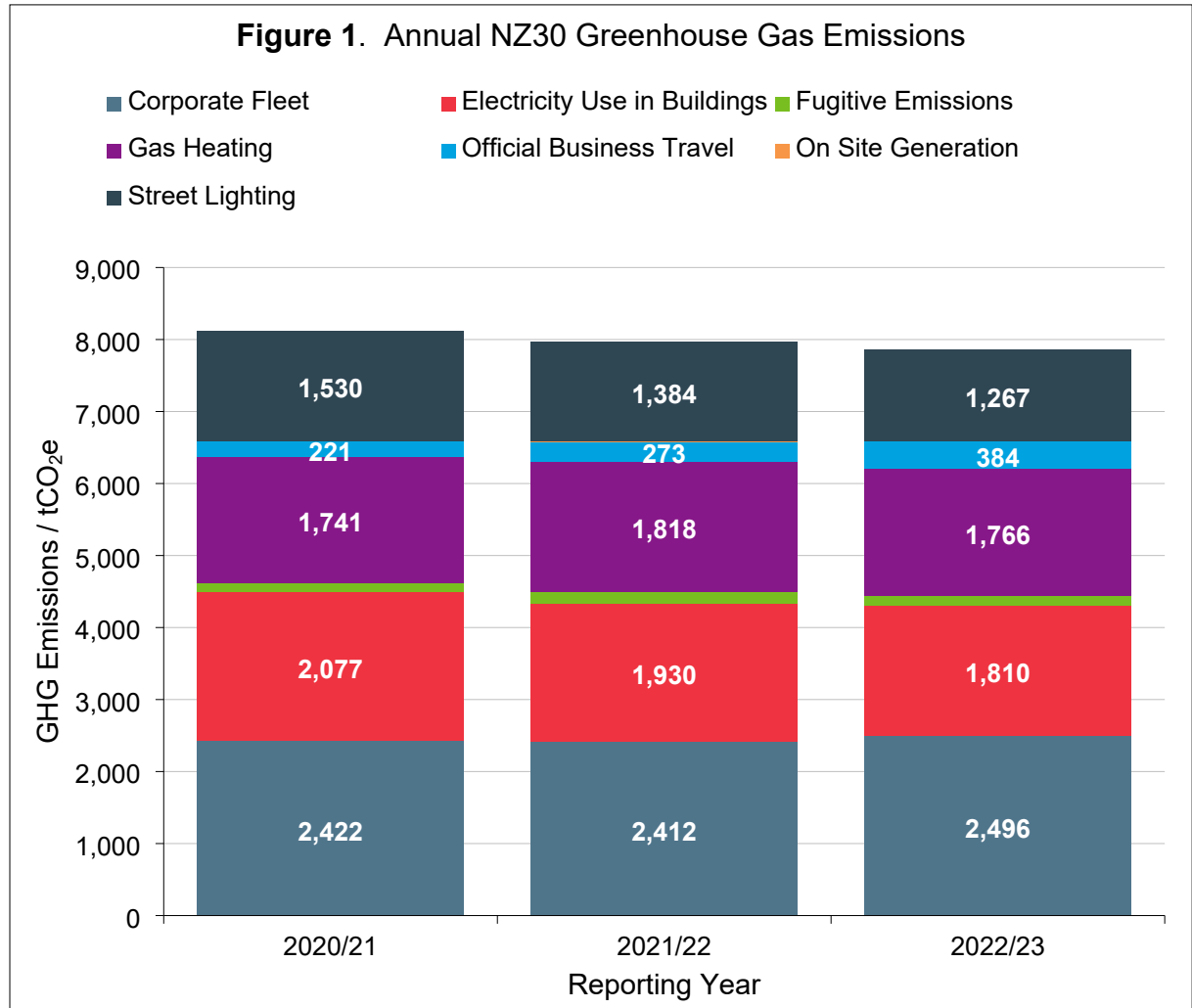


Appendix 3: Carbon Emissions Data Summary

1. Greenhouse Gas Emissions within Scope of the Council's Net Zero 2030 (NZ30) Climate Change Target

1.1



1.2 Greenhouse gas emissions within scope of the Council's Net Zero 2030 (NZ30) climate change target have decreased year on year, over the last three reporting years. Total NZ30 emissions decreased 1.9% from 8,121 tCO₂e in 2020/21, to 7,970 tCO₂e in 2021/22. Emissions decreased by another 1.4% the following year, to 7,862 tCO₂e.

