



2022 Carbon Commuter Survey Summary of Results

Amended September 2022

Prepared For: The University of Manchester

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Document Record

Project Name	P1715_20220811_Commuter Carbon Survey Report			
Remarks:	DRAFT	FINAL		
Date:	11/08/2022	19/09/2022		
Prepared by:	RB	RB		
Checked by:		GS		
Authorised by:		RB		

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1. INTRODUCTION

- 1.1 The University of Manchester has estimated the carbon dioxide equivalent generated by the University's staff and students in the process of their travel day-to-day travel to and from campus and also travel at the start and end of term for students. These type of emissions are known as scope 3 commuter emissions.
- 1.2 In May 2022, staff and students were asked questions on their mode of travel, distance travelled, frequency of travel, vehicle specification and vehicle occupancy. This information was converted into kilograms of carbon dioxide equivalent (kg CO₂e) based on HEFCE's *Measuring Scope 3 Emissions – Transport* and BEIS 2021 *Guidelines to GHG Conversion Factors for Company Reporting*.
- 1.3 Staff and students were encouraged to complete the online survey and representatives encouraged students to scan the QR code link to the survey on their smartphones, enabling them to complete the survey at their own leisure. Response rates (**Figure 1.1**) were lower than hoped for, and whilst a higher response rate would have been useful, as illustrated in **Figure 1.2** the sample sizes still provide a statistically reliable sample.

Figure 1.1 – Response Rates

Sector	Total Number of Full Completions	Total Staff / Students	Response Rate
Staff	544	12,021	4.5%
Student	447	46,646	0.8%

Figure 2.3 – Statistical Reliability

Sector	Total Staff / Students	Required Response Rate*	Responses in excess of sample size required.
Staff	12,021	373	171
Student	46,646	382	65

*This response rate is to achieve a confidence level of a minimum of 95% with a margin of error of 5%.

- 1.4 This report considers the findings of the 2022 Carbon Commuter Survey and assess the impact of the COVID pandemic on travel behaviour and the associated carbon footprint.



