Cheshire East Council

Carbon Neutrality Action Plan 2020-2025

January 2020

Anthesis

Cheshire East Council

Contents

Introduction and Context

Introduction

At the Council meeting on 22 May 2019 the Elected Members of Cheshire East Council (CEC) approved the following Notice of Motion relating to Climate Change.

"This Council notes that on 1 May Parliament declared an environment and climate emergency and
a) Requests that a Cheshire East Environmental Strategy is brought forward as a matter of urgency;
b) Commits to the target of Cheshire East Council being carbon neutral by 2025 and asks that details of how to meet this commitment are included in the Environmental Strategy;
c) Will work to encourage all businesses, residents and organisations in Cheshire East to reduce their carbon footprint by reducing energy consumptions and promoting healthy lifestyles."

This work is being commissioned by Cheshire East Council in response to this motion.

Document purpose

This Carbon Neutral Action Plan is focused on actions that CEC should consider deploying directly in support of the carbon neutral 2025 target.

A separate Supplementary Annex document provides further detail, analysis and recommendations in respect of the following topics:

- CEC's own carbon footprint from 2011 to present;
- Cheshire East borough's carbon footprint from 1990 to present, including emissions from agriculture and land use;
- An indicative 'route map' to 2050 which seeks to define the nature and extent of emissions reduction measures to reach carbon neutrality, for both the Council itself and the wider borough; and
- Carbon Neutrality definitions, challenges and case studies

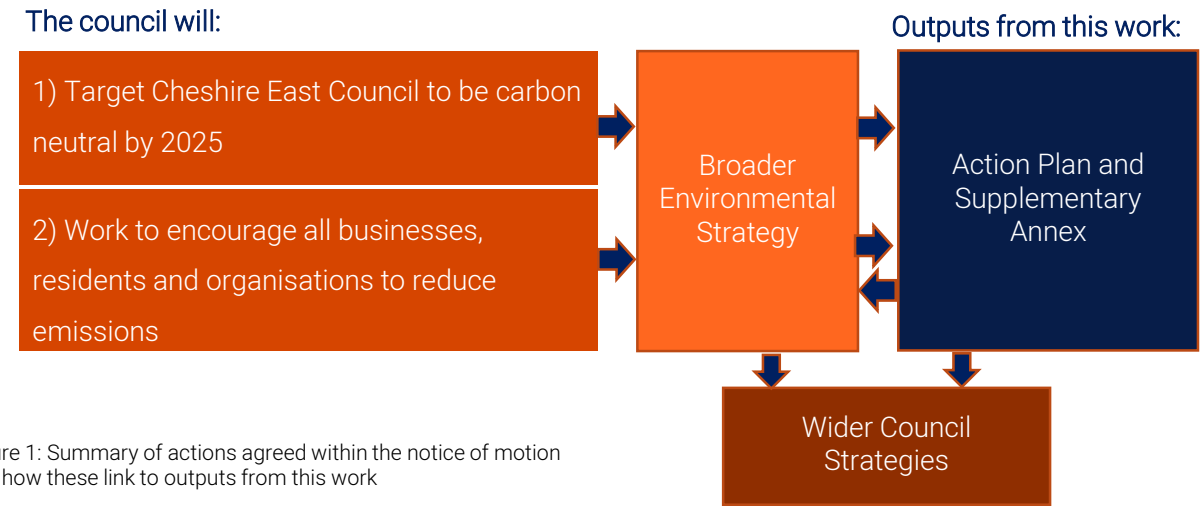


Figure 1: Summary of actions agreed within the notice of motion and how these link to outputs from this work

Introduction and Context

Global emissions performance

Intergovernmental Panel on Climate Change (IPCC) special report on the impacts of global warming of 1.5 °C above pre-industrial levels, was issued in October 2018, and serves as a stimulus of Local Authorities to act on the 'climate emergency'. This report stated that in order to remain within a 1.5 °C increase, governments must cut emissions of greenhouse gases (globally) by 45% by 2030.

The UN Environment Programme also recently published their 2019 Emissions Gap Report, which found that the Nationally Determined Contributions were insufficient to ensure that global temperature rises stays below 1.5°C, and that nations must triple their efforts in order to meet even a 2°C target. It also found that global emissions had increased in 2018 after a period of stability between 2014 and 2016.

A key finding of the report is that: '…non-state and subnational action plays an important role in delivering national pledges. Emission reduction potential from non-state and subnational action could ultimately be significant, allowing countries to raise ambition.'

Research by the Global Carbon Project issued in December 2018 reported that since 1990, there has been a 43% increase in total radiative forcing – the warming effect on the climate – by long-lived greenhouse gases.

In November 2019, the World Meteorological Organization reported that during 2018 concentrations of CO_2 peaked at 407.8 parts per million – a level last seen 3 million years ago when average global temperatures were 2-3 °C warmer.

The Climate Change Act 2008 introduced a legally binding target for the UK to reduce greenhouse gases by 80% by 2050 against a 1990 baseline. In June 2019 the UK Prime Minister announced a revised target - the UK will cut emissions to net zero by 2050 (relative to the 1990 baseline).

The above evidence makes clear that immediate and drastic action is required to avoid global warming to dangerous levels, whilst encouraging sub-national policy measures and action as a necessary means of reducing emissions.

Building the case for action

It is widely accepted that decarbonising will offer many co-benefits. These include:

Health improvements – Due to cleaner air, warmer homes, more exercise and better mental health.

Quality of Place – Less traffic congestion, job creation in the low-carbon sector, operational cost savings via increased energy efficiency and waste reduction

Green Infrastructure[1] – investments in natural solutions to climate change (i.e. tree planting, peatland management, etc)[2] can have a wide range of additional benefits including:

- Biodiversity – natural spaces in urban and rural settings create refuges for wildlife.
- Water management – regulation of water availability & quality and flooding.
- Heat regulation – vegetation provides cooling/ warming in the summer/ winter, respectively
- Economic benefits – e.g. increased productivity through greater wellbeing; new revenue streams.
- Health & wellbeing – e.g. increased recreation; reduced stress; spiritual connection to nature.

However, recent science indicates that decarbonisation needs to accelerate, and as a result, not only are we forgoing opportunities to live better, healthier lives, we are exposing ourselves to more frequent, extreme weather events, such as flooding and heat stress (among many other adverse impacts).

References

- Council announcement
- IPCC 1.5 Report
- Emissions Gap Report
- Global Carbon Project research
- World Meteorological Organization publication

Anthesis

Introduction and Context

Key definitions:

- **Carbon Budget:** The allowed cumulative total of emissions over a period of years which ensures temperature change remains below dangerous levels. Defined by The Tyndall Centre for Climate Change Research.
- **Carbon Neutral:** Refer to Section 3 of the Action Plan for a definition of carbon neutral as multiple definitions are available.
- **CO_2e:** This stands for carbon dioxide equivalent. This allows the comparison and inclusion of other GHGs (e.g. nitrous oxide and methane) as well as carbon dioxide. It represents the corresponding amount of carbon dioxide that would be required to produce the same level of radiative forcing and thus warming as these other GHGs.
- **Co-benefit:** The positive effects that a policy or measure aimed at one objective might have on other objectives.[1]
- **Decarbonisation**: Reducing the carbon emissions from an energy system.
- **Ecosystem services:** These refer to the benefits that 'flow' from natural capital (such as fertility from soils, or fuel and fibre from forests).
- **GHG**: Greenhouse Gases.
- **Green Infrastructure**: This refers to the network of multi-functional green (and blue) space and other features, both urban and rural, which can deliver quality of life and environmental benefits for communities. It includes everything from nature reserves, woodlands and hedgerows to farmland, roadside verges, and green roofs.
- **Insetting**: A similar principle to offsetting, however the carbon saving occurs within an organisation's supply chain or local authority region.
- **Nature-based solutions**: These employ natural phenomena to help address problems such as climate change mitigation and adaptation. In terms of climate mitigation (as is the subject of this report), they focus on carbon sequestration. Examples include tree and hedgerow planting and restoration of ecosystems including wetlands, peatland, grasslands, pasture, and soils. Nature-based solutions are championed in the U K Government's draft Environment Bill.
- **Natural Capital:** This refers to the 'stocks' of renewable and non-renewable natural resources available to society. It refers to nature in the context of the five capitals model in economics (i.e. financial, manufactured, social, human and natural capital). It is associated with monetary or other valuation and accounting techniques. Examples include soil, water, and forests.
- **Offsetting**: 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. Although they can be stored and traded like a commodity, they are not material things; offset credits are not literally "tonnes of carbon" but stand in for them and are better regarded as intangible assets or financial instruments. To act as an offset, units must be cancelled to represent a reduction and prevent further trading.[2]
- **Residual emissions**: The estimated emissions remaining or left-over after reductions have been applied.
- SCATTER: Setting City Area Targets and Trajectories for Emissions Reduction. This is the tool used throughout the report to look at borough-wide emissions and future emission pathways.
- **Scope 1** (at the borough level): Direct GHG emissions from sources located within the local authority boundary.
- **Scope 2** (at the borough level): Indirect GHG emissions occurring as a consequence of the use of grid-supplied electricity, heat, steam and/or cooling within the local authority boundary.
- **Scope 3** (at the borough level): All other GHG emissions that occur outside the local authority boundary as a result of activities taking place within the local authority boundary.
- **Scope 1, 2 and 3** (at an organisational level): These differ from the definition at a borough level and are defined on page 8.
- **Sequestration**: The uptake of carbon-containing substances, in particular carbon dioxide from the atmosphere.[1]

1 – IPCC Glossary definitions
2 – As defined by the Tyndall Centre for Climate Change Research

1. Process

The following diagram represents the processes and exercises that have been carried out in collaboration with Cheshire East Council in order to inform the Action Plan. This has been delivered alongside the Council's own internal work including conversations around cabinet facilities, engagement of Brighter Future Champions and officer competitions for ideas.

Initial Scoping

- To determine the scope, objectives and key stakeholders for the project.

Cheshire East Council current and future emissions

- Provision of the Council's present direct and indirect emissions (Scope 1, 2, & 3) to provide a baseline from which to measure progress.
- Breakdown of emissions into sub-sectors to identify priority areas for action.
- Analysis of potential future emissions pathways to raise awareness of the scale and extent of action required for the council to achieve carbon neutrality by 2025.

Cheshire East Borough wide current and future emissions

- Generation of the most recent year inventory of direct and indirect emissions using SCATTER tool (Scope 1 & 2) to provide a baseline from which to measure progress.
- Breakdown of emissions into sectors and sub-sectors to identify priority areas for action.
- Analysis of potential future emissions pathways to raise awareness of the scale and extent of action required for borough emissions to be reduced
- Comparison with a science-based target to provide context for whether the nature, timing and extent of planned activities are ambitious enough.

Stakeholder Engagement workshop

- To provide key stakeholders with an opportunity to inform, critique and prioritise content for the Carbon Neutrality Action Plan.
- Identification factors that may enable or challenge various council emissions reductions activities.

Further research into proposed actions

- To consolidate and develop ideas from the stakeholder engagement session
- Assessment of the potential of proposed actions in terms cost, benefits and implementation.

Carbon Neutrality Action Plan

- Formulation of a plan of actions for the council to work towards carbon neutrality by 2025 for their own operations and options for the wider borough.

2. Cheshire East Council Influence

Linking the motion to influence

Cheshire East Council's motion covers two key areas of action:
i) the council's own emissions; and
ii) other emissions that occur within the borough.

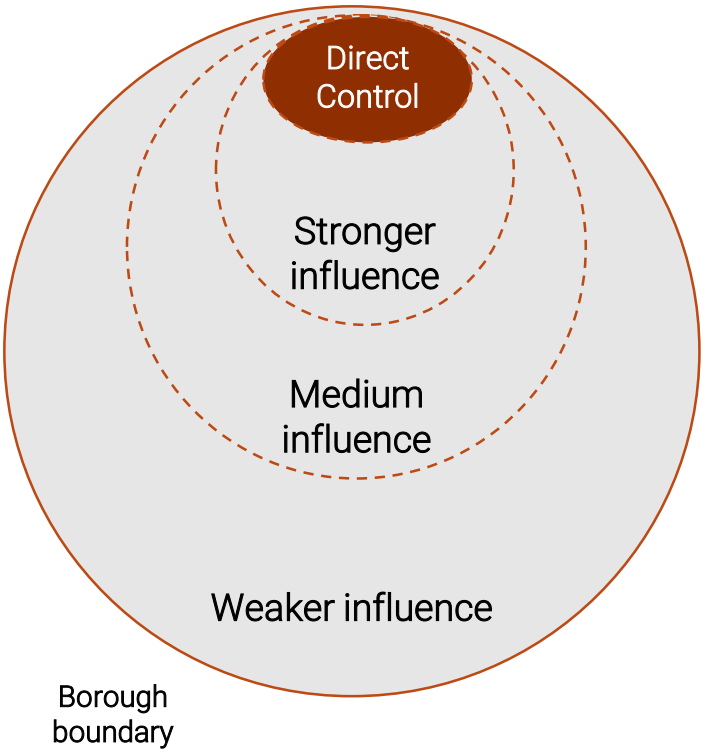
The difference between these two areas is the level of influence the council has over the emissions sources. In theory, CEC has the ability to directly control their own emissions whereas they can influence and encourage reductions in the borough emissions. The Direct Control emissions are the focus of the Council's carbon neutrality commitment by 2025, however, it is important that the Council seeks to minimise emissions in other areas of influence to fulfil its climate change motion and support national and international ambitions.

Therefore, the first stage of this Action Plan is to determine those emissions within direct control of the council. Following this, the level of influence over other emissions has been defined in terms of stronger, medium and weaker influence.

Table 1: Council motion and the associated level of influence.

CEC Motion	Emissions Source
i) Target Cheshire East Council to be carbon neutral by 2025 and asks that details of how to meet this commitment are included in the Environmental Strategy.	Direct Control
ii) Encourage all businesses, residents and organisations in Cheshire East to reduce their carbon footprint by reducing energy consumptions and promoting healthy lifestyles.	Stronger, Medium and Weaker influence

Figure 2: CEC Spheres of influence within the borough



The chart opposite illustrates the varied and complex influence of CEC across the different activities that occur within their own operations and across the borough. This crude comparison made in Figures 2 is intended to facilitate easier comparisons of emissions impact magnitude. These bandings are also not necessarily mutually exclusive of each other.

[Chart is illustrative only and not to scale]

2. Cheshire East Council Influence

Council influence is varied

Influence bandings are based on Anthesis' judgment following discussion with officers, and are by no means definitive. The examples that relate to each banding may highlight opportunities for CEC to apply their influence in areas or ways previously not fully explored (e.g. by using 'convening power' and/or policy), as opposed to representing any form of current statutory duty.

[redacted] influence does extend beyond the borough boundary, whereby their demand (and supply) of goods and services drive emissions in supply chains around the world. Such emissions are also referred to as consumption based emissions[1], or 'Scope 3' emissions. Please note that:

- The borough's consumption based emissions have not been estimated within the scope of this commission, however;
- Procurement related emissions (which would constitute part of the borough's consumption and production based emissions) are all assumed to occur within the Cheshire East borough. In reality, a significant proportion of these emissions will occur outside of the borough, and even outside of the UK.

Table 2: Footprint by influence banding

Influence Banding	Footprint	Description
Direct Control	15 $ktCO_2e$	Emissions sources are directly owned or operationally controlled by the Council. Includes all Scope 1 & 2
Stronger influence	40 $ktCO_2e$	Owners and operators of emissions sources are clearly defined but are not directly owned or operated by the Council. Emissions include specific council procurement activities and school buildings.
Medium influence	155 $ktCO_2e$	Emissions sources do not relate to council owned or operated assets, but relate to residual procurement activities not deemed 'stronger'. This may be larger if influence via 'convening power' were to be included. Note this assumes all procurement emissions occur within the district boundary.
Weaker Influence	2,518 $ktCO_2e$	Owners and operators of emissions sources are not clearly defined, influence limited to lobbying central government or trade associations.

Aligning influence to recognised accounting methodologies

Cheshire East have adopted an operational control approach on the basis that it was felt to better represent their influence (or potential to influence), than other approaches available (i.e. financial or equity share). However, there were certain instances, where the accounting rules didn't offer complete clarity, so some judgement has been applied and documented below.

The Greenhouse Gas Protocol (2019) states that operational control exists where the organisation has the "authority to introduce and implement its operating policies at the operation". If the entity or asset is deemed to fall within CEC's operational control, associated emissions should be accounted for under Scope 1 or 2. If not, it is likely that the source will still be accounted for, but within Scope 3. For example, if council fleet may not been owned, but if held on an operating lease and used exclusively on council terms, it would fall under Scope 1. A financial control approach would account for this in Scope 3. Our presentation of 'influence' (overleaf) further adds to the transparency given by the accounting standards.

92% of CEC related emissions are defined as Scope 3 (142,574tCO_2e), with 3% in Scope 2 (5,115 tCO_2e) and 5% in Scope 1 (7,414 tCO_2e).

Definitions: "Scope 1/2/3" are accounting terms taken from the GHG Protocol accounting standard. Scope 1 emissions primarily relate to natural gas for heating and fuel used by owned or controlled vehicles. Scope 2 relates to purchased electricity, Scope 3 emissions include schools, waste, procurement activities and employee commuting. Commercial estate has not been accounted for within Scope 3 due to limitations in data availability.

1.https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/794557/Consumption_emissions_April19.pdf27

2. Cheshire East Council Influence

The table below provides further detail of the operational control approach that has been applied and the rationale behind the inclusion/exclusion of key entities.

Table 3: Matrix showing level of Council control

Entity	Asset	Entity level		Asset Level		Comments
		Operational Control	Financial Control	Operational Control	Financial Control	
Schools	Buildings	×	×	×	×	With the exception of Academy Trusts (where no influence exists) CEC has some involvement with utility contracts and has some visibility over consumption. However CEC does not have the authority to operate the heating or electricity consumption at Schools. CEC are therefore deemed to have 'stronger influence' only. Schools to be included within Scope 3.
ASDVs	Fleet (Inc. Ansa Waste Collection)	×	✓	✓	✓	All Alternative Service Delivery Vehicles (ASDVs), including waste management organisation, ANSA, are wholly owned by CEC however commission all services via 'arms length' procurement contracts. The use of the Ansa waste collection vehicles is directly influenced by CEC, as is the energy operations of building that Ansa and other ASDVs occupy. Both fleet and the CEC buildings used by ASDVs to be included within Scope 1 & 2.
	CEC Buildings Used (Inc. Environm-ental Hub			✓	✓	
Jacobs	Fleet	×	×	✓	×	Jacobs are a national company with their own policies and operations. Two specific asset categories controlled by Cheshire East are the highways/maintenance fleet, and the building within which the Cheshire East team are based. Both asset categories to be included within Scope 1 & 2
	CEC Building (Delamere House)			✓	✓	

3. Carbon Neutrality

Context

Cheshire East Council passed a motion on 22nd May 2019 that committed the council to becoming **'Carbon Neutral'** by 2025. Additionally the draft Cheshire East Environment Strategy 2019-24 acknowledged Parliament's legally binding **Net Zero** by 2050 target.

No Local Authority (LA) has yet achieved certified Carbon Neutral status. This work seeks to explore what Carbon Neutral and Net Zero could mean and how this might be achieved by Cheshire East Council.

Introducing the term Carbon Neutral

Generally speaking, 'carbon neutral' or 'net zero' typically mean the same thing: that some carbon/GHG emissions remain but are then 'netted off' or 'offset' through carbon dioxide removal. Such removal may occur due to Negative Emissions Technologies (NETs) such as geo-sequestration or biomass energy with carbon capture and storage, or, natural sequestration via means such as afforestation. The boundary of the carbon neutrality target is important as this defines what activities and greenhouse gases are in scope for reduction and/or off-setting, if such a claim is to be made.

For example, the UK's Net Zero by 2050 target includes all Greenhouse Gases emitted by the UK i.e. methane emissions from agriculture are included as well as just carbon dioxide from fossil fuel combustion within the energy system. Consumption based (supply chain) emissions from outside of the UK are not included within this target.

Defining Carbon Neutrality for Cheshire East Council

In order to establish a robust definition of Carbon Neutrality for Cheshire East, a few points have been considered:

i. Likelihood of requiring offsets to achieve the 2025 target – It is highly likely offsets will be required unless radical, unprecedented levels change occur. Some of this change is outside of CEC's control and influence.

ii. The scope and boundary of neutrality – All of Direct Control Scope 1, 2 emissions plus Scope 3 and waste treatment only.

iii. The scope and boundary of offsetting – Local (in-borough) voluntary standards may exist such as the UK's Woodland Carbon Code, however there are none in CE at present and the current nature, extent, cost of offsets needs to be determined.

iv. The cost of offsetting vs other low carbon investments – Very diverse range of cost and 'quality' of offsets, whereby the additionality and permanence of carbon saving may vary.

v. The value that certified 'Carbon Neutral' status offers the public – CEC may wish to define Carbon Neutral in their own way or not use the term at all if attaining such certification requires diverting savings and benefits out of the region.

