Broadland District Council Greenhouse Gas Report 2018/19

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Disclaimer

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1. Background to this Report

Local authorities in England have been requested by Government to measure and report annually upon the greenhouse gas (GHG) emissions arising from their own activities.[1] This Annual Greenhouse Gas Report follows HM Government *Environmental Reporting Guidelines* with emissions broken down into three scopes and reported in Carbon Dioxide Equivalent (CO_2e), calculated using the UK Government's 2018 carbon conversion factors. [2, 3]

Broadland District Council is a second tier Local Authority. Head Office is Thorpe Lodge, Yarmouth Road, Norwich, NR7 0DU. The report covers the annual period 1st April 2018 to 31st March 2019.

The production of this Annual Greenhouse Gas Report represents stage 1 of Groundwork Norfolk's proposal to provide support for the councils to achieve net zero carbon emissions. This report is the baseline carbon footprint for the year 2018-19. It is understood that this and future annual footprint reports will be written and published on the council website. These reports show emissions in a particular year for the council's estate. The production of these reports does not include site visits or make detailed recommendations of actions that would reduce emissions.

The next stage is a detailed decarbonisation plan that would look at buildings and vehicles in depth and make quantified recommendations for emissions reductions.

[1] Via a letter to Local Authorities https://www.gov.uk/guidance/sharing-information-on-greenhouse-gas-emissions-from-local-authority-own-estate-and-operations-previously-ni-185
[2] H.M. Government Environmental Reporting Guidelines https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/791529/Env-reporting-guidance_inc_SECR_31March.pdf
[3] Greenhouse gas reporting: conversion factors 2020 https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2020

2. Methodology and Scope of Reporting

This 2018/19 Greenhouse Gas Report covers emissions from Broadland District Council's own estate and operations looking at electricity, gas, vehicle fleet fuel use, business travel and waste. Appendix 1 details the properties included within this report.

Energy, fuel consumption and estimated waste data has been provided by Broadland District Council with GHG emissions calculations and analysis carried out by Groundwork Norfolk. In line with the *Environmental Reporting Guidelines* carbon emissions are broken down into direct and indirect emissions. These are categorised into Scope 1, Scope 2 and Scope 3 emissions according to which activity and fuel or energy use they arise from.

Scope 1: These are Direct Emissions which arise from the activities of an organisation and include fuel combustion on site such as gas boilers and fleet vehicles.

Scope 2: These are Indirect Emissions from electricity purchased and used by the organisation. Emissions are created during the production of the energy which is eventually used by the organisation.

Scope 3: These are all other Indirect Emissions from activities of the organisation, occurring from sources that they do not own or control. In this GHG report these cover emissions associated with business travel by employees and also those associated with the 'Transmission and Distribution' (T&D) of electricity purchased by the organisation. Scope 3 can include a wide range of indirect emission sources such as supply and demand chains and staff commuting emissions although at present the data is not available for this.

For Broadland the waste fleet is operated by Veolia so the emissions associated with this fall into scope 3. Water use and waste disposal from owned buildings is also included in scope 3.

Inclusions

Buildings that are owned and operated by the councils have been included – where the council pays the energy bills.

GHG emissions are expressed as tonnes of CO_2 equivalents (tCO_2e). This is a unit of measurement used to indicate the global warming potential of a greenhouse gas, expressed in terms of the global warming potential of one unit of carbon dioxide. The UK Government's 2018 Carbon Conversion Factors have been applied to the units of energy and fuel consumption to calculate the associated emissions.[4] For example, CO_2 equivalent emissions from electricity

[4] Greenhouse gas reporting: conversion factors 2020
https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2020

consumption are calculated by multiplying the kWh use over a period by the conversion factor for electricity which gives a kgCO_2e figure.

3. GHG Emissions Statement

Broadland District Council's total gross greenhouse gas emission statement for the year 2018/19 has been calculated to be 1,297.1 tCO_2e, as shown in Table 1.

Table 1: Emissions Statement (Estate and Operations) 2018/19

2018-19		GHG Emissions (tCO_2e)
Scope 1	Natural Gas	57.6
	Heating Oil	6.1
	Biomass	1.3
	Authority Owned Vehicles	11.0
Scope 2	Electricity	161.0
Scope 3	Employee Business Travel	46.9
	T&D Emissions from Electricity	13.7
	Waste Disposal	6.2
	Waste Fleet	993.3
		1297.1

Transmission and Distribution Losses (T&D) refers to the emissions associated with electricity which is lost from the system used for delivering the purchased electricity. These emissions are calculated by using a 'T&D loss' emission factor which is included in the 2018 Carbon Conversion Factors.

