Methodology of how HE total emissions were calculated

Scope 1, 2 and 3

Scope 1 and 2

- Scope 1 and 2 combined carbon emissions for all reporting universities were recorded from HESA [1].
- 158 out of 161 universities reported their scope 1 and 2 combined emissions.
- A coefficient factor was created by summing the total scope 1 and 2 emissions of the 158 reporting universities and dividing by total spend (£) of the 158 universities [2].
- The coefficient factor for scope 1 and 2 emissions [Coeff_S1,2] = 3.82×10^{-5} tonnes CO_2e / £ spent.
- The 3 remaining universities had their scope 1 and 2 emissions modelled by multiplying their total spend by Coeff_S1,2.
- The total scope 1 and 2 emissions for 161 universities was calculated by summing all the reported and modelled scope 1 and 2 emissions.

Scope 3: Staff and Student Commuting

- Staff and student commuting carbon emissions for all reporting universities were recorded from HESA.
- 58 universities reported staff commuting emissions [1].
- 51 universities reported student emissions [1].
- Coefficient factors were created by summing the total commuting emissions of the 58 and 51 reporting universities respectively and dividing by total spend (£) of the reporting universities.
- The coefficient factor for staff commuting emissions [Coeff_staffcom] = 6.17×10^{-6} tonnes CO_2e / £ spent.
- The coefficient factor for scope 1 and 2 emissions [Coeff_studcom] = 1.06×10^{-5} tonnes CO_2e / £ spent.
- The remaining universities had their staff and commuting emissions modelled by multiplying their total spend by Coeff_staffcom and Coeff_studcom respectively.
- The total staff and student commuting for 161 universities was calculated by summing all the reported and modelled commuting emissions.

Scope 3: Business Travel

- Business travel carbon emissions for all reporting universities were recorded from HESA.
- 85 universities reported business travel emissions [1].
- A coefficient factor was created by summing the total business travel emissions of the 85 reporting universities and dividing by total spend (£) of the 85 universities.
- The coefficient factor for business travel emissions [Coeff_bt] = 1.13×10^{-5} tonnes CO_2e / £ spent.
- The 76 remaining universities had their scope business travel emissions modelled by multiplying their total spend by Coeff_bt.

- The total business travel emissions for 161 universities was calculated by summing all the reported and modelled business travel emissions.

Scope 3: Other

- Scope 3 supply chain carbon emissions (all other scope 3 emissions reported) for all reporting universities were recorded from HESA.
- These scope 3 emissions include: construction, business services, IT, food & catering, manufacture of chemicals, medical supplies, paper products, water supply, waste, other manufactured products and unclassified emissions (other).
- 66 universities reported scope 3 emissions [1].
- Coefficient factors were created by summing the total emissions for each category of emissions of the 66 reporting universities and dividing by total spend (£) of the 66 universities.
- The coefficient factors for the rest of the scope 3 emissions are listed in table 1:

Table 1: Coefficient factors for remaining scope 3 emission sources

Title (tonnes CO_2e)	Coefficient (CO_2e tonnes/£)
Business services	$2.39x10^{-05}$
Paper products	$4.68x10^{-06}$
Other manufactured products	$1.29x10^{-05}$
Manufactured fuels, chemicals, and gases	$6.92x10^{-06}$
Food and catering	$8.05x10^{-06}$
Construction	$4.30x10^{-05}$
Information and communication technologies	$9.11x10^{-06}$
Waste and water	$2.32x10^{-06}$
Medical and precision instruments	$4.72x10^{-06}$
Other procurement	$1.28x10^{-05}$
Unclassified	$4.54x10^{-06}$

- The 95 remaining universities had their remaining scope 3 emissions modelled with the coefficient factors from table 1.
- The totals for each type of emission for 161 universities was calculated by summing all the reported and modelled emissions.

Student Flights

- Student enrolment information for all reporting universities was recorded from HESA [3].
    - The number of students for 161 universities split into:
    - Total UK students
    - Other EU students
    - Non-EU students

- According to HESA, for 2018/19, the majority of students from inside the EU but outside the UK are from Italy, with France and Germany being very close.
- The majority of non-EU students are from China. North America being the second highest, but approximately 25% of China [3].
- In order to estimate student flight emissions, it was assumed that ALL non-UK EU students are flying Rome to London and ALL non-EU students are flying Shanghai to London.
    - Rome to London = 1440 km (flight path distance) [4].
    - Shanghai to London = 9260 km (flight path distance) [5].
- It is assumed ALL students are flying economy class.
- It is assumed ALL students make 2 return journeys per year. One return journey per semester.
    - No published information available into the travel behaviour of international students. Further study would be recommended.
    - A flight to begin university, one trip home during the academic year, one final flight home at the end of the year seems reasonable.
    - Students may fly more, but the university should only be responsible for required flights, not leisure flights.
- DEFRA emissions factors for short haul and long-haul flights were used for the calculations [6].
    - Short haul: 0.15573 kg CO_2e per passenger per km.
    - Long haul: 0.14981 kg CO_2e per passenger per km.
- For each university, the total tonnes of CO_2e for all non-UK EU student and non-EU student flights was calculated and totalled.
- The total emissions for international student flights was then calculated by summing the totals for each university.

References

[1] HESA, “hesa.ac.uk,” May 2020. [Online]. Available: https://www.hesa.ac.uk/data-and-analysis/estates/table-3. [Accessed October 2020].

[2] HESA, “hesa.ac.uk,” May 2020. [Online]. Available: https://www.hesa.ac.uk/data-and-analysis/finances/income. [Accessed October 2020].

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[4] Air Miles Calculator, “airmilescalculator.com,” [Online]. Available: https://www.airmilescalculator.com/distance/fco-to-lgw/. [Accessed October 2020].

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[6] Department for Business, Energy & Industrial Strategy, “www.gov.uk,” 4 June 2019. [Online]. Available: https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2019. [Accessed October 2020].