Measuring scope 3 carbon emissions – supply-chain (procurement)

Report to HEFCE on sector emissions by Arup, CenSA and De Montfort University

January 2012

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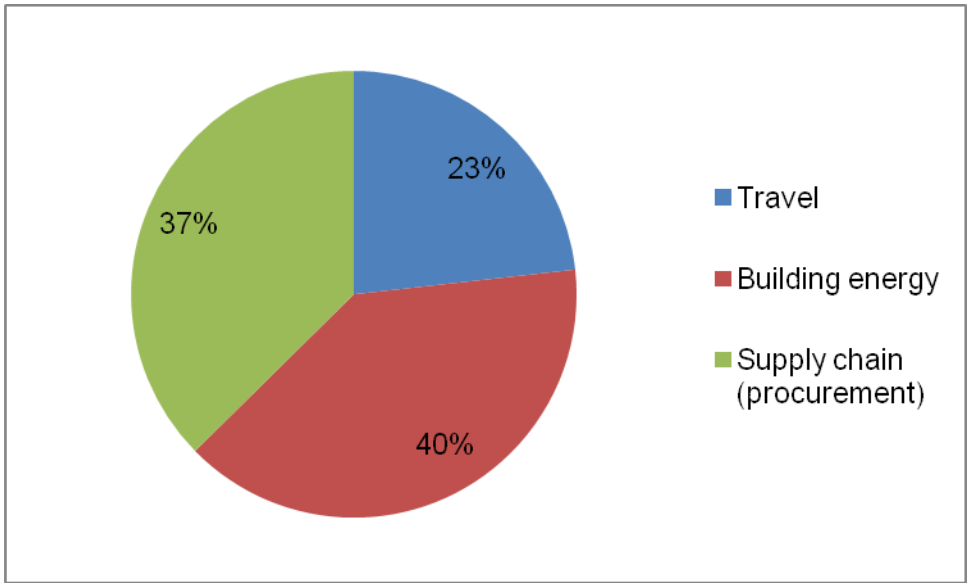
Executive Summary

1. This report presents research that estimates the supply-chain (procurement) carbon dioxide (CO_2) emissions for the higher education (HE) sector in England, for the baseline year 2005-06, using a consumption-based approach which includes the embedded emissions of the goods/services procured by the HE sector. The estimated CO_2 emissions are added to the travel and building energy emissions calculated in previous research, revealing for the first time the total carbon footprint of the HE sector in England. These emissions have been reported as scope 1, 2 and 3 emissions in accordance with the Greenhouse Gas (GHG) Protocol.

2. Although the term 'procurement emissions' is widely used as a shorthand for elements of scope 3 emissions it does not accurately describe the purchasing of goods and services which generates these emissions. DEFRA guidance on scope 3 does not use this term but instead talks about emissions from the supply chain, which is more accurate. Therefore we have used a description of 'supply chain (procurement) emissions' throughout this document and guidance in order to retain accuracy but also aid understanding.

3. The overall footprint results show the total English HE sector emissions for 2005-06 are estimated to be 5.4MtCO_2, with the largest sectors being building energy and the embodied emissions associated with supply-chain (procurement) as shown below:



4. Within supply-chain (procurement), construction is the largest sub-sector category in terms of CO_2 emissions, accounting for around a third of supply-chain (procurement) emissions. The extent of the construction related emissions appears to be a function of the large HE estate expansion programme that took place in that year. However as only a single year has been analysed it is not possible to know if this is representative of an 'average' year for the HE sector.

5. There are three key strategic implications of this analysis which are set out below.

- Firstly, as scope 3 emissions represent over 60 per cent of all HE sector emissions, this validates the effort being made to understand and measure this emissions category. This applies not only at a sector level, but also the emphasis being placed on measuring and reporting scope 3 emissions at an institution level.
- Secondly, construction is the largest carbon ‘hotspot’ in supply-chain (procurement) and therefore merits further investigation to understand how to reduce these emissions. This may increase focus in construction-related areas such as building life-cycle emissions, materials, retrofit and estate rationalisation.
- Thirdly, construction emissions may not be expected to be as large in the future. Therefore the HE sector should also study other significant supply-chain (procurement) emissions categories which are ‘open to influence’ such as information communication technologies (ICT).

1. Introduction

Project outline

1.1 Following the publication in 2010 of the Higher Education Funding Council for England (HEFCE) carbon reduction target and strategy for higher education in England[1], HEFCE commissioned Arup, the Centre for Sustainability Accounting (CenSA) and De Montfort University to undertake a baseline supply-chain (procurement) carbon footprint assessment of the higher education (HE) sector in England. This was completed using a consumption-based[2] approach, which includes the embedded carbon dioxide (CO_2) emissions of the goods/services purchased.

1.2 Although the term 'procurement emissions' is widely used as a shorthand for elements of scope 3 emissions it does not accurately describe the purchasing of goods and services which generates these emissions. DEFRA guidance on scope 3 does not use this term but instead talks about emissions from the supply chain, which is more accurate. Therefore we have used a description of 'supply chain (procurement) emissions' throughout this document and guidance in order to retain accuracy but also aid understanding.

1.3 The overall aim of the project was to measure a baseline of supply-chain (procurement) CO_2 emissions at sector level using scientifically based methods, and to support this by:

- Developing a robust and replicable methodology for completing the supply-chain (procurement) emissions baseline calculation.
- Adding the results to the existing energy and travel related emissions analysis completed by the consultancy firm SQW[3] to give an overview of the current HE sector full carbon footprint, identifying carbon hotspots where evident.
- Outlining the strategic implications of the analysis and results to HEFCE.

1.4 In parallel to this sector level study, an institution level scope 3 supply-chain (procurement) emissions reporting tool has been developed to be held and run by the four purchasing consortia in England. There is an accompanying research report which describes the research undertaken to develop this reporting tool.[4]

Report structure

1.5 This report sets out the methodology and presents the results of the English HE sector supply-chain (procurement) emissions study in the following sections:

- **Section 2: Background** – presents an overview of the policy context and relevant 'carbon' terminology.

[1] 'Carbon reduction target and strategy for higher education in England' (HEFCE 2010/01) available at www.hefce.ac.uk.
[2] Refer also to description of consumption-based approach in section 2.3 and Annex B.
[3] HEFCE: HE sector total carbon footprint (Scope 1, 2 & 3): September 2010 available at www.hefce.ac.uk.
[4] 'Measuring scope 3 carbon emissions – supply chain (procurement). Report to HEFCE on an emissions reporting framework by Arup. CenSA and De Montfort University' (2012) available at www.hefce.ac.uk.

- **Section 3: Analysis methodology and calculations** – sets out the analytical methodology and calculations, input data and key assumptions contained in the analysis.
- **Section 4: HE sector supply-chain (procurement) carbon footprint baseline (2005-06)[5] results** – presents the supply-chain (procurement) emissions CO_2 results together with the building energy and travel emissions from previous analysis to provide an overall HE sector emissions baseline.
- **Section 5: Review of HE sector results** – provides a review of the HE sector results and supply-chain (procurement) emissions, identifies carbon hotspots and offers a high level interpretation.
- **Section 6: Key results, conclusions and recommendations** – draws overall conclusions based on the results and makes recommendations.

1.6 This report also contains the following Annexes:

- **Annex A**: Environmentally Extended Input-Output (EEIO) analysis: a more detailed explanation of the analysis methodology
- **Annex B:** Supply-chain (procurement) spend data: definition of the datasets used in the study.

Acknowledgements

1.7 The analysis required to complete this evaluation of supply-chain (procurement) emissions for the HE sector would not have been possible without the support of many organisations, to whom we express our sincere thanks:

- All English HEIs that gave permission for us to obtain and use their collated expenditure data for the determination of the sector supply-chain (procurement) emissions
- The four purchasing consortia in England who passed the expenditure data to us: London Universities Purchasing Consortium (LUPC), North East Universities Purchasing Consortium (NEUPC), North West Universities Purchasing Consortium (NWUPC), Southern Universities Purchasing Consortium (SUPC)
- HEFCE
- The Measuring Scope 3 Carbon Emissions Advisory Group members who are listed in the table below:

Chair	
Tony Rich	University of Essex; Association of Heads of University Administration; HEFCE's Sustainable Development Steering Group
Members	
Sarah Grimes	Higher Education Statistics Agency
Sue Holmes	Leeds Metropolitan University; Association of University Directors of Estates (AUDE)

[5] Data relates to academic years, therefore 2005-06 refers to August 2005 to July 2006.

Jonathan Mills	University of Lancaster; Environmental Association for Universities and Colleges (EAUC)
Tony Overbury	University College London
Tim Pryce	The Carbon Trust
Paul Tomany	ENP; North West Universities Purchasing Consortium

2. Background

Policy context

2.1 The Climate Change Act[6] 2008 mandates that the UK's net greenhouse gas (GHG[7]) emissions account for the year 2050 is at least 80 per cent lower than the baseline 1990 level. The act also gives a minimum interim target of a 34 per cent cut in emissions by 2020, together with five-year carbon budgets for 2008-12, 2013-17 and 2018-2022[8].

2.2 In May 2011, based on advice from the independent Committee on Climate Change, the Government proposed that the fourth carbon budget for 2023-2027 is 1,950M metric tons of carbon dioxide equivalent ($MtCO_2e$), a 50 per cent reduction by 2025 on 1990 levels.

HE sector carbon strategy

2.3 Within the HE sector in England, HEFCE state "our vision is that 'within the next 10 years, the higher education sector in this country will be recognised as a major contributor to society's efforts to achieve sustainability – through the skills and knowledge that its graduates learn and put into practice, its research and exchange of knowledge through business, community and public policy engagement, and through its own strategies and operations'".

2.4 HE sector carbon emissions are split into three primary categories, as shown in Figure 2.1 below.

[6] Climate Change Act 2008. (c.27), London: HMSO
[7] Refer to terminology later in section 2
[8] Climate Change Committee Carbon budgets available at http://www.theccc.org.uk/carbon-budgets

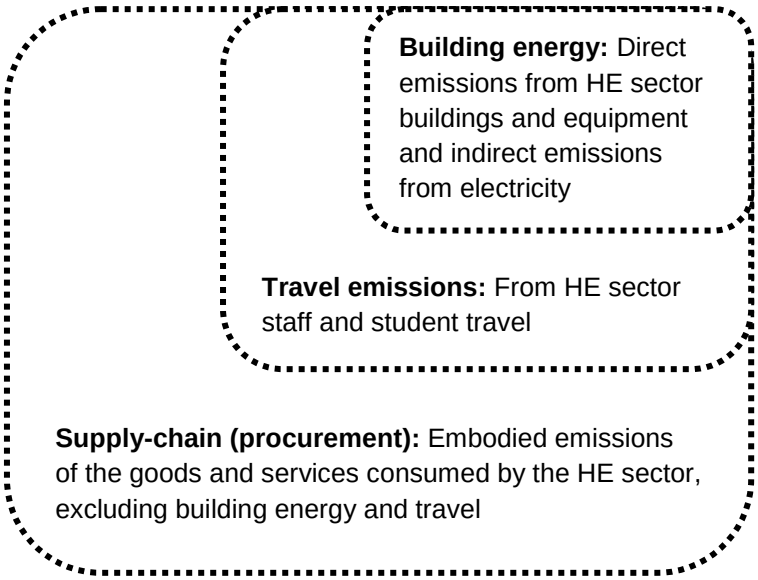


Figure 2.1: HE sector primary emissions categories

2.5 In January 2010 HEFCE published a strategy for carbon reduction in English HE[9]. The strategy comprises:

- A sector-level target for carbon reductions that is in line with UK targets
- A requirement for HE institutions (HEIs) to set their own targets and develop carbon management plans
- A commitment from HEIs to achieve actual improvements through actions that are appropriate for their institution, recognising the diversity of the sector
- Support from HEFCE, Universities UK (UUK) and GuildHE for HEIs to achieve carbon reductions
- Details of funding incentives
- Plans for annual monitoring and reporting on progress against the sector-level target
- A method of regularly evaluating the approach and taking action to learn from progress to date.

2.6 The strategy commits HEFCE to measuring a sector baseline of emissions from supply-chain (procurement) by December 2012 and setting targets for scope 3 emissions[10] reductions by December 2013.

2.7 In 2008 HEFCE commissioned research to produce an English HE sector-level carbon baseline for scope 1, 2 and 3 emissions[11]. Of the three primary categories of HE emissions, the analysis largely covered the building energy and travel sectors, but not supply-chain (procurement) emissions.