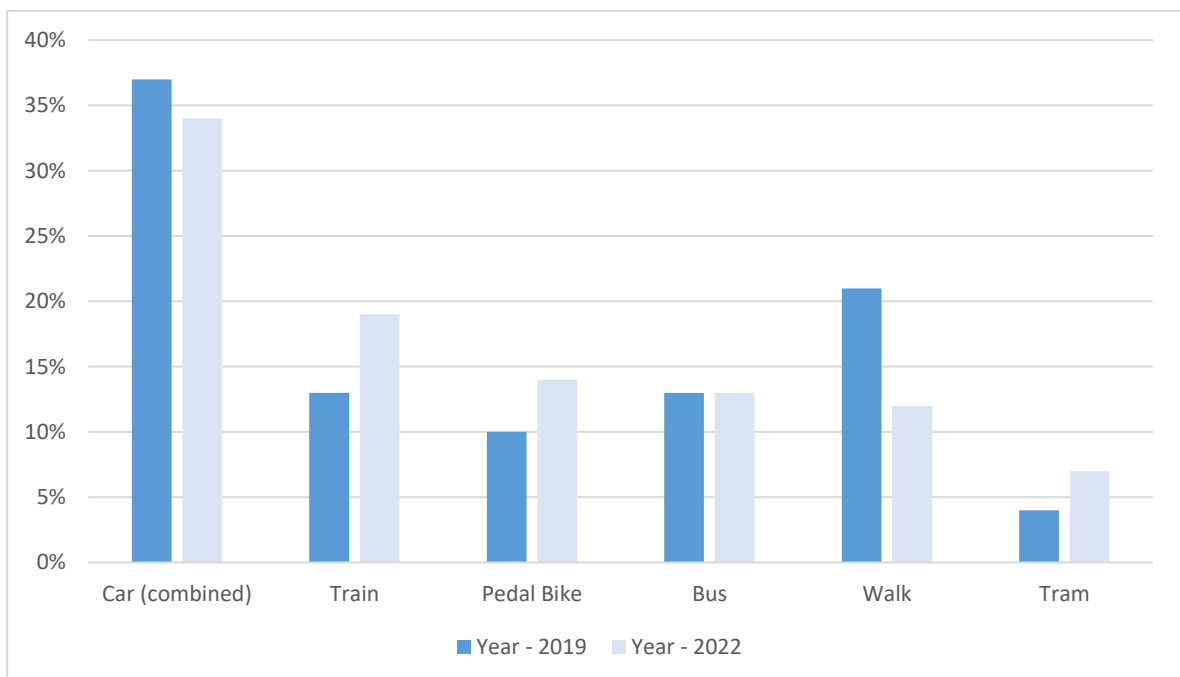
2. SURVEY FINDINGS – STAFF

2.1 Main Mode of Travel

Figure 2.1 – Main Mode of Travel – Comparison with 2019 Data

Mode of Travel	2019	2022
Car (combined)	37%	34%
Train	15%	19%
Pedal Bike	13%	14%
Bus	19%	13%
Walk	12%	12%
Tram	3%	7%
Other	1%	1%

Figure 2.2 – Main Mode of Travel – Comparison with 2019 Data



2.2 Distance Travelled to Campus

Figure 2.3 – Average Length of Commute by Mode of Travel

Mode	Average Distance (KM)
Train	33.8
Car Alone	19.3



Car Share (as driver)	19.3
Tram	19.3
Car Share (as passenger)	17.7
Bus	9.7
Pedal bike	9.7
Walk	4.8

2.3 As would be typically expected, average journey length by train is significantly further than other modes at 33.8km (one way). These distances have been used in the carbon assessment to factor up to the full staff headcount. To ensure these results are accurate and reflective, an additional piece of analysis was undertaken which assessed the average distance from the travel survey data to the average distance of all staff postcodes. As outlined in Figure 2.4 this illustrates the comparable nature of both approaches and therein the accuracy of the assessment.

Figure 2.4 – Comparison of Distance Assessment

Sample	Postcodes Analysed	Average Per Person (one way)
Staff Responses	788	15.7 km
All Staff Data	9954	15.3 km

2.4 **Frequency of Travel**

2.5 Since the COVID pandemic the frequency with which staff commute to campus has changed significantly and this has far reaching implications in relation to the carbon footprint associated with day-to-day commuting.

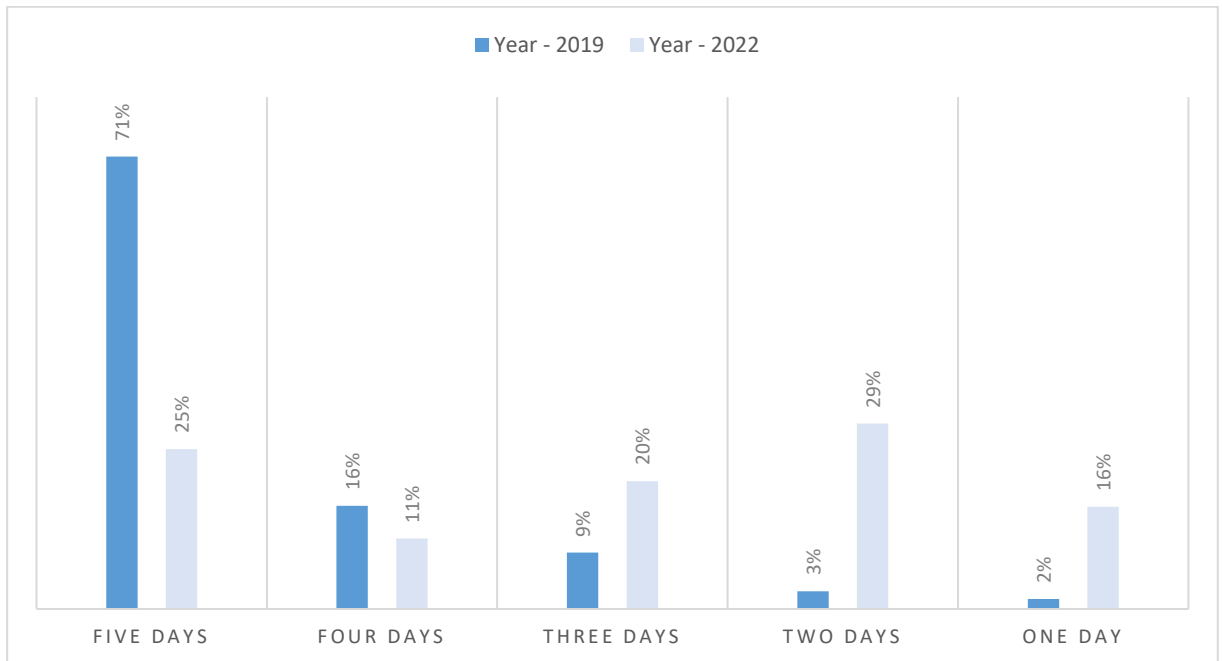
2.6 When compared to data from the 2019 travel survey, the frequency with which staff commute to campus (on a regular basis) has changed significantly. This is no doubt reflective of the ongoing hybrid working pilot. This is illustrated in **Figures 2.5** and **2.6**.

