Carbon Footprint Appraisal Report

Assessment Period:
1st April 2019 - 31st March 2020

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Executive Summary

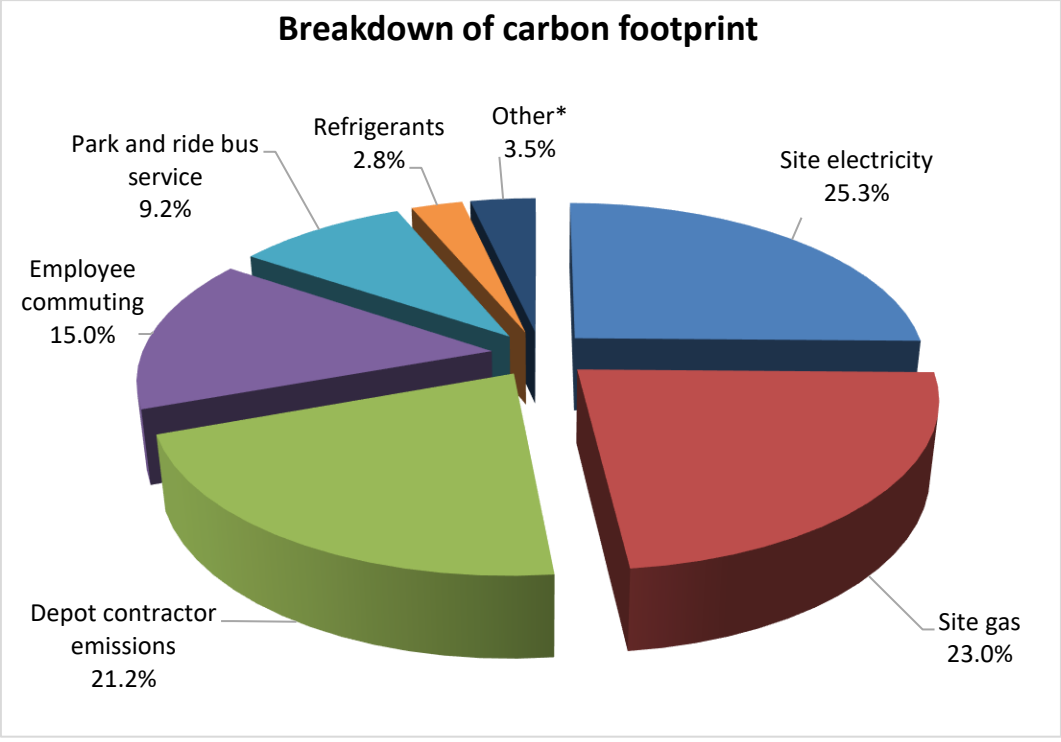
Carbon Footprint Ltd has assessed the greenhouse gas (GHG) emissions of Winchester City Council (WCC) from **1st April 2019 to 31st March 2020** based on a dataset provided by the company.

Current Performance

- → The scope of the assessment has been expanded this year to include employee commuting, water consumption for all non-housing sites, waste, diesel vehicles for ID Verde contractors and refrigerant data for leisure centres. **These new elements account for 846.34 tonnes of CO_2e.**
- → Due to the expanded scope, GHG Emissions have increased by 9.4% since the previous year. **However, if comparing like-for-like, the 2019/20 emissions have reduced by 11.7% since 2018/19.**
- → The most significant emission sources are electricity and gas consumption, together accounting for 48.3% of WCC's carbon footprint.

Recommendations

- → Continue to take annual meter readings (e.g. on the 1st of April each year) and investigate opportunities to move sites onto automatic meter readers to improve data accuracy.
- → Review the results of the employee commuting survey to determine how the questions can be improved for next time, and to identify the main barriers/opportunities to changing habits.
- → Continue working alongside leisure centres to improve energy efficiency/reduce energy wastage.
- → Discuss with suppliers the potential to use alternative fuel buses (e.g. biogas, electricity, biodiesel produced from waste oil sourced from businesses/schools in the district).
- → Conduct energy audits across the housing and non-housing properties.
- → Educate and raise awareness of energy issues and efficient technologies/behaviours among staff and the wider community.



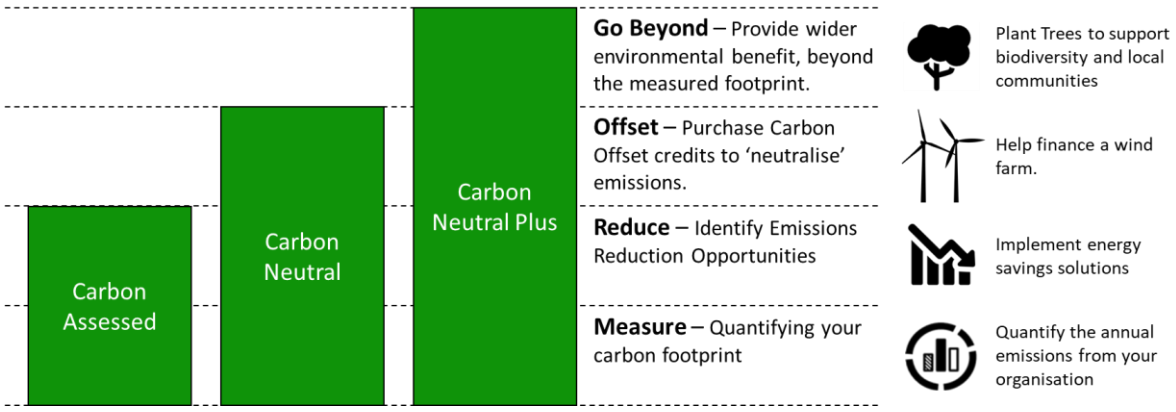
	2009/10 (Baseline)	2018/19	2019/20[1]	% change from baseline year	% change from previous year
Location-Based Total Tonnes CO_2e	5,476.89	4,005.19	4,383.02	**-20.0%**	**+9.4%**
Market-Based Total Tonnes CO_2e	-	-	4,267.71	n/a	n/a
Tonnes of CO_2e per employee[2]	9.61	8.21	9.39	**-2.3%**	**+14.3%**
Tonnes of CO_2e per capita[2]	0.048	0.032	0.034	**-28.2%**	**+7.7%**

The like-for-like assessment scope to the previous year:

Scope	Previous Year 2018/19	Current Year 2019/20	% change
Scope 1	406.79	384.70	-5.4%
Scope 2	897.76	778.80	-13.3%
Scope 3 *	2,700.65	2,373.17	-12.1%
Total	**4,005.19**	**3,536.68**	**-11.7%**

* Excluding employee commuting, refrigerants from leisure centres, ID Verde diesel, waste, and water (for sites other than Guildhall, City Offices, West Wing and Abbey House).

Offsetting the Council's emissions would certify it as a 'Carbon Neutral Organisation' and contribute to funding climate change solutions. By supporting our UK or Kenya tree planting programmes (both buddied with a reduced deforestation project in the Brazilian Amazon) the Council would be contributing to projects which reduce GHG emissions through sequestration and prevention of forest burning, as well as provide income and livelihoods to local communities in Brazil and Kenya. It would also help meet the Council's internal goal of planting 100 trees annually[3].



[1] Scope has expanded to include employee commuting, refrigerants from leisure centres, waste, and water for more sites.
[2] Location-based emissions
[3] Winchester City Council – Carbon Neutrality Action Plan. https://www.winchester.gov.uk/climate-change-and-energy/climate-emergency-what-we-are-doing-now/carbon-neutrality-action-plan

Table of Contents

Executive Summary I
1. Introduction 1
2. Calculation Scope and Accuracy 5
3. Carbon Footprint Results 7
4. Comparison and Benchmarking 18
5. Key Recommendations 22
6. References 27
A. Annex A – Calculation Methodology (Additional Notes) 28
B. Annex B – Supplied Data and Emissions Breakdown 29
C. Annex C – Scope 1 Emissions Breakdown 29

Quality Control

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Date:	18 November 2020
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1. Introduction

1.1. Winchester City Council's carbon management journey

Carbon Footprint provides a simple six step annual journey to enhance WCC's sustainability credentials whilst complying to best practice and differentiating the Council's brand. Winchester City Council has completed the first step of its carbon management journey by continuing to assess emissions annually. WCC's Carbon Neutrality Plan states the Council's targets and objectives to reduce emissions in the coming decade, achieving step 2 of its sustainability journey. Finally, WCC is continually making progress to reduce emissions year on year, meeting step 3 of the Council's sustainability journey.

The purpose of this report is to:

- Summarise the results of WCC's carbon footprint assessment.
- Recommend realistic aims for WCC's carbon reduction target.
- Provide practical recommendations to enhance WCC's sustainability programme and reduce its emissions.

1.2. What is a carbon footprint?

A carbon footprint is a measure of the impact our activities have on the environment in terms of the amount of greenhouse gases produced, measured in units of carbon dioxide equivalents (CO_2e). A carbon footprint is made up of two parts, direct and indirect emissions.

1. **Direct emissions:**
   Direct emissions are produced by sources which are owned or controlled by the reporting organisation and include electricity use, burning oil or gas for heating, and fuel consumption as a result of business travel or distribution. Direct emissions correspond to elements within scopes 1, 2 and 3 of the World Resources Institute GHG Protocol, as indicated in Table 1.

Table 1: Direct emissions sources

Footprint	Activity	Scope
Direct	Electricity, heat or steam generated on-site	1
	Natural gas, gas oil, LPG or coal use attributable to company owned facilities	1
	Company owned vehicle travel	1
	Production of any of the six GHGs (CO_2, CH_4, N_2O, HFCs, PFCs and SF_6)	1
	Consumption of purchased electricity, heat steam and cooling	2
	Employee business travel (using transport not owned by the company)	3

2. **Indirect emissions:**
   Indirect emissions result from a company's upstream and downstream activities. These are typically from outsourced/contract manufacturing, and products and the services offered by the organisation. Indirect emissions correspond to scope 3 of the World Resources Institute GHG Protocol excluding employee business travel as indicated in Table 2.

