

# Carbon measurement in the NHS:

Calculating the first consumption-based total carbon footprint of an NHS Trust



Paul Brockway

30<sup>th</sup> August 2009

MSc in Climate Change and Sustainable  
Development, De Montfort University

## **Acknowledgements**

I would like to thank the following people who have helped me undertake this research:

My supervisor Professor Paul Fleming, and in addition other members of the Institute of Energy and Sustainable Development at De Montfort University for their support.

Lawrence Ashelford, Katarina McCartney, Pieter Rodenburg and Richard Hyde at Cambridge University Hospitals (CUH) NHS Foundation Trust for their advice and information.

The Stockholm Environment Institute (SEI) at York for permitting the use of the carbon intensity data from the NHS England research for this dissertation. John Barrett and Kate Scott at the SEI for their advice and assistance with my questions.

Sonia Roschnik at the NHS Sustainable Development Unit (SDU) for her network of contacts at CUH NHS Foundation Trust and her support for this research.

Jon Bates and my wife Hilary, for their help and support over the last three years.

Finally, Arup Newcastle for their commitment which enabled me to undertake this MSc.

Cover photo: Basildon Cardiothoracic Centre © Daniel Clements/Arup 2008

## List of contents

List of Figures .....	vii
List of Tables.....	ix
List of abbreviations and acronyms.....	xi
Abstract.....	xiii
1 Introduction.....	1
1.1 Context - climate change .....	1
1.2 NHS England carbon emissions.....	3
1.2.1 A consumption-based footprint approach .....	3
1.2.2 The research rationale.....	5
1.3 Research aims and objectives.....	6
1.4 Thesis structure .....	7
1.5 Declaration .....	7
1.6 Confidentiality .....	7
2 Terminology .....	8
2.1 Greenhouse gas (GHG) emissions.....	8
2.2 The 'GHG Protocol'.....	8
2.3 Defining a carbon footprint.....	9
2.4 Defining 'carbon intensity' .....	10
2.5 Consumption-based emissions.....	11
2.6 Ecological footprint .....	11
3 Literature review .....	13
3.1 Carbon footprinting in the wider world .....	13
3.1.1 Origins .....	13

MSc in Climate Change and Sustainable Development	Carbon measurement in the NHS
3.1.2	Setting emissions targets ..... 14
3.1.3	Carbon confusion ..... 15
3.1.4	Moving towards carbon clarity ..... 16
3.2	Carbon footprinting in NHS England..... 17
3.2.1	NHS and DH carbon strategies ..... 17
3.2.2	Carbon action ..... 19
3.2.3	Journals - healthcare articles..... 21
3.3	NHS England carbon footprinting studies (2008-09) ..... 22
3.3.1	Carbon footprinting methodology - overview ..... 23
3.3.2	The top-down IO methodology ..... 24
3.3.3	NHS England carbon footprint: 2004 results ..... 25
3.3.4	NHS England carbon footprint: time-series results (1992-2004) ..... 28
3.3.5	NHS England carbon footprint: modelling to 2020..... 30
3.4	Discussion ..... 31
3.4.1	Literature review ..... 31
3.4.2	Implications and rationale for MSc research..... 32
4	CUH NHS Foundation Trust carbon footprint: analytical methodology & calculations ..... 33
4.1	Analysis methodology ..... 33
4.1.1	Overview ..... 33
4.1.2	Consumption data ..... 33
4.1.3	Carbon intensity data..... 34
4.1.4	Analytical assumptions ..... 35
4.1.5	Scope 1-3 emissions ..... 36
4.2	Travel emissions calculations ..... 37
4.2.1	Calculation structure / overview..... 37

4.2.2	Travel survey data .....	37
4.2.3	Estimates of annual patients, visitors and staff journeys for 2007 ...	40
4.2.4	Patient, visitor and staff commuting emissions calculations .....	41
4.3	Building energy emissions calculations .....	42
4.3.1	Calculation structure / overview.....	42
4.3.2	Collection of energy consumption data.....	42
4.3.3	On-site building energy emissions.....	42
4.3.4	Off-site (grid) electricity emissions.....	43
4.4	Procurement emissions calculations.....	45
4.4.1	Calculation structure / overview.....	45
4.4.2	Intermediate expenditure classification:.....	45
4.4.3	SIC classification .....	47
4.4.4	SIC sector emissions.....	54
4.4.5	NHS England sub-sector emissions .....	58
5	CUH NHS Foundation Trust carbon footprint: analytical results .....	60
5.1	Emissions results.....	60
5.1.1	Total and primary sector emissions .....	60
5.1.2	Sub-sector emissions .....	62
5.1.3	GHG Scope 1-3 emissions .....	66
5.2	Comparison to NHS England footprint.....	67
5.3	Discussion .....	69
5.3.1	Overall emissions .....	69
5.3.2	Travel emissions.....	70
5.3.3	Building energy emissions.....	72
5.3.4	Procurement emissions .....	74

5.3.5	Implications for CUH NHS Foundation Trust .....	78
6	Technical viability and benefits of applying the consumption-based footprint technique across all NHS Trusts.....	79
6.1	Technical viability .....	79
6.1.1	Research aims.....	79
6.1.2	Technical viability of wider use by NHS Trusts.....	81
6.2	Benefits of wider adoption by NHS Trusts .....	81
6.2.1	Trust level.....	81
6.2.2	Regional & national level .....	82
7	Conclusions and Recommendations .....	84
7.1	Conclusions .....	84
7.2	Recommendations.....	85
	References.....	87
	Appendix A: CUH NHS Foundation Trust structure .....	95
	Appendix B: CUH NHS Foundation Trust 2007-08 expenditure .....	98

## List of Figures

Figure 1.1: IPCC temperature projections to 2100.....	1
Figure 1.2: Trajectory of global fossil fuel emissions.....	2
Figure 1.3: IPCC GHG stabilisation pathways .....	2
Figure 1.4: Growth of EU and UK healthcare expenditure 1960-2020.....	4
Figure 1.5: NHS England emissions targets vs Climate Change Act targets .....	5
Figure 2.1: GHG Protocol classification of emissions .....	9
Figure 2.2: Ecological footprint by country/region .....	12
Figure 3.1: Cumulative occurrence of three 'footprint' terms in Scirus database journals .....	14
Figure 3.2: UK consumption versus production emissions .....	16
Figure 3.3: NHS England actual versus predicted energy consumption and carbon emissions.....	18
Figure 3.4 NHS England energy performance by Trust type 2004/05.....	20
Figure 3.5 Basic components of the NHS England carbon footprint .....	23
Figure 3.6: 2004 NHS England carbon footprint primary sector breakdown .....	26
Figure 3.7: NHS England Scope 1-3 CO <sub>2</sub> emissions .....	27
Figure 3.8: 2004 NHS England carbon footprint procurement emissions breakdown .....	28
Figure 3.9: 1992-2004 NHS England carbon footprint emissions breakdown.....	29
Figure 3.10: 1992-2004 NHS England medical equipment carbon intensity.....	29
Figure 3.11: 1990-2020 NHS England carbon footprint and carbon wedges .....	30
Figure 4.1: Staff commuting travel: Average single trip distance (miles).....	38
Figure 5.1: 2007 CUH NHS Foundation Trust CO <sub>2</sub> emissions: primary sector breakdown .....	61

Figure 5.2: 2007 CUH NHS Foundation Trust CO <sub>2</sub> emissions: primary sector breakdown .....	61
Figure 5.3: 2007 CUH Foundation NHS Trust CO <sub>2</sub> emissions: travel sub-sector breakdown .....	63
Figure 5.4: 2007 CUH Foundation NHS Trust CO <sub>2</sub> emissions: travel sub-sector breakdown .....	63
Figure 5.5: 2007 CUH Foundation NHS Trust CO <sub>2</sub> emissions: building energy sub-sector breakdown.....	64
Figure 5.6: 2007 CUH Foundation NHS Trust CO <sub>2</sub> emissions: building energy sub-sector breakdown.....	64
Figure 5.7: 2007 CUH Foundation NHS Trust CO <sub>2</sub> emissions: procurement sub-sector breakdown.....	65
Figure 5.8: 2007 CUH Foundation NHS Trust CO <sub>2</sub> emissions: procurement sub-sector breakdown.....	65
Figure 5.9: 2007 CUH Foundation NHS Trust CO <sub>2</sub> emissions: Scope 1-3 emissions breakdown .....	66
Figure 5.10: Comparison of CUH NHS Foundation Trust and normalised NHS England travel emissions .....	71
Figure 5.11: CUH NHS Foundation Trust travel survey modal breakdown .....	72
Figure 5.12: ERIC returns for NHS England estates buildings.....	73
Figure 5.13: Comparison of CUH NHS Foundation Trust and normalised NHS England building energy emissions.....	74
Figure 5.14: Comparison of CUH NHS Foundation Trust and normalised NHS England procurement emissions.....	74
Figure 5.15: Histogram of SIC sector codes versus ledger code allocation .....	77
Figure 5.16: Histogram of SIC sector emissions versus ledger code allocation....	77
Figure 6.1: Extract of CUH NHS Foundation Trust Patient Level Costing system	83



## List of Tables

Table 3.1: Comparison of NHS England ecological versus carbon footprint results .....	19
Table 3.2: 2004 NHS England carbon footprint primary sector breakdown .....	26
Table 4.1: Scope 1-3 classification according to 3 main NHS England emissions sectors .....	30
Table 4.2: Staff commuting modal travel survey data .....	37
Table 4.3: Patients and visitors modal travel survey data .....	38
Table 4.4: Estimated number of patient, visitor and staff journeys in 2007 .....	40
Table 4.5: Number of CUH NHS Foundation Trust staff in 2007.....	40
Table 4.6: Staff travel emissions in 2007 .....	41
Table 4.7: Patient/visitor travel emissions in 2007 .....	41
Table 4.8: CUH NHS Foundation Trust and NHS England total energy consumption 2007-08 .....	42
Table 4.9: CUH NHS Foundation Trust on-site energy emissions for 2007-08.....	43
Table 4.10: CUH NHS Foundation Trust electricity emissions 2007-08.....	44
Table 4.11: CUH NHS Foundation Trust account codes – summary of SIC / non SIC sector classification.....	46
Table 4.12: Comparison of procurement spend between CUH NHS Foundation Trust and NHS England.....	46
Table 4.13: 2007-08 CUH NHS Foundation Trust financial ledger mapped to SIC sector .....	47
Table 4.14: 2007-08 CUH NHS Foundation Trust procurement expenditure breakdown by SIC sector (at 2004 prices) .....	55
Table 4.15: SIC sector mapping to NHS emissions sectors from IO analysis .....	59

Table 5.1: 2007-08 CUH NHS Foundation Trust CO <sub>2</sub> emissions: primary sector breakdown .....	60
Table 5.2: 2007 CUH NHS Foundation Trust CO <sub>2</sub> emissions: sub-sector breakdown .....	62
Table 5.3: 2007 CUH Foundation NHS Trust CO <sub>2</sub> emissions: Scope 1-3 emissions breakdown .....	66
Table 5.4: 2007 CUH NHS Foundation Trust vs NHS England primary sector CO <sub>2</sub> emissions .....	67
Table 5.5: 2007 CUH Foundation NHS Trust vs NHS England sub-sector CO <sub>2</sub> emissions .....	68
Table 5.6: Comparison of other 2007-08 metrics between CUH Foundation NHS Trust and NHS England .....	69
Table 5.7: Comparison CUH Foundation NHS Trust and NHS England trip distances .....	71
Table 5.8: 2007 CUH NHS Foundation Trust vs NHS England building energy consumption .....	72
Table 5.9: Summary of mapping from CUH NHS Foundation Trust ledger codes to SIC sectors .....	76

**List of abbreviations and acronyms**

BERR	Department for Business, Enterprise and Regulatory Reform
CCC	Committee on Climate Change
CDP	Carbon Disclosure Project
COP	Conference Of Parties
CO <sub>2</sub>	Carbon dioxide
CO <sub>2</sub> e	Carbon dioxide equivalent
CUH	Cambridge University Hospitals (NHS Foundation Trust)
DECC	Department for Energy and Climate Change
DEFRA	Department of Energy, Food and Rural Affairs
DUKES	Digest of UK Energy Statistics
DH	Department of Health
EIO	Environmentally (extended) Input-Output
ERIC	Estates Return Information Collection
GDP	Gross Domestic Product
GHG	Greenhouse Gas
HMG	Her Majesty's Government
IO	Input-Output
IPCC	Intergovernmental Panel on Climate Change
LCA	Life Cycle Analysis / Life Cycle Assessment
MRIO	Multi Region Input-Output
NHS	National Health Service
NTS	National Travel Survey
PASA	Purchasing And Supply Agency

PAS	Publically Available Specification
SDU	Sustainable Development Unit
SEI	Stockholm Environment Institute
SIC	Standard Industrial Classification
SRIO	Single Region Input-Output
UK	United Kingdom
WTE	Whole Time Equivalent

## Abstract

In January 2009 a national NHS England carbon reduction strategy (SDU, 2009a) was launched. It is believed to be the first public sector organisation worldwide to publish a carbon strategy based on the embedded emissions of all its activities: a consumption-based approach. The strategy sets a target for 2015 to reduce NHS England's total consumption-based emissions from travel, building energy and procurement sectors to 10% below the 2007 level of 20.0MtCO<sub>2</sub> (SEI and Arup, 2009a).

At the local level, NHS Trusts currently measure building energy emissions and in some cases staff travel emissions, but do not include procurement. This omission is important, as procurement is estimated to account for 60% of NHS England emissions. Therefore, as none of the NHS Trusts in England have undertaken a consumption-based footprint, they have no means of baselining all emissions and checking individual progress towards the national target. A gap therefore exists between NHS England targets and the measurement tools available at an NHS Trust level.

This research seeks to explore this gap. Firstly, the consumption-based carbon footprint of Cambridge University Hospitals NHS Foundation Trust was calculated, and determined to be 168,902tCO<sub>2</sub> in 2007. A similar methodology was used to that developed for the NHS England carbon footprint study (SDC, 2008), except importantly bottom-up data was obtained directly from the NHS Trust. By reviewing the results, and comparing them to those for NHS England, the footprinting technique appears technically viable for use at an NHS Trust level.

Secondly, the applications and benefits of this technique were examined. At a Trust level, there are clear benefits in establishing and monitoring baseline emissions, and comparing progress to NHS England targets. In addition, wider use could accrue benefits via inter-Trust and regional NHS benchmarking.

Lastly, this technique could in future be applied to the development of 'low carbon pathway' models of care, by mapping carbon emissions to patient costing systems.

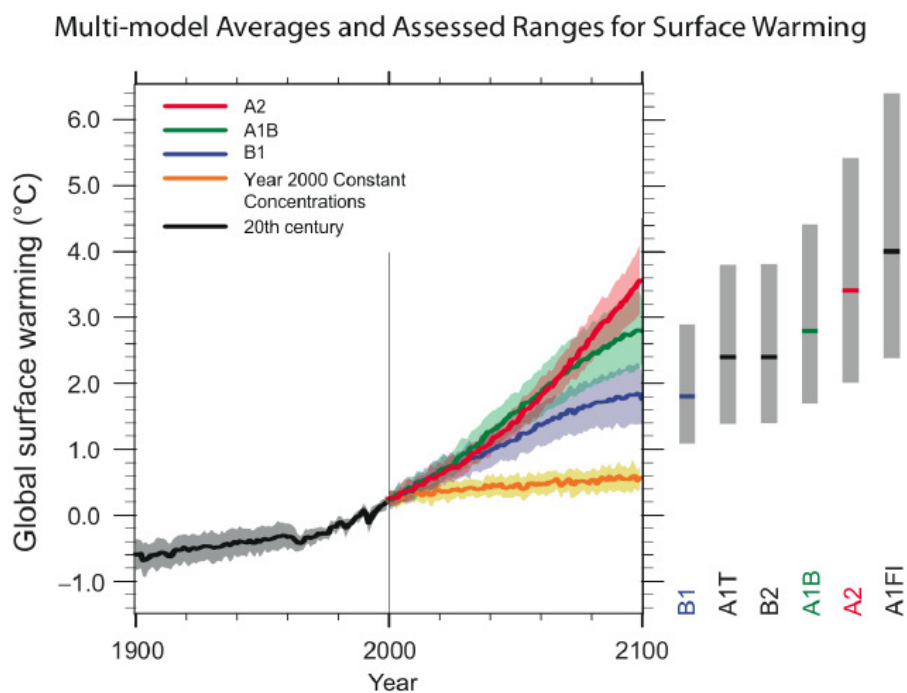
Approximate final word count: 17,000 words (excluding data tables)

# 1 Introduction

This thesis contains the work undertaken for the dissertation element of an MSc in Climate Change and Sustainable Development at De Montfort University. The introduction below summarises the research context and rationale, the key aims and objectives, and also outlines the thesis structure.

