



Carbon Footprint Report: 2018-19

30 January 2020

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Executive Summary

GCU reports its greenhouse gas emissions (GHG) annually to demonstrate progress towards its environmental commitments and meet a number of statutory obligations. This report uses the 2018-19 academic year as a focus for understanding how its environmental programmes have impacted on its GHG inventory relative to the 2014-15 baseline.

GCU reports its emissions in 14 categories and in 2018-19 its GHG emissions were 26,754 tonnes CO₂e (31.5% lower than in 2014-15). Six categories account for nearly 93% of reported emissions (Table 1), with 18.59% being direct emissions (scope 1), 5.89% indirect emission from purchased electricity (scope 2) and 75.52% other indirect emissions (scope 3).

Category (% significance – 2018-19)	Scope	2018-19 (tonnes CO ₂ e)	2017-18 (Tonnes CO ₂ e) (% change)	Trend (2014-15)
End of Term Student Travel (23%)	3	6,118	6,849 (-10%)	↓
Procurement (22%)	3	5,808	6,127 (-5%)	↓
Student Commuting (19%)	3	4,968	8,549 (-42%)	↓
Natural Gas (18%)	1	4,942	4,483 (+10%)	=
Electricity (5.89%)	2	1,576	1,881 (-16%)	↓
Business Travel (5.80%)	3	1,551	1,567 (-1%)	↓

Table 1 Emission and trend for the six most significant emission categories (>5% threshold) at GCU.

In 2018-19, the full emission inventory was 31.5% lower than the 2014-15 baseline (Figure 1), with reductions primarily in scope 3 and to a lesser extent in scope 2 emissions.

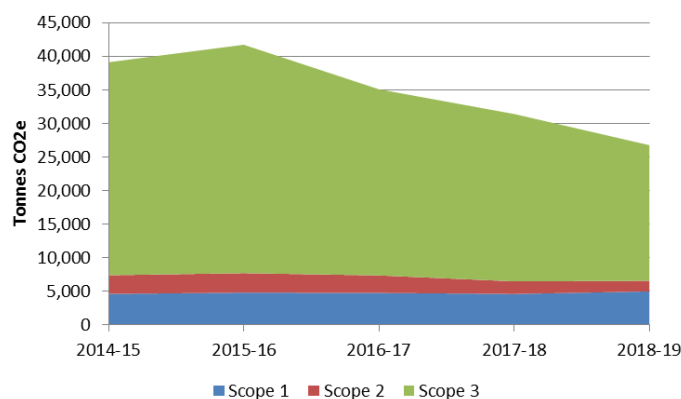


Figure 1 Total emissions by scope by academic year.

Introduction

GCU reports its greenhouse gas emissions (GHG) annually to demonstrate progress towards its environmental commitments and meet its statutory reporting obligations¹. This report uses the 2018-19 academic year as a focus for understanding the evolution of the University's emissions relative to the 2014-15 baseline and the impact of its environmental programmes.

Data & Methodology

The reporting boundaries (operational control) and methodology for the 2018-19 GHG emissions inventory are the same as those used in previous reporting periods. With some minor exceptions the datasets and sources are also broadly the same (Table 2).

Emission Category	Scope	Emission Activity	Data quality observations
Organisation's buildings	1	Gas consumption	High quality. Derived from gas meter readings.
	1	Refrigerant Gases	High quality. Derived from contractors measurements of systems' fluorinated gas charge.
Organisation's vehicles	1	Business travel (own fleet)	High quality. Derived from fuel card reports.
Purchased electricity	2	Electricity (Nat. Grid) Total	High quality. Derived from electricity meter readings.
Purchased Goods & Services	3	Water	High quality. Derived from water meter readings.
Purchased Goods & Services	3	Procurement (exc. construction) - HESCET	Low quality. Derived from procurement category spend using outdated emission factors.
Purchased Goods & Services	3	Construction - HESCET	Low quality. Derived from procurement category spend using outdated emission factors.
Other fuel & energy rel. activities	3	Electricity (transmission & distribution losses)	High quality. Derived from electricity meter readings.
Waste Generated in Operations	3	General Waste & recycling	Medium-high. Data for Glasgow derived from contractors' weighing systems. Other locations based on historic estimates.
	3	Wastewater	High quality. Derived from meter readings. Assumed that 95% of purchased water becomes wastewater.
Business travel	3	Travel (business – not owned)	High quality, but incomplete as data is not available for all business trips.
Employee commuting	3	Travel (commuting – staff)	Medium quality data derived from staff records and triennial travel surveys.
	3	Travel (commuting – students)	Medium quality. Derived from student records and triennial travel surveys.
	3	Travel (int. students flights to Glasgow)	Low quality. Derived from student records, historic surveys and assumptions on travel frequency.

Table 2 Observations on data quality for the University's emissions inventory.

¹ Climate Change (Scotland) Act 2009 (asp.12), Climate Change (Duties of Public Bodies: Reporting Requirements) (Scotland) Order SSI 2015/347 and HESA EMR returns (amongst others).

The main difference from previous reporting exercises is that the 2018-19 inventory includes flights booked directly by staff (and recorded in the University's expenses claim system – i-expenses) after this was identified as potentially being a material source of emissions. As the amount of flights booked independently was significant (20% of all distance flown) it was decided that a review of the data for all reporting periods (since 2014-15) would be carried out and the inventory updated. As a result, emissions for all reporting periods since 2014-15 have been reposted.