We have then presented a number of recommendations and options available for Cheshire East. A summary of these is provided below.

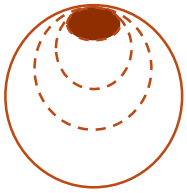
Summary of recommendations

Cheshire East Council should:

- Understand the timing, availability and cost of using accepted, **local** offsets to achieve Carbon Neutral status under PAS 2060 (or equivalent). No previously established options exist.
- If existing, accepted, local offsetting schemes are not available or suitable due to cost and/or emissions impact, then consider forgoing **certified** 'Carbon Neutral' status to avoid financial investment and co-benefits being diverted outside of the borough and/or the UK on international offsetting projects.
- Prioritise investment in the Cheshire East Borough as opposed to investment in Offsetting schemes 'out of borough'. However this does not preclude investment in appropriate offset schemes outside of the borough.
- Develop a standard with other authorities enable more transparent, reliable and consistent reporting of council led actions against such neutrality targets and claims.
- Review 'traditional' certified offsets/carbon neutrality standards again closer to 2025 – the option to go down the international offset and certification route will still remain then, however standards and offset types may have changed during this interim period.

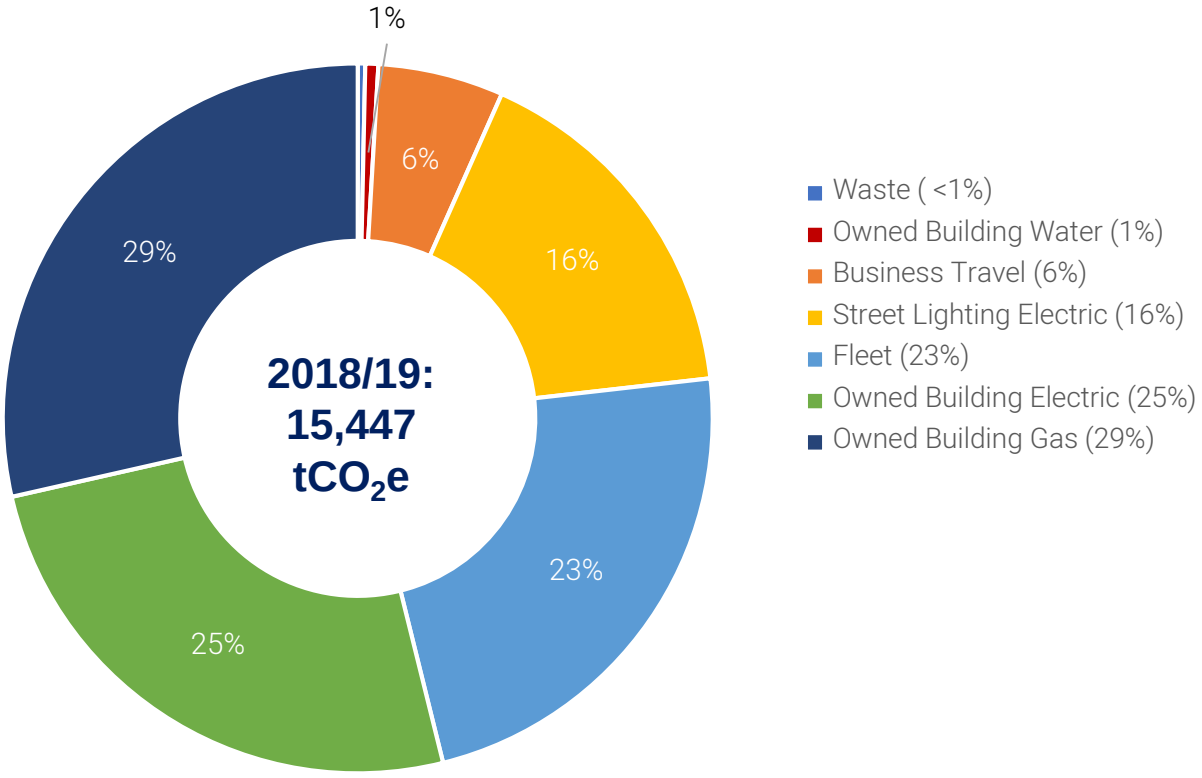
4. Current Emissions Profile and Pathways
CEC Carbon Neutrality (Council Motion part i)

Direct Control



The following chart sets out the direct control footprint of Cheshire East Council 2018-2019. This total is the focus of the 2025 carbon neutral target.
Further details on boundary assumptions and methodologies are included within the Supplementary Annex.

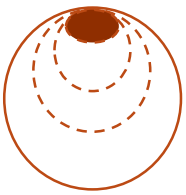
Figure 3: tCO_2e of 'Direct Control' activities only



The elements classed under 'direct control' will relate to the core emission sources that the Council considers 'in scope'. This covers all Scope 1 & 2 emissions (definitions on page 8) sources having applied an operational control boundary. It also includes Scope 3 waste treatment. This would form the basis of any such future 'carbon neutrality' claim that the council is looking to make (see also Section 3).

4. Current Emissions Profile and Pathways
CEC Carbon Neutrality (Council Motion part i)

Direct Control Scenario Analysis to 2050

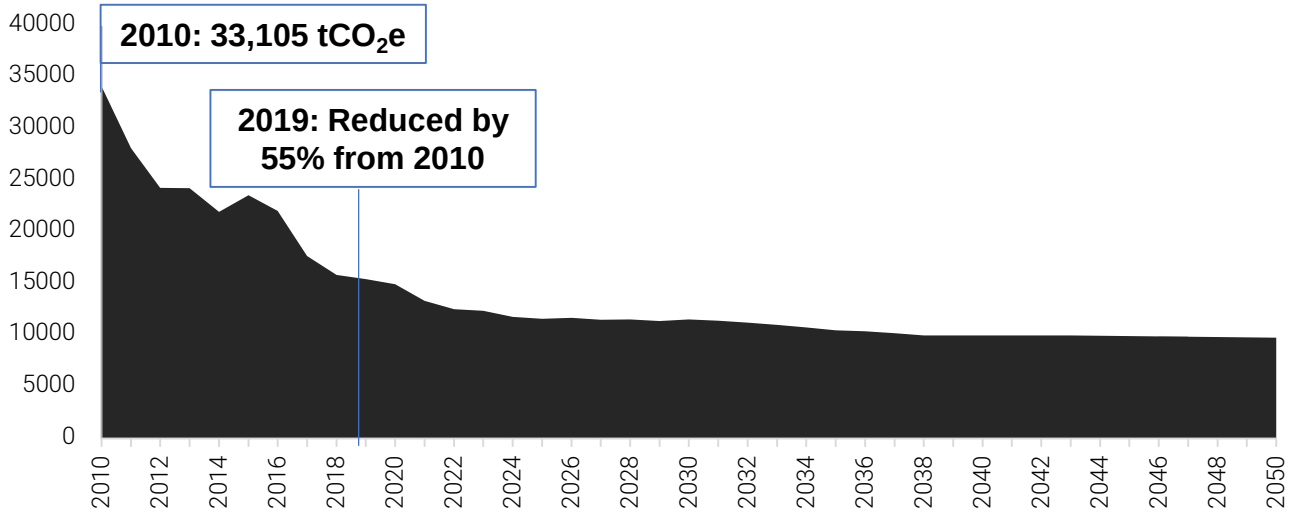


The below analysis shows an emissions scenario for the emissions classified as 'Direct Control'. The only variable changed is the electricity grid carbon intensity. This tracks the BEIS Energy and Emissions Projections.

This analysis shows 2 key things:

- Emissions reductions 2010 to 2019 have benefited from the decarbonisation of the national grid and asset management.
- Significant increases in efficiency and application of demand reduction measures will be required to get anywhere near carbon neutral, without investing a significant amount in carbon offsets (which presents various challenges, as explored in Section 3).

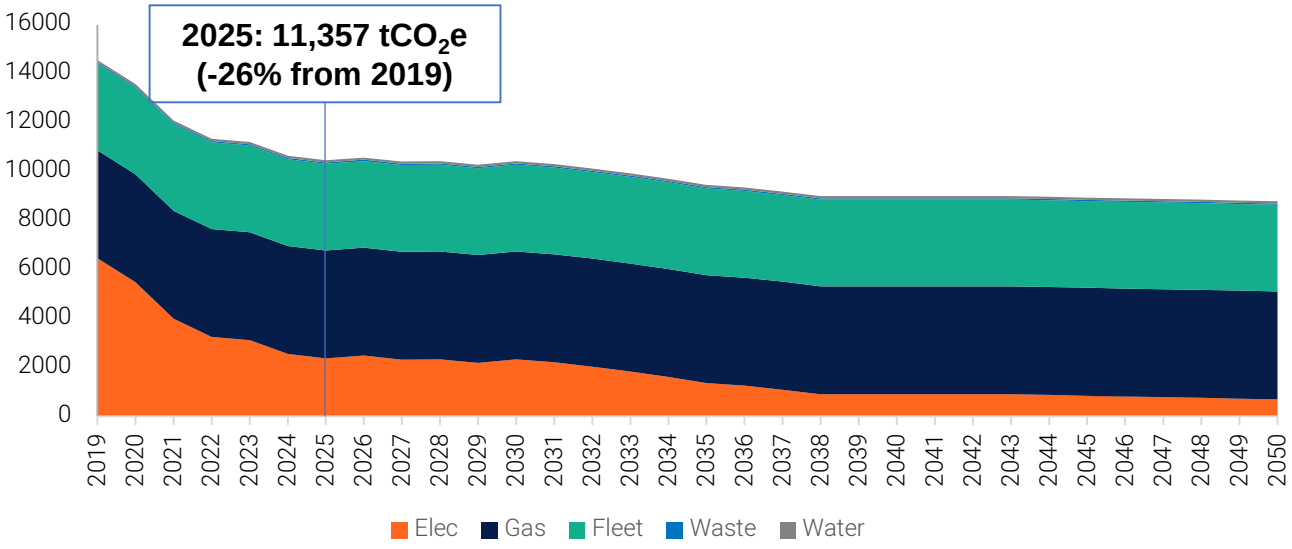
Figure 4: Direct Control CEC Emissions past performance + BAU 2010-2050 (tCO_2e), Waste and Water excluded



Note:

- Pre-2019 emissions may not be comparable like for like due to the completeness, classification or methodological differences.
- Water and waste have been excluded post 2019 (inclusive) to enable greater comparability.

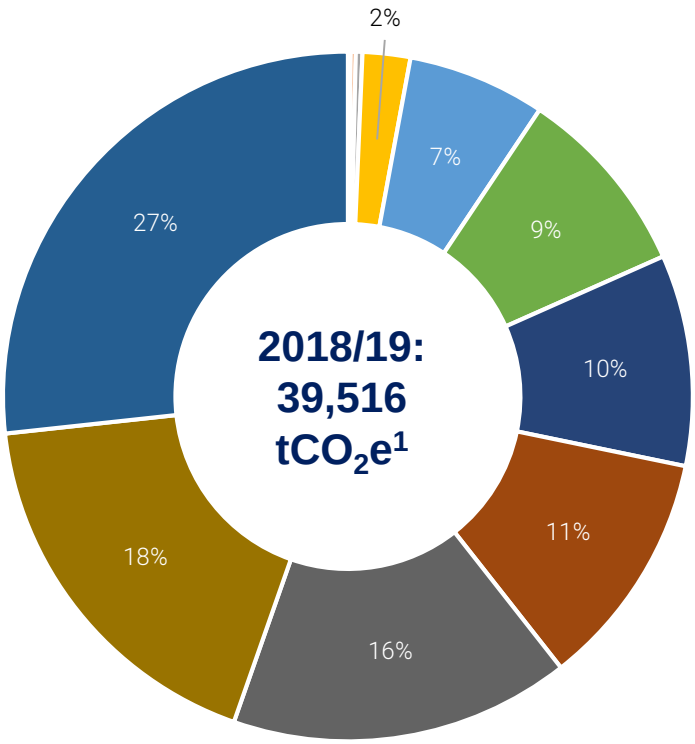
Figure 5: Direct Control 'Business as Usual' (BAU) – All 'Direct Control' categories (tCO_2e)



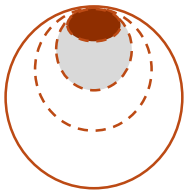
4. Current Emissions Profile and Pathways

Borough-wide action (Council motion part ii)

Figure 6: tCO_2e of 'Stronger Influence' activities only



1- The footprint associated with each sphere of influence is cumulative and so this figure also includes the emissions associated with Direct Control activities.

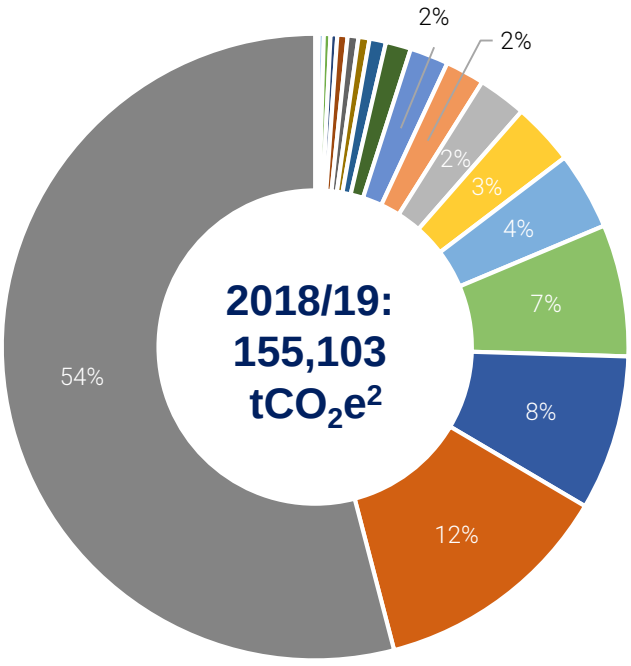


Stronger Influence

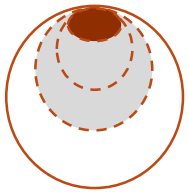
With the exception of Academy Trusts, schools were viewed by the council to be within a stronger influence boundary. CEC have strong relationships in place across the borough. Additionally, council staff commuting was deemed to represent opportunities for stronger influence.

- Waste (<1%)
- Owned Building Water (<1%)
- Schools Water (<1%)
- Business Travel (2%)
- Street Lighting Electric (7%)
- Fleet (9%)
- Owned Building Electric (10%)
- Owned Building Gas (11%)
- Schools Electric (16%)
- Schools Gas (18%)
- Commuting (27%)

Figure 7: Total footprint tCO_2e by Category and Scope



2- The footprint associated with each sphere of influence is cumulative and so this figure also includes the emissions associated with Direct Control and Strong Influence activities.



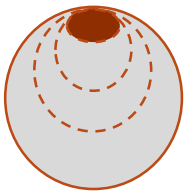
Medium influence

This is the most complete account of the CEC, including all Scope 1, 2 and 3 categories. The vast majority (82%) of the total is made up by procurement spend.

- Fleet (Other) (<1%)
- Waste (<1%)
- Water (<1%)
- Schools Water (<1%)
- Fleet (CEC) (<1%)
- UMS Elec WTT + T&D (<1%)
- Owned Building WTT (Gas) (<1%)
- Owned Building WTT + T&D (Elec) (1%)
- Schools WTT (Gas) (1%)
- Business Travel (1%)
- Schools WTT + T&D (Elec) (1%)
- UMS Electric (1%)
- Owned Building Elec (2%)
- Fleet (ANSA) (2%)
- Owned Building Gas (2%)
- Schools Electric (3%)
- Schools Gas (4%)
- Commuting (7%)
- Procurement (Ansa) (8%)
- Procurement (Jacobs) (12%)
- Procurement (54%)

4. Current Emissions Profile and Pathways
Borough-wide action (Council motion part ii)

Weaker Influence



The council's own emissions represent around 3% of the total borough's emissions. The figure below displays the current district emissions relating to the area administered by Cheshire East Council. It shows the subsector inventory for direct and indirect emissions calculated using SCATTER (excluding agriculture, forestry and land-use).

Note that key authority-level data sets are published 2 years in arrears. Full method available at https://scattercities.com/

Figure 8: Borough wide emissions profile

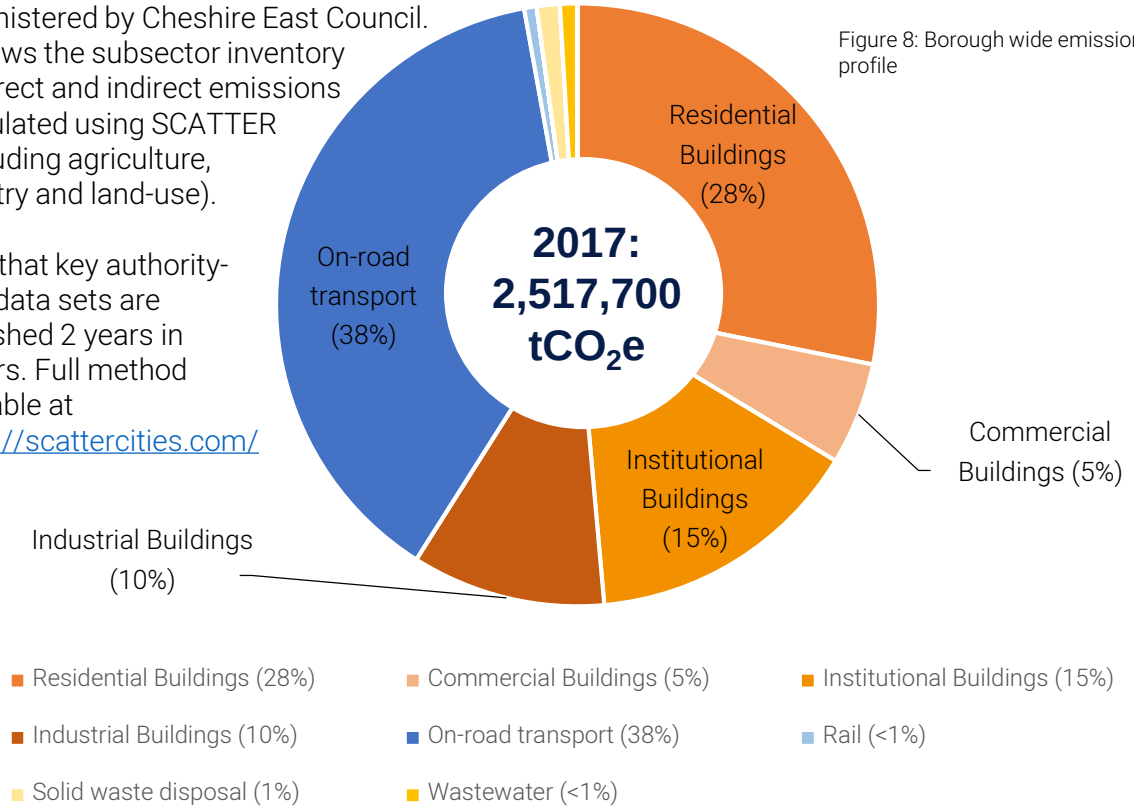
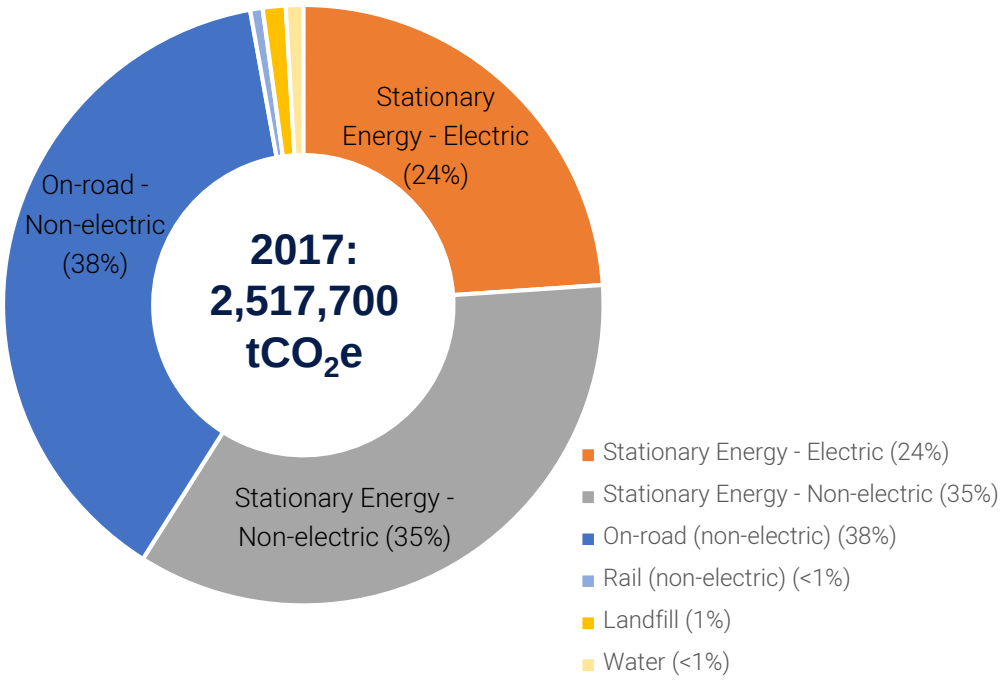


Figure 9: Borough wide electric vs non-electric consumption

The figure opposite shows the proportion of electric vs non-electric energy consumption. Stationary energy describes all emissions arising from buildings.