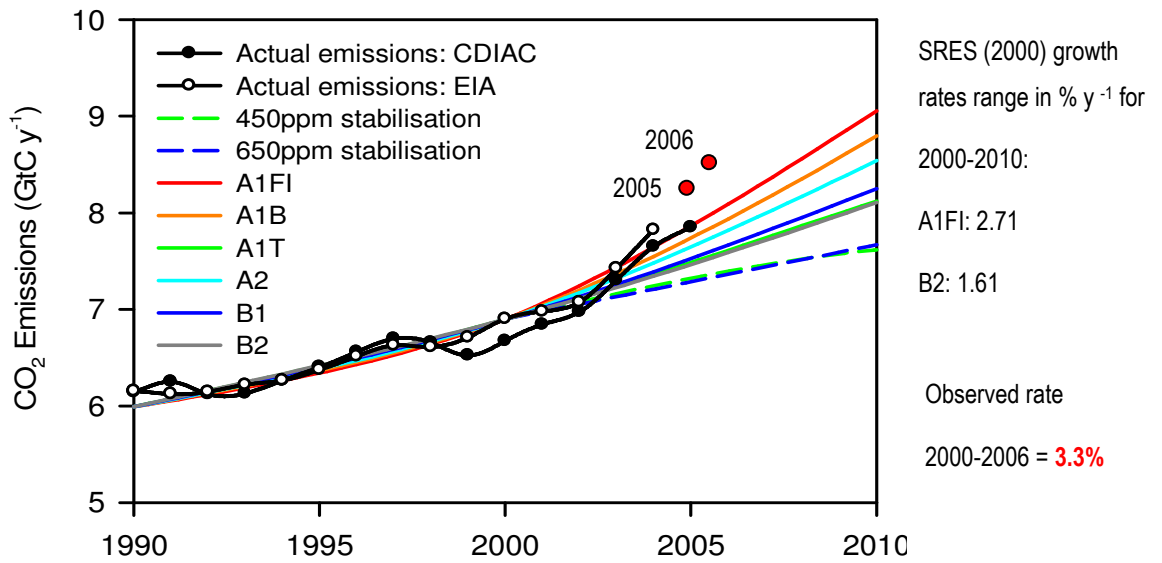
## 1.1 Context - climate change

Figure 1.1 shows the IPCC (2007a) projections for global temperature increases to 2100 due to rises in greenhouse gas (GHG) levels in the atmosphere – caused largely by man-made fossil fuel emissions (e.g. IPCC, 2007a):



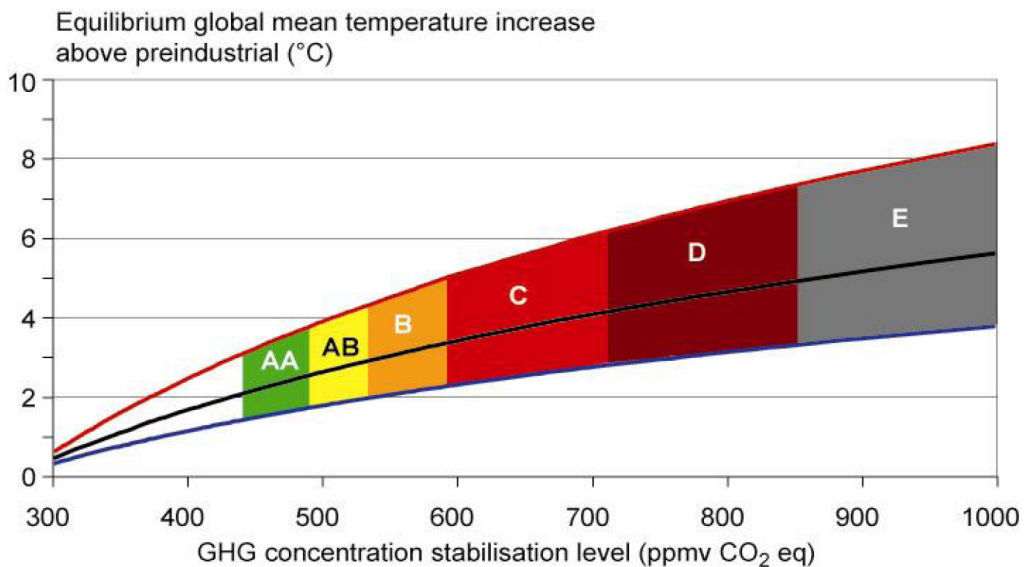
**Figure 1.1- IPCC temperature projections to 2100 (IPCC, 2007a)**

Figure 1.2 indicates that global emissions are currently following a 'high IPCC' emissions scenario, which suggests an average global temperature rise this century of up to 3°C, based on the projections in Figure 1.1. This translates to an increase of around 4°C above the pre-industrial level (c.1750).



**Figure 1.2- Trajectory of global fossil fuel emissions (Global Carbon Project, 2007)**

The view that the (current) high emissions scenarios would lead to temperature rises of at least 4°C above pre-industrial levels is supported by the IPCC (2007b) stabilisation pathways graph shown in Figure 1.3:



**Figure 1.3- IPCC GHG stabilisation pathways (IPCC, 2007b)**

Such temperature rises would lead the planet into various ‘tipping point’ scenarios (e.g., Lenton et al, 2008), beyond which carbon-cycle feedbacks (e.g. melting of

arctic ice cap) may lead to so-called 'run-away' or 'catastrophic' climate change. To avoid such scenarios, an increase in temperature above 2°C is widely accepted in the scientific community (e.g. Meinshausen, 2006) as being the upper limit permissible. Political leaders also now "recognise the broad scientific view that the increase in global average temperature above pre-industrial levels ought not to exceed 2°C". (p.19, G8 Summit, 2009). However, it has already been noted that most IPCC emissions trajectories will pass this stabilisation threshold.

Therefore, rapid global cuts in GHG emissions are required. In the UK, the Government via the 2009 Climate Change Act (HMG, 2008) has set a legal requirement for an 80% reduction in annual UK GHG emissions by 2050 relative to baseline (1990/1995) levels.

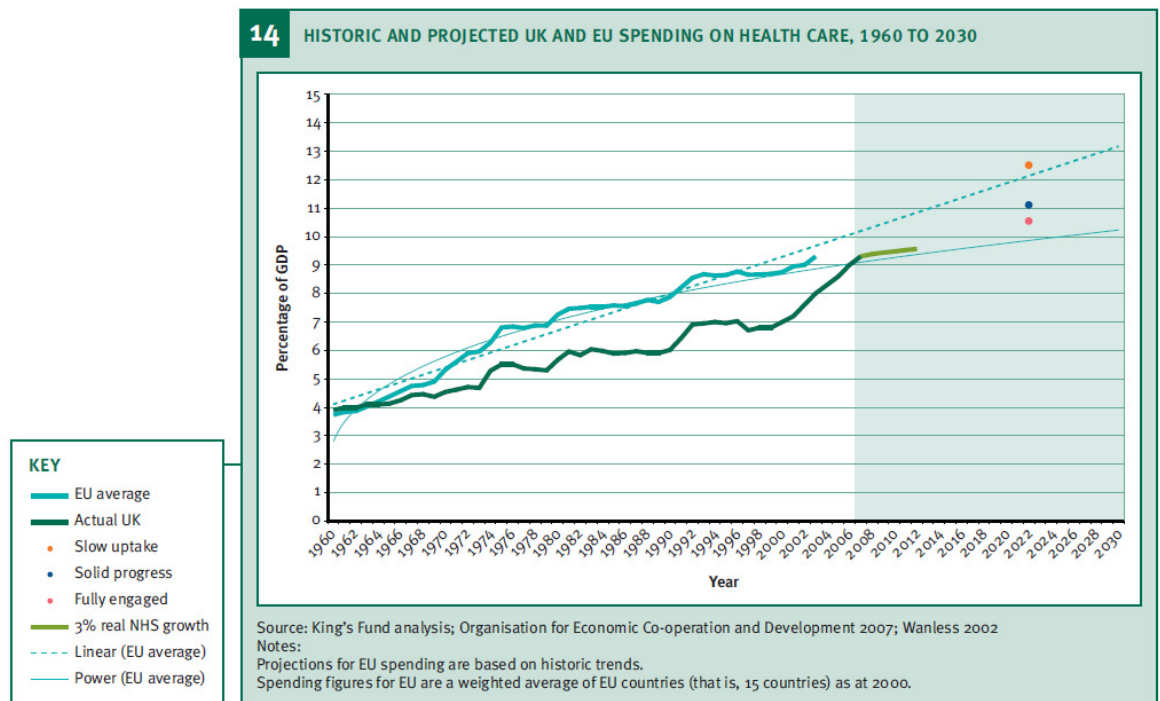
At an organisational level, various initiatives are underway including the Carbon Disclosure Project ([www.cdproject.net](http://www.cdproject.net)) and the Carbon Reduction Commitment (Defra, 2009). Standardised accounting systems are also being developed (e.g. BSI, 2008; GHG Protocol, 2009) to help companies to measure their carbon emissions and target reductions.

## **1.2 NHS England carbon emissions**

### **1.2.1 A consumption-based footprint approach**

Demand for healthcare continues to grow: UK healthcare expenditure (of which the NHS accounts for around 90%) has risen from 4% to 10% GDP between 1960 and 2010, as shown in Figure 1.4.



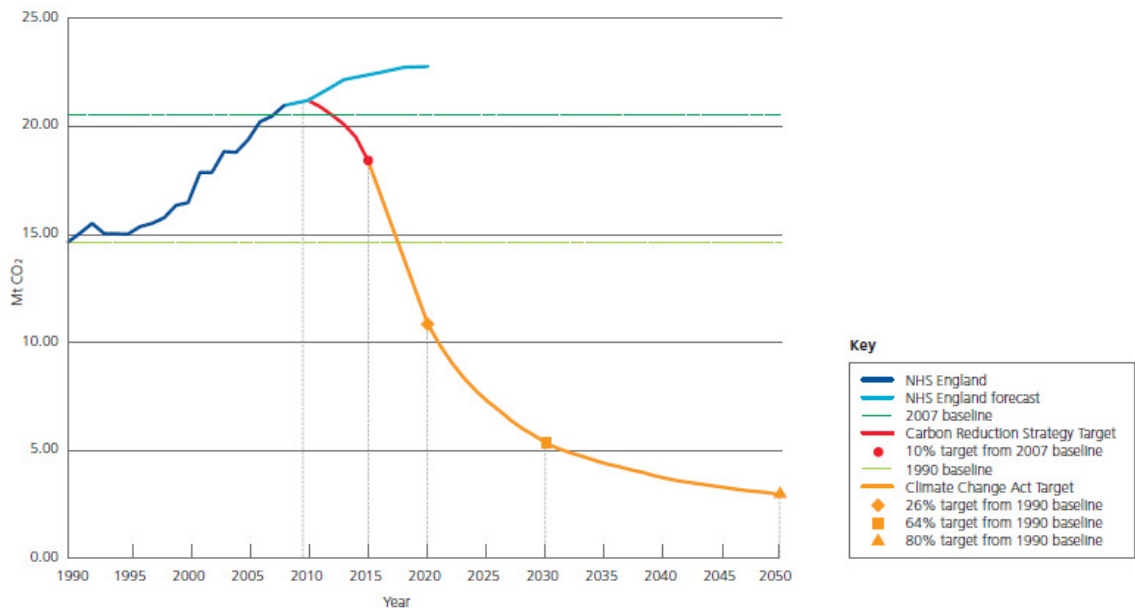


**Figure 1.4- Growth of EU and UK healthcare expenditure 1960-2020 (p.86 Wanless et al, 2007)**

Growth in expenditure usually means increases in emissions. Indeed, the carbon footprint study (SDC, 2008) found that NHS consumption-based emissions closely followed expenditure increases in the period 1992-2004. A key future challenge for the NHS is therefore to reduce healthcare carbon emissions whilst healthcare demand increases. To help coordinate a national strategy for resolving this issue, and sustainable development more widely, the NHS set up the Sustainable Development Unit (SDU) in 2008.

One of the SDU's first outputs was an NHS England Carbon Reduction Strategy (SDU, 2009a). The strategy's key target is a 10% reduction in the NHS England consumption-based carbon footprint by 2015 from 2007 levels. This target is overlaid with the UK's overall carbon reduction trajectory is shown in Figure 1.5.

This consumption-based approach has already been used in the UK at an organisational level in the public sector (e.g. Arup, 2009). However, NHS England has importantly become the first public sector in the UK (and possibly worldwide) to publish a strategy based around the measurement and reduction of its consumption-based carbon footprint.



**Figure 1.5- NHS England emissions target vs Climate Change Act targets (p.9, SDU, 2009a)**

Underpinning this consumption-based emissions strategy were two research studies (SDC, 2008; SEI and Arup, 2009a), undertaken primarily by the Stockholm Environment Institute (SEI), but co-developed and managed by the author. Taken together, they estimate the consumption-based footprint for NHS England over the period 1990-2020. These studies are outlined in more detail in Section 3.3.

### 1.2.2 The research rationale

Currently, more traditional carbon footprinting analyses are used at a Trust level, (e.g. Carbon Trust, 2009a), which measure building energy and vehicle fleet emissions, but not procurement-based emissions. This is an important omission, as by excluding procurement only a minority of NHS consumption-based emissions are measured.

However, the SDU are encouraging future research in NHS carbon footprint techniques. Indeed they state “piloting [footprint] approaches will be welcome as these will inevitably contribute to the required research and testing of

methodologies that is required prior to advocating a mainstream approach” (SDU, 2009b).

Therefore, the basic research rationale is that a gap exists between national targets and footprinting tools available at an NHS Trust level, which limits a Trust’s ability to monitor their contribution towards the national 2015 target of a 10% reduction in consumption-based emissions. This study contributes to that research agenda by undertaking the first consumption-based total carbon footprint analysis of an NHS Trust, and reviewing the results and the applicability of the technique.

### 1.3 Research aims and objectives

Having outlined the basis for the research, the research aims and objectives can now be formalised. Overall, the two main research aims were to:

- Develop a methodology to calculate the consumption-based footprint of Cambridge University Hospitals (CUH) NHS Foundation Trust and undertake the carbon footprint analysis.
- Review the analysis results and investigate the technical viability of applying the consumption-based methodology to NHS Trusts.

In addition, 8 objectives were then developed to meet these aims:

1. Develop initial analysis methodology;
2. Collate data required for carbon footprint analysis;
3. Iterate 1 and 2 until methodology and data confirmed;
4. Undertake the full consumption-based footprint analysis;
5. Review results and compare to the national footprint;
6. Review the validity of the input data, methodology and analytical results, and identify limitations where appropriate;

7. Assess the technical viability and benefits of the consumption-based footprint technique being more widely adopted at a Trust level;
8. Provide key conclusions, and make recommendations for future research.


#### **1.4 Thesis structure**

The thesis is structured as follows. Section 2 explains various terms which are pre-requisite understanding for the reader. Section 3 is a literature review summarising the current carbon research relevant to NHS England. The analysis methodology and emissions calculations are presented in Section 4, with the footprint results collated in Section 5. Section 6 reviews the potential for applying this technique more widely to NHS Trusts, before reaching overall conclusions and giving recommendations in Section 7. More detailed technical appendices are given, where appropriate, at the end of the thesis.

