Carbon Audit: Results and Recommendations

Breckland Council

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Draft Report – December 2020

Report for Breckland Council

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Executive Summary

Breckland Council commissioned Eunomia Research & Consulting to undertake a carbon audit of the authority assets and operations and provide recommendations with respect to setting a Net Zero target year. This report contains:

- Breckland Council's annual carbon footprint for the Financial Year 2019/20;
- A Carbon Management Plan summarising the key decisions and action timelines needed for each emissions area in Net Zero 2030, 2040 and 2050 scenarios; and
- Strategic advice on the key considerations involved in setting a Net Zero target date.

Carbon Footprint

The Council's assets and activity are responsible for 5,084 tCO_2e/year, which is spit by scope as shown in Table 1-1.

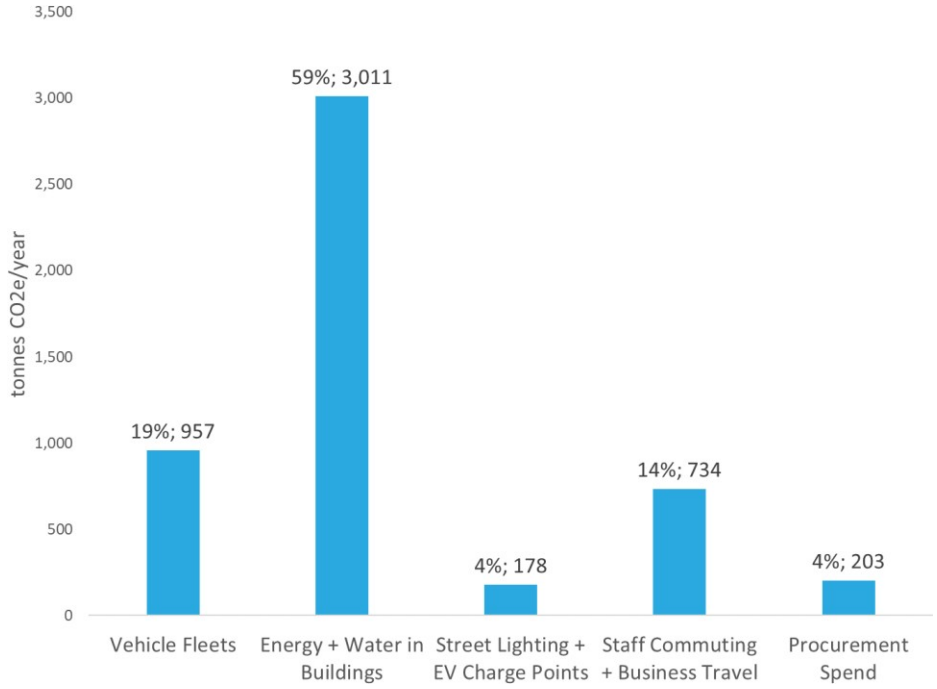
Table 1-1 Breckland Council's total carbon emissions by Scope

Scope	1	2	3
Emissions (tCO_2e/year)	12	239	4,833

Treatment of waste, which is not included in the general accounting, results in -5,890 tCO_2e/year. This value is negative because the Council's treatment of waste results in *avoided* emissions, principally through recycling. However, this negative value cannot be subtracted from the total emissions because it does not represent certified offsets and there is a legal obligation to collect and process waste.

Figure 1-1 breaks down the Council's carbon footprint into the major emissions categories. Energy and water use in buildings are responsible for more than half of all emissions. Of the emissions due to energy use in buildings, 96% is due to tenants' consumption and 4% the Council's. The Serco fleet of refuse collection and maintenance vehicles is responsible for approximately one-fifth of the footprint, and staff commuting and business travel in cars about 14%. Procurement spend, made up primarily of estimated emissions associated with staff pensions, is responsible for only 4% of emissions.

Figure 1-1 Breckland Council carbon footprint - major emissions categories



Carbon Management Plan

Error! Reference source not found. shows, for each major emissions category, the key actions that must be implemented in order to reach Net Zero. These timelines must therefore be taken into account when setting a Net Zero target year.

Key factors that will ensure success include:

- Including and consulting key partners (e.g. tenants and suppliers) to minimise disruption and potentially share funding burdens;
- Encouraging staff 'buy-in' to the process by incentivising low carbon behaviour and travel; and
- Aligning the timing of action implementation with asset end of life and technological development.

Box 1-1 Carbon Management Plan key actions

Energy efficiency in buildings

APPROACH: Reduce energy demand in buildings through e.g. insulation building management, efficient electrical equipment.

KEY ACTIONS/CONSIDERATIONS:

- Monitoring and planning should commence immediately to identify 'no-regrets' actions.
- Identify buildings where upgrades are impossible or uneconomical: a) remove from portfolio, b) proceed with low carbon heating system at higher cost, or c) continue with high-carbon building and offset emissions.
- Work with tenants to minimise disruption and harness co-funding opportunities.

Heat in buildings

APPROACH: Minimise carbon emissions from buildings by using low carbon heating technologies.

KEY ACTIONS/CONSIDERATIONS:

- Low carbon heat only appropriate in buildings with low energy use; must be done in conjunction with energy efficiency upgrades.
- The low carbon heating technologies most appropriate for buildings depend on the Net Zero target date: only heat pumps will be relevant before 2030; hydrogen boilers may be appropriate for 2040/2050.
- Work with tenants to minimise disruption and harness co-funding opportunities.
- Work with tenants to minimise disruption and harness co-funding opportunities.

Electricity

APPROACH: Reduce electricity consumption, self-generate green electricity, purchase green power.

KEY ACTIONS/CONSIDERATIONS:

- A green tariff is a good first step to decarbonising electricity, but more should be done.
- Reduce consumption across the estate e.g. through LED street lighting – a 'no-regrets' action.
- Assess the feasibility of solar PV installations on Council land, which can also generate revenue.
- Communicate with neighbouring Councils to assess the possibility of establishing a Power Purchase Agreement with a renewable power generator.

Commercial transport

APPROACH: Reduce transport activity where possible, and transition fleets to low carbon alternatives like electric (EV) or hydrogen vehicles.

KEY ACTIONS/CONSIDERATIONS:

- Vehicles at end of life should be replaced by EVs throughout 2020s; hydrogen vehicles unlikely to be viable alternatives in 2030 scenario.
- Tender for, and work with suppliers, to establish low carbon vehicle contracts.
- The waste collection fleet was recently renewed so cannot and should not be tackled until late 2020s.
- If transitioning to EVs, electrical grid upgrades may be needed at building depots to large-scale support charging.

Commuting and business travel

APPROACH: Follow the 'transport hierarchy' to reduce emissions from commuting and business travel.

KEY ACTIONS/CONSIDERATIONS:

- Reduce transport needs as far as possible through home working, transition to low carbon, 'active' transport (cycling and walking) – provide loans for bike purchases.
- Incentivise public transport use where possible – provide loans for season tickets.
- Avoid car use as far as possible.

Procurement

APPROACH: Minimise emissions from purchased goods and services such as equipment and pensions.

KEY ACTIONS/CONSIDERATIONS:

- Generally 'no-regrets' actions and should be implemented where possible in the coming years.
- Reduce the need for goods and services; update procurement frameworks to integrate Net Zero ambitions; work with suppliers to help them align Net Zero ambitions; ensure pension and investment portfolios have set tangible emissions reductions targets.

Setting a Net Zero Target Date

The process of setting this target date should consider the evidence and strategic advice set out in the Carbon Management Plan as well as further considerations:

- A later Net Zero target date leads to a **higher contribution to climate change**, because emissions tend to continue for longer, and because the slower pace of change leads to higher emissions in the immediate future.
- The **technical capability exists to tackle the majority of emissions** before 2030. However, some Scope 3 consumption, like vehicle commuting for staff with accessibility issues, will be unavoidable for the foreseeable future and the Council will have a **residual carbon footprint** in 2030 (and probably 2040) scenarios: see Table 1-3. Good-quality offsetting must be used to balance this final residual footprint, however the Cabinet intends to use offsetting as little as possible and so this residual will be a key consideration.
- The Net Zero target date could have an impact on the **Council's reputation**. A 2030 target would align the Council with the majority of UK Local Authorities in becoming an environmental leader, however a missed target could cause reputational damage.

Table 1-2 summarises the arguments put forward in Section 4.0, describing the main positive and negative considerations that the Council must take into account when setting its Net Zero target year.

Table 1-2 Net Zero target date advantages and disadvantages comparison

	Net Zero 2030	Net Zero 2040	Net Zero 2050
+	• Least contribution to climate change • Gain a reputation as environmental leader • Stimulate local green economy • Improve health of staff • Operational cost savings/ revenue generation	• Less costly than 2030 • Many of the changes would happen anyway as part of national transition • Less disruption to partners, tenants	• Lowest cost pathway • Least disruption to partners, tenants
-	• Most costly • Possible reputational damage through missed targets • Disruption to partners, tenants	• Considerably greater contribution to climate change • Will be in the bottom half for Net Zero ambition amongst Councils • Possible reputational damage	• May surpass internationally 'fair' carbon allowance with greatest contribution to climate change • Will be amongst the least ambitious Local Authorities

Table 1-3 Residual emissions that will likely be outstanding at each target year

Scope	Net Zero 2030	Net Zero 2040	Net Zero 2050
1	• Benefits enforcement team fleet [some influence on partner LAs' ambition]	• None	• None
2	• None	• None	• None
3	• Commuting [some influence] • Potentially: contracted waste fleet [some influence] • Tenant electricity consumption [some influence on green tariffs] • Some procured goods [high influence]	• Some commuting [some influence] • Potentially: tenant electricity consumption [likely most switch to green tariff] • Some procured goods [high influence]	• None

Contents

1.0 Structure of this Report

This report is made up of three main sections, as well as a Technical Appendix:

1) This section presents the

2) **Carbon** Footprint of Breckland Council's (the Council) activity in the financial year 2019/20. This section describes the general methods used to calculate this footprint (with more detailed methods given in the Technical Appendix), as well as the results of the footprint.
3) The **Carbon Management Plan** presents a brief, strategic overview of the steps that must be taken to achieve Net Zero carbon emissions by 2030, 2040 or 2050. The aim of this Plan is to provide an initial basis on which the Council sets its Net Zero target year, with the technological options available under each scenario being described and compared. An approximate strategic timeline is then given for each source of emissions, which sets out the actions required and the decisions that need to be made to meet each Net Zero target.
4) Finally, in the context of **setting a Net Zero target date**, the findings of the Carbon Management Plan are discussed alongside further considerations including:
    a. The effect of the target date on cumulative emissions and climate change;
    b. The Council's residual emissions; and
    c. Reputational considerations.

2.0 Carbon Footprint

The Council's baseline carbon footprint, which represents the emissions generated by the organisation over the 2019/20 financial year, is the foundation of its Carbon Management Plan and the net-zero target year it chooses to set.

Following conventional organisational footprinting methods[1], the carbon footprint quantifies all emissions arising from the Council's activities and assets. This includes:

- Energy and water use buildings and outdoor sites owned by the Council (even if they are leased out to other organisations; emissions from the use of leased out assets must be included in an organisation footprint);
- Fuel use vehicles owned by the Council or joint-owned/operated with partner Local Authorities;
- Fuel use vehicles in vehicles contracted by the Council (e.g. for waste collection);
- Council staff and member travel;
- Procured goods and services (e.g. office equipment and pensions).

2.1 Methodology and Key Accounting Considerations

The overall methodology used to calculate the Council's total carbon footprint is explained in this section. More detail on these methods is given in the Technical Appendix A.2.0, in particular where more specific methods were used (for example when building energy consumption data were unavailable).