For a more granular breakdown of the types of 'non-electric' fuel used by each sub-sector, please see the Supplementary Annex Appendices.



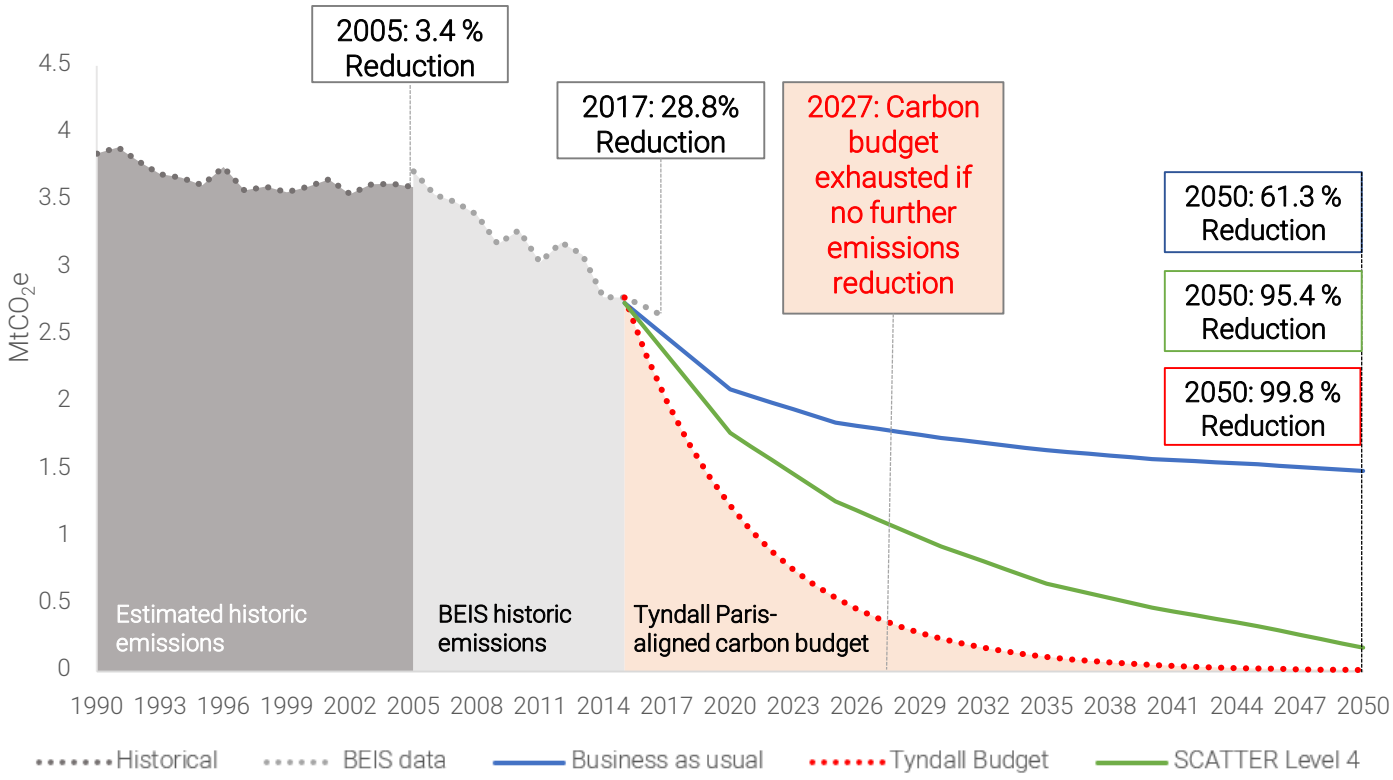
4. Current Emissions Profile and Pathways
Borough-wide action (Council motion part ii)

Borough-wide Emissions Future Pathways

The graph below shows two possible future emissions pathways up to 2050, as modelled by the SCATTER pathways tool.[1]

- **Business as usual (BAU)** assumes minimal action beyond current, national policy (where sufficiently defined by sector or measure) and nationally led decarbonisation of the electricity grid. This still requires a significant level of effort locally.
- **Science based budget** is based on climate science rather than tangible energy supply and demand measures used in SCATTER. This pathway is one way of allocating a finite carbon budget (the area underneath). Alternatively the same budget would last 7 years at current emission levels. This is beyond the current, statutory duties of local councils. Please refer to the work performed by the Tyndall Centre for Climate Change Research for further details.

Figure 10: Borough-wide emissions scenarios to 1990 to 2050



An estimation of CE emissions from 1990-2005, along with the BEIS local authority emissions data 2005-2017, shows that the emissions reductions will have to increase at a greater rate compared to that previously seen, if they are to get anywhere near the science based budget.

1 - For full SCATTER method and description see Section 3 in the Supplementary Annex,

5. The Action Plan
Introducing the actions

Given the varying influence of CEC across council and borough wide emissions, the type of action must be tailored to the level of influence. As a result, the Action Plan is formatted to firstly address topics directly under the council's control and then expands the scope to address areas of medium and weaker influence in the borough. Some actions relate to the 2025 target whereas others relate to the broader borough-wide ambition

More

Council Influence

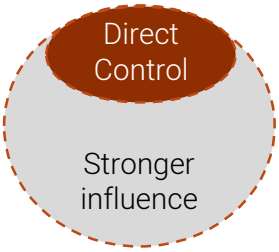
Less

1. Behaviour Change and Internal Policy

Actions that focus on internal policy, culture and behaviour of the council. Changes in this category are generally the least financially intensive and therefore represent 'quick-wins'. It is also important to drive actions in this area as an enabler and stimulus of further action in the wider borough.

2. Energy Demand Reduction

Focused on council operations and assets (e.g. council buildings, fleet), but unlike the above, relates to more tangible, capital investment related actions that the council can take to use less energy and fuel, and improve efficiency.

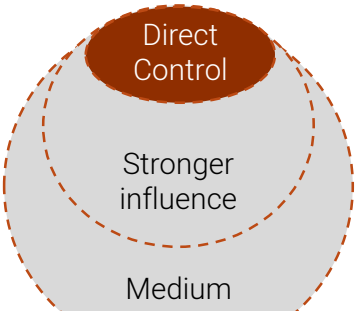


3. Increase Low Carbon Energy Supply

Alongside a reduction in energy demand, it is necessary to improve the supply of energy by using renewable sources. This includes both a council and borough-wide focus for action, as measures will commonly deliver benefits at scale that can provide opportunity for stakeholders beyond just the council.

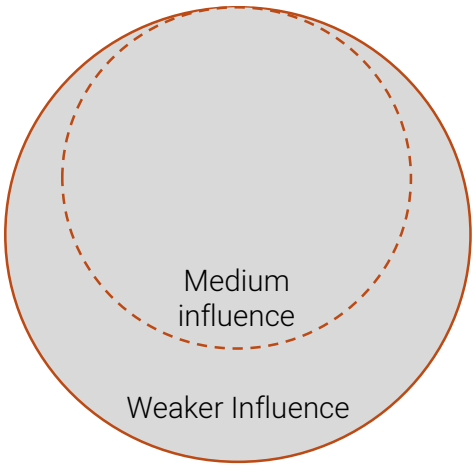
4. Natural Capital

Similar to energy supply – the council has the opportunity to progress action both on its own land estate and within the borough more widely. Both warrant consideration in the Action Plan.



5. Reduce Borough-wide Emissions/External Policy

Although these emissions may be under the least influence from the council, in-borough emissions must also reach net zero to keep the UK on track with the national target. The council's role becomes one of a partner or facilitator amongst the community and local businesses.



5. The Action Plan
Structure of the Action Plan

Action and Target
An overall action for what the council need to achieve and specific target have been included. This is based on reductions achieved elsewhere in the UK or using the SCATTER pathways tool (see Supplementary Annex).

Measures
This outlines the method for 'how' each action can be achieved

Estimated Costs
Indicative potential costs of each measure have been provided where possible. Due to limitations of budget and scope, this is not comprehensive cost analysis but provides an indication of relevant financial costs based on publicly available data. As such, we advise:

- Associated assumptions are reviewed and fully understood by the Council
- No reliance by the council (or any other party) should be placed on these figures due to the inherent limitations in assumptions – these are simply intended to help inform relative priority of actions and how more robust estimates could be performed.

Implementation
This outlines the first next steps to be taken for each measure and the council stakeholders needed to deliver them.

Benefits
An estimation of the magnitude of carbon savings that could be achieved by the action is included. Note this is an indication that should only be used to provide an idea of the scale of savings. It does not directly correspond to the achievement of the overall target. Potential co-benefits of the measures are also listed. Similar to Estimated Costs:

- Associated assumptions are reviewed and fully understood by the Council
- No reliance by the council (or any other party) should be placed on these figures due to the inherent limitations in assumptions – these are simply intended to help inform relative priority of actions and how more robust estimates could be performed.

Monitoring indicators
This outlines how the council may review and track performance against each suggested action. The indicators should be interpreted as what should be achieved during the initial phase of delivery. A specific time-frame for the indicator has not been provided and should be confirmed by CEC on an action-by-action basis.

Scope
The council-led actions and measures are not limited to those in the table and CE should continually look for further ways to reduce emissions as new practices and innovative solutions emerge.

Topic 1: Behaviour Change and Internal Policy

1. Behaviour Change and Internal Policy

Action 1.1: Increase engagement and awareness of staff			
Target: All staff will be carbon literate and have a carbon-related goal formalised into the appraisal process, leading to a reduction in energy consumption and waste.			
Initial Measure	Estimated Cost	Implementation	Benefits
a. Design a new communication campaign, different to previous approaches, to inform people of the facts/urgency of the situation and motivate staff to proactively act and support activities.	£5,000 per annum (within existing budgets).[1]	Promote previous successes and 'champions' who have made positive changes or who have learnt from mistakes Review the previous communication strategy and design a campaign that takes a new, refreshed approach Ensure all members of staff and departments are involved and emphasise the need for involvement from everyone. Lead Authority: Communications	Carbon Literate citizens have typical realised carbon savings of 5-15% per person.[3] Raising awareness amongst staff of energy efficiency measures at Islington borough council saved 196 tCO_2 per year.[4] Staff can take lessons learnt beyond the office and into their communities. Staff may be more likely to support more ambitious policies to reduce carbon.
b. Training for all relevant staff to become certified as carbon literate and understand climate impacts on their services.	Less than £5,000 for training and certification.[2]	Decide whether to run training externally or internally. Prioritise training of senior management team. Deliver a training session to all members of staff. Embed carbon literacy training into new starter process. Lead Authority: Communications	
Monitoring indicators • Staff feedback on campaign (embed a hit counter, or include some sort of 'sign up' or 'pledge to support' response) • Maintain a log of staff that have received carbon literacy training			

Case study: HOME Manchester [5]

The arts and cultural venue is recognised as a platinum carbon literate organisation. 100% of staff are trained in carbon literacy and all new starters are trained within 6 months of joining.

1. Behaviour Change and Internal Policy

Action 1.2: Incorporate carbon impact into decision making and procurement.			
Target: Demonstrate that the carbon neutral ambition has been considered in every major investment and policy decision.[6]			
Initial Measure	Estimated Cost	Implementation	Benefits
a. Allocation of carbon budgets to each department enable periodic comparison of performance	£10,000 (Within existing budgets).[1]	Calculate total carbon budget for council per year using Tyndall carbon budget tool.[8] Develop framework for designating budgets per department or project based on previous year emissions contribution. Lead Authority: Finance	Along with preventing emissions increases, Cheshire East Council estimate that identifying carbon impacts/benefits in decisions may achieve a 2% reduction in emissions per annum, which is equivalent to 1,500 tCO_2e.[7] Staff may be more likely to support more ambitious policies and investment decisions to reduce carbon. Reduces the risk that lower carbon attributes are 'value engineered' out solely on cost, if carbon is more formally embedded within appraisal criteria. For example, the absence of a robust carbon assessment criteria led to the value engineering out of low carbon investment (EV charging) at Tatton Park.
b. Introduce carbon pricing or more rigorous carbon consideration into capital investment decisions	£20,000 cost to develop and then an additional £5,000 per annum.[3]	Review current investment appraisal processes, and identify where better 'carbon impact' control could be introduced. Review best practice from other councils or organisations in the field of carbon pricing. Lead Authority: Finance	
c. On a rolling basis pass all policies being reviewed through the Carbon Neutral Team to ensure that they include measures and aspirations for carbon reduction.	£84,000 for additional staff within business case.[1]	Designate members that to provide carbon neutral scrutiny. Establish a monitoring framework to be put in place, including mid programme reviews. Lead Authority: Environment Team	
d. Develop a full carbon trajectory for borough-wide emissions.	£20,000 consultancy costs.[1]	Develop a strategy for 'carbon neutrality' for the borough based on SCATTER tool projections (See Supplementary Annex for the borough-wide carbon budget). Lead Authority: Environment Team	

Case Study: Stockport Borough Council.[9]

The council are currently undertaking work on developing a mechanism for incorporating carbon pricing into financial appraisals.

1. Behaviour Change and Internal Policy

Action 1.2: Incorporate carbon impact into decision making and procurement			
Target: Demonstrate that the carbon neutral ambition has been considered in every major investment and policy decision.[1]			
Initial Measure	Estimated Cost	Implementation	Benefits
d. Change in Procurement Policy to incorporate carbon neutral consideration including through social value and increased weighting.	Within existing budgets.[1]	Review current policy and use of social value section Define the carbon performance indicators to be included and how they will be assessed Lead Authority: Procurement.	It is estimated that a 5% reduction in emissions from procurement could save 5,779 tCO_2e over a fiscal year.[10]
e. Work with all commissioned services and major procurements to ensure they have carbon reduction policies and procedures in place.	Within business case.[1]	Continue work to establish baseline of top 50 suppliers. Develop criteria and guidance for service providers and major procurements. Lead Authority: Environment Team	Opportunity to influence suppliers and contractors to reduce their emissions.
f. Continue to explore divesting from fossil fuel investments in the council pension fund.	Within existing resources`	Currently awaiting a revised draft of the Cheshire Pension Fund's Responsible Investment Policy. Lead Authority: Environment Team	Not possible to estimate carbon savings without current data. Opportunity to look at wider environmental, social and governance criteria. Risk management: avoids 'stranded asset' risk to portfolio values from climate change.

Monitoring indicators:

- Confirm if carbon budgets have been allocated & whether effective
- Confirm if carbon pricing or more rigorous carbon considerations are embedded in investment decision making process.
- Confirm carbon budget and target for borough-wide emissions.
- Review all new policies to understand if carbon aspirations were included
- Confirm if the carbon/environmental elements within scoring and social value assessment have been updated.
- Confirm the process of reviewing pension investments has begun.

Case study: Metropolitan City of Rome Capital.[11]

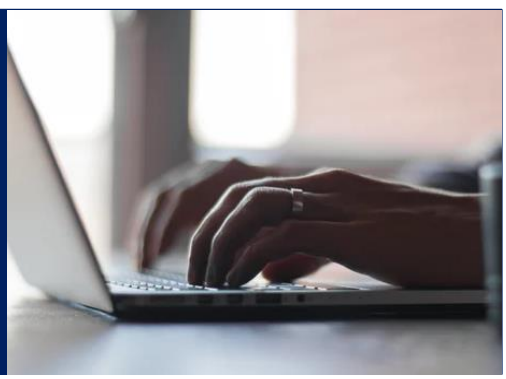
The inclusion of green criteria in procurement resulted in a saving of 749 tCO_2 from 2011-2014. They have now integrated the monitoring system with accounting systems.

1. Behaviour Change and Internal Policy

Action 1.3: Reducing emissions from business travel.			
Target: Travel reduced by 17% in 2025 relative to 2015 levels.[12]			
Initial Measure	Estimated Cost	Implementation	Benefits
a. Invest in better communications technology to promote more remote meetings	Technology costings:[13] Software licence: Under £50 per user per month.[14] Headphones: approximately £20-£30.[15] Spider phone: £90.[16] TBC nominal costs of £100,000 allocated.[1]	Assess type and quantity of IT packages and equipment required. Aiming for every member of staff and meeting room to be better equipped. Produce full order costings, install packages, buy equipment and distribute. Lead Authority: IT	It is estimated that the IT-enabled carbon abatement potential of e-work in the UK is 12 $MtCO_2$ by 2030. This is equivalent to reducing the UK's current carbon emissions by 2.36% in 2030.[17] Applying this reduction to the CE fleet would equal 20.8 tCO_2 per year.[18] Lower fuel costs and greater productivity. e.g. reducing the mileage of a driver covering 12,000 business miles a year by 10% would save around £150 on fuel costs and release around 30 hours for productive work.[19]
b. Provide training in use of technology to ensure maximum use	Time cost for staff attending half a day of training	Identify key knowledge and understanding gaps by consulting staff. Design comprehensive training session for all abilities. Run training for every member of staff. Lead Authority: IT	
c. Produce a business travel plan and framework	£50,000 budget for travel co-ordination officer and promotion per year.[1]	Review the current distances travelled for meetings Produce a document outlining policies for business travel and a decision flow chart for business travel Lead Authority: Highways	

Case study: PwC [20]

PwC reduced their emissions from business travel by 4% from 2007 to 2017. This included reducing unnecessary journeys by encouraging the use of technology e.g. in 2012 they launched a campaign to increase online meetings and trained over 5000 staff.[8]



1. Behaviour Change and Internal Policy

Action 1.3: Reducing emissions from business travel

Target: Travel reduced by 17% in 2025 relative to 2015 levels.[12]

Initial Measure	Estimated Cost	Implementation	Benefits
d. Driver training: Equip any drivers of council vehicles with the necessary knowledge to more appropriately plan journeys in order to minimise disruption and maximise carbon saving.	The Energy Saving Trust currently offer subsidised driver training programmes.[21] If data is not available, then investment in telematics may be required to monitor mileage. One telematics platform Appy Fleet estimates £48 per vehicle (based on £4 per driver, per month)[22]	Introduce a fleet management system and telematics to monitor pool car usage and mileage. Establish who should benefit from driver training and organise training sessions. Lead Authority: Facilities.	If CE were to achieve a similar reduction in mileage to West Yorkshire Police (2.6 million miles over 4 years), it could save approximately 565 tCO_2e.[23] Directly supports the Air Quality Action Plan and helps to deliver the associated health benefits. Encourages safer driving practices. Research suggests that the introduction of a mileage management system produces a saving of £281 per driver.[24]

Monitoring indicators:

- Report capital investment in communication technology, and compare against the prior year(s).
- Record any specialist training sessions that take place.
- Confirm if a business travel plan and framework as been produced
- Confirm if investment has been made in telematics technology and report any associated trends (i.e. diversity in carbon intense vs low carbon driving behaviour).

Case study: West Yorkshire Police [25]

West Yorkshire Police introduced telematics into 700 operational vehicles which led to the defleeting of 120 vehicles. This reduced the total mileage between 2012/13 and 2016/17 by 2.6 million miles.

Case Study: Oxford City Council [26]

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

1. Behaviour Change and Internal Policy

Action 1.4: Reduce staff commutes			
Target: Travel reduced by 17% in 2025 relative to 2015 levels.[12]			
Initial Measure	Estimated Cost	Implementation	Benefits
a. Update HR policy to encourage working from home	Within existing budgets.[1]	Assess the suitability of each department for staff to increase home working. Develop a policy to encourage home working where possible. Publicise option for home working. Lead Authority: HR	By working from home two days a week for a year, an average UK employee can save 390 $kgCO_2e$. It is estimated that if 10% of council staff worked from home it could save 199 tCO_2e.[27] This could save the average UK employee 50 hours commuting time and £450 including travel costs. It could also reduce energy and water consumption in council offices.[27]
b. Provide training in use of technology to enable remote working	Within existing budgets.[1]	Provide training to all departments suitable for home working and emphasise benefits. Lead Authority: IT	
Monitoring indicators: • Confirm if any updates to HR policy in respect of low-carbon, flexible homeworking have been made • Record any specialist training sessions that take place.			