[9] 'Carbon reduction target and strategy for higher education in England' (HEFCE 2010/01) available at http://www.hefce.ac.uk/pubs/
[10] Scope 3 emissions are indirect emissions that are a consequence of the activities of the organisation, but occur from sources not owned or controlled by the organisation; for example, business travel, commuting, procurement, waste and water.
[11] HEFCE: HE sector total carbon footprint (Scope 1, 2 & 3): September 2010 available at http://www.hefce.ac.uk/pubs/rdreports/2009/rd16_09/rd16_09summ.pdf

2.8 An important point to note is that ‘supply-chain (procurement)’ emissions do not refer to the act of procurement, but rather the embodied upstream emissions associated with the manufacture and distribution of a product or service purchased.

2.9 This supply-chain (procurement) study has been commissioned by HEFCE to complete the emissions evidence base by calculating the supply-chain (procurement) emissions baseline at HE sector level. The relationship between the 2008 (SQW) and 2011 (Arup) studies is shown in Table 2.1 below.

Primary category	Sub-category	GHG Protocol emissions scope (see section below)		
		Scope 1	**Scope 2**	**Scope 3**
Building energy	Gas, coal etc	SQW	n/a	Arup[1]
	Electricity	n/a	SQW	Arup[2]
Travel	Transport fuel	SQW	n/a	Arup[3]
	Business travel	n/a	n/a	SQW[4]
	Staff commuting	n/a	n/a	SQW[5]
	Student commuting	n/a	n/a	SQW[5]
	Air student travel	n/a	n/a	SQW[5]
Procurement	Construction	n/a	n/a	Arup
	Business services	n/a	n/a	Arup
	Information and communication technologies	n/a	n/a	Arup
	Other manufactured products	n/a	n/a	Arup
	Manufactured fuels, chemicals and gasses	n/a	n/a	Arup
	Paper products	n/a	n/a	Arup
	Medical and precision instruments	n/a	n/a	Arup
	Food and catering	n/a	n/a	Arup
	Other procurement	n/a	n/a	Arup
	Waste and water	n/a	n/a	Arup/SQW[6]

Table 2.1: Relationship between 2008 (SQW) and 2011 (Arup) HE sector studies

Table notes

1 Upstream emissions associated with the extraction and supply of gas/coal to point of use. These are typically around 10-15 per cent of the scope 1 value.

2 Upstream emissions associated with the extraction and supply of fuel to power stations, and electricity transmission losses. These are typically around 10-15 per cent of the scope 2 value.

3 Upstream emissions associated with the extraction and supply of fuel for company use. The small scope 1 value derived by SQW translates to a negligible scope 3 impact.

4 Business travel emissions are estimated by both the SQW and Arup analyses, and so are later excluded from Arup's results when added to the SQW results to avoid double counting.

5 These values have been calculated by the SQW report for the overall sector emissions study, but are not currently part of the mandatory HE institution Estates Management System (EMS) reporting.

6 These emissions are estimated by both the SQW and Arup analyses, and so are later excluded from Arup's results when added to the SQW results to avoid double counting.

Scope 3 emissions

2.10 As the previous section includes reference to scope 3 emissions it is useful at this point to understand what are scope 1, 2 and 3 emissions. The "Greenhouse Gas Protocol" (also known as the GHG Protocol, see www.ghgprotocol.org) categorises GHG[12] emissions as being Scope 1, 2 or 3, as defined below and shown in Figure 2.2.

- **Scope 1 emissions**: direct GHG emissions occurring from sources owned or controlled by the organisation. Examples include vehicle fleet emissions, on-site emissions from boilers and combined heat and power (CHP) energy generation.
- **Scope 2 emissions**: GHG emissions from the off-site generation of grid electricity used by the organisation.

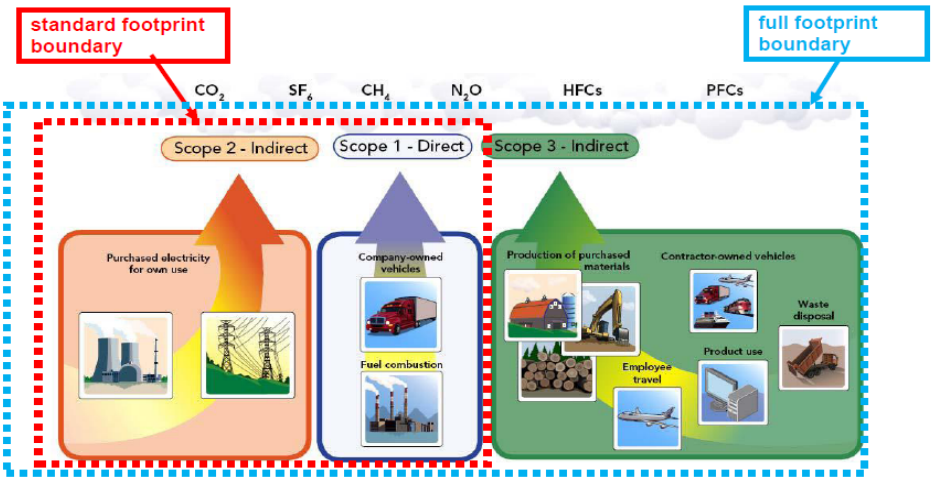


Figure 2.2: GHG Protocol classification of emissions[13]

2.11 **Scope 3 emissions**: an optional reporting category for all other indirect emissions, which are a consequence of the organisation's activities but occur from sources not owned or controlled by the organisation. Examples include 'upstream' emissions from the production and transportation of purchased goods, and 'downstream' emissions from the use and disposal of the organisation's products and services.

2.12 As the analysis later shows, the majority of emissions in the HE sector in England are scope 3 emissions.

[12] Six main GHG gases were included within the 1997 Kyoto Protocol: carbon dioxide (CO_2); nitrous oxide (N_2O); methane (CH_4); hydrofluorocarbons (HFCs); perfluorocarbons (PFCs); sulphur hexafluoride (SF_6). These gases trap heat in the earth's atmosphere, such that higher GHG levels cause higher temperatures – the so called 'greenhouse effect'.

[13] Clean Air-Cool Planet and Forum for the Future (2008) Getting to Zero: Defining Corporate Neutrality, available at http://www.forumforthefuture.org/sites/default/files/project/downloads/getting-zerouk-versionjune-2008.pdf

3. Analytical methodology and calculations

Methodology

Environmentally extended input-output (EEIO) analysis

3.1 The sector level supply-chain (procurement) emissions for HE have been calculated using an environmentally extended input-output (EEIO) model. This uses top-down carbon intensity data combined with a breakdown of bottom-up expenditure data to produce overall carbon emissions calculations. This is known as a 'consumption based' approach. A fuller description of EEIO analysis is given in Annex A.

3.2 Importantly the consumption-based footprint analysis methodology is consistent with other national studies, most notably the NHS England[14] and Department for Children, Schools and Families (DCSF) schools[15] studies. This means it incorporates and considers the full supply-chain impacts of each procured good/service.

3.3 The basic approach involves obtaining a spend profile of an organisation (in this case the HE sector total spend breakdown) and mapping this to carbon intensity data , to estimate overall supply-chain (procurement) emissions.

3.4 A key limitation of the current methodology is that 'sector-average' carbon intensity values are used. This means they do not reflect 'local' differences in consumption such as consumption of 'eco-friendly' products. Indeed an organisation may record higher emissions using this methodology if the 'eco-friendly' product has a higher price.

3.5 The alternative to the EEIO approach is a life cycle assessment (LCA), where individual products each have a separate bottom-up supply-chain emissions calculation, each with distinct calculation boundaries. This is particularly time consuming and impractical for the HE sector, which would require analysis of many thousands of products and services that have been purchased in any year. A fuller description of LCA analysis is given in Annex A.

3.6 Therefore the EEIO consumption-based emissions approach has been adopted as it is the best available at this point. It allows overall emissions to be estimated and identifies carbon 'hotpots', which can be studied in more detail using LCA or similar approaches. In due course more sophisticated hybrid EEIO-LCA models will allow 'local carbon intensities' to be used, removing the average carbon intensity current limitation.

[14] The NHS Carbon Footprint available at http://www.sdu.nhs.uk/documents/publications/1232983829_VbmQ_nhs_england_carbon_emissions_carbon_footprint_mode.pdf.
[15] Schools carbon footprint report to DFES available at http://www.sd-commission.org.uk/publications/downloads/SDC_Carbon_Footprint_report_to_DfES.pdf

Required input data

3.7 As noted above, expenditure data provides the key input for the EEIO analysis. At an HEI level, this data would be a collation of various datasets including:

- Financial management system (FMS) data
- Capital expenditure
- Expenses
- Third-party travel/hotel booking systems
- E-procurement cards

3.8 At a sector level, the main expenditure data is 'bottom-up' institution level spend data collated at purchasing consortia level. This spend is reconciled against 'top-down' spend data from the Higher Education Statistics Agency (HESA) to arrive at a final spend breakdown estimate for the HE sector.

3.9 The calculation method, in which the spend data is used as the input to the analysis, is set out below.

Calculation method

3.10 For the analysis, CenSA's TBL2 software[16] is used. This employs the EEIO methodology outlined above and is described in more detail in Annex A.

3.11 The basic steps in the supply-chain (procurement) emissions analysis are as follows:

- **Step 1:** obtain a breakdown of HE sector non-pay spend (in £ spent) for the baseline year. The bottom-up 'raw' datasets were obtained from the four regional purchasing consortia and collated into a single dataset using Proc-HE[17] as the common coding system.
- **Step 2:** reconcile the bottom-up consortia-held spend data versus top-down HESA datasets to quantify gaps/errors in data, and then amend the bottom-up dataset accordingly to produce the final spend data breakdown.
- **Step 3:** map the final spend breakdown to 123 National Accounts (NA) categories[18] of economic activity as categorised in TBL2. This translates the final spend data breakdown into the format required by the TBL2 model.
- **Step 4:** run the TBL2 model, which multiplies the 123-category spend breakdown dataset by carbon intensities ($kgCO_2$/£ spent) to calculate emissions in $kgCO_2$ for each NA category.
- **Step 5:** use the supply-chain (procurement) footprint results for the 123 categories are to identify carbon hotpots and also add them to the building energy and travel elements to determine the overall total carbon footprint for the year of analysis.

3.12 Steps 1 to 4 are described below. Step 5 is reported in Sections 4 and 5.

[16] Triple Bottom Line Accounting and Scope 3 Carbon Footprint Analysis with TBL2, available at http://www.censa.org.uk
[17] This is the common coding system for supplier spend from HEIs - refer also to Annex C
[18] For this sector level emissions study the 123 NA sector intensity values in the TBL2 model have been used, as this is the most accurate data available. For the institutional level procurement emissions tool, 75 sector intensity values are used. This is because they are publically available and therefore can be used without the need for proprietary software, a key requirement of that workstream.

Bottom-up expenditure data

Purchasing consortia

3.13 There are four regional purchasing consortia in England. They are:

- **LUPC** (London University Purchasing Consortium)
- **NEUPC** (North East University Purchasing Consortium)
- **NWUPC** (North West University Purchasing Consortium)
- **SUPC** (Southern University Purchasing Consortium)

3.14 These consortia collect annual spend data from HEIs in the form of Annual Return Data (ARD). The ARD data since 2005-06 has been collated in a database held by the consortia. The NWUPC provided the spend data for all four consortia for 5 years: 2005-06, 2006-07, 2007-08, 2008-09, 2009-10.

Step 1 - Consortia data summary

3.15 The ARD spend data is submitted in a format that is largely classified according to ProcHE coding, as shown in Annex C. The first process was to review the quantity and quality of the data, in order to select an appropriate baseline year. A summary of the data is given in Table 3.2 below.

Consortium		2005-6	2006-7	2007-8	2008-9
NWUPC	Total spend	£836,947,768	£992,076,026	£892,678,766	£1,001,485,714
	Unclassified	£57,127,400	£65,197,121	£84,145,536	£271,414,948
	% Unclassified	6.83%	6.57%	9.43%	27.10%
NEUPC	Total spend	£871,803,823	£1,120,756,008	£1,132,291,129	£1,281,084,483
	Unclassified	£173,549,278	£708,899,720	£516,761,638	£771,038,169
	% Unclassified	19.91%	63.25%	45.64%	60.19%
LUPC	Total spend	£548,219,241	£561,300,762	£365,041,650	£543,946,195
	Unclassified	£208,764,762	£278,079,987	£208,646,298	£385,711,454
	% Unclassified	38.08%	49.54%	57.16%	70.91%
SUPC	Total spend	£1,386,789,303	£1,492,639,594	£1,673,834,941	£2,074,678,790
	Unclassified	£37,255,345	£42,204,308	£110,305,968	£604,828,632
	% Unclassified	2.69%	2.83%	6.59%	29.15%
Total	Total spend	£3,643,760,135	£4,166,772,389	£4,063,846,486	£4,901,195,182
	Unclassified	£476,696,785	£1,094,381,136	£919,859,440	£2,032,993,203
	% Unclassified	13.08%	26.26%	22.64%	41.48%

Table 3.2: HE sector supply-chain (procurement) spend data from ARD data collation (excl. VAT)

3.16 This table shows that the 2005-06 data is the most accurate, as only 13 per cent of the data was unclassified.

Step 2 - Reconciliation of ARD data vs HESA data

3.17 HESA publish annual HE sector expenditure data[19]. Before selecting 2005-06 as the baseline year, a reconciliation against HESA non-pay spend data was required. An extract from HESA data (Table 2c) is shown in Table 3.3 below.

