Carbon Neutral City Council

Greenhouse Gas Emissions and Decarbonisation Report June 2023

1. Introduction

This report explores and analyses the sources and scope of carbon emissions of Worcester City Council in the baseline 2019-20 year and the 2021-22 year (emissions not yet available for 2022-23, these will be calculated later in the year and presented in the performance scorecard to November Environment Committee). The report then provides a potential route to decarbonisation in different services. It should be noted that all of the projects are subject to significant uncertainty regarding their feasibility, cost and timescale.

2. What does a carbon neutral City Council look like?

The vision for a carbon neutral City Council expressed in the Environmental Sustainability Strategy:

Worcester's zero emission refuse trucks serve the city with all council vehicles now electric or hybrid options. Building heating requirements are reduced through improved energy efficiency, and green gas is purchased for the remaining use. All electricity used by buildings and operations is green. Staff are encouraged to consider their need for travel, with effective video conferencing facilities available. When travel is required, many staff walk or cycle to work, with others driving electric vehicles they have been able to purchase through a salary sacrifice scheme or the council's own electric pool cars.

This report provides additional detail, supporting the Environmental Sustainability Strategy and Action Plan, on the route to internal decarbonisation.

3. Target

The Environmental Sustainability Strategy aims towards carbon neutrality by 2030. Carbon neutrality or 'net zero' recognises that it may not be possible to eliminate emissions completely, but instead some residual emissions may need to be offset. There are various ways of doing this, including planting trees, generating excess renewable energy or taking part in a carbon offset scheme.

4. Calculation of Greenhouse Gas Emissions

The Government publishes carbon conversion factors for each emission releasing activity – how much greenhouse gas is released by each mile driven, each kWh of energy used, even quantities of certain material used.

Emissions are expressed in tonnes of carbon dioxide equivalent (tCO2e). This is a term to describe the calculation including other greenhouse gases, not just carbon dioxide. All other greenhouse gases included are expressed as an amount of CO2 which would have the same global warming impact. The other main greenhouse gases taken into account are methane and nitrous oxides.

5. Reporting of Greenhouse Gas Emissions

The Council's carbon footprint has been included in the performance scorecard for the Environment Committee as an annual key performance indicator.

Emissions can also be submitted to the LGA to benchmark emissions with other councils, understanding how performance compares.

6. Sources of emissions

The Council has a fairly simple emissions profile comprised of gas and electricity usage in buildings, fuel use in vehicles, business travel and emissions from outsourced services (these are classed as scope 3 emissions).

6.1. Scopes

Carbon emissions are commonly reported within "scopes". Full information is available via the UK Government GHG Conversion Factors for Company Reporting. In brief, Scope 1 is direct emissions from activities owned or controlled by the organisation, including emissions from combustion in boilers and vehicles. Scope 2 is indirect emissions, which are a consequence of energy use by the organisation, but occurring at a source not owned or controlled by the organisation. For example, the consumption of purchased electricity is a scope 2 emission source. Scope 3 emissions are a consequence of the organisation but occur at sources not owned or controlled by the organisation. Examples are business travel in employees own vehicles, water usage and emissions from buildings housing outsourced or commissioned services.

The Council started purchasing renewable electricity through its existing provider, West Mercia Energy, in April 2020. This renewable electricity is certified zero carbon and therefore the Council's use of electricity no longer contributes to its carbon footprint. Government guidance recommends reporting emissions according to 'location based grid factors' alongside the 'market-based' reporting.

6.2. Emissions from baseline year 2019/20

2019-20 is being used as our baseline year, recognising that the Council's declaration of a climate emergency and pledge to work towards carbon neutrality was in July 2019.

Total calculated emissions in 2019/20 were 1662tCO2e. This does not include emissions from outsourced services.