Case Study: BT [27] [28]

A roll-out of homeworking at BT saved 14 $ktCO_2e$ over a period of 12 months. This equates to approximately 2% of emissions.

1. Behaviour Change and Internal Policy

Action 1.5: Reduce emissions from staff commuting by encouraging alternative transport and green vehicles			
Target: Less than 62% of staff commuting is by car.[29] 64% of cars are EV, PHEV or FCV.[30]			
Initial Measure	Estimated Cost	Implementation	Benefits
a. Conduct a review of current staff travel to establish a baseline	Within current budgets.[1]	Produce a staff survey on commuting, including information of barriers to more sustainable transport. Present results showing baseline, comparison with national statistics and areas for improvement. Produce a plan on how to address key barriers. Conduct a follow up survey Lead Authority: Highways	Potential carbon savings: not possible to quantify. Potential to improve staff engagement and awareness. Directly supports the Air Quality Action Plan and helps to deliver the associated health benefits.
b. Develop communications programme to encourage alternative transport	Within Travel Co-ordinator budget.[1]	Using results from staff survey to Identify areas for improvements. Develop a sustainable travel plan. Provide guidance documents on alternative transport options. Lead Authority: Highways	

Case Study: Lancaster University [31]

Lancaster University implemented a travel plan in 2005, achievements include a 24% reduction in carbon emissions from staff and student commuting and the proportion of staff commuting by car alone has reduced from 58% to 43%. Initiatives included a smartphone app for buses and dedicated parking facilities for bicycles across the campus.

1. Behaviour Change and Internal Policy

Action 1.5: Reduce emissions from staff commuting by encouraging alternative transport and green vehicles			
Target: Less than 62% of staff commuting is by car.[29] 64% of cars are EV, PHEV or FCV.[30]			
Initial Measure	Estimated Cost	Implementation	Benefits
c. Further promote cycling incentives, including cycle to work scheme and cycle mileage.	Administrative time plus £10,000 marketing and promotion budget.[1] Actual savings for staff are borne out of tax benefits, not gifted by the Council.	Liaise with HR, Finance and other relevant departments to further promote a Cycle to Work scheme and then publicise to staff. Lead Authority: Highways	If 9% of staff commute a 5 mile journey by bike instead of car it could save around 65 tCO_2.[33] Directly supports the Air Quality Action Plan and helps to deliver the associated health benefits. Increasing cycling also has health benefits. Cycling 5 miles to work burns, on average, over 2,000 calories in a week.[34]
d. Develop a programme to incentivise staff who drive low emission vehicles	TBC nominal cost of £5,000 allocated.[2] Dependent on chosen incentive.[32]	Assess potential incentives to provide for those who invest in lower emission cars. Promote amongst staff and assess impact and uptake of project. Lead Authority: Highways/HR	Potential carbon saving of 2,617 tCO_2 per year if 64% staff drive electric vehicles.[35] Directly supports the Air Quality Action Plan and helps to deliver the associated health benefits.
Monitoring indicators • Confirm if travel survey has taken place • Confirm if communications campaign includes any transport specific programme • Monitor uptake of Cycle to Work scheme updates via HR • Confirm if any new incentives have been introduced.			

1. Behaviour Change and Internal Policy – Sources

1.1

1 – Based on Cheshire East Council estimates as documented within the internal document "Action Plan" 24/12/2019. Such information has not been subject to Anthesis' review or verification.
2 – Based on email correspondence with the Carbon Literacy Project (05/12/19). Estimate includes cost for training and certification: £10 per applicant certification and £500-£750 for criteria checking. Option 1: Hire consultant for approximately £600/day to deliver training. Option 2: Cheshire East deliver training. Carbon Literacy Project are in the process of developing a Local Authorities toolkit to help with the design of training.
3 – The Carbon Literacy Project allows citizens to acquire the knowledge and skills to lower their carbon footprint, with typical realised carbon savings of 5-15% per person (Jacobs 2018).
4 – Case Study Islington Borough Council
5 – HOME Manchester

1.2

6– Option for council to determine what constitutes a major investment or policy decision.
7 – Based on Cheshire East Council estimates as documented within the internal document "191122 CEC Carbon Neutrality Projects 22/11/2019". Such information has not been subject to Anthesis' review or verification.
8 –Tyndall Carbon Budget is based on translating the "well below 2°C and pursuing 1.5°C" global target and equity principles in the Paris Agreement to a national carbon budget which is then split between sub-national areas.
9 – Based on current Anthesis project with Stockport Council. Contact details for Stockport officers leading this project available upon request.
10 – Method in Supplementary Annex. Note that 5% is arbitrary and intended as indicative only, rather than a suggested target.
11 – European Sustainable Procurement Network: Developing a monitoring system for GPP in Rome

1.3

12– Based on SCATTER Level 4 pathway for the wider borough (as council want to be exemplar). SCATTER estimates in 2025 that travel demand should have reduced by 17% from 2015 levels (See Supplementary Annex).
13 – TBC by CEC nominal costs allocated:
14 – Based on Anthesis' own commercial experiences with Microsoft Office 365 (includes, user licences, conferencing features, PSTN/DID)
15 – Based on Amazon search for Plantronics audio headset
16 – Based on Jabra Speak model
17 – In the absence of data on the breakdown of CEC business travel, National level predictions have been used to estimate the magnitude of savings. The Role of ICT in Reducing Carbon Emissions in the UK estimates that ICT-enabled carbon abatement could help to shrink the UK's identified emissions gap of 187 Mt CO_2e by 121.7 Mt CO_2e. This 122 Mt CO_2e reduction is equivalent to reducing the UK's current carbon emissions by 24% in 2030. It is estimated that the IT-enabled carbon abatement potential of e-work in the UK is 12 MtCO2 by 2030.
So 122MT=24% reduction. E-working is 9.83% of the 122MT reduction. This means that e-working is responsible for a 2.36% reduction in UK emissions.
18 – Previous estimate applied to the estimated emissions from CEC fleet (for method see Supplementary Annex). 2.36% of 884 tCO2.
19 – Energy Saving Trust Manage Mileage Information on typical business miles from staff not available at time of writing, therefore the number of miles is not scaled to CE.
20 – PwC Case Study We acknowledge that PwC are a very different organisation and this case study is not intended to provide a direct estimate of savings for CEC.
21– Subsidised Eco driving Training
22 – Appy Fleet When estimating total carbon savings, Appy Fleet uses £48 per vehicle per year from the savings (£4 per driver, per month) Data on number of vehicles and typical mileage not available at the time of writing.
23 – In the absence of data on the breakdown of CEC business travel and fleet management data, savings are based on West Yorkshire Police Case Study: reduction of 4,184,294 km over 4 years, emissions factor for a petrol car taken from Ashden: 0.135 kgCO_2e/km, giving 0.14 ktCO_2e p.a. This aims to show the emissions savings associated with a distance reduction. CEC should determine the potential distance for business travel to be reduced.
24 – Energy Saving Trust: Mileage management guide Vertivia analysis looked at the trends in recorded mileage following the implementation of mileage management system.
25 – West Yorkshire Police Case Study
26 – Oxford City Council Case Study

1.4

27– Carbon Trust: Carbon savings estimated from: modelling based on DECC/Defra emission factors and travel survey data.
Reduction in emissions per person assumes the total emissions per person in the UK are approximately 10 tCO_2e p.a.. Assumption based on 10% of staff working from home (c. 408), who each save 390 kgCO_2e per year. Note 10% is arbitrary and intended as indicative only, rather than a suggested target.
It is also important to consider the carbon usage of an employee working from home. This is mainly dependent on the level of heating required, however there is limited evidence on the change in energy consumption of home workers. The effectiveness is also dependent on the avoided emissions associated with each commute e.g. distance, vehicle, number of passengers, age of vehicle, however this data is not available for CEC. Using averages from the Carbon Trust, a commuter would have to travel 4 miles to work (one-way) to balance the average increase in home energy consumption 180 kg CO_2e. The CEC staff survey of commuting suggests that over 60% of staff commutes are over 5 miles.
28 – BT Carbon emissions statement 2012. Using the most recent available data, the 2008 estimate of BT's total footprint is used to provide a % change: 14 ktCO_2/687 ktCO_2

1. Behaviour Change and Internal Policy – Sources

1.5
29 – Based on SCATTER Level 4 pathways tool (See Supplementary Annex)- there will be a modal shift away from cars- Using the value for 2050 as staff survey suggests the council are almost at the 2025 level.
30 – Based on SCATTER Level 4 pathways tool (See Supplementary Annex)- 64% of cars are EV, PHEV or FCV.
31 – Lancaster University Travel Plan

1.6
32 – TBC by CEC, nominal cost allocated. Dependent on chosen incentive provided e.g. car parking space.
33 – Based on SCATTER Level 4 pathway where 9% of journeys should be by bike (See Supplementary Annex). 4,082 staff so 367 should cycle. The most common journey distance at the council was 5-10 miles. Taking the lower distance- cycling 5 miles instead of driving saving 178 $kgCO_2$ per year per person according to Cyclescheme 178 * 367 = 97,989$kgCO_2$.
34 – Cycling Calorie & CO_2 Calculator: Calories burned per week calculated in line with the Harvard University study and are based on a 155lb person cycling at a pace of 12-13.9 kmph.
35 – Emissions from 2019 staff commute non-sharing cars was estimated to be 7,745 tCO_2 (see Supplementary Annex). In line with SCATTER predictions for the wider borough on the percentage of EV, PHEV or FCV needed: 64% of which 80% are electric. Each switch to electric vehicles saves approximately 66% of emissions.

Topic 2: Energy Demand Reduction

2. Energy Demand Reduction

Action 2.1: Reduce emissions from council fleet by switching to low-emission vehicles			
Target: 100% of van and car fleet electrified by 2025 and 15% reduction in emissions from HGV fleet by 2025.[1]			
Initial Measure	Estimated Cost	Implementation	Benefits
a. Review and update fleet management plan: Specify that for certain categories of vehicle, only Ultra-Low-Emission Vehicles (ULEV) are permitted	The Energy Saving Trust offer a free Ultra-Low Emissions Vehicle review.[2] Strategy development: £25,000 plus £5,000 per annum.[3]	Conduct a review of a vehicles in council fleet. Assess the vehicles suitable for a switch to ULEVs. Update policy to include ULEV and electric vehicles as the default and define the criteria for non-compliance. Lead Authority: Environment Team	If 100% of CEC fleet transitioned to electric it could save 261 tCO_2e per annum. Note that savings will increase as grid electricity becomes lower carbon.[8] Directly supports the Air Quality Action Plan and helps to deliver the associated health benefits. Case study: Leeds City Council.
b. Review opportunities for the installation of EV charging points	Included in role of travel co-ordination officer (accounted for elsewhere). £50,000 capital allocation.[3]	Strategic plan of the installation of new charging points in line with fleet changes. Lead Authority: Facilities Management	
c. Allocation of funding (capital or operational) for investment in low emission vehicles and implementation of more EV charging points	EV: One estimate suggests a cost of £4.6m per annum.[4] However, other sources indicate a lower whole life costing for EVs e.g. Comparing an EV and ICE pool car over 5 years saves around £3,300. Comparing an EV and ICE van over 3 years saves around £3,100.[5] Electric charging points: Private: 50kW charging point: £17,000-£33,000.[6] Residential: £2,500 per charge point (in line with funding available for residential charging points)[7] Nominal cost allocated: £100,000 per annum.[3]	Allocate funding in the next annual budget. Trial sample vehicles in the next procurement cycle. Lead Authority: Facilities Management	

2. Energy Demand Reduction

Action 2.1: Reduce emissions from council fleet by switching to low-emission vehicles

Target: 100% of van and car fleet electrified by 2025 and 15% reduction in emissions from HGV fleet by 2025.[1]

Initial Measure	Estimated Cost	Implementation	Benefits
d. Introduce hydrogen into the HGV fleet, including a demonstration for the Refuse Collection Vehicles (RCV's).	Within existing budgets:[3] £50,000 cost for conversion of an RCV with potential savings of £15,000 per annum.[9]	Cledford Lane project: Deliver the Local Enterprise Grant to demonstrate two RCV's and associated hydrogen generation and storage. Record data to analyse success and opportunity for further roll-out. Lead Authority: Environment Team with ANSA and StorEngy.	Cledford Lane project could save 26 tCO_2 over 2 year project.[10] Potential 5,982 tCO_2 savings over 7 year replacement cycle from introducing low emission vehicles into fleet.[10] Directly supports the Air Quality Action Plan and helps to deliver the associated health benefits. Case Study: Glasgow City Council
e. Implement strategic plan to introduce low emission vehicles into the fleet (including waste and highways).	£1,800,000 total capital expenditure. But potential annual savings of £420,000.[10] TBC nominal cost of £100,000 per annum allocated.[3]	Review Hydrogen RCV trial success. Assess the potential for further improvements in efficiency and the application of CNG and Electric Vehicles. Explore the potential of trialling other alternative fuels. Lead Authority: Environment Team	

Monitoring indicators

- Confirm if the asset management plan has been updated and includes ULEV investment
- Confirm if EV charging point assessment has taken place
- Confirm if additional sources of finance for EV investment have been secured
- Confirm if RCV Hydrogen pilot is being successfully delivered and strategic plan to expand developed.

Case study: Leeds City Council [11]

Leeds City Council have 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.

Case study: Glasgow City Council [12]

Glasgow City Council are aiming for all of their fleet vehicles to be emission free by 2029. This includes the conversion of 23 gritters to dual fuel hydrogen.

2. Energy Demand Reduction

Action 2.2: Reduce emissions from council fleet by introducing low emission pool cars and pool bikes.

Target: All pool cars are 100% electric by 2025 and 6% of business travel should be by active transport in 2025.[13]

Initial Measure	Estimated Cost	Implementation	Benefits
a. Strategic assessment of current fleet to operate optimal number of pool cars	Energy Saving Trust offer free green fleet reviews.[14] Strategy development cost of £55,000.[3]	Conduct fleet review and establish a number of pool cars to procure. Assess the options for the storage, operation and management of pool cars. Research other council's or similar institutions' approach to pool car management. Lead Authority: Facilities Management	Employee owned vehicles are typically older. 50 company cars travelling 2,000 miles a year would save around 4 tCO_2. (Not including savings for low emission vehicle).[16]
b. Provision of Cheshire East pool bikes and bike library.	Feasibility assessment and an engagement campaign at £10,000-£20,000 depending on scale.[15] £5,000 for bike library (within current budgets).[3]	Assess the level of demand for pool bikes and enquire about the potential costs of buying pool bikes. Develop platform for hire or checking out pool bikes. Lead Authority: Environment Team	Cycling 6 miles instead of driving saves 214 $kgCO_2$ per year per person.[17] Directly supports the Air Quality Action Plan and helps to deliver the associated health benefits. Increasing cycling also provides health benefits for staff.
c. Communication plan to encourage usage of pool cars and bikes amongst staff	Within existing budgets.[3]	Establish relevant staff to share communications with Plan a communication campaign and implement Lead Authority: Communications	

Monitoring indicators:

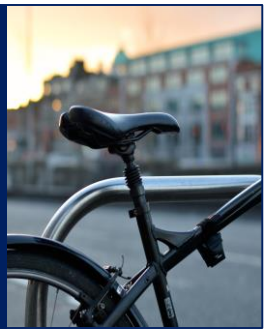
- Confirm if a strategic assessment of current fleet/pool car operation has been performed
- Confirm if feasibility study and/or investment into pool bikes has occurred
- Confirm if communications campaign includes any transport specific programme (including pool cars)

Case study: West Yorkshire Police [18]

West Yorkshire Police introduced 6 low emission pool cars, which saved them over £34,000 on private mileage claims in the first year.

Case Study: PwC [19]

Alongside their cycle to work scheme, PwC have been delivering improvements to buildings including double tier bike racks, extra showers, lockers and a bike repair station. The scheme has had over 2000 participants since it was introduced. They have also launched a scheme which allows staff to borrow Brompton bikes.



2. Energy Demand Reduction

Action 2.3: Reduce emissions from staff commuting by encouraging alternative transport and car sharing

Target: 73% reduction in emissions from road transport by 2025.[20]

Initial Measure	Estimated Cost	Implementation	Benefits
a. Allocate funding to improve cycle-friendly facilities	Cycle Parking: Bike stands: £30-£40 Covered parking: £1,800 plus stands Lockers: £620+ per locker.[21] Shower Facilities: dependent on chosen method of provision[22] Allocation for facilities: £30,000 per annum.[3]	Assess level of demand for facilities as part of staff survey. Assess different options for providing shower and changing facilities. Lead Authority: Facilities Management	If 9% of staff commute a 5 mile journey by bike instead of by car it could save approximately 65 tCO_2.[23] Directly supports the Air Quality Action Plan and helps to deliver the associated health benefits. Increasing cycling also has health benefits. Cycling 5 miles to work burns, on average, over 2,000 calories in a week.[23]
b. Invest in a communication platform to facilitate car sharing	Dependent on chosen platform: paper form, online, app.	Research different potential platforms for car sharing which could expand to whole borough. Carry out cost-benefit analysis for potential platforms. Roll out car sharing scheme. Lead Authority: Communications	For every sharing commuter, there is a saving of 1 tCO_2 per year. If 10% of CE staff who drive were to share it would save 153 tCO_2.[24] Directly supports the Air Quality Action Plan and helps to deliver the associated health benefits.

Monitoring indicators:
- Confirm if cycle-friendly facilities have been improved or allocated funding for improvement
- Confirm if CEC have access to a car sharing platform.

Case Study: Ocado [25]

Ocado has registered 3,700 members onto its Liftshare scheme, and offers staff incentives such as free breakfasts, parking spaces, competitions and a guaranteed ride home. This has led to a saving of 852 tCO_2.

2. Energy Demand Reduction

Action 2.4: Reduce energy demand from new & existing council influenced buildings

Target: All new buildings and retrofits built to highest grade of LEED/BREEAM standards (or equivalent) to ensure carbon emissions from operations and materials are minimised.
By 2025, 16% reduction in existing commercial heating and cooling demand from 2015.[26]

Initial Measure	Estimated Cost	Implementation	Benefits
a. Embed carbon reduction into Asset Management strategy.	Within existing budgets.[3]	Review Asset Management strategy and incorporate a carbon target and a way of assessing and monitoring the carbon impact of actions. Lead Authority: Assets	Not possible to estimate a carbon saving but this acts as an enabler to the subsequent measures.
b. Policy to ensure all new buildings are built to a much higher sustainable buildings standard e.g. BREEAM Excellent or Outstanding	New buildings to LEED Gold standard estimated to be c. 10% additional on capital costs although operational cost savings should more than compensate this premium over the lifetime of the building.[27] The difference between a BREEAM 'pass' and an 'excellent' rating for offices is shown to incur an increase in capital cost of 0.8%. However, it is estimated that savings in operational costs produce a 2% higher capital cost can be paid back within 5 years.[28]	Identify sources of finance of programme funding Liaise with LEED/BREEAM and the carbon neutral team to agree a strategy for implementation. Undertake a specific costing and feasibility study to understand cost vs. benefit. Define key elements of a standard based on current industry best practice. Note the scope may also extend to embodied carbon of construction materials as well as buildings in use. Lead Authority: Assets	The average CO_2 saving for a BREEAM assessed building is 22% and a BREEAM Excellent rated building is expected to reduce carbon emissions by 33%.[28] Lower operational costs- Energy efficiency and water saving technology has a forecast payback is typically less than 5 years for energy and less than 2 years for water.[29] It also benefits those who work within these offices through factors such as better air quality and lighting.[29]

Case Study: Welsh Government [30]

In a move towards more sustainable and zero carbon buildings the Welsh Government (WG) Planning Policy now requires projects with a floor area greater than 1000m^2 to achieve a BREEAM Very Good rating. In addition, WG require an Excellent rating to be achieved for projects where they provide core funding.

Llywodraeth Cymru
Welsh Government

2. Energy Demand Reduction

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By 2025, 16% reduction in existing commercial heating and cooling demand from 2015.[24]

Initial Measure	Estimated Cost	Implementation	Benefits
c. Assess suitability of retrofit options for each category of council influenced buildings, including leisure centres and schools. This includes efficiency and ventilation measures only (heating supply is covered within Low carbon supply).	Dependent on the size, complexity, age, operations, conditions of the existing building stock and its assets. Investment grade audits can be commissioned per building ranging £2,000-£5,000.[31] TBC nominal additional cost of £200,000 per annum allocated.[3]	Carry out an assessment of the stock to identify potential programmes: - desktop assessment based on available information - data gap in-fills through site visit - building performance modelling on key areas for improvements -investment grade audits to identify opportunities to gain returns There is no 'one size fits all' for retrofit so would include assessment of: - All Building Management Systems (BMS) are optimised, HVAC systems are well maintained - All lighting converted to LED either through planned replacement or proactive retrofit programme. - Insulation to the building fabric to ensure heat is kept on the correct side of the barrier (various measures within this category including walls, floors, ceilings and windows). Explore and research alternative options for retrofit and improvements to listed buildings given the constraints. Lead Authority: Facilities Management.	A 20% reduction in energy used for heating would produce a saving of around 2,945 tCO_2[32] Lower operational costs achieved through greater energy efficiency.