The review of flight data from i-expenses provided an opportunity to standardise all air travel data sets (i.e. those provided by the University's travel agents) and update the classification of historic datasets to reflect the flight categories used since 2016-17². More detail about the review of GCU's flight data is provided in Appendix A.

Data from i-expenses also revealed that additional records for rail, bus and taxi journeys are available, but currently not in an useable format.

The other noteworthy difference is that emissions from student and staff commuting for 2018-19 are derived from the 2018 Travel Survey rather than the 2015 Travel Survey.

Historic emission reports, underlying datasets and supporting reports are available from the reporting and data pages in the [sustainability section](#) of University's website. Emission factors used to calculate GCU's carbon emission are sourced from the [Department for Business, Energy & Industrial Strategy](#).

Finally, it is noted that the data and calculations in this report were subject to a reciprocal peer review organised by the Environmental Association of Universities and Colleges (Scotland) with the University of St. Andrews.

Inventory & Emissions

A summary of GCU's emission inventory for the reporting periods since 2014-15 are provided in Figure 2 and summarised in Table 3. A breakdown by emission category is provided in Table 4 and is followed by a summary of key changes.

² Details of the classification used are included in Appendix A.

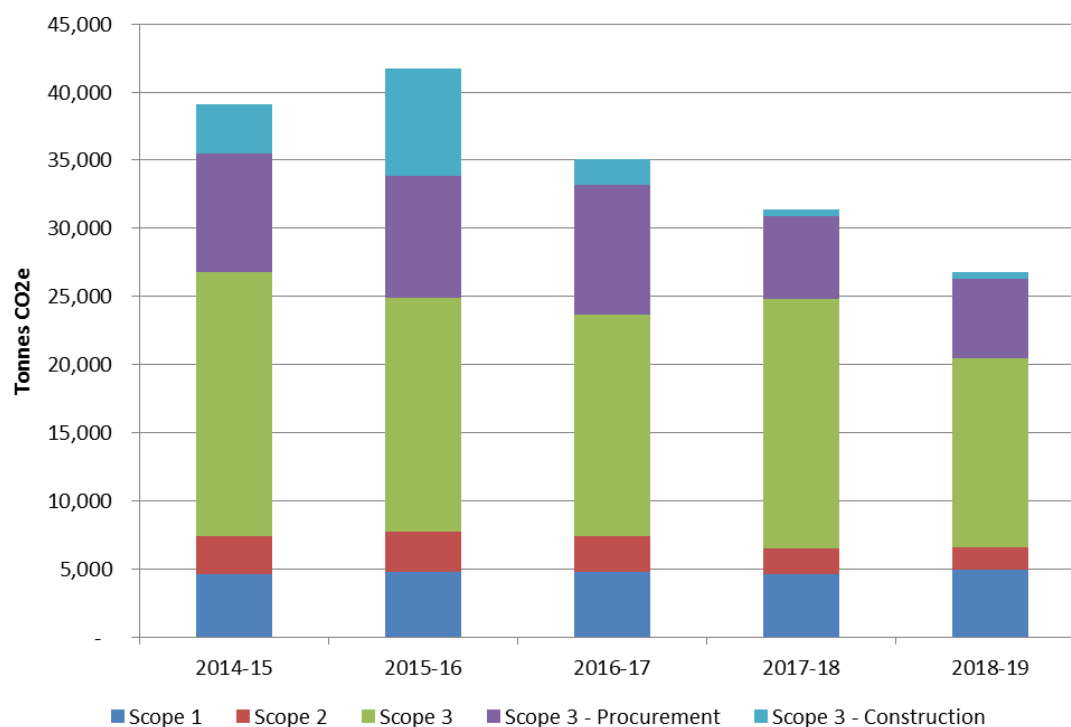


Figure 2 Emissions (tonnes CO₂e) by scope.

Scope	Description	Tonnes CO ₂ e				
		2014-15	2015-16	2016-17	2017-18	2018-19
1	Direct combustion of fuels and other fugitive emissions.	4,598	4,794	4,745	4,589	4,974
2	Electricity from the National Grid	2,784	2,902	2,613	1,881	1,576
3	Other up- and downstream activities outwith GCU's operational control	31,723	34,011	27,712	24,929	20,204
Total		39,105	41,707	35,070	31,399	26,754

Table 3 Emissions (tonnes CO₂e) by scope.