6.3. Emissions from 2021/22

Scope	Emissions Type	Emissions (tCO_2e)	Percentage of Total Emissions
Scope 1	Heating / Gas Use	554.72	29.00%
	Fugitive Emissions	0	0.00%
	Authority's Fleet	727.71	38.10%
Scope 2	Electricity	0	0.00%
Scope 3	Staff Business Travel	2.36	0.10%
	Working From Home	0	0.00%
	T & D Losses	0	0.00%
	Water	0	0.00%
	Material Use	0	0.00%
	Waste generated from own operations	0	0.00%
	Outsourced Scope 3	627.52	32.80%
Total emissions		1,912.32	100%

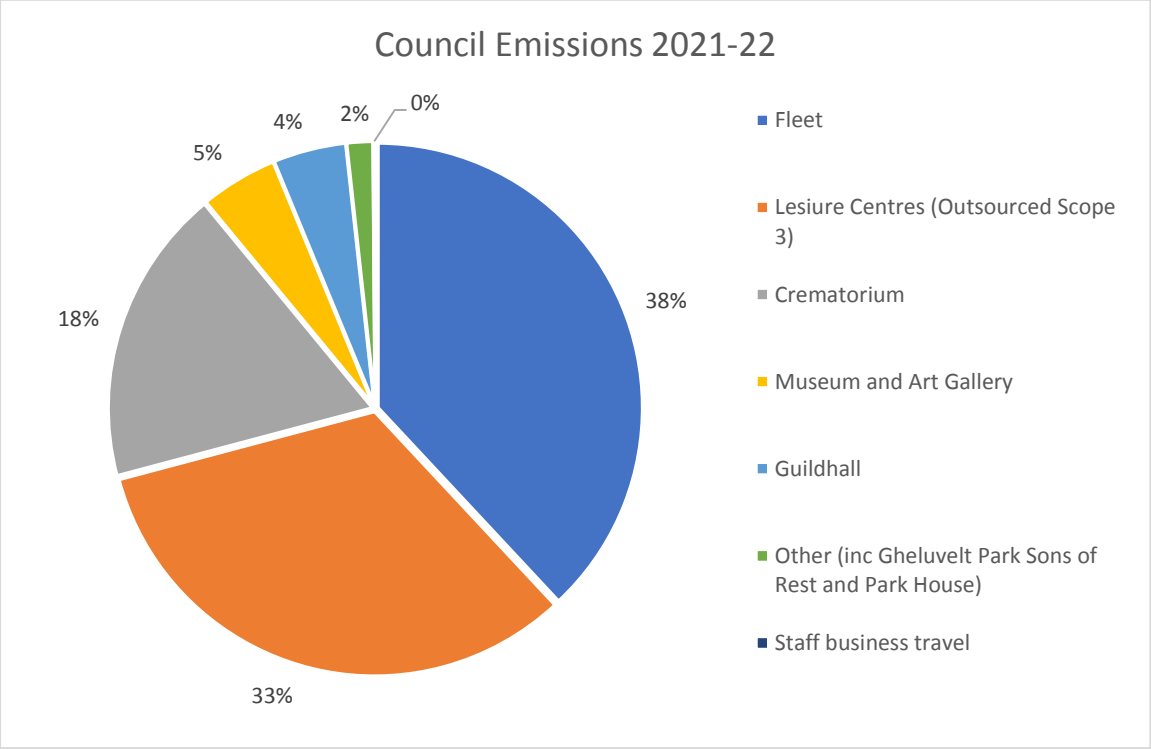

Figure 1. City Council Emissions 2021-22

6.4. Comparison between emissions in 2020-21 and 2021-22