4. Intensity Measurement

In mid-2018 Broadland District Council served a population of 129,464.[5] An intensity ratio of 'kilogrammes of CO_2e per resident' has been calculated to be 10.02 $kgCO_2e$ per resident for this period.

Previously local authorities were required to complete an annual greenhouse gas report. Since this requirement has ended not all local authorities have continued to report emissions.

Authorities differ significantly in size, geography and responsibilities so comparisons may be misleading, however, Table 2 below provides a snapshot of Broadland District Council's carbon footprint in comparison to other local authorities.

Table 2: GHG Emissions Comparison with Other Published Authorities.

Local Authority	GHG Emissions	Population	$kgCO_2e$/resident/year
Broadland District Council	**1,297**	**129,464**	**10.02**
London Borough of Tower Hamlets (excludes schools but includes street lighting)	6,485	317,705	20.41
South Norfolk Council	**2,936**	**138,017**	**21.27**
Norwich City Council (inc business and **contractor travel**, and **contractor operated buildings** but not housing stock)	4,297	141,137	30.44
Kings Lynn (inc Transmission and distribution losses, water supply, water treatment, business travel and **contractor travel**)	4,632	151,811	30.51
Ipswich Borough Council (excluding housing stock)	4,757	136,913	34.74
Breckland (include contracted vehicle fleets, **commuting**, **procured goods and services,** and expensed travel)	5,084	139,968	36.32
Eastleigh Borough Council (includes staff travel)	7,727	129,966	59.45

[5] Office for National Statistics. https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/datasets/populationestimatesforukenglandandwalesscotlandandnorthernireland

Bradford Metropolitan District Council (**excludes staff travel** but includes schools and street lighting	37,662	500,000	75.32

The exact composition of services, scopes and ranges of emissions included in each report also vary so comparisons can be misleading.

5. Breakdown of GHG Emissions

Of the 1,297.1tCO_2e emissions for the period 2018/19, 77% (993.3tCO_2e) has been attributed to the diesel consumption of the waste and street scene fleet based at the Frettenham depot operated by Veolia (Figures 1 and 2). These contractor emissions fall into Scope 3.

The heat, light, power and grounds fuel consumption at Frettenham Depot has been included in scope 1 as deemed a direct emission of the council along with the remaining emissions directly related to the authority's operations; grid electricity accounts for 13% (including T&D), natural gas for 4%, employee business travel for 4%, operational waste disposal and authority owned vehicles for 1% each, and heating oil and biomass for less than 1% each.

