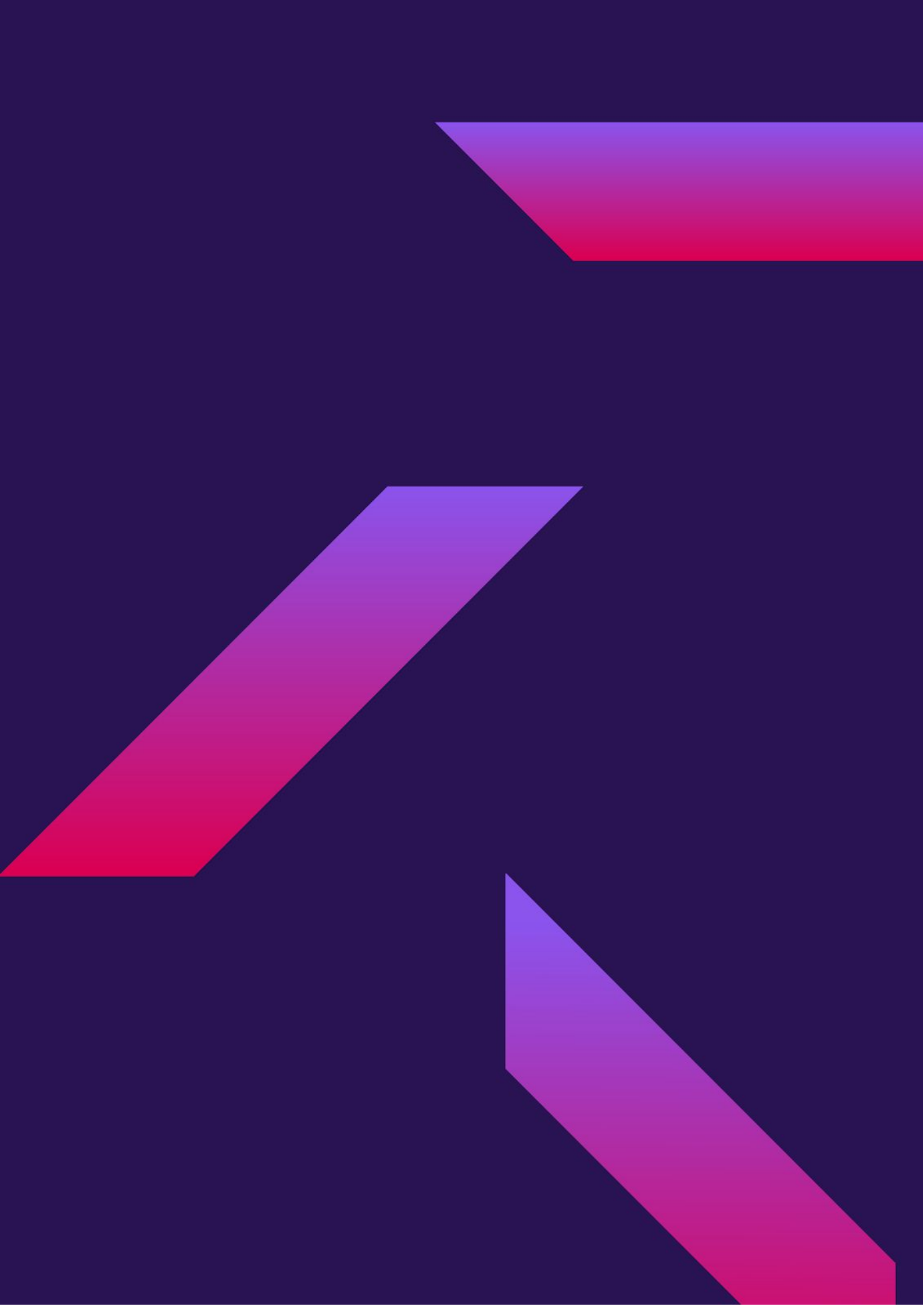




Urban
Foresight

PREPARED FOR:

Charnwood Borough
Council





Charnwood Borough Council is situated in Leicestershire and will aim to achieve carbon neutrality from its own operations by 2030. The Council is preparing a Carbon Neutral Plan setting out to achieve this.



Urban Foresight® is a multidisciplinary innovation practice that is dedicated to advancing the next generation of technologies, services and policy frameworks for cities. From our offices in Newcastle and Dundee we work with ambitious organisations around the world on projects that improve lives, protect the environment and boost local economies.



De Courcy Alexander Ltd is a sustainability consultancy that specializes in zero carbon solutions. The company works with private companies to develop and commercialise emerging technologies and new sustainable business models, helps public bodies that are aiming to achieve net zero emissions and creates collaborations to embed responsible business practices through communities and supply chains.

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Main author: Sam Nair

Introduction

In 2015, Charnwood Borough Council developed a Carbon Management Plan which aimed to achieve a 15% reduction in carbon emissions by 2020, against a 2012-13 baseline.

In 2015-16 a 21% decrease in emissions was recorded as a result of energy savings across Council operations. Progress continued and the 2017-18 monitoring report showed a 32% decrease in emissions compared to the 2012-13 baseline as more energy saving projects were deployed and took effect. This report presents the analysis for 2018-19 to show how further reductions in size of the carbon footprint have been made.

The Carbon Management Plan sets out 25 projects. Many of those projects have started to deliver sustained reductions in carbon emissions and costs. The name, location and delivery status of the projects are shown in Table 1

Table 1: Carbon Management Plan projects and their delivery status

Project ID	Location and name	Delivery status
1	Town Hall - LED	Completed in October 2018
2	Town Hall - Stage Lighting LED	Completed August 2017
3	Town Hall - Heating System	Completed August 2017
4	Town Hall - Pipe Insulation	Completed August 2017
5	Town Hall - VSDs on heating pumps	Completed August 2017
6	Beehive Lane - LED	Completed October 2018
7	Other Carparks - LED	Completed November 2017
8	Charnwood Museum - LED	Completed October 2017
9	Charnwood Museum - Heating System	Complete January 2016
10	Charnwood Museum - Pipe Insulation	Complete January 2016
11	Southfield Road ICS - LED	Not being implemented
12	Southfield Road ICS - Server Room Layout	Not being implemented
13	Woodgate Chambers - LED	Not being implemented
14	Woodgate Chambers - Boiler	Complete January 2016
15	Woodgate Chambers - Heating Controls	Complete January 2016
16	Oak Business Centre - LED	Completed March 2017
17 - 21	Sheltered Accommodation - LED	Ongoing
22	Fleet Transport EV	Completed 2017-18
23	Fleet Transport - low emission diesel	Completed 2015-16
24	Business Travel	Completed 2015-16

25	Green Impact Programme	Ongoing
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Energy use and carbon emissions have been tracked compared to a 2012-2013 baseline at these locations in previous monitoring reports for 2015-16, 2016-27, and 2017-18. This report provides a further update on energy use and emission from the locations where the projects have been implemented to show how energy use has continued change.