Figure 2.5 – Frequency of Commute to Campus – Historic Comparison

Frequency of Regular Commute	2019	2022
5 days a week	71%	25%
4 days a week	16%	11%
3 days a week	9%	20%
2 days a week	3%	29%
1 day a week	2%	16%



Figure 2.6 – Frequency of Commute to Campus – Historic Comparison





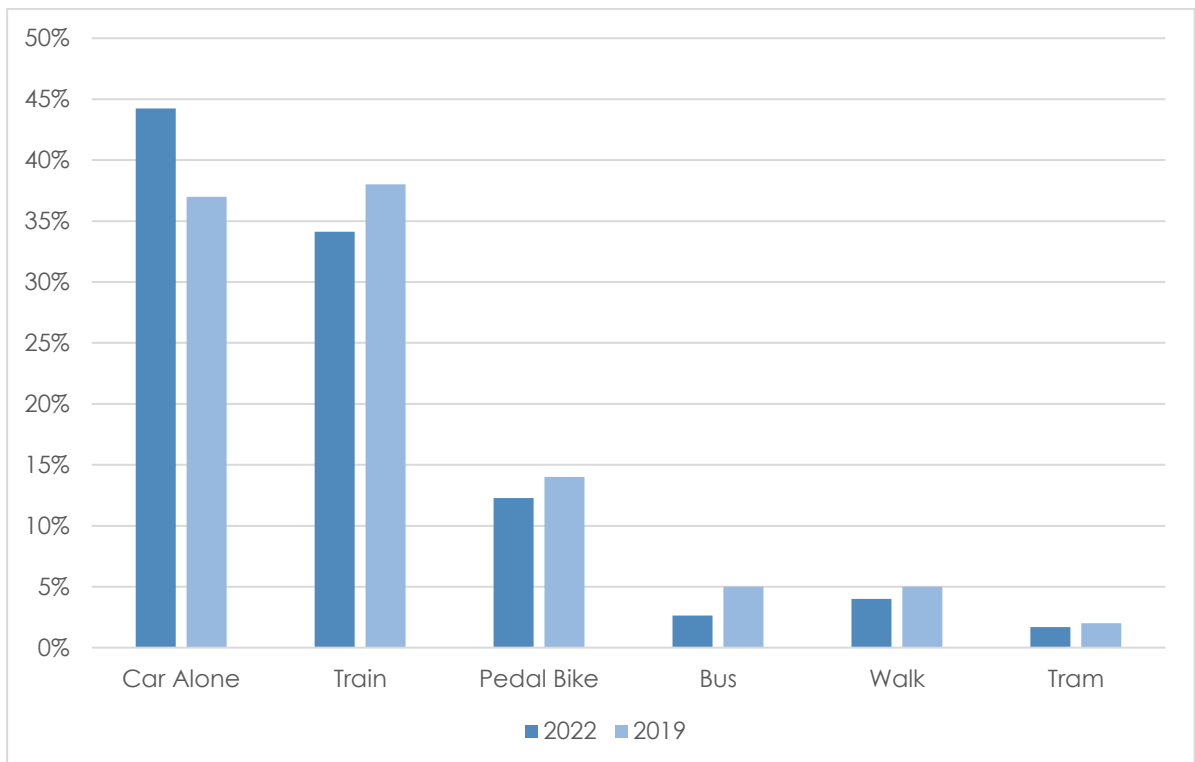
3. SURVEY FINDINGS – STUDENT (DAILY COMMUTING)