Category	Spend (2005-06)
Academic departments	£1,352m
Academic services	£491m
Administration & central services	£987m
Premises	£964m
Residences & catering operations (including conferences)	£479m
Research grants & contracts	£861m
Other expenditure	£622m
Total	**£5,755m**

Table 3.3: Other operating costs of each institution by activity – England Table 2c (2005-06)

3.18 Comparing the consortia data total spend for 2005-06 in Table 3.2 (£3.64 billion) with the HESA spend in Table 3.3 (£5.76 billion) above demonstrates the HESA reported spend is approximately 50 per cent higher than the bottom-up consortia data total for 2005-06. Further investigation has estimated the following differences:

- **Missing ARD HEIs**: the consortia did not receive ARD data from all HEIs. In 2005-6, 30 per cent of HEIs did not return ARD data to their local consortium. Most of these are smaller institutions, and so the missing spend has been estimated to be 15 per cent of the final total.
- **Missing ARD spend**: HEIs use Financial Management Systems (FMS) as the primary means of recording financial spend. However there are other 'off-book' systems used which may not end up as ARD submitted data. For example these can include petty cash, travel/accommodation and E-procurement cards. In the De Montfort University footprint study completed in 2010[20] spend attributed to these additional systems accounted for over 5 per cent extra spend to that recorded in the FMS system. In addition, ARD supplier spend is only submitted above certain thresholds (£1,000-£5,000). Therefore for this study the sector-wide missing spend in this category is estimated to be between 5 and 10 per cent, and hence is taken as 7.5 per cent of the final total.
- **ARD exclusions**: there are certain spend categories excluded from the ARD data. These include spend on other public sectors and individuals – a full list is given in Annex C. The amount of excluded spend is unknown but is not thought to be a large item and so is assumed to be 5 per cent for this study.

[19] HESA: Estates Management Statistics tables available at http://www.hesa.ac.uk/index.php?option=com_datatables&Itemid=121&task=show_category&catdex=4

[20] De Montfort University carbon emissions case study, available at http://spce.procureweb.ac.uk/1861.file.dld

- **Additional HESA categories**: some categories of spend recorded in HESA data are not recorded in the ARD data; for example, spend on agency staff (paid through the agency). Staff payroll data from HESA suggests this may amount to around 10 per cent of total spend.

3.19 We have reconciled the differences in the data based on this analysis as summarised in Table 3.4 below.

Annual HE sector dataset	Category	% of final spend	Value £ billion
ARD	Basic raw spend	72.5%	£3.65
	ADD: Missing HEIs	15.0%	£0.75
	ADD: Missing spend	7.5%	£0.38
	ADD: ARD exclusions	5.0%	£0.25
	Total	**100%**	**£5.03**
HESA	Basic raw non-pay spend	115%	£5.76
	MINUS: extra categories	-10%	-£0.50
	MINUS: balancing item	-5%	-£0.23
	Final total	**100%**	**£5.03**

Table 3.4: ARD vs HESA data reconciliation

3.20 The analysis therefore reconciles the basic raw spend (£3.65 billion) to the final estimate of £5.03 billion for 2005-06 and this is the final estimated procurement spend data for this analysis. This figure excludes VAT.

Step 3 - Carbon intensity data

3.21 The carbon intensity data used is crucial to gain an accurate overview of carbon emissions across the HE sector. For supply-chain (procurement), the carbon intensity values ($kgCO_2$/£ spent) are derived from Environmentally Extended Input-Output (EEIO) analysis according to National Accounts (NA) sectors. This gives carbon intensity data for 123 NA sectors, which are then used to determine overall carbon supply-chain (procurement) emissions for the HE sector.

Step 4 - Supply-chain (procurement) calculations

3.22 As noted earlier in section 3 the first task is to align the data in a format suitable for input to the TBL2 analysis software. This process is summarised in Annex B.

- Annex B1: Raw and final modified consortia ARD spend data; this data is presented in coded ProcHE format.
- Annex B2: Mapping ProcHE codes to 123 NA sectors; the data in Annex C1 is mapped to the 123 NA categories and calculations required prior to TBL2 analysis are completed.

3.23 The input data is then run through the TBL2 analysis model. The results are summarised in section 4.

Analytical assumptions

3.24 Before the analytical results (Section 4) are presented, there are some important analytical assumptions and limitations to note:

- **Reconciliation of ARD data**: As shown in Table 3.4, the raw data is modified based on the reconciliation of HESA and ARD data.
- **Double counting**: Supply-chain (procurement) emissions result from the production and transportation of goods and services purchased by the HE sector. In order to avoid double-counting, the HE sector building energy, waste/water and travel emissions are later excluded when collating total sector wide emissions as shown in Table 2.1 and section 4.
- **Financial year**: Data relates to academic years, therefore 2005-06 refers to August 2005 to July 2006.
- **Carbon intensity limitations**: The 'sector-average' carbon intensity values are a limitation of the current methodology, insofar as they do not reflect 'local' differences in consumption such as consumption of 'eco-friendly' products, such as recycled paper or chemical-free cleaning products. Refer also to Annex A.

4. HE sector supply-chain (procurement) carbon footprint baseline (2005-06) results

4.1 This section presents supply-chain (procurement) emissions footprint results for the HE sector in England in the following three sections:

- 2005-06 supply-chain (procurement) emissions results
- 2005-06 primary sector results
- 2005-06 scope 1-3 emissions

2005-06 supply-chain (procurement) emissions by sub-sector

4.2 The HE sector supply-chain (procurement) emissions for 2005-06 are estimated to be 2.0MtCO_2 (excluding building energy and business travel). These are detailed in Table 4.1 below.

Sector	Sub sector	CO_2 emissions	
		tCO_2	**% of supply-chain (procurement) emissions**
Travel	business travel (scope 3)[1]	59,360	n/a
Building energy	Upstream (scope 3) electricity emissions[2]	165,625	n/a
	Upstream (scope 3) gas/coal emissions[3]	63,957	n/a
Supply-chain (procurement)	Construction	649,271	32%
	Business services	338,900	17%
	Information and communication technologies	256,638	13%
	Other manufactured products	202,181	10%
	Manufactured fuels, chemicals and gasses	157,018	8%
	Paper products	142,366	7%
	Medical and precision instruments	96,196	5%
	Food and catering	88,404	4%
	Other procurement	42,114	2%
	Waste and water[4]	33,997	2%
	Supply-chain (procurement): sub total	**2,007,086**	**100%**

Table 4.1: 2005-06 HE sector CO_2 emissions: sub-sector breakdown

Table notes

1 Business travel emissions are excluded from the analysis after this point as travel has already been considered within the previous SQW analysis.

2 Average Defra/DECC scope 3 factors for electricity are around 12.5 per cent of scope 2 emissions (from power stations). Therefore this value is calculated as 12.5 per cent of the 1.325MtCO_2 scope emissions calculated by SQW.

3 These upstream (scope 3) impacts represent 11 per cent of the scope 1 emissions calculated by SQW.

4 Waste/water emissions are shown in the supply-chain (procurement) breakdown but are excluded from this analysis after this point as they have already been considered within the previous SQW analysis. The values estimated (28,000tCO_2 by SQW vs 34,000tCO_2 by Arup) compare well given the differing methodologies used.

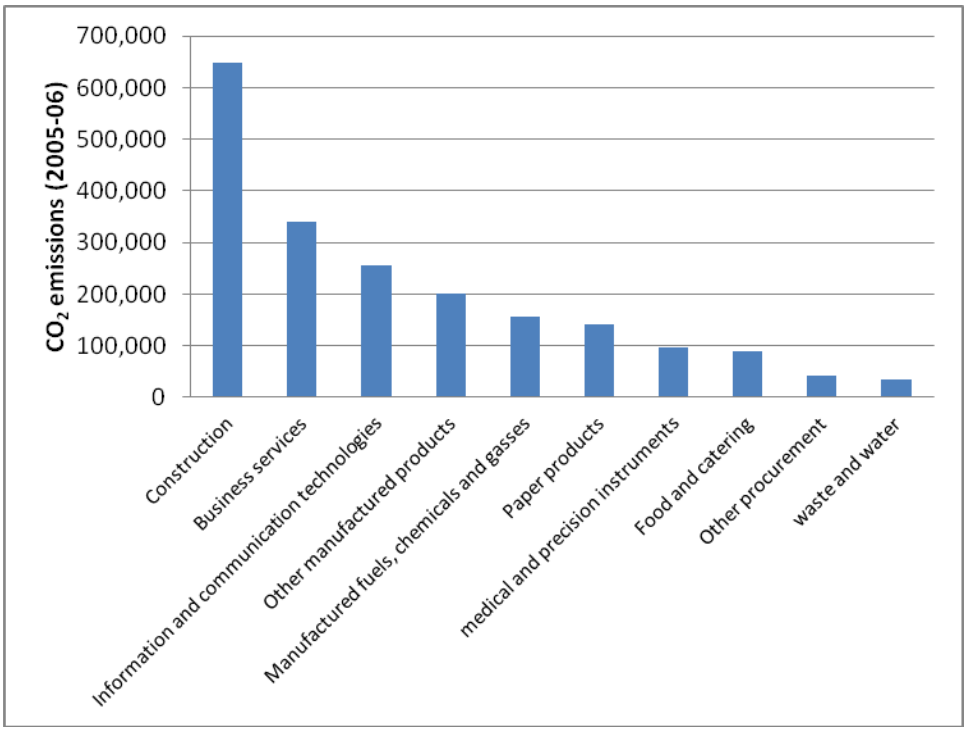


Figure 4.1: 2005-06 HE sector CO_2 emissions: supply-chain (procurement) sector breakdown

2005-06 carbon footprint by primary sector

4.3 The total HE sector consumption-based carbon footprint for 2005-06 is estimated to be 5.3MtCO_2. This value is derived from adding the results of this current study to the previous CO_2 footprint analysis of building energy and travel emissions[21]. The results, which are illustrated in Table 4.2 and Figure 4.2 below, indicate that supply-

[21] HEFCE: HE sector total carbon footprint (Scope 1, 2 & 3) from September 2010 available at http://www.hefce.ac.uk/pubs/rdreports/2009/rd16_09/rd16_09summ.pdf

chain (procurement) and building energy are the largest sectors, with around 2.0MtCO_2 each.

Sector	CO_2 emissions	
	tCO_2	% of total
Travel	1,260,000	23%
Building energy	2,120,000	39%
Supply-chain (procurement)	2,007,086	37%
Total	5,387,086	100%

Table 4.2: 2005-06 HE sector CO_2 emissions: primary sector breakdown

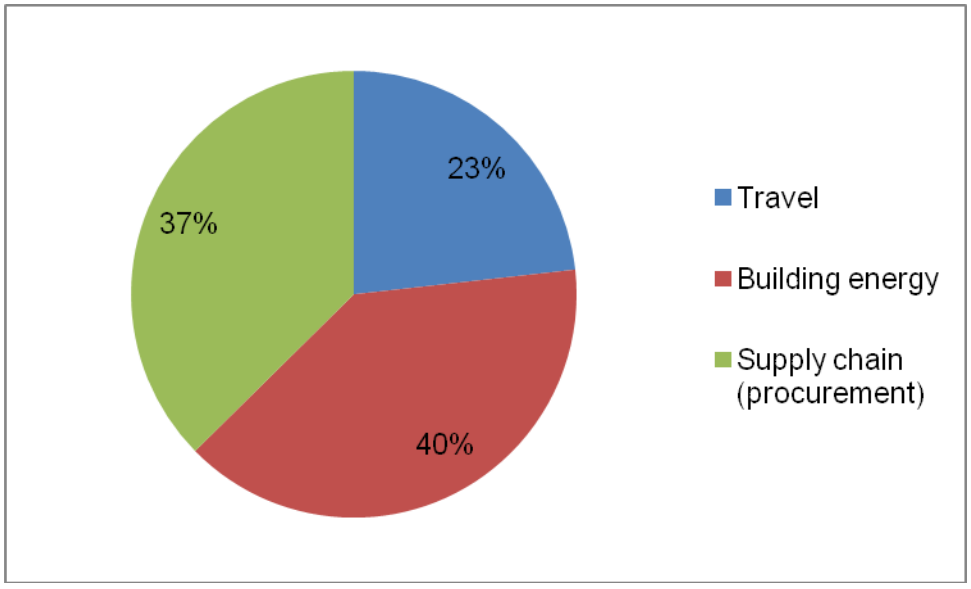


Figure 4.2: 2005-06 English HE sector CO_2 emissions: primary sector breakdown

GHG Protocol scope 1-3 emissions

4.4 Table 4.3 and Figure 4.3 below show the breakdown of English HE sector emissions by Scope 1, 2 and 3 divisions as defined under the GHG Protocol – refer also to Table 2.1 for notes.