The accounting of electricity purchased through a 'green' tariff and the emissions from waste treatment are explained below (Sections 2.1.3 and 2.1.4), as they are particularly noteworthy deviations from the methods applied to other emissions sources.

2.1.1 General methodology

Consumption data were provided by the Council across its activities. These data include, for example, the consumption of natural gas and electricity (kWh) across the Council's estate and the amount of money spent on procuring office equipment (£). See Table 2-2 for a full breakdown and description of emissions sources.

Total GHG emissions (measured in 'carbon dioxide equivalents', a metric used to compare the emissions from the various greenhouse gases) were then calculated by multiplying these consumption data by their 'emissions intensities,' the amount of GHG emissions that one 'unit' of that consumption category leads to. These emissions intensities were collected from a range of reliable Government and academic databases, which are detailed in the Technical Appendix A.2.0. The emission from each source is then summed to provide the overall carbon footprint for the Council.

[1] World Business Council for Sustainable Development, and World Resources Institute (2015) The Greenhouse Gas Protocol, p.116

In this accounting, emissions from buildings are broken down into two general categories: those whose billing is managed by the Council, and those who manage their own billing. This is done because of the difference in data availability for the two categories.

Another key distinction in building type is those properties occupied and operated by the Council, and those that are leased to tenants. This distinction does not affect the overall carbon footprint analysis. This distinction is important in understanding how easy emissions will be to tackle, as those properties operated by the Council will be easier to undertake works on.

2.1.2 Buildings not currently operating

Two Council buildings, Elm Road homeless shelter (under construction) and the Roman House offices (operational hiatus), were not fully operational during the studied period. However, the emissions at these sites were estimated and included as it is anticipated that they will contribute to the Council's carbon footprint in the future. Tackling them must be included in the Carbon Management Plan.

Because no energy consumption data were available from which to calculate emissions, these buildings' footprints were estimated by comparing to similar buildings owned by the Council. More detailed explanations are given in the Technical Appendix (A.2.2).

2.1.3 Emissions from electricity purchased through a 'green tariff'

Breckland Council uses a 'green' electricity tariff that covers properties where the Council is responsible for billing[2]. Under this green tariff, Renewable Energy Guarantees of Origin (REGOs) are bought which equal the Council's consumption from generators of electricity. These certificates guarantee that the electricity 'comes from' renewable sources.

As explained in more detail in the Technical Appendix (Section A.2.2.2), there are two methods for accounting for the carbon emissions from an organisation's electricity consumption. The 'market-based' method assumes that green tariffs provide carbon-free electricity, while the 'location-based' method assumes that production of electricity purchased through a green tariff emits the same amount of carbon dioxide as that purchased from the UK's national grid. Clearly, the method used will impact Breckland Council's carbon footprint.

This report principally uses the location-based method, meaning all electricity is considered to emit carbon at the same rate as electricity from the National Grid, but key figures are given using both methods in order to illustrate the effect of the green tariff.[3] This approach is taken not because there is no merit to using a green tariff; there are of course considerable benefits such as potentially lower (and more stable) energy costs, lower environmental impact and improved reputation. Rather, omitting any carbon emissions

[2] This includes the buildings that are owned and billed by the Council (27-39 Turbine Way, the Green Britain Centre, Elizabeth House, Breckland Business Centres at Dereham and Thetford, John Room House and Elm Road shelter) and street lighting. This does not include consumption by tenants at the Riverside complex at Thetford, the two leisure centres leased out by the Council and electric vehicle charging points.

[3] Electricity emissions calculated assuming that electricity on the green tariff are zero-carbon are given in brackets, with a 'dagger' symbol: †.

from electricity from the accounting would imply that nothing further can be done to reduce them, which is not the case, and would limit opportunities to reap further benefits from on-site renewable electricity generation and energy efficiency.

2.1.4 Waste treatment

The treatment of waste collected from residents and businesses is accounted for separately in this report, meaning that emissions are not included in the total footprint. This is done for two reasons[4]:

1) While the council has some influence over how waste is managed, the quantities and types of waste are to a large extent the responsibility of residents and businesses. It is therefore useful to present waste as a separate emissions category; and
2) Waste treatment leads to greenhouse gases like the methane being emitted from decomposing food waste and the CO_2 from burning waste in an Energy from Waste incinerator. Some forms of waste treatment can also lead to *reduced* emissions overall, for example through avoiding virgin material use via recycling, and displacing fossil fuel electricity generation through Energy from Waste.

   Such analysis of the Council's waste treatment shows net negative emissions when recycling and composting of garden waste are included. This emissions saving is difficult to capture in a conventional Scope 1-3 breakdown, and may also lead to a perverse incentive to increase waste production, which would not conform with the traditional waste hierarchy. The emissions cannot be combined with or subtracted from the rest of the footprint as, while they are avoided emissions, they do not represent certified offsets and there is a legal obligation to collect and process waste.

2.2 Results: Baseline Carbon Footprint

The Council's carbon emissions, broken down by overall Scope, category and emissions source, are presented graphically and described in this section.

2.2.1 Emissions by Scope

Organisational emissions accounting breaks a carbon footprint down into three emissions Scopes. The results of this section can be used by the Council for reporting purposes. Table 2-1 defines each of these Scopes with respect to the Council's carbon footprint and gives their annual emissions contributions.

[4] Note that the emissions from waste collection vehicles have been included.

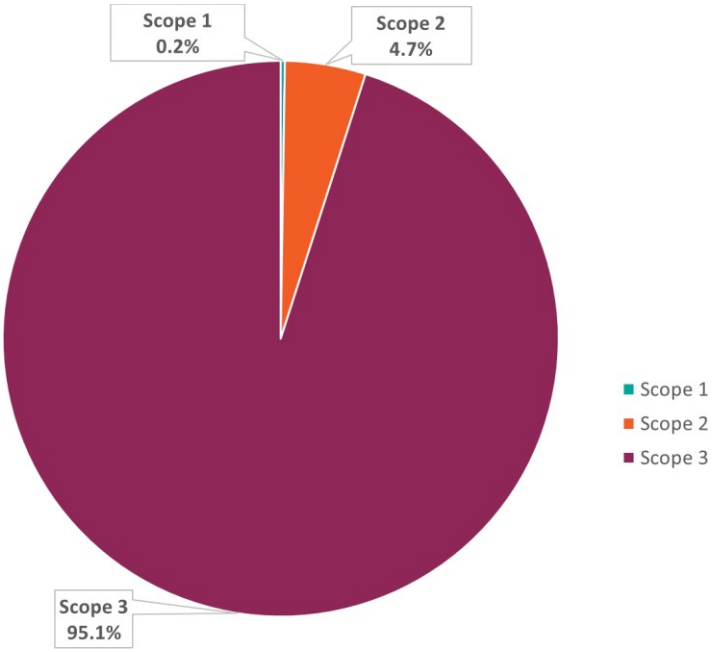
Table 2-1: Summary of baseline footprint by emissions Scope

Emissions Category	Description	tonnes CO_2e/year[5]
Scope 1	The emissions generated directly from the Council's assets when operated by the Council. This includes: • using gas boilers to heat the buildings owned and operated (i.e. used) by the Council, • fuel use in Council fleet vehicles.	12
Scope 2	The emissions from electricity use including: • the buildings owned and operated by the Council (inc. communal areas at the Riverside complex), street lighting and EV charging points.	239 (2†)
Scope 3	A broad category containing all emissions sources that are 'upstream' and 'downstream' from the Council's direct activity. The major source of emissions here is associated with energy consumption in buildings owned but not operated by the Council (i.e. leased out). Other large Scope 3 sources include contracted vehicle fleets, commuting, procured goods and services, and expensed travel. Electricity and gas consumption also result in 'upstream' emissions associated with delivery of energy, which is included in this category.	4,833 (4,537†)
Total		**5,084 (4,551†)**
Waste	The emissions from Breckland Council's treatment of residents' and business' waste (see Section 2.1.4): • residual waste sent for incineration, • dry recyclables, • garden waste sent to open windrow composting.	-5,890[6]

The breakdown of Breckland's carbon footprint by Scope is also shown in Figure 2-1.

[5] Emissions when electricity purchased through a green tariff is counted as zero-carbon are given in brackets alongside the † symbol.
[6] This is negative as it includes both emissions from treatment (positive emissions), and the emissions avoided by recycling instead of using virgin material (negative emissions).

Figure 2-1: Breckland Council emissions by scope (tonnes CO2e/year)



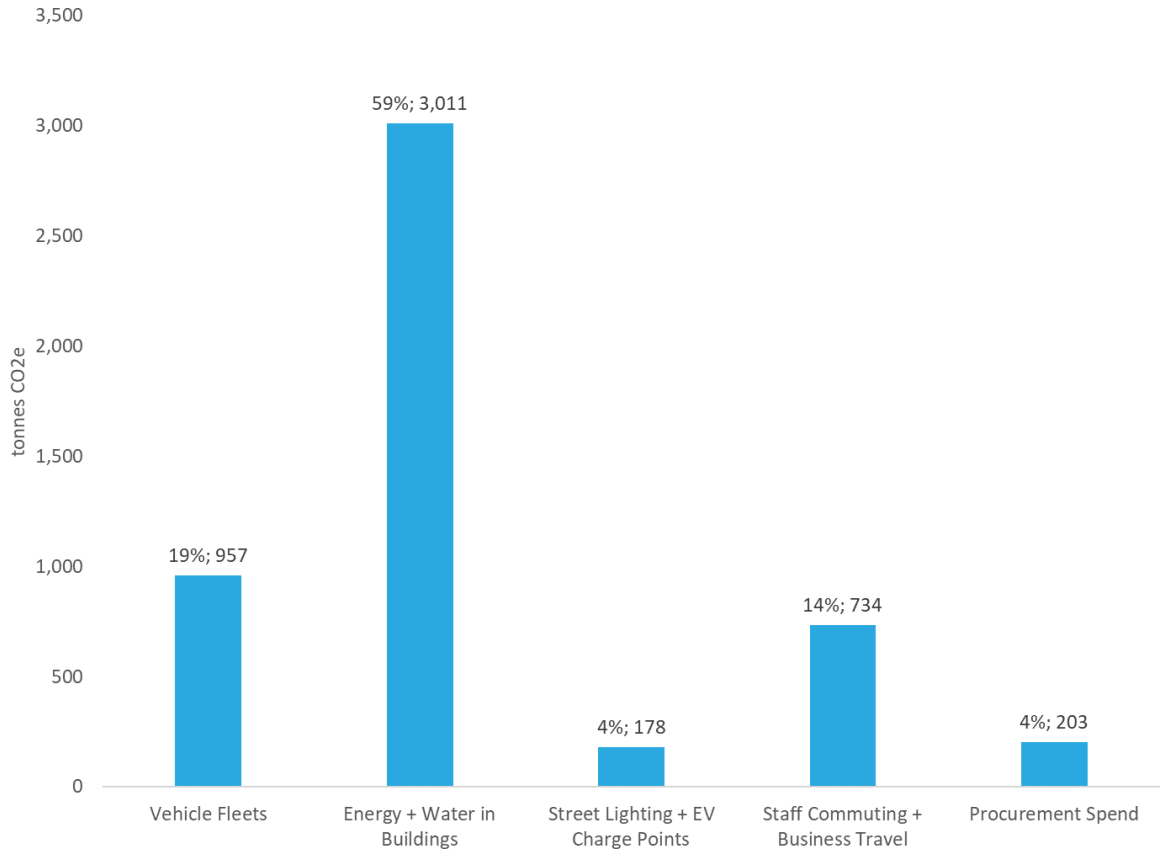
- **Scope 1** emissions – direct emissions from the burning of natural gas in boilers in buildings or fuel in vehicles which are operated by the Council – account for almost no emissions.
- **Scope 2** emissions, from electricity use in properties operated by the Council (Elizabeth House, street lighting and shared areas in the Riverside complex), account for just 5% of emissions, 239 tCO_2e/year. This is falls to just 2 tCO_2e when electricity purchased through a green tariff is discounted.
- **Scope 3** emissions account for the remainder (4,833 tCO_2e). This is largely due to emissions from energy use in buildings owned by the Council but operated by tenants, as well as the contracted Serco fleet of refuse collection and grounds maintenance vehicles. These emissions are discussed further in Section 2.2.2.