Emission Group	Scope	Emission Category	Tonnes CO ₂ e					Emission Category Observations	Comparison (baseline 2014-15)	Comparison (year-on-year)
			2014-15	2015-16	2016-17	2017-18	2018-19			
Organisation's buildings	1	Gas consumption	4,527	4,561	4,575	4,483	4,942	Gas (from the National Grid) used on-campus (Energy Centre and boilers) and Caledonian Court.	Generally level, with an unexpected spike for 2018-19	11% increase on campus and 8% lower in C. Court. No significant change in EF.
	1	Refrigerant Gases	61	225	162	100	25	Periodic losses from leaks in refrigeration systems.	Peaked in 2015-16, but generally downward trend.	Lower due to fewer system losses.
Organisation's vehicles	1	Business travel (own fleet)	10	8	8	7	8	GCU's fleet (leased).	General downward trend, mainly due to lower fleet use.	Higher in line with fuel use.
Purchased electricity	2	Electricity (Nat. Grid) Total	2,784	2,902	2,613	1,881	1,576	Electricity purchased from the National Grid.	Emissions 43% lower. Total purchased electricity 3% higher, but on a downward trend. EF 45% lower.	Total purchased electricity 6% lower. EF 10% lower. Emissions 16% lower.
Purchased Goods & Services	3	Water	17	16	15	14	14	Purchased water.	Emissions falling in line with consumption. 25% lower in (2018-19 than 2014-15. EF unchanged.	2% lower than in the previous reporting period.
Purchased Goods & Services	3	Procurement	8,760	8,956	9,482	6,127	5,808	Procurement activity excludes categories that GCU has original (primary) data for.	Falling due to lower spend.	5% lower than in the previous reporting period.
Purchased Goods & Services	3	Construction	3,588	7,850	1,901	485	506	Procurement activity for construction related services.	Falling, although skewed by spend on Heart of Campus redevelopment.	4% higher than in the previous reporting period.
Other fuel & energy rel. activities	3	Electricity (transmission & distribution losses)	230	263	244	160	136	Transmission and distribution losses associated with electricity purchased from the National Grid.	Emissions 40% lower. Linked to total purchased electricity. EF 41% lower.	Emissions 15% lower. Linked to total purchased electricity. EF 10% lower.
Waste Generated in Operations	3	General Waste & recycling	66	62	84	81	17	Waste and recycling in Campus, London and Caledonian Court.	Emission on campus levelling. London unchanged. C. Court falling.	Significant decrease at C. Court due to changes in waste treatment option provided by Glasgow City Council.
	3	Wastewater	34	32	14	27	27	Wastewater treatment for purchase water.	Emissions 20% lower and in line with freshwater consumption.	Emissions 2% lower.
Business travel	3	Travel (business – not owned)	2,434	1,054	1,640	1,567	1,551	Business travel in non-owned assets: flights, train and other vehicles.	Falling emissions (36% lower in 2018-19 than 2014-15) dominated by flights (96% of total category).	Emissions 1% lower, despite distance flown increasing 11%. Rail travel x4 higher in distance travelled in the UK and x2 internationally.
Employee commuting	3	Travel (commuting – staff)	1,271	1,150	1,107	1,069	1,061	Based on modal split in travel surveys (2012, 2015 and 2018).	Travel surveys show a marked shift towards lower carbon modes of transport. As a result emissions are 17% lower in 2018-19 than in 2014-15.	Emissions 1% lower.
	3	Travel (commuting – students)	8,784	7,826	7,532	8,549	4,968	Based on modal split in travel surveys (2012, 2015 and 2018).	As above. Emissions 43 % lower in 2018-19 than in 2014-15.	Emissions 42% lower due to a higher % of students living closer to the University and walking/cycling. Falling EF also likely to contribute.
	3	Travel (int. students flights to Glasgow)	6,538	6,802	5,693	6,849	6,118	Derived mainly (but not exclusively) from survey in 2012-13. Heavily influenced by % of students from Europe, who tend to fly shorter distances	Emissions 6% lower in 2018-19 relative to 2014-2015, when proportion of students from Europe increased from 39% to 44%.	10% fewer emissions. 17-18 40% European students vs 44% in 18-19.

Table 4 GCU's detailed emission inventory, activity overview and trends (EF stands for emission factor).

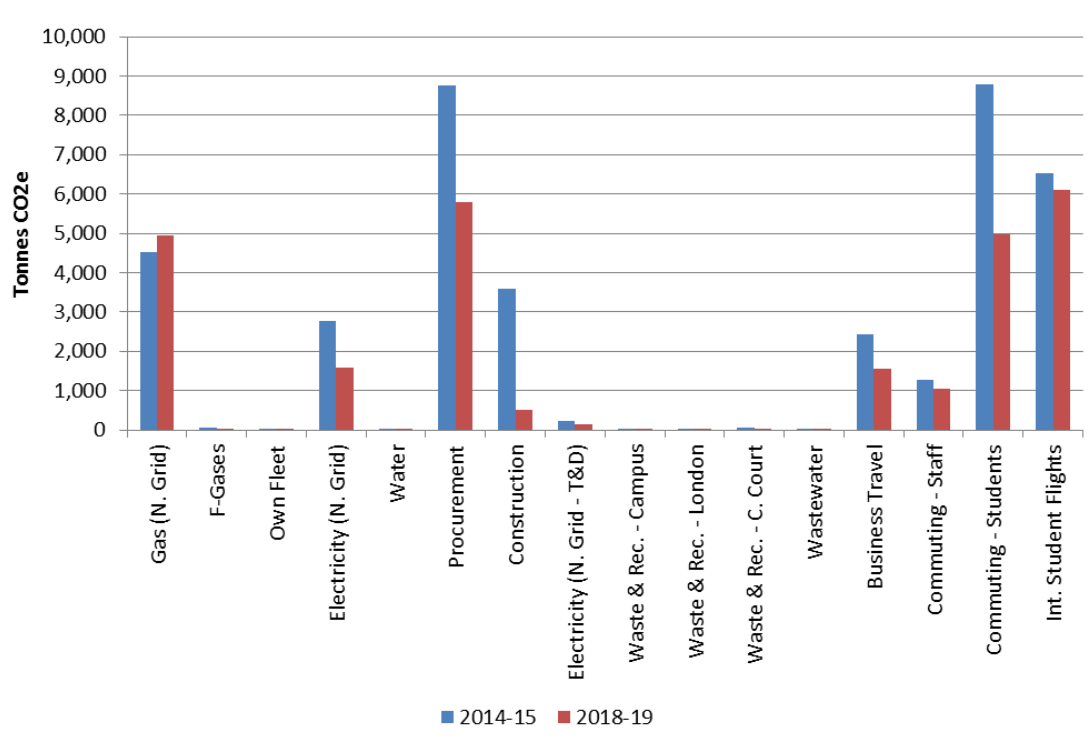


Figure 3 Comparison of emission for 2014-15 and 2018-19.