Monitoring indicators:
- Confirm if new build and retrofit policies have been updated to reflect a higher carbon performance
- Confirm how many investment grade audits have taken place

Case Study: Cambridgeshire County Council [33]

Cambridgeshire County Council adopted the Re:fit framework to increase energy efficiency, reduce CO_2 emissions and improve the condition of its buildings. The estimated potential of this scheme is to deliver 1.2 million tCO_2 savings over the lifetime of the project. The project is available to schools and public sector buildings across the county.

Cambridgeshire County Council

2. Energy Demand Reduction - Sources

2.1

1 – The European Commission proposed an interim CO_2 reduction target of 15% by 2025 for all large trucks compared to 2019 levels. Improvements beyond the European Commission target of 15% reduction achieved by scaling up existing low emission HGV pilots and piloting new technologies.

2 – Energy saving trust Ultra-low emission vehicle review- identifies where plug-in or alternatively-fuelled vehicles could be appropriate and cost effective. This review is available at no cost for most private and public sector organisations in England.

3 – Based on Cheshire East Council estimates as documented within the internal document "Action Plan" 24/12/2019. Such information has not been subject to Anthesis' review or verification. Nominal costs allocated are TBC.

4 – Actual number of Council vehicles not available at time of writing. Therefore, using Ashden 31 Climate Actions method of estimation: Leeds has 1,133 vehicles for a population of 474,000. Applying this ratio of fleet to the population of CE (380,790) would mean there are approx. 910 vehicles. The annual additional whole life costing of EV is around £5k.

5 – Energy Savings Trust compare EV and ICE pool car.

3 years 45,000 miles*	Citroen Berlingo	Nissan eNV200 Acenta
Life cost (excl. fuel)	£15,786	£14,661
Life fuel cost	£3,444	£1,446
Life total cost	£19,230	£16,107
Pence per mile cost	43	36

*Includes lease and service rental costs provided by Alphabet and Fleet News.

6 – CNEX low emission van guide – 50 kW charging point can charge an electric van in <1 hour. Hardware costs of a triple outlet 43-50kW, Type 2, CHAdeMO and CCS – £16,000-30,000
Approximate connection costs – of 1-3 Fast (22kW charge van in 1.5-2 hrs) or 1 rapid (50kW charge in <1 hr) – £1,000-£3,000

7 – Based on Ashden: Local Authorities are able to receive funding for 75% of the cost of residential charge points- up to £7.5k per charging point which means Local Authorities must fund the remaining £2.5k.

8 – Based on Ashden: who estimate that the average reduction from switch to EV is 66% (when charged from the grid). For total CEC fleet emissions see Supplementary Annex.

9 & 10 – Based on CEC estimates as documented within the internal document "191122 CEC Carbon Neutrality Projects 22/11/2019". Such information has not been subject to Anthesis' review or verification.
Cledford Lane Cost: Based on fixed and high costs for conversions, refuelling, electrolyser and additional PV/Grey water. Conversions, refueller and PV will remain assets after two years. Costed annual benefits: Estimated fuel and RTFO. Does not include the residual value of the equipment – estimated at £150k – and long term electricity generation beyond the project lifetime.
Cost: Based on additional investment which my be required to convert and increase specification – based on £30k per vehicle. Cost annual benefits: Based on £7k saving per vehicle – half vanguard due to no RTFO and purchase of hydrogen. Estimated 10,000 litres of diesel saved. 13 tCO_2e estimated saving per year for a 2 year Cledford Lane project. Strategic plan savings based upon an average 30% saving given 7 year replacement cycle.

11 – Energy Savings Trust case study

12 – Glasgow City Council On Road To Zero Emissions Vehicle Fleet

2.2

13- Based on SCATTER Level 4 pathway (See Supplementary Annex)- modal shift in transport away from cars, were active transport represents 6% of all travel.

14 – Energy Saving Trust Green Fleet Review evaluates how sustainable a fleet operation is and identifies opportunities to reduce emissions, fuel costs and expenditure. There is no charge for public sector organisations. Note that the cost is for the review only and does not include an estimate for the cost of pool cars.

15 – Based on Anthesis judgement and experience.

16 – Energy Saving Trust: A guide to managing and reducing grey fleet mileage. Company cars on average are 2.5 years old (132g/km) versus under 7 years old (158 g/km) for employee owned. Based on a fleet of 50 cars travelling 2000 miles per year. This does not include the additional saving that would be achieved by making these vehicles low emission.

17 – Cycling Calorie & CO2 Calculator
The distance between Cheshire East Council Headquarters and Crewe Station is approximately 6 miles according to google maps.
Cycling 6 miles instead of driving saves 214 $kgCO_2$ per year per person according to the CO_2 calculator. CO_2 emission saved per year is calculated based on factors from Transport Direct

18 – West Yorkshire Police case study

19 – PwC Support for Cycling

2.3

20 – Based on SCATTER assumption that there will be a modal shift away from cars – the share of transport by car should be 62% by 2050. The 2050 estimate is used as CE are already at 2025 target.

21 – Transport for London Workplace Cycle Parking Guide

22 – TBD by council. Options include: Converting current space, purpose built portable building or a partnership with a local leisure centre.

23 – Cycling Calorie & CO2 Calculator
Based on SCATTER Level 4 pathway 9% of journeys should be by bike. There are 4082 staff so 367 should cycle.
The most common journey distance at the council was 5-10 miles. Taking the lower distance- cycling 5 miles instead of driving saves 178 $kgCO_2$ per year per person according to the CO_2 calculator. CO_2 emission saved per year is calculated based on factors from Transport Direct -Calories burned per week calculated in line with the Harvard University study and are based on a 155lb person cycling at a pace of 12-13.9kmph

24 – Based on Ashden using data from LiftShare it is estimated that 1 tCO_2 p.a. is saved for every 'sharing commuter'. Based on 75% of staff commuting by car alone and if then if 10% of staff share (note this is arbitrary and intended as indicative only, rather than a suggested target), it equates to 153 individuals becoming a passenger in a car instead of driving.

25 – Ocado Case Study

2. Energy Demand Reduction - Sources

2.4

26 – Based on SCATTER pathways tool for high ambition pathway in 2025 (See Supplementary Annex)- 16% reduction in commercial heating and cooling demand from 2015.
27 – The Cost of LEED—An Analysis of the Construction Costs of LEED and Non-LEED Banks
28 – BREEAM carbon savings and estimated costs
29 – BREEAM co-benefits
30 – BREEAM Carmarthenshire
31 – Based on Anthesis industry experience and judgement.
32 – Based on Ashden 31 Climate Actions method where they estimate that 67% of energy is used for heating and that Interest free loans available to upgrade heating and controls can cut the energy used for heating by about 20%.
Total emissions from council and council owned buildings = 21,977 tCO_2 (See Supplementary Annex).
33 – Cambridgeshire County Council case study

Topic 3: Increase Low Carbon Energy Supply

Anthesis

3. Increase Low Carbon Energy Supply

Action 3.1: Increase supply from district heating

Target: Use Council Assets to support the development of more heat and power networks in the Borough to reduce our carbon emissions from heat and support regeneration and the Local Plan:
i. Large and mixed use developments of over 100 dwellings or non residential development of 10,000 square metres gross floor space should install a site-wide district heating network.
ii. Smaller developments of 10 or more dwellings or non residential development of 1,000 square metres gross floor space should connect to any available district heating network[1]

Initial Measure	Estimated Cost	Implementation	Benefits
a. Continue to progress district heating at: - Crewe Town Centre - Handforth Garden village - Alderley park	Revenue from ELENA and capital allocation.[2] Crewe Town Centre heat network capital cost £2.95m + £2.65m grant funding[3] Handforth Garden Village heat network integration capital cost £10.6m + £6.4m grant funding[4] Alderley Park ambient loop heat network, capital cost not specified.[5]	Crewe – use feasibility assessment outcomes to focus on the most cost effective technical and financial solutions for operation from 2023/24 to significantly decarbonise heat. [2] Handforth Garden Village – use the feasibility assessment outcomes to select a likely route to delivery including technology and financing solutions, to help agree an operational year for key stakeholders to decarbonise heat.[4] Alderley Park – once complete use feasibility assessment agreed approach to secure grant funding, confirming the completion date of 2024/25 and payback period, ultimately as leverage to drive down costs whilst optimising low carbon heat supply. [5] Lead Authority: ELENA	Potential carbon savings of approximately 11.4 $ktCO_2e$ by 2025.[8] National capital cost projections for district heating are widely estimating 30-40% of capital cost reduction in the coming years.[3]
b. Review further opportunities to develop heat networks elsewhere in the Borough where heat demand is high, especially linked to asset investment and regeneration.	An assessment of this type typically costs in the region of £10,000-£30,000, but is highly variable depending on the number of new opportunities and or reprioritisation sites/projects identified.[6]	Develop an energy prioritisation masterplan for specific decentralised energy opportunities which identify: - major heat loads including anchor heat loads, with particular reference to existing known sites; - additional major heat supply plant; - possible opportunities to utilise energy from waste; and - cooling network routes. Lead Authority: ELENA	

3. Increase Low Carbon Energy Supply

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ii. Smaller developments of 10 or more dwellings or non residential development of 1,000 square metres gross floor space should connect to any available district heating network[1]

Initial Measure	Estimated Cost	Implementation	Benefits
c. Review planning policy to encourage heat network opportunities	Cost of officer time to review policy.	Encourage policies to promote district heating projects, including providing a requirement for whole life costs to ensure economic connection for future users.[9] Lead Authority: Planning	See above.

Monitoring indicators:
- Report on the progress of current heat network projects.
- Confirm review of policy and reallocation of budgeting.

Case study: Southampton District Energy [10]

Southampton district heating started in 1980, saving 12 $ktCO_2$ per year with 26 MW of heat, 9MW of cooling and 7 MW of electricity from geothermal, tri-generation and CHP. Capital cost investment in 2014 of £13m saving consumers £0.6m in energy per year.

3. Increase Low Carbon Energy Supply

Action 3.2: Increase supply from photovoltaics (PV)			
Target: To maximise the potential for PV on land, domestic and non-domestic buildings.			
Initial Measure	Estimated Cost	Implementation	Benefits
a. Implement a community energy schemes to encourage the take-up of PV and renewable energy by communities, schools and businesses.	No additional cost beyond council resourcing time to facilitate initiative. Council can invest where there is a financial return.	Delegate responsibility to council team to develop the initiative to open collaboration with other land / asset owners and public. Lead Authority: Communities Team	Community financing mechanisms emerging as attractive return of investment. The major co-benefit being where community is engaged their day-to-day decarbonisation behaviours improve significantly.
b. Secure funding to invest in PV on both council land and council buildings extending any opportunities to wider stakeholders	Council land – capital cost c. £8m, annual payback £700,000 with 6% site yield at present council land only scale. No government tariffs.[11] Council buildings – capital cost £1.5m, annual payback £150,000 over 10 years and 50% capacity. No government tariffs.[11]	Council land – use present feasibility outputs to engage stakeholder's interest in PV community financing to extend feasible opportunities. Council buildings – use present feasibility outputs to take to investors. Using experiences as a method by which to increase uptake of PV to potential private roofs (if successful). Lead Authority: ELENA	PV installed on council buildings (1.2 MW capacity) and on council land (10 MW capacity) could save approximately 21,640 tCO_2e by 2025.[13] Post subsidy solar is becoming increasingly viable at scale, price of PV dramatically decreasing, energy efficiency increasing, especially when combined with wider renewables systems. Potential to generate income as well as carbon benefits.
c. Work in partnership with key stakeholders for PV to encourage the uptake of battery storage.	No additional cost beyond council resourcing time to facilitate uptake.	Off the back of PV engagement, facilitate battery storage opportunities where both technically and financially feasible through stakeholder and community finance initiative collaboration.[12] Lead Authority: ELENA	Increasingly battery storage solutions at scale can reduce (per kWh) lifecycle costs through improved pay back. Offers protection from future fossil fuel price increases.

Case study: Swindon Council [14]

Swindon developed a wholly owned subsidiary of the council, delivering the first renewable energy community Individual Savings Account (ISA) attracting local investment of £2.4m, a widely praised project.

Swindon Borough Council

3. Increase Low Carbon Energy Supply

Action 3.2: Increase supply from photovoltaics (PV)			
Target: To maximise the potential for PV on land, domestic and non-domestic buildings.			
Initial Measure	Estimated Cost	Implementation	Benefits
d. Work with DNOs locally to understand and overcome constraints on the electricity grid to facilitate regeneration and decentralised energy	No additional cost beyond council resourcing time to facilitate partnership.	It is important to develop communication channels early with the DNO to ensure the electricity grid can accommodate the design and connection to the grid.[15] Lead Authority: Economic Development with Environment Team	See above. We acknowledge that this measure may be relevant to other forms of renewable energy supply.
Monitoring indicators: • Confirm budget initiatives and uptake scheme development.			

3. Increase Low Carbon Energy Supply

Action 3.3: Increase supply of renewable energy through the procurement of green energy			
Target: 100% renewable energy procurement by 2025.			
Initial Measure	Estimated Cost	Implementation	Benefits
a. Update energy policy to ensure remaining supply, after the council's own generation, is from 100% renewable sources.	Estimated costs of switching supplier £10,000-£20,000.[16]	Undertake a cost comparison for 100% renewable energy providers, e.g. Good Energy, Ecotricity, etc., and switch to the package that best suits the council.[17] Lead Authority: Facilities Management	Based on replacing the whole of the Council's Scope 2 emissions would save 5,115 tCO_2 per year.[19] 100% renewable firms can also connect pre-existing or prospective independent energy storage products and trade through artificial intelligence passing savings directly back to energy supply. Investment in renewable energies delivers operational cost reductions over the short- to long-term with additional incomes available in PPA and export payments
b. Challenge the quality/ nature of green energy provided and ensure it provides necessary benefits	Within existing budgets.[2]	Explore pairing with disruptive energy providers that offer more tailored and holistic solutions for energy supply, usage, storage and generation e.g. Social Energy.[18] Lead Authority: Facilities Management	
c. Explore the potential for a Power Purchase Agreement (PPA) with other local organisations, or other commercial partners.	Council resourcing time to facilitate PPA (within existing budgets).[2]	PPA for renewables by combining resources with other local organisations, will not only increase the chances of financial saving, but also provide increased opportunity to contribute greater 'additionality' at generation source (renewable energy generation that is truly new). The extent of revenue generation/saving will depend on the nature of arrangement, whereby CEC could simply be one 'off-taker' or they could be a supplier to others fulfilling the role of an 'Energy Company'. Lead Authority: Facilities Management.	
Monitoring indicators: • Confirm policy review. • Review potential partnerships with local key partners for a PPA.			

Case study: Onshore wind PPA [20]

In 2019, 20 members of The Energy Consortium (TEC), agreed a deal for an aggregated PPA to deliver renewable energy directly from British windfarms to their institutions. The estimated saving based on forward market estimates is £6m.

3. Increase Low Carbon Energy Supply

Action 3.4: Explore the potential for hydrogen energy			
Target: To better understand the technical potential in the district for hydrogen energy			
Initial Measure	Estimated Cost	Implementation	Benefits
a. Support the trialling and adoption of hydrogen heat technology.	No additional cost beyond council resourcing time to facilitate investigation into credibility of hydrogen injection into gas network. Collaboration with the gas distributor and local university groups might be a cost effective way to gain expert insight.	The potential for hydrogen injection into the natural gas network is currently being explored through trials at a national level, with large opportunity for decarbonisation whilst being mindful of its slow implementation and needs for carbon capture and storage in its production. Exploration of hydrogen energy implementation in Cheshire East are still warranted. Key factors to consider include: 1) safety 2) hydrogen supply 3) costs and finance 4) timing 5) availability. This may also include exploration of heating technologies that replace conventional gas boiler technology (i.e. consistent with Leeds H21 City Gate project). Lead Authority: ELENA	Based on a 20% hydrogen injection/ natural gas mix (as is currently being trialled in the UK) and the total footprint for natural gas usage in CE accordingly being reduced by 20%. This would be equivalent to a reduction of approximately 36 $ktCO_2e$ per year[21] if produced using low carbon method.
Monitoring indicators • Review progress of Northern Gas Network and Cadent pilot projects.			

Case study: HyDeploy [22]

HyDeploy 2 is a four-year programme designed to test the viability of hydrogen-blend networks before assessing for wider deployment. If used nationwide, potential carbon savings are equivalent to removing 2.5m cars off the road, whilst minimising disruption to customers through use of existing infrastructure. Two test regions have been identified following backing from two gas distribution networks (Cadent in the North West and Northern Gas in Yorkshire and the North East).

3. Increase Low Carbon Energy Supply

Action 3.5: Explore the potential of alternative renewable sources			
Target: To better understand the technical potential in the district for all other generation technologies.			
Initial Measure	Estimated Cost	Implementation	Benefits
a. Explore the application of sustainable biomass by engaging with industry and formulating a list of opportunities, including: - Wood biomass - Slurry	£200,000 (additional staff member plus operating costs).[2]	A high level review of the application of biomass in reducing fossil fuel emissions from key emission sources to small emission sources in the context of the councils environment policies, e.g. air quality.[23] Wood Biomass: Assess the potential for energy from waste wood. This must include a consideration of the potential sources (e.g. highways planting) and the transport of materials. Slurry: Given the rurality of CE and the high intensity of dairy farms, there may be an opportunity to work with the CE farms estate to generate energy from slurry. This requires a full feasibility and impact assessment. Research from the Cholmondeley Farm Estate[24] raised the following issues, which CEC should work to find solutions towards: - The transportation of slurry - The treatment of food waste impacting the financial feasibility. Lead Authority: Rural and Cultural Economy.	Potential carbon savings: not possible to estimate, dependent on the generation technology and feasibility. There are opportunities for the private sector to work with councils (and other entities procuring waste facilities or services) to achieve the necessary scale to ensure the alternative renewable source benefits strong commerciality and long term decarbonisation in line with existing council policies. Wood biomass: this could support the management of neglected forests. There is also an opportunity to tie this work to the natural capital enhancement. Slurry: Potential to alleviate the pollution caused by slurry, protecting waterways and wildlife. Opportunities for business, inward investment and job creation.[24]
b. Explore the potential for micro-hydro schemes by engaging with industry and formulating a list of opportunities.	Within existing resources. Capital TBC.[2]	A high level review of the application of micro-hydro schemes as an alternative low carbon energy source on council owned land or whether the council could partner on non council land.[25] Further explore the potential and feasibility of micro-hydro on the River Dane and River Bollin. Provide planning guidance and advice for developers wishing to install micro-hydro systems.[26] Lead Authority: ELENA	

3. Increase Low Carbon Energy Supply

Action 3.5: Explore the potential of alternative renewable sources			
Target: To better understand the technical potential in the district for all other generation technologies.			
Initial Measure	Estimated Cost	Implementation	Benefits
c. Explore potential for on-shore wind on council-owned land.	Within existing resources. Capital TBC.[2]	This type of feasibility study typically involves: - Screening of council-owned land for potential sites. - Initial assessment of on-site wind resource at shortlisted sites - Technical assessment of physical and planning constraints and initial technical issues - Initial assessment of project costs, payment and return on investment - Risk assessment Carry out lobbying activities, public consultation and engagement to understand and address the opposition to onshore wind. Lead Authority: ELENA	See above.
d. Support heating efficiency through electrification of heat in less densely populated areas.	Publicising the campaign and providing advice on funding schemes and applications would require two members of staff at a cost of £30,000 per year for five years. The total cost would therefore be £300,000. This does not include capital costs.[6]	Develop programme for retrofit heat pump roll-out to existing homes/ commercial properties under LA control not connecting to heat networks. While this would be financed privately and/ or with use of government funding sources, the council would have a key facilitating role in identifying and publishing opportunities. Lead Authority: ELENA	
Monitoring indicators: • Commission an holistic review of alternative technologies assessing the feasibility of alternative renewable sources.			

Case study: Cornwall Council [27]

Cornwall Council's Climate Action Plan considers alternative fuels, as the next step to alternative renewable sources that were somewhat exhausted, including fuels such as bio-methane, which is expected to mature in demand in coming years.