#### **1.5 Declaration**

None of the original work contained in this thesis has currently been published in any scientific journals. In addition, I have worked as project manager and lead author for the NHS England carbon footprint studies (SDC, 2008; SEI and Arup, 2009a) and the NHSScotland carbon footprint study (SEI and Arup, 2009b). By necessity, some of the material from these reports is summarised in Sections 2 and 3.3.

#### **1.6 Confidentiality**

Some of the data presented for the original MSc thesis assessment is confidential. In order to produce a version which can be viewed by third parties, such data has been removed where appropriate replaced by a yellow highlighted cell. 

## 2 Terminology

Before the literature review and current research is presented, various key terms are first outlined; as such knowledge is a pre-requisite to understanding the current research boundary and the content of this thesis.

### 2.1 Greenhouse gas (GHG) emissions

Six main GHG gases were included within the 1997 Kyoto Protocol (UN, 1997): carbon dioxide (CO<sub>2</sub>); nitrous oxide (N<sub>2</sub>O); methane (CH<sub>4</sub>); hydrofluorocarbons (HFCs); perfluorocarbons (PFCs); and sulphur hexafluoride (SF<sub>6</sub>). These gases trap heat in the earth's atmosphere, such that higher GHG levels cause higher temperatures – the so called 'greenhouse effect'. GHG emissions are typically reported as CO<sub>2</sub> 'equivalent' emissions, known as CO<sub>2</sub>e. The terms CO<sub>2</sub>e and GHG emissions can therefore be used interchangeably.

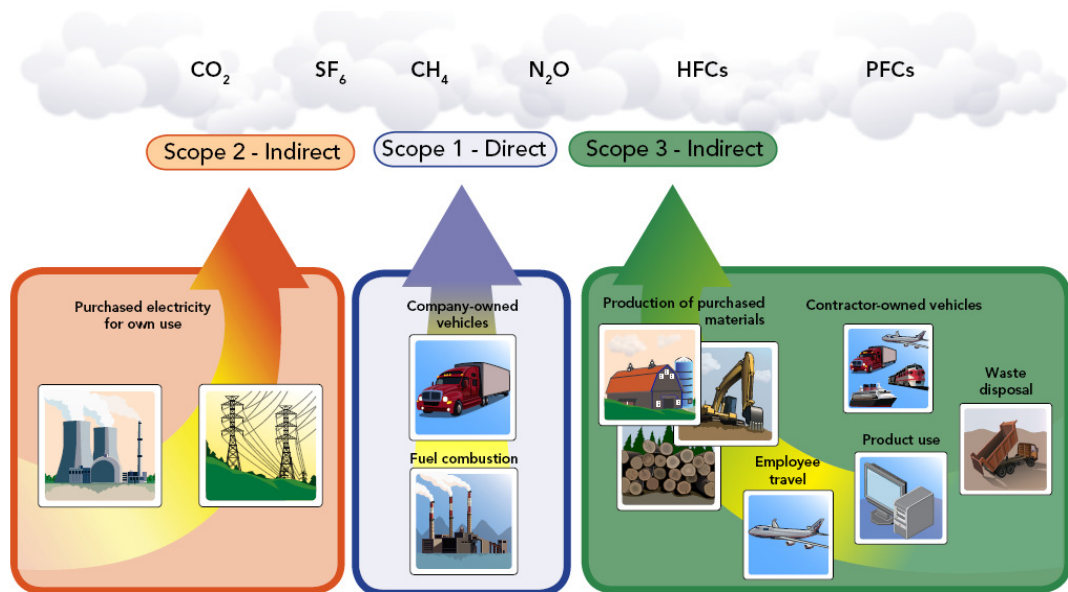
### 2.2 The 'GHG Protocol'

The "Greenhouse Gas Protocol" (also known as the GHG Protocol - refer to [www.ghgprotocol.org](http://www.ghgprotocol.org)) is the most commonly used standard methodology for emissions reporting worldwide. It provides the accounting framework for nearly all GHG standards in the world, and therefore is used by the majority of individual companies who produce GHG emissions inventories.

The GHG Protocol categorises emissions as being Scope 1, 2 or 3, as defined below and shown in Figure 2.1:

- **Scope 1 emissions:** direct GHG emissions occurring from sources owned or controlled by the company. 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 company.

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



**Figure 2.1: GHG Protocol classification of emissions (Clean Air-Cool Planet and Forum for the Future, 2008)**

The GHG Protocol organisation are developing two new standards for organisational and product life cycle emissions, to be published in 2010, which “will provide a standardised method to inventory the emissions associated with individual products across their full life cycles and of corporate value chains, taking into account impacts both upstream and downstream of the company’s operations” (GHG Protocol, 2009).

### 2.3 Defining a carbon footprint

Within the basket of GHG gases, carbon dioxide accounts for the majority of worldwide CO<sub>2</sub>e emissions (Hertwich and Peters, 2009), which explains the global

emphasis placed on CO<sub>2</sub> emissions. Combined with the fact that calculating CO<sub>2</sub> emissions is easier than for all six GHG gases, this explains why many organisations typically report only CO<sub>2</sub> emissions, rather than GHG/CO<sub>2</sub>e emissions. It was on this basis that NHS England's carbon reduction strategy (SDU, 2009a) uses CO<sub>2</sub> as a current proxy for overall progress to reducing GHG emissions.

Having determined that CO<sub>2</sub> emissions are of key importance, this research adopts the following consumption-based definition of a 'carbon' footprint:

“a measure of the exclusive total amount of carbon dioxide emissions that is directly and indirectly caused by an activity or is accumulated over the life stages of a product”  
(Wiedmann and Minx, 2008)

From this definition it can be seen there are two main types of carbon footprint:

- **Organisational carbon footprint:** this is the amount of CO<sub>2</sub> emissions directly and indirectly emitted by an organisation, for example a total annual footprint or the footprint to undertake a particular service or project. An organisational footprint approach is adopted for this research study.
- **Product carbon footprint:** this is the embedded life cycle analysis (LCA) emissions produced during the manufacture, consumption and disposal of a product.

Finally, the term 'carbon' footprint is a misnomer, as it is actually CO<sub>2</sub> (rather than carbon) emissions that are generally reported, as is the case in this thesis. However, as one mole of CO<sub>2</sub> (which weighs 44g) contains 12g of carbon, the masses of carbon and CO<sub>2</sub> can be directly related by the fraction 12/44.

## 2.4 Defining 'carbon intensity'

For this research study, 'carbon' intensity' is defined as:

“The carbon footprint per unit of consumption”

The following carbon intensities are used in this thesis, in line with commonly adopted conventions.

- **Travel:** kgCO<sub>2</sub>/km travelled (per person).
- **Building energy:** kgCO<sub>2</sub>/kWh used
- **Procurement:** kgCO<sub>2</sub>/£ spent.

In addition, 'carbon' intensity is a second misnomer as it actually refers to CO<sub>2</sub> emissions intensity, rather than carbon intensity.

## 2.5 Consumption-based emissions

It is important to understand the difference between production-based and consumption-based emissions in relation to carbon footprinting. An organisational 'production-based' footprint would typically consider only scope 1 and 2 emissions, whilst a consumption-based footprint would include all (scope 1-3) emissions.

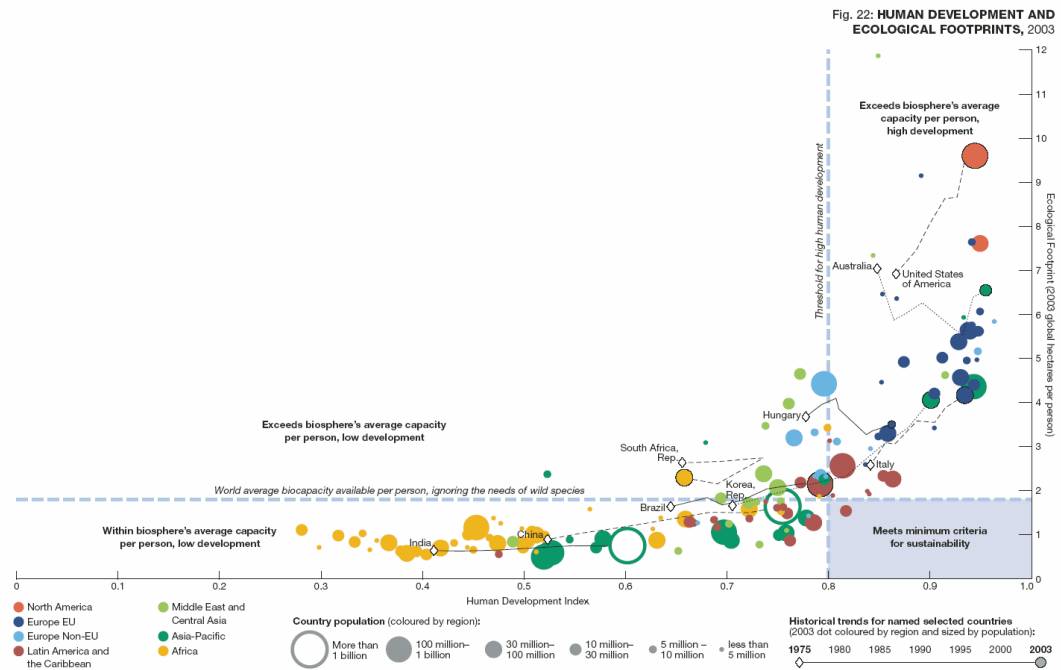
It is the consumption-based approach which was adopted for the national footprint research (e.g. SDC, 2008) and is also used for this research thesis. A top-down Input-Output (IO) analysis is a core part of the NHS consumption-based analysis. For more detail on both emissions boundaries and IO analysis, the reader is referred to Sections 3.1.3 and 3.3.2 respectively.

## 2.6 Ecological footprint

Carbon footprinting is sometimes confused with ecological footprinting. An 'ecological footprint' is defined below, and illustrated in Figure 2.2:

"A measure of the biologically productive land and water an individual, population or activity requires to produce all the resources it consumes and to absorb the waste it generates using prevailing technology and resource management practices" (Global Footprint Network (2009))





**Figure 2.2: Ecological footprint by country/region (p.19, WWF, 2006)**

A clear distinction can be made between the two types of footprints. Ecological footprinting assesses the natural resources consumed in relation to the amount available, and reports values in terms of area. However, carbon footprinting assesses the amount of fossil fuels extracted, burnt and released in gaseous form (as CO<sub>2</sub>) into the atmosphere. In this respect, the term 'footprint' is also a misnomer when applied to a 'carbon footprint', as it is not a measure of land area, but is a term that probably crossed over from the concept of ecological footprinting, a phrase which originated a decade earlier, as shown in Section 3.1.1.

### 3 Literature review

This section presents a carbon footprinting literature review relevant for this dissertation topic, and is split into the following sections:

- 3.1. **Carbon footprinting in the wider world:** this examines various key aspects of historical, current and future carbon footprinting use.
- 3.2. **Carbon footprinting in NHS England:** this outlines the various footprint studies that have been completed which focus on NHS England.
- 3.3. **NHS England carbon footprint studies (2008-09):** this covers in more detail the two most recent NHS England footprint studies, as they are highly relevant to the dissertation.
- 3.4. **Discussion:** the key points and implications from Sections 3.1-3.3 are discussed, leading to the MSc research rationale and key aims.

The literature review focuses on carbon footprinting techniques rather than applications, and so emerging uses such as carbon offsetting and carbon trading are not considered further in this section.

#### 3.1 Carbon footprinting in the wider world

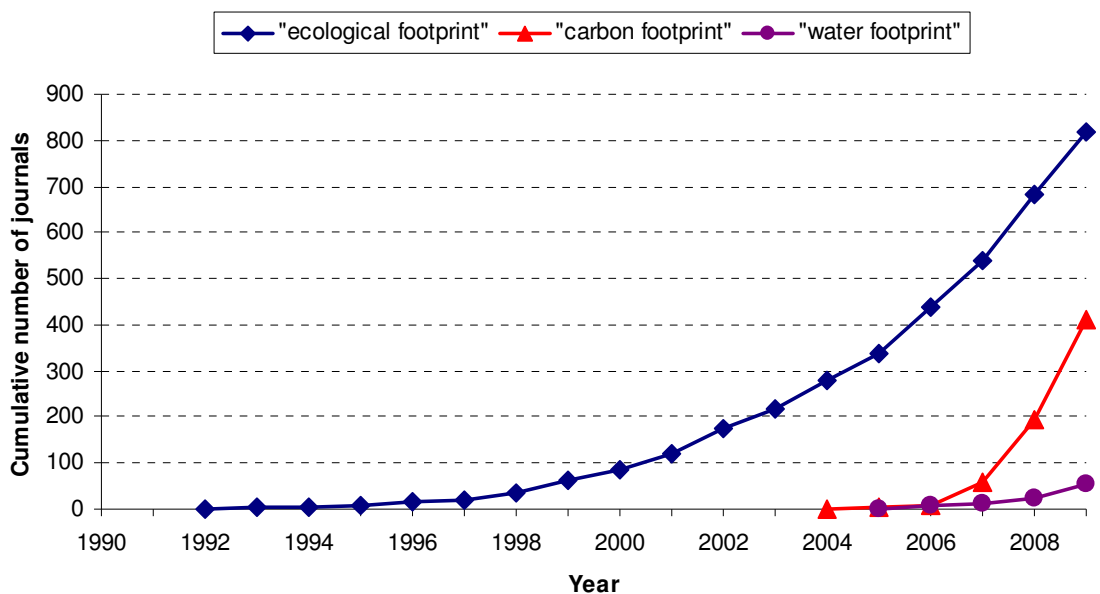
##### 3.1.1 Origins

The link between man-made emissions and global warming has been established for some time (e.g. Idso, 1974). Indeed, Perry et al (1982) noted that to restrict future global warming “it may become necessary to try to limit the concentration of atmospheric CO<sub>2</sub>.” Since then, climate change research has revealed the urgency required to reduce man-made carbon emissions to avoid serious and irreversible climate change (e.g., Hansen et al 2007, IPCC, 2007a).

The term ‘carbon footprint’ was introduced to cover the process of measuring carbon emissions, but its exact origin is unclear. A search on the Scirus database ([www.scirus.com](http://www.scirus.com)) found the first article including the term ‘carbon footprint’ to be

from Spencer (2005). It is most likely that the term carbon footprint developed from the term 'ecological footprint', which was first used by Rees (1992).

Whatever the origin of the term, its use has grown rapidly. Indeed, the use of the term 'footprint' as a concept is widening, and now includes 'water footprint' (e.g. Chapagain and Hoekstra, 2007). Figure 3.1 illustrates the growth in the use of the term 'footprint' by showing the cumulative number of journals available on the Scirus database that use the terms 'ecological footprint', 'carbon footprint' or 'water footprint':



**Figure 3.1: Cumulative occurrence of three 'footprint' terms in Scirus database journals**

### 3.1.2 Setting emissions targets

The 1997 Kyoto Protocol (UN, 1997) was the first global agreement on GHG emissions: it set an average target for industrialised countries to reduce their territorial emissions by 5.2% between 1990 and 2008-2012. A binding agreement for post-Kyoto targets (i.e. after 2012) is scheduled to be made at the Conference of the Parties (COP) 15, to be held at Copenhagen (UN, 2009).

Independently of global agreements, individual countries are legislating their own specific carbon emissions reduction targets. The UK is one example – the Climate Change Act 2008 (HMG, 2008) sets a target of an 80% reduction in GHG

emissions between 1990 and 2050. In addition, the Committee on Climate Change (CCC) has proposed the first three carbon budgets from 2008-2022, and has set an intended target of 42% reduction in GHG emissions (reported in CO<sub>2</sub>e) by 2020 from the 1990/1995 baseline levels (CCC, 2009).

At an organisational level, a wide range of companies are now measuring their organisational carbon footprint, and reporting them in their annual accounts and via mechanisms such as the Carbon Disclosure Project ([www.cdproject.net](http://www.cdproject.net)). It is also becoming more common for companies to set carbon emissions targets (e.g. Tesco plc, 2009).