Table 2: Indirect emissions sources

Footprint	Activity	Scope
Indirect	Employee commuting	3
	Transportation of an organisation's products, materials or waste by another organisation	3
	Outsourced activities, contract manufacturing and franchises	3
	GHG emissions from waste generated by the organisation but managed by another organisation	3
	GHG emissions from the use and end of life phases of the organisation's products and services	3
	GHG emissions arising from the production and distribution of energy products, other than electricity, steam and heat, consumed by the organisation	3
	GHG emissions from the production of purchased raw or primary materials	3
	GHG emissions arising from the transmission and distribution of purchased electricity	3

For businesses, the assessment focuses on direct emissions, as these lie under the control of the organisation. However, we ask companies to recognise that there is an indirect emissions footprint and select suppliers based on their environmental credentials alongside price and performance.

1.3. Why is it important?

Over the past two decades the effects of climate change have accelerated. Considerable evidence exists proving climate change has been exacerbated by human activity. Changes in our post-industrial lifestyles have altered the chemical composition of the atmosphere, generating a build-up of greenhouse gases – primarily carbon dioxide, methane, and nitrous oxide levels – raising the average global temperature.

The consequences of inaction will be disasterous. Sea level will continue to rise and local climate conditions to be altered causing an increase in extreme weather events, affecting forests, crop yields, and water supplies. It will also affect human health, accelerate species extinction, and disrupt many ecosystems.

Climate change is a global threat which will impact the lives of everyone on the planet. Hence, it is vital that all individuals, businesses, organisations and governments work towards the common goal of reducing greenhouse gas emissions. This carbon footprint assessment will enable WCC to continue doing its bit by monitoring, reducing and offsetting its emissions.

1.4. BS ISO 14064-1:2018

This GHG report has been prepared in accordance with Part 1 of BS ISO 14064: 2018. The GHG inventory, report, or statement has not been verified.

This standard requires the estimation of likely error margin based on a simple error analysis, to identify uncertainty in the calculations. Our simple error analysis provides a level of uncertainty based on the accuracy of the data provided. This shows the error for each emissions source, as well as the sum of these divided by the total emissions, to produce a total percentage error.

1.5. Greenhouse Gas Protocol Corporate Standard

This GHG calculation and report has been prepared in accordance with The Greenhouse Gas Protocol Corporate Standard. The GHG inventory, report, or assertion has not been separately verified.

Location-based approach – reflects the emissions from electricity coming from the national grid energy supply.

Market-based approach – reflects the emissions from the electricity sources or products that the consumer has specifically chosen.

1.6. Calculation methodology

The carbon footprint appraisal is derived from a combination of client data collection and data computation by Carbon Footprint's analysts.

Carbon Footprint's analysts have calculated Winchester City Council's footprint using the 2019 conversion factors developed by the UK Department for Environment, Food and Rural Affairs (Defra) and the Department for Business, Energy & Industrial Strategy (BEIS). These factors are multiplied with the company's GHG activity data. Carbon Footprint has selected this preferred method of calculation as a government recognised approach and uses data which is realistically available from the client, particularly when direct monitoring is either unavailable or prohibitively expensive.

Additional methodology information is presented in Annex A.

1.7. Data supplied for the carbon footprint appraisal

A summary of the data supplied by Winchester City Council for the appraisal is presented in Annex B. This can be found in the accompanying MS Excel spreadsheet named '2020_07 Annex B Winchester City Council'.

1.8. Abbreviations

A/C	Air Conditioning
BEIS	Department for Business Energy & Industrial Strategy
CHP	Combined Heat & Power
CO_2	Carbon Dioxide
CO_2e	Carbon Dioxide Equivalent
Defra	Department for Environment, Food and Rural Affairs
EU	European Union
GHG	Greenhouse Gas
IPCC	Intergovernmental Panel on Climate Change
ISO	International Standards Organisation
km	Kilometres
kWh	Kilowatt Hours
LPG	Liquified Petroleum Gas
PR	Public Relations
UN	United Nations

2. Calculation Scope and Accuracy

2.1. Scope of this work

Carbon Footprint has assessed the GHG emissions from 1st April 2019 to 31st March 2020 resulting from the energy consumption at WCC's facilities and its business transport activities.

2.2. Organisational & reporting boundaries

The organisation has accounted for all quantified GHG emissions and/or removals from facilities over which it has operational control. The following exclusions and assumptions have been made:

- Energy consumption which is metered directly to tenants has been excluded.
- Where 3rd party tenants are recharged by WCC and operational control is not perceived (i.e. tenants have individual boilers), energy has been included in scope 3.
- Where tenants have individual boilers (and therefore operational control), though the property only has one meter and is all recharged to tenants, the energy use/boiler that the Council has operational control over (i.e. communal space) has been reported in scope 3 due to inability to separate out the data.
- Where there is a central plant serving the whole property (flats and communal spaces), it has been assumed to be the Council's operational control.

Figure 1: Assessment boundary

Scope 1 Direct Emissions	Scope 2 Energy Indirect	Scope 3 Other Indirect
Fuel combustion **Natural gas, kerosene, petrol, LPG**	Consumption of purchased electricity, heat steam and cooling **Electricity**	Purchased materials and fuels **Water**
		Transmission and distribution of energy **Electricity**
Owned Transport **Council-owned car and van travel**		Leased assets, outsourcing & franchising **Contractor emissions[4], park and ride bus service, housing and managed leisure centres[5].**
Process emissions **None**		Transport related activities **Business travel (employee-owned cars, rail, taxi and air) and employee commuting**
		Sold goods and services **None**
Fugitive emissions **Refrigerants**		Waste Disposal **Residual & Recyclable**

Key:

Within the assessment boundary	Not included within assessment boundary

Indirect GHG sources that are outside the assessment boundary have been excluded from quantification as it is not technically feasible or cost effective, to include these in the GHG assessment.

[4] Includes fuel use, lorry travel, van travel and car travel.
[5] Includes energy and refrigerant usage.

2.3. Calculation accuracy & materiality

The result of a carbon footprint calculation varies in accuracy depending on the data set provided. The more accurate the data supplied, the more accurate the final result which will subsequently allow for better targeting of areas where improvements can be made. Materiality is determined by the percentage contribution of each element to the overall footprint. The data provided is derived from energy bills, expenses claims and data collected by WCC (Table 3). **Based on the accuracy of the data provided, a simple error analysis has been used to estimate the error margin for the appraisal results.**

Table 3: Assessment accuracy, materiality and simple error analysis

Dataset	Source of data and comments	Accuracy	Materiality	Uncertainty	Estimated Error Margin (tCO_2e)
Site electricity	Utility bills/meter readings.	Very Good	High (20-40%)	5%	55.36
Site gas	Utility bills/meter readings.	Very Good	High (20-40%)	5%	50.46
Depot contractor emissions	Contractors supplied vehicle details, mileage data and fuel consumption.	Very Good	High (20-40%)	5%	46.38
Employee commuting	Employee survey.	Very Good	Medium (5-20%)	5%	32.83
Park and ride service	Distance travelled provided by service provider. Converted into litres of fuel using average of 7.85 miles per gallon.	Very Good	Medium (5-20%)	5%	20.20
Refrigerants	Top-up quantities and refrigerant gas type provided from service records.	Very Good	Low (1-5%)	5%	6.13
Council-owned vehicle travel	Vehicle details and annual distance travelled sourced from internal records.	Excellent	Low (1-5%)	1%	0.65
Grey fleet & cash opt out	Vehicle fuel type and mileage were provided from expense records.	Excellent	Low (1-5%)	1%	0.55
Water	Internal records.	Good	Very Low (<1%)	10%	2.17
Kerosene	Internal records/invoices.	Very Good	Very Low (<1%)	5%	0.22
Rail travel	Journey details from internal records. Entries with no departure/destination data were estimated.	Good	Very Low (<1%)	10%	0.43
Waste	Waste quantities, type and disposal route supplied by waste provider.	Good	Very Low (<1%)	10%	0.38
Other fuel usage	Internal records/invoices.	Excellent	Very Low (<1%)	1%	0.01
Flights	Cabin class and flight paths were provided from internal records.	Excellent	Very Low (<1%)	1%	0.005
Taxi travel	Locations and individual journey costs were provided from internal records/expense claims.	Good	Very Low (<1%)	10%	0.003
Total				**4.92%**	**+/- 215.79**

To improve accuracy for future assessments, please see recommendations provided in Section 5.

3. Carbon Footprint Results

3.1. Summary of results

The following table provides a summary of results of WCC's carbon footprint calculation by scope and source activity. Both the location-based and market-based emissions have been calculated and reported for the current reporting period, in line with the GHG Protocol (see section 1.5).

As the management of WCC's two leisure centres is contracted out, the associated energy consumption and refrigerant usage is recorded as scope 3 emissions. Sheltered housing energy consumption reported in scope 3 includes energy which is not under the Council's operational control and is recharged to tenants.

WCC's total location-based footprint for the period ending 31st March 2020 is 4,383.02 tonnes CO_2e, and the market-based footprint is 4,267.71 tonnes CO_2e.

