modelling.
[2] LBBD Reduction and Recycling Plan.
[3] BEIS Local Authority Collected Waste.
[4] DEFRA Fly tipping incidents and actions taken in England

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 LBBD 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
LOCAL CASE STUDIES

INCREASING RECYCLING RATES

The Extended Recycling Scheme now allows households in LBBD to recycle more items, including glass bottles and jars, hardback books and aluminium foil. Residents who live in flats with blue Eurobins can now also put these additional items into their blue Eurobins. The extended recycling scheme follows a test pilot in Barking's Leftley Estate, which involved nearly 3,000 residents and ran from 14 September to 21 December 2020.

LBBD have been active in celebrating national events such as Recycling Week and Great British Spring clean with community groups, schools and educational institutions. In 2018, LBBD organised around 56 Community Outreach events across the Borough including 16 waste minimisation roadshows, 9 School recycling assembly, 8 Recycling and reuse workshops, 7 Garden waste roadshows and 16 Litter picking events

6.3 WASTE
NATIONAL CASE STUDIES

REDUCING THE QUANTITY OF WASTE

Bracknell Forest Council - Encouraging 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 120kg CO_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.

6.4 Industry

Anthesis

6.4 INDUSTRY
SECTOR OVERVIEW

Scope of Section

Industry and commercial emissions represent a large proportion of LBBD's baseline inventory, with around 34% of emissions. 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.

Key Emissions Sources

Industrial emissions are mainly composed of manufacturing emissions (97% of the total industrial emissions and of this 60% relates to the manufacturing of motor vehicles and trailers.

Green Recovery Considerations

- 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.
- Engaging the manufacturing sector in the shift to decarbonising transport could create a positive impact on local jobs and ensure the sector continues to thrive in a rapidly decarbonising world.

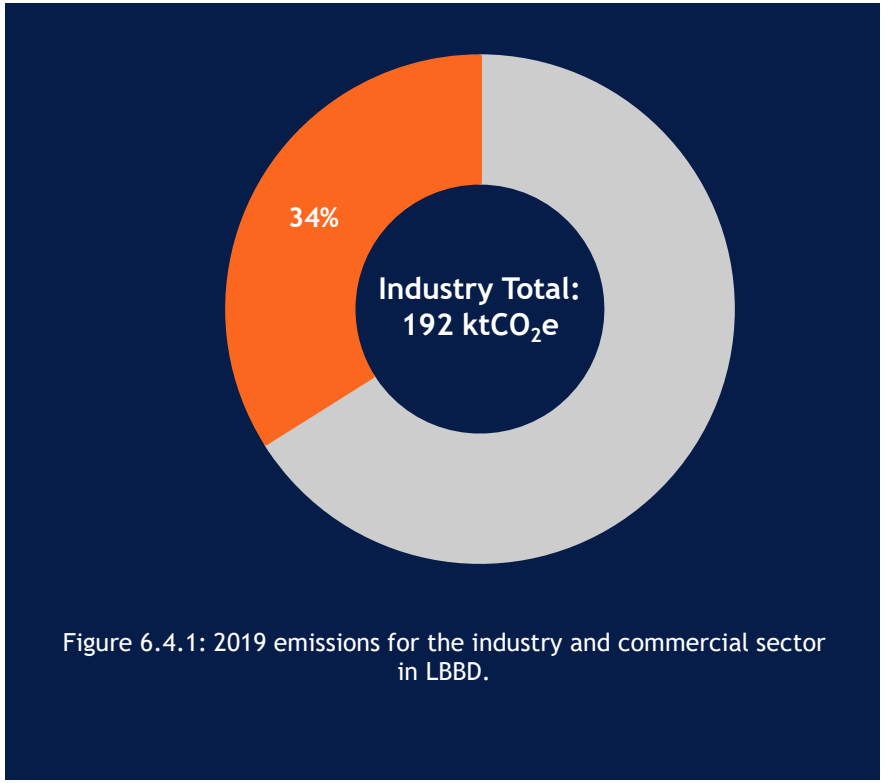
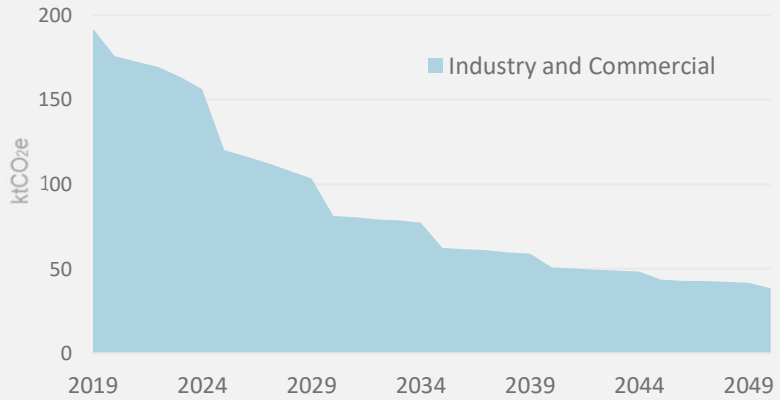


Figure 6.4.1: 2019 emissions for the industry and commercial sector in LBBD.

6.4 INDUSTRY
INTERVENTIONS OVERVIEW

The industrial sector represents a significant proportion of emissions in LBBD. 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 measure 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:

80 % reduction in emissions from industry by 2050

38.5 $ktCO_2e$ of industry emissions remaining at 2050

Figure 6.4.3 : LBBD's SCATTER High Ambition Pathway broken down by sector.

SCATTER Intervention	Cumulative Emissions Savings (2020 - 2050)
1. Shifting away from fossil fuels	Industrial processes: **3356 $ktCO_2e$**
2. More efficient processes	

Table 6.4.1: Cumulative carbon emissions savings (2020-2050) for 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]

Collecting local data would help to refine this intervention. This could be done via a stakeholder engagement programme targeting then industrial sector within LBBD.

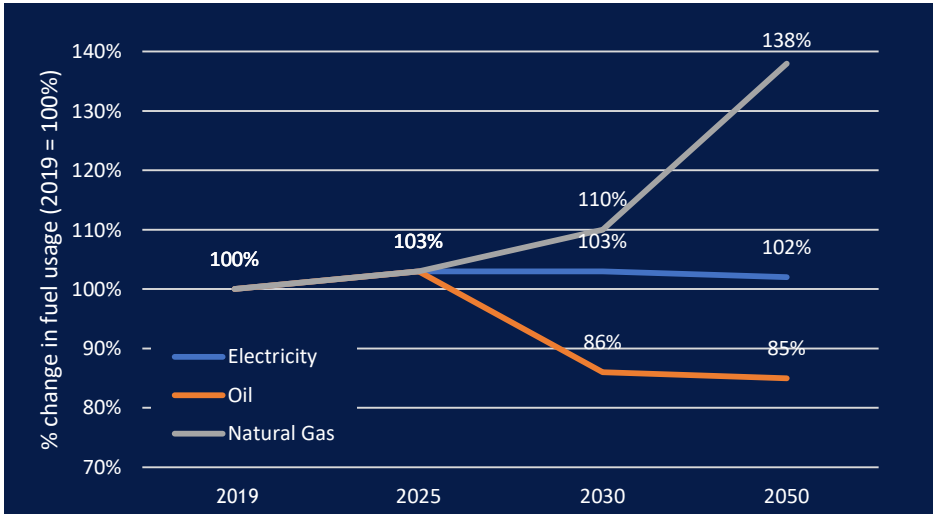


Figure 6.4.4: Modelled changes in fuel consumption for industrial processes and activities

Current Context 2020	By 2050
In the UK, 35% of energy consumed by the industrial sector in 2019 was electric.[1]	• 15% reduction in oil fuel usage • 2% increase in electricity consumption • 38% increase in natural gas usage

Table 6.4.2: Current context and the 2050 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 LBBD 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.

LBBD 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.

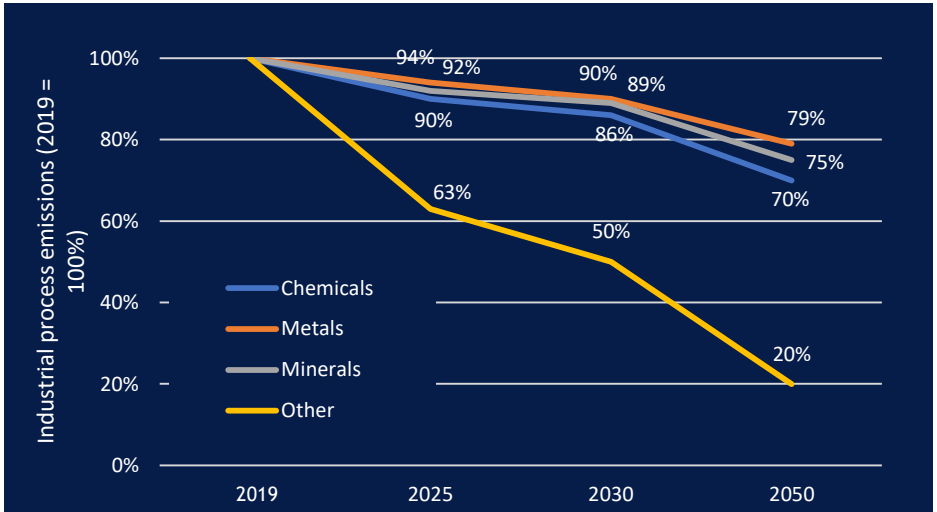


Figure 6.4.5: Modelled changes in fuel consumption for industrial processes and activities

(Right) Table 6.4.3: Current context and the 2050 intervention milestones for shifting off fossil fuels.