3.1 Main Mode of Travel

Figure 3.1 – Student Main Mode – Comparison with 2019 Results

Mode of Travel	2019	2022
Bus	40%	44%
Walk	32%	35%
Pedal Bike	16%	12%
Train	4%	3%
Car (combined)	6%	5%
Tram	1%	2%
Other	1%	0%

Figure 3.2 - Student Main Mode – Comparison with 2019 Results





3.2 Distance Travelled to Campus

Figure 3.3 – Average Distance to Campus by Mode of Travel

Mode	Average Distance – KM
Train	27.4
Car Alone	19.3
Tram	12.9
Car Share (as passenger)	8.0
Bus	4.8
Car Share (as driver)	4.8
Pedal bike	4.8
Walk	1.9
e-bike	1.6
Taxi	1.6

3.3 The distance-based assessment has been cross checked against the student population postcodes to ensure accuracy and these distances have been used to calculate the carbon assessment in Section 6.

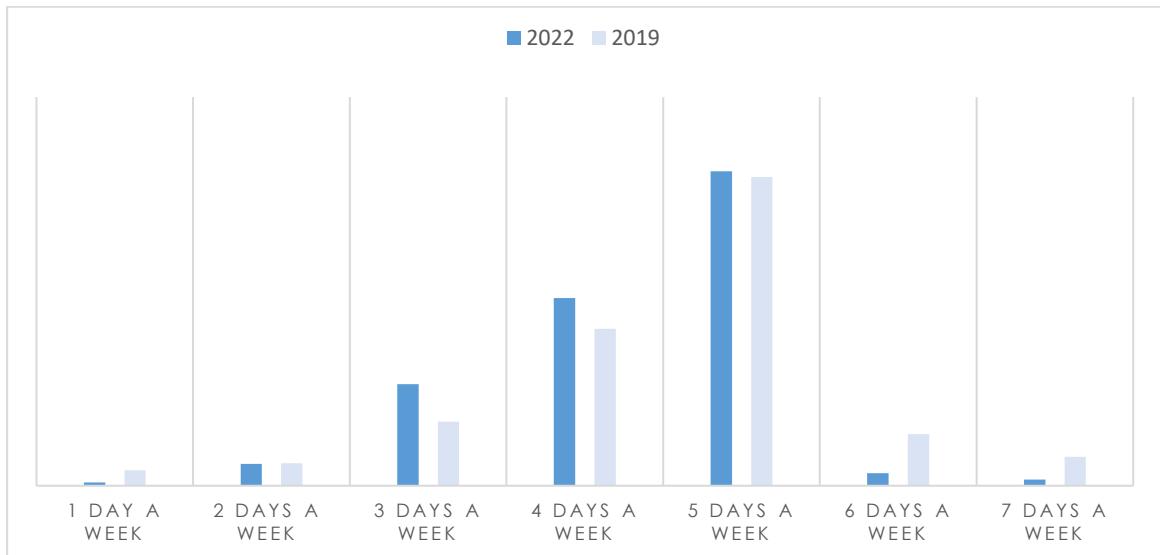
3.4 Frequency of Commute to Campus

Figure 3.4 – Frequency of Commute to Campus – Comparison with 2019 Data

Frequency of Regular Commute	2019	2022
1 day a week	2%	0%
2 days a week	3%	3%
3 days a week	10%	16%
4 days a week	24%	29%
5 days a week	48%	49%
6 days a week	8%	2%
7 days a week	4%	1%



Figure 3.5 – Frequency of Commute to Campus – Comparison with 2019 Data



3.5 Unlike the staff results there is less evidence that the COVID pandemic has influenced the frequency of trips to campus. Furthermore, given the high frequency of commuting trips to campus with more than 50% of students travelling at least 5 days a week there is likely to be a significant carbon footprint associated with this travel, even taking into account the high level of travel by sustainable modes of transport.



