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Data sources

The primary data sources used to compile the People & Planet Green League 2011 were:

1. Universities' responses to the 2011 People & Planet Green League questionnaire
2. The latest available Environmental Management Statistics(EMS) for 2009-2010.
3. EMS data from 2005.
4. Defra's guidelines for company emissions reporting (October 2011) See Annex B.

Other sources, used to supplement missing data were:

1. EMS from last year (to complete data missing this year).
2. 2006 and 2004 (to complete data missing in 2005).
3. HEFCE's report *Carbon baselines [for 2005] for individual Higher Education Institutions in England by SQW*.
4. HEIs themselves.

Source: This year's EMS

The latest EMS data, notes and definitions was downloaded on 21 April 2011 from HESA:

http://www.hesa.ac.uk/index.php/component/option.com_datatables/Itemid,121/task.show_category/catdex,4/

EMS carbon emissions data was found to be inconsistent due to varying conversion factors used by HEIs to report or calculate their carbon emissions from energy usage, making a HEI-HEI comparison quite misleading. After consultation with the pan-sector [Green League Oversight Group \(GLOG\)](#), this data was mostly recalculated using energy consumption data, Defra recommended conversion factors, and the EMS notes on which universities supplied Gross or Net Calorific Value data. We would have liked to have communicated with significantly affected HEIs directly on this but did not have the time. However, we are working with HESA to improve the reliability and quality of the EMS data for next year. Please see full details in Annex A: Mitigating inaccuracies in EMS.

Outliers were removed as erroneous:

- Courtauld Institute of Art D73 C01 and D73 C01a figures were extremely low (1.5 tonnes of waste is 46x lower than the next lowest HEI!) and considered erroneous.
- Newcastle University raised the fact that they had miscalculated their waste figures by a significant amount. This was accepted by HESA, and we used their corrected figures.

Where data was missing in the EMS submission, last year's EMS submission data was used, where possible:

- University of Dundee: Missing water D38b.C01
- Kingston University: Missing grey water D77a.C01
- University of Sheffield: Missing grey water D77a.C01
- University of Westminster: Missing grey water D77a.C01

Several HEIs were missing information for both years

- University of Abertay Dundee: Missing waste D73.C01 and D73.C01a
- Edge Hill University: Missing grey water D77a.C01
- Glyndwr University: Missing energy consumption D38a.C01, water D38b.C01, emissions D38c.C01, CHP D72c.C01, renewable electricity D72d.C01, grey water D77a.C01.
- London Business School: Missing grey water D77a.C01

Source: 2005 Baseline GHG Emissions

Emissions were calculated from consumption reported in 2005 EMS submissions, using the latest Defra conversion factors.

When data was missing from EMS but present in HEFCE's report for England's HEIs, we have used HEFCE's figures. HEFCE have informed us that in these cases the figures were obtained by themselves from the university directly.

Emissions are calculated per energy source (coal, oil, electricity...) by multiplying the consumption by a conversion factor.

These conversion factors are recalculated with greater accuracy over time. For electricity, factors for *each year* are recalculated. For a year-to-year comparison it is necessary to use the most up-to-date factors [for the year in question]. This means re-calculating the emissions from the energy data with the correct factors.

For calculating scores for criteria 12.2 (Carbon reduction since 2005) we are interested in 2005 (2005-2006) data. When data is missing in 2005 but available in 2006, 2006's data is used (but 2005's electricity conversion factor used). When data is missing in 2005 and 2006 but available in 2004, 2004's data is used (but 2005's electricity conversion factor used)

There was no information about whether 2005 figures were supplied on a Gross CV or Net CV basis; Gross was assumed.

In falling back to 2006 figures in preference to 2004's figures when 2005 submissions were missing we were following the methodology used by consultants SQW for HEFCE's baselines report.

The explanation for using 2005's electricity conversion factor with 2004/2006 data is that we assume an HEI's *consumption* remained roughly the same, not their *emissions*.

Coal: Only a few HEIs consume coal. HEFCE had not included emissions from coal (despite listing consumption figures), but we have not received any sound reason for this decision. So we have included coal in the same way as all the other energy sources.

See Annex B for conversion factors used.

Mergers:

The *University of Cumbria* 2005 baseline figure is the addition of:

- St. Martin's College
- Cumbria Institute of Arts

The *University of Wales, Trinity St. David* includes

- Trinity College Carmarthen
- University of Wales, Lampeter

Formulas for calculations

Question 2: FTE environmental staff

This is in the policy, not performance section, but is explained here for completeness' sake.

For questions 2 a-d, university survey participants entered an FTE quantity. These were checked by assessors, and the copied or corrected value put in a corresponding private assessment field.