While emissions Scopes help create consistency between organisations in terms of emissions reporting, they do not necessarily help Local Authorities think clearly about where they have the greatest opportunity to reduce emissions. This is because local authorities often have a reasonable extent of control over some Scope 3 emission sources even if it is not their activity which is causing them – a fact that is not clearly conveyed by Figure 2-1. The following sections provide a more granular breakdown of where emissions are generated across the Council's assets and activity, to demonstrate priority areas for emission reductions.

2.2.2 Emissions by category

Figure 2-2 shows the Council's total carbon footprint (Scopes 1-3), separated into the major emissions categories. As is shown, buildings account for 59% of all emissions, while use of vehicles (the Serco fleet, the benefits enforcement team, staff commuting and business travel) accounts for a quarter of the footprint. Electricity use outside buildings for street lighting and EV charge points, as well as procurement of goods and services (e.g. IT equipment) have a relatively small carbon footprint.

Figure 2-2 Breckland Council carbon footprint - major emissions categories



2.2.3 Emissions by source

Table 2-2 breaks down the Council's footprint into emission sources. This table is intended to provide a detailed level of insight into where emissions are generated across the Council. Note that the table also shows the 'upstream' energy emissions associated with the provision of energy, like efficiency losses in transmission; these emissions fall into the Scope 3 category.

Unlike in the 'Emissions by Scope' section, here emissions from buildings are broken down into those billed by the Council and those where the tenant manages their own billing. This is due to the relative availability of data for those two categories.

Table 2-2: Summary of baseline footprint by emissions source, in descending order

Category	Total emissions (tCO_2e)	of which is upstream energy emissions (tCO_2e)
Buildings not billed by the Council (natural gas)	1,778	205
Serco Fleet	950	183

Category	Total emissions (tCO_2e)	of which is upstream energy emissions (tCO_2e)
Staff Commuting	640	N/A
Buildings not billed by the Council (electricity)	595	114
Buildings billed by the Council (electricity)	357 (0†)	68 (0†)
Buildings billed by the Council (natural gas)	250	29
Procurement Spend	200	N/A
Street Lighting	176 (0†)	34(0†)
Staff Business Travel	94	N/A
Buildings Owned and Leased (Water)	26	N/A
Owned Fleet	7	1
Buildings Owned and Operated (Water)	6	N/A
Expensed Taxis	3	N/A
EV charging points	2	0
Total	**5,084 (4,551†)**	**633 (531†)**
Waste	**-5,890**	N/A

As shown in Figure 2-3, the majority of Breckland Council's emissions come from heat and electricity use in buildings (2,980 tCO_2e), notably natural gas used in properties which the Council does not manage billing for (1,778 tCO_2e).

The refuse collection vehicles (RCV) and other vehicles operated by Serco maintenance are a considerable source of emissions for the Council. Street lighting is similarly a considerable emitter, however it is noted that there is already a program of LED replacement underway so this should reduce over time, and this electricity falls under the green tariff. Conversely, emissions from electricity use at electric vehicle (EV) charging points, while small now, may increase into the future as electric fleets and personal vehicles become more popular.

Water accounts for a relatively small contribution to total emissions. The majority of water is consumed, unsurprisingly, in the two leisure centres operated externally.

Figure 2-3: Breakdown of emissions generated by council vehicles and properties (green = fuel, orange = electricity, purple = water) (4,146 tCO_2e)

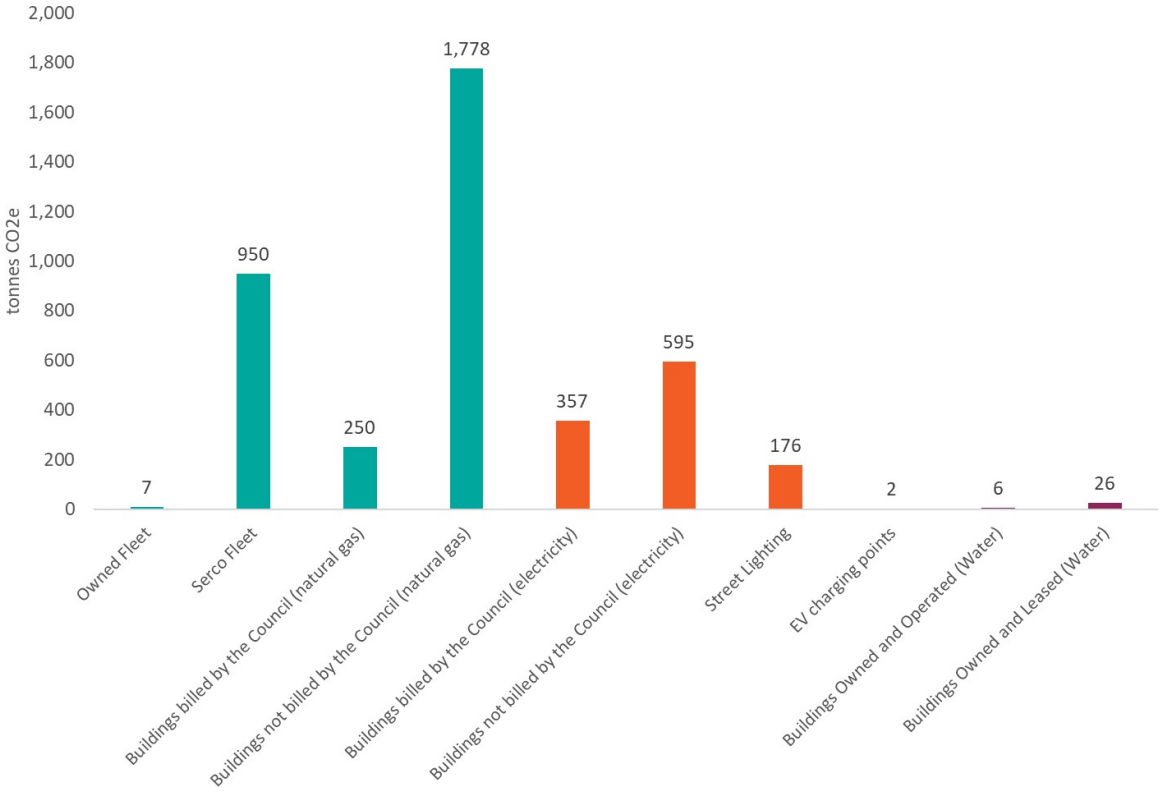
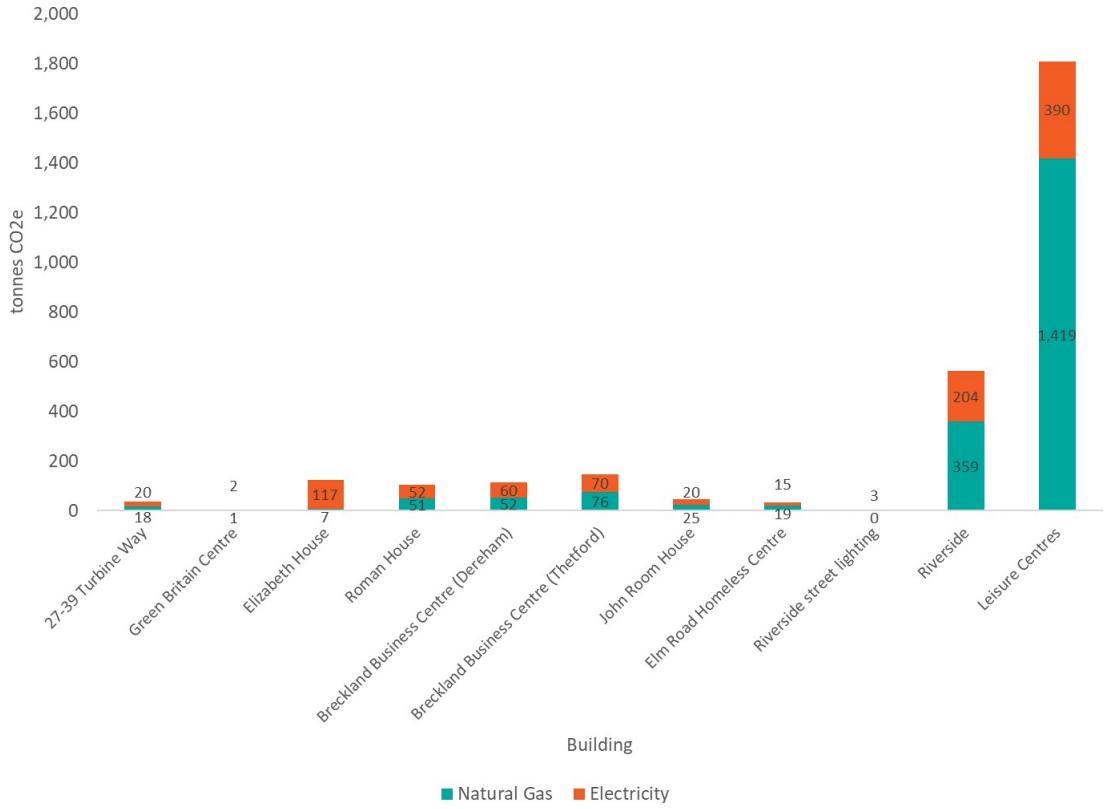


Figure 2-4 shows the emissions from natural gas and electricity used in the Council's building portfolio. About 68% of these emissions come from burning natural gas to heat space and water, with gas consumption in the leisure centres alone (which are operated externally) contributing half of all building emissions, and 28% of the Council's total footprint.

Figure 2-4 Emissions from natural gas and electricity use in the Council's building portfolio (2,982 tCO_2e)



Electricity and gas use in the hotel, restaurant, 24-hour gym and cinema at the Riverside complex in Thetford are also notable sources of emissions. However, it should be noted that these contributions were estimated using the property sizes and general consumption data from the literature (this estimation is explained in more detail in Appendix A.2.2.1), as no specific consumption data were available. The Council should aim to obtain these data to understand with greater confidence the emissions from the Riverside complex.

The balance of emissions from natural gas and electricity use at Elizabeth House is not the same as the other similar buildings owned by the Council, with electricity being the dominant source. This is because the building uses electric heating, with natural gas used only to heat water. This will have implications for tackling emissions from this building. Conversely, natural gas is the dominant source of emissions that the Council's leisure centres; here Combined Heat and Power (CHP) boilers burn natural gas to produce their own electricity, with the residual heat then being used to provide heat throughout the complexes. Hence, electricity purchases from the grid are significantly lower.

Figure 2-5 shows the emissions from natural gas and electricity consumption in buildings, split by building operator. As the Council leases out the majority of the buildings it owns, tenants are responsible for the great majority of consumption. As explained the Carbon Management Plan, this has a bearing on the Council's decarbonisation strategy, because implemented carbon reductions in buildings not operated by the Council will require co-operation from other stakeholders.