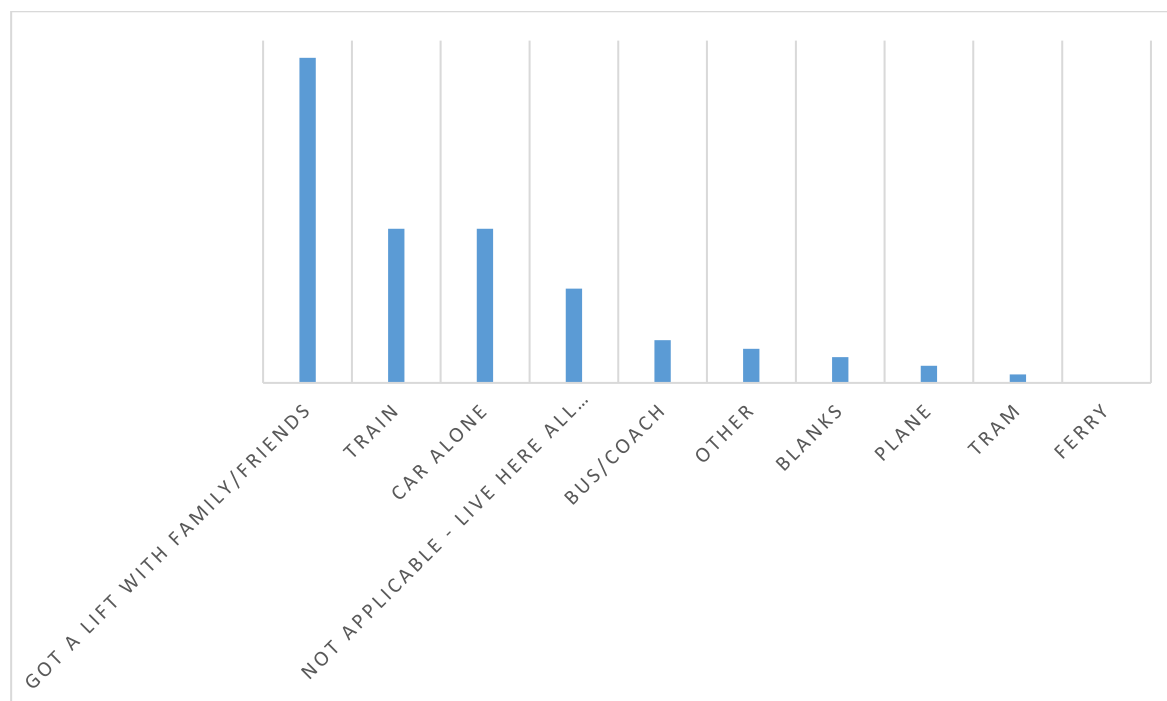
4. STUDENT TRAVEL – FROM PERMANENT/FAMILY LOCATION

4.1 Mode of Travel – Start and End of Term – Domestic Students

Figure 4.1 – Domestic Students – Start and End of Academic Year

Mode of Travel	Percentage
Got a lift with family/friends	38%
Train	18%
Car Alone	18%
Not applicable - live here all year	11%
Bus/Coach	5%
Other	4%
Blanks	3%
Plane	2%
Tram	1%
Ferry	0%
Total	100%