Current Context 2020	By 2050
• Industrial carbon emissions in the UK, 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: • 30% for chemicals • 21% for metals • 25% for minerals • 80% 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
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 LBBD will offer co-benefits across economic, social and environmental spheres:

ECONOMIC

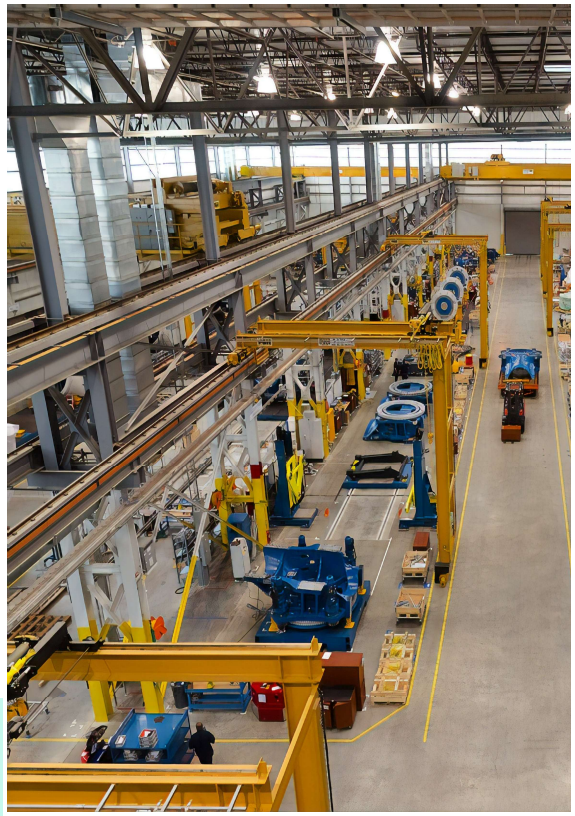
- CCUS and associated negative emissions technologies provide an opportunity for job creation in the LBBD. The UK government announced investments of £1m to establish two new carbon capture storage clusters by the mid-2020s, which have the potential to create an estimated 50,000 jobs UK-wide
- Improved 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
- Decarbonisation activity can also bring about shifts in local industry such as the rapid growth of retrofit materials manufacture and install
- A circular economy could be developed around utilising re-use or use of waste as a resource

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 LBBD 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
- Reductions in fossil fuel burning will lead to improvements in air quality



6.4 INDUSTRY
NATIONAL CASE STUDIES

SHIFTING FROM FOSSIL FUELS

Teesside Collective - A collective project 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 SBTi certified target aligned with the city's ambition.

6.5 Energy Supply

6.5 ENERGY SUPPLY
SECTOR OVERVIEW

Scope of Section

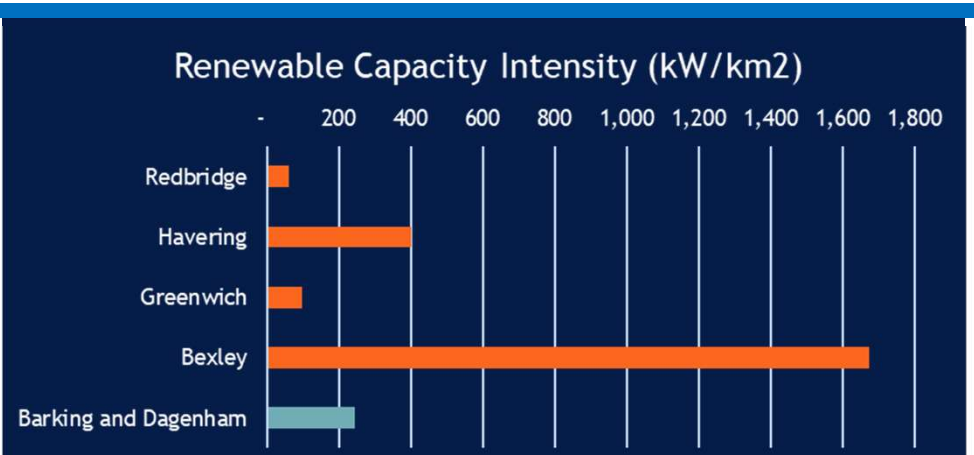
Throughout this chapter, reference is made to the importance of providing zero carbon electricity to LBBD. This is to ensure the benefits of moving away from fossil fuels and switching to electric supply are fully realised. The following analysis provides details for the scale and ambition required to meet LBBD'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 boroughs, LBBD has a median renewable capacity per unit land area at 245 kW/km^2. The largest renewable generation source is Solar PV which comprises 60% of total renewable generation in the borough. The other significant contributor is from organic fuels in the form of anaerobic digestion.

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 (CCC) 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.



LA's	Solar PV	Local Wind	Hydro	Organic Fuels	Total	Total land area (hectares) from SAM_LAD data set	km2	Renewable capacity per unit land area (kW/km2)
Redbridge	3,520	-	-	-	3,520	5,642	56	62
Havering	8,483	5,924	-	30,686	45,093	11,235	112	401
Greenwich	4,662	21	-	-	4,682	4,733	47	99
Bexley	6,587	2,800	-	91,900	101,287	6,058	61	1,672
Barking and Dagenham	**5,269**	**3**	**-**	**3,560**	**8,832**	**3,611**	**36**	**245**

Figure 6.5.1: Comparison of installed renewable energy capacity within LBBD compared to surrounding Greater London Local Authorities for 2018 (Source: BEIS Regional Renewable Statistics).

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 LBBD. 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, 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 LBBD. Some key technologies considered within SCATTER include solar hydro, anaerobic digestion, sewage and landfill gas, municipal soil waste generation and plant biomass.

The modelled capacities are scaled to LBBD 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 LBBD'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.

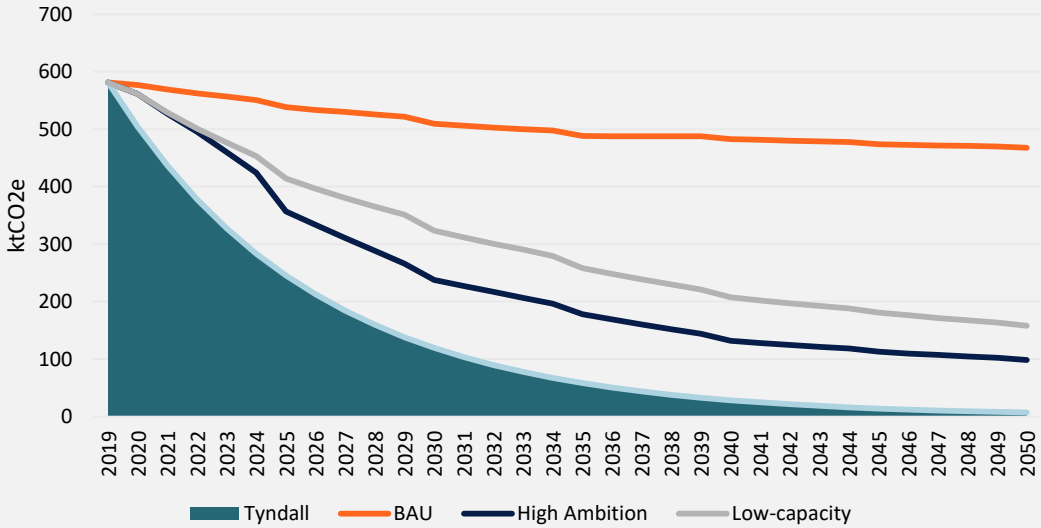


Figure 6.5.2 : The energy supply sector has been presented differently to other sectors to avoid double counting. It is not possible to separate out the savings specifically from renewable energy supply as it is interdependent with demand-side measures. The blue line tracks the High Ambition Pathway,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

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. Meaning that to meet the 2050 target would require over 2m meter sq of domestic PV, or average 136,000 homes installed.

As part of Investment Grade Proposal work carried out by Ameresco 14 council-owned sites were identified as being suitable for Solar PV installations, which would result in an installation of 1.32MW of generation capacity. Furthermore, LBBD are evaluating the business cases for Solar PV installation in properties where they own the freehold but aren't responsible for paying the electrical bills, as well as in properties where they don't own the freehold and aren't responsible for paying the electrical bills. Carrying out these opportunities would help to increase the scale of impact delivered by LBBD.

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 LBBD'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 LBBD-based stakeholders or Major Power Producers.

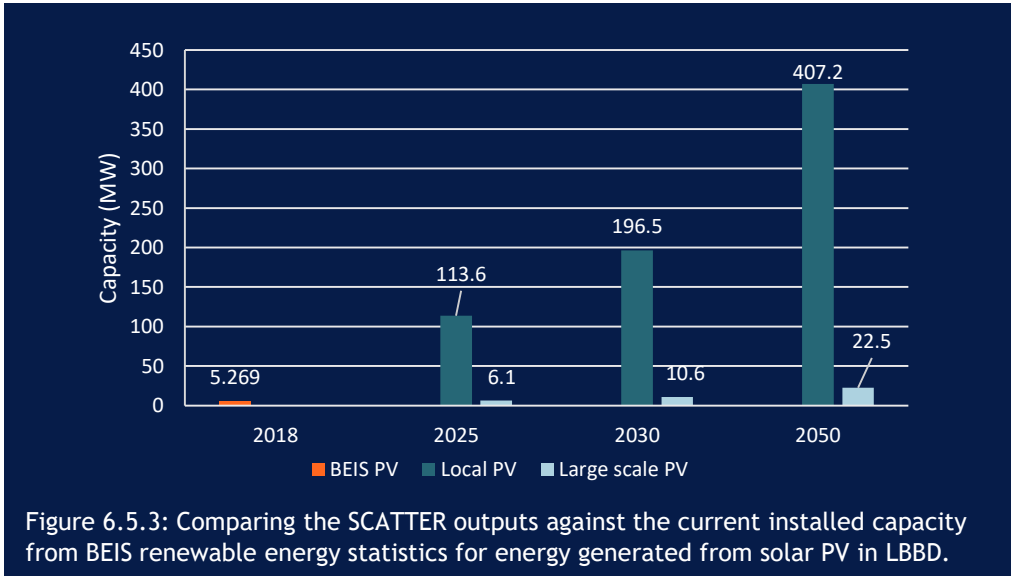


Figure 6.5.3: Comparing the SCATTER outputs against the current installed capacity from BEIS renewable energy statistics for energy generated from solar PV in LBBD.