Table 4: Results of WCC's location-based carbon footprint assessment by scope and source activity

Scope	Activity	Location-based Tonnes CO_2e	Market-based Tonnes CO_2e
Scope 1	Natural gas	314.11	314.11
	Council owned vehicles	65.27	65.27
	Other fuel consumption	5.33	5.33
Scope 1 Sub Total		**384.70**	**384.70**
Scope 2	Electricity generation	778.80	704.92
Scope 2 Sub Total		**778.80**	**704.92**
Scope 3	Depot contract emissions[6]	927.67	927.67
	Managed leisure centres[7]	871.37	849.47
	Employee commuting	656.55	656.55
	Park and ride bus service	404.04	404.04
	Housing energy recharged to tenants[8]	208.81	199.01
	Electricity transmissions & distribution	66.12	56.39
	Grey fleet & cash opt out	54.65	54.65
	Water (and wastewater)	21.73	21.73
	Rail travel	4.28	4.28
	Waste	3.80	3.80
	Flights	0.46	0.46
	Taxi travel	0.03	0.03
Scope 3 Sub Total		**3,219.51**	**3,178.09**
Total tonnes of CO_2e		**4,383.02**	**4,267.71**
Tonnes of CO_2e per employee		**9.39**	**9.14**
Tonnes of CO_2e per capita		**0.03**	**0.03**

[6] Includes lorries, vans, cars and other fuel use.
[7] Electricity, gas and refrigerant usage.
[8] Electricity and gas consumption recharged to tenants, not under WCC's operational control. Does not included energy which is directly metered to tenants by energy suppliers.

The majority of sites are on an electricity tariff which is slightly more carbon-intensive than the national average fuel mix for the UK. However, the leisure centres, as well as some other properties, are on tariffs which are less carbon-intensive. As the leisure centres are a significant element to the Council's carbon footprint, this has meant the market-based emissions are slightly lower than the location-based emissions. **The Council entered into a new energy contract for 2020/21 which is sourced from 100% renewable energy. Therefore, it is expected that the market-based footprint for the next data period will be significantly lower (possibly by 20%).**

Figures 2 and 3 show the breakdown of the total GHG emissions produced by Winchester City Council. It can be seen that 48.3% of the total emissions is produced due to electricity and gas consumption. **The Council's main focus should be to reduce energy demand across its facilities but also the community at large, for example through education, energy awareness campaigns etc.**

Employee commuting is also a significant aspect. These emissions were assessed prior to the COVID-19 pandemic, therefore the next survey will indicate what impact this has had on these emissions. **I recommend the Council evaluates the effectiveness of its ability to operate during the pandemic, when employees were largely working from home with restricted business travel, to determine what should be classed as "essential" travel and to be more flexible with remote-working going forwards.** If remote working will be more common going forwards (beyond COVID-19 period), I suggest including an estimate of energy emissions associated with home-workers in future assessments.

In the following graphs, the 'other' category includes: council-owned vehicles, employee car travel, other fuel consumption, rail travel, taxi travel, air travel, waste and water.

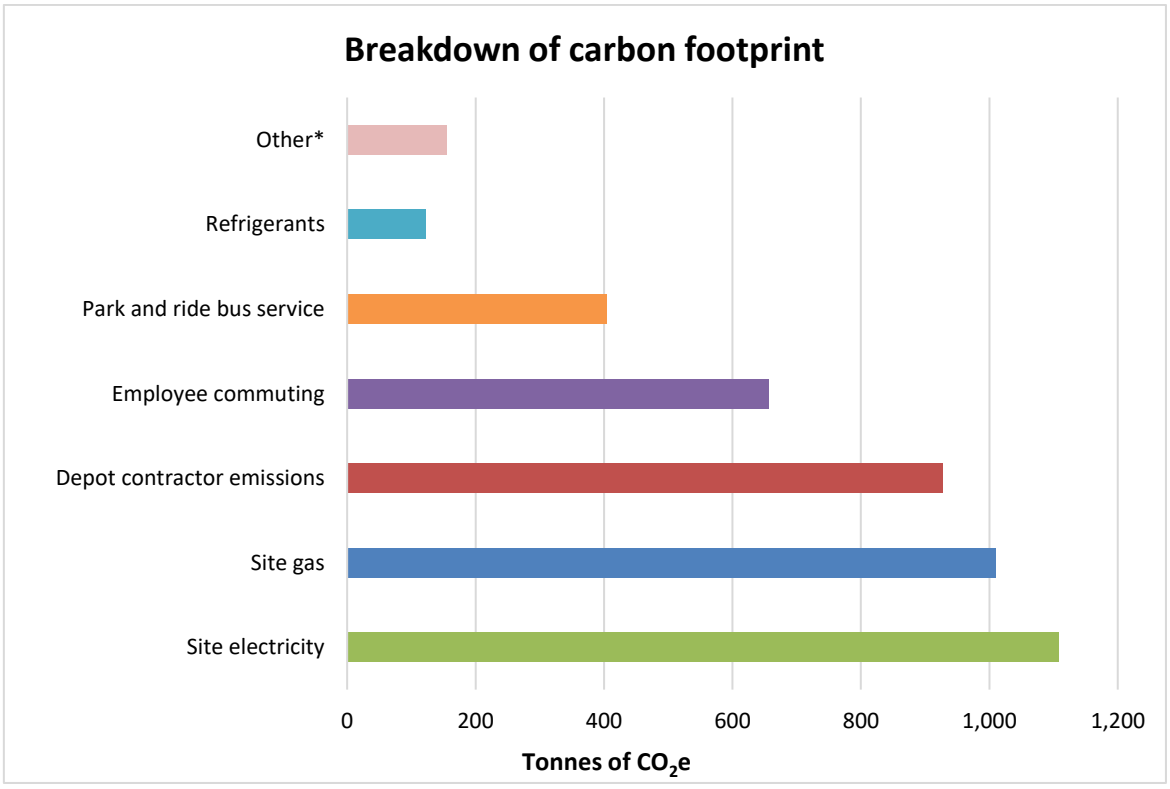


Figure 2: Contribution in tonnes of CO_2e of each element of WCC's location-based carbon footprint

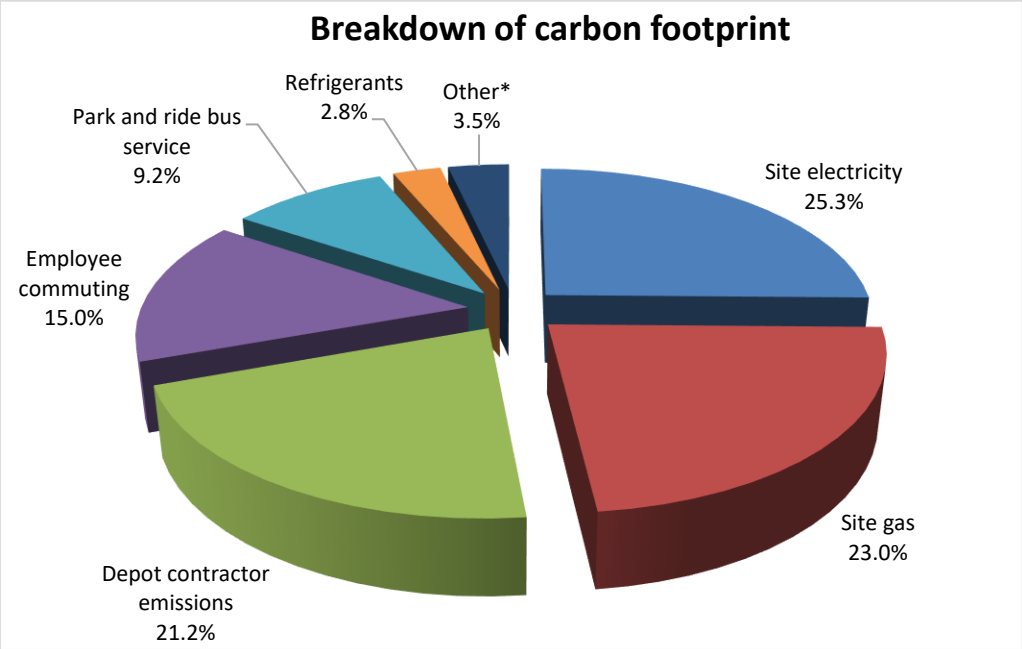


Figure 3: Percentage contribution of each element of WCC's location-based carbon footprint

3.2. Emissions from energy usage at site facilities

Figure 4 shows the breakdown of on-site energy consumption by property type. In line with the previous year, the two leisure centres continue to account for over a third of the total energy-related emissions at 35.3%. These two sites are where the Council should focus its efforts on working with the management company to optimise energy efficiency (e.g. utilising **heat recovery systems**) and increasing the amount of renewable energy generated on-site such as **solar thermal panels**. Solar thermal panels use solar energy to directly heat air or water. This conversion can be 90% efficient compared to photovoltaic panels which tend to only be 15-20% efficient in converting solar energy to electricity. These could be ideal for leisure centres which require large amounts of hot water for showers and swimming pools.

To reduce energy demand at other sites, I recommend the Council focuses on education/raising awareness of energy issues, behaviours and efficient technologies amongst staff and the wider community. The Council should consider developing a programme of energy audits across the housing and non-housing properties – for housing, this could be in the form of a short online survey. Based on the results of the audits/survey, **the Council could investigate the potential to negotiate discounts/provide vouchers for products to reduce energy demand for residents in low-income areas** (e.g. LED light bulbs, draught excluders, thermostatic radiator valves/controls etc.). This will reduce energy consumption but also help low income households reduce the cost of their energy bills.