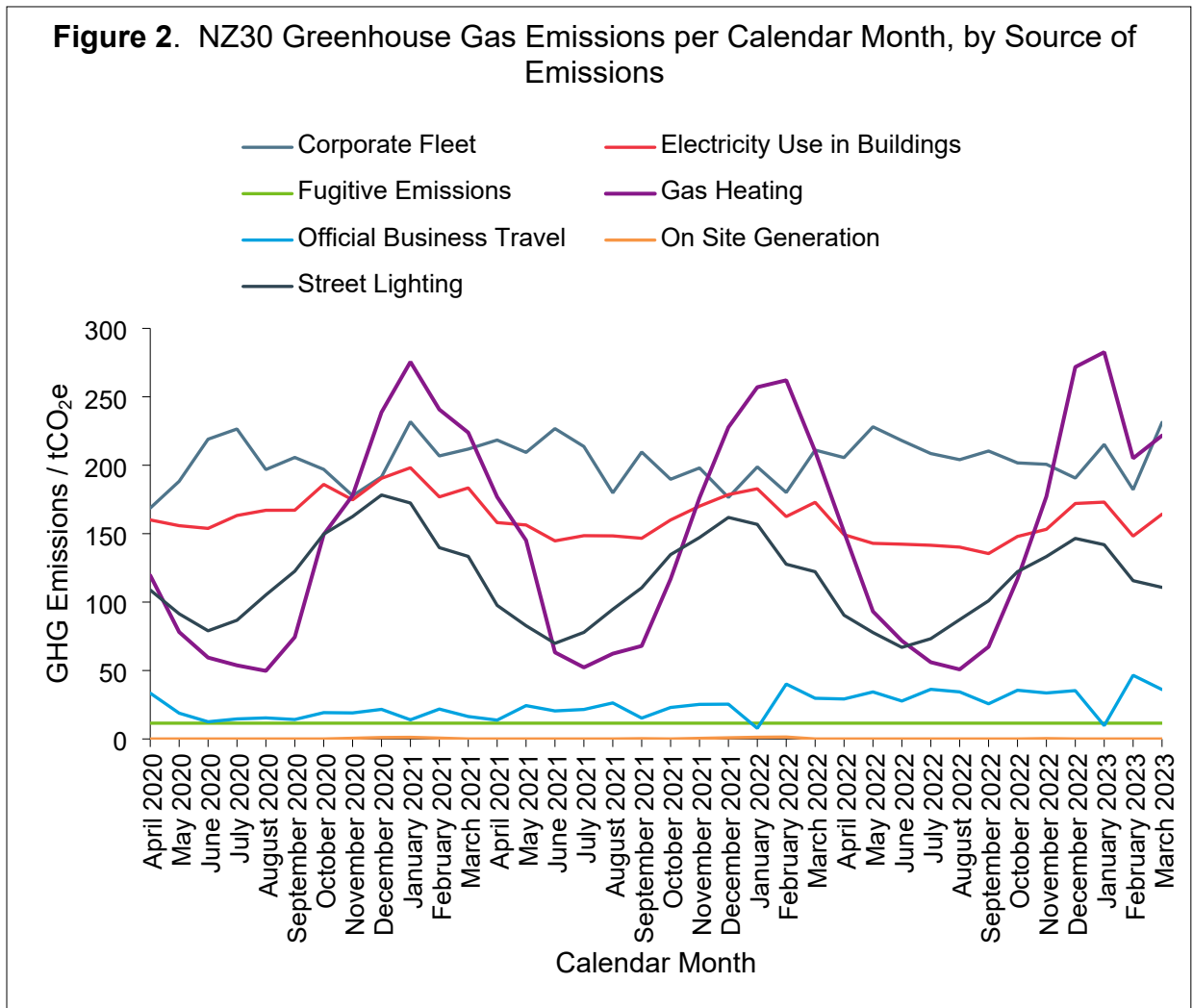
1.3 Tonnes of carbon dioxide equivalent (tCO₂e) are used to express other greenhouse gases, methane, nitrous oxide and fluorinated gases, as an equivalent amount of CO₂. For example, methane has a global warming potential 28 times greater than CO₂, over 100 years: over the same period, 1 tonne of methane is equivalent to 28 tonnes of CO₂ i.e., 28 tCO₂e.

1.4 Annual NZ30 greenhouse gas emissions are estimated from conversion factors published by the Department for Energy Security and Net Zero (formerly the Department for Business, Energy and Industrial Strategy, BEIS), applied to energy use and other data held by the Council.

1.5 Organisations which do not report emissions over the calendar year are advised to apply conversion factors according to the year which comprises the majority of their reporting period. Conversion factors from 2020 should be applied to 2020/21 and so on, for an April to March reporting period.

- *Greenhouse Gas Reporting: Conversion Factors 2022*. BEIS (September 2022).
- *Greenhouse Gas Reporting: Conversion Factors 2021*. BEIS (January 2022).
- *Greenhouse Gas Reporting: Conversion Factors 2020*. BEIS (July 2020).

1.6



1.7 ‘Scope 1’ and ‘scope 2’ greenhouse gas emissions, plus emissions from official business travel, comprise the scope boundary for central government bodies’ mandatory emissions accounting. Scope 1 emissions are from sources directly owned or controlled by an organisation; scope 2 emissions are from purchased electricity, heat, steam or cooling; whereas emissions from business travel are an example of scope 3 emissions, considered in more detail below.