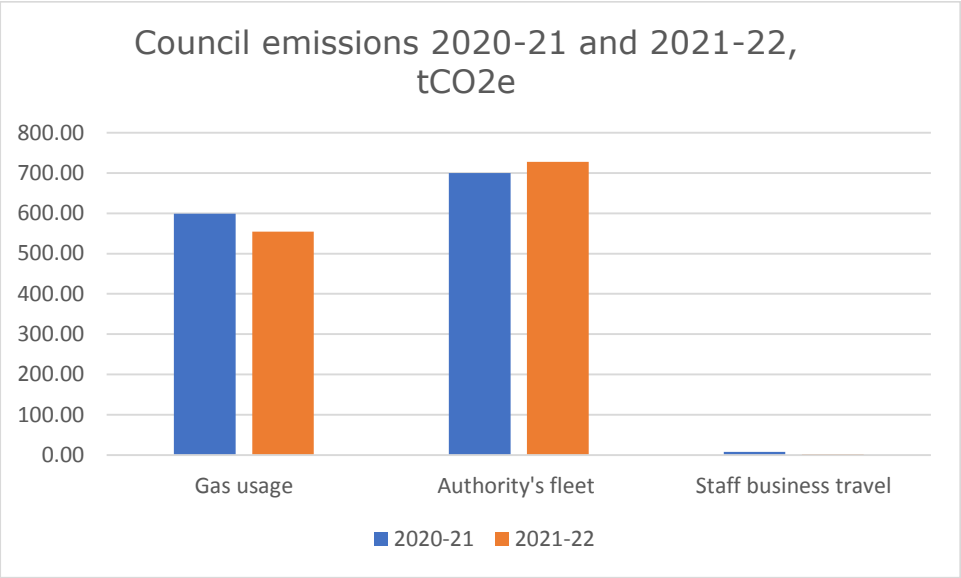

Figure 2. Comparison of City Council emissions 2020-21 and 2021-22, omitting outsourced scope 3 emissions as these were not available in 2020-21

Total emissions fell between 2020-21 and 2021-22, from 1,306tCO2e to 1,284tCO2e. These figures both omit the emissions from outsourced services, Scope 3 emissions, as these were not available for the 2020-21 year.

6.5. Detailed look at buildings emissions

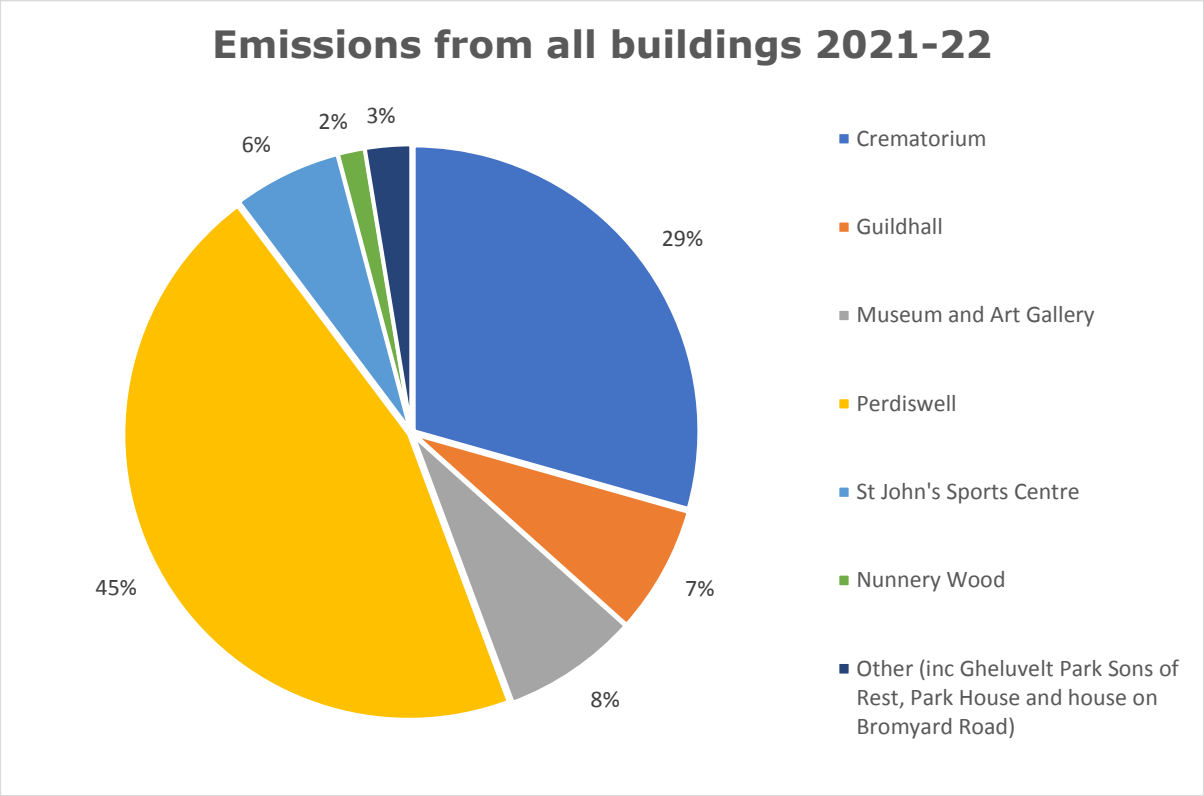

Figure 3. Carbon emission from gas usage in buildings in 2021-22, percentages relate to buildings only, not the Council's total carbon footprint