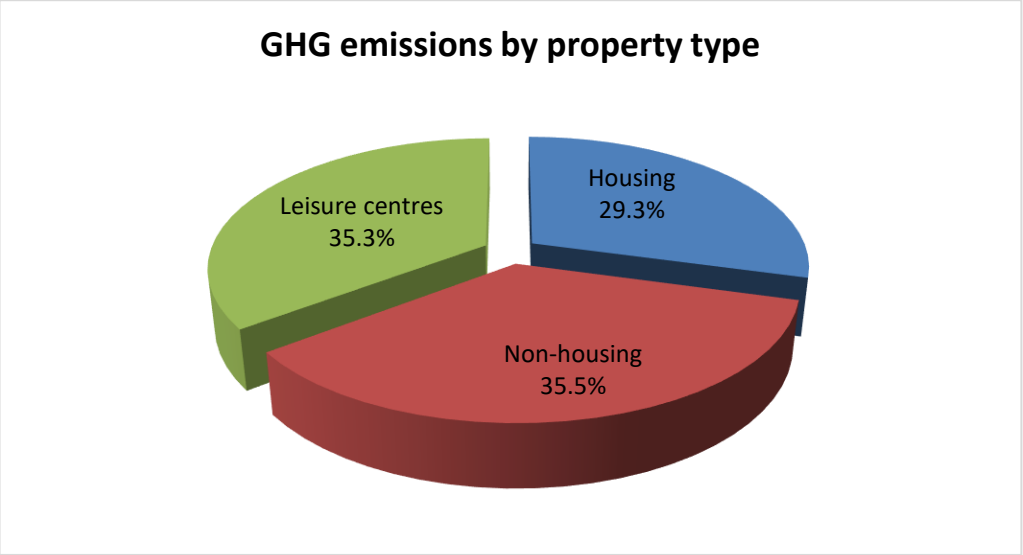


Figure 4: Breakdown of location-based site GHG emissions by property type

3.2.1 Emissions from non-housing sites

The top 10 highest emitting sites (excluding housing) account for 85.2% of the total non-housing site emissions (Table 5 and Figure 5), and 60.3% of total property emissions. The sites in the top 10 have remained unchanged since the previous year, although the cumulative total of these has decreased by 248.29 tonnes CO_2e (16.3%). This equates to 795,963 kWh which is a great achievement.

It can be seen that River Park Leisure Centre accounts for the largest proportion of emissions at a total of 709.56 tonnes CO_2e (47.3%).

The biggest decreases in emissions arise from River Park Leisure Centre and Brooks Car Park. River Park Leisure Centre has decreased electricity consumption by 113,751 kWh (12.4%) and gas consumption by 560,663 kWh (17.4%), as a result of work on improving controls, timing systems and employee awareness. Secondly, Brooks car park is responsible for a total decrease of 166,770 kWh (31.8%), after WCC upgraded the lighting to energy efficient LEDs with presence detection sensors and dimming technology. Brooks car park also utilises a renewable electricity tariff, which consequently reduces the Council's total market-based emissions.

However, electricity consumption at the Central Depot (Bar End Road) has increased since the previous year by 101,453 kWh (335.5%), equivalent to 27.23 tonnes of CO_2e. This large increase is due to the site being occupied by the contractor building the new leisure centre and a new boiler has been installed.

Table 5: Location-based CO_2e emissions as a result of site energy consumption (excluding housing sites)

Site	Electricity tCO_2e	Gas tCO_2e	Total tCO_2e
River Park Leisure Centre	221.91	487.65	709.56
Guildhall	102.03	41.86	143.89
Car Park - Brooks	99.16	-	99.16
City Offices	39.14	41.54	80.68
West Wing/ Kings Court	57.10	8.83	65.93
Central Depot, Bar End Road	36.52	13.99	50.50
Car Park Chesil Multi Storey	46.63	-	46.63
Meadowside Leisure Centre	19.99	19.15	39.14
Car Park Misc - Tower Street	28.47	-	28.47
Basepoint	14.66	-	14.66
Top 10 total emissions	**665.61**	**613.02**	**1,278.63**
Total non-housing emissions	**856.96**	**639.18**	**1,500.60**

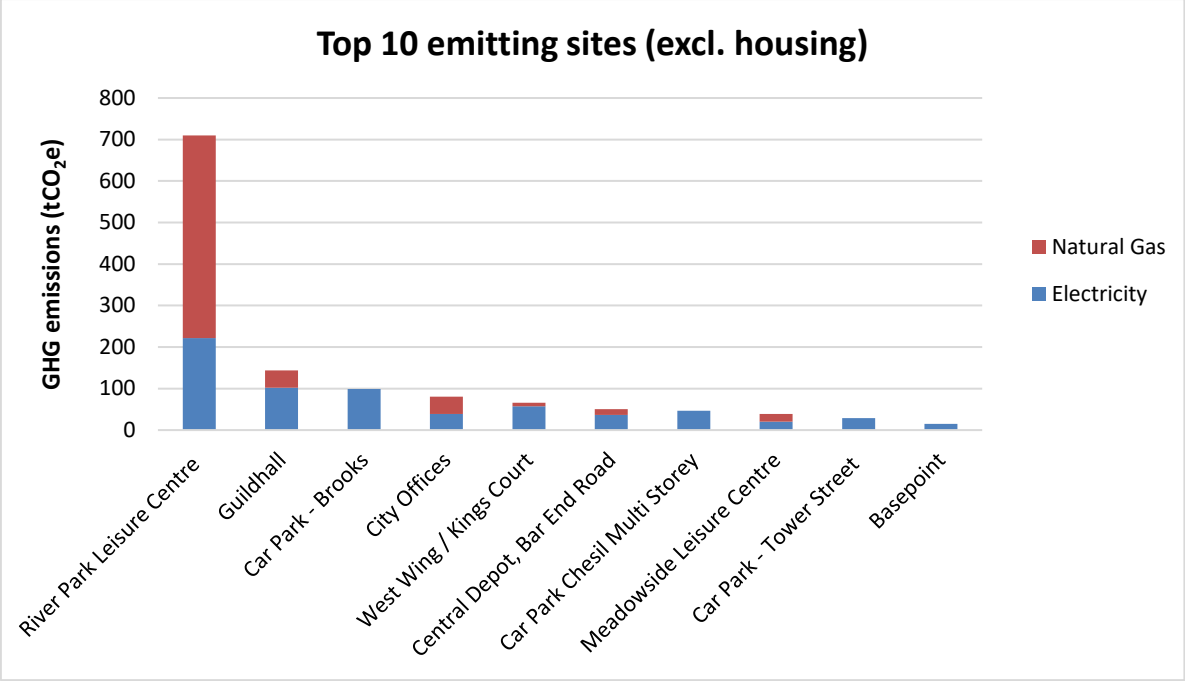


Figure 5: Location-based GHG emissions per site and per energy type for top 10 emitting sites (excluding housing)

3.2.2 Emissions from housing sites

Table 6 and Figure 6 shows the top 10 highest emitting sites from housing properties (this includes sheltered housing and communal areas, but not where it is directly metered to tenants). These top 10 properties account for 80.1% of all housing emissions, and 23.4% of all property emissions. Chesil Lodge remains the highest emitting housing site, as per the previous year. Gas consumption at Chesil Lodge has increased by 65,813 (10.0%) since the previous year due to increased levels of tenant occupancy, however electricity consumption has reduced by 29,325 kWh (17.5%) due to the CHP now working again.

I recommend an energy audit is completed for the top 5 properties to identify whether the heating system and controls are operating at appropriate settings and where there may be opportunities for improvement.

Table 6: Location-based CO_2e emissions from housing sites

Site	Electricity tCO_2e	Gas tCO_2e	Total tCO_2e
Chesil Lodge	38.24	133.12	171.36
Whitewings House	20.30	47.52	67.83
Danemark Court	7.97	51.69	59.66
Makins Court Landlords Supply 2	20.92	23.95	44.87
Matilda Place	7.12	33.93	41.04
Milford & Gordon Watson House	10.76	24.80	35.56
Eastacre	10.17	18.88	29.05
Barnes House aka 94 St Cross Road	7.15	15.50	22.65
Richard Moss House	15.46	-	15.46
Brittany House	9.15	-	9.15
Top 10 total emissions	**147.25**	**349.38**	**496.63**
Total housing emissions	**250.28**	**370.11**	**620.39**

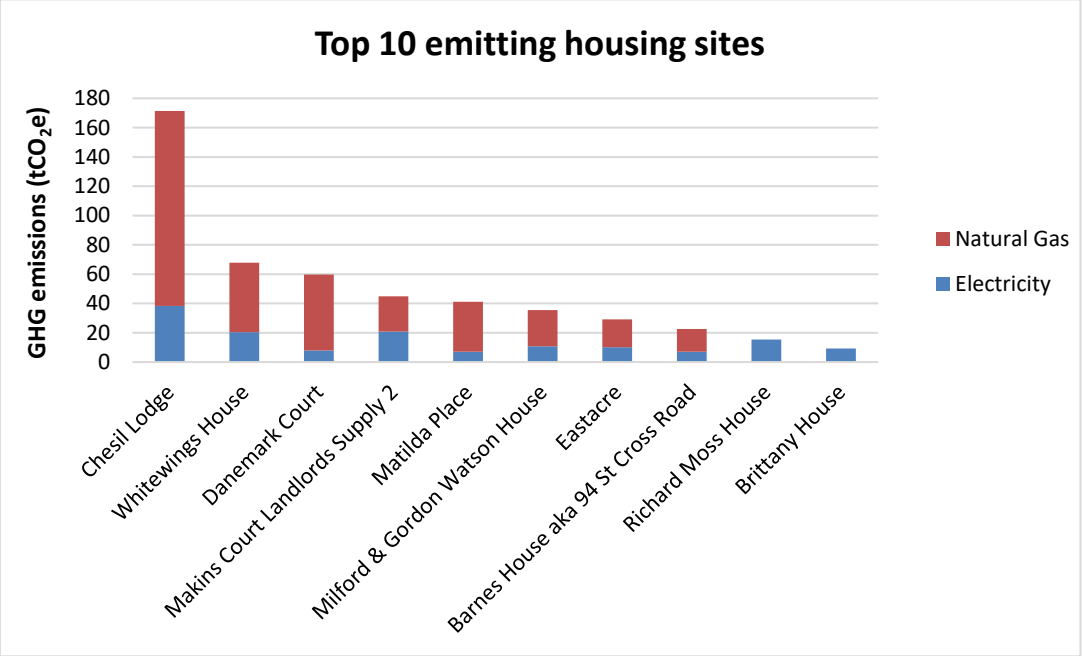


Figure 6: Location-based GHG emissions per site and per energy type for the top 10 emitting housing sites