Universities are compared against the ratio of these staff per 5000 students, with a cap on 15,000 students.

The student numbers come from the EMS data.

$$gl11_q2 = \frac{5000 \times (gl11_q2_a_pt_sole + gl11_q2_b_ft_specific + gl11_q2_c_ft_partial + gl11_q2_d_ft_sole)}{\text{MIN}(\{D4 Student FTE C4 Teaching\} + \{D4 Student FTE C7 Research\} + \{D5 FTE staff C1 Total\}, 15000)}$$

Bandings:

| | | |
|-----|-----------------------|------|
| 0 | $\leq gl11_q2 < 0.5$ | zero |
| 0.5 | $\leq gl11_q2 < 1$ | 4 |
| 1 | $\leq gl11_q2 < 2$ | 6 |
| 2 | $\leq gl11_q2$ | 8 |

Question 10: Renewable Energy

QUESTION 10.1

“% total electricity from renewable energy sources subject to LECs...”

This data is provided by the university staff directly, as part of the Management and Policy criteria survey. It is then checked by assessors, who will make notes should they feel the need to alter the data given based on the evidence provided and the scoring criteria.

Bands for up to 3 points were set at 40% and 80% and we intend to keep this constant next year. More universities are using more renewable electricity this year, so there are more universities scoring highly.

- 101 HEIs scored 0 for 0%
- 13 HEIs scored 1 for data more than 0% and up to and including 38.6%
- 9 HEIs scored 2 for data more than 38.6% and up to and including 79%
- 20 HEIs scored 3 for data over 79%.

QUESTION 10.2

“Has onsite CHP” 1 point if HEI has any.

$$gl11_q10_2_energy_chp = (bool) (\{D72c.C01: Energy generated on site by CHP\} > 0)$$

QUESTION 10.3

“% total energy generated on-site from LZC technology”

$$gl11_q10_3_energy_lzc = \{D72d.C01: Renewable on-site energy generation Total HEI (kWh)\} \div \{D38a.C01: Energy consumption Total HEI (kWh)(\#4)(\#5)\} \times 100\%$$

We used the same bandings as last year. More HEIs have scored the full 2 points (5 this year, 3 last year).

- 101 HEIs scored 0 for 0%
- 33 HEIs scored 1 for data more than 0% and up to and including 1%
- 5 HEIs scored 2 for data over 1%

Question 11: Waste & Recycling

QUESTION 11.1

“% waste an institution recycles”

$$gl11_q11_1_waste_recycled = \frac{\{D73.C01a: Waste Total HEI - Recycled (tonnes)\}}{\{D73.C01: Waste Total HEI (tonnes)\}} \times 100\%$$

Bandings were set to divide HEIs between the available points (0-4).

- 27 HEIs scored 0 for data up to and including 25%
- 25 HEIs scored 1 for data more than 25% and up to and including 34.82%
- 30 HEIs scored 2 for data more than 34.82% and up to and including 44.77%
- 30 HEIs scored 3 for data more than 44.77% and up to and including 61.41%
- 28 HEIs scored 4 for data over 61.41%

QUESTION 11.2

“Waste mass per head”

$$gl11_q11_2_waste_kgph = \frac{\{D73.C01: Waste Total HEI (tonnes)\}}{\left(\{D04.C04: Student FTE Teaching Total\} + \{D04.C07: Student FTE Research Total\} + \{D05.C01: FTE staff Total HEI\} \right)} \times 1000 \text{ kg/tonne}$$

Units are kg/FTE students & staff.

- 27 HEIs scored 0 for data at least 300
- 30 HEIs scored 1 for data less than 300 and at least 143
- 30 HEIs scored 2 for data less than 143 and at least 95
- 29 HEIs scored 3 for data less than 95 and at least 60
- 24 HEIs scored 4 for data less than 60.

Question 12 Carbon Reduction

QUESTION 12.1

“Carbon emissions per head”

$$gl11_q12_1_carbon_ph = \frac{\{D38c.C01: Energy emissions Total HEI^*\} \text{ kg GHG}}{\{D04.C04: Student FTE Teaching Total\} + \{D04.C07: Student FTE Research Total\} + \{D05.C01: FTE staff Total HEI\}}$$

*This value was recalculated for CO₂ equivalent (GHG) – see data sources section above.

Note: 6 points available this year, but only 4 last year.

Bands were set roughly to balance number of HEIs in each score, but adjusted slightly to fit bigger steps in the data values.