Figure 4.2 – Domestic Students – Start and End of Academic Year



4.2 Mode of Travel – Start and End of Term – International Students



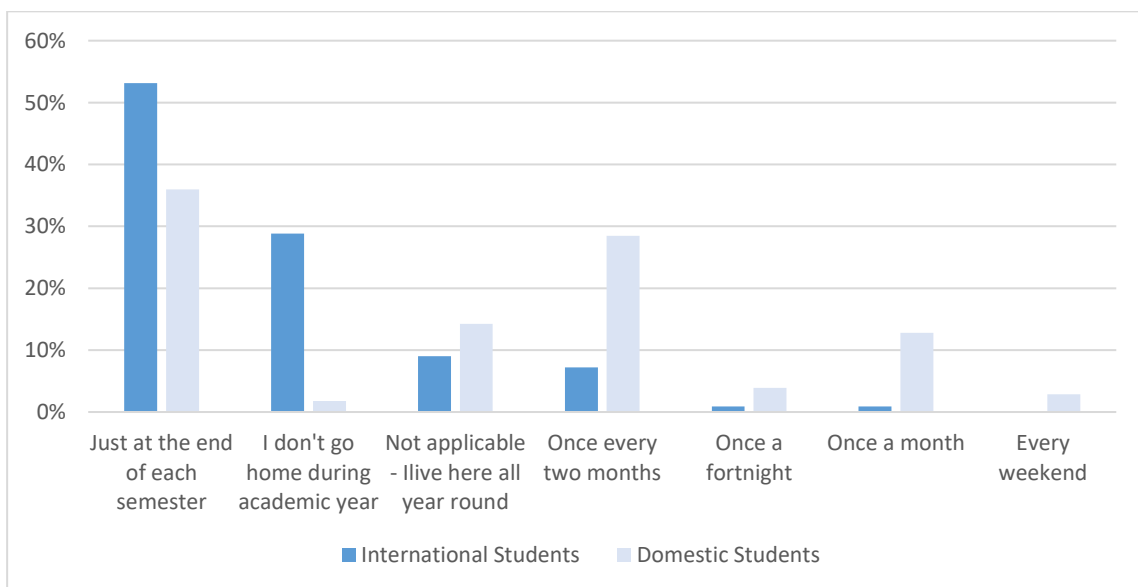
4.3 With a significant international student community (totally approximately 19,000 students) the environmental impact of travel at the beginning and end of the academic year is significant. As illustrated from the travel survey findings in **Figures 4.3** the majority of international students travel by plane. It should be noted that for the purposes of the carbon assessment in Section 6 an assessment of all international student locations (not just those who completed the travel survey) was used and this data is for information/reference only.

Figure 4.3 - International Students – Start and End of Academic Year

Mode of Travel	Percentage
Plane	94%
Ferry	3%
Bus/Coach	2%
Car Alone	1%
Blanks	1%
Got a lift with family/friends	0%
Not applicable - live here all year	0%
Other	0%
Train	0%
Tram	0%
	100%

4.4 **Frequency of Trips Home**

Figure 4.4 – Frequency of Trips Home





5. CARBON ASSESSMENT

Introduction

- 5.1 Whilst the travel survey was undertaken to gather key information on travel behaviour, the key purpose of the project is to measure the carbon impact of staff and student commuting to campus and students' trips at the beginning and end of the academic year. The outputs from this exercise can contribute towards the wider environmental policies of the University.

Methodology

- 5.2 The methodology adopted reflects that previously recommended by HEFCE and now under the responsibility of UK Research and Innovation an Office for Students, adopting the most recent Carbon conversion factors provided by Defra (2021). The data collated from the survey that feeds into the carbon assessment includes;

- o Mode split for staff and students;
- o Distance travelled for commuting;
- o Number of days travelling to the University;
- o Distance travelled at the start / end of the year for students; and
- o Frequency of travel to out of term address for students.