Primary sector	Sub-category	2005-06 GHG Protocol emissions ($MtCO_2$)		
		Scope 1	**Scope 2**	**Scope 3**
Building energy	Gas, coal etc	0.57	n/a	0.06
	Electricity	n/a	1.33	0.17
Travel	Transport fuel	0.02	n/a	0.00
	Business travel	n/a	n/a	0.16
	Staff commuting	n/a	n/a	0.27
	Student commuting	n/a	n/a	0.38
	Air student travel	n/a	n/a	0.43
Procurement	Construction	n/a	n/a	0.65
	Business services	n/a	n/a	0.34
	Information and communication technologies	n/a	n/a	0.26
	Other manufactured products	n/a	n/a	0.20
	Manufactured fuels, chemicals and gasses	n/a	n/a	0.16
	Paper products	n/a	n/a	0.14
	Medical and precision instruments	n/a	n/a	0.10
	Food and catering	n/a	n/a	0.09
	Other procurement	n/a	n/a	0.04
	Waste and water	n/a	n/a	0.03
Totals		**0.59**	**1.33**	**3.47**

Table 4.3: 2005-06 HE sector CO_2 emissions: scope 1-3 emissions breakdown

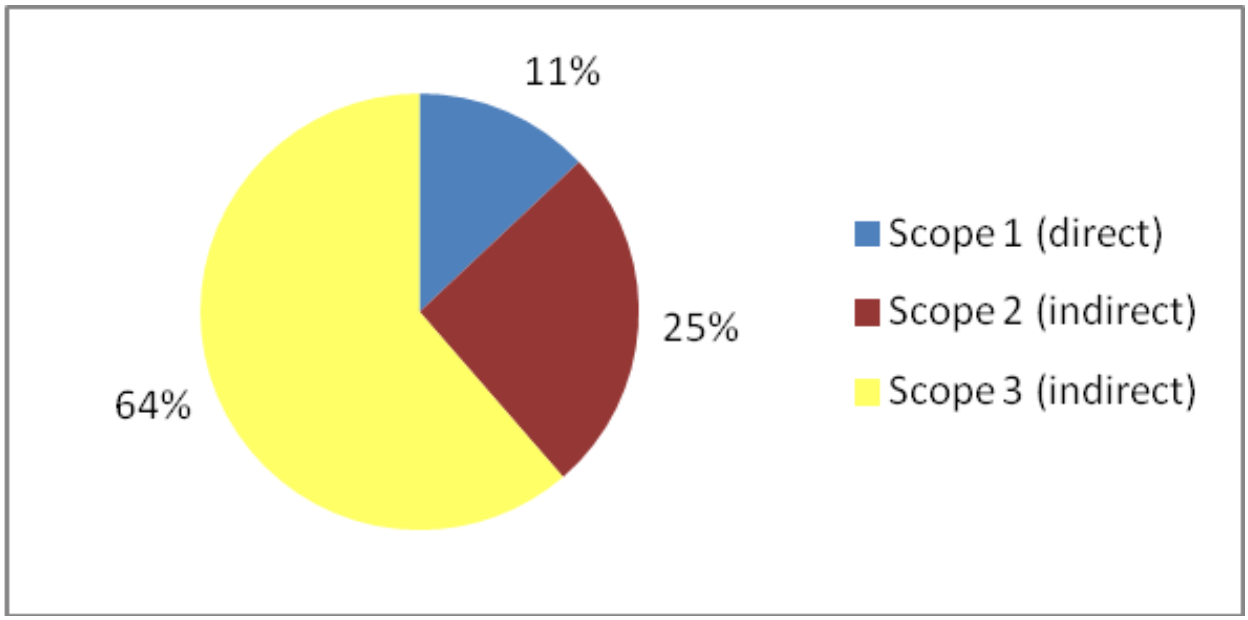


Figure 4.3: 2005-06 HE sector CO_2 emissions: scope 1-3 emissions breakdown

5. Review of HE sector results (2005-06)

5.1 In order to help interpret the HE sector results given in Section 4, the analytical results are now examined. This includes identifying and reviewing the carbon 'hotspots', as per Step 5 of the methodology outlined in section 3.

Overall HE sector emissions

5.2 The supply-chain (procurement) emissions were 2.0MtCO_2, whilst the total HE sector footprint is estimated to be 5.4MtCO_2 for 2005-06. To gain a first view of the scale and a sense check of the results, it is useful to compare them with the national level emissions footprint for two other public sectors which follow the same consumption-based scope 1-3 emissions approach. Therefore a comparison to two other public sectors is given in Table 5.1 below.

Category	**HE sector ($MtCO_2$)**		**DCSF schools ($MtCO_2$)** [22]		**NHS England ($MtCO_2$)** [23]	
Supply-chain (procurement) emissions	2.01	37%	3.52	33%	11.07	60%
Building energy	2.12	39%	5.04	48%	4.14	24%
Travel	1.26	23%	2.02	19%	3.41	16%
Total	5.39	100%	10.54	100%	18.61	100%

Table 5.1: Comparison of consumption-based CO_2 emissions for three public sectors

5.3 At an overall level, Table 5.1 above indicates that the total HE sector carbon emissions are half those of schools and around a third of NHS, which is expected due to the smaller sector size.

5.4 The 39 per cent contribution of supply-chain (procurement) emissions in the HE sector is much closer to the value of the schools sector (33 per cent) than that of the NHS (60 per cent). This seems reasonable, given the NHS is a different type of business and requires significant expenditure on pharmaceuticals and other medical products to perform its role.

5.5 The two largest sectors are building energy and supply-chain (procurement) emissions. Thus procurement of goods which are energy consuming needs special consideration, since a 'low-carbon purchase' may not be reflected in lower overall emissions if energy consumption duly rises. In these cases a life-cycle approach

[22] Schools carbon footprint report to DFES, available at http://www.sd-commission.org.uk/data/files/publications/GAP-Final-Report.pdf
[23] NHS England Carbon Emissions – Carbon footprint study, September 2008. Available at http://www.sdu.nhs.uk/documents/publications/1263313924_jgyW_nhs_england_carbon_emissions_carbon_footprinting_r.pdf

which includes both upstream and downstream emissions from point of purchase is important.

Supply-chain (procurement) emissions (2005-06)

5.6 Four sub-sectors make up an estimated 75 per cent of the total supply-chain (procurement) emissions:

- **Construction (32 per cent):** this is around a third of all supply-chain (procurement) emissions and indicates that there was a significant sector-wide build programme at this time.
- **Business services (17 per cent):** these include spending on equipment rental, security, travel and business services. These sectors are typically less carbon intensive than construction, but spend remains significant.
- **Information and communication technologies (13 per cent):** these are embodied emissions associated with manufacture of ICT products including PCs, monitors, printers and associated consumables (including ink and toner cartridges).
- **Manufactured products (10 per cent):** these include furniture and products made from metal and plastic, including specialist machinery.

Construction sector emissions (2005-06)

5.7 With the CO_2 emissions of construction being significant in the baseline year, a further breakdown is provided below. The emissions per £ spent on the construction sector can be broken down to understand the average supply-chain impacts for construction.

5.8 By running an EEIO model, TBL2 is able to track expenditure (and therefore emissions) down the supply chain, and this breakdown of emissions though the various levels of the supply chain is set out in Figure 5.1 below. Layer 1 shows the emissions onsite for construction. This refers to direct emissions from machinery and vehicles as well as any process emissions. Emissions associated with layer 2 relate to the supplier while layer 3 emissions relate to the supplier of the supplier and so on.

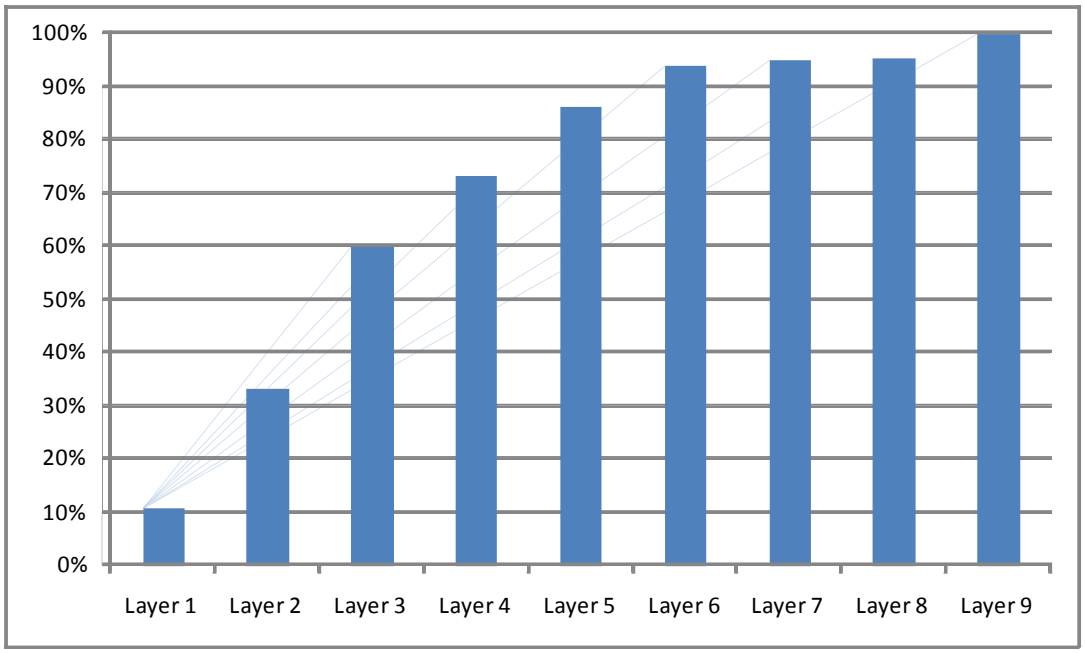


Figure 5.1: Supply-chain CO_2 emissions in UK construction

5.9 The emissions onsite are a relatively small percentage (10 per cent) of the total. The majority of the emissions are emitted directly by the suppliers of construction equipment and materials and their suppliers (50 per cent of the total). The remaining 40 per cent of the emissions occur further upstream in the supply chain.

5.10 Figure 5.2 below shows the sectors where the CO_2 emissions occurred.

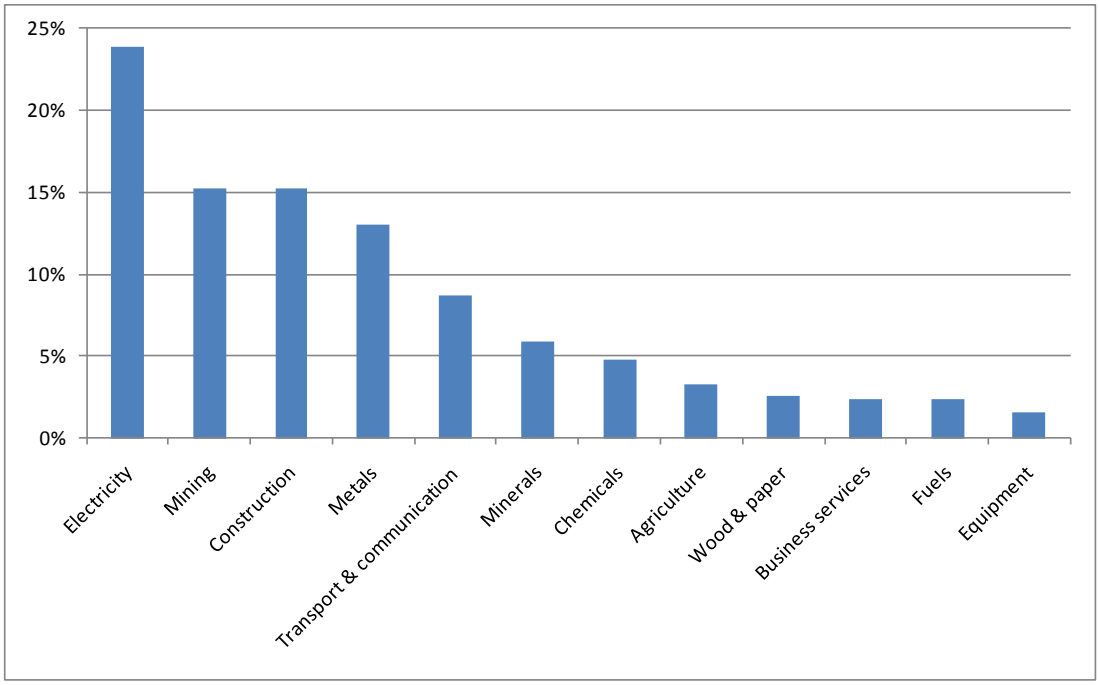


Figure 5.2: Construction sector CO_2 emissions

5.11 Nearly a quarter of the emissions occur in the electricity sector. The majority of the emissions relate to the provision of construction materials, where the emissions

occur in the mining, metals, minerals and chemical sector. The transportation of materials is responsible for under 10 per cent of the emissions, suggesting that a focus on material use and closed loop recycling are areas where most significant gains could be made.