### 3.1.3 Carbon confusion

On the surface, significant progress is being made. Globally, the scientific evidence of global warming is being translated into carbon emissions targets. The terms 'carbon emissions' and 'carbon footprinting' are now mainstream – they are part of our everyday language, and have borne spin-off concepts such as carbon trading and carbon offsetting. In calculating carbon footprints, two distinct analytical techniques have evolved: a 'bottom-up' life cycle analysis (LCA), and a top-down IO analysis. The former is more generally used at a product level, whilst the latter is more typically used at an organisational level.

However, at the same time, methodological differences have arisen in the carbon footprinting field:

- **Definitions:** Wiedmann and Minx (2008) note that “despite its ubiquitous appearance there seems to be no clear definition of this term [carbon footprint] and there is still some confusion what it actually means and measures and what unit is to be used”.
- **Methodological limitations:** the modelling techniques are novel and evolving and thus subject to limitations for both LCA and IO analysis techniques (e.g. Lenzen, 2001).
- **Emissions boundaries:** Matthews et al (2008) notes the importance of emissions boundaries. However, despite their importance, a lack of

common and consistent boundary applications has been problematic. Personal carbon calculators have been the subject of particular controversy (e.g. Padgett et al, 2008), as in turn have product carbon footprints (e.g. Johnson, 2008). Territorial emissions for countries illustrate the problem: they overestimate consumption emissions from exporting nations such as China (New Scientist, 2008), and conversely underestimate emissions from importing nations such as the UK, as illustrated in Figure 3.2:

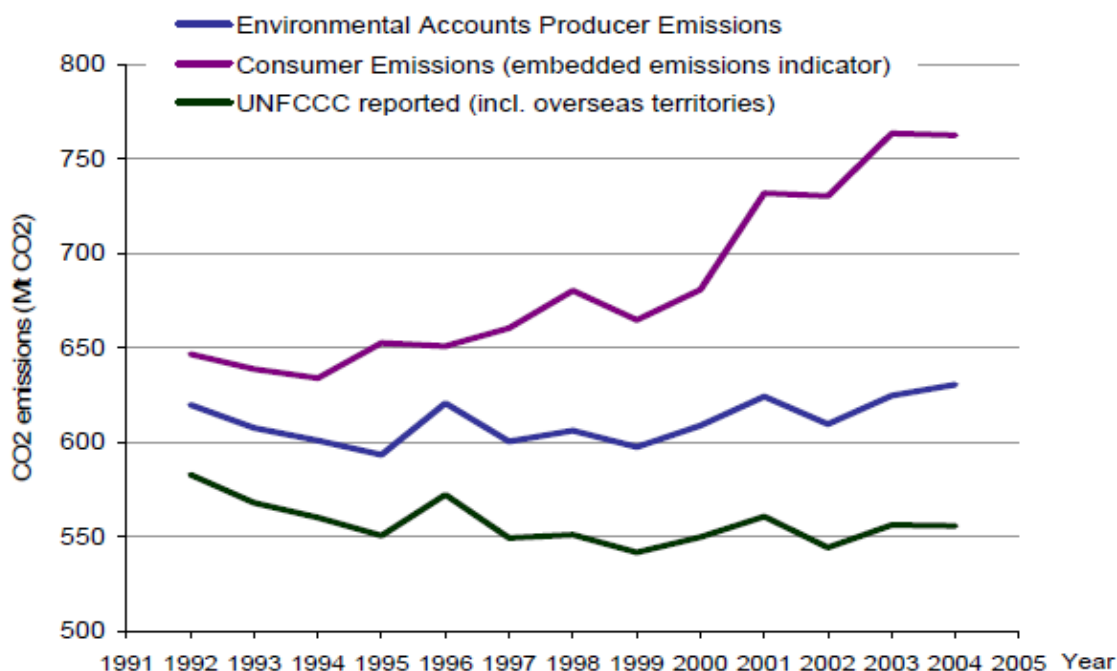


Figure 3.2: UK consumption versus production emissions (Wiedmann et al, 2008)

#### 3.1.4 Moving towards carbon clarity

Fortunately, as Wackernagel (2009) notes, “the last decade has seen extensive improvements in the methodology of footprint analysis, leading to increasingly robust and reliable results and a broader array of applications”. Whilst many methodological issues remain, there has been progress made in many areas. For example:

- **Definitions and boundaries:** these are focusing on a more consumption-based approach (e.g. Peters, 2008). In addition, more consistent guidance

is emerging as standardised methodologies are developed for organisational and product level footprinting such as the GHG Protocol (2009) and PAS 2050 (BSI, 2008).

- **Footprinting techniques:** these are becoming increasingly sophisticated. For example, IO analyses are starting to use Multi-Region IO (MRIO) models (Hertwich and Peters, 2009), rather than Single Region IO (SRIO) models. This accounts for carbon intensities from different world regions. Such analysis is also becoming more accurate (e.g. Wiedmann, Lenzen and Wood, 2008). In addition, the bottom-up and top-down approaches are now merging to form hybrid IO-LCA analysis techniques (e.g. Crawford, 2008). As Wiedmann and Minx (2008) stated “such a Hybrid-EIO-LCA method, embedding process systems inside input-output tables, is the current state-of-the art in ecological economic modeling”.

### 3.2 Carbon footprinting in NHS England

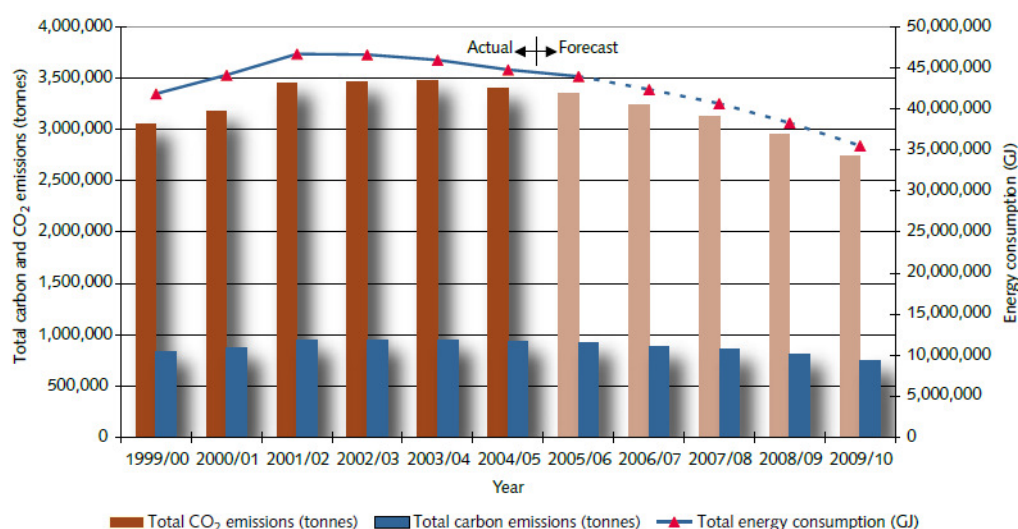
The literature search now focuses on NHS England, and reviews the carbon footprinting agenda that has been evolved in three key areas:

- Strategy
- Carbon action
- Journal articles

#### 3.2.1 NHS and DH carbon strategies

The Department of Health (DH) has produced numerous strategy documents since the NHS Plan (DH, 2000), including DH (2004); DH (2005); DH (2007b); Wanless et al (2007); and Darzi (2008). Given their focus on future service delivery and investment in the NHS, it is perhaps surprising that the terms ‘carbon emissions’, ‘climate change’ or ‘global warming’ do not occur once in any of these strategically important documents, given the effect that climate change may have on the demands of healthcare systems (e.g. Kovats, 2008).

DH's strategic advice on NHS carbon emissions has to date been provided by Estates and Facilities Division. This is indicative of the traditional focus on building energy emissions. In 2001, DH set a target for a 15% reduction in energy consumption and carbon emissions from the NHS estate between 2000 and 2010 (DH, 2001). This target has since been embedded in the NHS's 'Vital Signs' operating framework (DH, 2008). However, as the target resides in Tier 3, it is a voluntary and non-mandatory target, which arguably weakens its impact. Overall progress towards the DH target appears slow, as indicated by Figure 3.3:



**Figure 3.3: NHS England actual versus predicted energy consumption and carbon emissions, (p.13, DH, 2007a)**

In addition, in 2006 DH issued the guidance document EnCO<sub>2</sub>de (DH, 2007c), which gave Trusts advice on how to reduce building energy emissions within their estate.

In contrast to DH's continued focus on building energy emissions, there is evidence that the NHS more recently has moved strategically ahead by considering a much wider 'climate change' boundary. Two examples support this assertion:

- **The NHS Confederation:** this organisation – an independent membership body for all NHS organisations - published a paper (NHS Confederation, 2007) which examined "specific challenges [to the NHS] presented by climate change in six key areas: energy, planning and building,

procurement, transport and travel, waste management and employment policy”.

- **The NHS SDU:** the NHS set up this organisation in 2008 in order to “provide leadership, support and policy input to ensure the NHS in England is the leading public sector organisation in promoting sustainable development and mitigating climate change” (SDU, 2009c). One of its first actions was to produce an NHS carbon reduction strategy (SDU, 2009a).

### 3.2.2 Carbon action

Firstly, in terms of research into carbon emissions within NHS England, three studies are particularly relevant:

- **Material Health** (Barrett et al, 2004): this followed an LCA based approach to calculate an ecological footprint for the NHS. It converted mass of products into an ecological footprint. Table 3.1 shows very similar split of the calculated ecological and carbon footprint results between the 3 primary sectors. However, the table also shows there are significant differences in the sub-sector results for pharmaceuticals and medical equipment. In particular, the pharmaceutical ecological impact appears very low, which “illustrates the limitations of applying a product-based LCA approach to calculate a large organisational footprint” (Barrett, 2009).

Category	Sub-category	Material Health (Barrett et al, 2004) (% of total 2001 Ecological Footprint)	NHS carbon footprint report (SDC, 2008) (% of total 2004 Carbon Footprint)
Primary sector	Travel	22%	18%
	Building energy	17%	22%
	Procurement	60%	60%
Secondary sector	Pharmaceuticals	1%	22%
	Medical, surgical and laboratory equipment	26%	9%

**Table 3.1: Comparison of NHS England ecological versus carbon footprint results**



- Statistics on energy performance and carbon and CO<sub>2</sub> emissions** (DH, 2007a): this was produced by DH Estates and Facilities, and took annual Trust returns of building energy data from the Estates Return and Information Collection (ERIC) system (DH, 2009b), and converted the energy data into equivalent carbon and CO<sub>2</sub> emissions. Importantly for NHS Trusts, it distilled national energy consumption down to a local level by allowing their energy consumption to be assessed against energy performance benchmarks as illustrated in Figure 3.4:

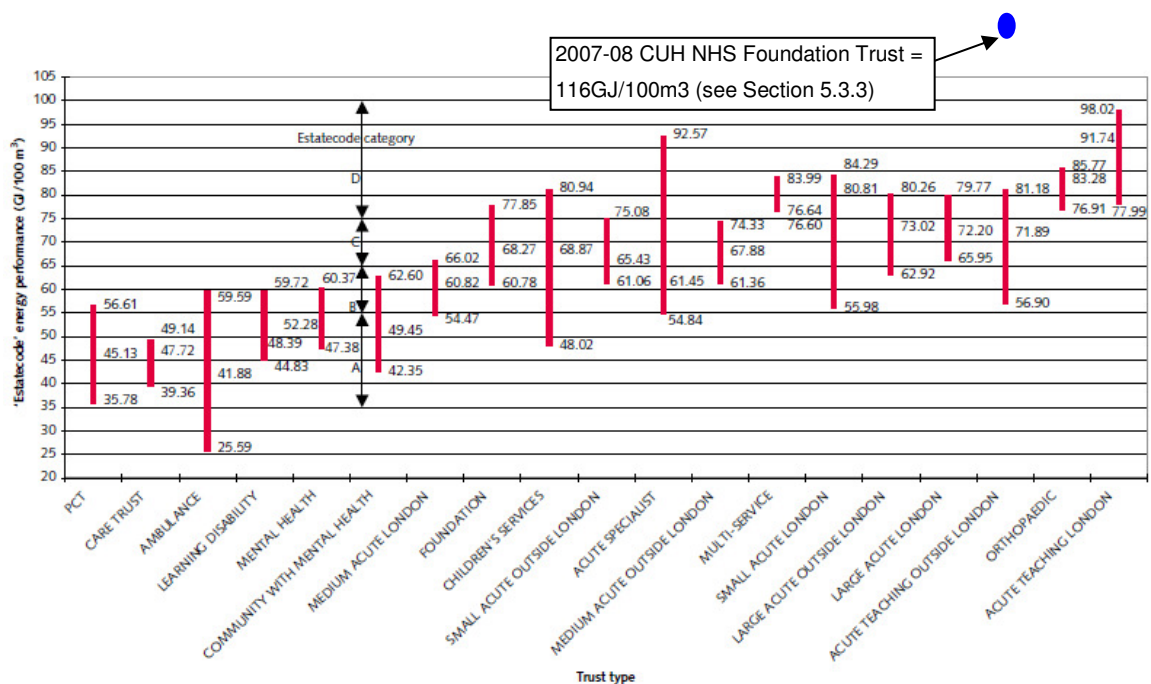


Figure 3.4: NHS England energy performance by Trust type 2004/05, (p.17, DH, 2007a)

- NHS England carbon footprint studies** (SDC, 2008; SEI and Arup, 2009a): these two studies were commissioned by the SDU to provide evidence based data for the NHS England carbon reduction strategy (SDU, 2009a). The consumption-based emissions of NHS England were calculated from three sectors: travel, building energy and procurement. As this MSc research calculates an NHS Trust footprint using a similar approach, the methodology and key results of the NHS England studies are very relevant, and so are summarised in Section 3.3.

Secondly, in terms of action on carbon, there are several initiatives affecting the NHS which are noteworthy:

- **The Carbon Trust Carbon Management Programme** (Carbon Trust, 2009b): This programme takes 10-20 Trusts per year and facilitates a building energy footprint and action plan. Phase 4 began in May 2009. Since 2006, 49 Trusts have completed the programme, equating to around 10% of all NHS Trusts.
- **DH Energy Efficiency Fund** (DH, 2009b): this released £100M of investment funds for Trusts wishing to adopt energy efficiency programmes. The most common application was for Combined Heat and Power (CHP) systems.
- **Good Corporate Citizenship Tool** (SDC, 2009): this is a tool for NHS bodies to review their overall environmental performance. It has proved popular such that “over half of all NHS organisations are now registered” (p.25, SDU, 2009a).
- **Procuring for Carbon Reduction**: the Purchasing and Supply Agency (PASA) – an executive DH agency who advise the NHS on supply issues - have set up a Procuring for Carbon Reduction steering group. The group is aimed at developing “a roadmap and guidance to help trusts consider carbon emissions and the impacts of decisions (where relevant) within the procurement processes” (PASA, 2009a).

### 3.2.3 Journals - healthcare articles

Various databases (including Scirus and ISI Web of Knowledge - [www.isiknowledge.com](http://www.isiknowledge.com)) were searched to identify journal articles relating to climate change and carbon emissions in NHS England. The NHS is a huge organisation: its annual budget is currently around £100Bn (8% of GDP), and with 1.3M staff it is the 4<sup>th</sup> largest employer in the world after the Chinese army, the Indian State Railways and Walmart (Imperial College Healthcare NHS Trust, 2009).

The scale of the NHS means its potential effect to influence environmental best practice has long been known – for example Gray and Keeble (1989) stated “that the NHS with its enormous purchasing power is ideally placed to stimulate environmentally friendly practices elsewhere in the economy”.