- 5.3 In order to assess the carbon emissions generated by staff and students commuting, a number of assumptions have been made, as follows:

- The average full time equivalent (FTE) member of staff works 215 days per annum (taking into account annual leave, bank holidays and absence);
- The average student attends University for Student weekly travel to campus during term time is comprised of 30 weeks of onsite weeks. <https://documents.manchester.ac.uk/display.aspx?DocID=35235>
- Based on an increase in working and studying at home as a result of the pandemic, respondents were asked about the frequency with which they travel to university. This information was used to factor the usual 215 and 150 days down to an estimate of the number of days staff and students are likely to travel within a year;



- Where respondents indicated an occasional alternative mode of travel this has been accounted for in the total distance by main mode and reflected accordingly;
- Response rates have been factored up to represent the full staff and student figures of 12,021 and 46,646 respectively;
- In this initial section only the regular commute to campus for students has been considered, as per HEFCE guidance the trips from parental/family home are not required, and will be considered in a separate section;
- The BEIS 2021 conversion factors have been used to calculate carbon emissions. Conversion factors are given for each mode, with average vehicle type for car and motorcycle used.



5.4 Staff Carbon Emissions from Commuting

Figure 5.1 – Background Data and Assumptions Made for Staff Emissions

Mode	Mode Share	Average Per Person Distance (annual two-way trips) KM	Factored Up Headcount	Factored Up Total Distance (per annum) KM
Car Alone	29.9%	3,833.45	3,589	13,759,324.91
Car Share	4.0%	4,406.37	480	2,113,306.66
Bus	12.7%	1,952.13	1,532	2,989,946.24
Train	18.7%	6,141.24	2,243	13,776,654.04
Tram	6.8%	3,376.40	820	2,768,526.84
Motorbike	0.5%	11,944.52	62	739,176.80
Taxi	0.4%	4,929.41	46	228,789.26
Non-Carbon Assessment Modes	27%	3191.32	820	2,616,882.4
Total	100%	-	12,021	38,992,607.15

Figure 5.2 – Carbon Emissions Generated by Staff Commuting (including allowance for occasional modes of travel)

	Total kg CO2e from main mode per annum	Total kg CO2e from occasional mode per annum	Total kg CO2e per year	Total tonne CO2e per year
Car alone	2,250,848	21,301	2,272,148	2,272
Car share	168,117	31,304	199,420	199
Bus	352,036	7,377	359,413	359
Motorcycle	83,934	6,136	90,070	90
Taxi	34,035	310	34,345	34
Train	488,933	66,269	555,202	555
Tram	77,879	21,780	99,658	100
Non-Carbon Assessment Modes	-	75,072	75,072	75
Total	3,455,781	229,548	3,685,329	3,685



5.5 The tables show that 3,685 tonnes of CO_{2e} per year are generated from staff commuting. This equates to 0.306 tonnes of CO_{2e} per head, per year. In terms of CO_{2e} per km travelled it equates to 0.009 tonnes per 100km of total travel.

5.6 **Student Day-to-Day Carbon Emissions**

Figure 5.3 – Background Data and Assumptions for Student Commuting Emissions

Mode	Mode Share	Average Per Person Distance (per annual) km	Factored Up Headcount	Factored Up Total Distance (per annum) km
Car Alone	2.4%	4,033	1,108	4,468,494
Car Share	2.1%	1,503	997	1,498,889
Bus	43.9%	1,125	20,498	23,058,392
Train	2.6%	4,564	1,219	5,562,615
Tram	1.7%	2,256	776	1,749,952
Taxi	0.2%	686	111	75,960.83
Non/Carbon Assessment Modes	47%	1,789.59	21,938	39,256,446
Total	100%	-	46,646	75,674,285

Figure 5.4 – Carbon Emissions Generated by Student Commuting (including allowance for occasional modes of travel)

	Total kg CO _{2e} from main mode per annum	Total kg CO _{2e} from occasional mode per annum	Total kg CO _{2e} per year	Total tonne CO _{2e} per year
Car alone	766,257	83,686	849,943	850
Car share	128,515	25,126	153,641	154
Bus	2,714,895	17,098	2,731,993	2,732
Taxi	11,300	-	11,300	11
Train	197,417	1,808	199,225	199
Tram	49,226	33,376	82,602	83



Non-Carbon Assessment Modes	-	82,400	82,400	82
Total	3,867,611	243,495	4,111,105	4,111

5.7 The tables show that 4,111 tonnes of CO_{2e} per year are generated from student commuting. This equates to 0.088 tonnes of CO_{2e} per head, per year. Again comparing this to total distance travelled, each 100km of travel generates a total of 0.005 tonnes of CO_{2e}.