Figure 2-5 Emissions from buildings by building operator (Council or tenant)

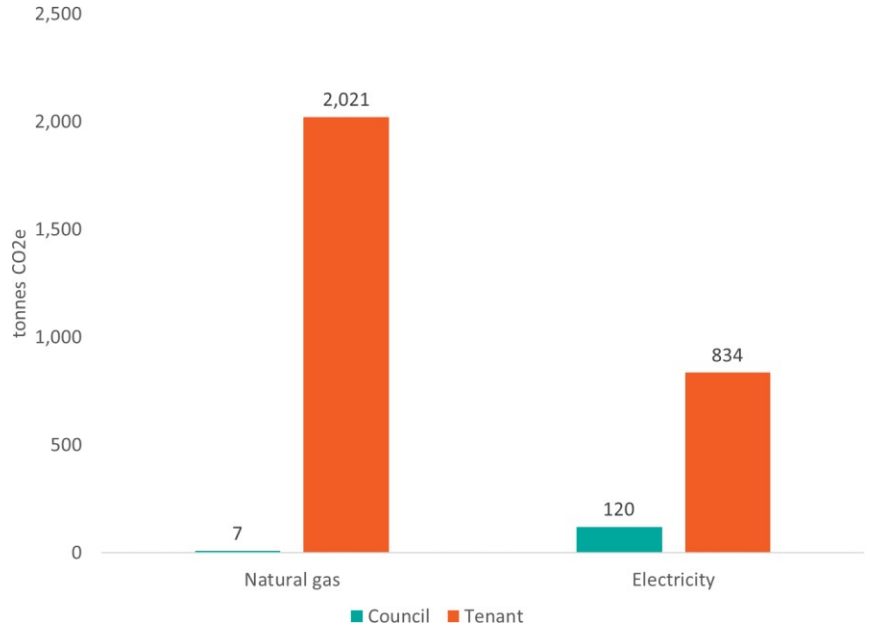
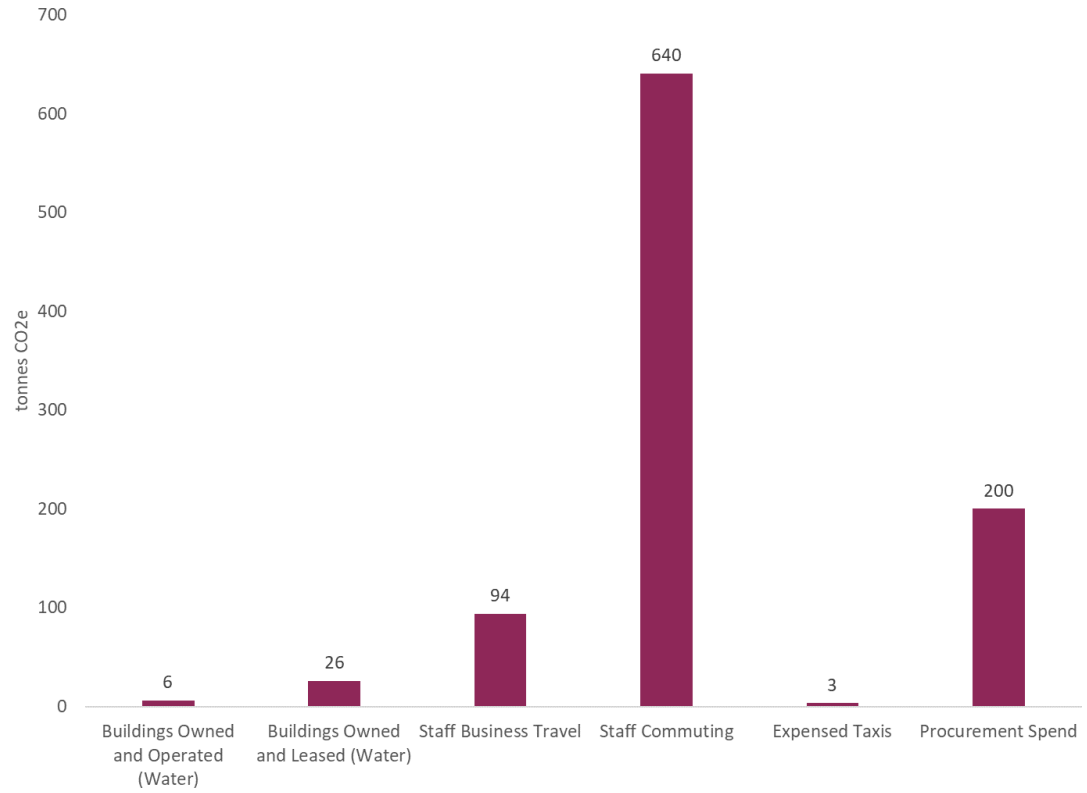


Figure 2-6 shows the Council's emissions from Scope 3 sources: those emissions not caused directly by the Council's consumption of energy. Note that, for simplicity, this graph does not include the indirect 'upstream' emissions that result from consuming electricity or fuel (e.g. the emissions associated with losses in the National Grid). Staff commuting by car to both primary and secondary offices accounts for two-thirds of Scope 3 sources (this is also a considerable 13% of all Council emissions).

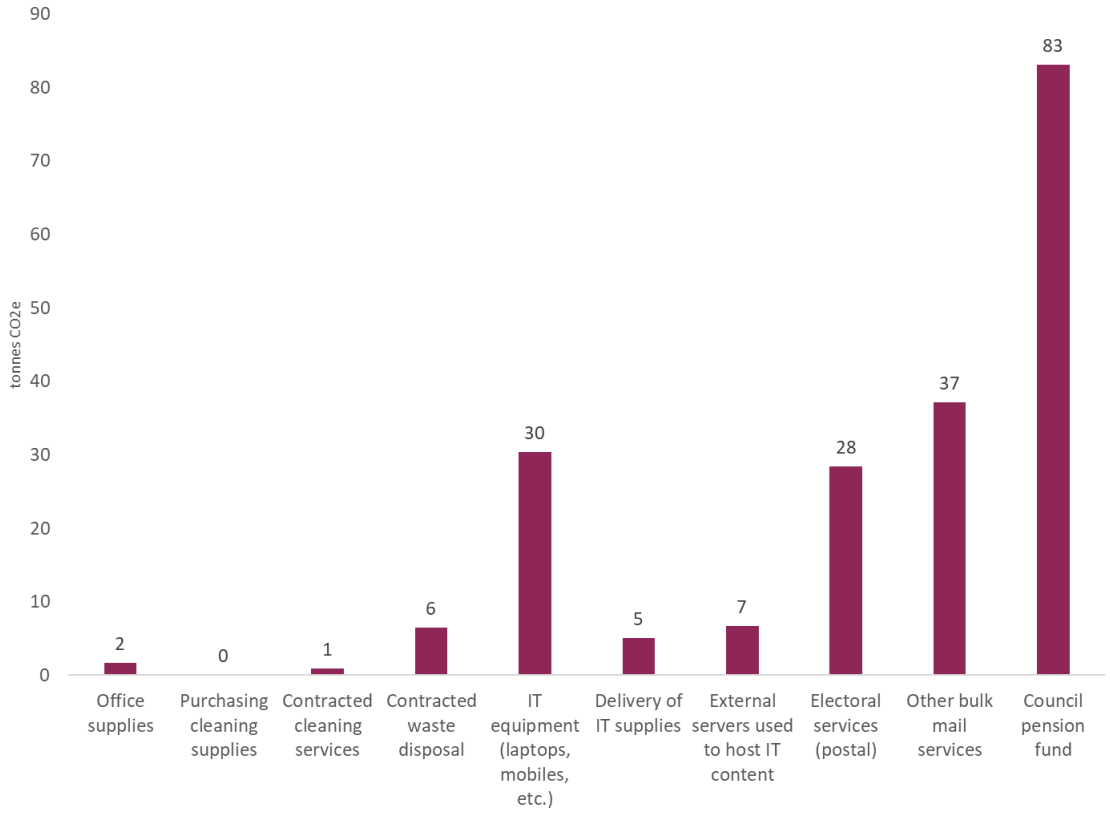
Figure 2-6: Scope 3 emissions (969 tCO_2e)



Procurement of goods and services (shown in more detail in Figure 2-7) accounts for a further 21% of Scope 3 emissions. The Council pension fund dominates this procurement figure, however it must be noted that, because of a lack of data, *this is an 'order of magnitude' calculation* based on the size of the Council's staff and Eunomia's experience from its work with other Local Authorities.

Calculation of these procurement emissions use generalised carbon emissions factors for each category, with the categories themselves being fairly generalised. Readers should note therefore that estimates for emissions associated with procurement of goods and services have a high degree of uncertainty, but that – given their relatively small contribution overall – this uncertainty is not considered critical to the conclusions found in this report.

Figure 2-7 Breakdown of emissions from procurement of goods and services (200 tCO_2e)



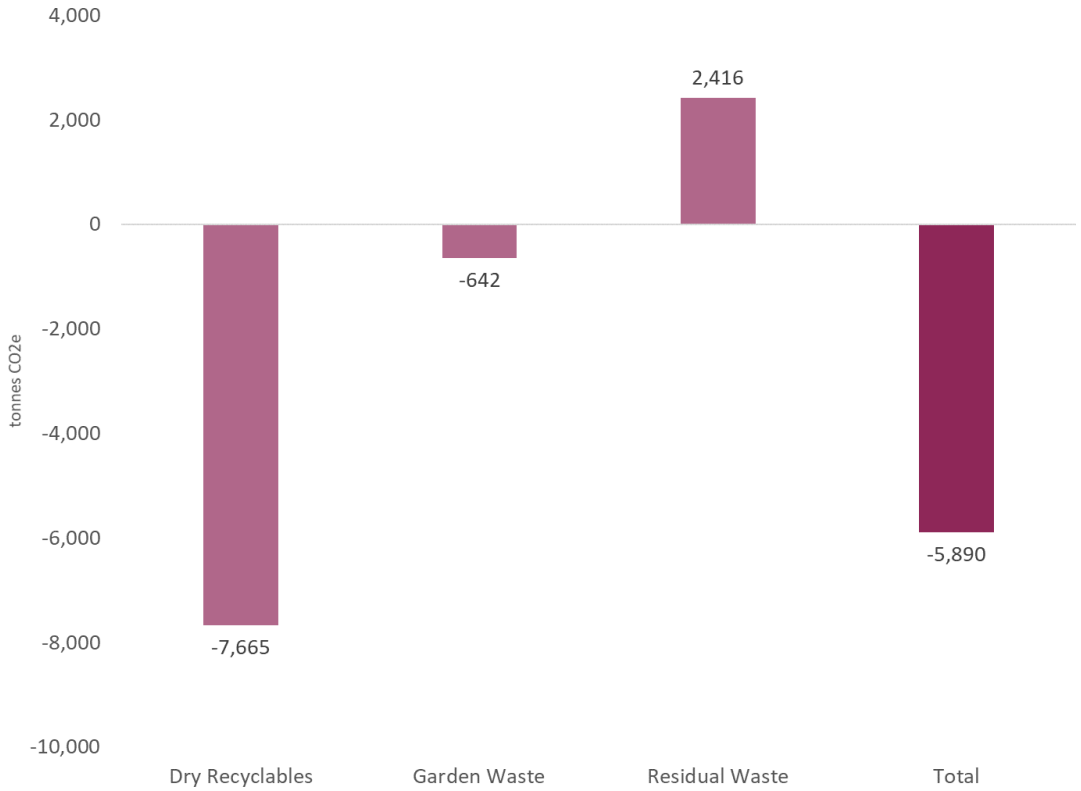
2.2.4 Waste treatment

Figure 2-8 shows a breakdown of emissions from the treatment of waste. This does not include the emissions from collection of waste, which are included in the 'Serco fleet' category in the main accounting. Waste treatment emissions are not included in the summaries above because of the separate accounting techniques needed and the limited control that the Council has over residents' and business' waste.