Figure 3 shows the emissions from all major Council buildings in 2021-22. For the leisure centres, these emissions are from both electricity and gas, as renewable electricity is not yet being purchased for these sites. For the other buildings, the use of renewable electricity means the emissions are from gas use only.

It is worth noting that over 80% of electricity usage comes from six sites (the main buildings, plus car park lighting). The remaining 20% usage is from a further 25 sites where the City Council is responsible for the electricity usage.

Gas is only supplied to five City Council operated buildings: Museum and Art Gallery, Guildhall, Crematorium, Gheulvelt Park Sons of Rest, Park House. As shown by figure 4, the Crematorium accounts for 36% of the total gas usage, with 392tCO2e.

The Crematorium therefore amounts to 18% of the City Council's emissions overall in 2021-22.

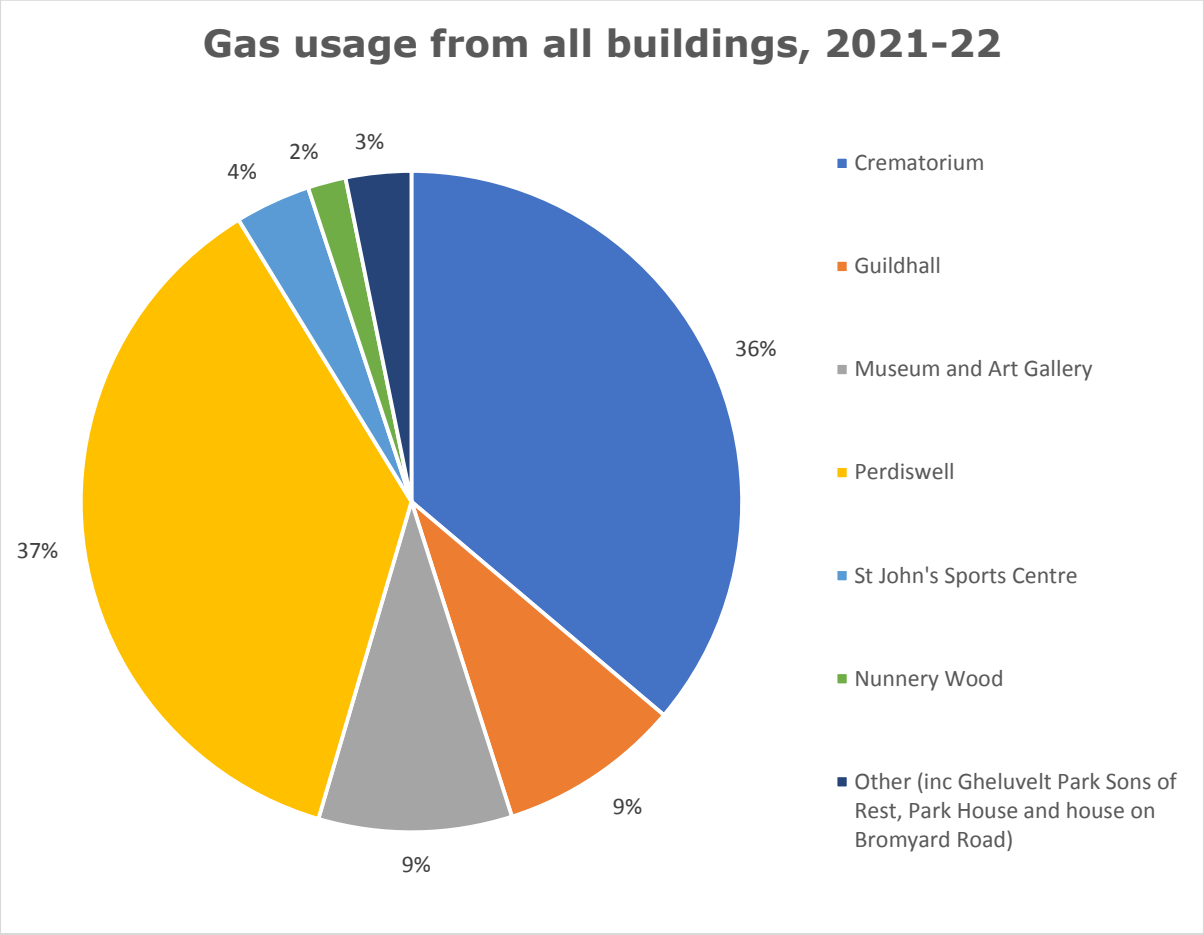

Figure 4. Gas usage in City Council buildings, both directly in scope and those used by outsourced services (Scope 3), in 2021-22

6.6. Detailed look at fleet emissions

Fuel used by the refuse trucks accounts for just over half of the total fuel usage from vehicles at the depot. The rest is for vehicles such as street sweepers, compactors, tippers, tractors and mowers. With 20 refuse trucks in operation, this means each is responsible for approx. 26tCO2e per year.

6.7. What isn't included in the Council's emission calculations?

Due to a lack of data or usage not being within the Council's control, a number of buildings and sources of emissions are not currently included. These could be considered for inclusion as 'scope 3' emissions in the future.

6.7.1. Water

As can be seen in Table 1, there are no recorded emissions from water usage. This is due to the lack of data available. The Council does not have smart or automated water meters recording usage, and the invoices are normally based on estimates. This is an area already identified to be improved by the Property Service. In future years therefore, it is hoped that emissions from water usage can be calculated. It is not expected that this will be a significant source of emissions.

6.7.2. Trinity Street, Sixways Depot and the Community Centres

The Council agreed a lease on a building in Trinity Street in 2020 to house the housing advice service. This building is not included on West Mercia Energy's reporting software as the electricity is submetered from the landlord's supply and was not included within the 2021-22 emission figures.