- *Sustainability Reporting Guidance: 2023-24*. HM Treasury (July 2023)

1.8 Applying the same scope boundary as for central government departments’ mandatory emissions accounting, the Council’s NZ30 emissions are:

- Emissions from corporate fleet vehicles, back-up diesel generators and mains gas heating.

- Fugitive emissions of fluorinated gases from refrigeration, air conditioning units and heat pumps.
- Emissions from purchased electricity used for street lighting and Council buildings.
- Emissions from 'grey fleet' vehicles and other business travel.

1.9 *Corporate Fleet Vehicles*

Corporate fleet vehicles accounted for 32% of NZ30 emissions in 2022/23, the single greatest source of greenhouse gas emissions within scope of the Council's climate change target.

Since 2020/21, gas oil or 'red diesel' has been phased out from the Council's fuelled sites. Compared with conventional or 'white' diesel, gas oil is taxed at a lower rate, through a rebate on fuel duty. From April 2022, most sectors no longer qualify for the rebate i.e., may no longer use gas oil. Gas oil has a greater greenhouse gas conversion factor than conventional diesel, hence a baseline reduction in corporate fleet emissions of 1.3%, over the last three years.

A change in methodology has obscured this trend. Previous Climate Change Annual Reports have reported emissions from gas oil-fuelled corporate fleet vehicles as emissions from petrol vehicles, in error. This error is corrected in the 2022/23 reporting year, with a commensurate increase in emissions from corporate fleet vehicles, which now include data from fuel cards used to reimburse the drivers of petrol-fuelled corporate fleet vehicles, for the first time.

- [Reform of Red Diesel and Other Rebated Fuels Entitlement](#). HM Revenue & Customs (November 2021)

1.10 *Electricity Use in Council Buildings*

Since 2020/21, electricity use in Council buildings has increased ca. 5%, to 9.370 million kWh in 2022/23. This increase may be due to increasing building occupancy: between April 2020 and March 2023, average occupancy at Riverside House increased from 6% to 24%, as working patterns continued to change in the wake of the COVID-19 pandemic. Notwithstanding increased demand for electricity in Council buildings, decarbonisation of the UK electricity system caused emissions to fall 11.6%, over the same period.

1.11 *Gas Heating*

Emissions from mains gas heating, which comprised 22% of NZ30 emissions in 2022/23, were broadly unchanged since 2020/21. Notwithstanding a relative peak in emissions during 2021/22, emissions from heating were 1.4% greater in 2022/23, than in 2020/21. These changes are most likely driven by annual, seasonal variability in external temperatures: 2022 was considerably warmer than 2021.

- [2022 UK Greenhouse Gas Emissions, Provisional Figures](#). Department for Energy Security and Net Zero (March 2023)

1.12 *Street Lighting*

Energy demand for streetlighting was essentially unchanged over the last three reporting years, from 6.562 million kWh in 2020/21 to 6.550 million kWh in 2022/23. However, increasing renewable generating capacity and the continuing phase out of coal fired power generation has reduced the greenhouse gas conversion factor for UK electricity from 0.23 kgCO₂e per kWh in 2020/2021, to 0.19 kgCO₂e per kWh in 2022/23: causing

greenhouse gas emissions from streetlighting to fall 17.2%, over the same period.

1.13 *Business Travel*

In 2022/23, greenhouse gas emissions from 'grey fleet' vehicles were 381 tCO₂e, up from 221 tCO₂e in 2020/21: a 74% increase. Mileage claims have increased, as working patterns have continued to change since the COVID-19 pandemic.

Emissions from accommodation and other modes of business travel were estimated to be 3.1 tCO₂e in the 2022/23 reporting year, the first time these emissions have been included in the Council's NZ30 emissions inventory.

1.14 *Fugitive Emissions*

Fugitive greenhouse gas emissions are produced unintentionally e.g., by accidental leaks from air conditioning equipment. Since many refrigerants have global warming potentials thousands of times greater than carbon dioxide, even trace amounts released by accident can have a significant environmental impact. Following a 'screening method, standard conversion factors are applied to an inventory of air conditioning units to produce an estimate of 138 tCO₂e per annum.

- *Environmental Reporting Guidelines: Including Streamlined Energy and Carbon Reporting Guidance.* HM Government (March 2019)

1.15 *On Site Generation (Back-up Diesel Generators)*

Emissions from back-up diesel generators were 3.4 and 4.1 tCO₂e in the 2020/21 and 2021/22 reporting years, respectively. In 2022/23, emissions fell 93.14% to 0.3 tCO₂e, as the Council ended its participation in STOR (short-term operating reserve). As a member of the scheme, the Council would export power from its back up diesel generators during periods of exceptionally high electricity demand, to help balance capacity in the UK grid. Back-up diesel generators are now used only to ensure business continuity, in case of interrupted electricity supply.