The following figures have been produced using Eunomia's in-house waste footprinting tool and the waste stream composition of Breckland's 'nearest neighbour', South Somerset District Council. The 'nearest neighbour' is the Local Authority that is found through Eunomia's 'Benchmarking' tool[7] to be the most aligned with Breckland in terms of various socio-demographic criteria.

- Positive numbers indicate where emissions are generated, primarily through processing energy demand and the direct emissions released during incineration.
- The negative numbers indicate areas where emissions are saved through the recycling of dry recyclables, as well as garden waste. These figures are calculated using the assumption that the recycled materials displace the use of virgin materials for new products (or fertiliser in the case of garden waste).

Figure 2-8 Emissions from waste treatment



[7] Eunomia Research & Consulting *Benchmarker*, https://www.eunomia.co.uk/services/local-environment/tools/benchmarker/

It is not possible to address opportunities for reducing emission from waste in detail within the scope of this report, because little is known about the composition of the waste and the possibility for changing treatment infrastructure. However, some opportunities are apparent. Emissions reductions can be achieved by reducing the quantities of plastics and textiles being sent for incineration, as these are responsible for the majority of the carbon emissions. In addition, further work to increase the recycling rate will help avoid emissions from virgin materials (where virgin materials are displaced).

3.0 Carbon Management Plan

The Carbon Management Plan presented here is a brief, strategic overview of the steps that must be taken to achieve Net Zero carbon emissions by 2030, 2040 or 2050. The aim of this Plan is to provide an initial basis on which the Council sets its Net Zero target year. The technological options that will be available under each scenario are described and compared[8]; a case study is given in which a Local Authority has successfully taken steps to reduce each source of emissions.

An approximate strategic timeline is then given for each source of emissions, setting out the actions required and the decisions that need to be made in order to meet each Net Zero target. To achieve Net Zero emissions Breckland will need to reduce emissions as far as possible, and then compensate for remaining emissions by investing in carbon offsetting projects.

As identified in the

[8] The Plan considers emissions from existing buildings only, and not new projects. New construction must be built with zero-carbon in mind, using heat pumps are heat networks, and insulated to a high level.

Carbon Footprint, Breckland Council's activity is responsible for 5,084 tonnes of CO_2e per year, however not all of this falls under the direct control of the Council. In particular, emissions from water consumption, staff commuting and energy consumption by tenants require engagement with other parties to achieve. Indeed, it is highly unlikely that the Council will be able to eliminate all emissions in the medium-term. Table 3-1 gives an overview of the major categories of measures that we will need to be taken in order to progress towards net zero.

Table 3-1: Overview of recommended carbon reduction measures and their applications

Measure	Emissions	Description
Energy efficiency	Existing Buildings	Reduction of energy consumption in buildings (e.g. through insulation)
Heat in existing buildings	Existing Buildings	Installing low carbon heating (e.g. heat pumps) in buildings
Electricity	Existing buildings, electric vehicles	A green energy tariff is a good start, but local Purchase Power Agreements (PPAs) would further reduce environmental impact
Commercial transport	Vehicle fleet	Transition the council's fleet of owned vehicles, and the vehicles it leases, to electric
Commuting and business travel	Commuting	Encourage a shift from car use to active travel, working from home, and public transport
Green procurement	Procurement and pensions	Establish a green procurement strategy in line with Net Zero agenda that ensures suppliers are reducing their own emissions and aims to minimise consumption

3.1 Energy Efficiency in Existing Buildings

Energy efficiency measures help reduce demand for heat, minimising the power requirements of new heating systems and reducing long term costs. Improving energy efficiency in buildings is an important precursor to installing low carbon heating solutions. The appropriate efficiency measures are specific to each building, but generally include:

- insulation and draught-stripping;
- building management systems and behaviour change; and
- efficient electricity equipment such as lighting (LEDs) and computers/servers/computing equipment.

Before any improvements can be made, the correct actions for each building must be identified through building energy surveys carried out by qualified assessors. Installing sub-building level smart meters across the estate will help develop a detailed level of understanding of how to prioritise interventions.

In some buildings, energy efficiency improvements may be economically or logistically unviable. In this case, the Council must decide whether to a) remove the building from its portfolio, b) proceed with operating a low carbon heating system (see Heat in Existing Buildings) at a higher cost, or c) continue to use a high-carbon building and offset the emissions.

When viable, improving energy efficiency is often an environmental/economic win-win, as reducing consumption will lead to savings on energy bills. Therefore, across all three scenarios we recommend starting planning in the coming years as a priority action for the decarbonisation agenda. This will identify where the Council could make cost savings, visible demonstration of which could incentivise earlier action elsewhere.

Implementing actions in buildings that the Council owns and operates (e.g. Elizabeth House) should be relatively straightforward; the Council will be the sole funder and beneficiary of the works, as well as the only entity that will be affected by any disruption caused. This will not be the case for buildings leased to other operators, who need to be included in the planning process as their operations could be affected. It is important that tenants are consulted on actions and timelines – these tenants may also be willing to contribute to funding installations as they will be the beneficiaries of energy savings.

A timeline of actions needed to meet Net Zero in each of the target years is shown in Table 3-2.

Case Study: Energy Performance Contracts, Peterborough City Council

- Peterborough City Council agreed an innovative 'energy performance contract' to install £7.5m worth of energy efficiency upgrades in its leisure buildings, admin offices, schools and car parks (private financing was permitted under the contact)
- Upgrades included new building management systems, air handling units, lighting systems, combined heat and power units, and pool filtration systems
- It is expected to save £10.1m over 10 years, and the contract stipulates that if the council does not make energy bill savings, the contractor will pay

Carbon Savings

✓ The improvements are expected to generate over 934 MWh of electricity savings and around 2.14 GWh of gas savings per annum (equivalent to approximately 620 tonnes of CO_2e)

Table 3-2: Energy efficiency timeline under each scenario.

(Note that there is overlap with the Decarbonising Heating timeline – these actions should be co-ordinated together)

Timeline	Net Zero 2030	Net Zero 2040	Net Zero 2050
2021-2023	• Research available Government/other funding • Contract building energy surveys for each site, including specific building action plans • Implement a programme of smart meter energy monitoring • Establish funding model for building upgrades • Engage tenants to establish co-operative plan to implement and fund building works	• Research available Government/other funding • Contract building energy surveys for each site, including specific building action plans • Implement a programme of smart meter energy monitoring	• Research available Government/other funding • Contract building energy surveys for each site, including specific building action plans • Implement a programme of smart meter energy monitoring
2023-2025	• Begin implementing energy efficiency measures in operated buildings, as decided in specific building action plans • Prioritise buildings with lower energy efficiency ratings • Identify any buildings where energy efficiency unviable and determine whether to retain and offset emissions, or dispose of the building	• Implement 'no-regrets' actions that will save money and energy in buildings operated by the Council • Establish funding model for wider upgrades	• Implement 'no-regrets' actions that will save money and energy in buildings operated by the Council • Establish funding model for wider upgrades
2025-2030	• Complete energy efficiency measures in operated buildings • Begin and complete energy efficiency improvements in buildings operated by tenants	• Identify any buildings where energy efficiency unviable and determine whether to retain and offset emissions, or dispose of the building • Begin wider rollout of energy efficiency measures across self-operated properties • Engage tenants to establish co-operative plan for implementing and funding building works, using results from own experience	• Identify any buildings where energy efficiency unviable and determine whether to retain and offset emissions, or dispose of the building • Begin wider rollout of energy efficiency measures across self-operated properties • Engage tenants to establish co-operative plan for implementing and funding building works, using results from own experience
2030-2035	• Continue to implement energy efficiency measures as they are developed and become cost effective	• Continue rollout of energy efficiency measures across self-operated properties • Begin rollout of energy efficiency measures across tenanted properties	• Complete energy efficiency improvements across the estate
2035-2040		• Complete energy efficiency improvements across the estate	

3.2 Heat in Existing Buildings

Decarbonising heat in buildings will require the installation of low carbon heating systems (see Table 3-3 for scenario timelines). This is most efficient from energy and economic perspectives when the buildings have low heat demand i.e. when they are energy efficient. Therefore, installing low carbon heating systems should be done in conjunction with improving building energy efficiency, and not before.

There are three major types of low carbon technology which will be used in the UK:

- **Heat pumps** are technologies which use electricity and ambient warmth to generate heat. These technologies are **well-established** and are particularly cost-effective at large scale, for example in leisure centres. Therefore, in many instances they could be implemented immediately. However, heat pumps may still lead to carbon emissions, depending on the source of the electricity used to power them. If this power is purchased from the National Grid, the associated emissions will fall as the grid decarbonises; if it uses self-generated renewable energy, emissions will be low.
- **District heat networks** provide heat from centralised power stations, energy-from-waste incinerators, or other waste hear sources through underground pipes. Heat networks are **established technology but not common** in the UK; it is unlikely that they could be used to decarbonise Council heating by 2030 as the council estate is not large enough for a dedicated heat network, and so this would require significant collaboration with other parties. It also requires a high density of heat demand to make it viable, which is usually only evident in cities and where there is significant industrial demand. As a result, it is unlikely that heat networks will be a relevant technology for Breckland Council.
- **Hydrogen gas** can be burnt in specialised boilers to produce heat, in a similar way to natural gas. Whilst there are existing proof-of-concept boilers, the production and distribution technologies are **not well-established**. There is currently no hydrogen distribution system or production of the gas at scale. Additionally, hydrogen production at present is carbon intensive as it is sourced from petrochemicals. Work is being conducted to make 'green' hydrogen production more cost-effective but this, along with the distribution technologies, are many years from realisation. For these reasons, it would not be possible to base a 2030 Net Zero ambition on using hydrogen in buildings. While development of this technology is predicted to be high over the next two decades, it cannot be guaranteed at this stage that it would be possible to use at all sites in 2040 either.

Case Study: Energy Performance Contracts, Peterborough City Council

- A new heating system in a council owned sheltered housing property in Maidenbower, West Sussex
- They installed a 70kW water source heat pump to replace the two existing boilers, alongside a brand-new backup boiler, a new radiator programme and a complete plant room upgrade
- A project of this size will earn c£8,000 per annum in Renewable Heat Incentive payments for 20 years, and the fuel cost saving will be approximately 10%

Savings

- ✓ The improvements are expected to generate over 934 MWh of electricity savings and around 2.14 GWh of gas savings per annum
- ✓ This is equivalent to approximately 620 tonnes of CO_2e
- ✓ £1.1m savings in the first year

As with energy efficiency improvements, decarbonising heat in buildings must be done in conjunction with tenants. Further, low carbon heating improvements may be economically or logistically unviable in some buildings. In this case, the Council must decide whether to remove the building from its portfolio or continue to use the high-carbon building and offset the emissions.