The buildings used by Environmental Operations at the depot near Sixways are also not included as data has been difficult to obtain due to the shared site arrangements with the County Council which provide for power usage to be apportioned between the site users.

The community centres run by Worcester Community Trust on behalf of the Council are also not included.

With all of these buildings, renewed efforts are being made to include these figure within the 2022-23 calculations.

6.7.3. Other procured services

No emissions have been included from other services being provided by external partners on behalf of the Council, e.g. ICT, Regulatory Services and Revenues and Benefits services based in Pershore.

7. How emissions have already been reduced

7.1. Zero emission electricity

Zero emission renewable electricity was purchased from April 2020, and therefore emissions from the direct use of electricity from this date have been eliminated.

7.2. Electric vans in City Services

5 electric vans are already in use by teams in City Services.

7.3. Solar PV on SMG

A solar photovoltaic (PV) array was installed on St Martins Gate car park in 2019 and reduces emissions by approx. 12 tCO2e per year. Whilst all electricity is now zero emission, contributing to the overall decarbonisation of grid electricity by generating our own renewable electricity is important.

8. Future emissions reduction

8.1. Bereavement Services

As the emissions from buildings analysis shows, the crematorium (including heating the whole building as well as the operation of the cremators) accounts for 18% of the Council's carbon footprint.

It should be noted that gas usage will fluctuate depending on the number of cremations each year and therefore, rather than measuring overall gas usage, a figure of average kWh used per cremation may be helpful to analyse.

Reducing and seeking to eliminate emissions from the operation of the crematorium will be essential to decarbonising the Council. Electric cremators are being considered as part of the overall considerations for Astwood Crematorium.

8.2. Fleet – refuse trucks, other vehicles

Electric alternatives for much of the fleet are slowly becoming available. A fleet review being led by the Energy Saving Trust for the Council gave information on what options are currently available and what options may be available in the medium term.