In general, journal articles reviewed can be grouped into two classes:

- **Adaptation to climate change:** these examine how the NHS needs to adapt its service provision and infrastructure to respond to climate change. Examples include studies into adaptation performance of naturally ventilated buildings (Lomas and Ji, 2009) and the health effects of climate change (Kovats, 2008).
- **Reducing emissions:** this class relates to how to reduce the footprint of activities undertaken by the NHS. Some are obvious topics, such as energy efficiency within the built environment (e.g. Wilkinson et al, 2007), or flying to medical conferences (ref, 2009). Others are less obvious, such as reduction in material consumption (Karlsson and Pigretti, 2005), or an ophthalmology carbon footprint (Somner et al, 2009).

### 3.3 NHS England carbon footprinting studies (2008-09)

Two studies were undertaken in 2008-09, with the author as project manager and lead author for the subsequent reports:

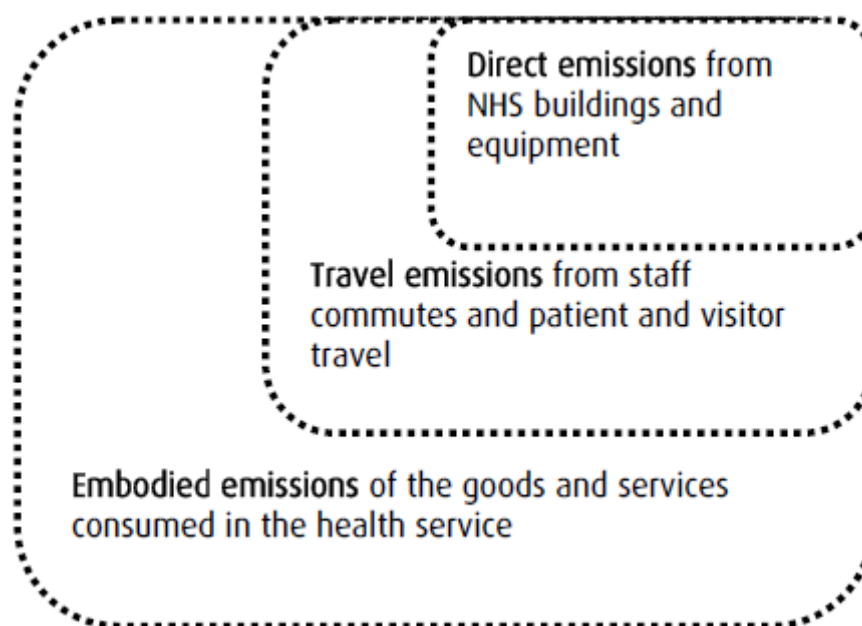
- **NHS England Carbon Emissions: Carbon Footprinting Report 2008** (SDC, 2008): this contained the consumption based carbon footprint analysis for NHS England for 1992-2004. It calculated emissions from three emissions sectors: building energy, travel and the embedded (procurement) emissions in goods and services used by the NHS. The study determined that 60% of emissions were from the procurement sector, which validated the importance of the consumption-based approach.
- **NHS England Carbon Emissions: Carbon Footprint modelling to 2020** (SEI and Arup, 2009a): this projected NHS England emissions to 2020, and

quantified policy interventions in terms of carbon saving ‘wedges’ – analogous to the Pacala-Socolow wedges (Pacala and Socolow, 2004).

These studies are of key interest to this research study, as the methodology developed in this thesis follows a similar approach. The methodology (Section 3.3.1) and results (Sections 3.3.2 - 3.3.5) are thus a pre-requisite for a detailed understanding of the main thesis results and conclusions, and as such the national studies are given below in some detail.

### 3.3.1 Carbon footprinting methodology - overview

A methodology was developed which included scope 3 emissions, in addition to scope 1 and 2 emissions. The methodology incorporates both direct (i.e. on-site) and indirect (i.e. off-site) carbon emissions, and considers the full supply chain impacts of NHS England’s activities which can be categorised by building energy, travel and procurement emissions as shown in Figure 3.5:



**Figure 3.5: Basic components of the NHS England carbon footprint (p.55, SDC, 2008)**

The key parts of the methodology for the three primary emissions sectors are now summarised below. For a more detailed description the reader is referred to the 2008 carbon footprint report (SDC, 2008).

- **Travel emissions:** these were associated with movement of people, i.e. staff, patients and visitors. Modal travel survey information for commuting and medical related journeys was obtained from the National Travel Survey (NTS) data (DfT, 2009a). Known data on NHS staff employment and the population in England were obtained. These datasets were combined with SEI derived modal carbon intensities ( $\text{kgCO}_2/\text{km}$ ) to calculate travel emissions for staff commuting, patient and visitor travel. Finally, business travel emissions were derived from the IO procurement analysis – see below.
- **Building energy emissions:** these result from consumption of on-site energy (e.g. heating gas use) and off-site (grid) electricity. Historical energy consumption data was obtained from annual returns by Trusts submitted to the DH Estates Return and Information Collection (ERIC) system (DH, 2009a). Energy carbon intensities ( $\text{tCO}_2/\text{kWh}$ ) were derived primarily from Defra (2007) data, and combined with the ERIC consumption data to calculate carbon emissions values.
- **Procurement emissions:** these are caused by the production, manufacture and transportation of goods and services consumed by NHS England to their point of use. The calculation technique combines an expenditure breakdown of NHS England with carbon intensities ( $\text{kgCO}_2/\text{£}$  spent) to determine NHS England procurement emissions. A top-down IO analysis forms the basis of the method, which due to its importance is explained in more detail in Section 3.3.2 below.

The methodology described above was used for the calculation of historical NHS England emissions. For projecting emissions to 2020, future estimates/extrapolations of consumption and carbon intensities in these sectors were used – refer to the 2009 report (SEI and Arup, 2009a) for more detail.

### 3.3.2 The top-down IO methodology

The analytical breakthrough by the SEI that enabled the overall NHS England consumption footprint to be derived was the application of a top-down IO analytical

approach to estimate NHS England procurement emissions – this had not previously been done. The basic process for calculating IO based procurement emissions is outlined below – refer to Appendix B of the 2008 NHS carbon footprint report (SDC, 2008) for more detail.

Firstly, at a national level, the economy can be classified into 123 Standard Industrial Classification (SIC) economic sectors (UK National Statistics, 2009a). The SIC sectors are given later in this thesis in Table 4.14. Each sector's expenditure flows to other sectors is known via IO analytical and Supply-and-use tables (UK National Statistics, 2009b). Healthcare was one such sector, and as NHS expenditure was determined to account for nearly all healthcare expenditure in the UK, the IO tables in effect show the NHS expenditure on other SIC sectors.

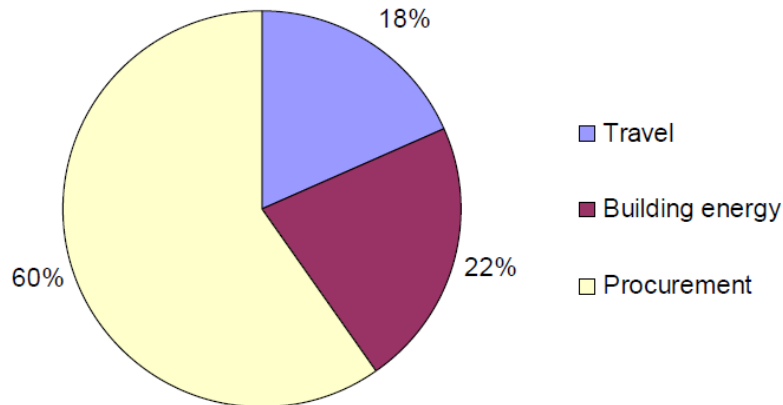
Secondly, carbon intensities ( $\text{kgCO}_2/\text{£ spent}$ ) were derived by the SEI for each SIC sector, using the UK environmental accounts (UK National Statistics, 2009c) and other data sources.

Finally, the SIC expenditure breakdown and emissions intensities were then combined to calculate total annual carbon emissions for each SIC sector. The SIC sectors were then grouped into various categories appropriate for the NHS. The mapping of SIC to NHS emissions sectors is identical for the NHS England footprint and this MSc research, and so to avoid replication the reader is referred to Table 4.15 of this thesis.

### 3.3.3 NHS England carbon footprint: 2004 results

The 2004 NHS England carbon footprint is broken down in the three primary sectors as shown in Figure 3.6 and Table 3.2. At an estimated  $18.6\text{MtCO}_2$  in 2004, NHS England's carbon footprint represents over a quarter of England's public sector emissions (p.71, SDC, 2008), and around 3% of the UK's total  $750\text{MtCO}_2$  consumption-based  $\text{CO}_2$  emissions (Wiedmann et al, 2008). Based on the comparative study (p.9, SDC, 2008), it can be seen that these percentages are very similar to the NHS England proportion of public sector net expenditure (£30Bn/£120Bn) and UK GDP (£30Bn/£1,000Bn). So overall NHS England

emissions are high due to the overall size of the NHS budget, rather than highly carbon intensive consumption.



**Figure 3.6: 2004 NHS England carbon footprint primary sector breakdown**

Sector	CO <sub>2</sub> emissions	
	MtCO <sub>2</sub>	% of total
Travel	3.4	18%
Building energy use	4.1	22%
Procurement	11.1	60%
<b>Total</b>	<b>18.6</b>	<b>100%</b>

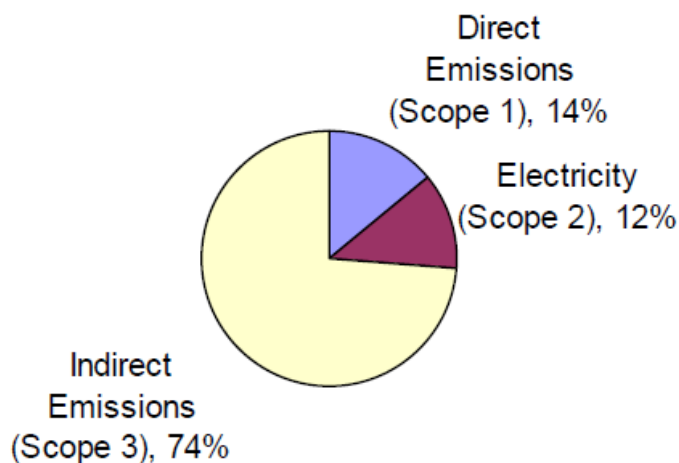
**Table 3.2: 2004 NHS England carbon footprint primary sector breakdown**

Arguably the most important footprint result was that emissions produced in the production and distribution of goods and services account for 60% of the carbon footprint of NHS England. This aligns the emissions of NHS England more closely to that of a service sector industry, where emissions from building energy are proportionately quite low. This assertion is supported by the observation above that the NHS England emissions intensity ( $\sim 0.55\text{kgCO}_2 / \text{£spent}$ ) is almost the same as both the rest of the public sector and the overall UK economy.

In contrast, a manufacturing organisation, whose core activities are based on energy intensive processes would have higher overall emissions intensity and a larger share of emissions from building energy. For example - the SDC (2008)

study found 80% of pharmaceutical emissions were from on-site energy consumption (p.13, SDC, 2008).

Finally, the importance of considering indirect scope 3 emissions within the NHS England footprint is supported by the breakdown of Scope 1-3 emissions shown in Figure 3.7:

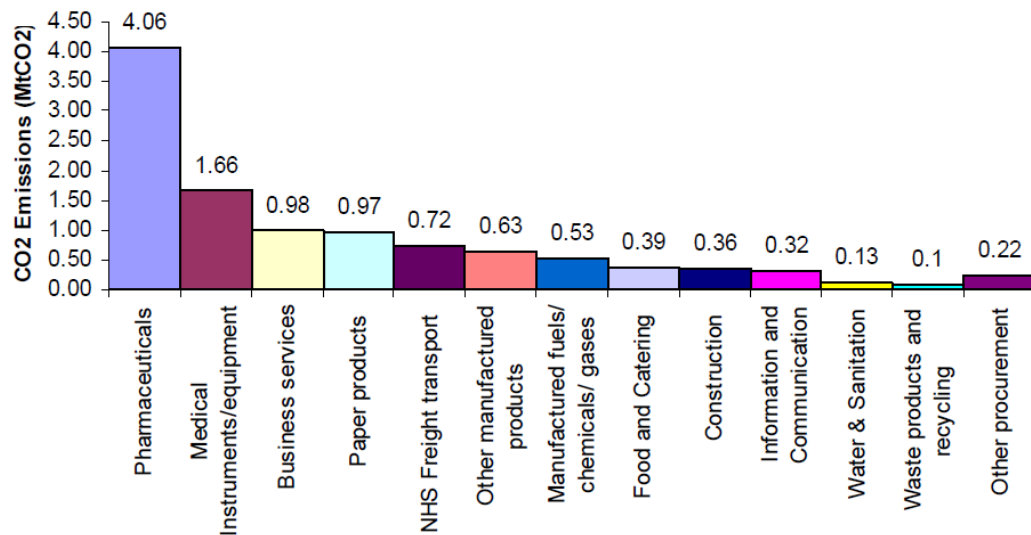


**Figure 3.7: NHS England Scope 1-3 CO<sub>2</sub> emissions (p.16 SDC, 2008)**

Scope 3 emissions include all procurement emissions, and in addition include travel emissions from staff commuting, patient and visitor journeys. This supports the rationale to determine and baseline NHS England emissions using scope 1, 2 and 3 emissions, as the consumption-based footprint defines the true impact of the NHS in terms of CO<sub>2</sub> emissions.

Within the procurement sector, the emissions occurring in the manufacture and distribution of pharmaceuticals consumed by NHS England are responsible for a fifth of the overall carbon footprint, as shown in Figure 3.8. This is equivalent in magnitude to either the building energy or travel sectors, and reflects the fact that around a quarter of the NHS England procurement budget is spent on pharmaceuticals (SDC, 2008).

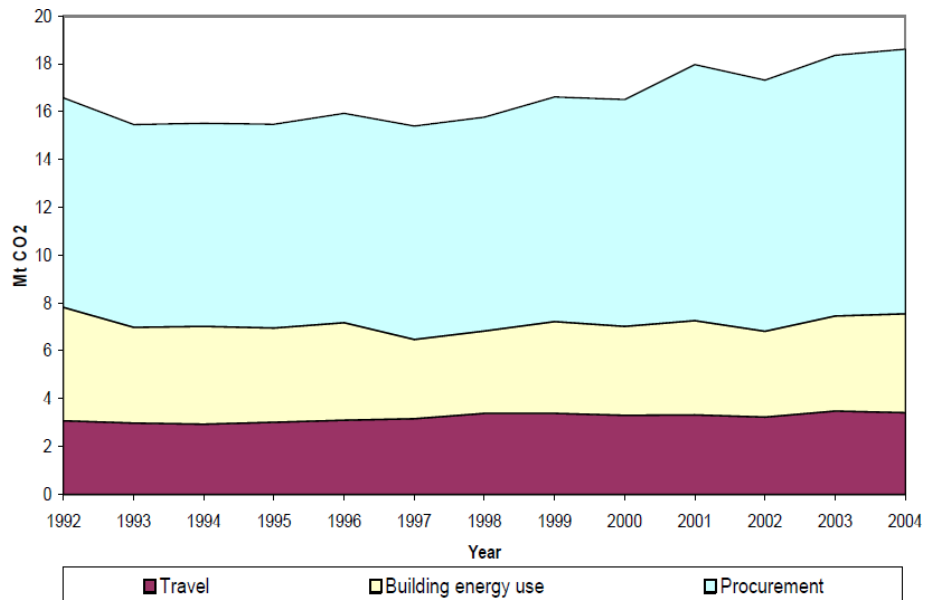




**Figure 3.8: 2004 NHS England carbon footprint procurement emissions breakdown (p.12 SDC, 2008)**

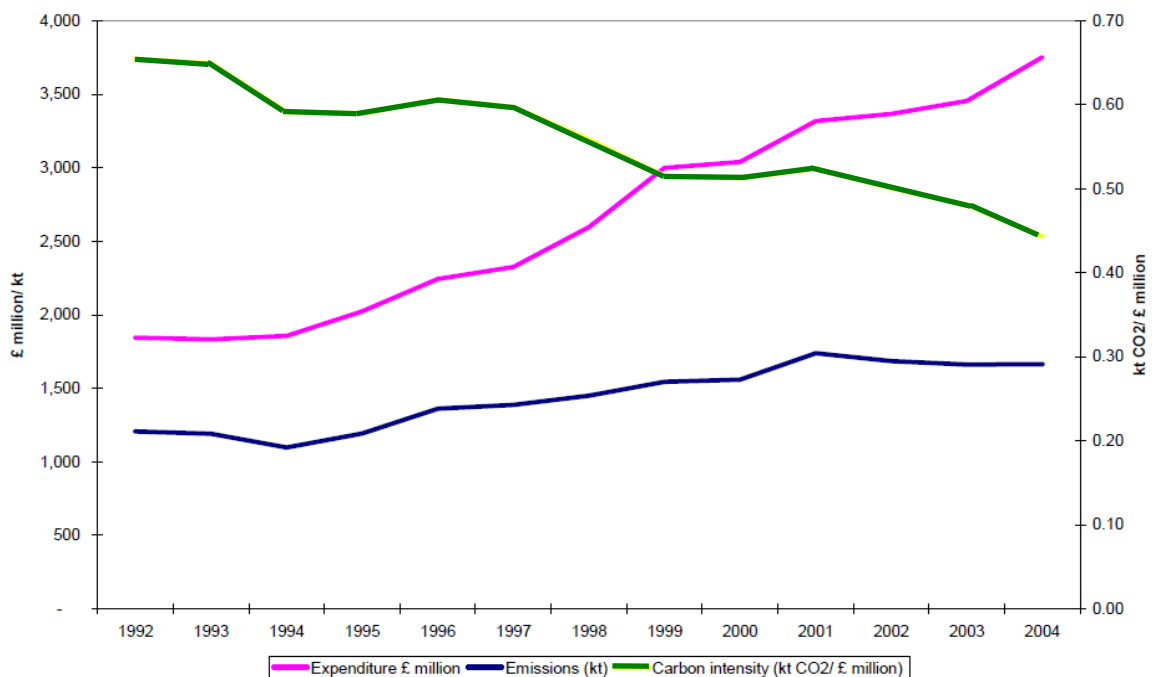
### 3.3.4 NHS England carbon footprint: time-series results (1992-2004)