5.8 Whilst total emissions for students is higher than staff, the amount of carbon per person generated is significantly lower.

5.9 **Daily Commuting – Summary and Comparison with Previous Assessments**

Figure 5.5 – Summary of Carbon Emissions from Commuting

Mode	Student – CO_{2e} tonnes	Staff – CO_{2e} tonnes	Total CO_{2e} (tonnes)
Car alone	850	2272	3122
Car share	154	199	353
Bus	2732	359	3091
Taxi	11	90	101
Motorcycle	-	34	34
Train	199	555	754
Tram	83	100	182
Non-Carbon Assessment	82	75	157
Total	4111	3685	7796

Figure 5.6 – Historic Comparison of Carbon Emissions from Commuting

Year	Total Carbon (CO_{2e} tonnes)	Percentage Change on Previous Year	Percentage Change in 2012
2012/13	14,650	-	-
2014/15	14,777	1%	1%
2016/17	10,637	-28%	-27%
2018/19	13,414	26%	-8%
2021/22	7,796	-42%	-47%



5.10 As shown in these tables, there has been a significant decrease in carbon emissions from regular commuting in 2021/22. This is due to the significant reduction in the frequency of staff travel to campus.

5.11 **Student Domestic Travel Home – Start/End of Academic Year**

Figure 5.7 – Carbon Emissions from Domestic Students at the Start / End of the Year

	Distance (km)	Kg CO2e per year	Factored up Total tonne CO2e per year
Car Alone	142,236	30,803	2,980
Got a Lift	279,886	60,612	5,865
Bus/Coach	19,960	665	64
Train	162,905	7,235	700
Tram	9	0.32	0.03
Total	604,995	99,314	9,609

Figure 5.8 – Carbon Emissions from International Students at the Start / End of the Year

	Number of Students	Total Distance (KM)	Total tonne CO2e per year
Short Haul	2,959	291,250	5,786
Long Haul	16,015	490,347,830	80,446
Total	18,974	490,639,080	86,232

5.12 It should be noted that 100% of the data for international home trips was provided and so no extrapolation is done for this aspect. It has been estimated that international students will take 2 return trips a year (4 flights in total), a one way trip at the start of the year, a return flight at Christmas and a one-way flight at the end of the year.



5.13 **Total Carbon Emissions**

Table 5.9 – Summary of Total Carbon Emissions from Day-to-Day Commuting and Travel at Start / End of the Academic Year

Emissions Type		Total Distance (KM)	CO ₂ e per Year - Tonnes
Start / End of Year	International Students	490,639,080	86,232
	Domestic Students	58,538,393	9,609
Staff Commuting		38,992,607	3,685
Student Commuting		75,674,285	4,111
Total		663,844,365	103,637



6. CONCLUSIONS

- 6.1 As outlined in this report, the carbon generated as a consequence of travel relating to the University is extensive, totalling some 103,637 tonnes CO_{2e} for the academic year 2021/2022.
- 6.2 The COVID pandemic, and the reduced day to day travel by staff, has had a significant impact on carbon, with 42% reduction compared to 2018/19. Whether this reduction will be sustained in the long term is as yet unknown as the hybrid working pilot is currently underway.
- 6.3 It is interesting to note that travel behaviour has not changed significantly as a consequence of the COVID pandemic, with a modest decrease in the proportion of trips by car alone by staff and an increase in bus trips by students.
- 6.4 As illustrated in the report, the biggest generator of carbon in travel and transport terms is international students. With a substantial international student community the carbon generated from flights at the beginning and end of term make up over 83% of all CO_{2e} associated with travel.