Methodology, scope & data sources

This report uses global standards of carbon reporting to enable comparisons to be made of emissions in the reporting year 2018 to be compared to previous years and the 2013 baseline. Information on this is included in Appendix 1. The methodology in this report is designed to following international standards and allow year on year comparison to the baseline. To that end, some limitations and assumptions are made. These are detailed in Appendix 1.

Emissions have been categorised into Scopes 1, 2 and 3, in accordance with Greenhouse Gas (GHG) Protocol developed by World Resources Institute (WRI) and World Business Council for Sustainable Development (WBCSD) as defined in 2013 for consistency with the baseline (Table 2).

Table 2: Emissions categorised by Scope

Emissions sources included in baseline scope	Data sources (source Charnwood Borough Council)
Scope 1 - includes all direct emissions from sources directly controlled by Charnwood Borough Council	
Fuel use in buildings and estates, including communal areas of social housing (e.g. gas and oil)	Gas use: SystemsLink software data from utility bills & automatic metering.
Fleet transport emissions (e.g. petrol, diesel)	Petrol and diesel consumption: data from fuel card reports.
Scope 2 – includes emissions from purchased energy produced off site	
Electricity consumption in buildings and estates	SystemsLink software data from utility bills & automatic metering.
Electric vehicles	Electric vehicle mileage: odometer data provided by
Scope 3 – all other emissions	
Business travel (staff own vehicle use)	Petrol and diesel mileage: data from fuel expense reports.
Water use	SystemsLink software data from utility bills.

Waste consumption	Provided by waste contractor.
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Scope 1 emissions are those created within Council owned assets that it occupies, such as Southgate offices. Scope 2 includes any emissions created on the Council's behalf, for example, through the purchase of electricity generated from gas-fired power stations. Scope 3 covers the other emissions that are the consequence of actions of the Council which are not included in Scope 1 or Scope 2.

The carbon emission sources included in this report cover energy, water, waste and transport emissions as set out in the table below. Emissions from fuel use, whether gas burned to heat a building or diesel to run a van, is calculated using the 2018 conversion factor defined by the Department for Environment, Food and Rural Affairs (DEFRA). Emissions from electricity and water use are based on data from meters and suppliers and DEFRA conversion factors for national averages.

As in previous years, emissions for waste disposal are based on the cost of end-of-life disposal of different materials using a variety of different disposal methods such as recycling or conversion to refuse derived fuel.

For consistency with the 2013 baseline, the report has some exclusions. For example, the report covers emissions in buildings and activities that Charnwood have management control and influence over, for example owner occupied buildings. For this reason, all outsourced activities (such as energy consumption in Leisure Centres or fuel consumption in contractor vehicles) has been excluded from this monitoring report.

When analysing the carbon footprint of natural gas is used for heating and hot water it is important that the analysis considers the impact of outdoor temperatures on heating needs. As temperatures vary from year to year, *heating degree days* can be used to adjust for weather conditions to provide a standardised annual comparison.

Heating degree days (HDD) are a measure of the severity and duration of cold weather. The colder the weather in a given month, the larger the degree-day value for that month. Published degree days in the UK are calculated to a base temperature of 15.5°C for general use within most buildings. In 2018-19 there were 3% more HDDs than in 2017-18, meaning the weather colder and expected demand for natural gas powered heating would be higher. Measuring energy use per HDD (expressed as kWh-HDD) enables us to show whether heating has become more efficient.

Summary of Progress

Compared to 2017-18 a reduction of 95 tonnes of carbon dioxide equivalent has been achieved by Charnwood Borough Council. This represents a 7% decrease compared to 2017-18 and 37% compared to the 2012-13 baseline.

This continues the pattern reported in previous years, and is substantially larger than the 15% reduction target by 2020 compared to a 2012-13 baseline (Figure 1). In total, Charnwood Borough Council has seen a reduction of 787 tonnes of carbon dioxide equivalent (tCO₂e), or 37%, compared to the 2012-13 baseline.