3. Increase Low Carbon Energy Supply – Sources

3.1

1 – Cheshire East Local Plan Strategy 2010-30
2 – Based on Cheshire East Council estimates as documented within the internal document "Action Plan" 24/12/2019. Such information has not been subject to Anthesis' review or verification.
3 – Reducing the cost of district heat networks
4 – Handforth Garden Village tender
5 – Alderley Park Heat Network feasibility study
6 – Based on Anthesis judgement and experience.
7 – Crewe AECOM Study 2015
8 – Based on Cheshire East Council estimates as documented within the internal document "191122 CEC Carbon Neutrality Projects 22/11/2019". Such information has not been subject to Anthesis' review or verification.

- Crewe heat network: 176 tCO_2 per year for 25 years, likely start in 2021/22.
- Handforth heat network: 2,200 tCO_2 per year, for 25 years, likely start in 2021/22.
- Alderly Park next generation 700 tCO_2 per year, 25 years, likely start in 2024/25.
- Alderly park optimisation: 300 tCO_2 per year, 15 years, likely start in 2021/22.

9 – Cheshire East Local Plan
10– Case study Southampton District Heating

3.2

11 – Based on Cheshire East Council estimates as documented within the internal document "191122 CEC Carbon Neutrality Projects 22/11/2019". Such information has not been subject Anthesis' review or verification.

- Council Buildings: Rough estimate based on Environmental Hub costs for PV. Benefits based on estimated on 10 year payback
- Council Land: Ballpark based on previous projects, depends on site conditions, connection issues, and if battery storage is needed. Assessment needed c. £15k, plus devt costs if viable. Benefits based upon finding a site with a yield of c. 6%.

12 – Crowdsourcing funding for PV projects
13 – Based on Cheshire East Council estimates as documented within the internal document "191122 CEC Carbon Neutrality Projects 22/11/2019". Such information has not been subject Anthesis' review or verification.

- PV on council buildings estimated to save 128 tCO_2 per year starting in 2020/21.
- PV on council land estimated to save 7,000 tCO_2 per year starting in 2022/23.

14 – Swindon Council
15 – Energy Saving Trust key recommendation from the Cornwall Partnership NHS Foundation Trust case study.

3.3

16 – Based on correspondence with CEC 09/01/2020 on the predicted additional cost for switching supplier in 2020.
17 – Comparing renewable energy supply costs
18 – Social Energy alternative energy supply solutions
19 – Based on replacing the all Scope 2 emissions with zero emission supply (for estimation of Scope 2 emissions see Supplementary Annex)
20 – TEC Case Study

3.4

21 – Assuming that the footprint from combustion of natural gas in the energy demand sector, in the absence of hydrogen injection, would be 180 $ktCO_2e$ p.a. The modified footprint would therefore be 180k * 0.8 = 144 $ktCO_2e$ p.a
22– Northern Gas Networks HyDeploy

3.5

23 – Energy Saving Trust – biomass
24 - EA Technology Consulting (2010): Establishment of a New Renewable Energy Policy, prepared for Cheshire West and Chester Council.
25 – Saughton Park micro hydro
26 – Micro-hydroelectricity factsheet
27 – Cornwall Council alternative fuels

Topic 4: Natural Capital

4. Natural Capital

Action 4.1: Protect and enhance natural capital (council-land)			
Target: Enhance Green Infrastructure to provide natural climate solutions on council land, including tree planting and peatland restoration.			
Initial Measure	Estimated Cost	Implementation	Benefits
a. Plan and develop natural climate solutions such as tree planting and peatland management to sequester carbon on at least 100 ha of council owned land by 2025.[1]	£510,000 (costs potentially recoverable).[2]	Better define and understand the suitability of land owned or controlled by the council for nature-based solutions. This should build on the Green Infrastructure Plan 2019.[3] Develop Natural Capital Valuation & Investment Plan (as under target 4.2.d). Develop engagement strategy for land users/farmers currently operating the land, including communication of multiple nature-based solution option such as tree and hedgerow planting and restoration/ management of ecosystems such as grasslands, pasture, and peatlands. Engage with Local Nature Partnership to develop a landscape approach to nature-based solutions and Green Infrastructure, maximizing co-benefits to society. Ensure suitability assessment considers co-benefits (i.e. beyond carbon), such as biodiversity, productivity, drainage, as this could stimulate both negative and positive impacts linked to species and location. Lead Authority: Rural and Cultural Economy	The carbon impact of this measure would be around 0.221 ktCO2 p.a. by 2025.[4] Tree planting has benefits for biodiversity, the environment (e.g. flood mitigation, heat regulation), individuals (e.g. spiritual connection to nature), society (e.g. recreation) and the economy (e.g. increased productivity resulting from the aforementioned factors).
Monitoring indicators: • Review land-use study and council budget for natural capital.			

4. Natural Capital

Action 4.2: Protect and enhance natural capital (borough-wide)			
Target: Enhance Green Infrastructure to provide natural climate solutions on non-council land, including through tree planting and peatland restoration.			
Initial Measure	Estimated Cost	Implementation	Benefits
a. Plan and develop natural climate solutions such as tree planting and peatland management to sequester carbon on between 41 and 1,347 Ha of non-council owned land by 2025.[5]	The cost of this initiative is covered under 4.1.a[6]	Review existing data on land-use and carbon sequestration to identify opportunities nature-based climate solutions, with particular reference to the Green Infrastructure Plan[3]. Develop Natural Capital Valuation & Investment Plan (as under target 4.2.d). Liaise with relevant landowners/ managers to identify and secure opportunities to implement sequestration projects. Also engage with Local Nature Partnership to develop a landscape approach and maximise co-benefits to society. Promote tree planting via media campaign to engage local stakeholders including landowners and potential volunteers to help with nature-based solutions including tree and hedgerow planting. Consolidate outcomes and, if necessary, review options for out-of-boundary planting. Lead Authority: Rural and Cultural Economy.	The carbon benefit of the measure by 2025 is between 0.1 and 0.31 $ktCO_2e$ p.a. by 2025. However, this is likely to be greater in the longer term.[7] Green Infrastructure and nature-based solutions offer many co-benefits, including for biodiversity, the environment (e.g. flood mitigation, heat regulation), individuals (e.g. spiritual connection to nature), society (e.g. recreation) and the economy (e.g. increased productivity resulting from the aforementioned factors). Any landowner/ manager can potentially be involved, creating a diverse group of stakeholders including schools, farmers, corporate organisations and private landowners/ individuals.

Case Study: GM City of Trees[3]

Greater Manchester City of Trees is a leading example of how a tree planting project can address climate change objectives whilst engaging the local community and providing numerous co-benefits. So far, the initiative has planted 459,929 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.

4. Natural Capital

Action 4.2: Protect and enhance natural capital (borough-wide)			
Target: Plant one tree for every person, halt peat extraction and restore degraded peatlands by 2025.			
Initial Measure	Estimated Cost	Implementation	Benefits
b. Develop and implement restoration and/ or management plans for 100% of peatlands in Cheshire East.	The cost of this initiative is covered under 4.1.a[8]	Complete land-use mapping to identify all potential peatlands for restoration and management. Conduct ground-truthing to clarify the nature of restorations required and potential for carbon sequestration and other benefits. Stakeholder mapping to identify ecosystem service providers/ beneficiaries. Assessment of costs and benefits associated with peatlands and communication of these to stakeholders. Engage with Local Nature Partnership to develop a landscape approach to nature-based solutions. Assessment of relevant financial instruments available and communication of these to stakeholders. Implementation of peatland restoration schemes, in particular through stakeholder facilitation. Lead Authority: Planning	We estimate around 7.4 $ktCO_2e$ per annum by 2025 in emissions from peatland can be mitigated[9]. However, this reflects a slowing of emissions, as opposed to being a net sink. Clean water (including drinking water); biodiversity; recreation; water flow regulation and flood mitigation.
c. Deliver the Green Infrastructure Plan to facilitate investment into natural capital and to be resilient to climate impacts.	Additional staff above.	Implementation phase of the Green Infrastructure Plan. Review Green Infrastructure strategy in line with the carbon neutral target. Lead Authority: Rural and Cultural Economy	

4. Natural Capital

Action 4.2: Protect and enhance natural capital (borough-wide)			
Target: Plant one tree for every person, halt peat extraction and restore degraded peatlands by 2025.			
Initial Measure	Estimated Cost	Implementation	Benefits
d. Develop Natural Capital Valuation & Investment Plan	£60,000	The Valuation and Investment Plan should build on the Green Infrastructure Plan and aims to facilitate implementation of payments for and investments in natural capital and ecosystem services. The plan should focus on mapping of natural capital and (potential) flows of ecosystem services in relation to providers and beneficiaries, and valuation of those flows. It should then focus on identifying and mobilizing investment vehicles and management systems to support provision of ecosystem services including carbon sequestration. .	This measure will help to stimulate investments, payments, and management arrangements key to achieving the above natural capital targets.
e. Facilitate community sequestration schemes	£18,000 per year for the cost of Mersey Forest Membership	Lead Authority: Rural and Cultural Economy	.
f. Work with other landholders including farmers to maximise the potential for tree planting and soil management.	Additional staff above.	Lead Authority: Rural and Cultural Economy	
Monitoring indicators: • In 12 months' time, commission land-use survey to review progress in afforestation and peatland restoration.			

Case study: North West Peatland Restoration [6]

Environment Agency recently secured £160,000 funding for six peatland restoration projects across six projects across the North West and involves the EA working with Cheshire Wildlife Trust, United Utilities and Natural England. Projects focus on restoration of upland and lowland peatlands to their natural state, increasing their capacity to prevent carbon entering the atmosphere, reducing flood risk by slowing the flow of rain water, and creating habitats for vulnerable wildlife. Restoration involves blocking drainage ditches, building peat bunds and working with the local topography to help keep water on the sites, encouraging the typical bog plant species and discouraging the dry-loving grasses and birch.

4. Natural Capital – Sources

4.2

1 - This figure is based on the Council's estimates of land available for natural climate solutions. It is required in addition to the activities outlined under 4.2. a. Note that natural climate solutions could include tree and hedgerow planting, but also grassland, pasture, peatland and soil management, where appropriate.
2 - Management costs for three full time members of staff to run the programme to 2025 would be £30k * 3 * 5 = £450 k. We assume that the direct implementation costs (e.g. saplings, labour beyond that of volunteers, etc.) can be raised through grants and other natural capital finance mechanisms.
3 - https://www.cheshireeast.gov.uk/planning/spatial_planning/research_and_evidence/green_infrastructure_framework.aspx
4 - Based on approximate cumulative carbon sequestration rates for mixed native woodland, calculated using the WCC Carbon Calculation Spreadsheet (2019). Assumptions include: area 100 ha; spacing 2.5m (total number of trees 1,600/ Ha); mixed native species including oak, sycamore, birch, aspen, alder, rowan, hazel, goat willow; yield class: 8 (according to UK Forestry Commission's 'Carbon Lookup Tables'); no forest thinning or clear-fell at any time: claiming carbon from year 0 to year 50; assumed permanence buffer of 20%; planting commences in Spring 2020.
5 – Cheshire East Council's own calculations (see CEC Insetting Options) indicate 140 hectares of afforested land would allow the council to offset 50% of its residual annual emissions by 2050. The lower bound of this target range, when considered against the provisions of 4.1.a., reflects this objective. The upper bound reflects the more rigorous target of net zero emissions by 2025. See pages 4 and 10 for details. Calculations used the WCC Carbon Calculator Spreadsheet as under 4. Note that the higher target of 1,447 Ha is considered additional to the 100 Ha considered under target 4.1.a.
6 –The costs of nature-based solutions are highly variable and can be substantial. However, we assume that the staff and Natural Capital Valuation & Investment Plan (target 4.1.d) would meet these costs.
7 - Many natural climate solutions offer larger sequestration benefits in the longer term. For example, trees sequester more carbon in the longer term as the they become more voluminous. The sequestration potential of trees in our model is nearly 5x higher in 2035 than in 2025.
8 –Development costs for peatlands are substantial, in the range of c. 30k per 1.5 Ha (Cheshire East Council, personal communication). There is around 1,392 ha of peat in Cheshire, most of this being disturbed in some way (Cheshire East Council, 2018). Assuming 700 ha of peatland is located in Cheshire East, the cost of restoration could amount to £14,000,000. However, we assume that funds can be raised to cover these costs through the Natural Capital Investment Plan and resulting activities.
9 – We assume that Cheshire East has 350 ha of former peatland that has been converted to cultivated farmland with an atmospheric influx of 22 tCO_2e p.a per hectare and 350 ha of peatland that has been extracted to some degree resulting in an influx of 5 tCO_2e p.a per hectare , and that by 2025 restoration activities can slow this to 3 tCO_2e p.a per hectare. The benefit figure above was therefore calculated as ((350 * 22) + (350 * 5)) – (700 * 3). Note that these figures reflect slowed emissions from peat, not negative emissions, which would take longer than the time horizon considered here to materialise (Natural England, 2010).
10 - An estimated £60k would be required for consultants and other external advisers to support in the develop and implementation the Natural Capital Valuation & Investment Plan.

Topic 5: Reduce Borough-wide Emissions/ External Policy

5. Reduce Borough-wide Emissions/ External Policy

5.1 Optimise governance, reporting and engagement structures

Target: Better utilise convening power and non-statutory influence within the borough to maximise engagement of other stakeholders.

Initial Measure	Estimated Cost	Implementation	Benefits
a. Host a Citizens Assembly on Climate Change	£5,000 (within existing budgets).[1]	Conduct survey of representative residents required from a diverse range of ages, incomes and wards. One or two day-long workshops of presentations, with participants resolving a number of priorities/actions as a conclusion to the Assembly. Potential for collaboration with educational institutions and other local networks. Lead Authority: Communities Team	May help enhance public trust and support by collectively agreeing workable actions. It can encourage stronger political unity and/or help bypass any future political challenges.
b. Better engage with local businesses and large or relevant emitting organisations specifically the topic of carbon reduction and assess the potential for the low carbon economy.	£15,000 (within existing resources and/or grant funding).[1]	Research, engagement and report write-up delivered by external partners; Council responsible for engagement thereafter. This should also include natural capital focused organisations such as the Local Nature partnership. Lead Authority: Economic Development	Various commercial benefits including cost reduction, increased commercial resilience, reduced absenteeism, better employee talent attraction/retention.
c. Better report local council led impacts and develop a mechanism that incentivises others to invest within borough wide carbon reduction initiatives.	Within existing resources.[1] Establishing a low carbon 'inset' fund would require more substantial resource support (i.e. a part time fund manager).	Co-develop a "Local Authority Based Insetting" scheme that helps to: a) More transparently report council led actions (initially) b) Incentivise and attract low carbon investment in the borough. Review proposed framework within the Supplementary Annex. Consider piloting work under both a) & b) and seeking endorsement from other local authorities. Lead Authority: Environment Team	More consistent, reliable, transparent reporting. Retention of investment within Cheshire East. Various co-benefits associated with decarbonizing (i.e. health and economic)

5. Reduce Borough-wide Emissions/ External Policy

5.1 Optimise governance, reporting and engagement structures

Target: Better utilise convening power and non-statutory influence within the borough to maximise engagement of other stakeholders.

Initial Measure	Estimated Cost	Implementation	Benefits
d. Work with local farmers and consumers to reduce impact of food and agriculture.	Additional staff member.[1]	Review agricultural emissions in the borough (see Supplementary Annex). Develop educational campaign for key stakeholders and consumers. Lead Authority: Rural and Cultural Economy	Based on the Committee on Climate Change medium scenario for dietary change: A 20% reduction in national consumption of dairy, beef and lamb would lead to an estimated reduction of 67,600 tCO_2e in CE.[2] This would also lead to reductions in grassland which could open up land for planting forests.[2]

Monitoring indicators:

- Review frameworks with local key partners and business organisations.

Case Study: Citizen's Assemblies and Council-Business Alliances

Camden[3] and Oxford[4] facilitated a public response to Climate Emergency Declarations which encouraged local engagement with the agenda.
London Climate Business Leader's Initiative[5] defines new means of collaborative action between business and government. This encourages those organisations defining emissions reductions targets to disclose progress publicly.

5. Reduce Borough-wide Emissions/ External Policy

5.2 Reduce emissions from domestic housing

Target: Increase standards in energy efficiency through leadership in building standards and enforcement of minimum standards.

Initial Measure	Estimated Cost	Implementation	Benefits
a. Better communicate energy efficiency standards, behaviours and activities in the private rental sector	There are significant existing advice and funding sources available to meet this measure (see right). However, a housing energy officer will be required lead in coordinating efforts including lobbying central government, sourcing additional funding (c.£50,000 per annum).[1]	Offering advice and financial support to those looking to improve property energy efficiency through retrofits: Many schemes currently exist that should be leveraged. These include: Cheshire Green Doctor advice service; Affordable Warmth Grant; Health through Warmth; Local Energy Advice Programme (LEAP) (Energy Projects Plus; Save Energy Advice Line (Energy Projects Plus); Energy Performance Certificates (delivered by Civicance) and ECO3. Tougher enforcement of legislation where appropriate: The council should refer to the national Minimum Energy Efficiency Standard (MEES), which mandates that landlords improve all rented accommodation currently in bands F and G by spending at least £3,500.[6] Councils are responsible for ensuring that these standards are met, but research suggests that many councils aren't effectively enforcing them at the moment, thus missing a key opportunity for cutting carbon and improving housing quality.[7] The council should also lobby at a national level to increase the minimum energy efficiency standard considered under the legislation to EPC Band C by 2025 Lead Authority: Strategic Housing	Potential carbon saving: estimated as 0.4 $ktCO_2e$ per annum.[8] Nearly half of households living in the most energy inefficient homes are in fuel poverty. Improving the energy efficiency of private rented homes will not only improve comfort and reduce energy bills but will reduce ill health.[9] National Energy Action estimates that 10,000 deaths each year are attributable to living in a cold home. Moreover, work undertaken by the Building Research Establishment (BRE) highlights that cold-related illnesses from privately rented F and G rated properties costs the NHS £35m per year.[9]

Case Study: Cornwall Council [10]

Cornwall Council undertook an education and awareness campaign aimed at helping landlords understand relevant housing standards regulations. They have also developed a responsible landlord scheme to help with this, as well as a 'Cornwall Rental Standard' that details all key regulations.

5. Reduce Borough-wide Emissions/ External Policy

5.2 Reduce emissions from domestic housing			
Target: Increase standards in energy efficiency through leadership in building standards and enforcement of minimum standards.			
Initial Measure	Estimated Cost	Implementation	Benefits
b. Lead and stimulate low carbon retrofit across the borough using social housing stock.	Cost of £309m[11] The majority of costs are related to the upgrading of existing stock, as costs associated with new stock can be borne by the developers and mandated in planning requirements. There is widespread recognition of the need for a government-sponsored vehicle to finance such investment, but as yet no particular mechanism has emerged.[12]	Use social housing providers to lead to lead in the implementation of low carbon homes through a minimum of EPC A+/Passivhaus/AECB standard by 2025. This should be mandated in planning requirements at a borough level. All existing stock should be a upgraded to a minimum of EPC band C by 2025. Being retrospectively, finance will be required to implement this. Stock modelling, stock surveying, maintenance programme review and void programmes can be first steps promoted by the council. Lead Authority: Strategic Housing	Potential carbon saving is estimated as 6.1 $ktCO_2e$ per annum.[13] Improving the energy efficiency of private rented homes will not only improve comfort and reduce energy bills but will reduce ill health.[14]

5. Reduce Borough-wide Emissions/ External Policy

5.2 Reduce emissions from domestic housing

Target: Increase standards in energy efficiency through leadership in building standards and enforcement of minimum standards.

Initial Measure	Estimated Cost	Implementation	Benefits
c. Encourage/ enable retrofit all existing owner-occupied housing stock	Cost of £14.7m[15] Retrofit costs (to achieve EPC C) around £4,385 per home with the costs falling to the home owner, with councils facilitating access to grants where available.	Increasing the energy efficiency rating of all owner-occupied housing to at least EPC C will be challenging, as the costs will often be borne in part or wholly by the owner-occupier. However, the cost will be recoverable through energy savings. Ensuring this investment case is clear and that funding is accessed where available or retrofits will require 114 staff, as per the calculation under costs.[8] To retrofit Cheshire East's 120,000 privately owned homes by 2025, the required rate is 20,000 homes per year between 2020 and 2025. Utilise local taxation to stimulate retrofit activity. Consult with bodies such as the AECB, PassivHaus Trust, Connected Places Catapult for further thought leadership on delivering retrofit at scale. Lead Authority: Strategic Housing	Potential carbon saving from this measure is 44 $ktCO_2e$ per annum.[16]
d. Develop policies/Supplementary Planning Guidance to specify carbon standards for development.	Within existing resources.[1]	Develop desired carbon standards for development. Encourage developers to follow guidance and prioritise low carbon actions. Lead Authority: Planning	Carbon savings dependent on carbon standards implemented. The annual emissions from a new typical semi-detached house with a gas heating system (excluding appliance use) will be around 2 tCO_2.[17]

Monitoring indicators:

- Review learnings and conclusions from updated comms programme.
- Review uptake of retrofit measures either through BEIS data proxies (RHI, ECO etc.) or council-specific means.