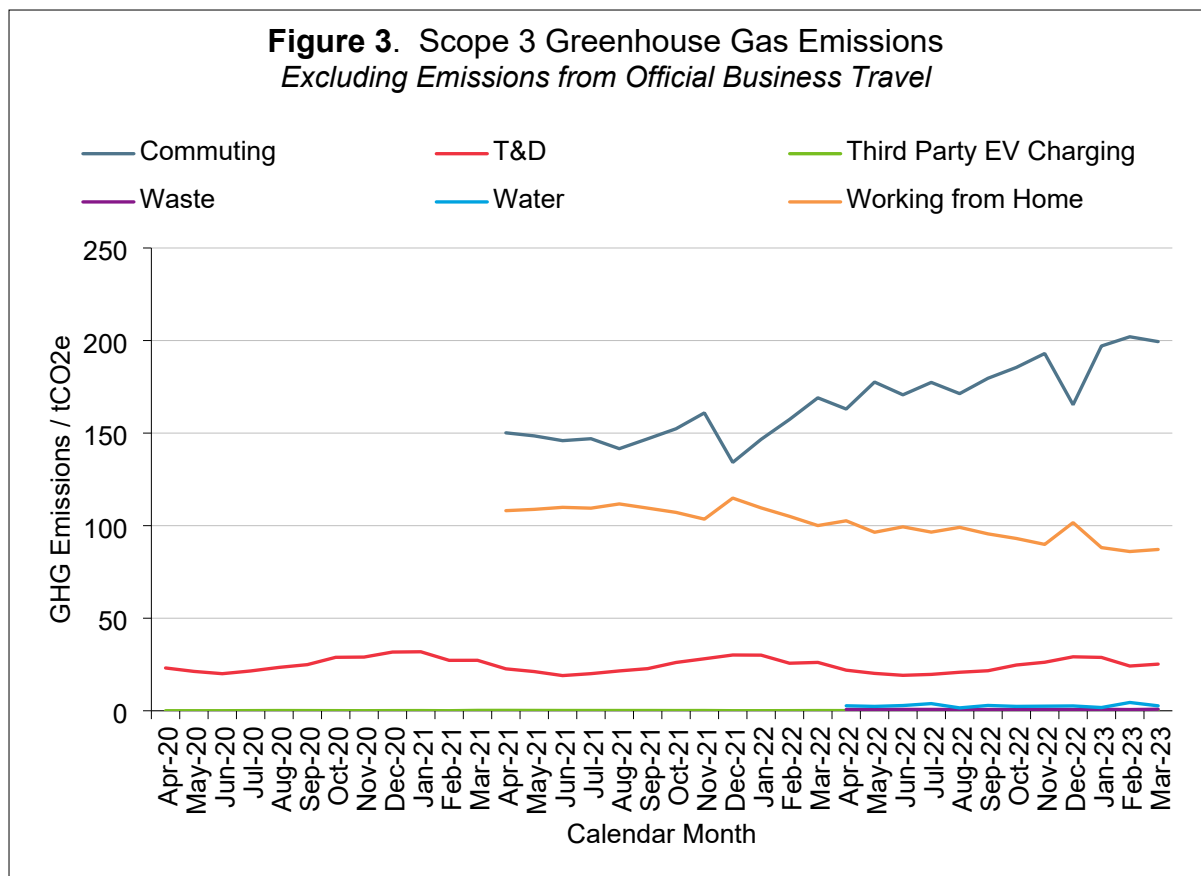
- *Short Term Operating Reserve (STOR).* National Grid (January 2018)

2. Scope 3 Greenhouse Gas Emissions

- 2.1** Scope 3 greenhouse gas emissions are from sources not directly owned or controlled by an organisation: they include all emissions which are a consequence of the organisation's activity, but which are not caused by its primary energy use, purchased energy or fugitive emissions.
- 2.2** Official business travel is a source of scope 3 emissions. 'Grey fleet' mileage is incurred by Council officers travelling in their own vehicles i.e., vehicles which the Council does not own or control. By reimbursing staff mileage claims; by setting a policy on travel expenses; and by creating a need to travel in the first instance, the Council shares a high degree of responsibility for these emissions, which nonetheless depend on the travel choices and driving practices of its employees.
- 2.3** Such a degree of responsibility for scope 3 emissions implies a corresponding degree of influence or control. As discussed below (4.9), the Council directly controls a small percentage of greenhouse gas emissions, within its local authority boundary. Scope 3 emissions are an important 'lever of influence' which the Council must use if it is to achieve its climate change target, for greenhouse gas emissions across the Borough of Rotherham to be 'Net Zero' by 2040.
- 2.4** Scope 3 emissions accounting is an emerging field: in figure 3 above, data series' different start dates reflect the Council's increasing capacity to estimate scope 3 emissions, over the last three years. In principle, scope 3 should include all emissions from work done on the Council's behalf, by its suppliers and contractors; emissions which are 'embodied' in the Council's assets; and emissions associated with the use of Council services.