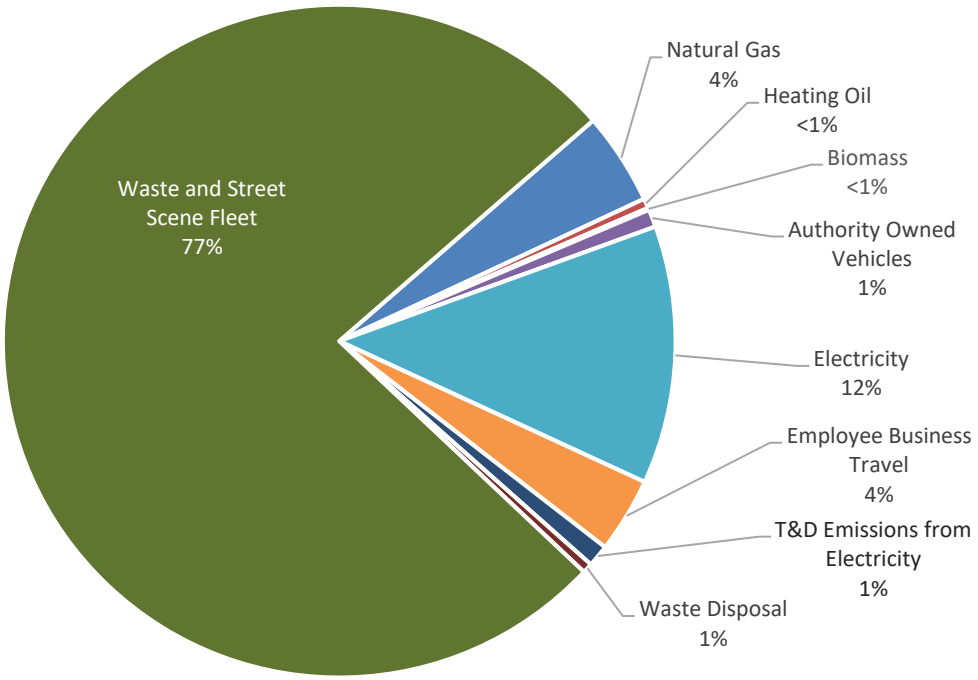

Figure 1: Breakdown of GHG Emissions by Source.

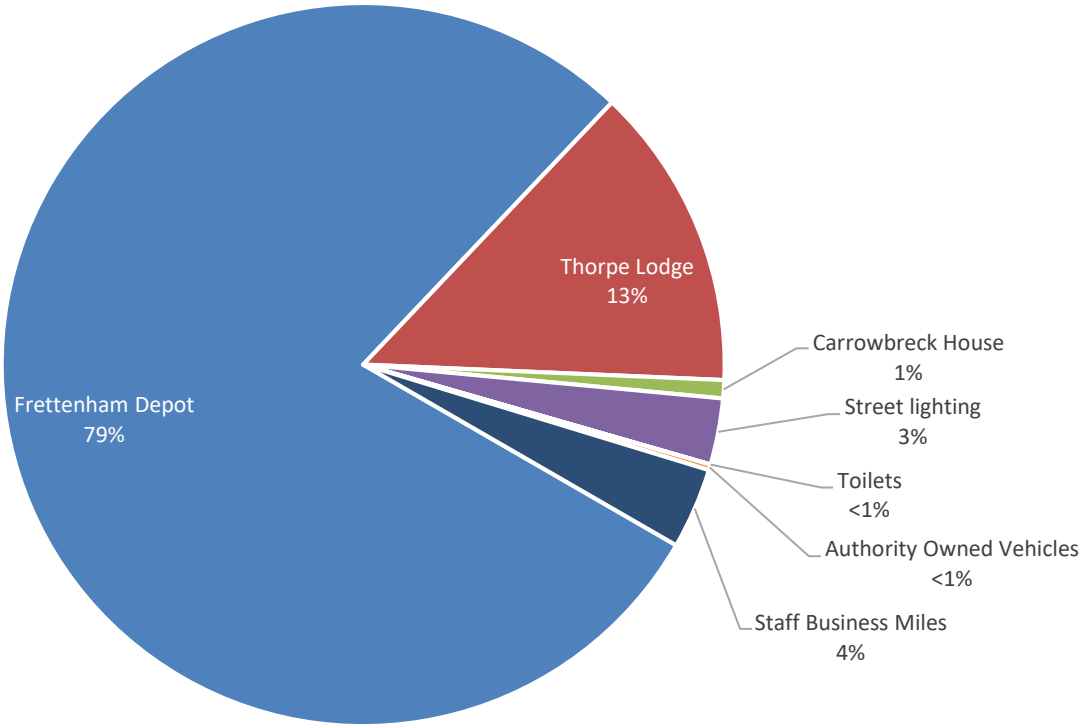

Figure 2: Breakdown of GHG Emissions by Location/Source.

6. Electricity Generated from On-site Solar PV

The authority has been able to supply renewable electricity generation figures for the installation at Thorpe Lodge.

In the year 2018/19 the total generation was 8224kWh, data supplied for the following 12 months shows this to be fairly consistent (Table 3).

Table 3: Metered Solar Generation at Thorpe Lodge

	2018	2019
Annual Generation (kWh)	8224	8455
tCO_2e	2.9	2.7

This represents approximately 2% to 3% of the total imported electricity at Thorpe Lodge.

The roof space at Thorpe Lodge could potentially contain five times the current PV capacity and if so could supply an estimated 15% or more of the imported demand (Figure 3).

Figure 3: The current solar PV array at Thorpe Lodge and the available roof space

It is understood that a further solar PV installation is located at the Frettenham Depot although no generation data has been provided. If the provided estimate of 10kWp is correct a south facing, roof mounted installation of that size could be expected to generate around 10,000kWh per year.