5. Reduce Borough-wide Emissions/ External Policy

5.3 Reduce emissions from the commercial sector

Target: Reduce the total carbon footprint relating to Cheshire East's SMEs by 30% by 2030 (15% by 2025).[18]

Initial Measure	Estimated Cost	Implementation	Benefits
a. Engage businesses across Cheshire East in energy and carbon measurement & reporting	Establishment of an officer team to oversee engagement: £1,000,000.[19] Embed within business support programmes at local and Cheshire & Warrington level.	Raise awareness of reporting benefits ("you can't manage what you don't measure"). Provide businesses information on relevant reporting tools, guidance and software. Provide training and resources to staff on how to better report and lessons learned. Consider facilitating stakeholder sessions to disseminate lessons learned from recent ESOS reporting or impending SECR regulations. Lead Authority: Economic Development.	The carbon saving associated with these measures is estimated as 9.3 $ktCO_2e$ p.a. by 2025).[20] Efficiency measures save costs, increases business resilience, particularly in the context of future energy price rises.[21] In certain circumstances investments in energy efficiency installations may also lead to increased asset value and/ or improved relationships with suppliers, lettors/ lessees, customers and staff.
b. Encourage businesses across Cheshire East to install energy & carbon efficiency measures	See above.	Providing advice and assistance to SMEs to improve energy and carbon efficiency in buildings. This may involve more proactively encouraging grant opportunities or partnering with businesses to accelerate plans. Develop a new and innovative funding mechanism such as Authority Based Insetting. Utilise local taxation to stimulate retrofit activity. Lead Authority: Economic Development	
c. Develop policy aimed at energy & carbon efficiency improvements in the borough's commercial sector	Negligible costs – Current policy design and appraisal processes could be modified to better consider carbon.	Develop borough-level policy aimed at encouraging businesses to improve their energy & carbon efficiency. Key policy levers include: - Develop options to use business rates to 'nudge' businesses to improve their energy performance. - Cost carbon into public procurement. - Develop standards with local businesses to measure and improve operational efficiency. Lead Authority: Economic Development	

5. Reduce Borough-wide Emissions/ External Policy

Monitoring indicators:

- Review key partners' progress with the programme and review new areas for engagement.
- Review new policy changes in line with defined targets.

Case study: GM Existing Buildings [22]

Decarbonising Greater Manchester's Existing Buildings sets out a plan for addressing the contribution of existing buildings to the city-region's carbon footprint. In particular, this is in the context of the 5 Year Environment Plan, which set an ambition for Greater Manchester to be carbon neutral by 2038. It recognises that reducing the amount of energy used in Greater Manchester's existing buildings will be key to achieving this aim, especially given 95% of Greater Manchester's existing buildings are still likely to be in use by 2050.

The plan builds on the priorities and actions on buildings in the 5 Year Environment Plan, and sets out where Greater Manchester is now and where it needs to get to in terms of the energy demand of its existing domestic, commercial and public buildings.

Based on that, it provides a set of recommendations for taking action, including on decarbonising commercial buildings.

An additional important case study is provided by the Carbon Trust's Green Business Fund[23], which since 2016 has supported hundreds of small businesses to identify an average potential saving of £8,230 on their energy spend.

5. Reduce Borough-wide Emissions/ External Policy

5.4 Reduce emissions from waste by reducing waste going to landfill

Target: 10% reduction in household waste and an increase in recycling rate to 65%.[24]

Initial Measure	Estimated Cost	Implementation	Benefits
a. Further develop communications/ educational campaign to reduce waste & increase recycling	Within existing budgets.[1] Cost of £160,000 based on estimated communication costs of a minimum of £1.00 per household. [25,26]	Promote food waste recycling and new composting plant. Communications Plan might include: - Pre and post-campaign participation monitoring including a post-campaign survey to assess the impact of the communications activities. - Printed communication material e.g. a new service introduction leaflet followed by more detailed information packs. Also potentially collection calendars, informational bin stickers, posters and contamination cards. - Road shows in local communities to explain the new service in more detail and answer questions. - A stakeholder event for local media and council members to help them understand the new scheme and gain first-hand experience of the recycling process. - Advertising to raise awareness of the new service using local newspapers, bus backs and Adshel sites. - Livery on the collection vehicles to reinforce the messages about the new service. Lead Authority: Environment Team	To take Cheshire East from its current recycling rate[27] of 54% to the SCATTER target of 65% (11% increase in recycling) could be expected to save a around 23 $ktCO_2e$.[28] Increased participation in recycling[28] has wider environmental benefits.

Monitoring indicators:

- Review effectiveness of comms campaign through analysis of recycling data.

5. Reduce Borough-wide Emissions/ External Policy

5.5 Reduce emissions from freight			
Target: 15% reduction in emissions from HGV fleet by 2025.[29]			
Initial Measure	Estimated Cost	Implementation	Benefits
a. Establish urban consolidation centres (UCCs)[30]	Within current budget[1]: Council engagement with partners; officer time.	Design 'last-mile consolidation centres' to allow low-emission vehicles to complete the final leg of a journey for freight deliveries into Cheshire East towns. Consolidation centres are located at the edge of a town where goods are then transferred from HGVs onto smaller vehicles. Lead Authority: Highways	Accounting for rurality of Cheshire East, assume maximum reductions due to UCCs does not exceed 40% of freight emissions; c. 78 $ktCO_2e$.[30] Improved air quality and road safety, reduced traffic congestion. In urban areas, studies have shown that freight is responsible for approx. 20% of vehicle emissions, and UCCs are capable of reducing freight emissions by up to 80%.[30]
Monitoring indicators: • Identify and engage with local partners and stakeholders. • Review feedback with partners and stakeholders.			

5. Reduce Borough-wide Emissions/ External Policy

5.6 Reduce emissions by encouraging a modal shift away from combustion cars

Target: A 6% reduction in car transport share in 2025 against 2015 levels.[31]

Initial Measure	Estimated Cost	Implementation	Benefits
a. Embed carbon reduction into the Local Transport Plan, including review potential for introducing charges for polluting vehicles - Emissions based parking permits & congestion charges.	Within existing budgets.[1] £45k pa to cover officer time.[32] Set up costs will depend on the system chosen; a congestion charge could potentially generate income.	Run public consultant on potential charges Assess both the carbon and wider impact of emission-based parking permits Assess both the carbon and wider impacts of a congestion charge Lead Authority: Highways	Not possible to estimate carbon savings. Directly supports the Air Quality Action Plan and helps to deliver the associated health benefits. Reduced congestion
b. Set up a car sharing scheme in the borough	The cost to set up a Liftshare scheme for a town is approximately £50,000.[33] TBC nominal cost of £10,000 per annum allocated.[1]	Assess the demand and potential in the borough Assess options for car sharing platform Lead Authority: Highways	Taking 1,000 cars off the road can save approximately 2 $ktCO_2e$ per annum.[33] Directly supports the Air Quality Action Plan and helps to deliver the associated health benefits. Reduced congestion
c. Communicate and promote car sharing amongst public	Costs c. £100,000 in marketing to get 1000 cars off the road.[34] Staff time: accounted for elsewhere. TBC nominal cost of £10,000 per annum allocated.[1]	Develop a communications plan to promote car sharing Monitor and target communications Lead Authority: Highways	

Monitoring indicators:

- Review feasibility of introducing vehicle charges.
- Feed back on success of comms programme for car sharing.

Case Study: London Congestion Charge [35]

The introduction of a congestion charge in London reduced CO2 emissions by 16%. It also reduced congestion in central London by 26%.

Case Study: Nottinghamshare Carshare scheme [36]

Nottingham city council have partnered with Nottingham county council and others to launch an online portal which enables carsharing across Nottinghamshire. The site now has over 3,450 members.

Nottinghamshire County Council

5. Reduce Borough-wide Emissions/ External Policy

5.7 Reduce emissions from transport by providing incentives and infrastructure for electric vehicles

Target: 64% of cars are EV, PHEV or FCV by 2025.[37]

Initial Measure	Estimated Cost	Implementation	Benefits
a. Encourage taxi companies to move to low emission vehicles by supporting grants and providing incentives	£18,000 per annum (staff time) for an officer to work with taxi drivers.[38] £10,000 per annum for engagement. Plus £50,000 per annum capital grants.[1]	Assess the current uptake of electric vehicles and liaise with taxi drivers to understand barriers and potential incentives Provide support and guidance on applications for DfT plug in taxi grants Explore the potential of an older vehicle trade in scheme Explore potential for incentives to be provided by reducing licensing fees for electric vehicles Lead Authority: Highways	If all taxis were switched to electric vehicles, it could save approximately 2.7 $ktCO_2e$.[40] Directly supports the Air Quality Action Plan and helps to deliver the associated health benefits.
b. Enable the rapid shift to electric vehicles through putting in place EV charging	Staff time to support households and businesses in private installation (£18,000 per annum).[38] Funding is available to local authorities at 75% leaving £2,500 per charge point for the LA to fund. Estimated need of 168 charge points therefore costs in the region of £420,000.[39] £15,000 for strategy development. Plus £100,000 per annum capital.[1]	Research potential grants and funding that are available to local authorities Develop a strategic plan for the location of charging points Provide guidance for home owners on installing their own charging points Lead Authority: Highways	If 30% of vehicles switch to electric it would save approximately 143 $ktCO_2e$.[41] Directly supports the Air Quality Action Plan and helps to deliver the associated health benefits. This can also be encouraged amongst council staff to reduce their emissions from commuting.

Case Study: TfL[42]

TfL are aiming to deliver the greenest taxi fleet in the world. They plan to do this through introducing new licensing requirements for new taxis to be Zero Emission Capable (ZEC), providing grants for ZEC vehicles and reducing vehicle age limits.

5. Reduce Borough-wide Emissions/ External Policy

5.7 Reduce emissions from transport by providing incentives and infrastructure for electric vehicles			
Target: 64% of cars are EV, PHEV or FCV by 2025.[37]			
Initial Measure	Estimated Cost	Implementation	Benefits
c. Explore the potential to commission an Electric Vehicle car hire scheme across Cheshire East	Staff time to research and apply for grants and funding (£18,000 per annum).[38]	Research potential grants and existing schemes available e.g. Bristol's EV hire scheme was supported by the European Union's Horizon 2020 programme.[43] Assess the potential demand for car hire scheme in the borough. Lead Authority: Highways	See above.
Monitoring indicators: • Survey taxi fleet. • Review number of EV charging points across the borough.			

Case Study: Go Ultra Low Oxford [44]

The project has been awarded funding from OLEV (Office for Low Emission Vehicles) to cover a trial of charging infrastructure and a roll out 100 charge points. Alongside this, they have developed a bespoke concession framework where they lease charge points to commercial operators.

Case Study: Bristol Electric Car rental [43]

Part of Bristol's REPLICATE project includes a fleet of 10 new electric cars which available to rent by the public. The vehicles are hired out on a pay as you go basis from national car club company Co-Wheels.

5. Reduce Borough-wide Emissions/ External Policy

5.8 Encourage active forms of travel (zero emissions)

Target: Modal share of active transport is 6% by 2025.[45]

Initial Measure	Estimated Cost	Implementation	Benefits
a. Further encourage cycling through accelerating strategic high quality walking and cycle routes	Within current budgets/grants.[1] Variable on type of cycle route; range from £0.1-1m per km.[46] Resurfacing existing cycle paths (such as those in green areas or along waterways) are c. £0.18m per km. Laying urban cycle pathways (e.g. in Cheshire East towns) c. £0.75m per km	Funding allocated to improve infrastructure, feasibility assessment of local factors affecting costs, training and engagement sessions on safe road bike usage and culture shifting. Lead Authority: Highways	A 5% shift from miles travelled by car to miles travelled by bicycle saves an estimated 49 $ktCO_2e$ p.a. Cycling and walking offer a return of £5.50 for every £1 of investment as a result of savings arising from reduced congestion, as well as health benefits due to encouraged exercise and better air quality.
b. Seek opportunities to reallocate road space to pedestrians	Within current budgets/grants.[1] Cost of officer time in terms of conducting research into new opportunities.	Assess which regions of town centres would best serve being pedestrianised.[47, 48] Use learnings from Poynton shared space scheme, particularly around surface maintenance. Perform an assessment for the visually impaired and people with disabilities to ensure spaces are kept inclusive. Lead Authority: Highways	

Monitoring indicators:

- Confirm that reviews of cycle routes have been carried out.
- Confirm that a review of potential shared spaces has been carried out.

Case study: Newcastle-Gosforth route[46]

4.9 km route from Newcastle city centre to Gosforth is an exemplar redevelopment for similar urban areas as can be found in Cheshire East. Appointment of a Commissioner for Walking and Cycling in Greater Manchester has offered a focal point through which efforts and projects can be developed.

5. Reduce Borough-wide Emissions/ External Policy

5.9 Reducing emissions by encouraging the use of carbon neutral public transport

Target: By 2025 88% of buses are EV, PHEV or FCV and rail is 100% electrified.[49]

Initial Measure	Estimated Cost	Implementation	Benefits
a. Bus fleet switch to EV	Point cost of purchasing electric buses (c. £500k per bus)[50] TBC additional cost of £100,000 per annum allocated.[1]	Engagement with private service providers to match-fund or apply for national government/EU funding. A review of buses close to 'retirement' can be carried out to identify those first up for replacement. Average lifetime is approximately 8 years, so by 2030 almost entire fleet will become eligible for replacement.[50] Lead Authority: Highways/TSS	Using bus mileage data from DfT for Cheshire East and typical carbon footprint per unit distance of travel, emissions saving would be 6.4 $ktCO_2e$ p.a. if all buses were zero emissions. Including health and climate-related costs, electric buses are cheaper than their diesel equivalent by about 7%.[50] This gap will grow in size as the grid decarbonizes. Improved air quality and reduced investment in stranded assets.
b. Optimise total bus journey mileage by strategically assessing routes and maximising service efficiency	Within existing council resources:[1] Council to review routes/efficiency of service	Survey of bus patronage and service popularity to define which services are redundant/where bus routes can be made more efficient (applying results of 2017 consultation). This may mean extending some services or adjusting routes to encourage more people to take the bus. Lead Authority: Highways/TSS	Reducing the demand for buses will either directly reduce emissions (in the case of diesel buses) or reduce electricity demand (in the case of electric buses). 10% reduction in bus mileage due to efficiency savings is a saving of 0.6 $ktCO_2e$ p.a.

Case Study: First Bus [51]

First Bus now operate 741 electrified ancillary buses across the UK; vehicles are in excess of 30% more fuel efficient than the buses being replaced and buses have succeeded across a variety of route types inc. hilly routes in Sheffield and Bristol.

5. Reduce Borough-wide Emissions/ External Policy

5.9 Reducing emissions by encouraging the use of carbon neutral public transport

Target: By 2025, 88% of buses are EV, PHEV or FCV and rail is 100% electrified.[49]

Initial Measure	Estimated Cost	Implementation	Benefits
c. Facilitate the decarbonisation of rail	Within existing council resources:[1] Complex projects within the UK have estimated costs of c. £1.25m per km of single track railway. RIA Electrification Cost Challenge report suggests that this is likely to be improved by as much as 33-50% (European rail electrification projects are significantly cheaper)[52]	Monitor Growth Track 360 project to electrify the line between Crewe and North Wales; and explore the expansion of that initiative to other local lines within region. Feasibility assessment of electrification of lesser-used lines necessary. Lobby national government to accelerate electrification plans in the region. Support the introduction and development of hydrogen powered trains. Lead Authority: Highways	Electric trains also have better acceleration potential and saved wear on brakes compared to diesel trains (HS2 is currently scheduled to be completed in Crewe by 2027). Diesel trains emit c. 0.075 $kgCO_2$ per passenger km. Electric trains are significantly lighter than their diesel equivalents, so tracks require less maintenance.

Monitoring indicators:

- Survey bus fleet.
- Review bus patronage statistics and total mileage travelled by buses.
- Review update of HS2 from national government.

5. Reduce Borough-wide Emissions/ External Policy

5.10 Reducing emissions from road transport by improving infrastructure and efficiency.			
Target: By 2025, improve the efficiency of road transport through smart technology.			
Initial Measure	Estimated Cost	Implementation	Benefits
a. Embed smart technologies into highways and regeneration to maximise carbon efficiency	Requires assessment of current highways. TBC by council.	Review current infrastructure and technology currently employed on highways and identify key areas for improvement. Lead Authority: Economic Development with Highways	Carbon savings not possible to estimate in the absence of data of CE highways. Directly supports the Air Quality Action Plan and helps to deliver the associated health benefits.
Monitoring indicators: • Confirm the development of a strategy for technology and efficiency of highways.			

5. Reduce Borough-wide Emissions/ External Policy – Sources

5.1
1 – Based on Cheshire East Council estimates as documented within the internal document "Action Plan" 24/12/2019. Such information has not been subject to Anthesis' review or verification.
2 – See Section 5 of Supplementary Annex for full Method
3 – Camden Citizens' Assembly
4 – Oxford Citizens' Assembly
5 – London Climate Business Leader's Initiative

5.2
6 – Energy Saving Trust, 2019
7 – Ashden
8 – Based on an emissions footprint of 510 $ktCO_2e$ from domestic space and water heating within SCATTER baseline year inventory. Taken the proportion of private rented sector emissions to be 13% based on borough tenure statistics. It is also assumed that 6.3% of privately rented accommodation in the borough is below the required standard and that EPC Band D reflects an average energy efficiency performance improvement of 10% (Energy Saving Trust). Thus, the total reduced emissions would be equivalent to 510 * 0.13 * 0.063 * 0.1 = 0.4 $ktCO_2e$ p.a.
9- Energy Saving Trust 2019. Minimum Energy Efficiency Standards in the Private Rented Sector.
10 - Cornwall Council 2015: Cornwall Rental Standard.
11 – Assumed average retrofit point cost of £17,000 per property, having accounted for economies of scale, based on IET studies. Taking the number of social housing properties to be 18,176 (Cheshire East Council 2019), the total cost would be 17,000 * 18,176 = £309m.
12 - UK's housing stock 'needs massive retrofit to meet climate targets.'
13 – Assumed that 75% of 120,000 owner-occupied households were below EPC band C and that their emissions are reduced by 10% for each energy band they improve as a result of the retrofits to EPC band C standard. Using EPC data, the estimated banding split of those houses below band C are as follows: D – 61%, E – 28%, F – 8%, G – 3%. Given the emissions saving is a function of the number of EPC bandings a household improves by, a weighted emissions saving factor is calculated from the average occurrence of each EPC banding i.e. a 10% reduction in emissions is modelled to occur in 61% of retrofitted households, a 20% saving occurs in 28% of households and so on. Emissions reduction is then taken as (total residential emissions) * (proportion of privately owned houses that reach EPC band C) * (weighted emissions savings %). I.e. 510 * 0.76 * 0.75 * 0.153 = 44 $ktCO_2e$ p.a.. Note that this figure is not net of any future social housing to be built to A+/ Passivhaus standard.
14 – Energy Saving Trust
15 – As an example, Haringey is funding a team of 15 staff to achieve improvements to C or better in 86,000 non-council owned homes over next 15 years at an annual cost of £525,000, plus a further team of 12 to support households with accessing funding over the 15 year period at an annual cost of £420k (Ashden, 2019). The total cost of the project is £945,000 * 15 = £14,175,000 for 27 staff over 15 years.
Estimate is based on pro-rata scaling for the 120,000 owner-occupied households in Cheshire East (1.4x more than in Haringey), of which 75% are below EPC band C: £14,175,000 * 14 = £14,742,000 for 27 * 1.4 = 38 staff. To achieve this over a five year period, the cost would remain the same but 114 staff would be required.
16 – Assumed that 75% of 120,000 owner-occupied households were below EPC band C and that their emissions are reduced by 10% as a result of the retrofits. Emissions reduction is taken as (total residential emissions) * (proportion of privately owned houses below EPC band C) * (emissions reductions per house). I.e. 510 * 0.76 * 0.75 * 0.1 = 29 $ktCO_2e$ p.a..
17– Taken from Ashden: According to Zero Carbon Hub, annual CO_2 emissions from a new typical semi-detached house with a gas heating system (excluding emissions due to appliances and cooking) will be around 2.0 tonnes.