Table 3-3 Decarbonising heating timeline under each scenario

(Note that there is overlap with the Decarbonising Heating timeline – these actions should be co-ordinated together)

Timeline	Net Zero 2030	Net Zero 2040	Net Zero 2050
2021-2023	• Research available Government/other funding • Contract building energy surveys for each site, including specific building action plans • Establish funding model for heating upgrades • Engage tenants to establish co-operative plan for implementing and funding building works	-	-
2023-2025	• Begin installing heat pump in buildings, as decided in specific building action plans • Prioritise buildings with lower energy efficiency ratings and older heating systems • Identify any buildings where energy efficiency unviable and determine whether to retain and offset emissions, or dispose of the building	-	-
2025-2030	• Complete heat pump installations in buildings	• Research available Government/other funding • Contract building energy surveys for each site • Replace boilers with heat pumps when decommissioning • Review heat network opportunities	• Research available Government/other funding • Contract building energy surveys for each site • Replace boilers with heat pumps when decommissioning • Review heat network opportunities
2030-2035	-	• Establish funding model for wider upgrades • By early 2030s make informed decision on the feasibility of hydrogen and heat networks • Continue heat pump installations where only feasible technology	• Establish funding model for wider upgrades • By 2035 make informed decision on the feasibility of hydrogen and heat networks • Begin heat pump installations where only feasible technology

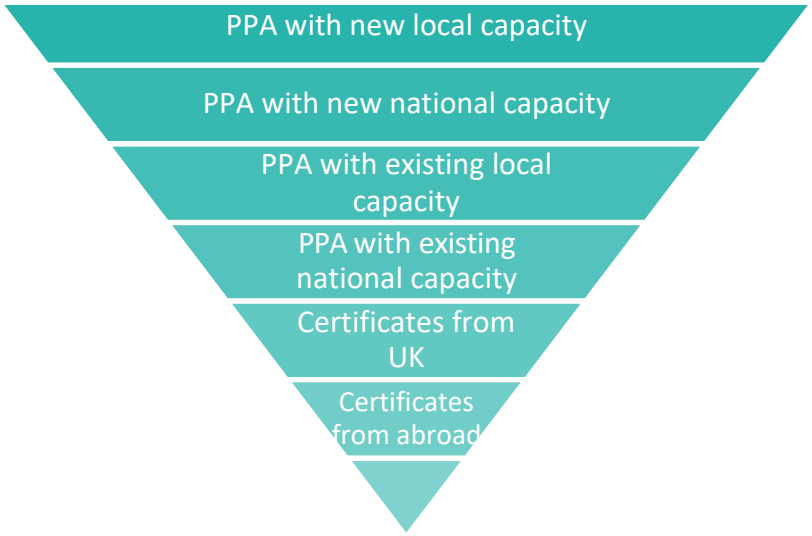
Timeline	Net Zero 2030	Net Zero 2040	Net Zero 2050
2035-2040	-	• Complete installation of appropriate heating technologies	
2040-2050	-	-	• Complete installation of appropriate heating technologies

3.3 Electricity

At the sites it controls billing for, Breckland Council already purchases electricity through a 'green' tariff, meaning every unit of electricity is matched by a 'Renewable Energy Guarantee of Origin,' a certificate guaranteeing that the electricity was produced by a renewable source. This is good progress towards meeting Net Zero ambitions, but more can be done to decarbonise the Council's electricity supply (noting that reductions in consumption should always be prioritised). As with energy efficiency improvements, on-site generation of renewable electricity can be profitable in the long-term, so is worth scoping immediately. Furthermore, the Council's electricity consumption is likely to increase as consumption switches from conventional fuels to electricity.

Error! Reference source not found. shows an indicative 'hierarchy' that shows the relative benefit brought about through different methods of sourcing renewable electricity.

Figure 3-1 Hierarchy of renewable energy sourcing



- Installation of renewable electricity, likely to be solar PV should be pursued on Council land where possible. Selling excess electricity to the grid would bring additional revenue, however installations can be costly and Government support was recently removed.
- The next best option would see the Council form a long-term agreement to purchase electricity *directly* from a renewable energy generator planning to build capacity – a Power Purchase Agreement (PPA). This is preferable to a green tariff because it guarantees revenue for renewable generators and de-risks their investment, thereby leading to renewable energy investment. A PPA could be formed with other councils.

Case Study: City of London/Voltalia PPA

- A £40m agreement to buy green electricity from solar PV to be installed in Dorset
- This funding led to this 49 MW project becoming financially viable without subsidy

Financial Benefits

- The City's governing body expects to save £3m

Table 3-4 Decarbonising electricity timeline under each scenario

<table>
<tr><th>Timeline</th><th>Net Zero 2030</th><th>Net Zero 2040</th><th>Net Zero 2050</th></tr>
<tr><td>2021-2023</td><td>• Assess the possibility of establishing a Power Purchase Agreement (PPA) with neighbouring councils
• Contract an estate-wide renewable energy scoping study on buildings and other land
• Work with tenants to encourage them to access renewable electricity
• Continue and complete LED installations across buildings and street lighting</td><td colspan="2" rowspan="2">• Contract an estate-wide renewable energy scoping study on buildings and other land
• Launch program of solar PV installation where possible
• Continue and complete LED installations across buildings and street lighting</td></tr>
<tr><td>2023-2025</td><td>• Develop and implement PPA contract
• Launch program of solar PV installation where possible</td></tr>
<tr><td>2025-2030</td><td>• Develop and implement PPA contract
• Continue solar PV installations</td><td colspan="2" rowspan="2">• Continue solar PV installations where profitable
• Work with tenants to encourage them to access renewable electricity</td></tr>
<tr><td>2030-2035</td><td rowspan="3">• Continue solar PV installations where profitable</td></tr>
<tr><td>2035-2040</td><td>• Assess the possibility of establishing a Power Purchase Agreement (PPA) with neighbouring councils
• Develop and implement PPA contract</td><td>• Continue solar PV installations where profitable</td></tr>
<tr><td>2040-2050</td><td>• Continue solar PV installations where profitable</td><td>• Assess the possibility of establishing a Power Purchase Agreement (PPA) with neighbouring councils
• Develop and implement PPA contract</td></tr>
</table>

3.4 Commercial Transport

As with other sources of carbon emissions, the best strategy for decarbonising transport usually involves reduction of the activity. However, there will always be a need for some forms of transport, for example that associated with site maintenance and waste collection. The residual emissions from such activities must therefore be tackled. It is noted that the vehicles used to collect waste in Breckland are relatively new and so major changes to the fleet will probably not be possible nor desirable for several years. Furthmore, some types of transport demand are shared with other councils (e.g. benefits enforcement); these Councils should collaborate to achieve low carbon transport. There are two principal low carbon transport technologies:

- **Electric vehicles** have electric motors that use power from the grid, or on-site renewables, instead of burning diesel or petrol. When used in conjunction with a Power Purchase Agreement, this electricity is low carbon, where conventional fuels emit CO_2 when burnt. Electric cars and maintenance vehicles are widely available and are quickly becoming cheaper across their life than fossil fuel equivalents. Larger vehicles like refuse collection vehicles (RCVs) exist but are not as technologically developed and are more expensive, however their costs are falling.[9]
  Electric vehicles use charging points. The economics of installing charging infrastructure depend on the size of the fleet; a large enough fleet would require upgrades to grid connections, which are costly. While the Council's own fleet is probably small enough to use a handful of charging points and not require large-scale connections, converting a larger fleet of RCVs may require substantial upgrades
- **Hydrogen vehicles** either burn hydrogen gas in an internal combustion engine or use hydrogen fuel cells to create electricity. They are not as widespread as EVs, and the technology and fuel supply are not widely established. Nonetheless, hydrogen vehicles are seen by some as preferable to electric vehicles for larger vehicles because of their higher range. It is unlikely that converting the fleets owned and contracted by the Council will be possible before 2030. It may be possible to store hydrogen fuel at the vehicle depot in a similar way to diesel (i.e. not requiring infrastructural upgrades like improved electricity grid connections.

Case Study: Electric Vehicle Roll Out, Nottingham City Council

- Goal of converting 22% of fleet to Ultra Low Emission Vehicles by 2022
- Have achieved 50 ULEVs, including electric street sweepers, refuse collection vehicles cars and vans
- Some sources suggest electric refuse collection vehicles have a 10-year life span—to a petrol vehicle's seven

Carbon and Cost Savings

- ✓ A current Euro 6 diesel engine RCV generates 27 tonnes of CO_2 each year. That's 270 tonnes of CO_2 over the lifespan of an electric bin lorry that would be saved by switching.
- ✓ The fuel savings for each vehicle will be about £10,000 per year, on top of the cheaper maintenance costs saving an additional £6,000 per year

[9] Eunomia Research & Consulting Ltd (2020) *Ditching Diesel - A Cost-Benefit Analysis of Electric RCVs*, January 2020, https://www.eunomia.co.uk/reports-tools/ditching-diesel-analysis-electric-refuse-collection-vehicles/

Table 3-5 Decarbonising commercial transport timeline under each scenario

Timeline	Net Zero 2030	Net Zero 2040	Net Zero 2050
2021-2023	• Establish working group to determine how transport needs can be reduced across Council activities • Replace smaller vehicles which are the end of their life with EVs	• Establish working group to determine how transport needs can be reduced across Council activities • Replace smaller vehicles which are the end of their life with EVs	• Establish working group to determine how transport needs can be reduced across Council activities
2023-2025	• Implement transport reduction actions where possible • Replace smaller vehicles which are the end of their life with EVs	• Implement transport reduction actions where possible • Replace smaller vehicles which are the end of their life with EVs	• Implement transport reduction actions where possible
2025-2030	• Convert (or tender for) electric-RCV fleet	• Determine need for depot electricity connection upgrades • Make informed decision on using hydrogen for larger vehicles when current RCV fleet at end of life • Convert (or tender for) electric- or hydrogen-RCV fleet or	• Determine need for depot electricity connection upgrades • Make informed decision on using hydrogen for larger vehicles when current RCV fleet at end of life • Convert (or tender for) electric- or hydrogen-RCV fleet or
2030-2035	-	-	• Replace smaller vehicles which are the end of their life with EVs
2035-2040			
2040-2050	• Convert to hydrogen vehicles if this becomes economical		• Replace smaller vehicles which are the end of their life with EVs

3.5 Commuting and Business Travel

Commuting and business travel do not fall under the Council's direct control, meaning it may not be possible to totally decarbonise this area. This is not to say that progress cannot be made in this area, however, because most of the Council staff drives to work. The Council should follow a hierarchy which prioritises travel reduction:

- **Minimise travel** needs by encouraging working from home and online meetings to reduce travelling between offices and facilitating ride-sharing (e.g. through an app).
- **Active travel** – walking and cycling – is zero carbon and has excellent health benefits. Around 40% of staff live within about 5 miles of their office. The council could encourage active travel through promoting the Cycle to Work scheme (through which an employee gets a 0% interest loan to pay for a bike).
- **Public transport** results in significantly lower emissions than using a car. As Breckland is a rural county, public transport provision is not as widespread as in cities, but the Council could support its use where possible by providing Season Ticket loans.
- **Private taxis and ride sharing** (e.g. facilitated through an app) reduce the number of person-miles travelled, and therefore carbon emissions.

Implementing this travel hierarchy will help reduce Breckland's carbon footprint and improve the health of its staff at relatively little cost to the Council. It is therefore recommended to make as much progress as possible regardless of the Net Zero target date set.