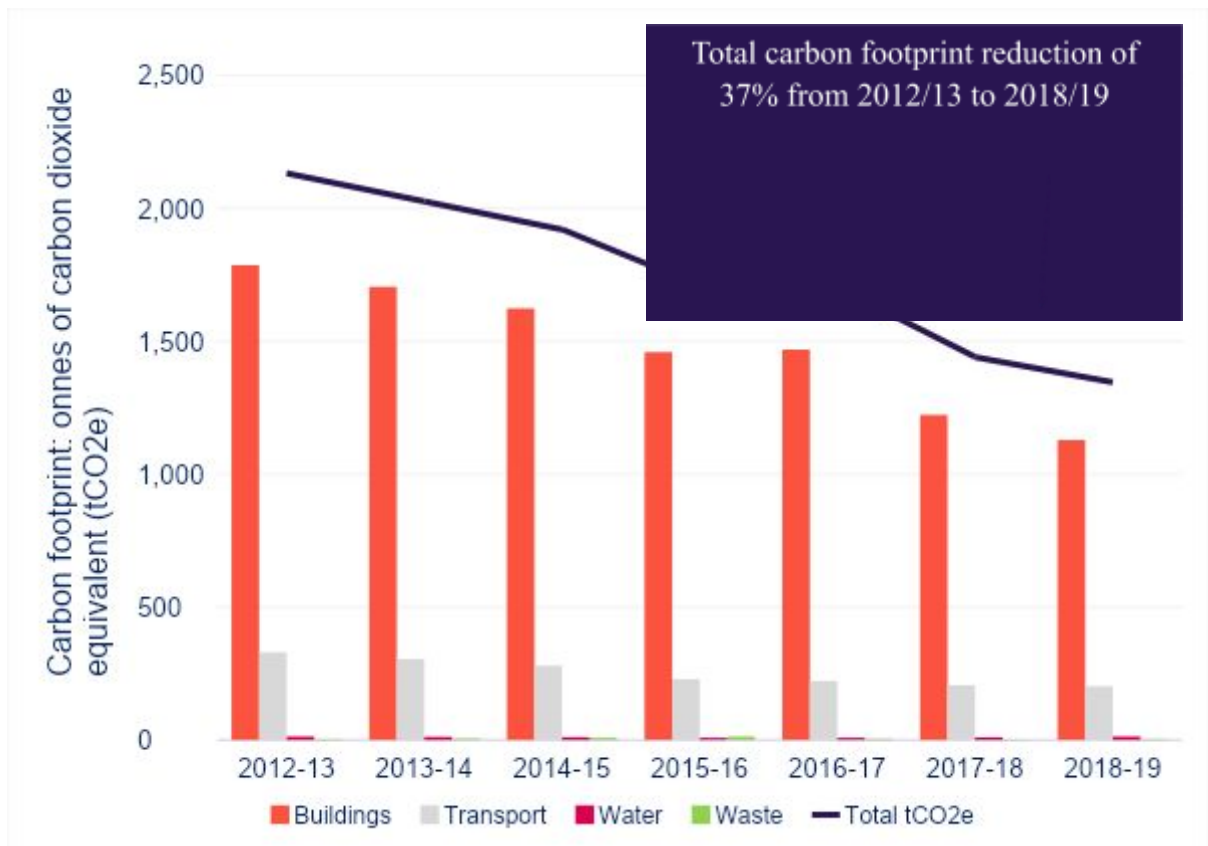


Figure 1: change in Charnwood Borough Council’s carbon footprint over time

Table 3 presents a year by year total of Charnwood Borough Council’s carbon footprint. The fall in tCO₂e emissions has been driven by a steady decrease in emissions from buildings, which saw 95 fewer tCO₂e in 2018-19 than in 2017-18 (Table 4.).

Emissions resulting from energy use in buildings represents the biggest share of the Council’s carbon footprint (Figure 2Table 4). Buildings make up 83.8% of the footprint, transport water 1% and waste 0.2%.

Table 3: Annual carbon footprint and year on year change

Year	Total carbon footprint tCO ₂ e	Year on year change (%)
2012-13	2,133	n-a
2013-14 ¹	2,027	-5%
2014-15	1,922	-5%
2015-16	1,710	-11%
2016-17	1,703	0%
2017-18	1,441	-15%
2018-19	1,346	-7%

An annual breakdown of emissions by source is shown in Table 4. Buildings have seen a reduction of 659 tCO₂e from 2012-13 to 2018-19, a reduction of 37%. Transport emissions have fallen by 128 tCO₂e, or 39%. Waste and water have seen no change overall.

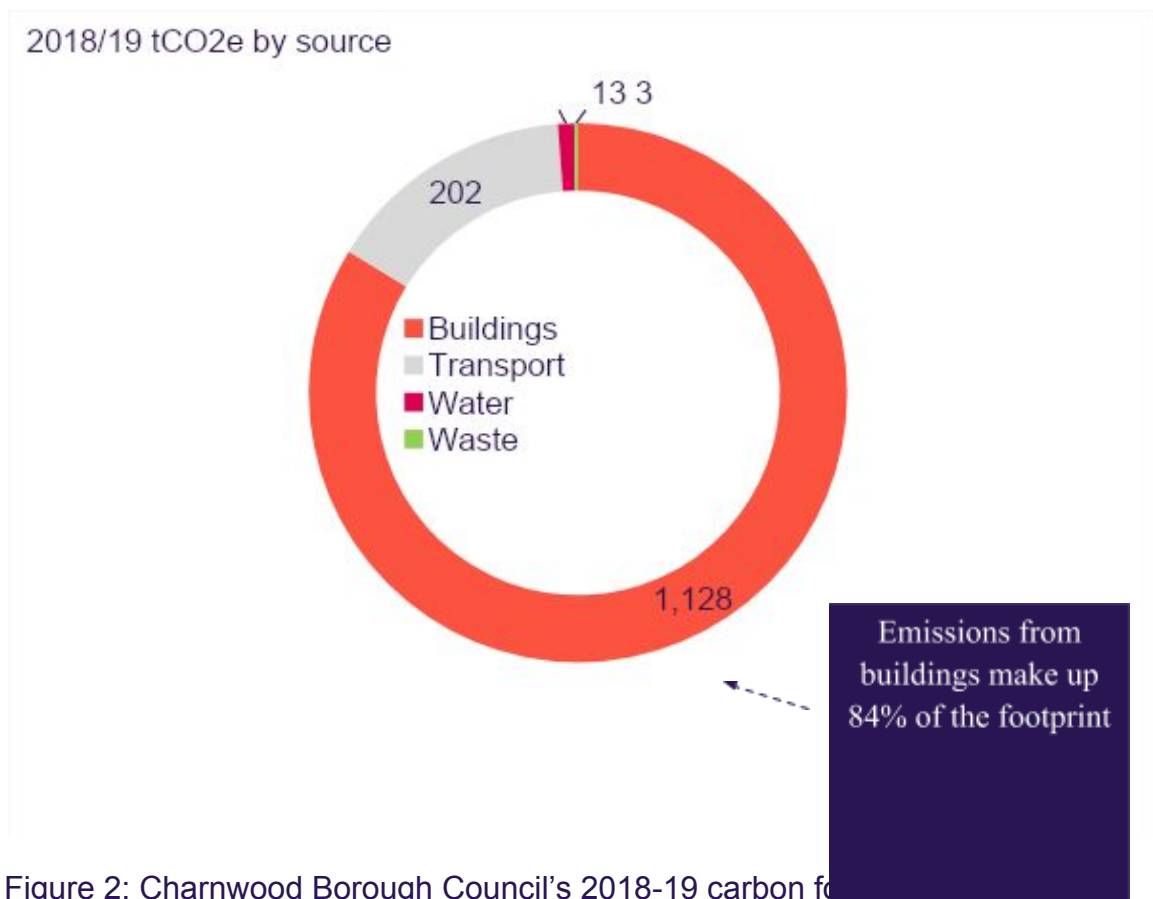


Figure 2: Charnwood Borough Council's 2018-19 carbon footprint by source

¹ 2013-14 and 2014-15 data unavailable, so this report uses modelled figures based on a trajectory from 2012-13 to 2015-16 data/