Mitigating construction emissions

5.12 Construction has three phases of impact:

A. Upstream of the work: along the supply chain of the products purchased
B. During the work: direct energy and electricity use
C. Downstream of the work: the use phase once the infrastructure is in place

5.13 The timescale and the impacts of these phases can vary between projects and in order to determine where the greatest reductions could be made in terms of emissions it would be useful to evaluate major projects individually. Actions can be taken to reduce the impacts at each phase.

A. Upstream construction emissions

5.14 Upstream environmental impacts could originate in a number of areas along supply chains; for example, the extraction or processing of raw materials could have a high impact; manufacturers may use considerable energy to process materials; and/or the transport of the materials could be carbon intensive.

5.15 Good project planning and design could be used to minimise any over-ordering, eliminating the need for some products entirely, which would quickly and efficiently reduce the footprint and costs. Materials, suppliers and contractors could be selected based on environmental credentials or whether they have achieved any carbon accreditations or commitments. Universities could follow the Green Public Procurement initiative for procurement items, identifying products and materials that meet sustainability requirements and ensure that recommended products are bought whenever possible. The government agency WRAP (Waste and Resources Action Programme) has dedicated web pages and publications for all stages of construction projects from procurement to waste disposal. This is mainly focused on ways to reduce waste through better material procurement and design, but in many cases taking the same actions could also help to reduce emissions.

B. Work phase construction emissions

5.16 The main impacts from the work phase of a construction project would be the direct fuel for power or transport used on-site and the electricity requirements. Universities could develop an action plan or guidelines to reduce on-site energy use. Initially, it may be necessary to collect data to inform an action plan for future projects.

C. Downstream construction emissions

5.17 Ensuring that the downstream impacts of a construction project are minimised requires consideration and planning at the design stage. There is a trade off between reducing use of high embodied carbon products and the reduced downstream emissions that they enable. This is likely to be where the majority of focus is set for current projects, with building regulations and innovative technologies providing the obligation and means to take environmental impacts into account. Design that reduces impacts is essential to ensure that any new infrastructure locks-in low-impact behaviours rather than high, i.e. cycling as opposed to car use for commuting, or low energy and water use in all buildings. Universities should aim for the highest possible environmental standards on all new buildings and construction projects and investigate the potential of different technologies to reduce use impacts. For example, many simple and existing technologies such as good insulation can considerably reduce downstream impacts.

Other 'open to influence' supply-chain (procurement) categories

5.18 The analysis also highlighted other supply-chain (procurement) 'carbon hotspots', which are 'open to influence' in terms of reducing carbon emissions. Two examples are given below.

- ICT: lowering carbon impacts through due consideration of issues including replacement cycles, the use of 'thin clients', multi-functional printing devices (MFDs) and virtual servers.
- Manufactured products: key categories for the HE sector include specialist machinery/equipment and furniture. Possible actions to reduce carbon impacts include greater re-use via refurbishment and reconditioning, or operating a 'swop-shop' with other HEIs or the wider public sector such as the NHS.

6. Key results, conclusions and recommendations

Key results

6.1 This research study has estimated the scope 3 supply-chain (procurement) carbon footprint of the HE sector for the baseline academic year 2005-06. The key results from the footprint study are outlined below.

- **Total HE sector supply-chain (procurement) emissions:** overall supply-chain (procurement) emissions are estimated to be 2.0MtCO_2, a value calculated using a consumption-based methodology consistent with the NHS and DCSF schools studies.
- **Total HE sector emissions:** overall HE sector emissions are estimated at 5.4MtCO_2 by adding the above supply-chain (procurement) emissions to those previously estimated for the building energy and travel sectors.
- **Construction sector**: This sector is estimated to account for around a third of total HE sector supply-chain (procurement) emissions.

Conclusions

6.2 Following on from the key results, the main conclusions from this HE sector study are now set out below.

- **Analytical robustness:** The Annual Returns Database (ARD) dataset was sufficiently robust for this analysis. The data covered around £3.7 billion of spend for 2005-6, some 67 per cent of the HESA dataset, but further reconciliation of this data closed the gap between these two datasets and provided a final estimated value (£5.03 billion) for the footprint analysis. The use of a consortia-held supply-chain (procurement) emissions tool should encourage HEIs to improve data coding in ARD returns. This would act to strengthen the 'raw' ARD procurement dataset required to produce a sector level footprint, and thus improve the accuracy of future HE sector supply-chain (procurement) emissions footprints.
- **Analytical methodology:** The EEIO method is the best currently available for calculating sector-wide emissions and is consistent with that used for other sectors in the UK including the NHS. It provides the analytical platform for current carbon strategy in the HE sector and a future framework for increasing granularity of data in key sectors (e.g. at product level) which is the longer term goal.
- **Size of supply-chain (procurement) emissions:** Supply-chain (procurement) comprises a similar fraction of total emissions (just over a third) to the DCSF schools study, which seems reasonable given they are similar sectors.
- **Construction emissions:** The highest supply-chain (procurement) emissions category was construction, which suggests a significant HE sector build programme at that time. If repeated for subsequent and current years, a move

away from new build construction could reduce the impact of construction on emissions, and thus lower the overall supply-chain (procurement) footprint.

- **Whole life-cycle emissions**: The two largest sectors are building energy and supply-chain (procurement) emissions. This informs us that low-carbon purchasing may not be reflected in lower overall emissions as energy consumption could rise, and so a life-cycle approach which includes upstream and downstream emissions from point of purchase is important.
- **Scope 3 emissions**: The magnitude of these emissions validates the need to calculate them. The consumption-based approach taken in this analysis provides a detailed analytical basis for a HE sector carbon management plan to include actions on the significant supply-chain (procurement) carbon hotspots.

Recommendations

6.3 The results and conclusions of the completed study lead to the following recommendations to the HE sector.

- **New estate:** This study has highlighted that construction is the single largest contribution to overall supply-chain (procurement) emissions in the baseline year 2005-06. If typical for subsequent years, further work will be required to understand how carbon emissions can be reduced in the construction of new buildings.
- **Existing estate:** Greater emphasis should be placed on estate rationalisation/reconfiguration, given the impact of construction emissions on the HE sector. For example, the removal of unnecessary buildings from HE estate could be encouraged and existing buildings from other building portfolio holders could be used; e.g. education, local and central government and the private sector.
- **Better ARD data:** The coding to ProcHE in the ARD data has fallen since 2005-06. Improving the coding of data in future returns to the consortia will increase the accuracy of the sector supply-chain (procurement) footprint.
- **Engagement across all areas**: The results show that emissions are not just an estates issue, and work across all departments is required. Purchasing choices made by different departments (e.g. ICT) have a quantifiable impact on the carbon and energy performance of the whole institution. Cross departmental working can target cost and carbon reductions.

Annex A. Environmentally extended input-output (EEIO) analysis

What is EEIO analysis?

Environmentally extended input-output (EEIO) analysis is based on an 'input-output' method that tracks all financial transactions between industrial sectors and consumers within an economy. By adding environmental information, such as greenhouse gas emissions, to each sector it becomes possible to assign an environmental burden (a "footprint") to these financial transactions. Similar to following the flow of money, or costs, from production to consumption, an environmentally extended input-output model allows the flow of environmental footprints along supply and production chains to be followed. As each production step adds an environmental burden, the result is a life-cycle inventory of impacts of production and consumption, e.g. carbon, water or ecological footprints of companies, organisations, sectors, individuals, regions or countries.

How established is EEIO analysis?

Economic input-output (EIO) analysis was first developed by Wassily Leontief in the 1930s to aid manufacturing planning and has been used ever since in countless applications addressing questions on economy, labour, social issues, trade, energy, ecology, resource use, industrial ecology and environmental science. The compilation of input-output tables of national and regional economies is a routine practice governed by a UN standard. Thousands of analysts and researchers use analytical input-output techniques. Environmental applications of IO began in the early 1970s when it was widely used for energy analysis. In 1973, Leontief received the Nobel Prize for Economic Science for the development of the input-output methodology and its wide application.

What are the main advantages of EEIO?

Due to its economy-wide approach, EEIO analysis allows for the allocation of all impacts along the production and supply chain to the consuming sector or groups of final products. This has the advantage of being complete and avoiding boundary issues commonly associated with process analysis. Results from EEIO analysis are fully consistent with standard accounting, and a direct and valid comparison of environmental performance (e.g. carbon footprint intensity) is possible between companies/organisations, sectors or nations.

EEIO analysis is also a very efficient technique that saves time and money as it requires a minimum of data collection; the required financial information is in most cases readily available.

What are the main limitations of EEIO?

Environmental input-output models work with data that are aggregated at the level of economic sectors rather than individual products. Input-output tables are the sum of countless individual activities (financial transactions) and for practical reasons this wealth of data is grouped in a limited number of industries (e.g. 123 in the UK). For this reason, the results of an EEIO analysis show the impact of an industry or product group (e.g. 'dairy products') but not of a specific product type (e.g. 'cheese') or even individual products (e.g.

'Cheddar'). To achieve this level of detail, EEIO analysis needs to be combined with a bottom-up analysis of specific processes.

What is the quality of input-output data? How reliable are input-output models?
The ideal data basis for an input-output model is either detailed supply and use tables or symmetric input-output tables in basic prices, all of which are regularly compiled by statistical offices. Not all of the information is published, however, and it therefore depends on the quality and date of available information, as well as the capacity of the modeller to update and handle missing or conflicting data, how well the model reflects the real-world economy.

The uncertainty of input-output data is routinely and well documented by the statistical authority compiling the national accounts; the standard errors of input-output data are published. A similar process of uncertainty calculation and error publication has been established by the process of compiling national greenhouse gas inventories under the UN Framework Convention on Climate Change – the data set underpinning the national environmental accounts of greenhouse gases. Recent research has shown that national carbon footprint estimates using a multi-region input-output model have a standard error of about ±5 per cent.[24]

CenSA's EEIO model
CenSA has created its own environmental EEIO model of the UK economy and uses official data from the Office for National Statistics' National (economic) Accounts and Environmental Accounts. This means that all results are fully consistent with standard accounting and fully comparable amongst each other. The sophisticated methodology is based on year-long scientific research, has been field-tested over five years and has been published in numerous journal articles.

CenSA's model is the engine that provides the EEIO supply-chain emissions factors to DEFRA in their GHG emissions factors guidance.[25]

Top-down vs. bottom-up approaches
Carbon footprints can be calculated using a 'top-down' input-output analysis (IOA) or a 'bottom-up' life-cycle assessment (LCA) approach as outlined below.

- IOA is an economy-wide, top-down approach that utilises economic accounting frameworks to map the structural components of the direct and indirect demand of resources, and attributes the resource use to the final demand.[26] This approach can consider infinite supply-chain systems and, consequently, it does not suffer from truncation errors. IOA is a better technique for the calculation of emissions in higher level systems, such as industrial sectors, individual businesses, larger product groups,

[24] Wiedmann, T., Lenzen, M. and Wood, R. (2008) Uncertainty Analysis of the UK-MRIO Model available at http://randd.defra.gov.uk/Document.aspx?Document=EV02033_7332_FRP.pdf
[25] Carbon intensity values for scope 3 GHG emissions provided in Defra's 2010 Guidelines to Defra/DECC's Greenhouse Gas Conversion Factors for Company Reporting, available at http://archive.defra.gov.uk/environment/business/reporting/pdf/101006-guidelines-ghg-conversion-factors.pdf

[26] Druckman, A., Bradley, P., Papathanasopoulou, E. and Jackson, T. (2008). "Measuring progress towards carbon reduction in the UK" in Ecological Economics, vol. 66, Elsevier, pp. 594-604.

households and countries among others.[27] This approach is well-suited to provide the overall carbon footprint of these large systems from a top-down perspective and to identify important product groups and responsible units.