3.3. Emissions from transport

The next graph and table show the GHG emissions resulting from business travel and logistical operations. It can be seen that the largest contributor is emissions from the depot contract vehicles, accounting for 63.7% of the total transport emissions. The second most significant source is the Park & Ride bus service. **I recommend the Council discusses with its suppliers the potential to use alternative fuel buses (e.g. biogas, electricity, biodiesel produced from waste oil sourced from businesses/schools in the district).**

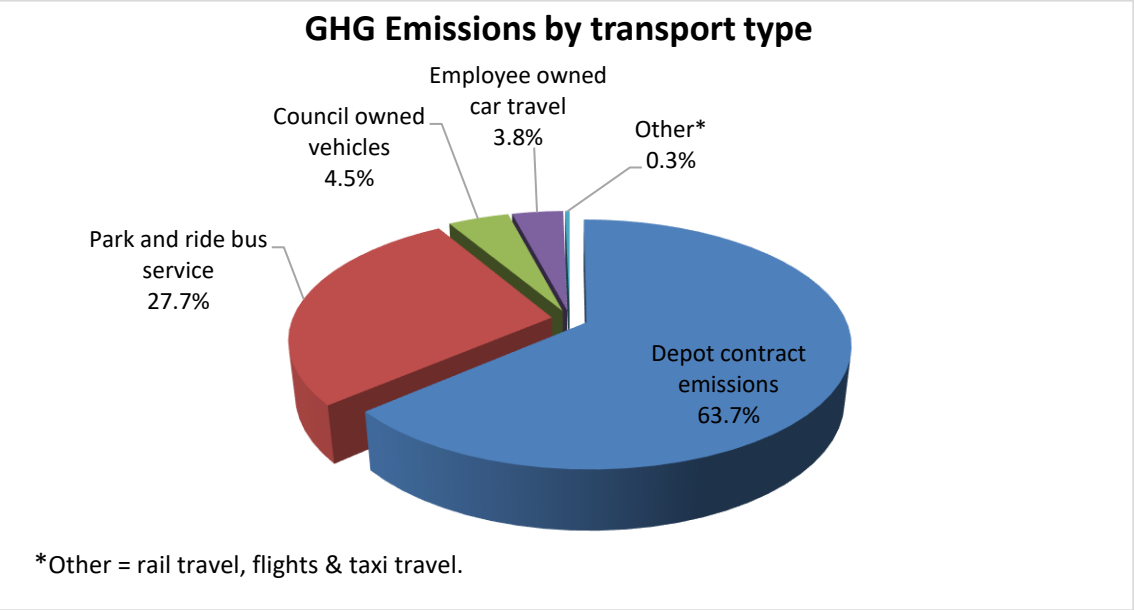


Figure 7: Percentage contribution of each element to transportation emissions

Table 7: CO_2e emissions due to transportation

Type of Travel / Transport	Tonnes of CO_2e
Depot contract vehicle travel	927.67
Park and ride bus service	404.04
Council owned vehicles	65.27
Grey fleet & cash opt out	54.65
Rail travel	4.28
Flights	0.46
Taxi travel	0.03
Total	**1,456.39**

The detailed results are given in Annex B.

3.4. Emissions from employee commuting

Emissions from employee commuting were calculated from the results of an internal survey conducted on 9th March 2020. The response rate was 62.5% of the workforce. The results were extrapolated to cover the total number of employees for 2019/20 (Table 8). The survey results showed that car travel was the most frequently used mode of transport for commuting, and as a result it also accounts for the majority of GHG emissions from employee commuting (Figure 8 and Table 8). Compared with car travel, bus and rail travel produces approximately 41% and 77% less carbon per passenger-km respectively (based on single occupant in car) (BEIS, 2019).

Despite the total distance travelled by bus only being 1.2% higher than the distance travelled by train, it is a more carbon intensive mode of travel as it can hold less people, therefore GHG emissions produced are 151.4% higher (Table 8).

The average annual commuting emissions per person is 1,406 kg of CO_2e.

Once the threat of COVID-19 has been eliminated, WCC should encourage staff to commute using public transport to reduce GHG emissions from car travel. The Council could do this by informing employees through noticeboards, posters, emails etc. of the carbon impacts of the different modes of travel, and advertise local bus/train stations and cycling routes. The Council should evaluate its policy on remote working so that staff have the option to continue this post COVID-19.

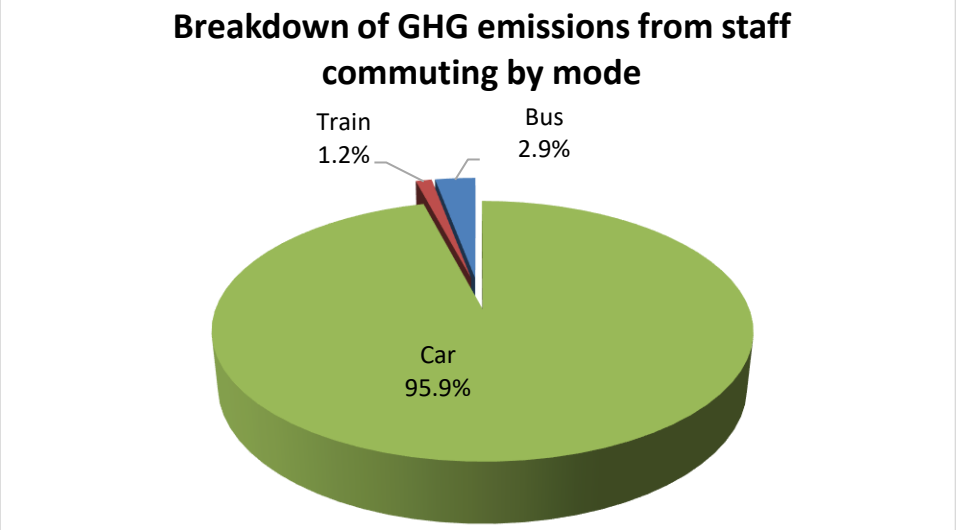


Figure 8: Percentage contribution of each element to employee commuting emissions

Table 8: CO_2e emissions arising from employee commuting

Transport mode	km travelled	Tonnes CO_2e
Car	3,408,573	629.66
Bus	183,687	19.23
Train	185,883	7.65
Total	**3,778,143**	**656.55**

3.5. Emissions from refrigerants

During the appraisal period, numerous refrigerant top-ups were reported for River Park Leisure Centre. The cumulative amount of refrigerant gas added to the system was 61.10 kg (Table 9). I recommend that the reasons for these are investigated and regular leak detection surveys are carried out to ensure refrigerant gas is not being lost unnecessarily.

Table 9: CO_2e emissions as a result of on-site refrigerant gas replenishment

Location	Amount Refilled	Refrigerant type	GWP ($kgCO_2e$)	Emissions (tCO_2e)
River Park Leisure Centre	61.10 kg	R410A	2,088	122.68

3.6. Emissions from water consumption

This is the first year that WCC has included emissions from water consumption for all sites (excluding sheltered housing schemes) operated by the Council. Previously only data from the Guildhall, City Offices, West Wing and Abbey House could be obtained, however significant effort has been made over the past year to collate the relevant information for the other sites.

The top 10 water consuming sites account for 84.7% of the GHG emissions from water consumption (Table 10). As expected, River Park Leisure Centre consumes the most amount of water (46.0% of the total), due to its swimming pool and shower facilities. Other notable sites are the Broadway/Abbey Garden and Market Lane public conveniences. Compared to the other public conveniences managed by the Council, these two consume a significantly larger amount of water. This is likely due to these facilities being located on busy streets in the city centre. Market Lane already has an Automatic Meter Reader (AMR) in place, which allows unusually high consumption levels to be identified, enabling leaks to be resolved quickly. WCC has plans to install an AMR at the Broadway toilets. In the meantime, **I recommend that the Broadway public toilets are investigated to determine whether there are any leaking cisterns or taps, and identify opportunities to reduce water consumption (e.g. push or infrared sensor taps with aerators).** Alternatively, the Council could put up posters reminding people to turn taps off and provide a phone number to call if there are any issues to report.

Table 10: CO_2e emissions from water and wastewater consumption

Site	Water supply (m3)	Emissions from water supply (tCO_2e)	Emissions from wastewater treatment (tCO_2e)	Total tCO_2e
River Park Leisure Centre	12,930	4.45	1.83	6.28
Public Toilets (Broadway Abbey Gardens)	2,145	0.74	1.44	2.18
Public Conveniences (Market Lane)	2,135	0.73	1.44	2.17
Guildhall	1,992	0.69	1.34	2.03
City Offices	1,387	0.48	0.93	1.41
Cemetery Alresford Road	1,128	0.39	0.76	1.15
STW Long Priors/Church Lane	1,056	0.36	0.71	1.07
Central Depot Bar End Road	908	0.31	0.61	0.92
Meadowside Leisure Centre	683	0.23	0.46	0.69
Public Conveniences (Houchin Street)	492	0.17	0.33	0.50
Top 10 Sub-Total	**24,856**	**8.55**	**9.85**	**18.40**
Total	**28,125**	**9.68**	**12.06**	**21.73**

3.7. Emissions from waste

This is the first year that Winchester City Council has provided waste data for the assessment. This only includes the City Offices, Guildhall and Cipher House. Based on the number of bins and type of waste, the Council's waste management provider has estimated the total weight of waste produced during the data period (Table 11).