Case Study: Beat the Street active travel game, Colchester Borough Council

- A two-week program which rewarded local residents with points and prizes for exploring the town on foot or by bicycle
- In total, more than 13,000 residents took part, running, walking and cycling almost 100,000 miles over the seven weeks

Social Benefits

- ✓ The proportion of people reporting as inactive (doing 0-30 minutes of exercise in the past week) decreased from 12% to 8%
- ✓ The proportion of adults walking or cycling for travel for 10 minutes or longer, on five or more days in the past week, increased from 65% before Beat the Street to 68% immediately after

Table 3-6 Low carbon commuting and business travel key actions

Key Net Zero Actions
• Establish green travel staff working group to understand and incorporate staff priorities and needs (e.g. accessibility) • Carry out staff commuting survey to understand in detail the commuting profile of the staff in terms of distance and preferred modes • Encourage more frequent working from home while balancing social and operational needs of Council • Implement and promote cycle to work and public transport loan schemes where these do not already exist • Hold business meetings online where possible • Develop business travel criteria checklist which ensures that business travel only approved when necessary and that low carbon options prioritised

3.6 Green Procurement

The Council must align its procurement strategy – the purchased of goods and services like office equipment and its delivery – to ensure that carbon emissions upstream and downstream of its direct activity decrease in line with the Council's own activity emissions. This may include:

- Reducing the need for procured goods and services;
- Ensuring that purchased goods are of 'best-practice' levels of energy consumption;
- Updating procurement frameworks to integrate Net Zero ambitions into the bidding criteria, for example by using the Themes Outcomes and Measures (TOMs) framework;
- Working with suppliers to help them align with the Council's Net Zero ambitions;
- Ensuring pension and investment portfolios have set tangible emissions reductions targets.

'Greening' procurement practices will not come at significantly increased costs to the Council, and can generally be considered 'no-regrets' actions. We therefore recommend that the green procurement strategy detailed in **Error! Reference source not found.** be implemented swiftly regardless of the Net Zero target date – this will come with reputational benefits and could contribute to stimulating the local green economy.

Case Study: Public Health Wales sustainable office transition

- When moving offices, Public Health wales sought suppliers who could reuse and remanufacture as much already owned furniture as possible
- The contract was delivered by a consortium of responsible suppliers including sustainable office design company Rype Office Furniture, local furniture manufacturer Orangebox and community interest company Greenstream Flooring

Benefits

- ✓ 94% of furniture was reused or remanufactured, diverting 41 tonnes of waste from landfill
- ✓ Achieved a CO_2 saving of 134 tonnes

Table 3-7 Green procurement timeline

Timeline	Net Zero Actions
2021-2023	• Establish internal Green Procurement working group to foster Council-wide buy-in • Update overall procurement strategy to reflect the climate neutral agenda • Implement programme to replace equipment at end-of-life with green technologies
2023-2025	• Engage with suppliers to communicate new procurement ambitions and work together to reach solutions • Build supply chain network that increasingly aligns with the council's climate neutral ambitions
2025-2030	• Develop mechanism to contractually enforce requirements that help drive your carbon neutral agenda through your supply chain • Build supply chain network that increasingly aligns with the council's climate neutral ambitions

3.7 Potential Challenges to Implementation

Table 3-8: Potential Challenges to Implementation

Low Carbon Action Area	Potential Challenges
Building Energy Efficiency **Heating**	• Installing energy efficiency measures is likely to cause disruption to building use in the Breckland portfolio. There may be periods where buildings cannot be used during works and alternative properties will have to be identified. • Within the leased portfolio, necessary consent will be required from residents to proceed with works. • The necessary low carbon heating solutions will vary by building; some technologies are not appropriate for certain buildings. For example, air source heat pumps may not be suitable for larger buildings, and ground source heat pumps or connection to a heat network may be more appropriate. • Some solutions require more substantial building work, such as ground source heat pumps or heat networks. The necessary work may cause wider disruption to local transport networks and local amenities.
Green Electricity	• Installation of on-site generation via solar PV may involve invasive building works, but this is unlikely to be a major challenge. • More complex energy procurement, for example entering into Power Purchase Agreements, may require coordination with other purchasers and take time to reach agreements.

Vehicle Fleet	• The extent of vehicle electrification may be limited by:
	  ○ The required mileage per charge of vehicles and the technical constraints of current electric vehicles
	  ○ The extent of charging infrastructure required to service the fleet
	  ○ The availability of suitable electric replacements for larger vehicles such as trucks and buses
	• With regard to larger vehicles, it is likely that a greater variety of options for alternative fuel replacements will be available in the coming years. These may be electric, or hydrogen fuel may become more widely adopted for larger vehicles.

Low Carbon Action Area	Potential Challenges
Commuting and Business Travel	• Decarbonising commuting may be limited by the availability of low carbon public transport, and there may always be some need for private, fossil fuelled vehicle travel. • The commuting requirements of officers may not be suited to low carbon transport types, depending on where officers live and the availability of alternative transport modes.

3.7.1 Embodied Carbon

As well as the 'operational' carbon emissions considered in this report, all new technologies and infrastructure have embodied carbon emissions – emissions generated during their production and provision to the council. These emissions would be accounted for in the Scope 3 emissions of future council emission assessments. Given the need to upgrade infrastructure to reduce, and where possible eliminate, operational carbon emissions, it is inevitable that there will be an increase in embodied carbon emissions delivered through the measures suggested in this report.

4.0 Setting a Net Zero Target Date

The Net Zero target date is the year by which emissions from the Council's activities must produce zero or near-zero carbon emissions, with the smallest possible residual footprint being offset through reputable offset projects. The process of setting this target date should consider the evidence and strategic advice set out in the Carbon Management Plan, and take into account further considerations described in this section: the effect of cumulative emissions, the residual footprint, and the reputational impact of the date set.

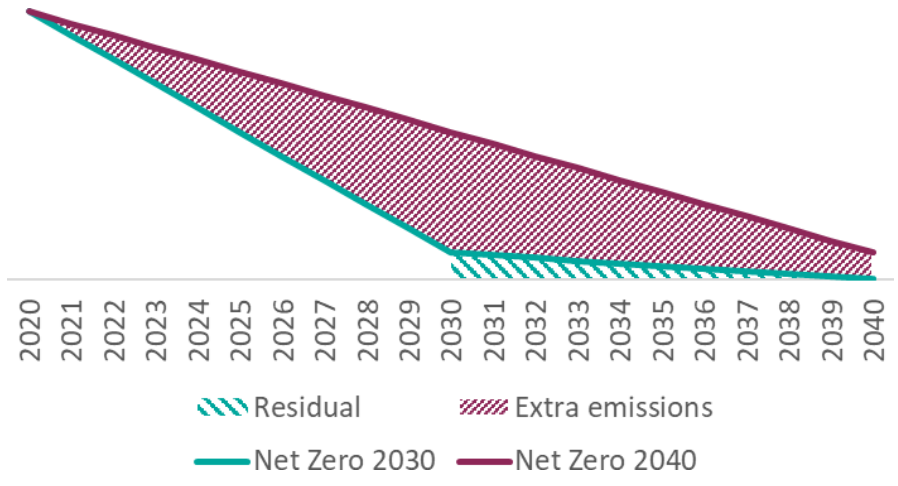
4.1 Cumulative Carbon Emissions

Much of this report has examined annual emissions, but climate change is driven by the accumulation of GHGs in the atmosphere. As a result, the emissions generated between now and meeting net zero will determine the impact on climate change. The journey therefore matters.

A later Net Zero achievement date will therefore usually result in more carbon emissions to the atmosphere. This is for two reasons: both because emissions tend to continue longer into the future, and because the slower pace of change leads to higher emissions in the immediate future. The purple shaded area in Figure 4-1 represents an example difference in cumulative emissions between Net Zero 2030 and 2040 scenarios. This demonstrates that the later the date that net zero is achieved by, the greater the total climate impact.

Fundamentally, speed of reduction is very important, not just the end point of net zero.

Figure 4-1 A graph showing the indicative accumulation of emissions under different levels of ambition (2020-2030)



4.2 Residual Carbon Emissions

The technical capability exists to reduce all Scopes 1 and 2, and most Scope 3 emissions before 2030. However, some Scope 3 consumption, like vehicle commuting for staff with accessibility issues, will be unavoidable for the foreseeable future and the Council will have a residual carbon footprint in 2030 (and probably 2040) scenarios: see the bottom half of Table 4-1.

The green shaded area in Figure 4-1 represents the emissions that the Council will not be able to totally reduce by 2030. These residual emissions must be offset in order to meet the Net Zero target.

While historically offsetting has (perhaps fairly) been criticised, the Science Based Targets Initiative, the leading international NGO working to standardise Net Zero strategies, considers offsetting residual emissions acceptable when the residual has been minimised to the greatest extent possible[10]. This offsetting must be done using certified and reputable offset credits.

It is noted that Breckland Council's cabinet intends to use offsetting as little as possible; this is commendable and, as shown by the Carbon Management Plan, possible in a Net Zero by 2030 scenario. Nonetheless an offsetting plan will be required before 2030.

4.3 Reputational Considerations

More than three-quarters of local authorities have set Net Zero targets, with the majority of them aiming to be Net Zero by 2030. Such aggressive decarbonisation can bring benefits in the form of improved local environments and air quality, stimulation of the local economy, and of course, ending the contribution to climate change. However, meeting a 2030 Net Zero target will be a considerable challenge, requiring significant mobilisation of capital, coordination from Council officers and members, and cooperation from local stakeholders. In certain cases, it may also rely on future technological advances. It will also rely on offsetting in almost all cases.

Setting an early Net Zero target would align Breckland Council with the majority of its national counterparts in leading the UK's ambition towards becoming a Net Zero country, and will garner the reputational benefits that this will bring. Conversely, it comes with a reputational risk, as any missed or reneged-on targets – or a perceived reliance on carbon offsetting to reach a final target – could lead to criticism.

[10] Science Based Targets Initiative (2020) *Foundations for Net Zero*, September 2020, https://sciencebasedtargets.org/resources/legacy/2020/09/foundations-for-net-zero-full-paper.pdf

4.4 Summary

Table 4-1 summarises the arguments put forward in Section 4.0, describing the main positive and negative considerations that the Council must take into account when setting its Net Zero target year.

Table 4-1 Net Zero target date advantages and disadvantages comparison as well as likely outstanding emissions at each date

	Net Zero 2030	Net Zero 2040	Net Zero 2050
Positive	• Least contribution to climate change • Will likely gain a reputation as environmental leader in the county • Contribute to stimulating the local green economy • Improve health of staff • Operational cost savings/ revenue generation	• Less costly than 2030 • Many of the changes would happen anyway as part of national transition • Less disruption to partners, tenants	• Lowest cost pathway as most can be achieved through standard investment cycles • Least disruption to partners, tenants
Negative	• Most costly approach as some investment will need to be brought forward • Possible reputational damage through missed targets • Potential disruption to partners, tenants	• Greater contribution to climate change through cumulative emissions • Will be among the later Councils with regards Net Zero ambition • Possible reputational damage among those with major focus on climate issues	• Significantly greater cumulative emissions will contribute more to climate change • Reputational risk from being seen to act slower than Paris Agreement • Will be amongst the least ambitious Local Authorities that have declared a climate emergency
Likely residual emissions			
Scope 1	• Benefits enforcement team fleet [some influence on partner LAs' ambition]	• None	• None
Scope 2	• None	• None	• None
Scope 3	• Commuting [some influence] • Potentially: contracted waste fleet [some influence] • Tenant electricity consumption [some influence on green tariffs] • Some procured goods [high influence]	• Some commuting [some influence] • Potentially: tenant electricity consumption [likely most switch to green tariff] • Some procured goods [high influence]	• None

A.1.0

Appendix

A.2.0 Technical Appendix: Assumptions and Methodology, Baseline Carbon Footprint

A detailed breakdown of Breckland Council's carbon footprint is given in Table 4-2.