- LCA or process analysis is generally used for the assessment of individual products based on "bottom-up" data of specific processes. Although this approach can provide more accurate results for direct, on-site emissions, it could also involve significant systematic errors caused by the truncation of the life cycle system by a finite boundary.[28] In addition, LCA could be quite time- and resource-consuming and due to the differences in assumptions, allocation rules and impact assessment methods, results are not always strictly comparable.

Both methods have limitations, but they are being continuously refined and extended. Another option is the use of an hybrid approach that preserves the detail and accuracy of bottom-up approaches in the lower order stages (direct emissions and potentially some key inputs), while the indirect, higher order requirements, such as most of the purchases of goods and services, are covered by the input-output part of the model.

[27] Druckman, A. and Jackson, T. (2009). "The carbon footprint of UK households 1990-2004: A socio-economically disaggregated, quasi-multi-regional input-output model" in Ecological Economics, vol. 68, Elsevier, pp. 2066-2077.
Wiedmann, T., Lenzen, M. and Barrett, J.R. (2009). "Companies on the Scale. Comparing and Benchmarking the Sustainability Performance of Business" in Journal of Industrial Ecology, vol. 13, no. 3, Blackwell Publishing, pp. 361-383.

[28] Wiedmann, T., Lenzen, M. and Barrett, J.R. (2009). "Companies on the Scale. Comparing and Benchmarking the Sustainability Performance of Business" in Journal of Industrial Ecology, vol. 13, no. 3, Blackwell Publishing, pp. 361-383.

Annex B. Supply-chain (procurement) spend data

B1 Annual Returns – Categories Omitted from Database

The following list is the categories of spend by HEIs that are omitted from the ARD databases:

Arts/theatre groups
Associations
Charities
Clubs and societies (but not companies – eg insurance society)
Conferences (but NB include conference organisers)
Councils and local government bodies
Educational groups
Foundations
Government bodies unless they supply goods and could tender for contract
Hospitals, Health Authorities and Trusts
Housing Associations
Institutes
Names of individual people who aren't suppliers
Names beginning with Mr, Ms, Miss or Mrs (which are not companies eg "Mr Clean") also Dr's
Purchasing consortia/organisations
Research bodies
Restaurants/cafes (individual)
Staffing costs
Students and non-supplier names including doctors
Trusts
Unions, forums etc
Universities, colleges and schools
University subsidiary companies (but use discretion)

B2 Annual Returns – Supply-chain (procurement) input data for analysis

The following tables are the input data used for the sector emissions analysis:

- Table B1: ProcHE Annual Return Database (ARD) datasets from consortia (raw and final).
- Table B2: Final 123 National Account (NA) sector spend breakdown

2 letter Proc-HE Code	ProcHE Description	Raw ARD data Totals	Final modified ARD Total
A	The Arts, Audio-Visual & Multimedia Supplies and Services	£19,069,059	£0
AA	Audio Visual Equipment (purchase, maintenance, repair and hire)	£14,971,377	£23,698,027
AB	Display and Projection Equipment and Consumables	£1,345,517	£2,129,803
AC	Learning and Training Packs and Pre-recorded Media	£561,900	£889,425
AD	Music Instruments, Scores, Purchase, Maintenance,	£1,540,538	£2,438,500
AE	Photographic Equipment Supplies and Services	£7,950,632	£12,584,967
AF	Studio Hire and Running Costs	£692,317	£1,095,861
AG	Theatre Production Costs (scenery, lighting, props, costumes)	£1,498,581	£2,372,087
AH	Video Equipment (suspended)	£483,652	£765,567
AJ	Audio Visual Consumables, Accessories, Cassettes etc	£597,694	£946,083
AK	Photographic Consumables, Accessories etc	£1,638,256	£2,593,177
AL	Digital Imaging Equipment Purchase, Maintenance, Repair, Consumables	£803,691	£1,272,154
AM	Commercial and Graphic Art Equipment (purchase and maintenance and consumables)	£409,921	£648,859
AN	External Production Services (performances, tours)	£1,810,849	£2,866,373
AP	Tape Machines, Video Interviewing Equipment	£31,957	£50,584
AQ	Website Design and Services SUSPENDED	£531,848	£841,856
AR	Fine and Creative Arts, Equipment Purchase, Maintenance, Consumables	£528,506	£836,567
AT	Audio-Visual Equipment (suspended)	£482,454	£763,672
AZ	Other and General Audio-Visual Aids	£3,512,000	£5,559,105
B	Library & Publications	£40,649,663	£0
BA	Book Binding Services	£1,045,823	£1,654,266
BB	Books	£40,912,374	£64,714,527
BC	Inter-Library Loans	£598,694	£947,004
BD	Journals	£19,445,756	£30,758,980

2 letter Proc-HE Code	ProcHE Description	Raw ARD data Totals	Final modified ARD Total
BE	Library Subscriptions	£1,166,241	£1,844,741
BF	Manuscripts	£354,254	£560,354
BG	Newspapers and Periodicals	£11,821,515	£18,699,080
BJ	Archiving Equipment and Consumables (inc. maintenance and repair)	£995,901	£1,575,299
BK	Electronic Media (inc. microfilm)	£950,540	£1,503,549
BL	Manuals; Computer, Workshop, Training	£257,154	£406,762
BM	Tickets and Tokens (including electronic tickets and book tokens)	£10,995	£17,392
BN	Library Equipment and Services (e.g. book tagging) including maintenance, repair and hire	£954,903	£1,510,450
BZ	Other and General Library	£4,202,753	£6,647,847
C	Catering Supplies & Services	£21,039,394	£0
CA	Beers, Wines, Spirits, Alcoholic drinks	£5,076,511	£7,033,650
CB	Bakery Products	£4,390,972	£6,083,816
CC	Dairy Produce	£2,035,174	£2,819,791
CD	Frozen Foods	£9,565,713	£13,253,566
CE	Groceries	£8,881,341	£12,305,349
CF	Catering, Bar Equipment and Accessories	£2,707,594	£3,751,448
CG	Catering Equipment Maintenance and Repair	£2,866,688	£3,971,877
CH	Meat, Poultry, Offal	£5,547,932	£7,686,816
CJ	Soft and Non-alcoholic Drinks	£4,925,966	£6,825,066
CK	Tableware, Crockery, Cutlery, Table Coverings etc	£704,049	£975,480
CL	Vending Equipment, Consumables and Charges	£3,858,263	£5,345,733
CM	Fruit and Vegetables	£3,807,615	£5,275,559
CN	Table and Room Decorations	£306,607	£424,813
CP	Fish and Seafood	£707,983	£980,930
CQ	Confectionery, Sweet and Savoury	£1,241,532	£1,720,178
CR	Watercooler Equipment, Services and Consumables	£1,182,146	£1,637,897
CS	Catering Entertainments, Discos etc	£83,797	£116,103
CT	Catering Services (outsourced incl pre-prepared meals)	£10,486,451	£14,529,274
CZ	Other and General Catering	£6,739,030	£9,337,117
D	Medical, Surgical, Nursing Supplies & Services	£10,216,139	£0
DA	Medical, Surgical, Nursing Capital Equipment >£10k	£3,021,980	£4,247,357

2 letter Proc-HE Code	ProcHE Description	Raw ARD data Totals	Final modified ARD Total
DB	Medical, Surgical, Nursing Small Apparatus, Equipment, purchase, maintenance, repair and hire	£5,320,641	£7,478,098
DC	Medical, Surgical, Nursing Consumables and Disposables	£11,804,125	£16,590,559
DD	Medical, Surgical, Nursing, Dressing and Bandages	£7,847	£11,029
DE	Medical, Surgical, Nursing, Clothing	£378,778	£532,369
DF	Equipment Maintenance and Repair SUSPENDED	£2,727,332	£3,833,233
DG	Waste Disposal Clinical SUSPENDED	£108,431	£152,398
DH	Medical, Surgical, Nursing, Patient Diagnostic Services and ClinicalTrials	£198,556	£279,068
DK	Physiotherapy and Sports Science Equipment and Consumables	£167,008	£234,728
DZ	Other and General	£7,630,991	£10,725,268
E	Agricultural/Fisheries/Forestry/Horticultural/Oceanographic Supplies & Services	£2,778,634	£0
EA	Livestock and Animal Services and Supplies	£342,712	£586,804
EB	Livestock, Animal and Farm Feeds	£1,089,466	£1,865,424
EC	Agricultural, Fisheries, Forestry, Oceanographic Capital Equipment >£10k	£441,934	£756,695
ED	Agricultural, Fisheries, Forestry, Oceanographic, Small Equipment and Tools	£216,299	£370,354
EF	Equipment Maintenance and Repair	£475,643	£814,414
EG	Equipment Hire	£94,657	£162,076
EH	Agricultural, Fisheries, Forestry, Oceanographic, Purchase of Plants, Crops, Trees etc	£391,223	£669,866
EJ	Veterinary and Farrier Services	£1,375,617	£2,355,382
EK	Fertilisers, Pesticides, Composts, Soils	£117,058	£200,431
EL	Fencing Supplies and Associated Services	£7,776	£13,315
EM	Horticultural Consumables (Pots, Seed Trays etc)	£74,601	£127,734
EN	Oceanographic Supplies and Services	£325,607	£557,516
EP	Kennels, Catteries, Stabling, Supplies and Services	£79,963	£136,916
ER	Spare	£16,168	£27,684
ES	Agricultural, Fisheries, Forestry, Horticultural: Pasturage, purchase, lease, maintenance	£33,588	£57,511

2 letter Proc-HE Code	ProcHE Description	Raw ARD data Totals	Final modified ARD Total
EZ	Agricultural, Fisheries, Forestry, Horticultural, Oceanographic, Geology: Other and General	£391,851	£670,942
F	Furniture, Furnishings & textiles	£16,127,197	
FA	Electrical White Goods and Domestic Kitchen Equipment	£3,751,226	£5,260,436
FB	Laboratory Furniture - Fixed and Free-standing	£1,406,001	£1,971,669
FC	Furniture - Office purchase and hire	£17,223,728	£24,153,251
FD	Floor Coverings	£5,486,972	£7,694,513
FE	Textiles, Fabrics, Soft and Loose Furnishings	£1,810,274	£2,538,591
FF	Furniture - Residential	£3,841,836	£5,387,500
FG	Window Coverings	£1,305,943	£1,831,356
FH	Sports, Recreational and Nursery Materials and Equipment	£2,811,479	£3,942,605
FJ	Furniture - Removal and Storage	£4,636,993	£6,502,567
FK	Furniture - Repairs	£155,386	£217,901
FL	Furniture - Classroom and Lecture Theatre	£1,254,738	£1,759,550
FM	Drama Production Requisites (deleted Oct 002 - use AG)	£15,382	£21,571
FN	Furniture: General Storage, Racking, Shelving (incl. Library)	£2,150,369	£3,015,514
FO	Boards, Notice, Pin, Chalk, Easels, Mirrors	£281,969	£395,412
FP	Security Furniture	£640,823	£898,641
FQ	Clocks and Timepieces	£56,596	£79,365
FR	Office Seating	£83,416	£116,976
FS	Hair and Beauty Equipment, services, suppliers Purchase, maintenance and repair	£87,706	£122,992
FT	Outdoor furniture	£0	£0
FZ	Other and General Furniture, Furnishings and Textiles	£2,970,925	£4,166,200
H	Janitorial & Domestic Supplies & Services	£10,740,147	£0
HA	Detergents	£380,363	£532,596
HB	Cleaning and Maintenance Machines and Consumables	£1,422,948	£1,992,455
HC	Gloves, Cleaning and Industrial	£6,256,345	£8,760,325
HD	Personal Hygiene and Vending Supplies and Services	£1,577,270	£2,208,541
HE	Paper Disposables	£513,344	£718,800
HF	Protective Clothing and Safety Workwear	£1,345,918	£1,884,595