7. Energy use in Buildings

Electricity and gas consumption data was provided from meter readings for the two main Broadland District Council buildings and the Frettenham site operated by Veolia (Figure 4). The heat light and power emissions associated with Thorpe Lodge account for 13% of the total authority emissions, Carrowbreck for 1% and Frettenham 1.5% .

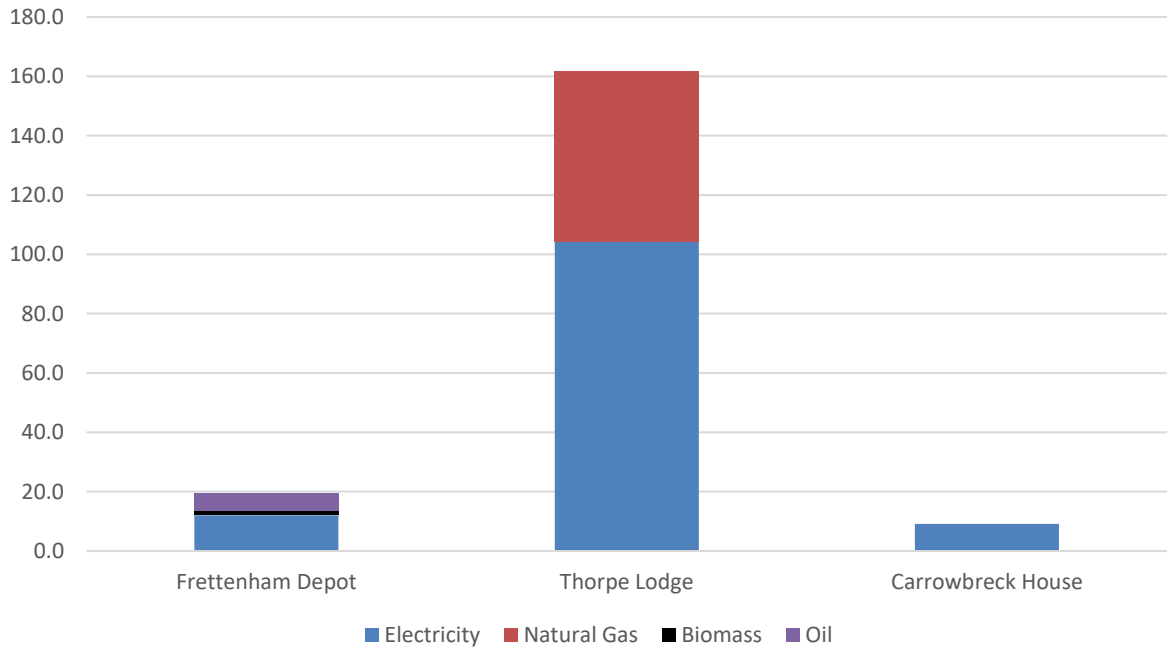

Figure 4: GHG Emissions Associated with Heat, Light and Power Energy Consumption.

Replacing fossil fueled heating at Thorpe Lodge and Frettenham Depot with high-efficiency electric heat pump and building control systems could save an estimated 33.8tCO_2e. Please note that surveys have not been carried out to determine if this is possible or associated costs.

Improvements have already been made at Frettenham depot including the installation of PV panels and a biomass boiler.

8. Transport Related Emissions

The authority has two vehicles, one of which is understood to be shared with South Norfolk Council. In total these are accountable for 3.3tCO_2e and have been entirely included in this Broadland District Council report as no split in mileage was available and the figure is deemed to be insignificant.

Staff business mileage in their own vehicles has been estimated based on the mileage data supplied, this was not available by fuel type in the recorded data. A sample of the vehicle's registrations were checked for fuel type against the government records and a proportion then extrapolated over the entire mileage and average vehicle conversion factors were used. This mileage accounts for a more significant 46.9tCO_2e.

Emissions associated with the waste fleet are the largest emitter. The planned move from diesel to HVO is expected to have a significant reduction on the emissions.

9. Water Emissions

Limited water meter data was available for the Broadland District Council properties. Carbon emissions from staff and public welfare facilities water consumption can be insignificant however the wider environmental impacts of water consumption and waste water disposal may be considered in future environmental reports so should be part of the monitoring systems.