5.3
18 – Note this target is aligned with advice given to Parliament in March 2019 by representatives of organisations including the Committee of Climate Change and UK Green Buildings Council (A, B) on strengthening UK commercial buildings energy and carbon efficiency targets.
19 – Cost describes the capital investment in an officer team to oversee commercial decarbonization. Assuming salary implications of one programme manager and five officers over five years, anticipated costs would therefore be £200,000 * 5 = £1,000,000.
20 – We assume that SMEs in CE account for 45% of energy use from commercial heating/ cooling, lighting and appliances, which according to SCATTER total 138 $ktCO_2e$ p.a.. The current SME footprint is therefore assumed as 62 $ktCO_2e$ p.a.. In terms of the modelled reduction, we assumed that UK SMEs could improve their energy efficiency performance by 30% through energy improvements (BEIS, 2019). As such, to meet the 30% reduction target, 100% of CE's 20,000 SMEs would need to be improved. We assume here that 50% of those improvements would be met by 2025, resulting in a reduction in carbon footprint of 62 * 0.5 * 0.3 = 9.3 $ktCO_2e$ p.a. by 2025 (or 18.6 $ktCO_2e$ p.a. by 2030).
21 – Based on Ashden: 31 Climate Actions
22 – Decarbonising Greater Manchester's Existing Buildings. Report by Greater Manchester Combined Authority, 2019.
23 - Carbon Trust, 2019. Green Business Fund.

5.4
24 – Based on SCATTER Level 4 pathways tool (See Supplementary Annex)- there will be a 10% reduction in household waste as well as a 65% increase in recycling rates
25 – Zero Waste Scotland - Recycling and Transport
"As a rule of thumb, and based on the experience of a large number of UK local authorities, effective communications costs a minimum of £1.00 per household for ongoing communications." (=total £160,000 for CEC)
26 – Zero Waste Scotland - Improving Recycling by Communications
27 – Cheshire East Waste Data
28 – WRAP Waste Cheshire West and WRAP case study resulted in:
- Recycling rates increased from 34% in 08/09 to 48% in 09/10. Overall, recycling increased by 3,302 tonnes, of which 1,389 tonnes was dry recycling and 1,913 tonnes was composting.
- Participation in the service rose from 82% to 96% following the introduction of the new service.
- By diverting an additional 3,302 tonnes of waste from landfill to recycling (14% increase in recycling), Cheshire West would have saved 23 ktCO2e p.a.. To take Cheshire East from it's current recycling rate16 of 54% to the SCATTER target of 65% (11% increase in recycling) could be expected to save a similar amount of CO2e emissions (impact of landfill scenario - impact of recycling scenario = savings of ca. 23 ktCO2e).

5. Reduce Borough-wide Emissions/ External Policy

5.5
29 – The European Commission proposed an interim CO_2 reduction target of 15% by 2025 for all large trucks compared to 2019 levels. Improvements beyond the European Commission target of 15% reduction achieved by scaling up existing low emission HGV pilots and piloting new technologies.
30 - UCC research paper

5.6
31 - Based on SCATTER Level 4 pathways tool (See Supplementary Annex)- there will be a modal shift away from car transport, a 6% reduction in journeys by car.
32 – Full time officer salary to manage engagement estimated from Ashden. Charges would generate income to offset this salary.
33 – Based on data from Liftshare. Setting up a Liftshare scheme for a town costs <£50,000. Liftshare estimate that it costs an extra £20 in marketing to successfully recruit a member to the scheme. For every 5 members (5 x £20) it is assumed an increase of one 'sharing commuter'. For each saving commuter 1 tCO_2e p.a. is saved. It therefore costs c. £100,000 in marketing to take 1,000 cars off the road within the first year of the scheme. In Year 2, 80% of the commuters will still be sharing at no additional cost. For cost of £100k, would take 1000 cars off road savings 2 $ktCO_2e$ p.a.
34 – Savings based on Ashden estimates of pro-rata scaling against London congestion charge.
35 – London demand management and London congestion charge case studies
36 – Nottingham Case Study of a Liftshare scheme.

5.7
37 - Based on SCATTER Level 4 pathways tool (see Supplementary Annex)- 64% of cars are EV, PHEV or FCV.
38 – Based on Ashden estimation of 2 days a week of full-time officer salary.
39 – Based on Ashden pro-rata analysis of national charging point levels (Cheshire East has c. 0.6% of national population) giving 168 charging points. Cost of installation of these charging points is 168 * £2,500 = £420,000.
40 – CEC projects list indicate 790 licensed taxis across the borough. Average mileage: 42,000 km; emissions factor for petrol car: 0.135 $kgCO_2e/km$; emissions factor for EV car: 45 $kgCO_2e/km$. (Number of taxis) * (annual average mileage of one taxi) * (emissions factor of petrol car) = emissions from petrol taxis. Subtracting off the equivalent annual emissions of a 100% EV taxi fleet gives a net carbon saving of 2.7 $ktCO_2e$ p.a.
41 – Based on Ashden: assume 75% of road emissions arise from cars and vans; if 30% of cars and vans switch to EV and subsequently reduce emissions by 66%, then can estimate savings from on-road emissions in 2017 from SCATTER: 961 $ktCO_2e$ * 0.75 * 0.3 * 0.66 = 142.7 $ktCO_2e$
42 – TfL Case Study: Since 01/01/18, taxis presented for licensing for the first time are required to be zero emissions capable (ZEC). The threshold for this definition an emissions factor ≤ 0.5 $kgCO_2e/km$ and a minimum 30 mile zero emission range. First-time taxi vehicle licences are no longer granted to diesel taxis. ZEC taxis with petrol engines need to meet the Euro 6 emissions standards. Between 01/11/20 and 01/11/22 the age limit of Euro 3, 4 and 5 diesel taxis will be reduced by one year, each year.
43. Bristol Electric Car Rental Case Study
44 – Go Ultra Low Oxford, run by Oxford City Council and Oxfordshire County Council, is trialling six types of charging infrastructure over 12 months to assess their suitability for on-street charging in residential areas. The project was awarded £816,000 from the Office for Low Emission Vehicles (OLEV), which covers the capital costs of the trial and the subsequent roll-out of around 100 charge points. The charge points are then leased to commercial charge point operators for four years, with the option to extend the contract by a further four years.

5.8
45 – Based on SCATTER Level 4 pathways tool (see Supplementary Annex)- Modal shift away from cars and a subsequent increase in active transport to represent 6% of journeys.
46 – Cycling Route Costings
47 – Identifying shared spaces
48 – Rural shared spaces

5.9
49 – Based on SCATTER Level 4 pathways tool (see Supplementary Annex)- shift to electric buses and rail.
50 – Electric buses market review
51 – The Low Emission us Guide
52 – RIA electrification report

6. Summary of Measures

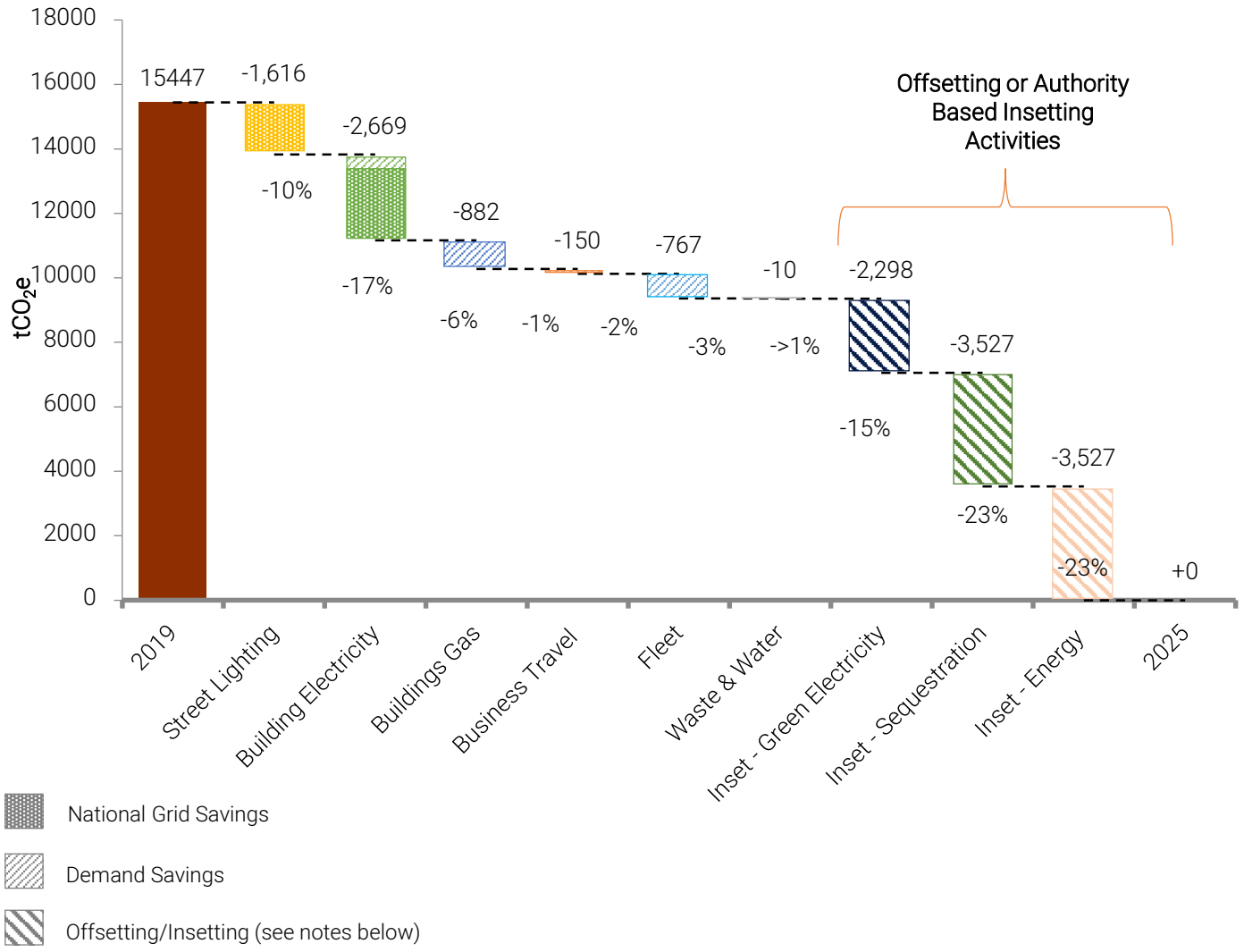
Introduction

The below chart represents an aggregation of the various council-led potential carbon savings from the above Action Plan.

Key Findings

- Outside of council-led action, there will be nationally led decarbonisation of the electricity grid which will reduce CEC emissions by 4,090 tCO_2e (a 26% reduction from 2018/19).
- Council-led actions and achievement of the set out targets in the Action Plan has the potential to add further 13% of savings at approximately 2,005 tCO_2e. (a 39% reduction from 2018/19 in total).
- The residual emissions remaining equals 9,352 tCO_2e, which could be offset, by tree-planting and other nature based solutions in the wider-borough.
- If the extent of tree planting and nature based solutions is not enough to offset all residual Direct Control emissions, the council may look to explore other borough-wide renewable energy and efficiency project as types of 'Authority Based Insetting'. Note that these should not be 'netted off' and would not constitute Carbon Neutrality under existing certified standard definitions (i.e. PAS 2060). Please see the 'Note on Insetting' overleaf for further details.

Figure 11: 2025 Emissions Reduction 'Waterfall' Chart for CEC Direct Emissions



6. Summary of Measures

Direct Control Savings

The key below outlines the basis for direct control savings. However, it is important to note the following key assumptions:

- The carbon savings totals may not be complete. There were various actions and measures within the Action Plan that could not be quantified.
- The carbon savings are based on the achievement of the overall target of actions that relate to the councils direct emissions. Due to limitations in accuracy of savings estimates and the availability of data, the extent of actions may not be complete and may not fully map to actions suggested in the Action Plan.
- There may be some double counting included within the measures. Due to the varied basis of the estimates (where often there was limited transparency over the methodology used by third parties), some measures may drive the same nature of action.
- The estimates themselves are based on third party proxies and are inherently limited in accuracy.
- CEC should look to perform more robust estimates of figures included and be sure to understand the assumptions made and limitations therein. The estimates are prudent, and not intended to constrain ambition and the council should look to go beyond the targets set.
- Supply and demand side interventions should not typically be added together (to avoid the risk of double counting); however have been presented on the same chart to illustrate the need to consider energy supply projects in the wider borough as one way of compensating for any unabated Directly Controlled emissions.
- CEC may look to add a 10% contingency should CEC not reduce direct emissions by the extent assumed above.

Green Electricity inset – The remaining emissions from electricity consumption from CEC buildings and street lighting is reduced through procuring green zero-emissions electricity. The remaining emissions from fleet is also reduced by ensuring the electricity supplying EVs is from 100% renewable sources.

Sequestration inset- Based on offsetting an arbitrary 50% of the residual emissions through application of nature based solutions (i.e. tree planting).

Renewable Energy or Efficiency inset- The remaining residual emissions after sequestration will relate to projects that are outside of CEC's influence and control, but may stand to benefit and realise additional, permanent, and verifiable carbon savings as a result of council action.

Street Lighting savings– Based on national grid decarbonisation (in line with national requirements). Reductions reflect the decarbonisation of the national grid (following the BEIS Energy and Emissions Projections). This does not include demand reductions as the council have already completed a project to switch to LED street lighting.

Owned Buildings Gas savings - Based upgrading the heating system and insulation of council-buildings reducing energy consumption for heating by 20% from Ashden estimations. Note this assumes there is no direct associated increase in electricity demand not accounted for, which may be the case if heat pump technology is installed in place of gas.

Fleet savings– There are 2 components to this saving: 100% of fleet being electric, which is on average reduces emissions from vehicles by 66%, with the exception of HGVs which track the target of 15% reduction in emissions from HGVs.

Business Travel savings - Based on reducing the need for business travel by 17%. Emissions reductions should be greater than this with a modal shift in travel methods, however in the absence of data providing a breakdown of business travel it is not possible to provide a savings estimate.

Owned Building Electricity savings– 93% of the total saving is based on national grid decarbonisation (in line with national requirements). The remaining saving is based on increasing staff awareness of energy efficiency measures, reducing emissions by 196 tCO_2. This number is based off achievements from other councils but CEC should look to go beyond this saving.

Waste and Water savings- Based on increased staff awareness and campaigns reducing emissions from waste by 10%. Savings from water are based on CEC's own assessment of potential emissions reductions.

6. Summary of Measures

Note on Insetting

Green Electricity

- Renewable electricity could be purchased to reduce any residual consumption in 2025. However, it is important to consider the quality and 'additionality' of purchased renewables to ensure that it is appropriate to claim a zero emissions 'market based' figure for Scope 2 electricity. For further details, please refer to the Appendix on Renewables Energy Purchasing within the Supplementary Annex.

Sequestration

- 'Offsetting' or 'Insetting' via tree planting and other nature-based solutions: If the council was to aim to further reduce the residual 2025 emissions through nature-based solutions by 50%, it would need to develop in the range of 141 Ha and 1,447 Ha of land to sequester carbon.
- The higher end assumes the trees are sequestering the equivalent of the council's 2025 emissions by 2025, whereas the lower end assumes sequestration by 2050. The former is more aligned with the science[1] whereas the latter is aligned with current national policy[2]
- Note existing tree stock and borough wide potential has been considered in the land and agricultural workings within the Supplementary Annex.
- It is important to acknowledge the important role of Council land in storing and sequestering carbon. Managing and maintaining this function is crucial in order to maintain the base levels of carbon storage assumed in this report.

Energy

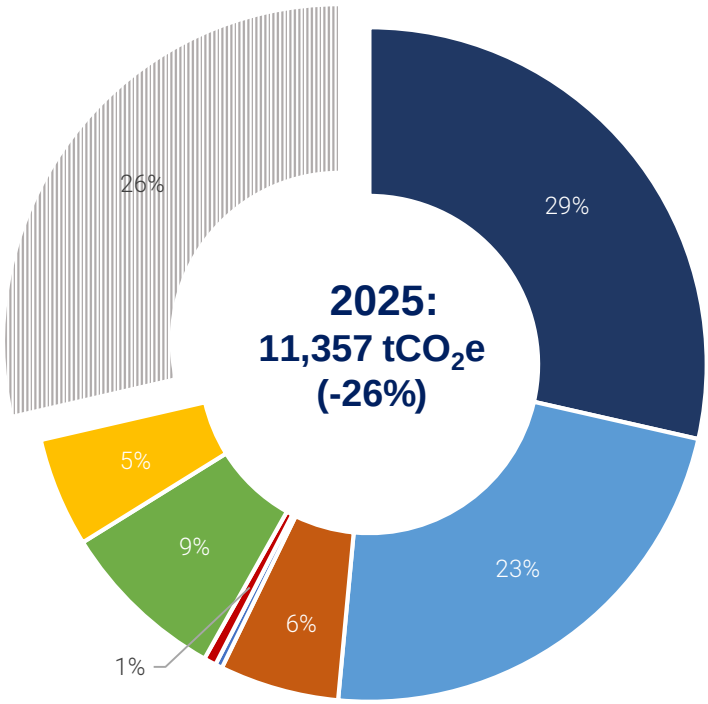
- This relates to renewable energy generation projects. This could be termed a type of 'Inset', which is defined here as other projects and initiatives within the Cheshire East Borough, whereby energy system emissions could be reduced due to council or action led by other businesses outside of CEC (but still within the borough). The term insetting has previously only been used with reference to an organisation's supply chain(s); however as part of this project, Cheshire East have sought to develop a version of this better tailored to Local Authorities.

1 – The Tyndall Centre for Climate Change Research https://carbonbudget.manchester.ac.uk/ present the concept of finite, carbon budgets at Local Authority level. This highlights that due to the cumulative impact of CO_2 on global heating, the emphasis of action needs to be urgent and focused on the short term. "Cheshire East will use this entire budget within 7 years [if unabated]."

2 – National policy does not yet stipulate how Net Zero should be achieved by 2050 or the trajectory required to get there. If only considering the end date of 2050, it may not be commensurate with the science, and irreversible climatic tipping points may occur before then. https://www.gov.uk/government/news/uk-becomes-first-major-economy-to-pass-net-zero-emissions-law

6. Summary of Measures

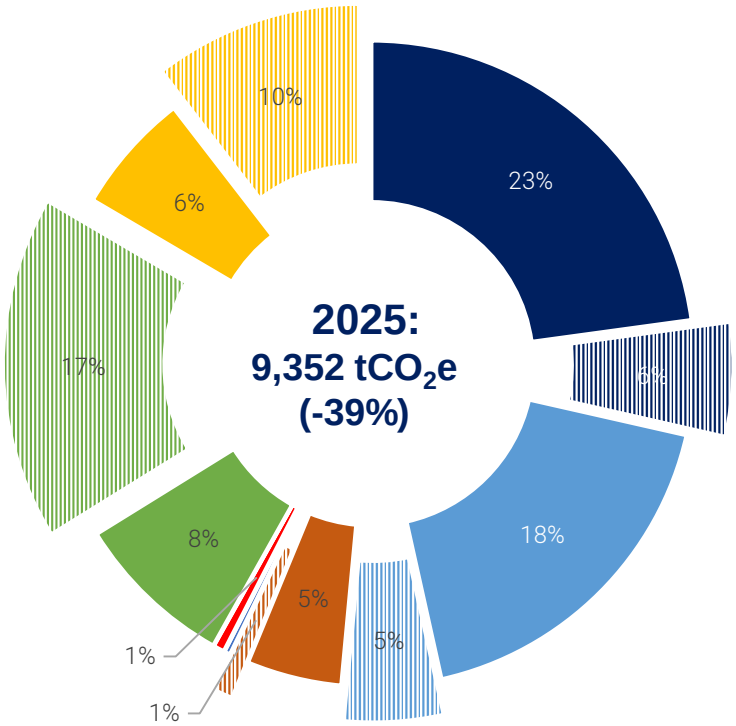
Figure 12: 2025 Emissions profile, grid decarbonisation only or 'BAU"



2025 emissions profile: Grid savings only ('Business-as-Usual')

The figure represents a business as usual scenario where the council do not take any further action and just allow the national grid to decarbonise (in line with national requirements). Reductions reflect the decarbonisation of the national grid (following the BEIS Energy and Emissions Projections).

Figure 13: tCO_2e by direct control activities with reductions



2025 emissions profile: Grid savings + Council Actions

If the council were to carry out the recommended actions and reach the targets set out in the Action Plan, then direct council emissions could by reduced by 2,005 tCO_2e. Please note: Due to limitations in accuracy of savings estimates, the extent of actions may not be complete and may not fully map to actions suggested in the action plan.

Total in the centre of the pie charts represent the total emissions in 2025 with savings applied (i.e. the total does not include the displaced, striped segments).
% reduction is in relation to emissions in 2018/19 in Figure 3.

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