Table 4: Annual breakdown in tCO₂e by source

Year	Carbon footprint (tCO ₂ e)				Total
	Buildings	Transport	Water	Waste	
2012-13	1,787	330	13	3	2,133
2013-14	1,705	305	12	6	2,027
2014-15	1,624	280	11	8	1,922
2015-16	1,460	229	8	13	1,710
2016-17	1,469	222	8	4	1,703
2017-18	1,223	206	10	2	1,441
2018-19	1,128	202	13	3	1,346

In terms of scope the biggest contributor to the Council’s carbon footprint are Scope 2 emissions contribute most, representing 58.5% (Figure 3). Scope 1 emissions make up 31.6% of emissions and Scope 3 contribute to 9.9% of total emissions. The different activities measured in Scopes 1, 2 & 3 are described in the methodology section.

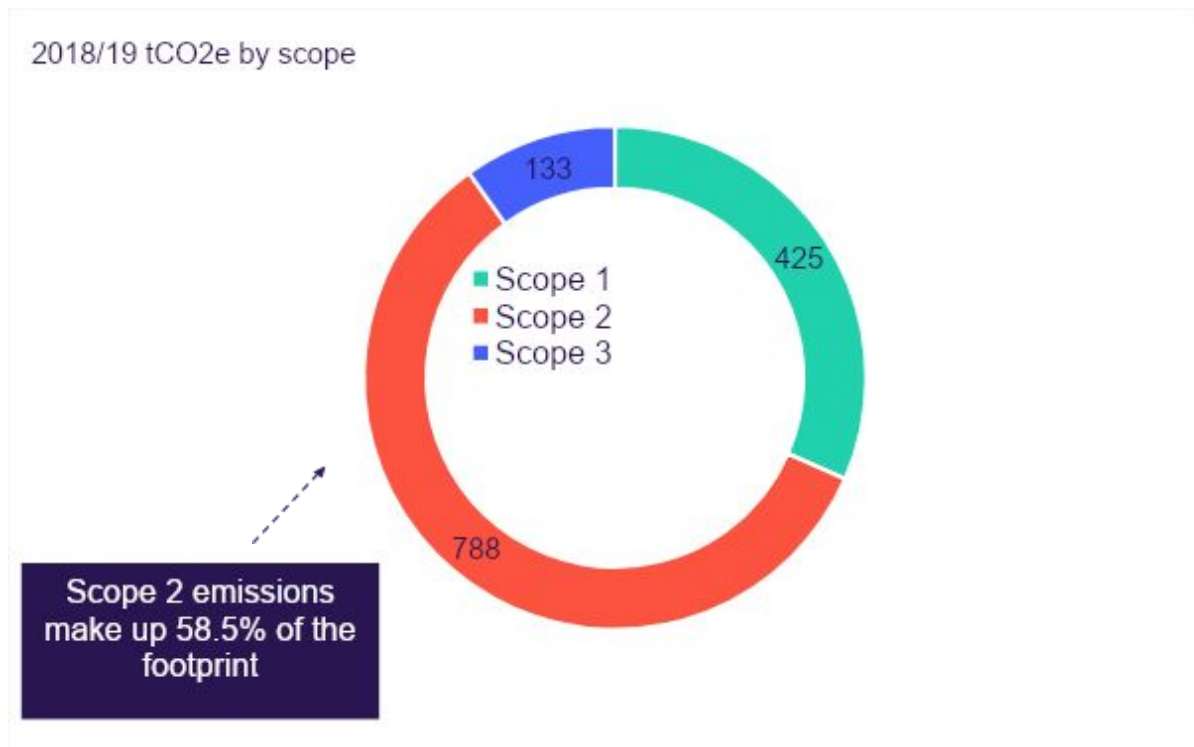


Figure 3: Charnwood Borough Council’s 2018-19 carbon footprint by scope

Scope 1 emissions appear to have increased since 2017-18, by 4%. Scope 2 & Scope 3 have fallen by 9% and 21% respectively. The impact of the reduction in Scope 2 emissions is the driver of the total net decrease in total emissions, with Scope 2 representing the biggest absolute decrease of 76% from 2017-18 to 2018-19 (Table 5).

Table 5: % change in tCO₂e by scope

Scope	2017-18		2018-19		tCO ₂ e
	tCO ₂ e	% of total	tCO ₂ e	% of total	% change
Scope 1	408	28%	425	32%	4%
Scope 2	864	60%	788	59%	-9%
Scope 3	169	12%	133	10%	-21%
Total	1,441	100%	1,346	100%	-7%

Carbon footprint breakdown by category

Looking in more detail at the breakdown of emissions by category Council buildings and offices contribute the highest level of tCO₂e, representing 83% of total emissions from Council operations in 2018-19. Compared to the 2012-13 baseline, council offices have seen a reduction in emissions of 217 tCO₂e, or 24% (Table 6)².

Whilst Council buildings and offices have seen the most significant change, other building types have seen a greater percentage change such as car parks (46% decrease), historic buildings (43%) and housing landlord supply (54%). This is likely to be reflecting the fact that of the 22 delivered projects from the 2015 Carbon Management Plan, only a small number were in Council buildings and offices.

Table 6: breakdown and % change in tCO₂e by category

Category		tCO ₂ e				% change in tCO ₂ e	
		Baseline 2012-13	2016- 17 ²	2017- 18	2018- 19	2012-13 to 2018-19	2017-18 to 2018-19
Building energy	Historic Buildings	89	78	59	50	-43%	-15%
	Council Buildings-Offices	903	754	693	686	-24%	-1%
	Car Parks - Toilets	191	138	107	104	-46%	-3%
	Housing Landlord Supply	502	393	304	232	-54%	-24%
	Hostel-Sheltered Housing Accommodation	70	69	41	46	-35%	12%
	Other	32	37	19	10	-69%	-48%

² Data for the period 2013-14 to 2015-16 unavailable.