The analysis estimated the NHS England emissions for the period 1992-2004. The results are illustrated in Figure 3.9. At 12%, the growth in total NHS consumption CO<sub>2</sub> emissions over 1992-2004 is slightly lower than the 17% rise in the same period for overall UK consumption CO<sub>2</sub> emissions (Wiedmann et al, 2008). Despite a 13% fall in building energy emissions, the overall rise in emissions resulted from increases in the other two sectors: travel (+11%) and procurement (+26%).



**Figure 3.9: 1992-2004 NHS England carbon footprint emissions breakdown**

In addition, Figure 3.10 shows a very important result. It shows how medical equipment carbon intensity – as with most procurement sectors - fell in this period. This means that emissions increases would have been greater had it not been for reductions in carbon intensity.



**Figure 3.10: 1992-2004 NHS England medical equipment carbon intensity**

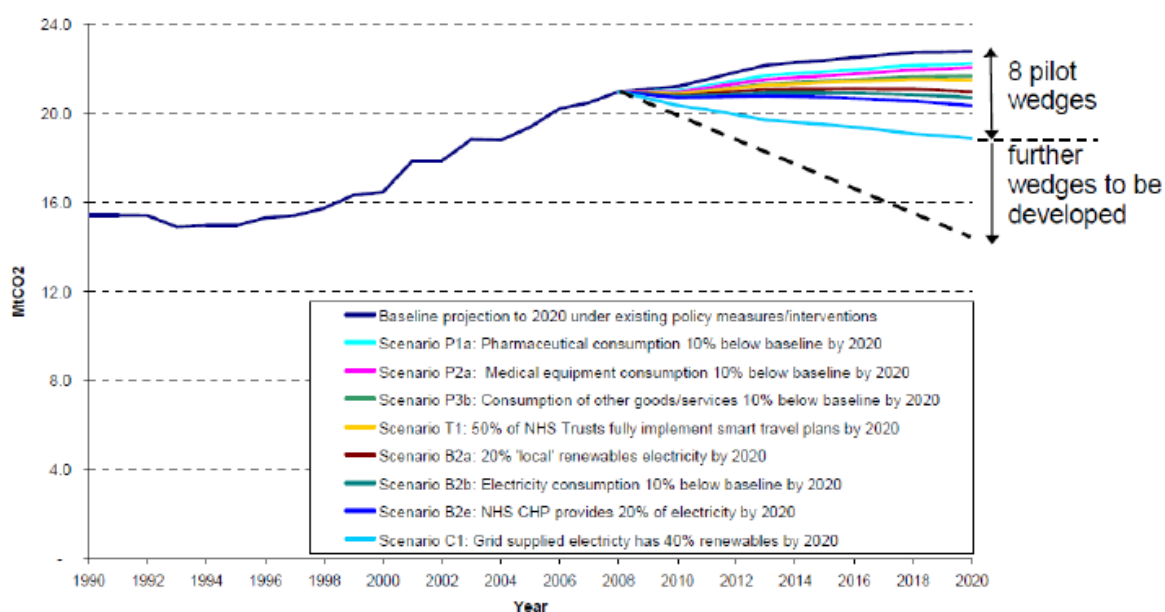
### 3.3.5 NHS England carbon footprint: modelling to 2020

Having calculated the historical NHS England emissions, the second phase of the carbon research study looked ahead to NHS England emissions in 2020. The analysis was split into two parts which are described below.

Firstly, emissions were projected to 2020 using a baseline scenario, which combines a continuing trend analysis with known estimates of future consumption – for example NHS England expenditure projections (Wanless et al, 2007). It is therefore similar to (but not the same as) a business-as-usual scenario. Under the baseline scenario, consumption-based CO<sub>2</sub> emissions were forecast to rise to 23MtCO<sub>2</sub> by 2020, 55% higher than in 1990.

Secondly, the model that had been developed to project emissions to 2020 was then used to test ‘pilot’ carbon ‘wedge’ savings, based on sample policy interventions, as shown in Figure 3.11. Key pilot wedges included:

- **Travel:** smart travel plans adopted across all NHS Trusts;
- **Building energy:** CHP provides 20% of NHS England electricity by 2020;
- **Procurement:** lowering consumption of pharmaceuticals to 10% below the 2020 baseline projection



**Figure 3.11: 1990-2020 NHS England carbon footprint and carbon wedges (p.18, SEI and Arup, 2009a)**

### 3.4 Discussion

#### 3.4.1 Literature review

Section 3.1 found that the term 'carbon footprint' has emerged in scientific literature quite recently – around 2005. Since that time, carbon footprint research has moved at a great pace – however this inevitably means within this still quite embryonic field that confusion about definitions and boundaries still exist. However, based on the literature review it appears that footprinting is moving towards a fuller inclusion of Scope 1-3 carbon emissions (e.g. GHG Protocol, 2009), as methodologies and datasets develop.

Section 3.2 illustrates how carbon research and action within the NHS has until recently been focussed on building energy emissions. This is changing, as the national level measurement and strategy is now based around full consumption-based emissions. For example, the NHS is evolving ways including the supply chain impacts into its decision making (e.g. PASA, 2009a), whilst research is also looking at the wider NHS impacts of consumption (e.g. Somner et al, 2009).

Section 3.3 outlines the full consumption footprint studies done for the NHS in 2008-09. This new understanding of the full consumption footprint of NHS England has facilitated a broad ranging carbon reduction strategy that includes building energy emissions, but also moves beyond this sector. In particular the carbon research:

- Highlights the importance of considering the NHS England's full consumption footprint, since only a quarter of NHS England emissions are scope 1 and 2 emissions, which are captured by 'traditional' carbon footprinting techniques.
- Confirms the scale of the challenge to NHS England: annual emissions are projected to rise by over 50% over the period 1990-2020, at a time when significant reductions are required.

### 3.4.2 Implications and rationale for MSc research

Overall, the literature review did not find evidence of a Trust level full consumption-based footprint yet being undertaken. This concurs with the author's knowledge, who has been working at a national level with the SDU and in the NHS consumption-based carbon footprinting field since 2008.

This could be problematic for the NHS: national consumption-based targets may not be accepted by Trusts if such footprinting techniques are not used at a Trust level. Nor are there any recommendations to do so from the SDU, who state "the initial [footprinting] methodology should therefore take into account energy consumption, some level of travel and possibly no estimation of procurement yet (SDU, 2009b).

The need to develop a consumption-based Trust footprint technique - in order to close the gap between national targets and Trust level measurement tools - forms the basis of the rationale behind the MSc research study. By developing a pilot methodology to calculate a Trust level consumption-based carbon footprint, it is hoped that this will contribute to the development of a common footprinting approach which can be used by all Trusts, and one that is consistent with the national NHS strategy and targets.

## 4 CUH NHS Foundation Trust carbon footprint: analytical methodology & calculations

The overall project aim as noted earlier was to calculate the first consumption-based footprint of an NHS England Trust, in this case CUH NHS Foundation Trust. The methodology developed is based on that used for the national level NHS England footprinting studies (SDC, 2008; SEI and Arup, 2009a) and is outlined below. Further understanding can be gained by reviewing the calculation for each emissions sector, which are presented in sections 4.2 (travel); 4.3 (building energy) and 4.4 (procurement).

### 4.1 Analysis methodology

#### 4.1.1 Overview

The pilot Trust carbon footprint analysis is based on a similar methodology to that used for the national footprint – as outlined in Section 3.3.1 - but using Trust level (bottom-up) data where available. The Trust level footprint comprises the same three consumption-based emissions sectors as for the national footprint, in order to be consistent in approach and yield comparable results.

The basic footprint approach remains the same: calculating emissions based on multiplying consumption in each sector (i.e. km travelled, kWh used or £ spent) by their associated carbon intensities, using the data sources outlined in Sections 4.1.2 and 4.1.3.

#### 4.1.2 Consumption data

These are bottom-up data sources:

- **Travel distances (km/yr):** this uses annual travel survey data for patients, visitors and staff, collected and supplied by CUH NHS Foundation Trust. Comparison to previous years ensures no outliers are present. This differs from the national footprint, which used top-down National Travel Survey

(NTS) data in the absence of bottom-up Trust level data being available across the whole NHS. In addition, staff numbers were supplied by CUH NHS Foundation Trust, in order to compare to the staff numbers recorded in the travel survey.

- **Building energy use (kWh/yr):** the data for on-site energy use (gas, oil, coal and/or renewables) and grid electricity is obtained from the ERIC data system, in the same manner as used for the overall national footprint.
- **Procurement data (£ spent/yr):** at a national level, the consumption (expenditure) data was already disaggregated by SIC sector. For the Trust level footprint, CUH NHS Foundation Trust financial ledger accounts provided bottom-up expenditure data. Account codes were mapped in turn to one of the 123 SIC sectors, which when complete provided an overall breakdown of expenditure by SIC class.

#### 4.1.3 Carbon intensity data

These were previously derived from top-down data sources by the SEI, and are the same values in each sector as used in the national footprint analysis:

- **Travel (kgCO<sub>2</sub>/km):** carbon intensities for each travel mode are used, ranging for example from 0.00kgCO<sub>2</sub>/km (foot) to 0.26kgCO<sub>2</sub>/km (lone car driver).
- **Building energy (kgCO<sub>2</sub>/kWh):** the carbon intensity values vary from 0.21kg CO<sub>2</sub>/kWh (on-site gas) to 0.63kg CO<sub>2</sub>/kWh (grid electricity).
- **Procurement (kgCO<sub>2</sub>/£ spent):** the carbon intensity values are derived from environmentally extended IO (EIO) analyses according to SIC sector. These range from 0.12kg CO<sub>2</sub>/£ spent (SIC Sector 109: Legal Activities) to 8.29kg CO<sub>2</sub>/£spent (SIC Sector 85: grid-electricity production and distribution).

#### 4.1.4 Analytical assumptions

Before the calculations (Sections 4.2-4.4) and analytical results (Section 5) are described, there are some important analytical assumptions to note:

1. The footprint is completed for the year 2007. Where Input data is obtained for a financial year in lieu of calendar year, the year 2007-08 is chosen as with 9 months data in 2007 this is most closely aligned to 2007.
2. Travel emissions relate to the 'movement of people', whereas transport emissions are termed the 'movement of goods and services', and so are included within procurement emissions – see Section 4.4 – as they are part of the process of production and transportation to/from point of use.
3. The 123 SIC sector results are later mapped to 13 procurement categories. The full process is described in Section 4.4 including Table 4.15, however at this stage it is worth noting that:
  - Some SIC sectors are split between procurement categories;
  - Business travel is moved from 'procurement' to 'travel' sector;
  - The top-down electricity data (SIC sector 85) is replaced by the bottom-up ERIC emissions to avoid double counting.
  - To be comparable with NHS England results, SIC sector 117 (Health services) are removed from the analysis results.
4. SIC sectoral emissions are calculated based on expenditure. In the time-series NHS England results (SEI and Arup, 2009a) expenditure was adjusted to 2004 prices, and so carbon intensities in that analysis were calculated at 2004 prices. Therefore, to calculate 2007 SIC sector emissions for CUH NHS Foundation Trust, the following process must be adopted to provide comparable results:
  - Deflate 2007 expenditure to 2004 prices (a 6% reduction);
  - Use the projected 2007 SIC carbon intensities, which are based on 2007 spend at 2004 prices. These were derived by the SEI for the national footprint study analysis (SEI and Arup, 2009a).



5. 'Top-down' carbon intensities are used to calculate emissions. These 'average' UK values are a limitation of the current methodology, as they are not able to account for 'local' differences in consumption such as:

- **Travel:** local prioritisation/use of biofuels
- **Building energy:** 'green' electricity tariffs
- **Procurement:** consumption of 'eco-friendly' products, for example Ecover cleaning products or recycled paper.

#### 4.1.5 Scope 1-3 emissions

The analysis also generates data of the GHG Protocol defined scope 1-3 emissions. These are classified in relation to the travel, building energy and procurement sectors as set out in Table 4.1:

Scope 1-3 emissions sector (GHG Protocol)	Reference to 3 primary emissions sectors in footprint classification
Scope 1: direct on-site emissions	Travel – business travel
	Building energy – on site fossil fuels
Scope 2: off-site electricity emissions	Building energy – off-site electricity
Scope 3: all other indirect emissions	Procurement
	Travel - commuting
	Travel – patient/visitor travel

**Table 4.1: Scope 1-3 classification according to 3 main NHS England emissions sectors**

## 4.2 Travel emissions calculations

### 4.2.1 Calculation structure / overview

The travel emissions methodology and calculation follows three sequential tasks, which are noted below and then explained with the example of the CUH NHS Foundation Trust calculations:

- **4.2.2: CUH NHS Foundation Trust travel survey data**
- **4.2.3: Estimates of annual patients, visitors and staff in 2007**
- **4.2.4: Patient, visitor and staff commuting emissions calculations**

As first noted in 4.1.4, business travel emissions calculated by the IO analysis are subsequently moved to the travel emissions results - refer to Section 4.4.

### 4.2.2 Travel survey data

Bottom-up data was used in place of the previous NTS travel survey data. The Trust has developed a comprehensive travel planning approach (DfT, 2009b), and part of their work has involved collecting annual travel survey data since 1993.

Firstly, modal travel data is required. Tables 4.2 and 4.3 shows the 2002-2008 Trust data for staff, patients and visitors. The highlighted data for 2007 is selected for this research. The staff travel data (Table 4.2) shows a clear modal shift occurring, as journeys by car have reduced, whilst bus and cycle journeys have increased. This provides further evidence of why the Trust's "Hospital travel plan has been hailed as one of the best travel plans in the UK" (p.12, DfT, 2009b).