Emission Trends & Observations

This section reviews the trajectory of emissions in GCU's inventory by main emission category. GCU's emissions, reported across 14 categories (Table 4), peaked in 2015-16 at 41,707 tonnes CO₂e. The peak is attributed to the construction activity for the Heart of Campus redevelopment (Figure 2), with emissions subsequently following a downward trajectory (Figure 4). Emissions are now below pre-Heart of Campus levels and in 2018-19 they were 31.5% lower than in 2014-15 (the University's current baseline) at 26,754 tonnes CO₂e.

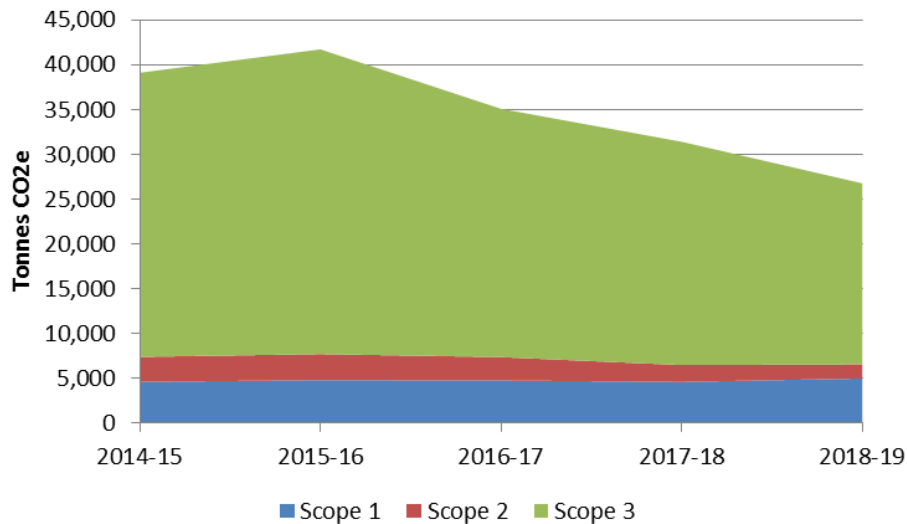


Figure 4 Evolution of emissions (tonnes CO₂e) at GCU

In 2018-19 six emission categories were deemed to be material (i.e. representing more than 5% of emissions) and accounted for 93% of reported emissions. Amongst these, 18.59% are direct emissions (scope 1), 5.89% indirect emission from purchased electricity (scope 2) and the remaining 75.52% are other indirect emissions (scope 3) (Figure 5).

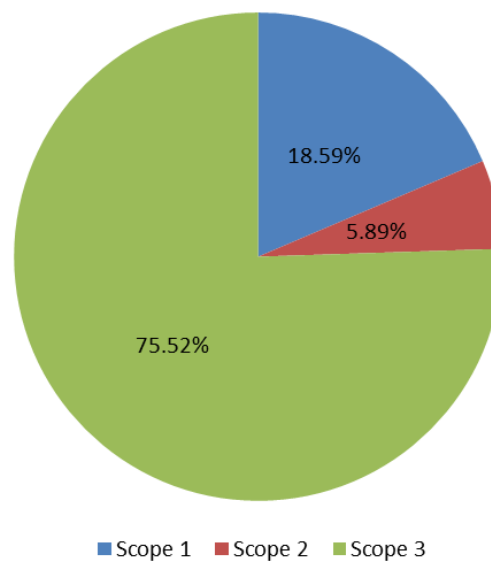


Figure 5 Proportion of significant emissions by scope.

With the exception of emissions from business travel, which become more significance as overall emissions drop, the materiality of these categories has not changed since the baseline year of 2014-15 (Table 5). A synopsis of these categories, associated emission trends and potential for reduction is provided below.

	2014-15	2015-16	2016-17	2017-18	2018-19
Gas (N. Grid)	12%	11%	13%	14%	18%
F-gases	0%	1%	0%	0%	0%
Own Fleet	0%	0%	0%	0%	0%
Electricity (N. Grid)	7%	7%	7%	6%	6%
Water	0%	0%	0%	0%	0%
Procurement	22%	21%	27%	20%	22%
Construction	9%	19%	5%	2%	2%
Electricity (N. Grid - T&D)	1%	1%	1%	1%	1%
Waste & Rec. - Campus	0%	0%	0%	0%	0%
Waste & Rec. - London	0%	0%	0%	0%	0%
Waste & Rec. - C. Court	0%	0%	0%	0%	0%
Wastewater	0%	0%	0%	0%	0%
Business Travel	6%	3%	5%	5%	6%
Commuting - Staff	3%	3%	3%	3%	4%
Commuting - Students	22%	19%	21%	27%	19%
Int. Student Flights	17%	16%	16%	22%	23%

Table 5 Proportion (%) of emission by emission category.