	Total Building Energy	1,787	1,469	1,223	1128	-37%	-8%
Transport energy	Fleet	223	122	129	123	-45%	-5%
	Business	107	100	77	79	-26%	2%
	Total Transport	330	222	206	202	-39%	-2%
Further Scope 3	Waste	3	4	2	3	-4%	44%
	Water	13	8	10	13	3%	34%
	Total Further Scope 3	16	12	12	16	2%	36%
Total		2,133	1,703	1,441	1,346	787	-37%

Electricity & Gas

Charnwood Borough Council has achieved reductions in carbon emissions in excess of the 15% target from both their electricity and gas consumption.

Combined, electricity and gas use by Charnwood Borough Council produced 1,067 tCO₂e in 2018-19, making up 79% of the total carbon footprint ().

Electricity has seen the largest reduction with a 14% reduction in usage compared to the 2012-13 baseline resulting in a 45% reduction in emissions (Table 7). In total, electricity consumption fell by 401,065 kilowatt hours (kWh) from 2012-13 to 2018-19 resulting in a reduction of 647 tCO₂e.

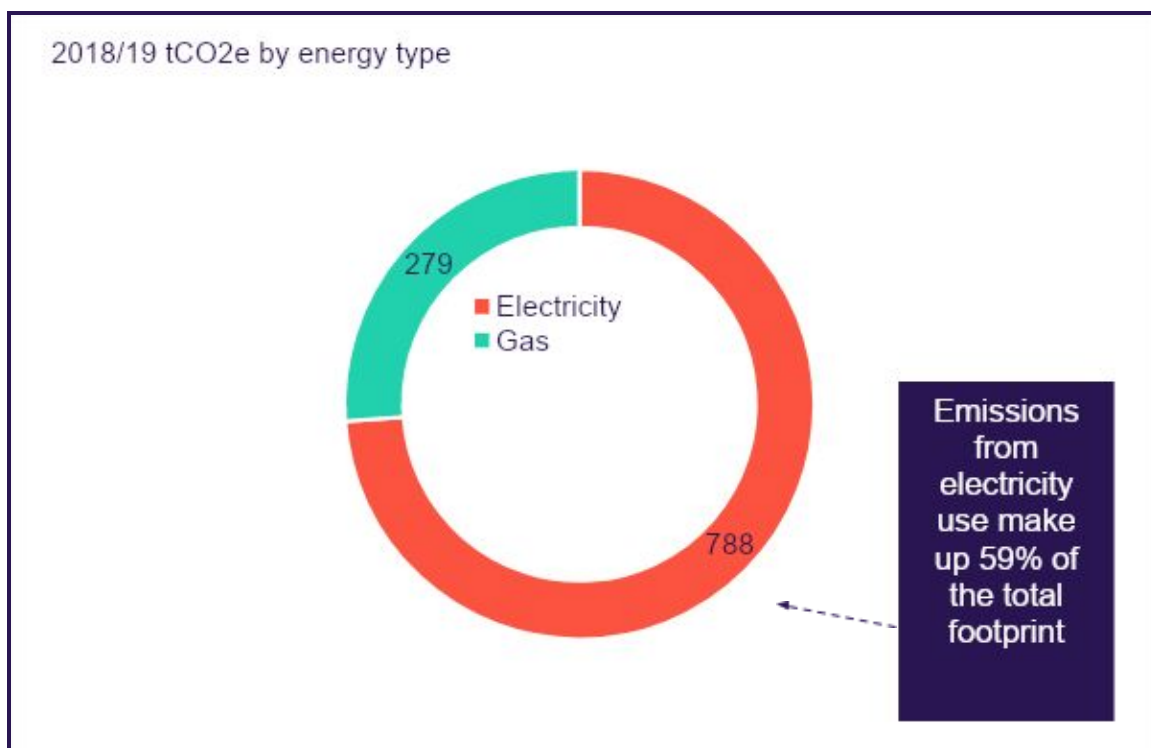


Figure 4: Charnwood Borough Council’s 2018-19 carbon footprint by scope

Compared to 2017-18, there has been an increase in energy consumption of 91,847 kWh, or 4%, but a fall in carbon emissions of 163 tCO₂e, or 17%. Continuing decarbonisation of the grid is the reason why emissions have fallen while consumption has increased.

Table 7: Electricity consumption summary

	2012-13	2016-17	2017-18	2018-19	% Change 2012-13-2018-19	% Change 2017-18-2018-19
Total electricity consumption (kWh)	2,966,589	2,870,362	2,473,677	2,565,524	-14%	+4%
Carbon emissions tCO ₂ e	1,435	1,183	951	788	-45%	-17%

Total gas consumption has increased by 84,567 kWh (5%) compared to 2017-18 (Table 8). One driving force for the increase in gas is that the weather was generally colder compared to the previous year. Following best practice, this can be measured in a change in heating degree days (HDD), which are the number of days that it is expected that heating is required. More detail on HDD is described in the methodology section. The number of degree days has increased but so has the

gas consumption per degree day (measured in kWh-HDD), suggesting that gas use within Council buildings has become less efficient.

At the same time, the impact of burning a single kWh of gas has decreased due to improvements in the emissions from the UK gas network. The net effect of this is an increase in emissions of 8% (23 tCO₂e) compared to 2017-18. In total, carbon emissions from gas usage have fallen by 49 tCO₂e, or 14%, from the 2012-3 baseline to 2018-19 with a 265,895 kWh (14%) reduction in energy consumption.

Table 8: Gas consumption summary

	2012-13	2016-17	2017-18	2018-19	% Change 2012-13-2018-19	% Change 2017-18-2018-19
Total natural gas consumption (kWh)	1,907,929	1,557,467	1,515,318	1,642,034	-14%	8%
tCO ₂ e	351	287	279	302	-14%	8%
Heating degree days	2,607	1,944	2,104	1,993	-24%	3%
Consumption per heating degree day (kWh-HDD)	732	801	720	824	13%	6%

Following the 2013 methodology, no allowance is made for the impact of “green” electricity tariffs or the retirement of Renewable Energy Guarantees Origin (REGO). In practice, Charnwood Borough Council now pay a renewable energy premium guaranteeing a 100% renewable supply from their provider.