Current Context 2020	By 2050
In 2020, LBBD had 1259 installations with a capacity of 5.7MW and 5,570MWh generation.[1]	• Local PV: 407.2MW installed capacity • Large scale PV: 22.5 MW installed capacity

Table 6.5.3: Current context and the 2050 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 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.

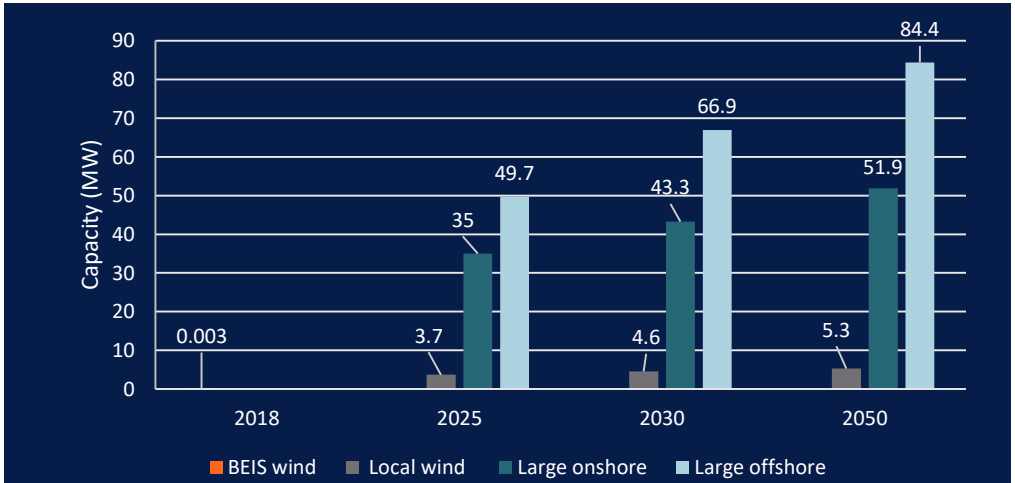


Figure 6.5.4: Comparing the SCATTER outputs against the current installed capacity from BEIS renewable energy statistics for energy generated from wind in LBBD.

Current Context 2020	By 2050
In 2020, LBBD had 1 onshore wind site and no offshore wind sites.[1]	• Large onshore: 51.95 MW installed capacity • Large offshore: 84.4 MW installed capacity

Table 6.5.4: Current context and the 2050 intervention milestones for wind.

[1] BEIS Regional Renewable Statistics

6.5 ENERGY SUPPLY
INTERVENTION MILESTONE

3. Other renewables

LBBD already has installed capacity of other renewable sources due to the biogas/biomass generation 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 or biogas 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 or biogas.

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

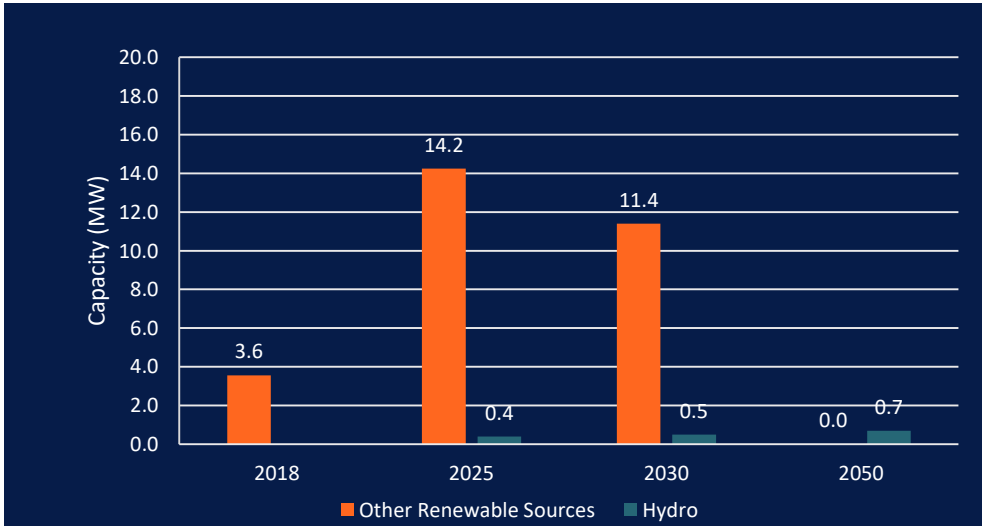


Figure 6.5.5: Installed capacity in MW of other renewable technology types within LBBD.

Current Context 2020	By 2050
• No local hydro capacity in 2020 • 2 Anaerobic digestion sites totalling 3.56MW and 19,647 MWh of generation • No biomass, municipal solid waste or landfill or sewage gas[1]	• Declining usage having displaced fossil fuel sources in power stations • Local hydro: 0.7MW installed capacity

Table 6.5.5: Current context and the 2050 intervention milestones for other renewables.

[1] BEIS Regional Renewable Statistics

6.5 ENERGY SUPPLY INFRASTRUCTURE

DNO engagement

UK Power Networks (UKPN) is the District Network Operator (DNO) for LBBD. They provide publicly available information on electrical supply via their online mapping tool. This includes the details of substation locations, as well as demand and generation constraint zones within the UKPN licence areas.

The installation of new sources of electricity demand, such as heat pumps and electric vehicle chargers, increase electricity flows on the low voltage network as well as likely contributing to an increased peak demand for the building. It is anticipated that a new energy efficient home with an electrical vehicle charger and a heat pump will draw an estimated 3.4 kVA peak without curtailment. General housing with gas heating is assumed to draw approximately 1kVA.

Considering the apparent electrical demand constraints, as well as the projected increase in new demand technologies and locally-connected renewable generation, it is strongly recommended the local authority engage with UKPN to understand the proposed scope of any future upgrade works, and the likely implications to local electrical infrastructure considering a widespread roll out of heat pumps, electric vehicle charging and renewable electrical generation across the area to address local and national policy objectives.

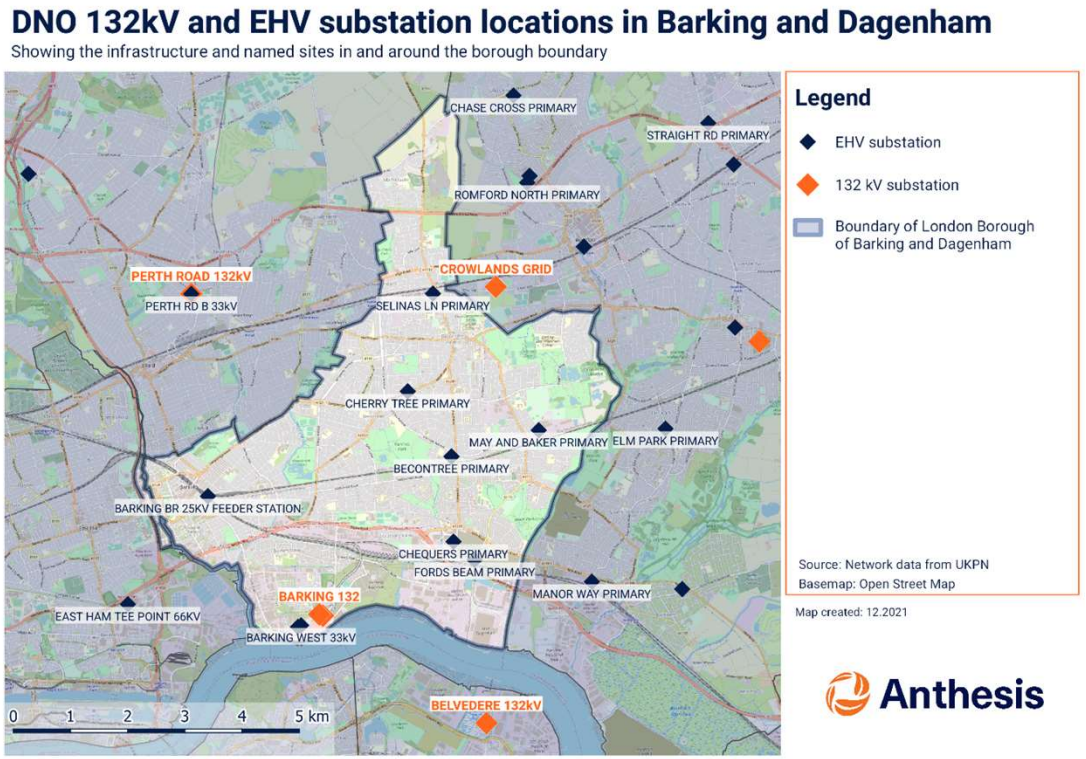


Figure 6.5.6: Electricity distribution network context from the UKPN mapping portal for LBBD

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 LBBD will offer co-benefits across economic, social and environmental spheres:

ECONOMIC

- Reduced energy costs 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
LOCAL CASE STUDIES

OTHER RENEWABLE TECHNOLOGIES

B&D Energy was set up in July 2016 and has since bought two decentralized energy networks into LBBD. The first at Becontree Heath, serving the existing leisure centre and 170 new homes and the second, at Gascoigne serving 381 properties. Heat is currently generated using highly efficient gas fired combined heat and power units (CHPs) with back up boilers. However, the infrastructure being installed has the capacity to switch to alternative sources of heat, for example, excess heat generated at waste plants and water source heat pumps fed from the Thames.