Replacing one refuse truck with a zero emission electric alternative will reduce the Council's carbon footprint by approx. 50 tCO2e.

Whilst the trial of an electric refuse truck in 2022 showed that the range on these vehicles is not yet adequate, it is hoped that these will be a viable option in a few years time, with the next round of procurement due for 2025/26. The Environmental Sustainability Strategy Action Plan for 2021-2022 has a specific

action around consideration of electric alternatives within the vehicle replacement / procurement strategy, and work is underway to prepare for this including investigation of the required infrastructure.

8.3. Leisure Centres

In February 2023, a capital allocation of £550,000 was agreed in order to fund energy efficiency improvements and renewable energy installations on all three leisure centres. Freedom Leisure have produced a list of recommended measures which would reduce the carbon footprint of the leisure centres by around 10%. Solar PV on all three leisure centres, along with replacement lighting and variable speed drives, are part of the recommendations.

8.4. Gas usage from buildings

Decarbonisation Plans for each of the Council's major buildings have been produced. Reducing gas usage through energy efficiency measures is a priority.

A number of small projects are underway to improve pipe lagging, replace pumps and install sensors to reduce gas usage in the Museum and Art Gallery and the Guildhall.

Once usage is reduced, then alternatives to the use of natural gas should be considered. Unfortunately for many of the Council's buildings, the options here are limited due to the nature of the buildings.

The Council has been awarded grant funding for the detailed project development stage of a Heat Network. The project envisages drawing heat from the River Severn using a heat exchanger and distributing this across a number of major consumers that could include the Guildhall and the Museum and Art Gallery. This could therefore be the best option to eliminate emissions from heating these buildings, along with many other public sector buildings in the city.

An alternative is to assess the possibility of air or water source heat pumps based in each individual building. However, these can require significant changes to a building such as increased radiator size, and may therefore have their own challenges.

Heat pumps are likely to be good options for the leisure centres and should be investigated.

A longer-term option is the possibility of hydrogen to be used for heating, although this technology is still under development

For buildings where there are no viable options at the current time to eliminate emissions from heating or gas use, then an alternative may be to purchase certified zero carbon 'green' gas, which is generated from the anaerobic digestion of food waste for instance.

The Council's existing energy supplier, West Mercia Energy, have advised that their 'green gas' tariff is 37% more expensive than their standard tariff.

As it is unlikely that a heat network would be completed and operational by 2030, this has not been included in the projected emission reduction pathway in section 9. Purchasing green gas may bridge the gap to the other future changes discussed above.

8.4.1. Business travel

The remaining source of emissions is from business travel. The Council's Active Travel Action Plan includes a project to reduce emissions from business travel in a number of ways, including the use of the Council's electric bikes, ensuring effective video conferencing options under the Council's Hybrid working policy, and consideration of the use of electric pool vehicles.

9. Potential emissions reduction pathway

It is clear that there are many factors to emissions reduction and it is not expected to be a linear, consistent annual reduction.

9.1. Summary of potential major interventions:

One potential route to decarbonisation is summarised here, with more information on each option given below. Note these potential interventions make a significant number of assumptions which have not yet been progressed past the concept stage of project development. All of these interventions are subject to significant risk and uncertainty around their feasibility and timescales.

Major Interventions	**Scale of impact tCO2e**	**% reduction**
Purchase of certified green electricity by Freedom Leisure or installation of solar PV to generate the majority of centre electricity requirements	237	12%
Installation of electric cremators at the Crematorium	348	18%
Installation of heat pump at Perdiswell (assuming electricity is certified renewable and therefore no increase in emissions from increased electricity; assume 75% of gas use is heat load not hot water)	264	14%
Conversion of 1 refuse truck to electric (average of 22tCO2e per annum per refuse truck used)	22	1%
Conversion of all 20 refuse trucks to electric	440	23%
Conversion of all other fleet vehicles to electric	288	15%
Total		**83%**

Assumptions

- The first electric refuse truck will be purchased in 2025/26 and all subsequent refuse trucks replaced according to the vehicle replacement

strategy are replaced with electric trucks, resulting in a transition to electric of 2-3 refuse trucks per year. Other vehicles will need to convert to electric over the period to 2030 as well.