Units are kg GHG / FTE students & staff

- 22 HEIs scored 0 for data at least 2000
- 20 HEIs scored 1 for data less than 2000 and at least 1631.08
- 19 HEIs scored 2 for data less than 1631.08 and at least 1187.96
- 19 HEIs scored 3 for data less than 1187.96 and at least 841.42
- 21 HEIs scored 4 for data less than 841.42 and at least 712
- 21 HEIs scored 5 for data less than 712 and at least 600
- 19 HEIs scored 6 for data less than 600.

QUESTION 12.2

“...emissions reductions since 2005 compared to sector-wide reduction target from 2005 baseline.”

The EMS data is from 2009-2010, so we're comparing against 2009, i.e. year 4 since 2005. The carbon reduction that HEIs should have achieved by 2009 (based on the Universities UK, GuildHE and HEFCE sector targets) was calculated as (43% by 2020) ÷ (15 years) × (4 years) = 11.47%. (last year it was 9.6% based on 48% ÷ 15 × 3, but the 48% has since been revised to 43%)

$$gl11_q12_2_carbon_reduction = \left(1 - \frac{\{D38c.C01: Energy emissions Total HEI (Kg GHG)\}}{\{Energy emissions Total 2005\}} \right) \times 100\%$$

More universities are scoring full marks this year. This is largely due to the recalculation of 2005 baseline figures with the latest conversion factors (last year this recalculation was not done), which has the effect of increasing 2005 emissions by 12% on average, thus improving the calculated reduction.

- 88 HEIs scored 0 for increasing or not reducing emissions.
- 17 HEIs scored 1 for data more than 0 and up to and including 5% reduction
- 17 HEIs scored 2 for data more than 5% and up to and including 11.47% reduction (target)
- 7 HEIs scored 3 for data more than 11.47% and up to and including 20% reduction
- 10 HEIs scored 4 for data over 20% reduction.

Question 13 Water Reduction

QUESTION 13.1

“water consumption per head”

$$gl11_q13_1_water_ph = \frac{\{D38b.C01: Water consumption Total HEI(m^3)\}}{(\{D04.C04: Student FTE Teaching Total\} + \{D04.C07: Student FTE Research Total\} + \{D05.C01: FTE staff Total HEI\})}$$

Units are kl/FTE students & staff. (kl = 1000 litres = 1 m³)

- 28 HEIs scored 0 for data at least 19
- 25 HEIs scored 1 for data less than 19 and at least 13
- 29 HEIs scored 2 for data less than 13 and at least 7.8
- 30 HEIs scored 3 for data less than 7.8 and at least 5.2
- 29 HEIs scored 4 for data less than 5.2.

QUESTION 13.2

“% total water from grey or rain...”

$$gl11_q13_2_water_grey = \frac{\{D77a.C01: Water supply 'grey water' and rain water Total HEI (m^3)\}}{\{D38b.C01: Water consumption Total HEI(m^3)\}} \times 100\%$$

Last year there were 4 points, this year 2 (points moved to carbon emissions per head).

- 107 HEIs scored 0 for not using any grey water
- 27 HEIs scored 1 for using some grey water, up to 1%
- 5 HEIs scored 2 for data over 1%.

Annex A: Mitigating inaccuracies in EMS

This was discussed and backed by the [People & Planet Green League Oversight Group](#) (GLOG).

Definitions

GHG Greenhouse Gasses, i.e. CO₂e or CO₂ equivalent.

CV Calorific Value

HEI Higher Education Institution

GLOG Green League Oversight Group

GHG Emissions are calculated by multiplying a known value (e.g. consumption in kWh) by a conversion factor.

The conversion factors are approximations and DEFRA provided a full set that represent the current best methodologies in 2010.

Electricity has a different conversion factor for each year.

Combustible fuels (coal, oil, gas) have different factors for Net CV, Gross CV and per volume/mass.

Gross or Net CV?

The EMS notes for the latest, 2009, data list universities that submitted Gross CV instead of Net CV. It is therefore implied that Net CV was desired, and that this is what the remaining (c50%) of HEIs returned.

However, in HEFCE's commissioned "Carbon baselines for individual Higher Education Institutions in England" August 2010 report Gross CV is assumed.

If a *Net CV* consumption quantity is known, the *Net CV* conversion factor must be used to calculate the emissions correctly. Likewise, for Gross CV.

2005 data

We do not know whether the data requested or provided in c2005 was Gross or Net but we have followed HEFCE in assuming that all figures were Gross CV.

2009 data

The EMS column headers state that DEFRA recommended conversion factors have been used in calculating the emissions but this is not the case. We have discovered a wide range of conversion factors in use. Even where some HEIs have used a Gross/Net CV conversion factor from the DEFRA tables, this does not correspond with the list of HEIs that provided the data in Gross CV.