2 letter Proc-HE Code	ProcHE Description	Raw ARD data Totals	Final modified ARD Total
HG	Laundry and Dry Cleaning Services and Equipment	£2,791,533	£3,908,789
HJ	Janitorial and Domestic: Washing Materials	£839,900	£1,176,053
HK	Janitorial and Domestic: Waste Sacks and Bags	£512,877	£718,146
HL	Disinfectants	£5,458	£7,642
HN	Soaps	£20,861	£29,210
HP	Dusting and Polishing Consumables (Rags, Brushes, Mops)	£171,090	£239,566
HQ	Window Cleaning	£267,260	£374,225
HR	Clothing and Tailoring Supplies and Services	£868,262	£1,215,766
HS	Footwear Supplies	£176,905	£247,708
HZ	Other and General Cleaning and Janitorial	£17,215,861	£24,106,173
J	Utilities	£35,604,213	£0
JA	Electricity Supply and Services	£38,690,175	£70,455,396
JB	Gas Supply and Services	£9,337,661	£17,004,023
JC	Oil Supply and Services	£327,239	£595,907
JD	Solid Fuel, supplies and services	£612,871	£1,116,048
JE	Water and Sewerage Services	£13,090,771	£23,838,492
JZ	Other/General Utilities	£26,823	£48,845
K	Computer Supplies & Services	£86,888,606	£0
KA	Continuous Stationery SUSPENDED	£224,849	£329,766
KB	Printer Purchase, Maintenance and repair	£4,983,092	£7,308,253
KC	Printer Consumables, Toners, Ink, Ribbons etc	£5,254,815	£7,706,765
KD	Magnetic Media and Storage, Optical Media and Storage	£1,782,649	£2,614,451
KE	Software Purchase, Licences, Maintenance, Development, Royalties	£67,894,111	£99,574,192
KF	Workstation and Mini-computer Purchase and Maintenance	£9,498,056	£13,929,945
KG	Server and related items Purchase and Maintenance	£9,268,893	£13,593,853
KH	Desktop Computer Purchase and Maintenance, PC's, Applemacs, Monitors	£48,272,517	£70,796,963
KI	Computing SPARE	£15,134	£22,196
KJ	Network Equipment Installation and Maintenance	£28,523,235	£41,832,466
KK	Portable and Laptop Computer Purchase and Maintenance	£19,340,479	£28,364,943
KL	Plotter and Scanner Purchase and Maintenance	£3,325,563	£4,877,304

2 letter Proc-HE Code	ProcHE Description	Raw ARD data Totals	Final modified ARD Total
KM	Computer Consumables, Peripherals, Upgrades and Add-ons	£22,127,626	£32,452,601
KN	Internet and Intranet Services	£1,941,528	£2,847,465
KO	Web Design	£23,239	£34,082
KP	Computer Teaching Aids and Materials	£1,528,855	£2,242,235
KQ	Apple Mac Desk Top Computer Purchase, Maintenance, repair, hire	£398,910	£585,045
KR	Sun/Unix Equipment Purchasing, maintenance, repair and hire	£1,505,057	£2,207,332
KS	Spare	£21,837	£32,027
KZ	Other and General Computer	£14,057,098	£20,616,282
L	Laboratory/Animal House Supplies & Services	£90,543,398	£0
LA	Laboratory Support Equipment, Accommodation, Accessories	£2,745,842	£4,326,870
LB	Laboratory Animals	£914,173	£1,440,545
LC	Laboratory Small Apparatus and Equipment Purchase and Hire	£53,297,629	£83,985,871
LD	Other Sciences (Astronomy, Sports Science, etc) Supplies and Services	£1,053,136	£1,659,522
LE	Laboratory Blood Products	£2,633,037	£4,149,113
LF	Laboratory Bonded Alcohol	£15,280	£24,078
LG	Laboratory, Capital Equipment >£10, 000	£44,549,707	£70,200,984
LH	Laboratory Chemicals - Organic and Inorganic	£15,855,663	£24,985,195
LJ	Laboratory Clothing	£358,108	£564,303
LK	Laboratory Consumables and Sundries, incl. Disposables	£38,322,379	£60,388,023
LL	Laboratory Diagnostic Testing and Calibration Services	£2,675,598	£4,216,181
LM	Laboratory Equipment Maintenance and Repair	£9,911,506	£15,618,453
LN	Laboratory Gases Purchase and Associated Rentals	£4,184,471	£6,593,848
LP	Laboratory Glassware	£555,269	£874,988
LQ	Pharmaceuticals - Non-vetinerary	£800,151	£1,260,870
LR	Pharmaceuticals, Veterinary	£655,327	£1,032,658
LS	Laboratory Plasticware	£1,151,808	£1,815,008
LT	SPARE / NOT USED	£33,686	£53,082
LU	Laboratory Refrigerants include Liquid Nitrogen	£19,547	£30,801
LV	Scintillation Fluids	£0	£0
LW	Stable Isotopes and Radiochemicals	£739,491	£1,165,283
LX	Tissue Culture and Bacteriological Media	£4,160,293	£6,555,748

2 letter Proc-HE Code	ProcHE Description	Raw ARD data Totals	Final modified ARD Total
LY	Laboratory Waste Disposal - Clinical and Chemical	£1,100,755	£1,734,559
LZ	Other and General Laboratory	£5,655,291	£8,911,552
M	Workshop & Maintenance Supplies (Lab & Estates)	£16,831,897	£0
MA	Batteries	£427,685	£666,549
MB	Electrical Sundries and Components	£9,196,120	£14,332,201
MC	Fasteners inc. Nuts, Bolts, Rivets etc	£600,707	£936,205
MD	Hand Tools	£344,992	£537,671
ME	Handling and Storage Equipment Purchase, Maintenance, Repair and Hire	£338,482	£527,526
MF	Machine Tools and Accessories Purchase, Hire	£3,234,947	£5,041,682
MG	Workshop Equipment and Tool Maintenance and Repair	£2,621,265	£4,085,255
MH	Mechanical Components and Spare Parts	£1,673,122	£2,607,569
MJ	Metals	£578,142	£901,038
MK	Other Raw Materials inc Lubricants and Road Salt	£140,410	£218,830
ML	Plastics, Glass and Ceramics	£377,369	£588,131
MM	Wood	£389,886	£607,639
MN	Electronic Components and Test Equipment Purchase, Maintenance, repair and hire	£3,931,141	£6,126,704
MP	Plumbing Sundries	£2,865,316	£4,465,609
MQ	Ironmongery, Door Furniture, Locksmiths Supplies and Services	£1,402,405	£2,185,656
MR	Adhesives, Fillers and Sealants	£43,458	£67,729
MS	Workshop Consumables, Rags, Cleansers etc	£3,646,576	£5,683,208
MT	Workshop Teaching Aids and Materials	£7,926	£12,353
MZ	Other General Workshop and Maintenance Supplies	£3,989,389	£6,217,483
P	Printing	£11,303,806	£0
PA	Printing Binding and Finishing Services	£3,592,620	£4,990,839
PB	External or Outsourced Printing	£19,722,423	£27,398,231
PC	Printing Consumables, Sundries and inks	£723,412	£1,004,958
PD	Printing - External Design and Artwork	£6,699,835	£9,307,357
PE	Printing Equipment Purchase, Lease, Hire and Maintenance	£2,975,622	£4,133,710
PF	External Typesetting, Colour Separation etc	£117,451	£163,162

2 letter Proc-HE Code	ProcHE Description	Raw ARD data Totals	Final modified ARD Total
PG	Printing Paper and Specials (NOT PHOTOCOPY PAPER - SEE S)	£1,860,682	£2,584,844
PH	Printing Card and Board	£144,246	£200,386
PK		£179,005	£248,672
PZ	Other and General Printing	£4,249,285	£5,903,072
Q	Telecommunications, Postal & Mail Room Services	£29,580,147	£0
QA	Mail Services	£16,622,575	£28,094,603
QB	Mail Room Equipment Purchase, Lease & Maintenance	£123,140	£208,124
QC	Courier Services	£3,329,340	£5,627,075
QD	Freight, Carriage & Haulage Services	£956,544	£1,616,700
QE	Mail Services Overseas/International	£3,210,113	£5,425,565
QF	Spare	£21,053	£35,582
QG	Telephony & Switchboard Capital Purchase >£10,000	£4,499,253	£7,604,402
QH	Telephony & Switchboard Maintenance	£87,997	£148,727
QJ	Telecoms Transmission Equipment Purchase & Maintenance	£4,044,257	£6,835,391
QL	Radios, Mobile, Encrypted	£81,447	£137,658
QM	Phone Cards, Swipe Cards, Equipment & Supplies	£92,660	£156,609
QN	Communications Equipment & Accessories (Hubs, Modems, Routers)	£1,384,866	£2,340,627
QP	Freight Carriage & Haulage Services (SUSPENDED)	£34,555	£58,403
QR	Telephony, Land & Mobile, Line Rental, Call Charges, Equipment	£12,775,464	£21,592,417
QS	Telephony - Mobile Line rental, call charges, equipment	£2,850,263	£4,817,364
QZ	Other Postal & Telecommunications	£3,388,044	£5,726,294
R	Professional & Bought-in Services	£119,840,981	£0
RA	Advertising (Course, Recruitment & Other)	£35,016,825	£59,169,702
RB	Conferences & Meetings	£5,717,455	£9,661,073
RC	Data Information Services	£3,236,918	£5,469,584
RD	Accountancy Services, inc. Audit, Consultancy,	£18,750,131	£31,683,046
RE	General Consultancy	£71,413,786	£120,671,489
RF	Insurance Services	£23,332,354	£39,425,859
RG	Legal Services	£22,061,990	£37,279,261
RH	Banking Services	£19,029,477	£32,155,071
RJ	Patents, IPR, Trademarks, Royalties, Copyright	£4,019,442	£6,791,855

2 letter Proc-HE Code	ProcHE Description	Raw ARD data Totals	Final modified ARD Total
RK	Temporary staff & Employment Agencies	£47,960,172	£81,040,730
RL	Promotions & Publicity (incl Exhibitions and Fairs)	£8,022,649	£13,556,277
RM	Speakers & Presenters	£1,103,654	£1,864,900
RN	Subscriptions (Learned Society, Professional etc)	£5,720,017	£9,665,402
RP	Training Courses	£13,713,826	£23,172,946
RQ	Marketing & Recruitment Services (not Advertising)	£3,242,495	£5,479,007
RR	Debt Collection Services	£283,870	£479,670
RS	Market Research Services	£2,159,610	£3,649,202
RT	Auction Services	£22,332	£37,736
RU	Translation, Interpreter, Transcription & Procedural Writing Services	£1,230,375	£2,079,026
RV	Archival and Storage Services	£292,296	£493,908
RW	Student Placement Programmes, costs and expenses	£94,793	£160,177
RZ	Other/General Professional & Bought-in Services	£28,715,949	£48,522,792
S	Stationery & Office Supplies	£4,097,761	£0
SA	Envelopes SUSPENDED	£206,215	£249,677
SB	Files Filing Folders Binders SUSPENDED	£48,424	£58,629
SC	Office Equipment Purchase, Lease, Hire and Maintenance	£6,500,366	£7,870,376
SD	Diaries Calendars SUSPENDED	£50,871	£61,593
SE	Spare	£35,603	£43,107
SF	Papers (Photocopying) etc	£3,774,239	£4,569,693
SG	Photocopying - Rental, Lease, Purchase, Maintenance, Charges	£20,374,824	£24,669,001
SH	Pre-printed Stationery	£154,684	£187,286
SJ	General Stationery	£8,255,449	£9,995,359
SK	Desktop Sundries SUSPENDED	£70,301	£85,118
SL	Education Packs and Materials Specific to Teaching and Learning (not Media - use AC)	£915,497	£1,108,447
SZ	Other and General Stationery and Office Supplies	£1,126,622	£1,364,068
T	Travel & Transport (incl. Vehicle hire & Subsistence)	£15,885,295	£0
TA	Accommodation & Hotels, incl room bookings and restaurants	£22,167,988	£28,364,773
TB	Air Travel	£4,752,759	£6,081,334
TC	Ferry Travel	£67,262	£86,064
TD	Taxi Hire	£2,848,171	£3,644,342
TE	Mileage (Private Vehicles)	£51,002	£65,259