- Gas usage at the Crematorium is reduced by 1% per year (approx. 4tCO2e) through operational efficiencies.
- New electric cremators are purchased in 2027/28.
- Gas usage from the Museum & Art Gallery and the Guildhall reduces at a rate of 3% per year due to efficiency measures being installed.
- Business travel reduces at the rate of 0.2tCO2 for 2021-22 and 2022-23, increasing from then to a consistent annual reduction of 0.5tCO2e as increasing numbers of staff use an electric car for business travel and electric bike/car options are available. By 2030 all business travel is carried out either by electric car, bike (electric or pedal) or public transport. Public transport does still have carbon emissions associated and therefore it is not possible to completely eliminate emissions from this source.

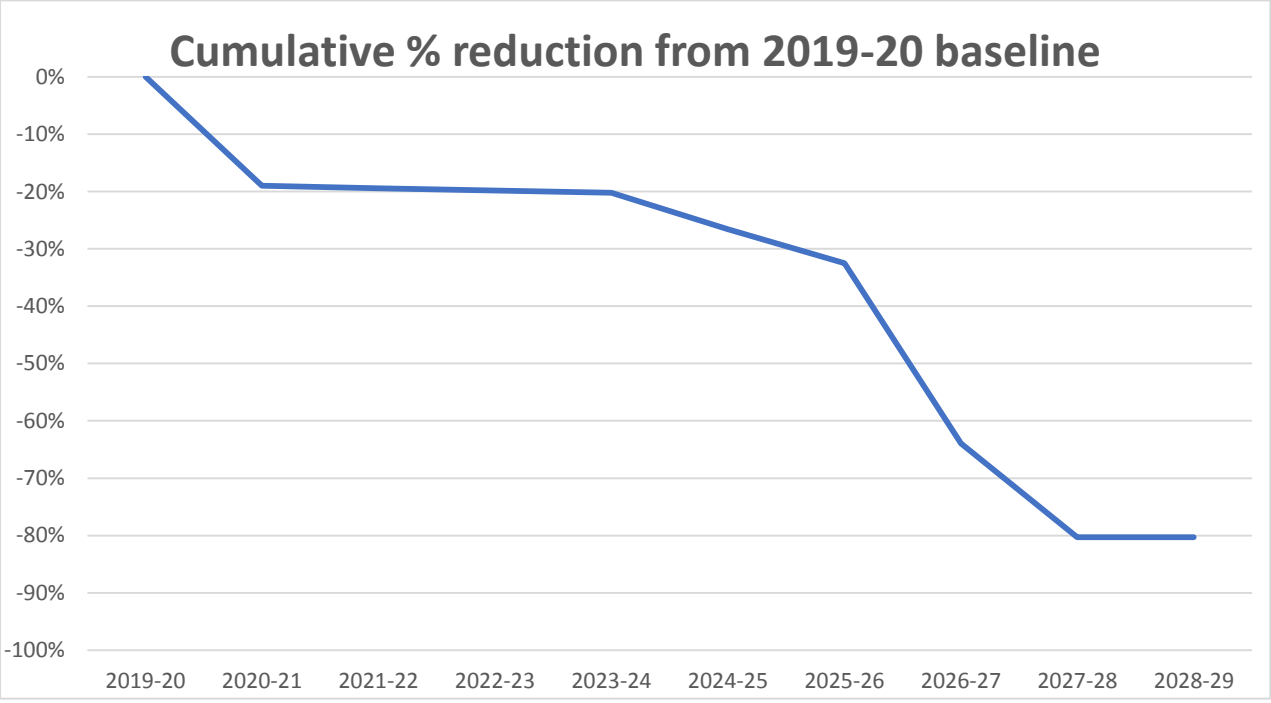

Figure 5. Potential cumulative percentage reductions from the baseline year 2019-20