ReFood- Barking and Dagenham is home to an anaerobic digestion plant that converts food waste into 14 million m^3 gas per annum, enough to fuel 12,600 homes per year (in addition to diverting 160,000 tonnes of waste away from landfill.

SOLAR PV

Green Homes Grant - LBBD Council secured £3.3m of funding from Government to carry out energy efficiency and home improvement works to qualifying household, including 90 free Solar PV installations.

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.

6.6 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 LBBD, such as net biodiversity gain, improved air quality and improved 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 LBBD. 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 LBBD a net negative value for the natural environment of -0.16%. LBBD Borough Council has committed to increasing tree coverage and in particular focusing on the 10 major parks in the borough. LBBD has officially been recognised a Tree City of the World and the council has further committed to planting thousands more trees as part the tree planting programme, although the tree planting programme (including the recent Miyawaki Forest in Parsloes Park) is counted under the council's own operations.

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.

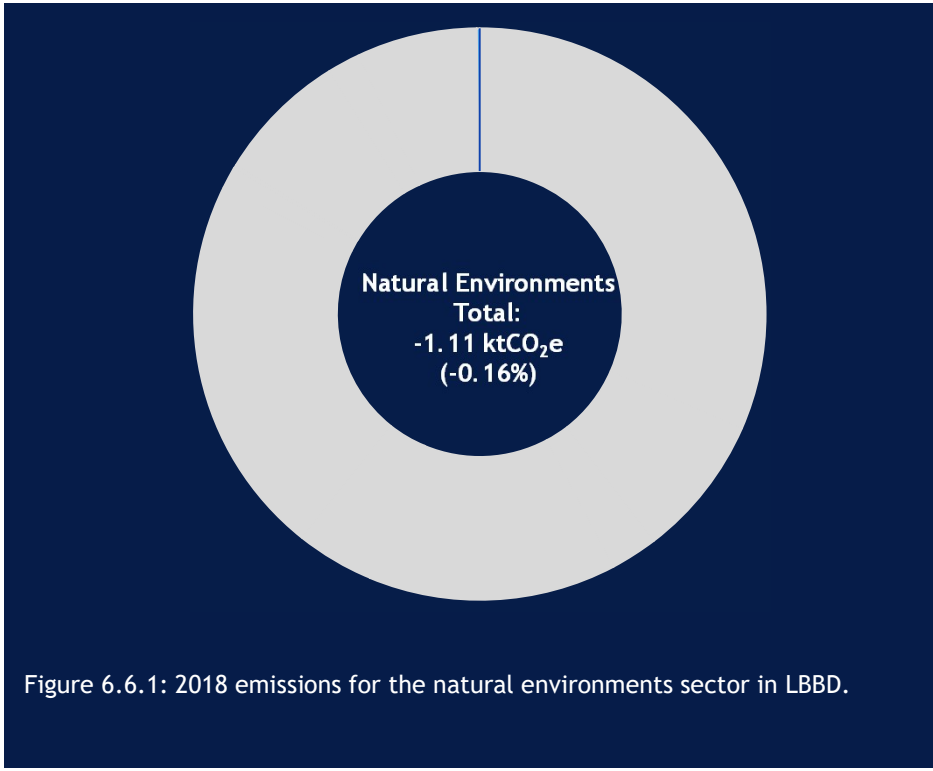


Figure 6.6.1: 2018 emissions for the natural environments sector in LBBD.

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.

London

- London Environment Strategy targets a 10% increase in canopy cover, from a 20% baseline, and by 2050 more than 50% green cover.]
- London Green Belt Policy aims to prevent urban sprawl by keeping land permanently open. 2/3 of all Green Belt land is in agricultural use.

LBBD

- Air Quality Action plan 2020-2025 targets the allocation of green space for new developments including green walls, roofs and vegetation used to mitigate air pollution.
- Parks and Open Spaces Strategy highlights masterplans for 10 of LBBD's main parks. The strategy includes programmes for repair, maintenance and development of the Borough's green spaces.
- Tree Planting Strategy sets out strategic tree, orchard and woodland planting targets for LBBD and emphasises the importance of increased tree cover in the Borough.
- Green Infrastructure and Biodiversity Strategy creates a green grid network encompassing SUDs active travel, trees, biodiversity and green roofs.

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 26. Offsetting is an approach used to balance the climate impact of an organisation, activity or individual through the purchase of tradeable units representing emissions rights, often through nature-based solutions. This is discussed further on page 136.

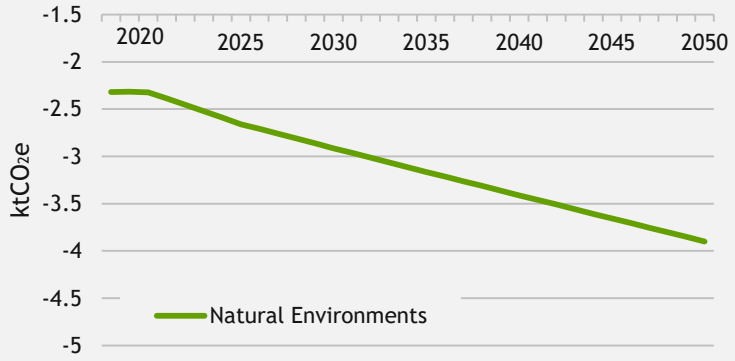


Figure 6.6.3: LBBD's SCATTER High Ambition Pathway for natural environments.

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 - 2050)
1. Increased tree coverage and tree planting	Land use: **7.7 $ktCO_2e$**
2. Land use management	
3. Sustainable consumption	Agriculture & Livestock: **0.16 $ktCO_2e$**
4. Considering offsets	**N/A**

Table 6.6.1: Cumulative carbon emissions savings (2020-2050) for natural environments. Land use savings describe savings from improved sequestration from woodland.

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 750kgCO_2.

	Current Context 2020	By 2050
Forest coverage	Trees currently cover 1.6% of Barking and 9.5% of Dagenham and Rainham.[1]	The SCATTER High Ambition Pathway suggest a 48% increase in forest cover by 2050.
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 2050 intervention milestones for tree coverage and tree planting.

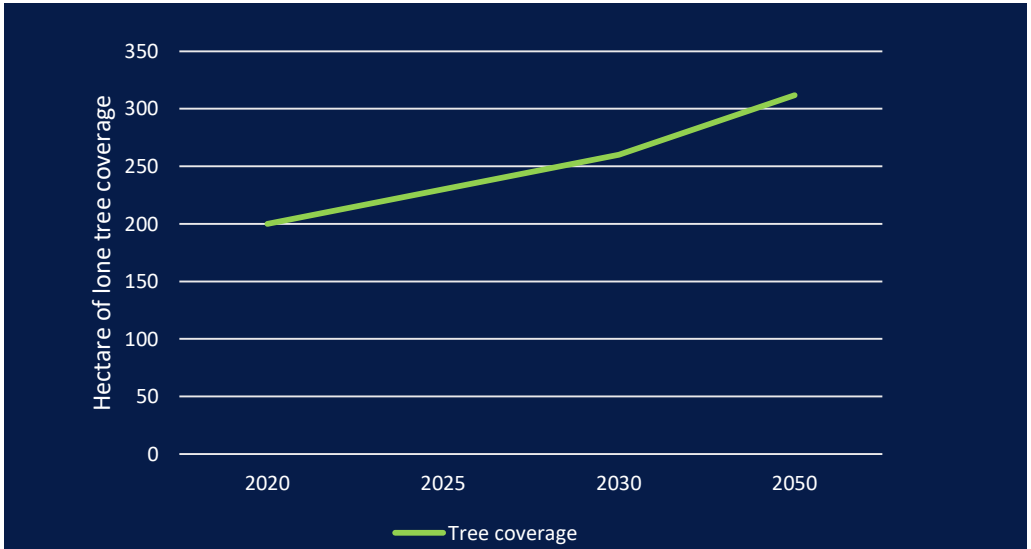


Figure 6.6.4: SCATTER High Ambition Pathway milestones for tree planting outside of woodlands (including lone trees, hedges and small woodlands).

[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 LBBD.

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. There are 28 park spaces across the borough so maintaining their quality is vital.

Current Context 2020	By 2050
In 2018, there was approximately 14.9 ha of rough grassland in LBBD.[1] In 2018, 6.1% of land use in LBBD was agricultural.[1]	By 2050, there is a 5% decrease in grassland to allow for increased forestland and carbon sequestration potential

Table 6.6.3: Current context and the 2050 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 46% reduction by 2050.

This SCATTER modelling is based on national data, scaled down to LBBD. Given the nature of LBBD 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.

[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 26.