End of Term Student Travel

End-of-term travel for non-UK domiciled students accounted for 23% of total reported emissions (2018-19) and since 2014-15 they have dropped by 6% to 6,118 tonnes CO₂e (2018-19 - Figure 7). As non-UK domiciled student numbers in these two reporting periods are comparable (2,101 and 2,121), it is likely that the drop in emissions is driven by a higher proportion of students from Europe (who generally will fly shorter distances), which increased from 33% in 2014-15 to 44% in 2018-19, and marginal decreases in emission factors.

For comprehensiveness, emissions from end-of-term travel for UK domiciled students should be included in future emission inventories. However, it remains unclear to what extent the University can influence emissions in this category.



Figure 6 Emissions from non-UK domiciled students' end-of-term travel (tonnes CO₂e).

Procurement Activity

In 2018-19 5,808 tonnes CO₂e were attributed to procurement activity at GCU (22% of reported emissions). Procurement is the third most significant source of emissions and closely linked to procurement spend. Although emissions peaked in 2016-17 (Figure 8), there has been a 34% decline since 2014-15 which is expected to continue. However, it is noted that the emission factors used in this category have not been updated since the dataset first became available (2013-14) and that it is unlikely that the emission represent a true reflection of GCU's supply chain (because they do not incorporate the impact of any carbon reductions)³.

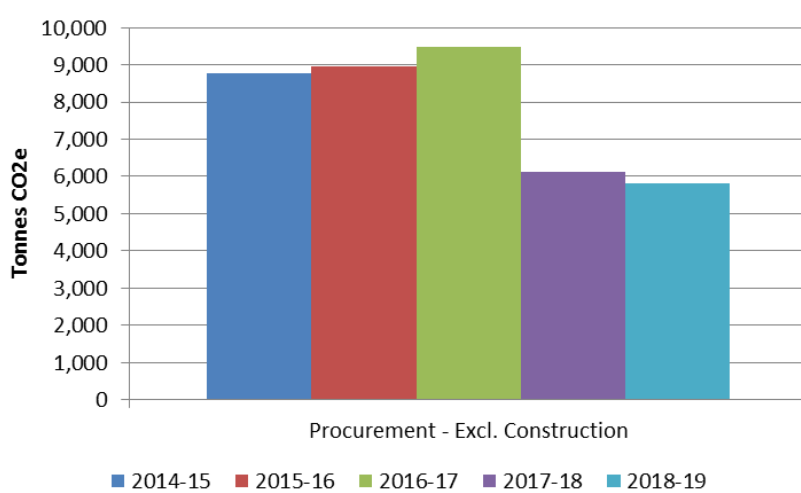


Figure 7 Emissions (tonnes CO₂e) from procurement (excl. construction).

With the exception of standard budgetary controls⁴, there currently is limited scope for the University to influence emissions in this category.

Student Commuting

In 2018-19 student commuting was the third largest single source of emissions in GCU's inventory (4,968 tonnes CO₂e and 19% of total reported emissions). The trend is downward and is driven by more students living closer to the University and choosing more active, lower carbon modes of transport to commute⁵. The downward trajectory is particularly noticeable between 2018-19 and 2017-18, when emissions from student commuting fell to 4,968 tonnes CO₂e (by over 40% - Figure 6).

³ The University is involved in a sector-wide initiative to update the emission factors used in the Higher Education Supply-Chain Emission Tool to calculate emissions for procurement activity.

⁴ Budgetary control is important for this emission activity because emissions are calculated using an expenditure-based intensity factor.

⁵ [Travel Survey Report \(2018\)](#).

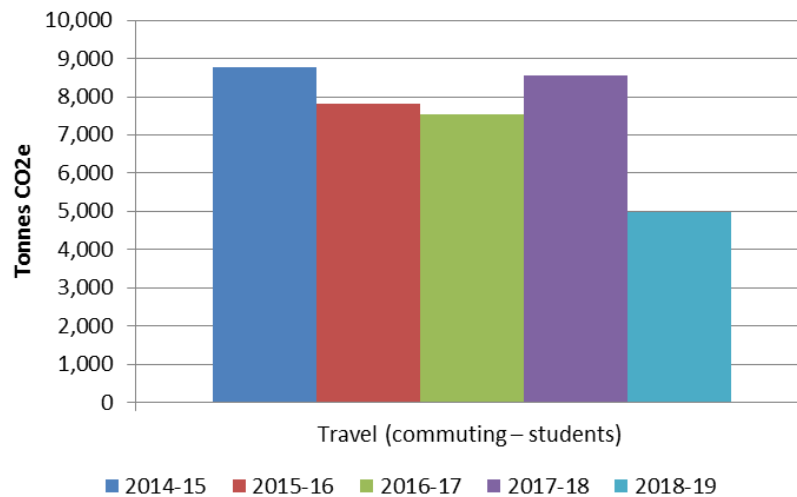


Figure 8 Emissions from student commuting (tonnes CO₂e).

The University's Sustainable Travel Plan outlines a number of measures designed to reduce emissions from student commuting.