Table 11: GHG emissions from waste

Type of Waste	Waste produced per year (tonnes)	Disposal Route	Total Emissions (tCO_2e)
General waste	131.61	Energy Recovery (Combustion)	2.81
Dry mixed recyclables	35.91	Recycling	0.77
Glass	10.60	Recycling	0.23
Total	**178.12**		**3.80**

3.8. Other fuel consumption

Table 12 below summarises fuel used for purposes other than heating, for example forklifts and equipment for land maintenance. This includes data from external contractors.

Table 12: CO_2e emissions from contractor fuel consumption

Department/Contractor	Diesel (litres)	Petrol (litres)	LPG (litres)	Emissions (tCO_2e)
ID Verde	17,529	8,167	-	**63.51**
Special Maintenance	-	295	141	**0.87**
Total litres	**17,529**	**8,462**	**141**	**26,132**
Tonnes of CO_2e	**45.47**	**18.69**	**0.21**	**68.83**

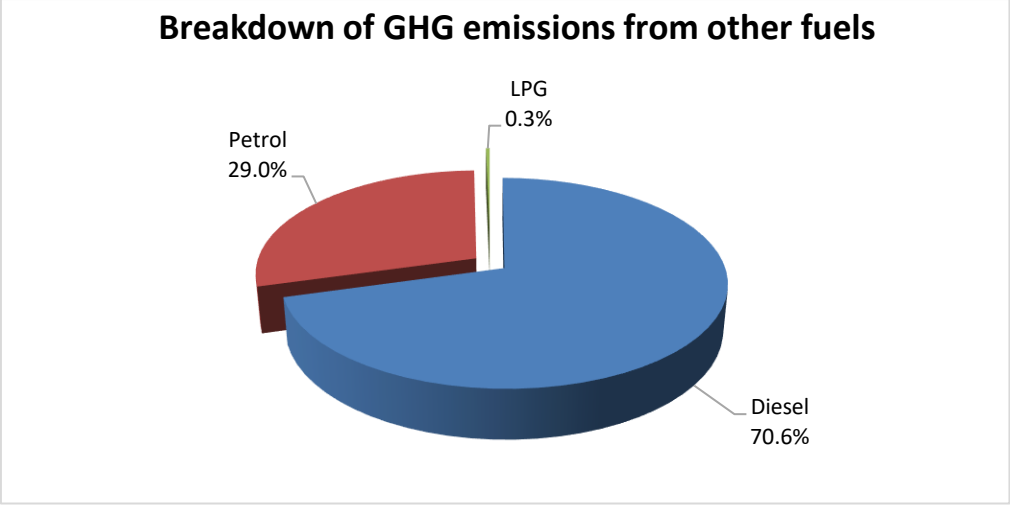


Figure 9: Breakdown of GHG emissions by fuel type

4. Comparison and Benchmarking

4.1. Comparison to base year emissions

For the baseline year emission data please refer to the 2009/10 report. The scope of the assessment was expanded this year to include employee commuting, refrigerant top-ups at the leisure centres, waste and water data for more sites. Therefore, this should be considered when making comparisons against previous years.

The Council's total emissions has increased by 9.4% since the previous year (Figure 10 & Table 13), however this is due to the expansion of the assessment boundary. Specifically, due to the inclusion of employee commuting this year (which accounts for 15.0% of the total footprint), as well as in smaller part due to a high amount of refrigerant gas top ups required at the River Park Leisure Centre during the data period. If comparing like for like (i.e. without employee commuting, waste, leisure centre refrigerants and expanded water data), the 2019/20 footprint has actually reduced by 11.7% compared with the previous year. The main causes of which are electricity, gas and depot lorry travel.

Emissions from electricity consumption have decreased by 60.4% since the baseline year and by 14.9% since the previous year (Table 13). Although this is in part due to the national energy grid decarbonising year on year, increasing the proportion of energy supplied from renewables, Winchester City Council has made significant improvements across its properties by upgrading lighting to LEDs (e.g. at Brooks car park), installation of solar photovoltaics at the City Offices and Cipher House, as well as the installation of a new and energy efficient air conditioning system with heat pump to replace the old and inefficient system in Customer Services, together with an air curtain to prevent cooling/heat loss through open doors. Regarding gas consumption, the main reason for decrease has been significant work at the leisure centres to improve the heating controls and timings, staff awareness and a review of the CHP strategy. The decommissioning of boilers at Makins Court, which were then replaced with electric Quantum heaters, is also responsible for contributing to decreased gas consumption.

There has been a large increase in emissions from refrigerants this year as River Park Leisure Centre reported 61.1 kg of gas requiring replenishment during the data period. This equates to 122.68 tonnes of CO_2e. I advise that the reason for this is investigated and measures put in place to ensure leaks are identified and repaired quickly (e.g. automatic leak detection systems).

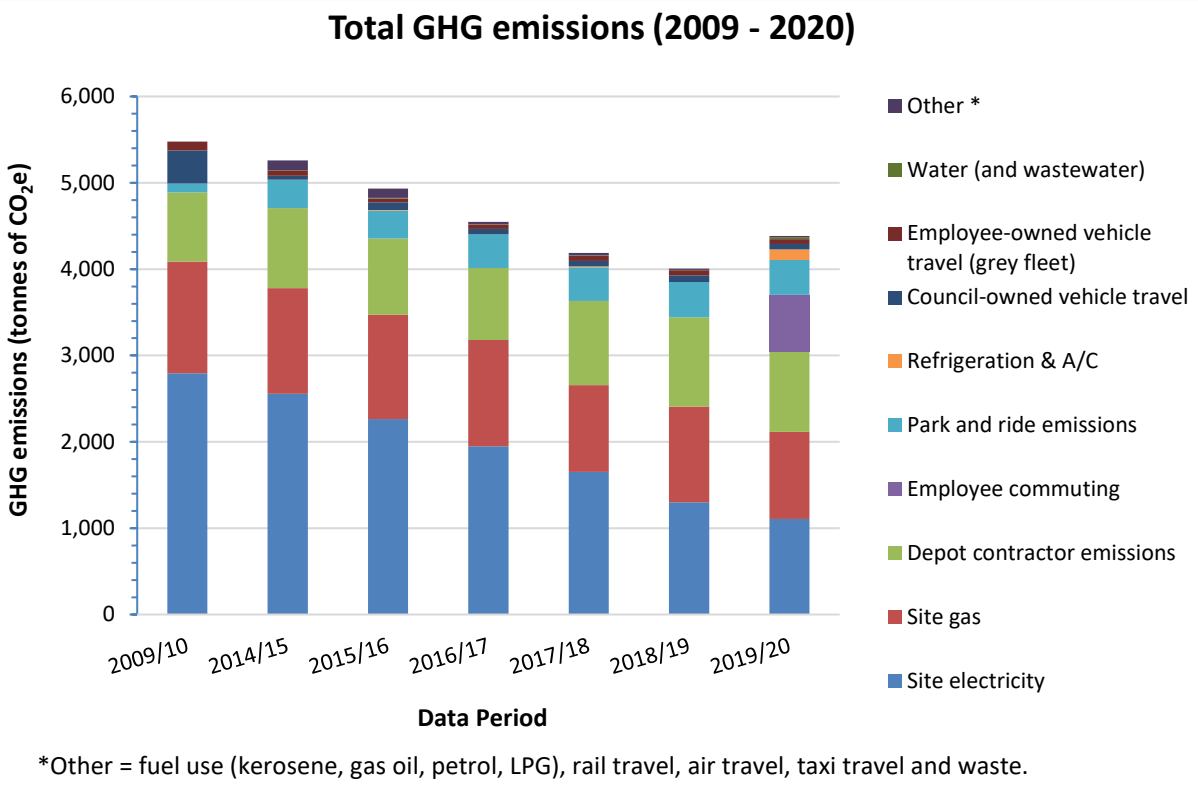


Figure 10: Detailed emissions comparison for the various aspects of Winchester City Council's location-based emissions