2 letter Proc-HE Code	ProcHE Description	Raw ARD data Totals	Final modified ARD Total
TF	Rail Travel	£1,012,212	£1,295,163
TG	Subsistence	£130,750	£167,299
TH	Car Hire	£2,676,284	£3,424,405
TJ	Van Hire	£638,347	£816,789
TK	Coach Hire	£7,301,041	£9,341,956
TL	Boat Hire & Charter	£196,299	£251,172
TM	Travel Agency Services	£19,845,502	£25,393,065
TN	Aircraft & Helicopter Hire	£35,184	£45,020
TO	Storage & Warehouse Services	£230,416	£294,825
TP	Student Travel Arrangements	£821,854	£1,051,593
TQ	Conferences, Meetings and Room Bookings	£4,132,929	£5,288,238
TR	Relocation and Household Removal Expenses	£634,052	£811,293
TS	Spare	£21,570	£27,600
TT	Package Travel, Field Trips	£7,199,701	£9,212,288
TZ	Other/General Travel & Transport	£3,638,736	£4,655,900
U	Safety & Security	£10,574,620	£0
UA	Confidential Waste Disposal	£199,400	£272,457
UB	Fire Protection/Fire Fighting Equipment & Services	£4,947,372	£6,760,012
UC	First Aid Supplies	£106,881	£146,041
UD	Safety & Personal Protection Equipment	£1,005,197	£1,373,486
UE	Security Equipment & Consumables	£7,913,478	£10,812,855
UF	Security Services	£18,972,582	£25,923,843
UG	Waste disposal & Treatment, Recycling, Hazardous, Non-laboratory	£2,438,600	£3,332,065
UH	Occupational Health Supplies & Services (incl. Physio)	£979,989	£1,339,042
UJ	Surveillance Equipment, Installation & Maintenance (CCTV)	£406,358	£555,241
UK	Access Control, Keys, Security Passes	£846,700	£1,156,917
UL	Counselling Services	£35,700	£48,780
UM	Alarms (including Fire, Smoke, Gas, Intruder) purchase, maintenance, repair and hire	£826,539	£1,129,371
UN	Special Needs/DDA Suppliers, Services Equipment purchase, maintenance, repair and hire	£415,915	£568,300
UZ	Other/General Safety & Security	£4,314,211	£5,894,871
V	Vehicles (Purchase, Lease, Contract Hire)	£1,748,587	£0
VA	Vehicle Purchase	£1,141,267	£1,630,105
VB	Motoring Association Charges	£54,775	£78,237

2 letter Proc-HE Code	ProcHE Description	Raw ARD data Totals	Final modified ARD Total
VC	Vehicle Lease Hire	£782,168	£1,117,194
VD	Road Tax	£0	£0
VE	Vehicle Repair, Maintenance & MOT	£748,220	£1,068,705
VF	Tyres	£670,305	£957,417
VG	Fuels & Lubricants	£973,115	£1,389,928
VH	Vehicle Parts & Accessories	£106,866	£152,639
VJ	Garage Equipment	£55,404	£79,135
VK	Specialist Vehicle Purchase - Motor Cycle & Bicycles	£7,814	£11,161
VL	Specialist Vehicle Purchase - Marine Craft	£82,678	£118,092
VM	Specialist Vehicle Purchase - Aircraft & Helicopters	£159,294	£227,525
VZ	Other/General Vehicle Purchase & Lease Hire	£253,547	£362,149
W	Estates & Buildings	£254,744,421	
WA	Building Materials	£6,290,798	£9,133,227
WB	Capital Projects	£361,862,278	£525,365,823
WC	Decoration Materials, Works & Services	£15,521,090	£22,534,126
WD	Conservation Projects	£489,210	£710,255
WE	Electricity Supply & Services SUSPENDED	£60,015,835	£87,133,340
WF	Fencing - Property & Specialist	£231,509	£336,114
WG	Gas Supply & Services SUSPENDED	£9,529,844	£13,835,800
WH	General Building Repairs & Maintenance	£133,985,369	£194,525,205
WI	Specialist Building Services (Scaffolding, Plumbing, Carpentry, Roofing)	£66,400,191	£96,402,397
WJ	Grounds Maintenance Equipment	£1,250,527	£1,815,564
WK	Ground maintenance, Supplies & Services (incl Landscaping)	£5,703,069	£8,279,938
WL	Testing & Calibration Services	£1,069,834	£1,553,227
WM	TBC	£1,077,117	£1,563,801
WN	Plant Purchase, Hire & Maintenance, inc. Lifts, Air-conditioning, Boilers, Generators etc	£21,027,105	£30,527,974
WP	Temporary & Mobile Buildings, Hire & Purchase	£3,223,169	£4,679,523
WQ	Waste & Refuse Disposal	£8,825,369	£12,813,017
WR	Solid Fuel	£10,039	£14,574
WS	Water & Sewerage Services	£2,603,867	£3,780,397
WT	Cleaning Services	£15,106,565	£21,932,303

2 letter Proc-HE Code	ProcHE Description	Raw ARD data Totals	Final modified ARD Total
WU	Professional Services, Architects, Estates Agents, QS, Construction Management, Surveying Equip & Services	£116,636,151	£169,336,931
WV	Pest & Vermin Control Services	£1,246,604	£1,809,869
WW	Estates Tool & Plant Hire	£547,952	£795,539
WX	Signs & Signposting	£2,185,100	£3,172,413
WY	Tent & Marquee Purchase, Hire & Maintenance	£452,251	£656,596
WZ	Other/General Estates & Buildings	£108,570,105	£157,626,330
X	Miscellaneous/Unclassified	£7,153,965	£0
XA	Fees for Lecturing, Teaching, Examining, Moderating, supervision, research, tutor	£3,145,865	£3,657,245
XB	Credit Card Charges	£4,363,344	£5,072,632
XC	Customs & Excise - VAT	£2,059	£2,394
XD	Fees - Students	£1,314,401	£1,528,065
XE	Hospitality/Entertainment/Courtesy Expenses	£5,772,559	£6,710,924
XF	Works of Art	£864,698	£1,005,260
XG	Building/Premises/Land - Rent, Lease, Hire, Feu Duties	£25,530,524	£29,680,669
XH	Welfare	£694,860	£807,814
XJ	Other Educational Establishments	£2,537,856	£2,950,400
XK	Other Public Bodies	£675,366	£785,151
XL	Rates	£343,122	£398,899
XM	Awards, Gifts, Trophies, Souvenirs	£827,911	£962,493
XN	Bursaries, Scholarships, Endowments, Donations	£603,440	£701,533
XP	Purchase Card Purchases	£6,980,252	£8,114,935
XQ	Identity Access Cards SUSPENDED	£1,150,997	£1,338,098
XR	Interdepartmental trading	£117,523	£136,627
XY	Other/General Unclassified	£3,821,470	£4,442,673
XZ	Other/General Miscellaneous	£15,336,080	£17,829,054
Y	Not relevant to Purchasing or Procurement	£0	£0
YY	Not relevant to Purchasing, Procurement	£0	£0
Unclassified		£395,460,494	£0
Totals		**£3,643,760,135**	**£3,643,760,135**

Table B1: ProcHE Annual Return Data (ARD) data 2005-06

Sector		2005-06 expenditure allocation
1	Agricultural products	£10,913,202
2	Forestry products	£483,865
3	Fresh fish	£483,865
4	Coal, lignite, peat	£0
5	Crude oil and gas	£0
6	Metal ores	£0
7	Aggregates (stone, sand, gravel, etc.)	£0
8	Meat	£15,049,849
9	Fish, fruit and vegetables	£13,478,551
10	Vegetable and animal oils and fats	£2,965,483
11	Dairy products	£6,063,187
12	Grain mill products	£2,965,483
13	Prepared animal feeds	£0
14	Bread, baked products	£13,288,859
15	Sugar	£2,965,483
16	Chocolate and confectionery	£4,855,198
17	Other food products	£6,605,435
18	Alcoholic beverages	£7,726,872
19	Mineral waters and soft drinks	£12,262,537
20	Tobacco products	£0
21	Textile fibres	£0
22	Textile weaving products	£0
23	Finished textiles	£2,932,397
24	Made-up textile articles	£1,947,116
25	Carpets and rugs	£4,090,442
26	Other textiles	£3,205,154
27	Knitted and crocheted fabrics and articles	£0
28	Wearing apparel, fur	£12,775,639
29	Leather products	£0
30	Footwear	£496,362
31	Wood and wood products	£55,550,258
32	Pulp, paper and paperboard	£16,688,985
33	Articles of paper and paperboard	£14,886,782
34	Publishing and printing	£162,239,144
35	Refined petroleum etc.	£3,192,789
36	Industrial gases, dyes and pigments	£6,826,360
37	Inorganic basic chemicals	£12,872,979
38	Organic basic chemicals	£12,872,979
39	Fertilisers etc.	£107,942
40	Plastics and synthetic rubber	£0
41	Pesticides etc.	£0

Sector		2005-06 expenditure allocation
42	Paints, varnishes etc.	£12,975,563
43	Pharmaceuticals etc.	£14,674,625
44	Soap, detergents etc.	£4,247,554
45	Other chemical products	£6,947,901
46	Man-made fibres	£0
47	Rubber products	£9,786,699
48	Plastic products	£102,315,026
49	Glass and glass products	£3,624,310
50	Ceramic goods	£293,826
51	Bricks, tiles etc.	£2,580,088
52	Cement, lime and plaster	£2,580,088
53	Articles of concrete, plaster and cement	£2,580,088
54	Basic iron and steel	£3,087,090
55	Basic precious and non-ferrous metals	£507,002
56	Casting of metals	£0
57	Structural metal products	£130,767
58	Tanks, reservoirs etc.	£0
59	Forming of metal	£0
60	Cutlery, tools etc.	£12,844,609
61	Other fabricated metal products	£67,682,572
62	Mechanical machinery	£877,206
63	Other general purpose machinery	£152,763
64	Agricultural and forestry machinery	£0
65	Machine tools	£0
66	Special purpose machinery	£34,538,782
67	Weapons and ammunition	£0
68	Domestic appliances	£5,592,948
69	Office machinery and computers	£243,825,798
70	Electric machinery	£0
71	Insulated wire and cable	£0
72	Electrical equipment	£17,046,397
73	Electronic valves and tubes etc.	£74,206,026
74	TV, radio transmitters etc.	£0
75	TV, radio receivers etc.	£14,960,871
76	Medical, precision and optical instruments	£216,987,851
77	Motor vehicles, trailers etc.	£1,889,022
78	Ships and boats	£124,353
79	Other transport equipment	£0
80	Aircraft and spacecraft	£239,589
81	Furniture	£12,139,363
82	Jewellery, musical instruments etc.	£1,338,594
83	Sports goods, games and toys	£4,191,817

Sector		2005-06 expenditure allocation
84	Miscellaneous manufactured products	£36,468,445
85	Electricity	£168,944,674
86	Gas, steam and hot water	£32,645,534
87	Water supply	£28,120,564
88	Construction	£847,295,746
89	Sale, maintenance and repair of motor vehicles; retail sale of automotive fuel	£1,125,370
90	Wholesale trade	£0
91	Retail trade	£0
92	Hotels and restaurants	£29,745,289
93	Transport via railways	£0
94	Other land transport; transport via pipelines	£23,011,488
95	Water transport	£90,252
96	Air transport	£6,377,313
97	Supporting and auxiliary transport	£62,352
98	Post and courier services	£43,519,887
99	Telecommunications	£0
100	Banking and financing	£42,220,776
101	Insurance and pension funding	£8,484,520
102	Auxiliary financial intermediation	£11,657,434
103	Real estate activities with own property	£0
104	Letting of dwellings	£40,033,171
105	Real estate activities on a fee or contract basis	£0
106	Renting of machinery and equipment	£38,208,838
107	Computer and related activities	£111,680,897
108	Research and development	£0
109	Legal activities	£41,016,754
110	Accounting etc.	£34,859,481
111	Business / management consultancy activities	£0
112	Architectural and engineering activities	£95,673,571
113	Advertising	£65,101,857
114	Other business services	£139,070,456
115	Public administration and defence	£1,600,271
116	Education	£37,630,093
117	Health care	£4,540,057
118	Social work activities	£1,143,739
119	Sewage and refuse disposal	£20,523,470
120	Activities of membership organisations	£10,716,808
121	Recreational, cultural and sporting activities	£21,728,836
122	Other service activities	£414,699,805
123	Private households employing staff	£0
Total		**£3,643,760,135**

Table B2: Final 123 National Account (NA) sector spend breakdown

Terms and acronyms

ARD	Annual Returns Database
AUDE	Association of University Directors of Estates
CenSA	Centre for Sustainability Accounting Ltd
CHP	Combined Heat and Power
CO_2	Carbon Dioxide
DCSF	Department for Children, Schools and Families
DECC	Department for Energy and Climate Change
DEFRA	Department of Environment, Food and Rural Affairs
EAUC	Environmental Association for Universities and Colleges
EIO	Economic Input-Output
EEIO	Environmentally Extended Input-Output
EMS	Estates Management System
FMS	Financial Management System
GHG	Greenhouse Gas
GHG Protocol	Greenhouse Gas Protocol
HE	Higher Education
HEFCE	Higher Education Funding Council for England
HEI	Higher Education Institutions
HESA	Higher Education Statistics Agency
ICT	Information Communication Technology
IOA	Input-Output Analysis
LCA	Life Cycle Assessment
LUPC	London Universities Purchasing Consortium
Mt	Metric Tons
NA	National Accounts
NEUPC	North East Universities Purchasing Consortium
NHS	National Health Service
NWUPC	North West Universities Purchasing Consortium
SUPC	Southern Universities Purchasing Consortium
TBL2	CenSA's Triple Bottom Line software
UUK	Universities UK
WRAP	Waste and Resources Action Programme