Natural Gas

Natural gas was the fourth most significant (18%) source of emissions in GCU's 2018-19 emissions inventory. Emission from natural gas have remained level and in-line with consumption, although a 10% year-on-year increase in 2018-19 to 4,942 tonnes CO₂e is noted (Figure 9). The cause of this increase is unknown and under investigation.

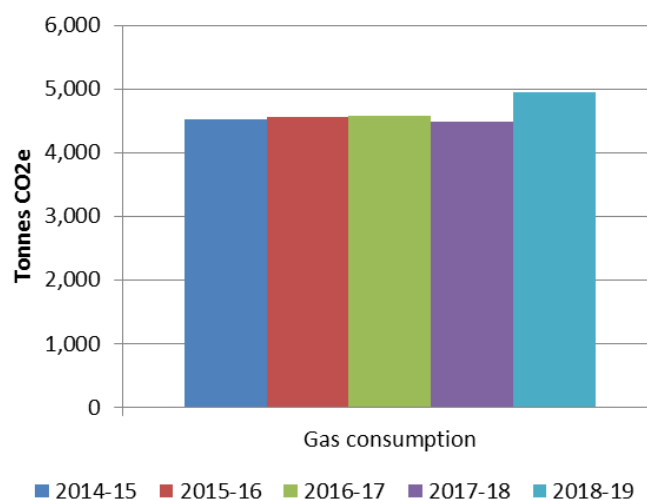


Figure 9 Emissions from natural gas (tonnes CO₂e).

The University's Carbon Management Plan identifies a number of opportunities for reducing emissions in this category.

Electricity

Electricity from the National Grid was the fifth most significant (5.89%) source of in GCU's 2018-19 emissions inventory. In 2018-19 1,576 tonnes CO₂e were attributed to electricity from the National Grid, a 16% reduction compared to the previous year 2017-18 and 43% lower than in 2014-15 (Figure 10).

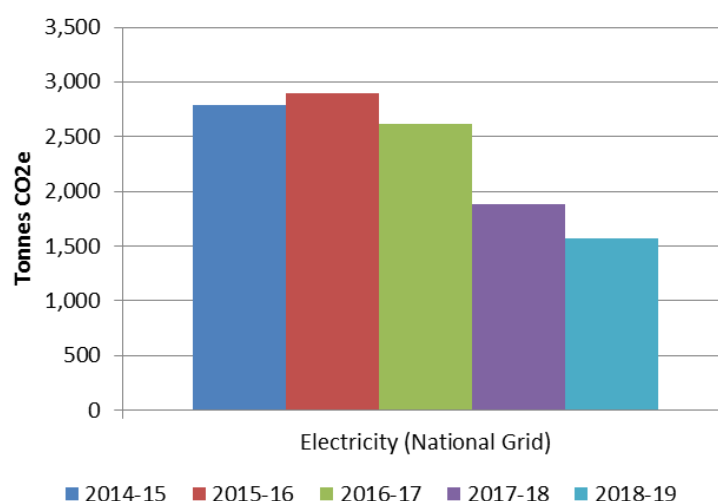


Figure 10 Emissions from electricity purchased from the National Grid (tonnes CO₂e).

The main factor behind this reduction is the decarbonisation of the National Grid, with the emission factor for 2018-19 being 45% lower than that for 2014-15. The fall in carbon intensity of the National Grid overcompensates for increases in electricity purchased by the University. Notwithstanding this, there was a noticeable decline in the amount of electricity purchased since it peaked in 2016-17 (Table 5).

	2014-15	2015-16	2016-17	2017-18	2018-19
Campus (kWh)	5,037,613	6,081,532	6,353,250	5,660,387	5,355,393
C. Court (kWh)	986,110	962,140	1,078,081	982,948	858,470
Emission Factor (kg CO ₂ e.kWh)	0.4622	0.41205	0.35156	0.28307	0.25358

Table 6 Electricity consumption from the National Grid and emission factors

The University's Carbon Management Plan identifies a number of opportunities for reducing emissions in this category.

Business Travel

Emissions from business travel accounted for almost 5.8% of total reported emissions. Similar to the other categories, emissions from business travel are declining, with a 36% reduction since 2014-15, with 1,551 tonnes CO₂e reported emitted in 2018-19 compared to 2,434 tonnes CO₂e in 2014-15 (Figure 11). Emissions in this category are dominated by air travel, which represent 96% of total (category) emissions (Figure 12 and Figure 13).

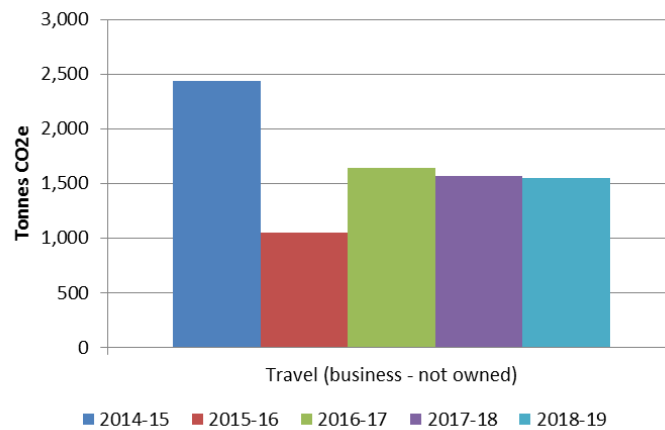


Figure 11 Emissions from business travel (tonnes CO₂e).