10. Waste Emissions

Commercial waste data supplied for Thorpe Lodge and Carrowbreck House indicates that there a three main streams; recycling, composting and residual, with the residual waste going to incineration (energy from waste)

The government conversion factors for all three streams are identical, meaning the emissions per kg from all three are identical. There may be wider environmental factors that the council could consider in reducing waste streams to incineration and reducing the production of waste in general through reduced printing, selective procurement etc.

11. Thorpe Lodge

This report was a desktop exercise, it has not been necessary to visit buildings at this stage.

The information on the buildings has been taken from published DECs and EPCs and details on improvements to the buildings has been provided by building managers.

Detailed audits of buildings to make specific recommendations would form part of a decarbonisation plan which is the next step.

The Thorpe Lodge site consists of the original house built around 1820 which was Grade II listed in 1973 and newer 4 storey blocks.

The government energy certificates website lists three address associated with this postcode, all of which are described as Broadland District Council, the last operational ratings for which can be seen in table 4.[6]

Table 4: Registered Operational Ratings for Thorpe Lodge

Address	Property Type	Total Floor Area m^2	Operational Rating	Typical
Broadland District Council Thorpe Lodge, 1 Yarmouth Road NORWICH NR7 0DU	General Office Mechanical ventilation	4076	78:D	100:D

Improvements suggested for the main building in the latest report that could pay for themselves in three years include:

- Heating and cooling controls to avoid simultaneous operation
- Variable speed drives for pumps and fans

Longer term suggestions include:

- Reducing solar gains
- Reducing heat losses
- Increasing renewable generation

[6] Find Energy Certificates and Reports. https://find-energy-certificate.service.gov.uk/find-a-non-domestic-certificate/search-by-postcode?lang=en&property_type=non_domestic

Benchmark emissions data is usually based on the treated floor area (heated and lit) which, without more detailed data, can be estimated at 75% of the total floor area, 3057m^2. So on that basis the heat, light and power data supplied for this report suggests an emission for Thorpe Lodge of 0.053tCO_2e/m^2. The CIBSE Energy Consumption Guide 19 (ECON 19 Guide) suggests a benchmark for a *good* air conditioned standard office building of 0.087tCO_2e/m^2 suggesting the building is reasonable efficient for its type and age.[7]

It is understood that recent improvements at Thorpe Lodge include:

- Voltage optimiser
- Cylon BMS
- ABB HVAC inverter
- Pumps and gate valves insulated
- Quinta high efficiency boilers
- Solar panels for hot water (top up)
- PV panels for feed in tariff
- 300mm cavity insulation both sides of the mansard roof
- 100mm cavity insulation in old lodge roof space
- Turn water off a night to all urinals saving around 13 hours usage (approx. 2808 litres per day saved)
- Reduced times on the heating system
- LED lighting for all outside lights
- LED lights internal as and when they need to be replaced
- Refurbished sash windows in the old part the Lodge reducing drafts
- Double glazed external doors
- Low power pc's and laptops (IT equipment)

[7] David H. Clark. What Colour is Your Building? Measuring and reducing the energy and carbon footprint of buildings. 2013, London.

Appendix 1:

Broadland District Council Site Emissions Considered in this Report

Property name	Full Address	Postcode	Type of building	Electricity kWhpa	Natural Gas kWhpa	Incinerated General Mixed Waste (kgs)	Heating Oil (l)	Biomass Wood Pellets (tonnes)	Diesel (l)	Recycled Waste (kgs)	Composted (kgs)	Sanitary (Kgs)	Electrical (kgs)
Thorpe Lodge	Thorpe Lodge, 1 Yarmouth Road, Norwich	NR7 0DU	office block	368,446	313,044	252000				840	21840	134.8	64
Carrowbreck House	Carrowbreck House, 7 Carrowbreck Road, Norwich	NR6 5FA	office block - training centre	32,342		28600							
streetlights			streetlights	125,025									
toilets			toilets	200									
Frettenham Depot			Waste Depot	42594			2400	18	378,105				

Council	Type/person/Fleet/department	Fuel type	Mileage pa
Broadland	Staff	Diesel	67936
Broadland	Staff	Petrol	78608
Broadland	Members	Unknown	14801