- *Climate Change: Reporting Guidance for Local Authorities. LGA*
- *Sustainability Reporting Guidance: 2023-24. HM Treasury (July 2023)*

2.5



- 2.6** Transmission and distribution, abbreviated “T&D” above: greenhouse gas emissions from the Council’s purchased electricity, accounting for losses in the electricity system.
- 2.7** Previous climate change annual reports have accounted for emissions from purchased electricity used to charge electric vehicles (EV’s) as scope 2 greenhouse gas emissions. Albeit this is appropriate for EV charging of corporate fleet vehicles, the majority of EV charging points installed by the Council are intended for public use. Moreover, only four EV charging points installed by the Council are intended for public use. Moreover, only four EV charging points with their own metered electricity supply were being reported separately from electricity use in Council buildings. Now, transactions data have been used to estimate emissions from ‘third party’ EV charging i.e., from public use of the Council’s EV charging infrastructure.
- 2.8** Since the COVID-19 pandemic significantly affected working patterns and led many organisations to adopt hybrid working policies, commuting and home working have been included within scope 3 emissions accounting. Emissions estimates published in a previous climate change annual report were based on a 2021 survey of staff working patterns and travel choices, before and after the COVID-19 pandemic. In the series above, these estimates are supplemented by building occupancy surveys and access data, used as proxy indicators for number of days worked by staff, from home or on site.
- 2.9** Water is pumped and pressurised, using energy and causing greenhouse gas emissions as it is supplied to the end-user. Carbon dioxide, methane and nitrous oxide are all by-products from the treatment of waste water, before it is returned to the environment. Intercepting rainwater and ‘grey’ water recycling are means to cut greenhouse gas emissions arising from water use.
- *Greenhouse Gas Emissions of Water Supply and Demand Management Options.* Environment Agency (July 2008)
 - *A Critical Decade: Removing Greenhouse Gases from Wastewater Treatment.* Water UK (November 2021)
- 2.10** Emissions from the Council’s own waste are estimated from internal Business Waste customers’ waste collection capacities, supplemented by weight analysis. Paper and card recycling collections were first offered to existing, internal customers in October 2023. Before then, all collections were of residual waste, processed at the BDR Waste Treatment Facility. The carbon intensity of waste treatment at the BDR Waste Treatment Facility is published in the BDR Waste Partnership annual report.
- *Annual Service and Environmental Report: Financial Year 2022/23.* BDR Waste Partnership