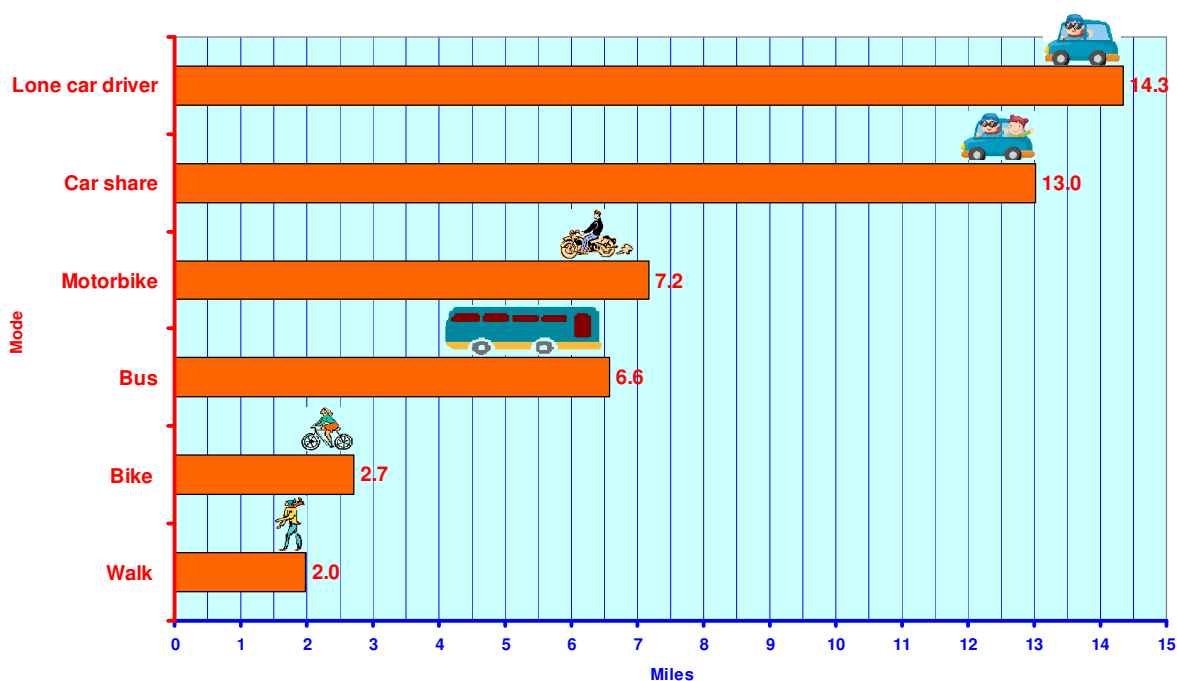
Travel mode	No. of staff travelling by each mode on day of travel survey													
	2002		2003		2004		2005		2006		2007		2008	
Pedal Cycle	1,097	19%	1,497	26%	1,405	25%	1,307	22%	1,558	25%	1,833	26%	2,311	28%
Motor Cycle	106	2%	122	2%	119	2%	153	3%	190	3%	165	2%	167	2%
Car (lone)	2,457	42%	2,138	38%	1,980	35%	2,142	36%	1,974	31%	2,333	34%	2,687	32%
Car (Multiple)	407	7%	396	7%	303	5%	210	4%	460	7%	280	4%	438	5%
Bus	1,087	19%	1,235	22%	1,274	23%	1,424	24%	1,580	25%	1,570	23%	1,752	22%
Walk	689	12%	288	5%	507	10%	639	11%	577	9%	752	11%	917	11%
<b>Total</b>	<b>5,846</b>		<b>5,676</b>		<b>5,588</b>		<b>5,875</b>		<b>6,339</b>		<b>6,933</b>		<b>8,272</b>	

**Table 4.2: Staff commuting modal travel survey data**

Travel mode	No. of patients & visitors travelling by each mode on day of travel survey													
	2002		2003		2004		2005		2006		2007		2008	
Pedal Cycle	238	2%	189	2%	242	2%	216	2%	275	3%	332	3%	408	4%
Motor Cycle	22	0%	18	0%	20	0%	27	0%	33	0%	33	0%	29	0%
Car (lone)	3,540	37%	3,510	35%	3,348	34%	3,555	36%	3,478	35%	3,219	31%	3,447	31%
Car (Multiple)	5,342	55%	5,475	55%	5,380	54%	5,139	52%	5,083	52%	5,495	54%	5,984	53%
Bus	341	4%	543	5%	712	7%	780	8%	807	8%	861	9%	956	9%
Walk	155	2%	168	2%	235	2%	209	2%	235	2%	309	3%	374	3%
<b>Total</b>	<b>9,639</b>		<b>9,903</b>		<b>9,937</b>		<b>9,926</b>		<b>9,911</b>		<b>10,249</b>		<b>11,198</b>	

**Table 4.3: Patients and visitors modal travel survey data**

Secondly, travel distance information is required. Staff commuting single trip distances to work are shown in Figure 4.1, which replaces the previous NTS data of UK population commuting modal distances.



**Figure 4.1: Staff commuting travel: Average single trip distance (miles)**

Trip distances are not collected for patients/visitors, so an estimate of their travel journeys is required. To do this, the following average single trip distances were compared:

- **Commuting:** NTS Data = 6.8kms (p.71, SDC, 2008)
- **Commuting:** Trust data = 12.8kms (Table 4.6)
- **Patient/visitors:** NTS data = 2.8kms (p.69, SDC, 2008)

The data shows that the average commuting distance is around twice the national population average. This may be due to the function of the hospital, and therefore has a large catchment area for the 7,000 staff – however further analysis is beyond the scope of this research.

In terms of the patient/visitor travel, the use of the NTS data is considered to be inaccurate at a Trust level. This is because the national dataset records an average of 22 trips/year for every person in the UK on medical related journeys (p.69, SDC, 2008). With a catchment area of around 400,000 people (CUH NHS Foundation Trust, 2009), 22 trips/year would mean nearly 9,000,000 visits/year, compared to the estimated 3,200,000 visits/year (Table 4.4). Thus many of these trips could well be to local GPs, dentists and pharmacies, rather than hospitals. This would help to explain why the average 2.8km NTS trip distance is very low.

Therefore, for this research study, the Trust level staff modal travel distances in Figure 4.1 are used for patients and visitors, as it is felt to be most appropriate, in lieu of specific patient/visitor modal distance data. Future travel survey data collected for patient and visitors would remove the need for this assumption.

### 4.2.3 Estimates of annual patients, visitors and staff journeys for 2007

The annual numbers of patients, visitors and staff journeys are now estimated.

Table 4.4 shows the calculation:

	Travel survey	No of visits/week <sup>2</sup>	Total visits per year	Final allocated visits <sup>3</sup>
<b>Staff</b>	6,933 <sup>1</sup>	41,598	2,169,039	2,169,039
<b>Patients</b>	10,249	61,494	3,206,473	2,565,178
<b>Visitors</b>				641,295
<b>Total</b>	17,182	103,092	5,375,511	5,375,511

**Table 4.4: Estimated number of patient, visitor and staff journeys in 2007.**

Notes:

1. This value is of the same order as the Staff headcount data, given in Table 4.5 below.
2. The number of trips/week assumes the same number of visits occur Monday-Friday, but half the number of Monday-Friday daily visits occur on Saturdays and Sundays.
3. Following the national study results (SDC, 2008), it is assumed that 80% of patient/visitor journeys are made by patients, and 20% are made by visitors, as Trust level data for the split of patients/visitors is not available.

<b>Headcount by Staff Group as at 31 March 2008</b>			
<i>Excludes Bank, Research, Honorary, Endowment and Trust Funded Staff</i>			
<b>Staff Group</b>	<b>Headcount</b>	<b>WTE</b>	<b>Assignments</b>
Add Prof Scientific and Technical	172	161.37	172
Additional Clinical Services	882	790.67	895
Administrative and Clerical	1382	1,215.30	1395
Allied Health Professionals	371	328.29	381
Estates and Ancillary	284	275.36	285
Healthcare Scientists	432	402.77	433
Medical and Dental	892	853.13	898
Nursing and Midwifery Registered	2407	2,141.82	2433
Students	18	17.80	18
<b>Grand Total</b>	<b>6840</b>	<b>6,186.51</b>	<b>6910</b>

**Table 4.5: Number of CUH NHS Foundation Trust staff in 2007**

#### 4.2.4 Patient, visitor and staff commuting emissions calculations

Having collated estimates of numbers of patients, visitors and staff and their modal travel patterns, the travel emissions calculations can now be undertaken. The additional data required is the modal carbon intensity (kgCO<sub>2</sub>/km travelled), which are taken as the same values – calculated by the SEI - used for the national carbon footprint study (SDC, 2008). These factors are shown, together with the whole emissions calculation in Tables 4.6 and 4.7. The emissions results are then analysed and presented in Section 5.

Staff travel mode to/from CUH Trust	% of annual trips taken by this mode	total estimated number of return trips/yr	average CUH modal distance travelled (miles) for commuting journeys		total distance travelled (kms) per year by this mode	average emissions for each mode kgCO <sub>2</sub> /km	total emissions (tCO <sub>2</sub> /yr)
			Miles	Kms			
Pedal Cycle	26%	563,950	5.40	8.69	4,899,936	0.00	0
Motor Cycle	2%	43,381	14.40	23.17	1,005,115	0.23	231
Car (lone)	34%	737,473	28.60	46.02	33,936,595	0.29	9,842
Car (Multiple)	4%	86,762	26.00	41.83	3,629,582	0.13	478
Bus	23%	498,879	13.20	21.24	10,595,589	0.26	2,755
Walk	11%	238,594	4.00	6.44	1,535,593	0.00	0
<b>TOTAL / average</b>	<b>100%</b>	<b>2,169,039</b>	<b>15.93</b>	<b>25.63</b>	<b>55,602,410</b>	<b>0.24</b>	<b>13,306</b>

Table 4.6: Staff travel emissions in 2007

Patients / visitors mode to/from CUH Trust	% of annual trips taken by this mode	total estimated number of return trips/yr	average CUH modal distance travelled (miles) for personal medical journeys*		total distance travelled (kms) per year by this mode	average emissions for each mode kgCO <sub>2</sub> /km	total emissions (tCO <sub>2</sub> /yr)
			Miles	Kms			
Pedal Cycle	3%	96,194	5.40	8.69	835,793	0.00	0
Motor Cycle	0%	0	14.40	23.17	0	0.23	0
Car (lone)	31%	994,007	28.60	46.02	45,741,599	0.29	13,265
Car (Multiple)	54%	1,731,495	26.00	41.83	72,435,376	0.13	9,548
Bus	9%	288,583	13.20	21.24	6,129,147	0.26	1,594
Walk	3%	96,194	4.00	6.44	619,106	0.00	0
<b>TOTAL / Average</b>	<b>100%</b>	<b>3,206,473</b>	<b>24.376</b>	<b>39.22</b>	<b>125,761,021</b>	<b>0.19</b>	<b>24,407</b>

Table 4.7: Patients/visitor travel emissions in 2007

### 4.3 Building energy emissions calculations

#### 4.3.1 Calculation structure / overview

The methodology and calculation for building energy emissions follows four steps, which are given below and then explained with the example of the CUH NHS Foundation Trust calculations:

- **4.3.2 – Collection of energy consumption data:**
- **4.3.3 – On-site building energy emissions**
- **4.3.4 – Off-site (grid) electricity emissions**

#### 4.3.2 Collection of energy consumption data

The energy consumption data is taken from ERIC (DH, 2009a). For later comparison, NHS England ERIC energy data is also collated. The data is given below in Table 4.8:

	2007-08 Annual Total Hospital energy consumption (GJ)						
	On-site fuel use (GJ)					Off-site grid Electricity (GJ)	Total energy use (GJ)
	Gas	Oil	Coal	Renewables	On-site Fuel Total		
CUH NHS Trust	412,856	8,194	0	0	421,050	112,448	533,498
NHS England	30,166,363	2,647,306	1,135,749	1,339,955	35,289,573	13,928,283	49,217,656
% of NHS England	1.4%	0.3%	0.0%	0.0%	1.2%	0.8%	1.1%

**Table 4.8: CUH NHS Foundation Trust and NHS England total energy consumption 2007-08**

#### 4.3.3 On-site building energy emissions

Next, the emissions from on-site energy use are calculated. Table 4.9 shows the calculation procedure. Firstly, energy consumption values in kWh are multiplied by

carbon intensity factors (tCO<sub>2</sub>/kWh) to calculate on-site emissions. The carbon intensity factors for each fuel source are taken from DEFRA (2007), which are the same factors used for the NHS England analysis (SEI and Arup, 2009a).

Secondly, the emissions from gas production and transmission are included, by adding the emissions calculated in the IO analysis (see Section 4.4) to the gas combustion emissions, as shown in Table 4.9 below. This adds around 20% to the overall on-site building energy emissions.

On-site energy consumption			Direct energy intensity factors (tCO <sub>2</sub> / kWh) from DEFRA (2007)	Total emissions ktCO <sub>2</sub>	Gas transmission emissions (SIC sector 86 from IO analysis) ktCO <sub>2</sub>	Total emissions ktCO <sub>2</sub>
Fuel source	GJ	kWh				
Gas	412,856	114,691,397	0.206	23.63	6.08	29.71
Oil	8,194	2,276,293	0.281	0.64	0	0.64
Coal	0	0	0.346	0	0	0
Renewables	0	0	0.01 <sup>1</sup>	0	0	0
<b>Total</b>	<b>421,050</b>	<b>116,967,690</b>	<b>0.207 (weighted av.)</b>	<b>24.27</b>	<b>6.08</b>	<b>30.34</b>

**Table 4.9: CUH NHS Foundation Trust on-site energy emissions calculation for 2007-08**

Notes:

1. A renewable energy factor of 0.01 tCO<sub>2</sub>/ kWh is assumed for this analysis, on the basis that a small impact is attributed to renewable energy infrastructure.

#### 4.3.4 Off-site (grid) electricity emissions

Now the emissions from the grid-supplied electricity are calculated. From the ERIC data summarised in Table 4.8, the grid-supplied electricity consumption for 2007-08 for CUH NHS Foundation Trust was reported as 112, 448 GJ, equating to 31,238,054 GWh. This electricity consumption is then combined with carbon intensities by fuel source to calculate overall electricity emissions. This follows the same method and values used as for the national footprint study (SEI and Arup, 2009a):



Source of electricity	Proportion of total electricity supply (by % and GWh) <sup>1</sup>		2007 Carbon intensity of electricity production by source <sup>2</sup> (ktCO <sub>2</sub> / GWh)	2007 CO <sub>2</sub> emissions (ktCO <sub>2</sub> )
	%	GWh		
Gas	38%	11,979,031	0.42	5.05
Oil	2%	481,182	0.97 <sup>3</sup>	0.47
Coal	42%	12,986,790	0.97 <sup>3</sup>	12.59
Nuclear	18%	5,540,504	0.26 <sup>4</sup>	1.44
Renewables	1%	351,314	0.03 <sup>4</sup>	0.0
CHP	0%	0	0.03 <sup>4</sup>	0.0
<b>Totals</b>	<b>100%</b>	<b>31,238,054</b>	<b>0.63 (Average)</b>	<b>19.54</b>

**Table 4.10: CUH NHS Foundation Trust electricity emissions 2007-08**

Notes:

1. The assumed UK electricity mix used in the analysis is based on same data used in the NHS England study (p.55, SEI and Arup, 2009a)
2. Carbon intensity factors applied to each source of electrical production used in the analysis is the same as used for the SEI and Arup (2009a) study. They are derived from two sources: carbon intensity of direct burning of fuels: DEFRA (2007) and efficiency of electricity generation from fuel sources BERR (2007)
3. It is a quirk that the carbon intensity for oil and coal are the same. It derives from the fact that coal is more carbon intensive but is more efficient than oil in producing electricity.
4. Where no data was available, the following assumptions (the same as those made for the NHS England study – SEI and Arup, 2009a) have been made:
  - A nuclear electricity factor of 0.26 ktCO<sub>2</sub>/ GWh is taken, as nuclear is a lower carbon energy source.
  - The renewable electricity factor is taken as 0.03 ktCO<sub>2</sub>/GWh
  - The CHP carbon intensity factor is taken as 0.03 ktCO<sub>2</sub>/GWh - the same as renewable electricity.