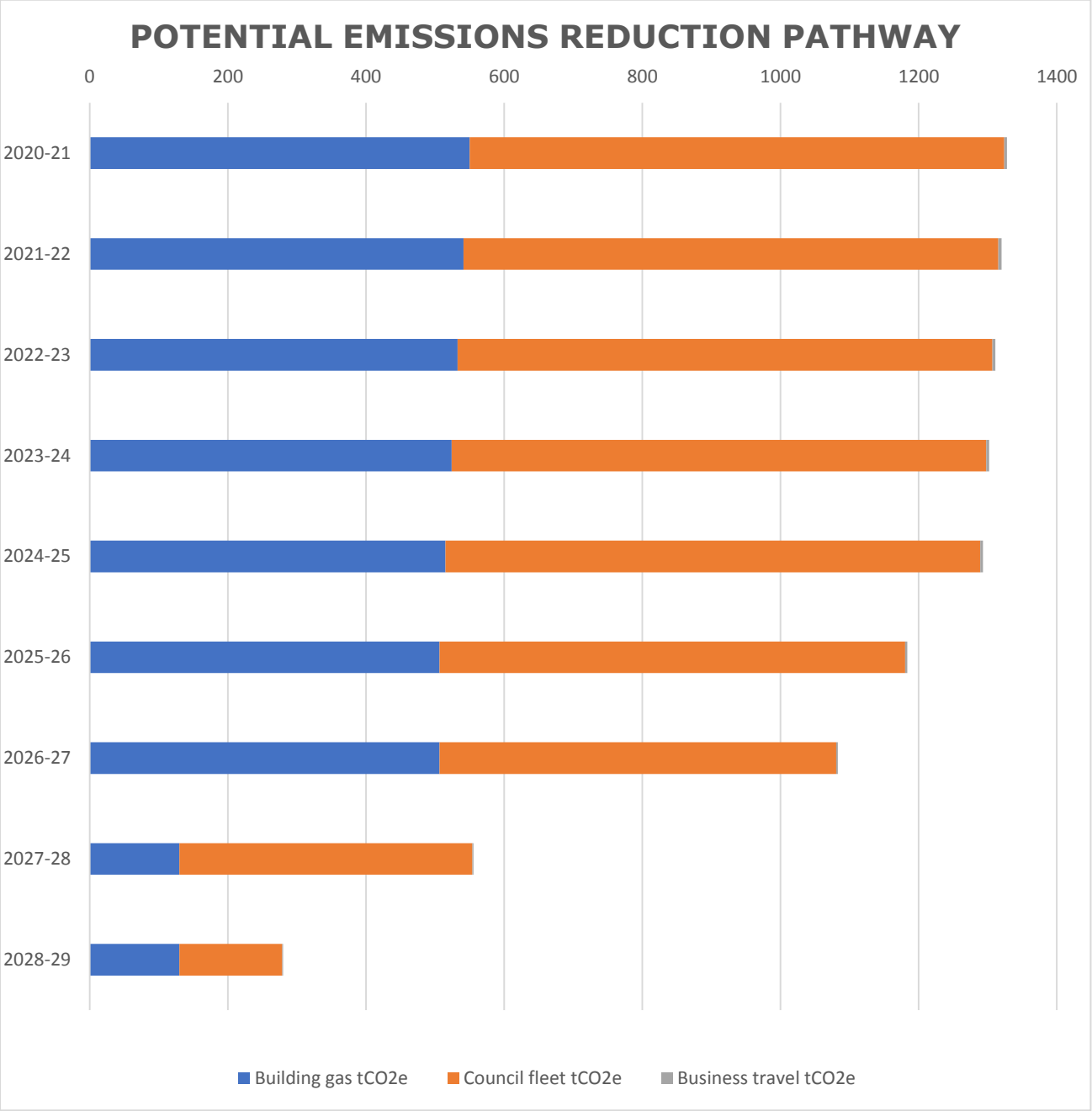

Figure 6. Emissions reduction potential pathway, by source (tCO2e)

Figure 5 shows the annual year-on-year reductions and the cumulative reduction, with figure 6 then splitting this reduction into the different categories of emissions for the Council currently. These figures demonstrate it will not be possible to have a consistent annual target, expected reductions are dependent on the projects which can be brought forward in any one year. All of these reductions are subject to significant uncertainty at this time.

Appendix 1

Electricity usage 2019-20.