2.11

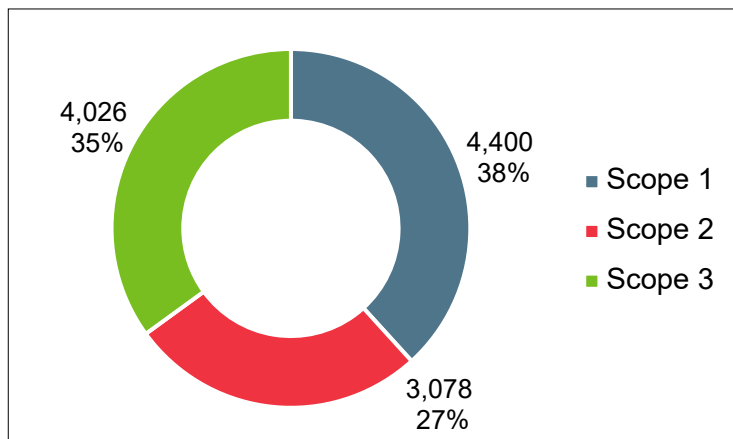
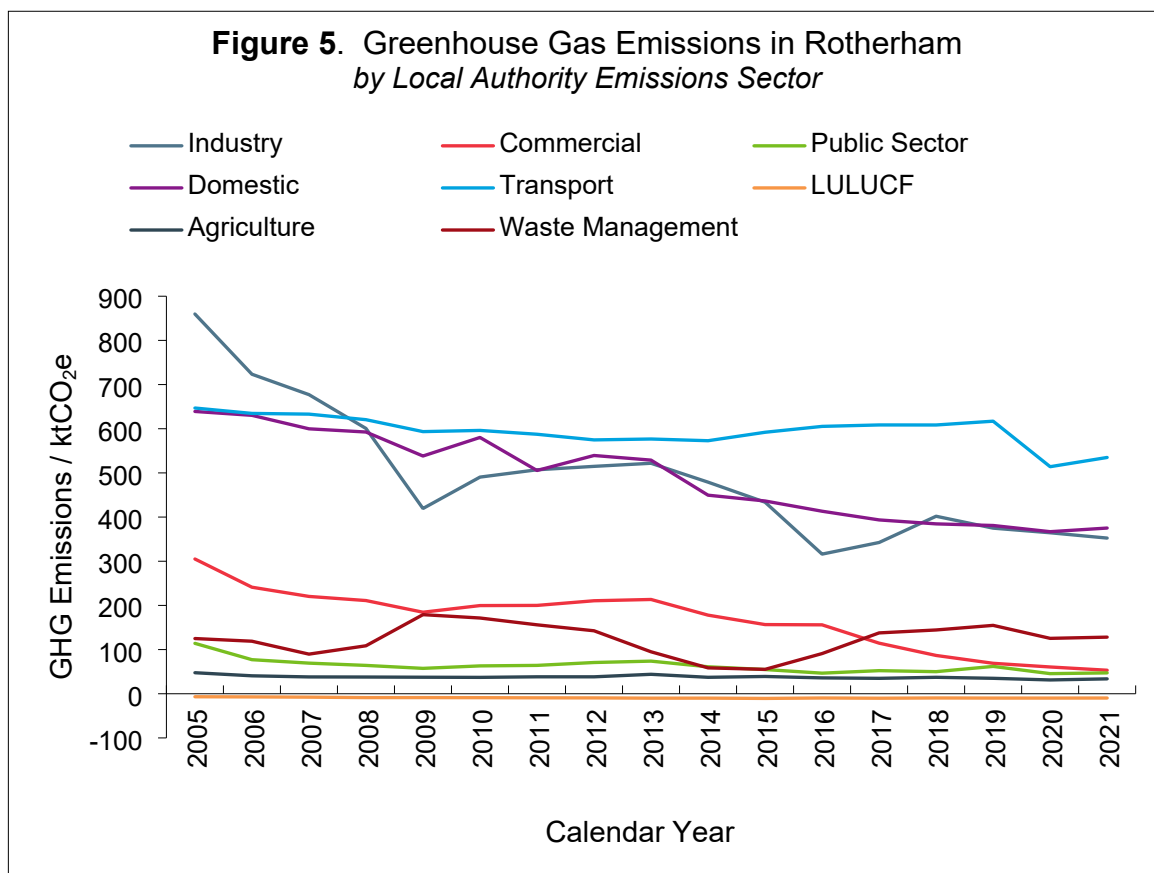


Figure 4. Annual Greenhouse Gas Emissions by Scope
1 April 2022 - 31 March 2023

All greenhouse gas emissions, irrespective of NZ30 scope boundary, totalled 11,503 tCO₂e in the 2022/23 reporting year. The Council is still increasing its capacity to monitor and report scope 3 emissions.

3. Net Zero 2040: Greenhouse Gas Emissions across the Borough of Rotherham

3.1



3.2 Local authority greenhouse gas emissions statistics for the 2021 calendar year and revised statistics for calendar years 2005-2020 were published in June 2023, by the Department for Energy Security and Net Zero. Fluorinated gases, emissions from aviation and shipping, military transport and trade exports were not allocated to local authority areas; in 2021, these sectors accounted for 6.2% of total UK emissions.

- *UK Local Authority and Regional Greenhouse Gas Emissions National Statistics: 2005-2021. Department for Energy Security and Net Zero (June 2023)*

3.3 In Rotherham as elsewhere, greenhouse gas emissions were significantly affected by the COVID-19 pandemic. Transport is the greatest source of emissions in Rotherham. Transport emissions had been unchanged by more than a few percentage points, for a period of fifteen years, when in 2020 the introduction of lockdowns and other travel restrictions caused them to fall 16.7%, in just one year. As restrictions were eased during 2021, emissions from transport increased; though not to the same level as in 2019, the last full calendar year before the pandemic.