Transport

In addition to its own transport fleet, Charnwood relies on staff using their own vehicles for business trips. The fleet consists of electric, diesel and petrol vehicles, while staff drive vehicles powered by petrol and diesel.

Emissions from transport equate to 330 tonnes CO₂e, or 14% of total emissions. Of that, 63% is from the Council’s own fleet and 37% from business journeys undertaken in other cars. Emissions from fleet use has reduced by 5% compared with the previous year and 45% against baseline (Table 9).

Table 9: Transport emissions summary

	tCO ₂ e			% change in tCO ₂ e	
	2012-13 baseline	2017-18	2018-19	% Change against baseline	% Change against 2017-18
Fleet	223	129	123	-45%	-5%
Business	107	77	79	-26%	2%
Total	330	206	202	-39%	-2%

Vehicle mileage has increased by 20% compared to the baseline. However, this total aggregate change masks more interesting fluctuations during the last six years.

Petrol vehicle mileage has reduced by 39% compared to the baseline, but increased by 16% compared to 2017-18. Diesel vehicles show the reverse pattern, increasing by 54% compared to the baseline, but now entering a period of decline with a 20% fall compared to 2017-18.

Table 10: Mileage figures summary

	2012-13 Mileage	2017-18 Mileage	2018-19 Mileage	% Change 2012-13-20 18-19	% Change 2017-18-20 18-19
Petrol	272,758	144,190	166,612	-39%	16%
Diesel	67,264	128,966	103,778	54%	-20%
Total	340,022	273,156	270,390	-20%	-1%

Case study: Fleet Electrification

Electric fleet vehicles have been purchased and deployed as one of the projects instigated as part of the 2015 Carbon Management Plan.

Three vehicles with data collected for 2018-19 had a combined mileage of 6,616 miles creating 783 tCO₂e, and a combined annual energy running cost of £265.

This is a saving of 3,330 tCO₂e and £469 in fuel costs compared to making the same journeys in a comparable petrol or diesel vehicle.

Costs

To assist in calculating the financial impacts of emissions and predict the potential financial savings of interventions, the baseline used cost factors. These are

generated by modelling a range costs of including energy, fuel, vehicle design and allow for a comparable metric of costing to be used year on year. These 'cost factors' are shown in Table 11.

Table 11: Cost factors

Factor	Units	Baseline (2012-13)	2017-18	2018-19	Source
Electricity (grid)	kWh	0.12	0.12	0.16	Energy Saving Trust, 2019
Natural gas	kWh	0.04	0.023	0.04	Energy Saving Trust, 2019
Transport Diesel (litres)	Litres	1.19	1.19	1.30	BEIS QEP 2019
Transport Petrol (litres)	Litres	1.35	1.18	1.25	BEIS QEP 2019
Average petrol car	km	0.318	0.305	0.32	BEIS QEP 2019
Average diesel car	km	0.31816	0.319	0.35	BEIS QEP 2019
General waste to landfill	Tonnes	N/A	160	160	Carbon Trust 2019
General waste recycled	Tonnes	N/A	115	115	Carbon Trust 2019
Cardboard-paper recycled	Tonnes	N/A	12	12	Carbon Trust 2019
Refuse derived fuel	Tonnes	N/A	160	160	Carbon Trust 2019
General waste to landfill	Tonnes	N/A	160	160	Carbon Trust 2019
General waste recycled	Tonnes	N/A	115	115	Carbon Trust 2019

The financial impact of the modelled carbon generated activities has reduced compared to the 2013 baseline by 5% (Table 12). Emission sources vary in their cost intensity therefore it is expected that cost changes will not reflect changes in carbon emissions. For example, the per litre cost of diesel has increased over the period while the cost of petrol has decreased.

However, the effect of these is mitigated by the efficiency gains that have been made during the period, including the introduction of electric vehicles. This means

that overall, there has been a reduction in the cost of transport, which is down by £128,525, a saving of 46%.

There are some increases, such as the cost of operating the Council buildings, hostels and sheltered accommodation. Some of this may be explained by changes in operation and the change in the balance between electricity and gas use.

Table 12: Cost of footprint

	Category	Baseline (2012-13)	2017-18	2018-19	% change 2012-13 to 2018-19	% change 2017-18 to 2018-19
Building energy	Historic Buildings	£20,329	£13,486	£16,416	-19%	22%
	Council Buildings-Offices	£206,004	£169,190	£269,139	31%	59%
	Car Parks - Toilets	£45,976	£33,369	£53,121	16%	59%
	Housing Landlord Supply	£120,639	£94,985	£107,197	-11%	13%
	Hostel-Sheltered Housing Accommodation	£16,798	£12,745	£22,210	32%	74%
	Other	£7,614	£5,873	£5,111	-33%	-13%
	Total Building Energy	£417,360	£329,648	£473,195	13%	44%
Transport	Fleet	£105,541	£59,009	£60,853	-42%	3%
	Business	£174,101	£136,862	£90,264	-48%	-34%
	Total Transport	£279,642	£195,871	£151,117	-46%	-23%
Further Scope 3	Waste	£2,604	£9,988	£18,273	602%	83%
	Water	£30,414	£55,662	£54,948	81%	-1%
	Total Further Scope 3	£33,018	£65,650	£73,221	122%	12%
	Total	£730,020	£591,169	£697,533	-5%	15%

A breakdown of how the 2018-19 cost relates to costs in previous years is shown in Table 13.

Table 13: Cost of footprint over time

Year	costs	Change from baseline	Change from previous year
2012-13	£730,020	n/a	n/a
2015-16	£709,964	-3%	n/a
2016-17	£639,683	-14%	-11%
2017-18	£591,167	-23%	-8%
2018-19	£697,533	-5%	15%

Project Site Progress

Reductions in emissions have been seen at nearly all the sites where projects have been delivered.

Of the buildings where 2015 Carbon Management Plan projects have been implemented Charnwood Museum has seen the biggest percentage decrease, with 54% reduction in emissions compared to the baseline.

The Town Hall has seen the biggest absolute change, with 92 tCO₂e fewer emissions in 2018-19 compared to the 2012-13 baseline, a reduction of 29% (Table 14).