This leaves the data as received as a poor basis for comparison, either between HEIs or between the 2005-2009 datasets. As the People & Planet Green League judges HEIs on precisely these comparisons, it is important that we do all we can to fairly represent the emissions in each relevant year.

Oil – Gas / Fuel / Burning

After a lot of data interrogation and assistance from the GLOG the following came to light:

HEFCE's consultant chose the "Burning Oil" conversion factor in the 2005 baseline data, which we believe to be in error; burning oil is typically Kerosene and is mainly used for heating homes, not

larger premises.

The EMS data only has one column for Oil, but there are at least two popular different types of oil in use: Fuel Oil and Gas Oil. It would be much clearer if there were at least two columns for the separate oils' used.

HEIs used no less than 16 different conversion factors in submitting their Oil emissions data. 45 out of 62 universities used factors identifiable as Defra factors for Fuel Oil. Only two HEIs used factors identifiable for Gas Oil. Other than this we have no information about what type of oil was consumed.

The majority (42 out of 62) used CO₂-only conversion factors; we are interested in GHG.

People & Planet Methodology

1. We recalculated emissions based on consumption using the DEFRA-recommended conversion factors for Oil, Gas, Coal and Electricity.
2. We used the list of HEIs in the EMS notes as the basis for determining whether the Gross or Net conversion factor should be applied to the combustible fuels.
3. We used Fuel Oil conversion factors for oil; we used this factor for 2005 oil data also (rather than Burning Oil).
4. We did not recalculate the emissions for Steam and "Other", for which there are no clear factors; here we used the EMS data unaltered.

Justification

1. This is DEFRA's recommendation as a standard for reporting which we understand to be widely accepted and used across all nations. There are limited reasons for HEIs to use their own/different conversion factors.
2. The EMS columns suggest this is how it should have been done.
e.g. *"D38c.CO1b: Energy emissions Total HEI - Gas [Calculation based on D38a.CO1b multiplied by DEFRA conversion factor] (Kg CO₂)(#4)(#5)"*
3. This follows a transparent and clear logic.
4. Some conversion factors used are so far out that there must be an error.
e.g. one institution used a conversion factor for electricity of 0.24484 instead of 0.54522 – underestimating their emissions by more than half.
5. We are in discussions with and proposing to HESA that this is how EMS is calculated from here on.

Effect on emissions data

The largest effect is that caused by applying Net/Gross CV conversion factors. The change in applying the DEFRA standardised conversion factor generally has negligible effects except for a few extreme cases.

HEIs who use Gas Oil will have their emissions under-reported by c3.5% because we're using the Fuel Oil conversion factor, but this distortion is thought to be minor compared with the lack of standardisation in the raw EMS data.

In summary:

| | |
|----|---|
| 12 | HEIs' emissions changed by 10% or over |
| 5 | HEIs' emissions changed by 5% or over |
| 38 | HEIs' emissions changed by 1% or over |
| 86 | HEIs' emissions changed by less than 1% |

Annex B: Conversion factors used

Conversion factors used in People & Planet Green League 2011

All from Defra report updated October 2010 (Nb. Last updated says Aug-10, but all this was copy-and-pasted from the October update)

Annex 1 - Converting from fuel use to carbon dioxide equivalent emissions

Last updated: Aug-10

Table 1c

| Converting fuel types on an energy, Gross CV basis ⁹ | | Scope 1 |
|--|-------|-------------------------------|
| Total Direct GHG | | |
| Fuel Type | Units | kg CO ₂ e per unit |
| Coal (industrial) ³ | kWh | 0.32227 |
| Fuel Oil ⁶ | kWh | 0.26592 |
| Natural Gas | kWh | 0.18523 |

Table 1d

| Converting fuel types on an energy, Net CV basis ¹⁰ | | Scope 1 |
|---|-------|-------------------------------|
| Total Direct GHG | | |
| Fuel Type | Units | kg CO ₂ e per unit |
| Coal (industrial) ³ | kWh | 0.33923 |
| Fuel Oil ⁶ | kWh | 0.28289 |
| Natural Gas | kWh | 0.20558 |

Annex 3 - Converting from purchased electricity use to carbon dioxide equivalent emissions

Last updated: Aug-10

Table 3c

| Electricity emission factors from 1990 to 2008 per kWh (electricity CONSUMED): | Grid Rolling Average | Total Direct GHG |
|---|-----------------------------|------------------------------|
| UK Grid Electricity Year | Amount USED per year, kWh | kg CO ₂ e per kWh |
| 2005 | | 0.53744 |
| 2008 | | 0.54522 |