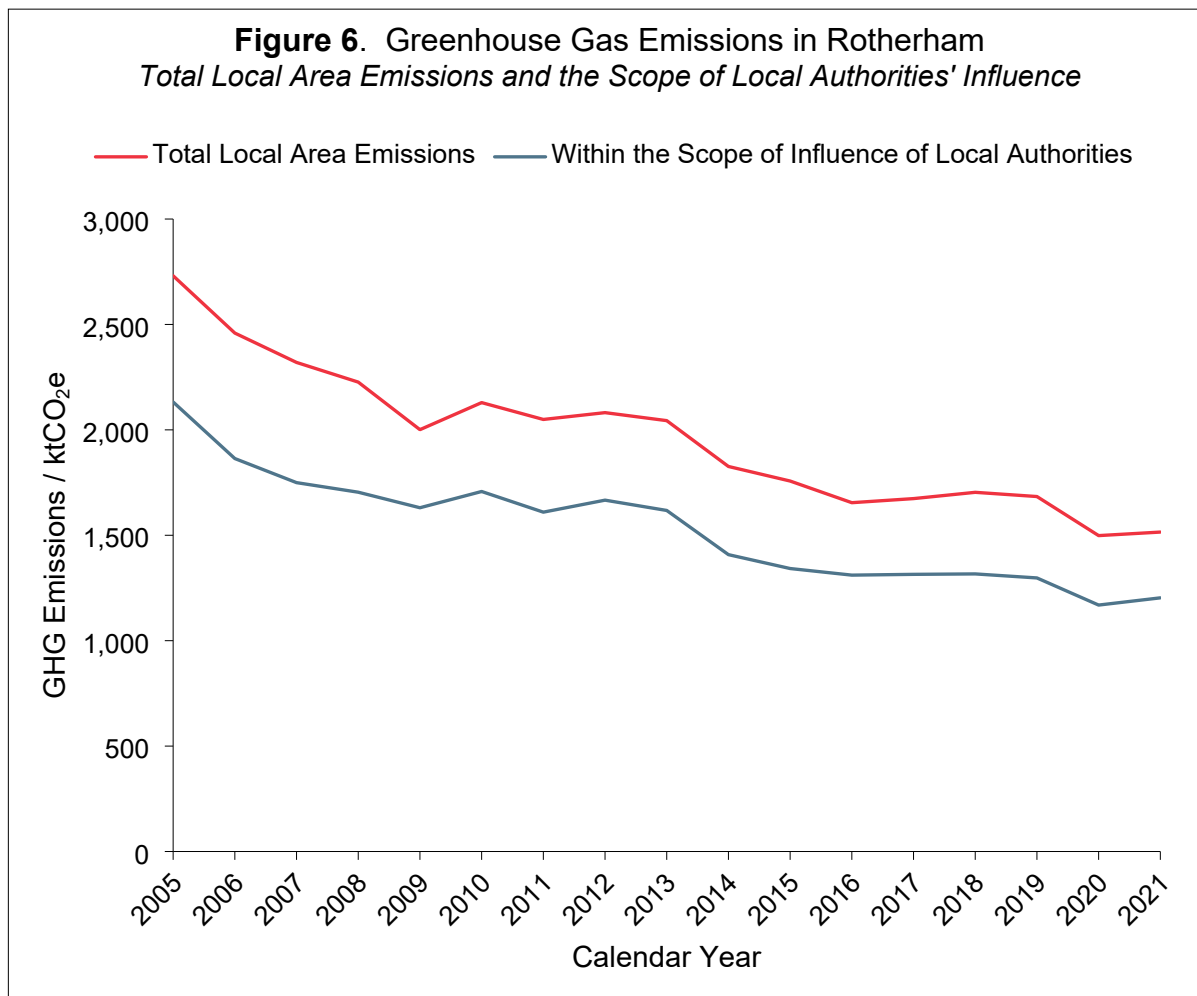
3.4 Longer-term changes in greenhouse gas emissions have been driven by decarbonisation of the UK electricity system, through increased renewable generating capacity and the continuing phase out of coal from the fuel mix used to generate electricity. For the purpose of local authority emissions statistics, emissions related to energy use are allocated by end-user. As such, this national programme of grid decarbonisation translates directly into decreased emissions from electricity use in industry, commercial, public and domestic sectors, in the Borough of Rotherham.

3.5 Agriculture sector emissions, including emissions from livestock and soils, accounted for 2% of local area emissions in Rotherham, in 2021. In the same year, 53.7% of land in the Borough was in agricultural use.

- *Land Use in England, 2021*. Department for Levelling Up, Housing and Communities (October 2022)

3.6 Land Use, Land Use Change and Forestry (LULUCF) made a small, net negative contribution to local area emissions in Rotherham of -9.7 ktCO₂e in 2021 i.e., of a magnitude less than 1% of gross emissions in the Borough, in the same year.