Table 13: WCC's location-based carbon footprint comparison and percentage change

Element	2009/10 (Base Year)	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20 [9]	% change on baseline year (2009/10)	% change on previous year
Site electricity	2,795.32	2,557.74	2,264.36	1,950.26	1,651.97	1,300.65	1,107.24	-60.4%	-14.9%
Site gas	1,290.79	1,222.98	1,208.10	1,227.42	1,003.59	1,107.08	1,009.30	-21.8%	-8.8%
Depot lorry travel	803.95	876.66	625.55	586.66	824.39	903.91	747.10	-7.1%	-17.3%
Employee commuting	-	-	-	-	-	-	656.55	n/a	n/a
Park and ride emissions	101.74	327.76	325.43	388.13	386.42	409.29	404.04	+297.1%	-1.3%
Refrigeration & A/C	0.00	0.31	6.39	0.00	11.69	0.00	122.68	n/a	n/a
Depot contract car and van	0.00	50.27	255.63	249.19	152.93	112.14	117.06	n/a	+4.4%
Contractor fuel use	0.00	0.00	0.00	0.00	0.00	17.99	63.51	n/a	+253.0%
Council owned van travel	344.14	7.51	56.78	43.31	43.40	53.62	52.41	-84.8%	-2.3%
Cash opt out car travel	0.00	47.29	32.82	41.39	45.67	45.43	50.65	n/a	+11.5%
Water (and wastewater)	-	4.69	3.94	4.00	4.59	3.91	21.73	n/a	+456.4%
Council owned car travel	39.61	38.19	31.52	20.80	22.65	23.53	12.86	-67.5%	-45.4%
On-site fuel use (kerosene/gas oil)	0.00	82.51	76.81	15.94	0.30	4.45	4.46	n/a	+0.2%
Rail travel	4.07	4.27	3.66	5.68	6.57	6.34	4.28	+5.0%	-32.6%
Employee-owned vehicle travel (grey fleet)	97.26	14.90	13.31	10.05	10.66	15.18	4.01	-95.9%	-73.6%
Waste	-	-	-	-	-	-	3.80	n/a	n/a
Other *	0.00	25.42	29.26	6.35	22.00	1.67	1.35	n/a	-19.0%
Total Tonnes of CO_2e (location-based)	**5,476.89**	**5,260.51**	**4,933.57**	**4,549.19**	**4,186.84**	**4,005.19**	**4,383.02**	**-20.0%**	**+9.4%**
Tonnes of CO_2e per employee	**9.61**	**10.42**	**10.17**	**9.34**	**8.59**	**8.21**	**9.39**	**-2.3%**	**+14.3%**
Tonnes of CO_2e per capita	**0.048**	**0.044**	**0.041**	**0.038**	**0.034**	**0.032**	**0.034**	**-28.2%**	**+7.7%**

*Other = fuel use (petrol & LPG), air travel and taxi travel.

[9] Assessment scope has expanded in 2019/20 to include: employee commuting, waste, water for a larger number of sites, and refrigerant use at the leisure centres. Data availability of contractor fuel use has also improved this year.

The carbon intensity metrics in Figure 11 show a continual downward trend since 2014/15. The employee commuting emissions have been separated out to provide like for like comparison.

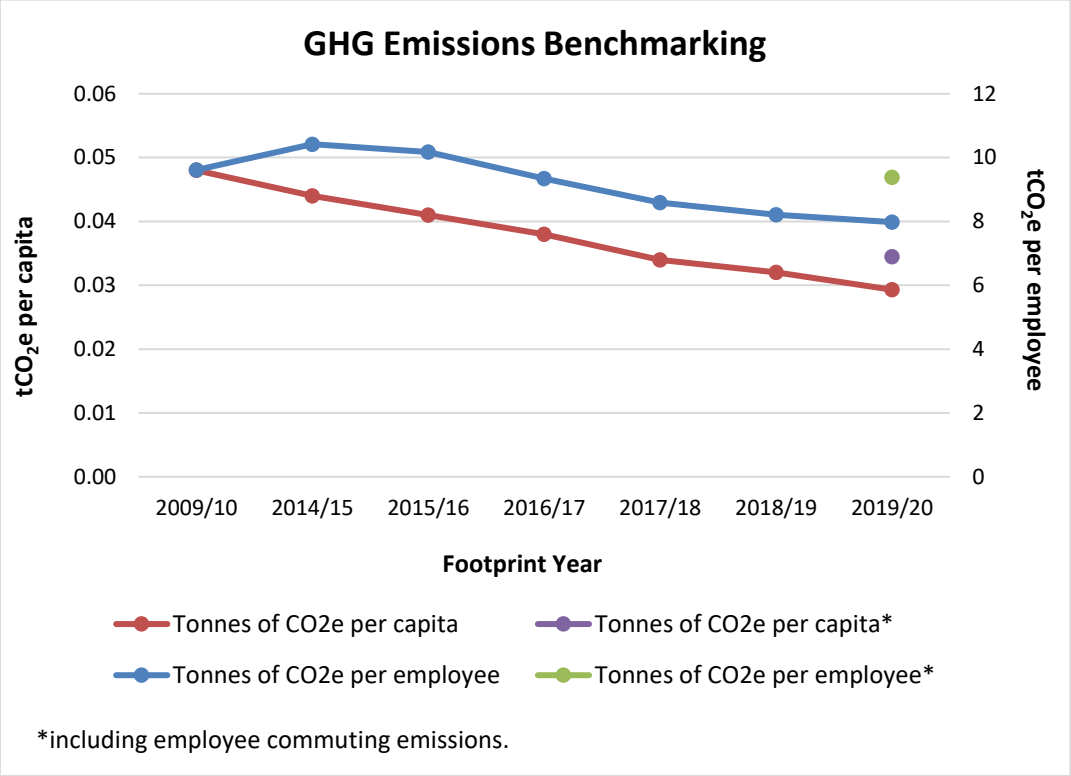
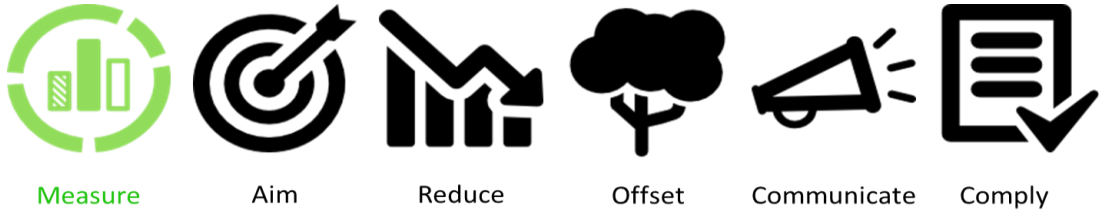


Figure 11: Carbon footprint of Winchester City Council for internal benchmarks

Carbon Footprint recommends that organisations use the base-year GHG inventory as a benchmark to measure against. When using the base-year GHG inventory as a benchmark, organisations can set realistic reduction targets and measure their progress year on year. This can also provide excellent marketing opportunities, where real figures can demonstrate WCC's commitment towards helping fight climate change.

5. Key Recommendations

The following recommendations are designed to help WCC build upon the results of the appraisal and its carbon management over the coming year.



5.1. Carbon & sustainability targets

WCC has the goal of becoming Carbon Neutral by 2024[10]. The Council should continue to assess its emissions annually in order to track its progress of carbon reductions. All targets set should be regularly reviewed and adjusted accordingly (i.e. brought forward/increased if reduction targets are met early). We recommend a combination of short-term and long-term targets based on absolute and intensity metrics. These can be measured in terms of activity data (e.g. kWh) or emissions.

5.1.1. Improving the accuracy of future carbon footprint assessments

The estimated overall error margin is +/- 4.9%. To improve the accuracy of future assessments, we recommend the following:

- Continue to take annual meter readings for all sites as well as continue investigating opportunities to install Automatic Meter Reader devices to all sites.
- Review the questions and answers of the employee commuting survey to determine how it can be improved for next time.
- Consider estimating emissions from employees remote-working due to the COVID-19 pandemic in next year's assessment.

5.2. Reducing emissions

To reduce GHG emissions, we recommend the following:

Energy:

- Continue to work closely with the leisure centres to identify opportunities to reduce emissions and optimise efficiency. Carry out regular energy analysis and on-site audits to identify areas of energy waste.
- Continue to develop a programme of energy audits across the housing and non-housing properties (e.g. for housing this could be in the form of on-site audits of the top 5 properties and a short online survey for the remaining).

[10] Winchester City Council – Carbon Neutrality Action Plan. https://www.winchester.gov.uk/climate-change-and-energy/climate-emergency-what-we-are-doing-now/carbon-neutrality-action-plan

WCC is already planning to begin conducting energy audits, beginning with the highest consuming sites.

- Educate and raise awareness of energy issues and efficient technologies/behaviours among staff and the wider community.
- Investigate the potential to source discounts/provide vouchers for products to reduce energy demand for residents in low-income areas (e.g. LED light bulbs, draught excluders, thermostatic radiator valves/controls etc.). Raise awareness about the Government's Green Homes Grant.
- Continue to investigate opportunities for the installation of renewable and low carbon technologies across the Council's estate (e.g. solar thermal, solar photovoltaics, air source heat pumps etc.).
- Continue to utilise renewable electricity tariffs as per the Council's goal by 2021. Choosing to purchase renewable/low-carbon tariffs will reduce the Council's market-based emissions for future assessments.
- Continue upgrading lighting wherever possible to energy-efficient LED lamps throughout Council-owned buildings.

Transport:

- Discuss with suppliers the potential to use alternative fuel buses (e.g. biogas, electricity, biodiesel produced from waste oil sourced from businesses/schools in the district).
- Encourage employees to commute by public transport (once the threat of COVID-19 is eliminated) or by bicycle in order to reduce emissions from commuting. Displaying local transport information and educating about the environmental impacts will increase employee awareness. Also ensure staff are aware of the Government's bicycle maintenance grant.
- Review the comments provided in the employee commuting survey to identify the main barriers and opportunities regarding changes to employee commuting habits.
- Evaluate the effectiveness of using remote meetings and limited travel, and re-define what WCC classifies as "essential" travel.

Other:

- When refrigerant top ups are required, investigate the reasons why and ensure measures are put in place to fix the cause and prevent it reoccurring.
- Investigate whether there are any leaking cisterns or taps, and identify opportunities to reduce water consumption (e.g. push taps with aerators) at the largest water consuming sites.

5.2.1. Setting carbon reduction budgets based on emissions

Having an agreed and defined system for investing in future carbon reduction activities helps drive carbon reduction and cost savings in a business. Many leading organisations are doing this through setting an "Internal Carbon Tax" or an "Internal Carbon Price" within their organisation (see http://www.carbonfootprint.com/internal_carbon_pricing.html for more information).

We suggest starting by setting a price of £20-25 per tonne of CO_2e, as this typically relates to 1-6% of the cost of causing emissions (as shown in the table below). WCC may wish to collect the "taxation" by each functional group (depending on their emissions), or simply account for this at the top-level company budgeting.