Table 14: emissions at buildings where Carbon Management Plan 2015 projects have been implemented

	tCO ₂ e			% Change 2012-13-20 18-19	% Change 2017-18-201 8-19
	2012-2013	2017-2018	2018-2019		
Town Hall	313	225	221	-29%	-2%
Charnwood Museum	41	24	19	-54%	-22%
Southfield Road offices	183	159	127	-30%	-20%
ICS building	180	130	112	-38%	-14%
Woodgate Chambers	9	47	51	468%	8%
Oak Business Centre	84	60	49	-42%	-19%
Total	496	421	358	-28%	-15%

Woodgate Chambers, which used to be the smallest source of emissions out of these buildings has seen an increase in emissions and now creates more carbon as reported in tCO₂e than either the Charnwood Museum or the Oak Business Centre.

A number of sheltered housing locations have had LED lights installed as part of the 2015 Carbon Management Plan. Examples of this include Offranville Court, Sharpley Road, Sorrel Court, St Michael's Court, St Peter's Court and Wordsworth Road. The lights were installed in communal areas, which are measured

separately to the flats. The carbon emissions of these buildings have reduced from 72 tCO₂e in 2012-13 to 25 tCO₂e in 2018-19, a reduction of 65%.

Car parks, where LED lights have been installed in place of existing lights, have seen a substantial reduction in carbon emissions. Most notably is the Beehive Lane Carpark which has seen a reduction of 56% compared to the baseline and 39% compared to 2017-18 (Table 15).

Table 15: emissions at car parks where Carbon Management Plan 2015 projects have been implemented

	tCO ₂ e			% Change 2012-13-2018-19	% Change 2017-18-2018-19
	2012-2013	2017-2018	2018-2019		
Beehive Lane Carpark	149	79	65	-56%	-18%
All other car parks	19	25	15	-18%	-39%
Total	168	104	80	-52%	-23%

Beehive Lane is home to electrical vehicle charge points. A full time series of electricity consumption data is available for one of these charge points, which has two sockets. Electricity use at this charge point has increased from 5,703 kWh in 2017-18 to 6,611kWh in 2018-19.

Despite electricity use increasing at this charge point, the carpark as a whole has seen carbon emissions reduce by 18% during the same time period. This shows the effectiveness of the LED light installations.

Project detail

Table 16: assessment of 2015 Carbon Management Plan Projects

Project ID	Project location and name	Status	Results
1	Town Hall - LED	Completed in October 2018	The cost of upgrading the stage lighting with LEDs was £27,882, an increase of £5,882 compared to a like-for-like replacement. Electricity consumption in 2018 has increased by 9% from the 2013 baseline.
2	Town Hall - Stage Lighting LED	Completed August 2017	
3	Town Hall - Heating System	Completed August 2017	As reported in the 2018 report, two new boilers and four new pump sets were installed for an additional cost of £4,800. Gas
4	Town Hall - Pipe Insulation	Completed August 2017	

5	Town Hall - VSDs on heating pumps	Completed August 2017	consumption has reduced by £11,747 per year compared by 2013 baseline.
6	Beehive Lane - LED	Completed October 2018	Cost of installation reported in 2018. According to the 2018 report, the LED upgrades in Beehive Lane, Granby Street and Browns Lane cost £16,885, £8,941.20 and £16,990.60 respectively. In 2018, the cost of all electricity to the car park estate is £4,118 less than in 2013.
7	Other Carparks - LED	Completed November 2017	
8	Charnwood Museum - LED	Completed October 2017	As reported in 2018, the track display lighting was upgrading to LED at a cost of £21,372 as opposed to £18,000 for like-for-like, making a difference of £3,372. Energy costs for the Museum went from £10,934 in 2013 to £9,666 in 2018, a saving of £1,268.
9	Charnwood Museum - Heating System	Complete January 2016	As reported in 2017, the older heating systems were replaced with high efficiency condensing systems and new insulation on pipes, valves and flanges. Energy consumption in 2018 is 9% higher than the 2013 baseline, with an increase of £95 in gas costs.
10	Charnwood Museum - Pipe Insulation	Complete January 2016	
14	Woodgate Chambers - Boiler	Complete January 2016	As reporting in 2017, the existing system was upgraded to a condensing gas boiler system, but energy consumption had not dropped. This trend has continued in 2018, with the carbon footprint associated with gas use increasing by 8% and associated costs increasing by £4,523 compared with the 2013 baseline.
15	Woodgate Chambers - Heating Controls	Complete January 2016	
16	Oak Business Centre - LED	Complete March 2017	Upgrading the lights to LED was accomplished. However, electricity consumption has increased by £2,555 against the 2013 baseline

17 - 21	Sheltered Accommodation - LED	Status as January 2018	Lighting upgrades were completed at Arnold Smith House, Beresford Court, Dudley Court, Grays Court, Offranville Close, St Pauls Court and St Michaels Court. Electricity consumption at these locations has reduced by 65% from 2012-13 to 2018-19.
22	Fleet Transport EV	Completed in 2018	Three vehicles with data collected for 2018-19 had a combined mileage of 6,616 miles creating 783 tCO ₂ e, with a combined annual energy running cost of £265. This is a saving of 3,30 tCO ₂ e and £469 in fuel costs compared to making the same journeys in a comparable petrol or diesel vehicle.
23	Fleet Transport - low emission diesel		Fleet has seen a 45% reduction in tCO ₂ e compared to the 2012-13 baseline and 5% compared to 2017-18.
24	Business Travel		Business travel has seen a 26% reduction in tCO ₂ e compared to the 2012-13 baseline and 2% compared to 2017-18.
25	Green Impact Programme	Ongoing	The last staff survey reported in the 2018-18 monitoring report showed that over 80% of the participants have found the programme either or excellent or good, and have felt good about themselves for engaging in the programme.