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 district focused on improving the carbon sequestration of natural capital. These approaches should 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, the new Science Based Targets Institute standard for Net Zero stipulate that only offsets acquired through neutralisation, rather than compensation, are eligible in achieving net zero, and this will be no more than 5-10% of emissions.

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.

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, LBBD should prioritise those within the boundaries of the district (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
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 LBBD will offer co-benefits across economic, social and environmental spheres:

ECONOMIC

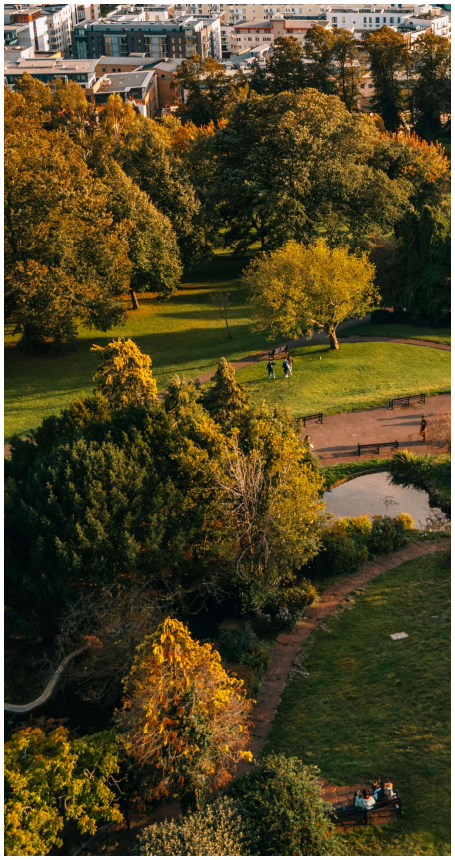
- Industrial areas and employment sites with access to natural greenspace can have more productive employees and these employees tend to have greater job satisfaction. Retail areas with trees perform better than shopping centres without them, as customers are found to spend both more time and money
- On average, house prices increase between 5 – 18% when a property is associated with mature trees, although house price increases can have negative as well as positive impacts
- 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 Barking 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 busy transport links such as the A12 and A13
- Trees enhance biodiversity - A mature oak can host up to 5,000 different species of invertebrate that will form the basis for a healthy food chain that benefits birds and mammals



6.6 NATURAL ENVIRONMENTS & OFFSETTING
LOCAL CASE STUDIES

INCREASED TREE COVERAGE

Tree planting programme - In the last 5 years, LBBD's tree planting programme has delivered over 1000 new trees, including around 400 trees in new developments and 350 replacement trees in streets, parks and highways. As of 2020, LBBD has officially been recognised as a Tree City of the World.

Forest of Thanks - LBBD Council planted a forest at Parsloes Park in Dagenham to thank key workers and community members for their efforts during the pandemic. Almost 28,000 new native trees and shrubs were planted using the Miyawaki method to create the largest Miyawaki project to date in Europe. Miyawaki forests grow 10 times faster than regular forests, are chemical free and become self-sustainable as soon as their third year of life.

LAND MANAGEMENT

Biodiversity enhancement - Over the next few years LBBD will focus on a programme of installing habitat enhancements across parks, such as bird and bat boxes, creating summer and skylight meadows and community orchards and upgrading several local sites of conservation interest.

Dagenham Farm - Opened in 2012, transformed from an ex-council nursery and demonstrates the potential of growing and selling significant amounts of produce from farms on the outskirts of London. The farm produces about five tonnes of organic veg and fruit every year, for sale locally and through the Growing Communities' fruit and veg bag scheme. The farm hosts a range of social activities including a Grown in Dagenham young people's programme for over 130 young people a year as well as a free Growing on Holiday club and after schools club. There are currently 20 active community food growing projects within schools, care homes, housing estates and communal areas in LBBD.

6.6 NATURAL ENVIRONMENTS & OFFSETTING
NATIONAL CASE STUDIES

INCREASED TREE COVERAGE

Solihull's Wildlife Ways Project - An £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 - 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.

6.7 The Council's Wider Influence

Anthesis

6.7 THE COUNCIL'S WIDER INFLUENCE
SECTOR OVERVIEW

Context

As LBBD Council strive towards their Net Zero goal by 2050, the council will have to adapt both internally and externally to ensure changes outlined in this report are implemented and achieved. LBBD Council is directly responsible for just over 5% of emissions (excluding scope 3) in the borough, which means how it influences those responsible for the remaining 95% 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. These are outlined below:

1. Drive behaviour change in the council and improve understanding

LBBD Council can also look to enable wider change through their direct communication and engagement internally. 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

LBBD 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

LBBD 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. LBBD has a specific ability to influence the arms-length organisations via a carbon reduction working group to connect up strategies and activities. In addition LBBD can set up a local climate action network for business in the borough to share learning and drive action.

4. Lobby national government to deliver national policy changes

LBBD 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.

08 Conclusions

8. 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 LBBD 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 2050 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 33).

8. 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 **79% reduction in emissions by 2050**, the borough would **still not reach carbon neutrality** by this time. **Additional shifts in behaviour and technology** will be needed to meet the 2050 timeline.

The cumulative investment required to achieve the high ambition pathway between now and 2050 will be substantial , 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, LBBD 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 district'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 2050 LBBD is left with an emissions gap of **120 $ktCO_2e$** to meet the target of carbon neutrality, and a gap of **110 $ktCO_2e$** to meet the Paris Agreement-aligned target.

Tackling these residual emissions will require more radical measures in some areas, going above and beyond the actions outlined in this report. Carbon offsetting is another possible method, and some actions around this are provided in Chapter 6.6.

9 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.

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.

10 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 LBBD
- 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: DERIVING THE CARBON BUDGET

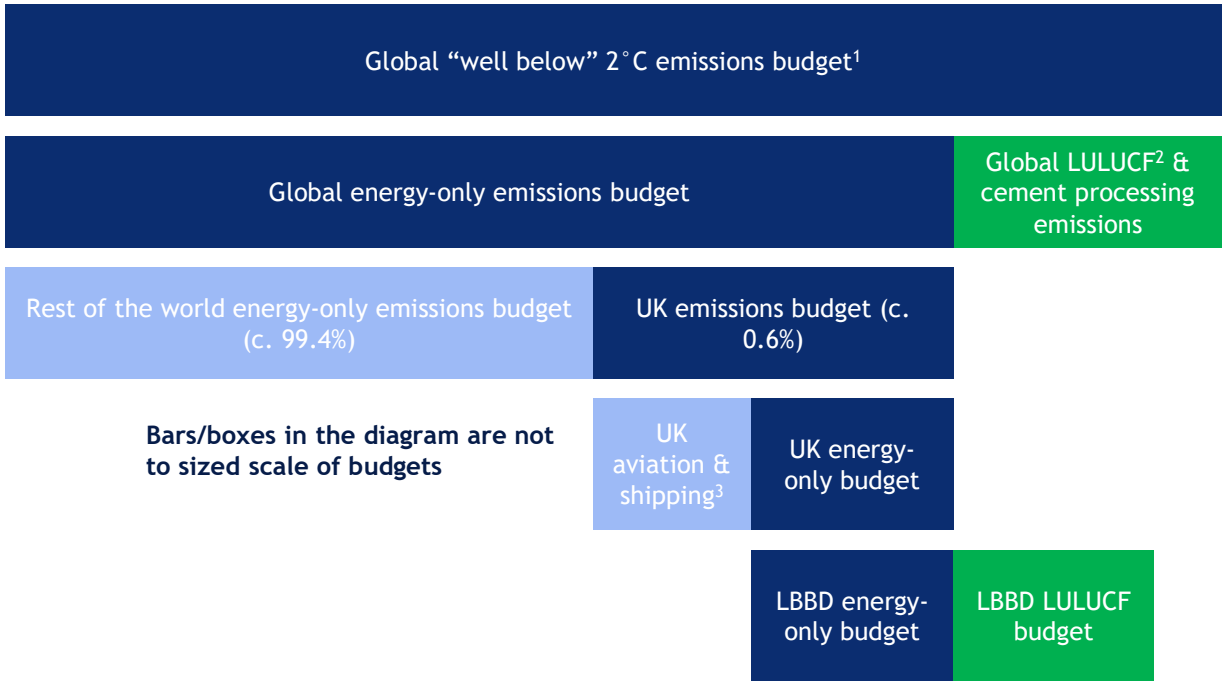
LBBD's carbon budget

The carbon budget sets out a finite emissions limit that LBBD should not exceeded in order that LBBD 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 LBBD 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 12.3% emissions reduction rate for LBBD 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 3: 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.