Table 14: Carbon price compared to energy and travel costs

Emissions Source	Electricity	Natural Gas	Car Miles	Flights
1 tonne CO_2e is equivalent to	2400 kWh	5500 kWh	3300 miles	5200 km
Cost to produce 1 tonne CO_2e	£335	£220	£1485*	£400
£20 carbon price represents	6%	9%	1%	5%

**assumes a rate of 45p per mile*

We recommend allocating this defined budget to help both internal and external carbon reduction activities. For example, it could be split:

- 75% on internal carbon reduction measures
- 25% on external carbon offsetting activities

Investments in internal carbon reduction activities should be made based on the level of carbon savings and the associated cost savings. Good carbon reduction investments usually pay for themselves and give a return on investment to the business within 3 years. Carbon offsetting return on investment is primarily measured through access to tenders, brand enhancement and PR (use marketing return on investment techniques).

5.3. Carbon offsetting

Carbon offsetting is a great way to compensate for the emissions that WCC cannot reduce, by funding an equivalent carbon dioxide saving elsewhere. Offsetting would also certify WCC as a Carbon Neutral organisation.

Our tree planting programmes will not only contribute to WCC becoming carbon neutral, one of the Council's own goal to achieve by 2024, but also provide fantastic biodiversity and social benefits to the communities where they are based.

We can provide both UK-based and international projects for WCC to support. The majority of projects focus on the development of renewable energy in developing countries, however there are others which have a greater focus on social benefits as well as environmental benefits. Further detail on the type and specific projects that we currently have in our portfolio can be provided on request or be found at: http://www.carbonfootprint.com/carbonoffsetprojects.html.

Example of Carbon Offsetting Projects:

Tree Planting in UK Schools

Avoided Deforestation in the Brazilian Amazon

Clean Water in Rwanda

5.4. Carbon Footprint Standard

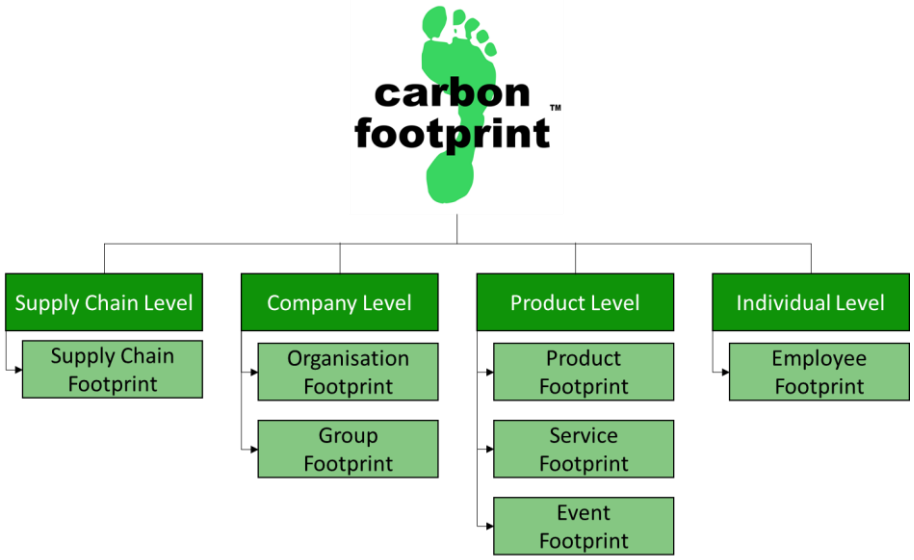
5.4.1. Brand endorsement

WCC, in conjunction with Carbon Footprint Ltd, has assessed and reduced its carbon footprint by 20.0% against the baseline year. By achieving this WCC has qualified to use the Carbon Footprint Standard branding. This can be used on all marketing materials, including website and customer tender documents, to demonstrate the councils carbon management achievements.

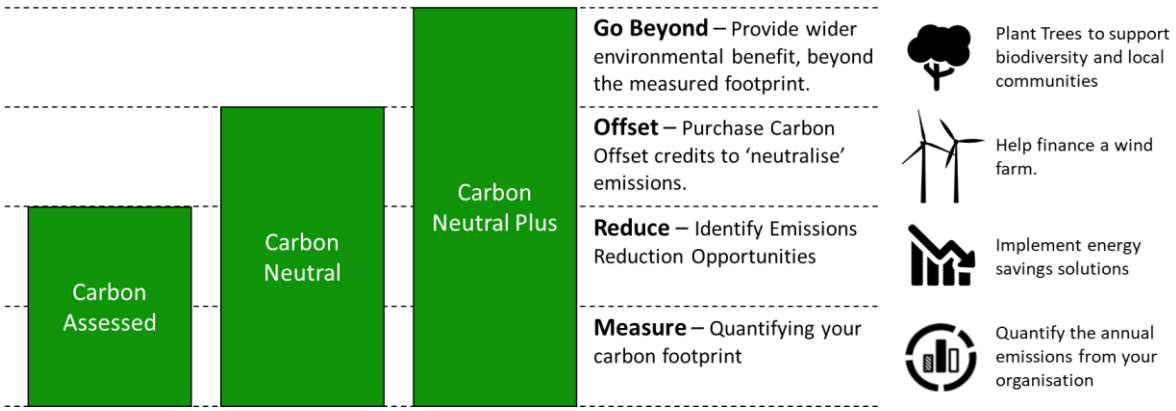
The Carbon Footprint Standard is recognition of WCC's organisation's commitment to carbon management. The text to the right-hand side of the logo demonstrates what level WCC have achieved in line with international best practice.

5.4.2. Scope

As WCC is at the beginning of its Carbon Footprint Journey, the council has decided to focus on the carbon footprint at the organisational level. This is a great start. Over time, WCC can progress its carbon footprinting to increase the scope and encompass its products, supply chain and employees. By doing so, WCC will be able to receive the Carbon Footprint Standard for these categories.



Once the scope has been identified, the Carbon Footprint Standard will allow WCC to develop from a novice to an exemplar in the market. WCC can progress from a Carbon Assessed Organisation to a Carbon Neutral or a Carbon Neutral Plus Organisation by supporting a range of environmental projects that come with wider CSR and PR opportunities.



5.4.3. Communicate

Make sure WCC communicate its actions and achievements effectively, both within its organisation, to help develop the council's culture, and externally to help improve the councils brand image.

When promoting WCC's actions, be sure to utilise all marketing channels available to WCC, such as website, newsletters, brochures, press releases, conferences/events and social media etc.

WCC should:

- Explain why climate change matters to WCC (for more information visit: www.carbonfootprint.com/warming.html)
- Tell the story of where WCC has come from, the progress it has made and what its commitment is for the future (e.g. targets).
- Be clear and accurate about what WCC has achieved – take care not to exaggerate.
- Use the Carbon Footprint Standard branding, certificates, images of offset projects WCC are supporting and graphs of WCC's carbon performance to help communicate the councils point in a clear and enticing manner.

6. References

1. BEIS GHG Conversion Factors for Company Reporting (June 2019)
2. Guidelines to Defra's Greenhouse Gas (GHG) Conversion Factors for Company Reporting – annexes (June 2013)
3. The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard, Revised Edition (March 2004)
4. Winchester City Council – Carbon Neutrality Action Plan. Available at: https://www.winchester.gov.uk/climate-change-and-energy/climate-emergency-what-we-are-doing-now/carbon-neutrality-action-plan

A. Annex A – Calculation Methodology (Additional Notes)

A.1 How is the carbon footprint calculated?

Carbon Footprint confirms that the methodology used to quantify the carbon footprint meets the following principles:

a) The subject and its boundaries have been clearly identified and documented.
b) The carbon footprint has been based on primary activity data unless the entity could not demonstrate that it was not practicable to do so, in which case an authoritative source of secondary data relevant to the subject was used.
c) The methodology employed minimised uncertainty and yielded accurate, consistent and reproducible results.
d) Emission factors used are germane to the activity concerned and current at the time of quantification.
e) Conversion of non-CO_2 greenhouse gases to CO_2e has been based upon the 100-year Global Warming Potential figures published by the IPCC or national (Government) publication.
f) Carbon footprint calculations have been made exclusive of any purchases of carbon offsets.
g) All carbon footprints have been expressed as an absolute amount in tCO_2e.

A.2 Biomass

There are no CO_2 emissions from the combustion of biomass to be considered within this report.

A.3 Greenhouse gas removals

Within the calculation of WCC's carbon footprint, there are no business processes resulting in the reduction of greenhouse gases from the atmosphere to be deducted from the calculation.

B. Annex B – Supplied Data and Emissions Breakdown

Please refer to accompanying MS Excel spreadsheet "2020_07 Annex B Winchester City Council v1.0.xls".

C. Annex C – Scope 1 Emissions Breakdown

The table below demonstrates the Council's scope 1 CO_2e emissions in their respective greenhouse gases.

Table C.1: CO_2e Emissions breakdown for Scope 1 emissions into their greenhouse gases.

Activity	kg CO_2e	kg CO_2 in CO_2e	kg CH_4 in CO_2e	kg N_2O in CO_2e
Site gas	1,009,245.13	1,007,381.17	1,326.14	539.06
Kerosene	4,458.44	4,401.09	56.84	0.00
Refrigeration & A/C	122,678.4	0.00	0.00	0.00
Council owned car travel	12,856.43	127,25.90	17.90	112.57
Vehicle fuel usage	64,380.36	63,663.66	63.29	653.18
Council owned van travel	169,470.65	167,248.90	33.79	2,187.78
Total	**1,383,089.40**	**1,255,420.72**	**1497.97**	**3,492.59**