Appendix 1: Methodology and Assumptions

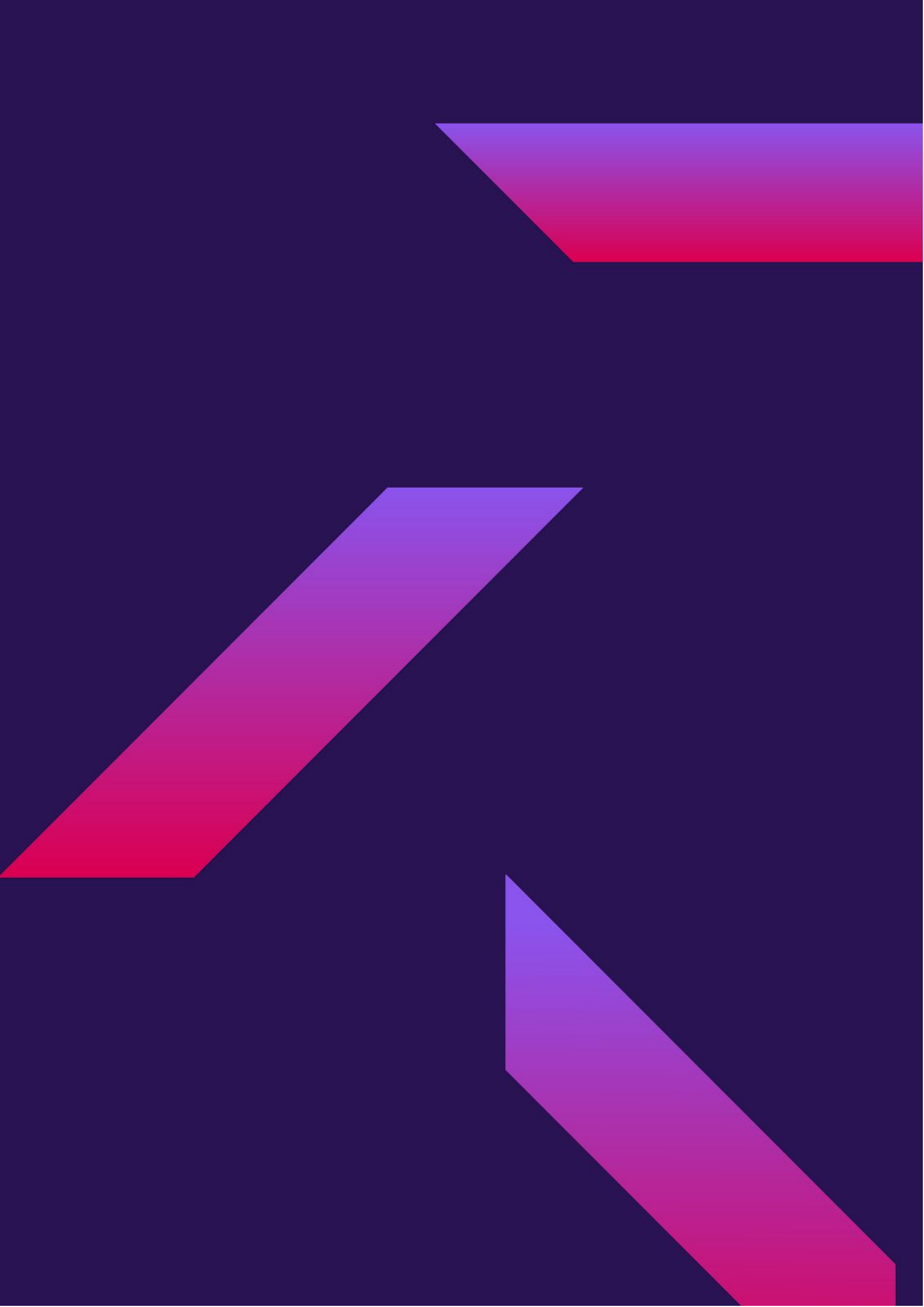
Carbon emissions are calculated based on the requirements of the Corporate Standard of the GHG Protocol developed by World Resources Institute (WRI) and World Business Council for Sustainable Development (WBCSD). The Protocol gives guidance on measuring the impact of the greenhouse gases (GHG) that are emitted in consequence of the operation of an organisation, with the aim of helping the organisation understand, manage and reduce its impact on climate change. GHG are defined by the UNFCCC-Kyoto Protocol. These GHGs are currently: carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulphur hexafluoride (SF₆), and nitrogen trifluoride (NF₃). The amount of impact of these are all combined in a single figure, which is measured in carbon dioxide equivalent (CO₂e). In this document the terms “emissions” and “carbon” should be considered to mean all greenhouse gas emissions.

As part of the calculation,

1. All carbon emissions data is calculated based on figures recorded at Charnwood Borough Council from primary sources, such as meter reading. Where primary data is unavailable or datasets are incomplete, the report highlights these areas and the mitigation required.
2. Electricity: Carbon emissions for electricity are calculated on Scope 2 only, using UK grid average as produced by the Department for Environment, Food and Rural Affairs (DEFRA) and updated annually. No allowance is made for regional variation in fuel mix or the impact of the change in carbon intensity over a period of less than twelve months in line with DEFRA reporting guidelines. The impact of distributed renewables is assumed to be zero. Similarly, following the 2013 methodology, no allowance is made for the impact of “green” electricity tariffs or the retirement of Renewable Energy Guarantees Origin (REGO).
3. Gas: To be consistent with the previous monitoring reports gas heating is assumed to be all by natural gas. Emissions are calculated based on gross calorific value and are only for Scope 1 as defined by the GHG Protocol. For consistency with previous reports, communal gas supply is counted as zero. Conversion to carbon is based on annually updated figures for natural gas issued by DEFRA.
4. Transport: Carbon emissions for vehicle fuels, including petrol and diesel, are calculated using an annual average of fuel from DEFRA based on data from Ricardo AEA and others. The impact of biofuels is included based on a

national average. Driving style is assumed to be national average and car type assumed to conform to UK modes. Mileage for fleet vehicles are unknown, as is fuel use for owner driven vehicles and so appropriate conversion factors are used in compliance with the GHG Protocol. No additional allowance for vehicle emissions due to external conditions is made. Emissions from electric vehicles are excluded from Scope 1 in line with the GHG Protocol.

5. Waste: Data for waste disposal is taken from supplier reports. Due to a change in waste contract, waste data for 2018-2019 is incomplete and so annual consumption was modelled from trends and usage figures for the period April to October 2018. Recycling rates are assumed to be average for the UK and contamination within normal parameters. Conversion factors conform to DEFRA guidelines.
6. Water: Carbon emissions from water use is calculated using figures for water procured from suppliers and is categorised as Scope 3 as defined in the GHG Protocol. Following DEFRA guidelines, a 2018 water supply conversion factor is used to account for the carbon impact of water delivered through the mains supply network.





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