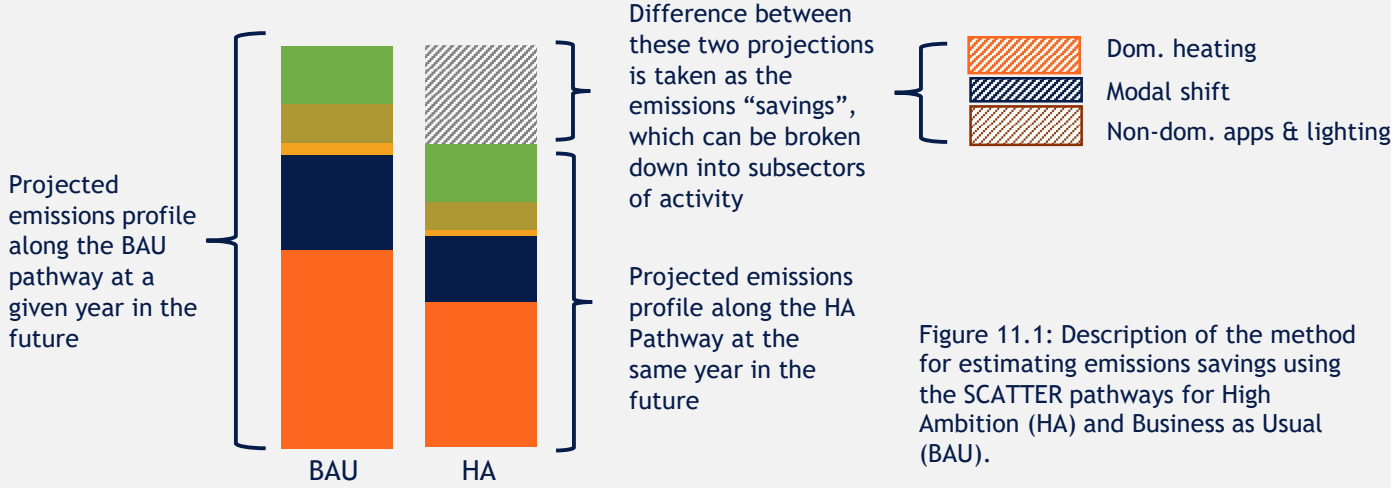


Figure 11.1: Description of the method for estimating emissions savings using the SCATTER pathways for High Ambition (HA) and Business as Usual (BAU).

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 4: 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 LBBD 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 2050
Domestic Buildings	Improved energy efficiency	• By 2025, 2900 new houses are projected compared to 2020. 100% must be built to passivhaus standards. • By 2025, 2200 households have received medium retrofit measures of deep inner wall insulation; 17400 households have additionally received deep external wall insulation.	• By 2030, 5300 new houses are projected compared to 2020. 100% must be built to passivhaus standards. • By 2030, 3600 households have received medium retrofit measures of deep inner wall insulation; 29100 households have additionally received deep external wall insulation.	• By 2050, 9900 new houses are projected compared to 2020. 100% must be built to passivhaus standards. • By 2050, 9700 households have received medium retrofit measures of deep inner wall insulation; 47,600 households have additionally received deep external wall insulation.
Domestic & Non-Domestic Buildings	Improved energy efficiency	• 15% domestic reduction for heating, cooling and hot water • 12% non-domestic reduction	• 21% domestic reduction • 17% non-domestic reduction	• 43% domestic reduction • 40% non-domestic reduction
Domestic & Non-Domestic Buildings	Shifting off gas heating systems	• 34% domestic heating systems are electric • 28% of of non-domestic heating systems are electric	• 47% domestic heating systems are electric • 39% of non-domestic heating systems are electric	• 100% domestic heating systems are electric • 80% of non-domestic heating systems are electric

APPENDIX 4: EMISSIONS REDUCTION INTERVENTIONS (CONT.)

Sector	SCATTER Intervention	By 2025	By 2030	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 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
Transport	Driving less	• Minimal reduction in road transport use • Minimal increase in rail transport	• 6% in road transport use • 17% increase in rail transport	• 19% reduction in road transport use • 50% increase in rail transport

APPENDIX 4: EMISSIONS REDUCTION INTERVENTIONS (CONT.)

Sector	SCATTER Intervention	By 2025	By 2030	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
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	• 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	• 57% reduction in the volume of waste
Waste	Increased recycling rates	• 29% increase in recycling rate	• 50% increase in recycling rate	• 137% increase in recycling rates
Industry	Shifting from fossil fuels	• 3% increase in oil fuel usage • 3% increase in electricity consumption • 3% in natural gas usage	• 14% reduction in oil fuel usage • 3% increase in electricity consumption • 10% increase in natural gas usage	• 15% reduction in oil fuel usage • 2% increase in electricity consumption • 38% increase in natural gas usage
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: • 30% for chemicals • 21% for metals • 25% for minerals • 80% other industries

APPENDIX 4: EMISSIONS REDUCTION INTERVENTIONS (CONT.)

Sector	SCATTER Intervention	By 2025	By 2030	By 2050
Renewable energy supply	Solar PV	• Local PV: 113.6 MW installed capacity • Large-scale PV: 6.1 MW installed capacity	• Local PV: 1956.5 MW installed capacity • Large-scale PV: 10.6 MW installed capacity	• Local PV: 407.2 MW installed capacity • Large-scale PV: 22.5 MW installed capacity
Renewable energy supply	Other renewable technologies (solar thermal, small-scale wind, anaerobic digestors etc.)	• Other renewable technologies: 3.7 MW local wind 35 MW large-scale onshore wind 49.7 MW large-scale offshore wind 0.4 MW local hydro	• Other renewable technologies: 4.6 MW local wind 43.3 MW large-scale onshore wind 66.9 MW large-scale offshore wind 0.5 MW local hydro	• Other renewable technologies: 5.3 MW local wind 51.9 MW large-scale onshore wind 84.4 MW large-scale offshore wind 0.7 MW local hydro
Natural Environment	Forest coverage & tree planting	• Tree planting outside of woodlands equivalent to 230 hectares	• 24% increase in forest coverage • Tree planting outside of woodlands increases by 30% from 2019, equivalent to 260 hectares	• Tree planting outside of woodlands increases by 20% from 2030, equivalent to 312 hectares
Natural Environment	Land use management	• Maintaining existing green spaces	• Maintaining existing green spaces	• 5% decrease in grassland and 4% decrease in cropland to increase forestland and carbon sequestration potential • Maintaining existing green spaces

APPENDIX 5: TRACKING IMPACT
DATA SOURCES

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 5: 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 Zap Maps - Charge Points
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 6 – SUMMARY OF ACTIONS

11.1 BUILDINGS
1) IMPROVED ENERGY EFFICIENCY IN BUILDINGS

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

Responsibility	Action	LBBD's role	Action Impact	Timescale	Complexity
LBBD	Embed building technologies such as living roofs and green facades into planning policy	Policy & Strategy	Strategic	Medium	Medium
LBBD	Investigate using Section 106 developer contributions to deliver net zero projects as part of a Climate Change Action Plan Fund	Implementation	Direct	Long	High
LBBD	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	Strategic	Short	Low
Borough	Ensure the operational carbon of new developments is accurately reported following building completion	Communication & Engagement	Indirect	Short	Medium
Borough	Encourage the use of recycled materials in new developments as a means of reducing the embodied carbon of new-build (scope 3 action)	Communication & Engagement	Direct	Short	Low
Borough	Signpost and promote retrofit opportunities and funding, initially targeting business sectors or domestic housing areas with the most need	Communication & Engagement	Indirect	Short	Low

11.1 BUILDINGS
1) IMPROVED ENERGY EFFICIENCY IN BUILDINGS

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

Responsibility	Action	LBBD's role	Action Impact	Timescale	Complexity
LBBD	Implement standardised performance measurement and reporting requirements for all existing and new commercial developments aligning with the Local Plan	Implementation	Strategic	Long	High
Borough	Encourage annual energy reporting requirements across the borough's non-domestic buildings	Communication & Engagement	Indirect	Medium	High
Borough	Set up a mechanism through which business stakeholders can achieve sustained collaboration and showcase leading examples of decarbonisation	Communication & Engagement	Indirect	Short	Medium
Borough	Support businesses in accessing green finance by providing staff resources for guidance and advice via business networks	Communication & Engagement	Indirect	Short	Low
Borough	Implement strict energy efficiency standards for new data centres sites built in the borough	Implementation	Direct	Medium	High

11.1 BUILDINGS
1) IMPROVED ENERGY EFFICIENCY IN BUILDINGS

Goal: Improve energy efficiency in privately owned and rented properties

Responsibility	Action	LBBD's role	Action Impact	Timescale	Complexity
LBBD	Implement standardised performance measurements with standards beyond Part L for all existing buildings such as Future Homes Standard	Policy & Strategy	Strategic	Long	High
LBBD	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	Strategic	Long	High
LBBD	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	Strategic	Long	High
LBBD	Utilise household fuel poverty data to identify 'hotspots' of low energy efficiency properties and target engagement and financing opportunities to these households.	Research & Design	Indirect	Medium	Medium
LBBD	Ensure new houses incorporate an uplift in energy efficiency standards in alignment with progression towards the Future Homes Standard	Implementation	Direct	Long	High

11.1 BUILDINGS
1) IMPROVED ENERGY EFFICIENCY IN BUILDINGS

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

Responsibility	Action	LBBD's role	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	Indirect	Long	Medium
Borough	Publicise opportunities associated with improving energy efficiency standards and provide communications to owner-occupied homes	Communication & Engagement	Indirect	Short	Low
Borough	Set up a system where tenants could anonymously report landlords who do not meet MEES or EPC standards.	Implementation	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	Strategic	Long	Low

11.1 BUILDINGS
1) IMPROVED ENERGY EFFICIENCY IN BUILDINGS

Goal: Improve energy efficiency in public sector buildings

Responsibility	Action	LBBD's role	Action Impact	Timescale	Complexity
LBBD	Encourage newly built public sector developments to be to the highest energy efficiency standards e.g. Passivhaus standards	Communication & Engagement	Strategic	Short	Medium
LBBD	Provide guidance and communicate financing opportunities for energy efficiency measures and DEC scoring in existing public sector buildings	Communication & Engagement	Indirect	Short	Low
LBBD	Encourage annual energy audits of all public sector buildings, to assist with monitoring and reporting of annual emissions	Communication & Engagement	Indirect	Short	Medium