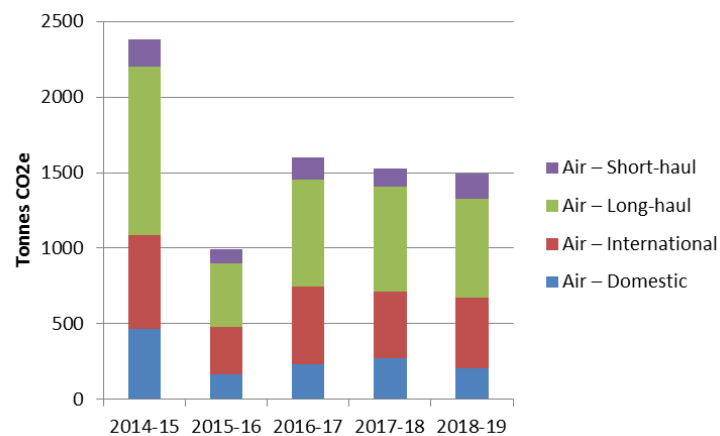


Figure 12 Emission (tonnes CO₂e) from business travel by flight category.

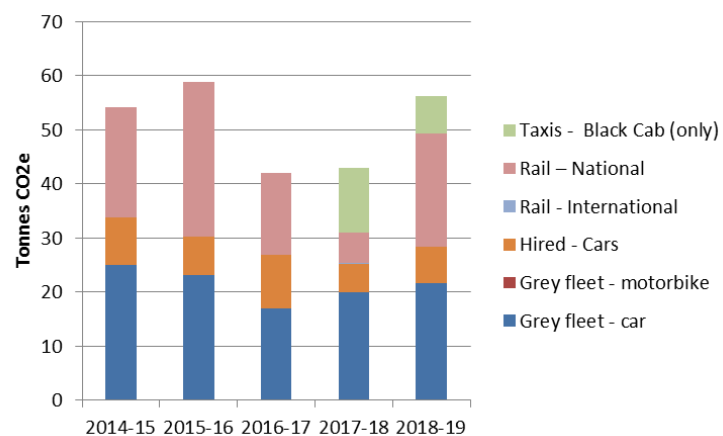


Figure 13 Emission (tonnes CO₂e) from business travel (non-flights)

The University's Sustainable Travel Plan outlines a number of measures designed to reduce emissions from business travel and there is also scope for improvements in data quality, particularly

around business travel booked directly by staff and claimed through the University's claims management system.

Other Emission

The remaining categories account for 7% of total reported emissions in 2018-19 and on their own are not considered to be material sources of emissions because they are below the 5% materiality threshold. The remaining emission categories, listed in Table 6, also demonstrate the general downward trend.

Emission Category	Emission Reduction Plan
Travel (commuting – staff)	Sustainable Travel Plan
Electricity (transmission & distribution losses)	Estates' Carbon Management Plan
Refrigerant Gases	Asset maintenance plan
General Waste & Recycling	Waste Minimisation & Recycling Plan
Waste water	N/A
Water	N/A
Business travel (own fleet)	Sustainable Travel Plan

Table 7 Emission reduction plans for emission activities that were not material in 2016-2017 reporting period.

Closing Remarks

The 2018-19 emissions report is the most comprehensive and accurate so far, as it incorporates a number of data quality improvements identified in previous reporting exercises.

This report confirms that GHG emissions associated with GCU's operations are on a downward trajectory, with emissions in 2018-19 31.5% lower than the 2014-15 baseline.

The downward trend is a result of combination of improvements and positive behaviour change at GCU and in its supply chain, all of which needs to be sustained (and in some cases augmented) for the University is to achieve its commitment to become carbon neutral.

Appendix A - Business Flight Data Review

This Appendix details the methodology developed by GCU to standardise the calculation of emissions from business flights.

A review of data used to calculate emission from air travel was carried out during the 2018-19 reporting period because existing data processing arrangements are quite onerous and a new source of data was identified. The University's travel agents provide air travel data in a variety of formats and considerable time is required to process it into the required format. As part of this review, it also became apparent that a significant number of flights were being booked directly by staff and not included in any of data provided by GCU's travel agents (Table 7).

Booking Agent	2014-15	2015-16	2016-17	2017-18	2018-19
T Agent 1	91	52	100	66	0
T Agent 2	0	0	209	2624	2759
T Agent 3	5660	4923	2923	187	71
Direct (staff) – i-expenses	470	151	809	926	1021
Total	6221	5126	4041	3803	3851
Direct (staff) - % Total	8%	3%	20%	24%	27%

Table 8 Flight (segments) bookings by source.

Data Processing

Emissions from flights are calculated by applying an emission factor to the distance flown, with journeys split into segments (pairs of origin and destination airports) and each segment attributed to one of the classes⁶ listed below, each with its own emission factor:

- Domestic - flights that start and end within the UK (inc. Northern Ireland).
- Short-haul - flights to/from Europe that start/end in a UK airport.
- Long-haul - flights to/from the rest of the world that start/end in a UK airport.
- International – flight that do not include UK airports.