3.7



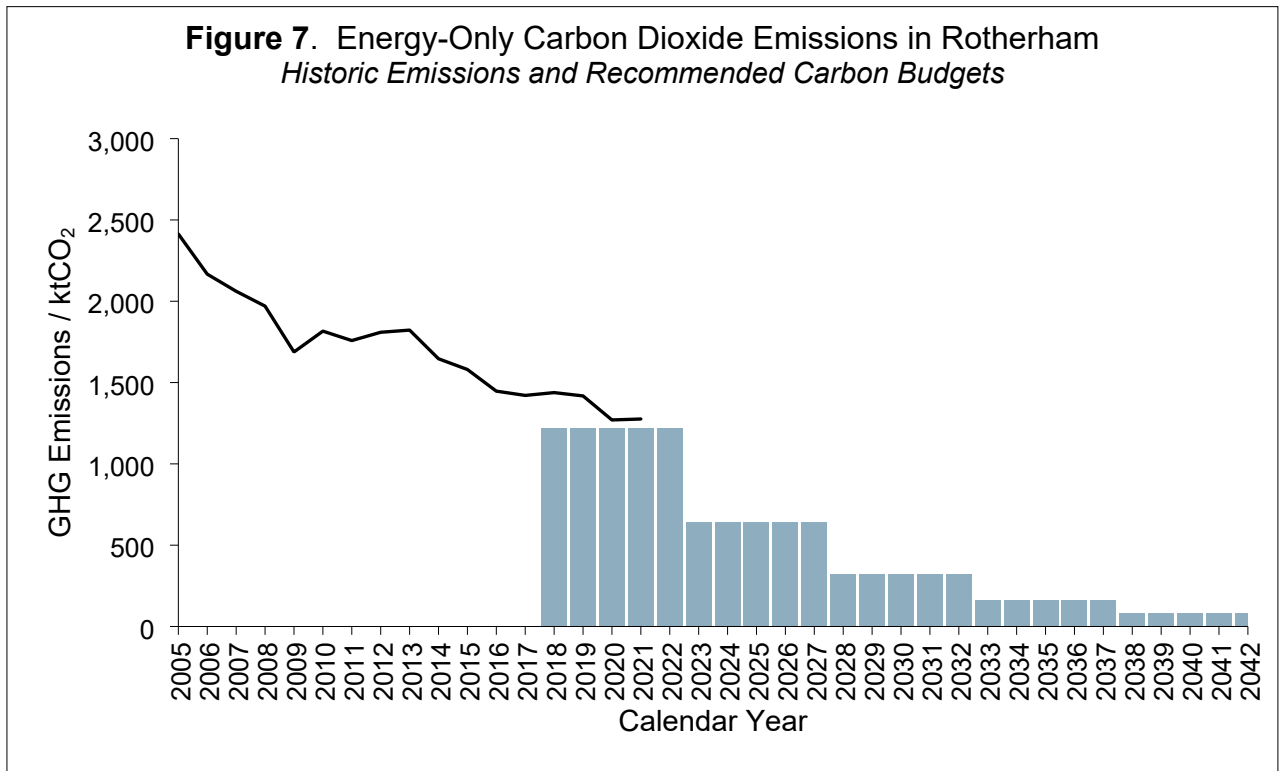
3.8 Greenhouse gas emissions from large industrial installations, railways and motorways, livestock, soils and the LULUCF sector are considered outside the scope of local authorities' influence. Applying the same scope boundary to emissions in Rotherham, in 2021 the Council could influence greenhouse gas emissions of 1,203 ktCO₂e, 78% of gross local area emissions.

3.9 In 2021, the Council's NZ30 greenhouse gas emissions were 8,082 tCO₂e. Compared with gross local area emissions of 1,540 ktCO₂e, this implies the Council had direct control over 0.52% of all greenhouse gas emissions produced in Rotherham that year.

3.10 In a 2020 report, the Climate Change Committee proposed that local authorities could influence up to a third of emissions in their respective areas. Unlike the 78% figure quoted above, this estimate accounts for local authorities' varying degrees of influence: from direct control, through procurement and commissioning, to place-shaping responsibilities, wider communication and engagement.

- *Local Authorities and the Sixth Carbon Budget*. Climate Change Committee (December 2020)

3.11



3.12 Local area, energy-only carbon dioxide emissions are estimated from a sub-set of UK local authority greenhouse gas emissions statistics. Emissions from the Land Use, Land Use Change and Forestry sector; waste management, livestock and soils; and ‘other’ domestic and industrial emissions sources are excluded from local area emissions, to indicate energy-only CO₂ emissions.

- *UK Local Authority and Regional Greenhouse Gas Emissions National Statistics: 2005-2021.* Department for Energy Security and Net Zero (June 2023)

3.13 Five-year carbon budgets for Rotherham were recommended as part of a series of “Tyndall Carbon Budget Reports,” published by the Tyndall Centre for Climate Change Research and informing the Council’s decision to adopt ‘Net Zero’ climate change targets.

- *Responding to the Climate Emergency.* RMBC (March 2020)

3.14 UK carbon dioxide emissions are provisionally estimated to have decreased 2.4% in 2022, compared with 2021. If the same applies to energy-only CO₂ emissions in the Borough of Rotherham as the rest of the UK economy, then the recommended carbon budget for 2018 – 2022 will have been exceeded by ca. 550,000 tCO₂ (9%).

- *2022 UK Greenhouse Gas Emissions: Provisional Figures.* Department for Energy Security and Net Zero (March 2023)

3.15 Recommended carbon budgets are considered the maximum cumulative CO₂ emissions consistent with a local authority area’s “fair contribution to the Paris Climate Agreement,” which commits signatories to pursue efforts to limit global average temperature increases to 1.5°C above pre-industrial levels. Exceeding the carbon budget of one five-year period implies steeper cuts in future if a local area is to uphold its “fair contribution.”

- *Setting Climate Commitments for Rotherham: Quantifying the implications of the United Nations Paris Agreement for Rotherham.* Kuriakose et al. (December 2023)