11.1 BUILDINGS
2) SHIFTING OFF GAS HEATING SYSTEMS

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

Responsibility	Action	LBBD's role	Action Impact	Timescale	Complexity
LBBD	Work with B&D Energy in both expanding the district heat networks in Barking and Dagenham and decarbonising them.	Research & Design	Indirect	Short	Low
Borough	Mandate that data centres of a certain size are required to investigate heat network opportunities	Policy & Strategy	Direct	Long	High
Borough	Ensure developers have the knowledge and resources to install non-gas heating systems in new developments	Communication & Engagement	Direct	Long	Medium
Borough	Encourage and provide guidance to businesses on low carbon heating solutions	Communication & Engagement	Indirect	Short	Low
Borough	Support households in accessing funding for installation of heat decarbonisation measures	Communication & Engagement	Indirect	Long	Medium

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

Responsibility	Action	LBBD's role	Action Impact	Timescale	Complexity
Borough	Ensure guidance and finance opportunities are provided to public services to encourage uptake of low carbon heating	Communication & Engagement	Indirect	Long	Medium

11.1 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	LBBD's role	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	Indirect	Short	Medium

11.2 TRANSPORT
1) TRAVELLING SHORTER DISTANCES

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

Responsibility	Action	LBBD's role	Action Impact	Timescale	Complexity
LBBD	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	Strategic	High	Existing staff time & resource
Borough	Strategically locate core services (such as shops, hospitals and schools) to reduce length of journeys	Policy & Strategy	Strategic	High	Existing staff time & resource

Goal: Consolidation of journeys is encouraged

Responsibility	Action	LBBD's role	Action Impact	Timescale	Complexity
Borough	Set up a car sharing scheme in the borough to reduce number of journeys.	Implementation	Direct	Short	Medium
Borough	Support and require large fleets operating in the borough, such as waste services, to practice journey optimisation	Communication & Engagement	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	Strategic	Medium	Medium
Borough	Engage with school bus route operators to carry out route optimisation and minimise multi-stop journeys	Communication & Engagement	Direct	Medium	Medium

11.2 TRANSPORT
1) TRAVELLING SHORTER DISTANCES

Goal: Employees are supported in working from home

Responsibility	Action	LBBD's role	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	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	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	Indirect	Short	Low
Borough	Collaborate with nearby councils where a significant number of LBBD's residents work to support businesses in overcoming barriers to increased remote working	Communication & Engagement	Indirect	Medium	High
LBBD	Develop a Digital Infrastructure Strategy to encourage and facilitate the deployment of telecommunications networks across the Borough	Policy & Strategy	Strategic	Short	Low

11.2 TRANSPORT
2) DRIVING LESS

Goal: Infrastructure and policy are designed to facilitate active travel

Responsibility	Action	LBBD's role	Action Impact	Timescale	Complexity
LBBD	Deliver the Barking and Dagenham Borough-Wide Transport Priorities: 2021-2037 considering street space allocation in favour of active travel	Implementation	Strategic	Long	High
LBBD	Include requirements in building and planning policy which further incentivise active travel, such as the provision of secure storage and drying rooms	Policy & Strategy	Strategic	Medium	High
Borough	Further encourage cycling through accelerating the development of strategic high-quality walking and cycling routes across the borough	Implementation	Strategic	Short	High
Borough	Set a commitment to increase the amount of active travel infrastructure in the borough	Policy & Strategy	Strategic	Immediate	Low
Borough	Work with all schools and academies in the borough to set up walking buses and provide cycle workshops	Communication & Engagement	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	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	Direct	Short	Medium

11.2 TRANSPORT
2) DRIVING LESS

Goal: Reduce private vehicle use and influence behavioural patterns

Responsibility	Action	LBBD's role	Action Impact	Timescale	Complexity
LBBD	Set targets to improve air quality across the borough and report progress in line with current air quality metrics.	Policy & Strategy	Indirect	Long	Low
Borough	Enforce restrictions on idling whilst running an anti-idling campaign, introduce parking zones and road closures near schools during peak hours	Implementation	Indirect	Short	High
Borough	Actively campaign to limit short trips to discourage driving for commute or school run	Communication & Engagement	Indirect	Short	High
Borough	Enforce more mandatory red routes within the borough to reduce congestion, especially around schools	Implementation	Direct	Medium	Medium

11.2 TRANSPORT
3) SWITCHING TO ELECTRIC VEHICLES

Goal: Increase EV uptake

Responsibility	Action	LBBD's role	Action Impact	Timescale	Complexity
Borough	Roll out emissions-based parking permits and ULEV zones in town centres	Implementation	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	Indirect	Short	High
Borough	Continue to incentivise and support taxi drivers in switching to EV through interest-free loans or other mechanisms	Communication & Engagement	Indirect	Medium	Medium
Borough	Encourage and incentivise public services within the borough to use pool EVs rather than private vehicles.	Communication & Engagement	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 EV	Implementation	Direct	Medium	Medium

11.2 TRANSPORT
3) SWITCHING TO ELECTRIC VEHICLES

Goal: Improve EV infrastructure

Responsibility	Action	LBBD's role	Action Impact	Timescale	Complexity
LBBD	Implement EV-ready building codes and establish preferred EV parking policy in Local Plan	Policy & Strategy	Strategic	Long	High
Borough	Identify sites for EV infrastructure through consultation and a strategic assessment, such as car parks and taxi ranks	Research & Design	Strategic	Short	Medium
Borough	Install EV infrastructure in identified strategic sites across the borough	Implementation	Indirect	Medium	Medium

11.2 TRANSPORT
4) IMPROVING FREIGHT EMISSIONS

Goal: Consolidate and reduce impact of freight journeys

Responsibility	Action	LBBD's role	Action Impact	Timescale	Complexity
LBBD	Strengthen procurement policies for council suppliers who provide services using freight vehicles	Policy & Strategy	Indirect	Short	Low
Borough	Assess the feasibility of local distribution hubs for home deliveries in LBBD which utilise low-carbon "Last Mile" deliveries	Research & Design	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	Indirect	Short	Low
Borough	Encourage and support suppliers to utilise rail freight opportunities as opposed to HGVs	Communication & Engagement	Direct	Long	High
Borough	Develop an e-cargo bike scheme for local deliveries	Implementation	Direct	Medium	Medium

11.2 TRANSPORT
4) IMPROVING FREIGHT EMISSIONS

Goal: Use local suppliers to reduce miles travelled

Responsibility	Action	LBBD's role	Action Impact	Timescale	Complexity
LBBD	Council should opt where possible for local suppliers i.e. using local produce if providing food	Implementation	Indirect	Short	Medium
Borough	Encourage residents to consider "miles travelled" in their purchasing decisions and buy locally where possible	Communication & Engagement	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	Indirect	Medium	Medium

11.3 WASTE
1) REDUCING THE AMOUNT OF WASTE

Goal: Encourage citizens to reduce waste and wastewater

Responsibility	Action	LBBD's role	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	Indirect	Immediate	Low
Borough	Organise a food waste campaign using community growing projects and education in schools	Communication & Engagement	Indirect	Short	Low
Borough	Provide information on minimising waste of water to residents	Communication & Engagement	Indirect	Short	Low

11.3 WASTE
1) REDUCING THE AMOUNT OF WASTE

Goal: Encourage businesses to reduce waste and wastewater

Responsibility	Action	LBBD's role	Action Impact	Timescale	Complexity
LBBD	Support innovation in reducing construction waste through new materials specifications in planning policy	Policy & Strategy	Strategic	Short	Medium
Borough	Provide better incentives to commercial sites and workplaces to adopt improved waste management measures	Implementation	Indirect	Short	High
Borough	Expand waste and recycling reporting by developing a standardised waste reporting framework for businesses in the borough	Implementation	Indirect	Medium	Medium

Goal: Encourage public services to reduce waste and wastewater

Responsibility	Action	LBBD's role	Action Impact	Timescale	Complexity
Borough	Consider opportunities for partnerships to develop waste reduction programs within schools	Communication & Engagement	Direct	Short	Medium
Borough	Continue to encourage and support monitoring, measuring and reporting of waste across the public sector	Communication & Engagement	Indirect	Long	Medium

11.3 WASTE
2) INCREASING THE RECYCLING RATE

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

Responsibility	Action	LBBD's role	Action Impact	Timescale	Complexity
LBBD	Once all suitable households have a food bin, consider setting borough wide targets for food waste and ensure infrastructure and engagement supports this	Implementation	Strategic	Medium	Medium
Borough	Develop further education campaigns for residents to raise awareness of what can be recycled	Communication & Engagement	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	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	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	Indirect	Short	Low

11.3 WASTE
2) INCREASING THE RECYCLING RATE

Goal: Businesses are supported to increase recycling

Responsibility	Action	LBBD's role	Action Impact	Timescale	Complexity
Borough	Work with the other East London boroughs to share case studies from businesses on circular economy practices to maximise environmental and economic opportunities	Communication & Engagement	Indirect	Short	Low
Borough	Consider policies to reduce or repurpose waste in construction, demolition and excavation of buildings through circular economy models	Policy & Strategy	Strategic	Short	High
Borough	Expand networks facilitating the donation of edible surplus food to food banks across the borough	Implementation	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	Indirect	Medium	Low

11.3 WASTE
2) INCREASING THE RECYCLING RATE

Goal: Public services are encouraged to increase recycling

Responsibility	Action	LBBD's role	Action Impact	Timescale	Complexity
Borough	Encourage public services to segregate their waste through incentives and sharing best practice	Communication & Engagement	Indirect	Medium	Low
Borough	Develop a recycling and circularity education campaign in schools	Communication & Engagement	Indirect	Short	Low