Table 4-2: Breakdown of Breckland Council's Carbon Footprint by Category, Sub-category and Scope

Category	Subcategory	Scope 1	Scope 2	Scope 3	Total
		tonnes CO_2e			
Owned fleet	Diesel	6.1	0	1.4	**7.5**
Serco Fleet	Diesel	766	0	182	**949**
	Petrol	0.9	0	0.2	**1.1**
Buildings Owned and Operated	Natural Gas	221	0	29	**250**
	Electricity	0	288	68	**357**
	Water	0	0	6.1	**6.1**
Buildings Owned and Leased	Natural Gas	1,573	0	205	**1,778**
	Electricity	0	481	114	**595**
	Water	0	0	26	**26**
Street Lighting	Electricity	0	143	34	**176**
EV charging points	Electricity	0	1.6	0	**1.6**
Staff Business Travel	Diesel	0	0	36	**36**
	Petrol	0	0	57	**57**
	Train	0	0	0.4	**0.4**
Staff Commuting	Diesel	0	0	248	**248**
	Petrol	0	0	392	**392**
Expensed Taxis	Taxis and hired cars with drivers	0	0	3.3	**3.3**

Category	Subcategory	Scope 1	Scope 2	Scope 3	Total
		tonnes CO_2e			
Procurement spend	Office administrative, office support and other business support services	0	0	1.7	**1.7**
	Disinfectants, polishes, other cleaning materials, some pest controls	0	0	0.03	**0.03**
	Domestic services including cleaners, gardeners, au pairs	0	0	1.0	**1.0**
	Refuse collection including skip hire	0	0	6.5	**6.5**
	Computer, electronic and optical products	0	0	30	**30**
	Postal and courier services	0	0	5.1	**5.1**
	Computer programming, consultancy and related services	0	0	6.8	**6.8**
	Postal and courier services	0	0	28	**28**
	Postal and courier services	0	0	37	**37**
	Insurance, reinsurance and pension funding services, except compulsory social security & Pensions	0	0	83	**83**
Total		**2,568**	**914**	**1,602**	**5,084**
Waste management	Dry Recyclables	0	0	-7,665	**-7,665**
	Garden Waste	0	0	-642	**-642**
	Residual Waste	0	0	2,416	**2,416**

A.2.1 Vehicles

Diesel and petrol consumption data (in litres of fuel) for Serco, who manage waste collection and other services. Spend data for diesel consumption in the Benefits Enforcement team, which is split amongst 5 authorities. The portion of that spend which applies to Breckland Council was estimated based on the population of each authority. Spend data were converted to fuel consumption data (litres) using Government fuel price statistics.

A.2.2 Buildings

The methods used to calculate carbon emissions from energy and water use in buildings is presented in this section. The methods used to estimate consumption where specific data were unavailable are given on a case-by-case basis.

A.2.2.1 Gas

Natural gas boilers are used to heat all of the properties that Breckland Council owns. Natural gas consumption data were provided for the majority of Breckland's estate. Carbon emissions factors per unit of natural gas as published by BEIS were used to determine the overall carbon footprint of this energy consumption.[11]

There are two properties that are owned and operated by the Council for which it was not possible to use gas consumption data: Elm Road Further Education Centre (which is being converted into a shelter for the homeless) and Roman House (an office which was unoccupied for much of the relevant time period).

Elm Road Shelter

In the absence of any further EPC or floorplan data, it was assumed that the energy consumption at the Elm Road shelter is the same **per m^2** as at the council's other shelter, John Room House (for which data were available).

Roman House

Gas consumption data in Roman House were available for December 2019 only. It was assumed – again in the absence of the necessary EPC data – that energy consumption in December as a proportion of total energy consumption is the same for Roman House and for Elizabeth House, another office owned by the Council.

[11] Department for Business, Energy and Industrial Strategy (2020) *Greenhouse gas reporting: conversion factors 2020*, June 2020, https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2020

Riverside

Because energy and water consumption at the Riverside complex is managed by its tenants, no data were available. Instead, these were using per-unit data found in the literature and floorplan data.[12]

Figure 4-2 Typical electricity, gas and water consumption from the literature for different the business types at the Riverside Thetford complex

Property	Typical energy consumption (kWh/m²)[13]		Typical water consumption/m²) [14]	Approximate business footprint at Riverside (m²)
	Electricity	Gas		
Gym	150	440	-	450
Hotel	105	330	60 m^3/bed	2710
Cinema	160	620	-	320
Restaurant	90	370	0.9 m^3/m^2	340

A.2.2.2 Electricity

Electricity consumption data for all sites owned and operated or leased were provided as one figure by Breckland Council. Carbon emissions factors per unit of electricity as published by BEIS were used to determine the overall carbon footprint of this electricity consumption.[15]

Reporting Emissions from Electricity Purchased through a Green Tariff

The GHG Protocol outlines two methods for accounting for carbon emissions from electricity consumption, one ('market-based') reflecting "emissions from electricity that companies have purposefully chosen" and the other ('location-based') "the average emissions intensity of grids on which energy consumption occurs."

Company emissions reporting mandates reporting emissions under both the market- and location-based methods, which is done here.

Roman House

No electricity consumption data were provided for Roman House. Electricity consumption was estimated by assuming that the ratio of electricity and gas consumption is the same as for the rest of the portfolio (excluding Elizabeth House, whose consumption data appears anomalous).

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[12] Floorplan data taken from https://www.francisdarrah.co.uk/wp-content/uploads/2019/07/Thetford-Riverside-Leisure-2019.pdf

[13] Cundall (2013) *What Colour is your Building? Appendix C - Energy Consumption data*, 2013, https://cundall.com/Knowledgehub/What-Colour-Is-Your-Building-.aspx

[14] No data were found for gyms in the literature. It was assumed that water consumption in cinemas is negligible compared to hotels and restaurants.

[15] Department for Business, Energy and Industrial Strategy (2020) *Greenhouse gas reporting: conversion factors 2020*, June 2020, https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2020

Elm Road Shelter

In the absence of any further EPC or floorplan data, it was assumed that the energy consumption at the Elm Road shelter is the same **per m^2** as at the council's other shelter, John Room House (for which data were available).

Riverside

See A.2.2.1, 'Riverside'.

A.2.2.3 Water

Riverside

Water consumption data were not available for the four business tenants at the Riverside complex. Standard data relating to average water consumption were found in the literature for the hotel[16] and restaurant[17] (per bed and per m^2 respectively). No such data were found for the gym and cinema. The gym was assumed to use approximately as much water per m^2 as a restaurant; the cinema half that value.

A.2.3 Commuting and business travel

A.2.3.1 Business travel

Car

Data for business travel by car was provided by the Council in the form of miles travelled. These values were converted into fuel consumed assuming the national proportion of petrol and diesel owners applies to Council staff.[18]

Train

Data for business travel by train claimed on the Council's HR system was provided by the Council in the form of miles travelled. No data were available on train distances purchased through the purchasing card, so it was assumed that this is equal to the figure through the HR system.

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[16] Waterwise (2006) *Water key performance indicators and benchmarks for offices and hotels*, Report for London, 2006, https://www.waterwise.org.uk/wp-content/uploads/2018/02/CIRIA-2006_Water-Key-Performance-Indicators-and-Benchmarks-for-Offices-and-Hotels.pdf

[17] Colorado Waterwise (2007) *Collaboration for Industrial, Commercial & Institutional Water Conservation*, June 2007, https://coloradowaterwise.org/Resources/Documents/ICI_toolkit/docs/Brendle%20Group%20and%20CWW%20ICI%20Benchmarking%20Study.pdf

[18] Department for Transport (2018) *Vehicle Licensing Statistics: Annual 2017 (Revised)*, April 2018, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/716075/vehicle-licensing-statistics-2017-revised.pdf

A.2.3.2 Commuting

Primary offices

The distance between each member of staff's home and office was calculated (using anonymised postcode data handled only by members of the Breckland Council HR team). These distances were converted into miles travelled by car using the following assumptions (guided by the Breckland project team):

- 90% of staff drive to work
- Staff work from home on average 0.5 days a week
- Distance travelled by car is 15% further than 'as the crow flies'
- There are approximately 230 working days in a year (accounting for weekends and holidays)

Secondary offices

Some staff also travel to secondary offices. The total miles made by car claimed for these journeys was provided by the Council.

A.2.3.3 Procurement

Pensions

Data were not available relating to the pension fund used by Council staff. However, there is evidence that this could contribute a significant amount to the Council's scope 3 emissions.

The average emissions per council member pension has been calculated by Eunomia for previous projects. This emissions intensity was the applied to the number of Breckland Council staff to calculate the overall impact.

A.3.0 Glossary

Term	Definition
'Business-as-usual' scenario	The emissions pathway that would most likely have been followed in the absence of a carbon reduction/offset project, also referred to as the 'baseline scenario'.
Carbon balancing (offset)	Carbon offsets (or balances) are the 'certificates' used for showing that payments or funds have led to carbon sequestration or reductions elsewhere. Carbon offsets are purchased through selected and verified carbon projects and can be purchased on a voluntary basis or to meet regulatory requirements.
Carbon dioxide (CO_2)	The most emitted greenhouse gas, carbon dioxide is a by-product of industrial processes, burning fossil fuels and land use changes, and is absorbed by plants and oceans.
Carbon dioxide equivalent (CO_2e)	A metric used to compare the emissions from the various greenhouse gases on the basis of their global-warming potential. The CO_2e quantity of any greenhouse gas is the amount of carbon dioxide that would produce the equivalent global warming potential.
Carbon footprint	A carbon footprint is the total amount of greenhouse gas (GHG) emissions emitted by an organisation, event or product. For simplicity of reporting, it is often expressed in terms of CO_2e.
Carbon neutral/climate neutral/net zero	When a net carbon footprint is nil, because no greenhouse gases are emitted or because a measured amount of carbon released is offset with an equivalent amount sequestered or avoided.
Emissions factors	An emissions factor tells you how much CO_2e is created per unit of activity. For example, the emissions factor of taking the train is 0.0662kg of CO_2e per mile. Multiplying that by how many miles you travelled will give you the carbon footprint of that journey.[19] BEIS publishes an updated set of emissions factors each year.
Emission reduction pathway	A route to decarbonisation which can have varying levels of ambition. A more ambitious pathway will reduce more CO_2e but will likely come at a higher capital cost. Any remaining emissions will need to be offset.

[19] https://bulb.co.uk/carbon-calculator/glossary/

Term	Definition
Energy efficiency measures	Energy efficiency measures help reduce a building's demand for heat, minimise the power requirements of new heating systems and reduce long term costs. Some examples are insulation, double glazing and draft exclusion.
Green energy tariff	Tariffs offered by energy companies who buy certificates showing that this electricity has come from renewable sources. Theoretically, increasing demand for this type of tariff raises the price of renewable certificates, thus boosting investment in low carbon energy sources and driving further grid decarbonisation.
Greenhouse gas (GHG) protocol	GHG Protocol establishes comprehensive global standardised frameworks to measure and manage greenhouse gas (GHG) emissions from private and public sector operations, value chains and mitigation actions.[20]
Market-based system of carbon reporting	The 'market-based' system of carbon reporting uses the carbon intensity of your specific energy tariff. When purchasing a green energy tariff, electricity emissions can be considered to be zero in the market-based reporting method.
Scope 1 Emissions	Emissions from fuel consumed by the Council's estate, either from heating or owned vehicles.
Scope 2 Emissions	Emissions from electricity consumed by the Council's estate, including in buildings and street lighting.
Scope 3 Emissions	Indirect emissions that result from the Council's activities. This includes: - Indirect emissions from Scope 1 and 2 activities, such as the transmission and distribution of electricity - Emissions from other Council activities, such as water consumption, staff commuting, procurement, leased dwellings, etc.

[20] https://ghgprotocol.org/about-us