Business flight data is available from the University's travel agents and expenses claim management system (i-expenses) in different formats with origin and destination airports being the only common element. Some data sources also include the number of passengers on each journey and distance flown. Often, flight data is listed by booking, rather than actual journey flown. As a result, significant cleaning is required to convert the data a standard, useable format that does not have duplicate entries.

To standardise and streamline the data cleaning process and facilitate the adoption of a common processing approach to all datasets, a Microsoft Excel tool was built that:

⁶ The classification in to domestic, short-haul, long-haul and international flights is that recommended by the [UK Government GHG Conversion Factors for Company Reporting](#).

1. Converts airport names (including variations) into their respective [IATA airport code](#) (although some travel agents can provide the data as 'flight segment reports' which breakdown bookings by segment).
2. Uses a matrix of historic flights (segments) to determine the distance between origin and destination airports (using the IATA airport codes).
3. Uses a second matrix of historic flights (segments) to classify individual segments.
4. Calculates total distance flown by segment classification.

Although we believe that most aspects of cleaning the data could be automated through simple coding, in its present form the tool's datasets need to be updated manually.

Business Flight Distance & Emissions

Historic datasets of flight from the University's travel agents and expenses claims systems booked since the 2014-15 academic year were re-analysed and revealed, with one exception, minor increases in distance flown (Figure 14 and Figure 15).

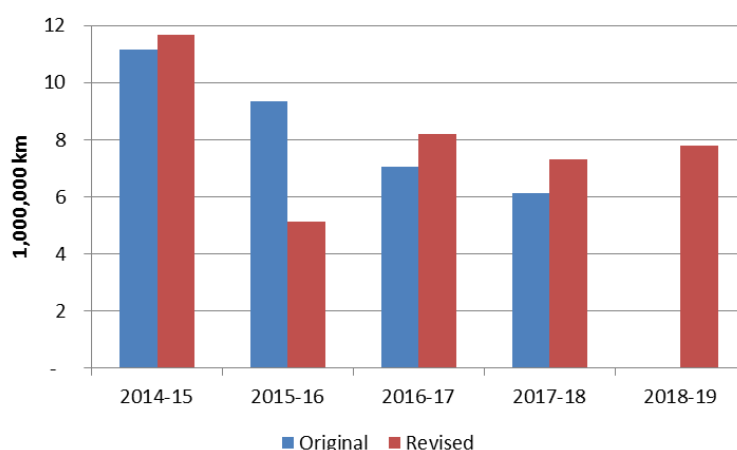


Figure 14 Distance (km) flown based on the original and revised calculation methods.

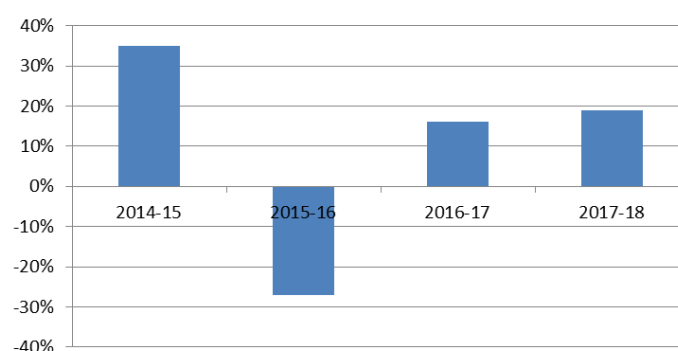


Figure 15 Percentage (%) difference in distance flown (km) between the two calculation methods.

Overall, the new methodology returned similar distances as the previous approach, with the increase in distance flown attributed to flights recorded in i-expenses. The exception is a reduction in

distance flown in 2015-16 which seems to be a result of fewer domestic and short-haul flights, but the original data is not sufficiently detailed reach an unequivocal conclusion for the difference. Notwithstanding this, the new method provides a more robust and consistent approach for calculating distance flown on business.

Impact on Reported Emissions

Although the new dataset and revised methodology resulted in a significant increase in emissions from business flights within the category (Figure 16), overall the increase was not significant as it was offset by the general downward trend in other categories.

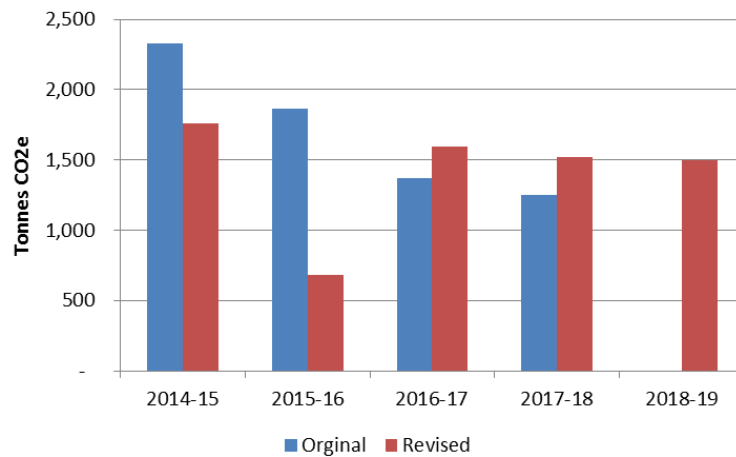
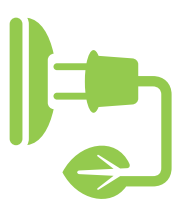


Figure 16 Carbon emissions (tonnes CO₂e) from business flights based on the two methodologies.



University for the Common Good

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