Goal: The council demonstrates leadership in the circular economy

Responsibility	Action	LBBD's role	Action Impact	Timescale	Complexity
Borough	Develop a circular economy roadmap for the borough, mapping material flows within the area to identify opportunities for circularity and co-location	Policy & Strategy	Strategic	Medium	Medium
Borough	Encourage suppliers to adopt circular economy principles through procurement policies	Policy & Strategy	Indirect	Short	Medium

11.4 INDUSTRY

1) SHIFTING FROM FOSSIL FUELS AND MORE EFFICIENT PROCESSES

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

Responsibility	Action	LBBD's role	Action Impact	Timescale	Complexity
Borough	Work collaboratively with local industry to deliver the industrial strategy, particularly focusing on the clean growth challenge	Implementation	Strategic	Medium	Medium
Borough	Develop refresh of the Borough's economic growth vision and strategy to put LBBD 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	Strategic	Short	Low

11.4 INDUSTRY

1) SHIFTING FROM FOSSIL FUELS AND MORE EFFICIENT PROCESSES

Goal: Industry is supported to decarbonise

Responsibility	Action	LBBD's role	Action Impact	Timescale	Complexity
LBBD	Set guidance and provide training for promoting zero and low-carbon infrastructure when assessing industrial/commercial planning applications	Implementation	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	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	Strategic	Short	Low

11.5 ENERGY SUPPLY

1) INCREASE SOLAR PHOTOVOLTAIC (PV) CAPACITY

Goal: Installation of solar panels on properties are maximised

Responsibility	Action	LBBD's role	Action Impact	Timescale	Complexity
LBBD	Evaluate the opportunities for solar panels within the borough's social housing	Research & Design	Strategic	Medium	Medium
Borough	Scope the development of solar PV installations on large commercial buildings	Research & Design	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	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	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	Indirect	Short	Low

11.5 ENERGY SUPPLY
2) INCREASE WIND CAPACITY

Goal: Installation of wind turbines are maximised

Responsibility	Action	LBBD's role	Action Impact	Timescale	Complexity
LBBD	Conduct a renewable energy feasibility study to evaluate the opportunities for wind turbines across the borough	Research & Design	Strategic	Immediate	Low
LBBD	Install wind turbines on council owned land where opportunities are identified by the feasibility study	Implementation	Direct	Long	High
Borough	Explore opportunities to invest in the development of a wind farm within or outside of the borough	Implementation	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	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	Indirect	Long	Medium
Borough	Provide a wind map for businesses and residents to indicate how appropriate their land is for turbines	Communication & Engagement	Indirect	Short	Low

11.5 ENERGY SUPPLY

3) INCREASE THE CAPACITY OF OTHER RENEWABLE TECHNOLOGIES

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

Responsibility	Action	LBBD's role	Action Impact	Timescale	Complexity
LBBD	Review renewable potential across the borough and identify barriers through a renewable energy feasibility study	Research & Design	Strategic	Immediate	Medium
LBBD	Use policy to prioritise the key strategic sites identified in the feasibility study to overcome the barriers identified	Policy & Strategy	Strategic	Medium	Medium
LBBD	Increase the requirements for renewables in the upcoming plans and strategies	Policy & Strategy	Strategic	Medium	Low
Borough	Coordinate action with DNO on initiatives to significantly increase the demand on electricity for heating/ power (as opposed to fossil fuels) and to identify opportunity areas for investment	Communication & Engagement	Strategic	Medium	High

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

Goal: Businesses are supported to maximise renewable energy installations

Responsibility	Action	LBBD's role	Action Impact	Timescale	Complexity
LBBD	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	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	Indirect	Medium	Medium
Borough	Provide support for SMEs to access funding and collaborate on energy projects through a shared platform	Communication & Engagement	Indirect	Short	Low
Borough	Develop business-owned renewable technology projects in commercial areas through collaboration and partnerships	Communication & Engagement	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	Indirect	Medium	Medium

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

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

Responsibility	Action	LBBD's role	Action Impact	Timescale	Complexity
Borough	Encourage data centres within LBBD to shift from diesel-powered generators for backup power to low-carbon standby power systems including battery storage and low carbon fuels	Communication & Engagement	Direct	Long	High
Borough	Facilitate coordinated investment in energy infrastructure at key locations to enable developers to benefit from infrastructure required to achieve net zero buildings	Implementation	Indirect	Medium	High
Borough	Explore partnership with local businesses to create a framework to allow businesses to buy power in aggregation rather than in isolation	Research & Design	Direct	Medium	High

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

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

Responsibility	Action	LBBD's role	Action Impact	Timescale	Complexity
LBBD	Consult with residents and other key stakeholders to develop a clean energy target for the borough	Research & Design	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	Indirect	Short	Medium
Borough	Provide support for residents and schools such as grants, loans or subsidies to install renewable technology	Communication & Engagement	Indirect	Long	Medium
Borough	Encourage community renewable technology projects, such as through the co-operative ownership model	Communication & Engagement	Direct	Long	Medium

11.6 NATURAL ENVIRONMENTS
1) INCREASED TREE COVERAGE & TREE PLANTING

Goal: Existing tree coverage is maintained

Responsibility	Action	LBBD's role	Action Impact	Timescale	Complexity
LBBD	Develop a long-term strategy to protect and manage existing urban trees and woodland in the borough	Policy & Strategy	Strategic	Short	Medium
LBBD	Carry out ongoing inventory and report on tree & hedgerow abundance, diversity and cover statistics	Implementation	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	Indirect	Immediate	Low

11.6 NATURAL ENVIRONMENTS

1) INCREASED TREE COVERAGE & TREE PLANTING

Goal: Opportunities to increase tree coverage are explored

Responsibility	Action	LBBD's role	Action Impact	Timescale	Complexity
LBBD	Plant trees, woodland or hedgerows on council-owned land (where appropriate) including strategic land and along grass verges or highways	Implementation	Direct	Short	Medium
LBBD	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	Strategic	Short	Low
LBBD	Ensure tree cover is considered for all new developments by mandating for a minimum level of tree coverage in new developments, and exploring incentives for developers to retain trees	Implementation	Direct	Medium	High
Borough	Continue to engage with private landowners in the borough to identify opportunities for tree and hedge planting	Communication & Engagement	Indirect	Short	Medium
Borough	Engage with community groups (e.g. friends of parks groups) and schools to carry out tree planting	Communication & Engagement	Indirect	Short	Low

11.6 NATURAL ENVIRONMENTS
1) INCREASED TREE COVERAGE & TREE PLANTING

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

Responsibility	Action	LBBD's role	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	Indirect	Long	Medium
Borough	Prioritise hedge and tree planting near to schools to act as an effective barrier to pollution	Implementation	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	Indirect	Medium	Medium

11.6 NATURAL ENVIRONMENTS
2) LAND MANAGEMENT

Goal: Maintain and enhance green space

Responsibility	Action	LBBD's role	Action Impact	Timescale	Complexity
LBBD	Continue current investment and source further funding for greater enhancement of existing green spaces as housing development density increases	Implementation	Indirect	Long	Medium
LBBD	Impose more ambitious green space requirements in planning policy for development and ensure that green spaces are at the heart of planning	Policy & Strategy	Strategic	Long	High
LBBD	Restore, retain and protect existing land uses which store CO_2 on council-owned land	Implementation	Direct	Long	Low
Borough	Consider imposing living wall planning requirements for all commercial developments in the borough	Policy & Strategy	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 the borough	Implementation	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	Implementation	Direct	Long	Medium

11.6 NATURAL ENVIRONMENTS
2) LAND MANAGEMENT

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

Responsibility	Action	LBBD's role	Action Impact	Timescale	Complexity
Borough	Drive an increase in the number of Green Flag status parks across the borough	Communication & Engagement	Indirect	Medium	Low
Borough	Develop a toolkit for green community schemes that SMEs could refer to in looking for community engagement or philanthropy opportunities	Communication & Engagement	Indirect	Long	Low

11.6 NATURAL ENVIRONMENTS
2) LAND MANAGEMENT

Goal: Improve biodiversity in the local area

Responsibility	Action	LBBD's role	Action Impact	Timescale	Complexity
LBBD	Rewild verges, reduce mowing and plant and/or sensitively manage hedgerows to connect and enhance wider ecological networks	Implementation	Direct	Short	Low
LBBD	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 LBBD's existing parks	Policy & Strategy	Strategic	Short	Medium
LBBD	Embed a minimum of 10% Biodiversity Net Gain into planning policy for new developments	Policy & Strategy	Strategic	Long	Medium
Borough	Engage with residents on the value of land use and habitats within private gardens	Communication & Engagement	Indirect	Short	Medium
Borough	Run a campaign/training on Biodiversity Net Gain	Communication & Engagement	Indirect	Short	Medium
Borough	Encourage the use of open green spaces at public facilities for gardening clubs and community gardens	Implementation	Indirect	Medium	Low

11.6 NATURAL ENVIRONMENTS
3) SUSTAINABLE CONSUMPTION

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

Responsibility	Action	LBBD's role	Action Impact	Timescale	Complexity
LBBD	Provide locally sourced, vegetarian or vegan meals in council offices and council led events	Implementation	Direct	Immediate	Low
Borough	Set up procurement contracts with local producers or Meat Free Mondays in schools across the borough	Implementation	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	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	Indirect	Short	Medium

11.6 NATURAL ENVIRONMENTS
4) CONSIDERING OFFSETS

Goal: Residual emissions are addressed through offsetting

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

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