## 4.4 Procurement emissions calculations

### 4.4.1 Calculation structure / overview

The procurement emissions methodology and calculations follow four steps, which are noted below and then explained in detail with the example of the CUH NHS Foundation Trust calculations:

- **4.4.2 – Intermediate expenditure classification:**
- **4.4.3 – 123 SIC sector classification**
- **4.4.4 – SIC carbon intensities**
- **4.4.5 – NHS England sub-sector emissions**

### 4.4.2 Intermediate expenditure classification:

First, the CUH NHS Foundation Trust financial ledger accounts (comprising 1215 account codes) are assessed as to which can be categorised by Standard Industrial Classification (SIC) sector. There are 123 SIC codes in the UK SIC (2003) system (UK Statistics, 2009a), which is the same system as used in the national carbon footprint research studies (SDC, 2008; SEI and Arup, 2009a).

Second, each account code is reviewed in turn. Each of the 123 SIC sectors contain many sub-classes, and so each financial code is assessed to see if it matches the SIC sector classification. Essentially, the Trust expenditure for SIC classification is that used to directly purchase goods or services. This means the following Trust accounts code types are included/excluded as follows:

- **Included:** Expenditure on goods and services, including salaries for locum, agency and bank staff (as they are providing a service).
- **Excluded:** All inter-Trust spending, Trust income, reimbursement and staff salaries.

The full account code breakdown of Trust expenditure and identified codes for SIC classification is given in Appendix B rather than the main report, since the data table is 14 pages in length. However, the classification results are summarised in

Table 4.11. These shows that 408 out of 1215 account codes were subsequently classified by SIC sector (see Section 4.4.3).

Account code prefix letter	Account code summary description	sum year to date 2007-08 income (-) or expense (+)	no of rows in ledger account	SIC classification required? No of rows used (YES) versus not used (NO)	
				SIC	Non-SIC
A	Income		159	0	159
B	Balance sheet (income)		146	0	146
C	Balance sheet - capital costs		45	42	3
D	Reserves		117	0	117
E	Expenses (pay)		2	0	2
P	Pay (Salaries)		306	42	264
R	Receipts (expenses)		440	324	116
<b>Total</b>			<b>1215</b>	<b>408</b>	<b>807</b>

**Table 4.11: CUH NHS Foundation Trust account codes – summary of SIC / non-SIC sector classification**

Lastly, in order to provide a check on the account codes selected for SIC classification, a review of intermediate spend levels was undertaken. The results are summarised in Table 4.12, and finds that the intermediate spend of CUH NHS Foundation Trust is 49%, which compares well to the overall NHS England average of 46% (p.82, SDC, 2008).

CUH Account codes with SIC coding		SIC account coding			Intermediate spend as a % of total net spend	
Prefix letter	Account code summary description	No of SIC rows in ledger account	2007-08 intermediate expenditure (i.e. SIC row expenditure)	2007-08 net total expenditure for the CUH account codes C, P and R	CUH Trust	NHS England (p.83, SDC, 2008)
C	Balance sheet - capital costs	42			56%	
P	Pay (Salaries)	42			9%	
R	Receipts (expenses)	324			93%	
<b>Total</b>		<b>408</b>	<b>£239,346,917</b>	<b>£492,917,321</b>	<b>49%</b>	<b>46%</b>

**Table 4.12: Comparison of procurement spend between CUH NHS Foundation Trust and NHS England**

## 4.4.3 SIC classification

The 408 account codes are now classified into one or more of the 123 SIC sectors. The SIC 2003 classification is used (National Statistics, 2009a). This is a time-consuming activity, as each account code is checked in turn against the SIC classification system and allocated to one or more SIC sectors. The classification results (for non-zero expenditure) are shown in Table 4.13 below:

CUH NHS Foundation Trust Account code		2007-08 accounts spend	Standard Industrial Classification (SIC)	
Code	Description		Code	SIC Description
C9201	Buildings Legal Fees		112	Architectural and engineering activities
C9202	Buildings Valuers & Estate Agent F		112	Architectural and engineering activities
C9203	Buildings Quantity Surveyor Fees		112	Architectural and engineering activities
C9204	Buildings Architect Fees		112	Architectural and engineering activities
C9205	Buildings Electrical Engineering F		112	Architectural and engineering activities
C9206	Buildings Mechanical Engineering F		112	Architectural and engineering activities
C9207	Buildings Design Team Fees		112	Architectural and engineering activities
C9208	Buildings Project Team Fees		112	Architectural and engineering activities
C9209	Buildings Small Works		88	Construction
C9210	Buildings External Contracts		88	Construction
C9211	Buildings Planning Fees		112	Architectural and engineering activities
C9212	Buildings Consultancy Fees		112	Architectural and engineering activities
C9213	Buildings Planning Supervisor		112	Architectural and engineering activities
C9214	Buildings Structural Engineer		112	Architectural and engineering activities
C9215	Buildings Electrical Installations		88	Construction
C9216	Buildings Removal Costs		88	Construction
C9301	Equipment S/L Lab Equipment		76	Medical, precision and optical instruments
C9302	Equipment S/L Medical Equipment		76	Medical, precision and optical instruments
C9304	Equipment S/L Mechanical Equipment		62	Mechanical machinery
C9305	Equipment S/L Electrical Equipment		72	Electrical equipment n.e.c.
C9400	Equipment M/L Radiology Equipment		76	Medical, precision and optical instruments
C9401	Equipment M/L Lab Equipment		76	Medical, precision and optical instruments
C9402	Equipment M/L Medical Equipment		76	Medical, precision and optical instruments
C9404	Equipment M/L Mechanical Equipment		62	Mechanical machinery
C9405	Equipment M/L Electrical Equipment		72	Electrical equipment n.e.c.
C9410	Equipment M/L Project Team Fees		112	Architectural and engineering activities
C9500	Equipment L/L Radiology Equipment		76	Medical, precision and optical instruments
C9501	Equipment L/L Lab Equipment		76	Medical, precision and optical instruments
C9502	Equipment L/L Medical Equipment		76	Medical, precision and optical instruments
C9504	Equipment L/L Mechanical Equipment		62	Mechanical machinery
C9505	Equipment L/L Electrical Equipment		72	Electrical equipment n.e.c.
C9600	Transport Vehicles		77	Motor vehicles, trailers etc.
C9700	IT Office Equipment		69	Office machinery and computers
C9703	IT Implementation (non-network)		112	Architectural and engineering activities
C9750	IT Network Equipment		69	Office machinery and computers
C9751	IT Network Points & Telephone Inst		112	Architectural and engineering activities
C9752	IT Network Installation Works		112	Architectural and engineering activities
C9753	IT Network Project Team Fees/Imple		112	Architectural and engineering activities
C9800	F&F Soft Furnishings		24	Made-up textile articles
C9850	F&F Furniture		81	Furniture
C9900	Intangibles Software Licences		107	Computer and related activities

CUH NHS Foundation Trust Account code		2007-08 accounts spend	Standard Industrial Classification (SIC)	
Code	Description		Code	SIC Description
C9940	Intangibles Development Expenditur		107	Computer and related activities
P0045	Consultant Locum - vacancy		114	Other business services
P0046	Consultant Locum - sick leave		114	Other business services
P0047	Consultant Locum - annual leave		114	Other business services
P0048	Consultant Locum - mat/pat leave		114	Other business services
P0106	Career Grade Locum - sick leave		114	Other business services
P0200	SpR - Deans' salary		114	Other business services
P0201	SpR - Banding		114	Other business services
P0202	SpR - Non Deans' salary		114	Other business services
P0205	SpR Locum - vacancy		114	Other business services
P0206	SpR Locum - sick leave		114	Other business services
P0207	SpR Locum - annual leave		114	Other business services
P0208	SpR Locum - mat/pat leave		114	Other business services
P0209	SpR Locum - special leave		114	Other business services
P0305	SHO Locum - vacancy		114	Other business services
P0306	SHO Locum - sick leave		114	Other business services
P0307	SHO Locum - annual leave		114	Other business services
P0308	SHO Locum - mat/pat leave		114	Other business services
P0309	SHO Locum - special leave		114	Other business services
P0355	FY2 Locum - vacancy		114	Other business services
P0356	FY2 Locum - sick leave		114	Other business services
P0357	FY2 Locum - annual leave		114	Other business services
P0358	FY2 Locum - mat/pat leave		114	Other business services
P0359	FY2 Locum - special leave		114	Other business services
P0375	FY1 Locum - vacancy		114	Other business services
P0376	FY1 Locum - sick leave		114	Other business services
P0377	FY1 Locum - annual leave		114	Other business services
P0378	FY1 Locum - mat/pat leave		114	Other business services
P0379	FY1 Locum - special leave		114	Other business services
P1029	Band 2 Bank Nurse		114	Other business services
P1039	Band 3 Bank Nurse		114	Other business services
P1049	Band 4 Bank Nurse		114	Other business services
P1059	Band 5 Bank Nurse		114	Other business services
P1069	Band 6 Bank Nurse		114	Other business services
P1079	Band 7 Bank Nurse		114	Other business services
P1089	Band 8 Bank Nurse		114	Other business services
P5729	Band 2 - Bank Admin & Clerical		114	Other business services
P5739	Band 3 - Bank Admin & Clerical		114	Other business services
P5749	Band 4 - Bank Admin & Clerical		114	Other business services
P5759	Band 5 - Bank Admin & Clerical		114	Other business services
R0015	Locum Consultant-Annual Leave		114	Other business services
R0065	Locum HO Annual Leave		114	Other business services
R0433	Scale I Nurse Bank		114	Other business services
R0443	H Nurse Bank		114	Other business services
R0453	Scale G Bank Nurse		114	Other business services
R0463	Scale F Bank Nurse		114	Other business services
R0473	Scale E Bank Nurse		114	Other business services
R0483	Scale D Bank Nurse		114	Other business services
R0493	Scale C Bank Nurse		114	Other business services
R0503	Scale B Bank Nurse		114	Other business services
R0513	Scale A Bank Nurse		114	Other business services
R1023	A&C Grade 3 Bank		114	Other business services
R1073	A&C Bank Scheme		114	Other business services
R1194	Ward Assistant - Bank		114	Other business services
R1410	Agency Nursing (Qualified)		114	Other business services
R1411	Agency Nursing (Unqualified)		114	Other business services
R1415	Agency AHPs		114	Other business services
R1425	Agency Scientists & Technicians		114	Other business services
R1426	Agency ODA		114	Other business services
R1435	Agency Pharmaceutical		114	Other business services
R1441	Agency A&C Clerical		114	Other business services
R1453	Agency Ancillary		114	Other business services

CUH NHS Foundation Trust Account code		2007-08 accounts spend	Standard Industrial Classification (SIC)	
Code	Description		Code	SIC Description
R1460	Agency - Other		114	Other business services
R1465	Bank Staff Annual Leave		114	Other business services
R1470	Management Consultant		111	Business / management consultancy activities
R1473	Professional Fees		114	Other business services
R2000	Drug Issues		43	Pharmaceuticals etc.
R2001	Drugs Anti Retroviral		43	Pharmaceuticals etc.
R2003	Drugs Overhead		43	Pharmaceuticals etc.
R2007	Drugs Stock Adjustment		43	Pharmaceuticals etc.
R2010	Drugs Musculo Skeletal		43	Pharmaceuticals etc.
R2012	Drugs Ceredase		43	Pharmaceuticals etc.
R2013	Drugs Immunoglobulins		43	Pharmaceuticals etc.
R2014	Drugs Myozyme(Pompe)		43	Pharmaceuticals etc.
R2015	Drugs N.I.C.E		43	Pharmaceuticals etc.
R2016	Drugs Zavesca		43	Pharmaceuticals etc.
R2017	Drugs Anti TNF		43	Pharmaceuticals etc.
R2018	Drugs Fabrys		43	Pharmaceuticals etc.
R2019	Drugs Idursufase (Hunter's)		43	Pharmaceuticals etc.
R2070	Drugs FP10		43	Pharmaceuticals etc.
R2090	Medical Gases		36	Industrial gases, dyes and pigments
R2096	Drugs General Sale At Fulbourn		43	Pharmaceuticals etc.
R2098	Drugs Cost Of General Sales		43	Pharmaceuticals etc.
R2140	AHNR Orthoptist Prosthesis		76	Medical, precision and optical instruments
R2141	Paediatric IP Surgical Appliances		76	Medical, precision and optical instruments
R2142	Paediatric OP Foot Prosthesis		76	Medical, precision and optical instruments
R2143	Paediatric OP Other Prosthesis		76	Medical, precision and optical instruments
R2144	Adult IP Surgical Appliances		76	Medical, precision and optical instruments
R2145	Adult OP Foot Prosthesis		76	Medical, precision and optical instruments
R2146	Adult OP Other Prosthesis		76	Medical, precision and optical instruments
R2147	Self-Referred Patient Appliances		76	Medical, precision and optical instruments
R2150	Patients Appliances		76	Medical, precision and optical instruments
R2151	Patients Appliances - Wigs		84	Miscellaneous manufactured products
R2152	Prosthesis - Other		76	Medical, precision and optical instruments
R2153	Patients Appliances - Dental		76	Medical, precision and optical instruments
R2154	Footwear Accessories		30	Footwear
R2156	Hearing Aid Moulds		76	Medical, precision and optical instruments
R2157	Lower Body Prosthesis		76	Medical, precision and optical instruments
R2158	Upper Body Prosthesis		76	Medical, precision and optical instruments
R2160	Prostheses Repair		76	Medical, precision and optical instruments
R2161	New Lower Limbs Conventional		76	Medical, precision and optical instruments
R2162	New Upper Limbs		76	Medical, precision and optical instruments
R2163	New Lower Modular Limbs		76	Medical, precision and optical instruments
R2164	Limb Service Contract		76	Medical, precision and optical instruments
R2169	Wheelchair Stocks		79	Other transport equipment
R2170	Upper & Lower Stump Socks		28	Wearing apparel, fur
R2171	Wheelchair Accessories		79	Other transport equipment
R2172	Wheelchair Modification		79	Other transport equipment
R2173	Powered Wheelchairs		79	Other transport equipment
R2174	Wheelchair Recondition		79	Other transport equipment
R2175	Wheelchair Repair Contract		79	Other transport equipment
R2176	Wheelchair Vouchers		79	Other transport equipment
R2181	Footwear - Stock		30	Footwear
R2182	Footwear - Bespoke		30	Footwear
R2183	Footwear - Repair		30	Footwear
R2188	Optical Appliances		76	Medical, precision and optical instruments
R2192	Therapy Materials And Equipment		76	Medical, precision and optical instruments
R2194	Aids For Disabled		76	Medical, precision and optical instruments
R2195	Hearing Aids - Private		76	Medical, precision and optical instruments
R2196	Batteries		72	Electrical equipment n.e.c.
R2197	Hearing Aids - Repair		76	Medical, precision and optical instruments
R2198	Hearing Aids - NHS		76	Medical, precision and optical instruments
R2200	Cochlear Processors		76	Medical, precision and optical instruments

CUH NHS Foundation Trust Account code		2007-08 accounts spend	Standard Industrial Classification (SIC)	
Code	Description		Code	SIC Description
R2218	Urology Robot Semi Disposals		76	Medical, precision and optical instruments
R2219	Disposable Surg Instruments		76	Medical, precision and optical instruments
R2220	Dental Equipment & Materials		76	Medical, precision and optical instruments
R2230	Angio Med & Surg		76	Medical, precision and optical instruments
R2232	ICP Bolts		76	Medical, precision and optical instruments
R2240	X-Ray Film		76	Medical, precision and optical instruments
R2249	Haemophilia Blood Products		43	Pharmaceuticals etc.
R2250	Laboratory Chemicals		43	Pharmaceuticals etc.
R2251	Laboratory Isotopes		43	Pharmaceuticals etc.
R2252	Laboratory Immuno Reagents		43	Pharmaceuticals etc.
R2253	Blood Gas Analyser Contract		43	Pharmaceuticals etc.
R2254	Laboratory Equipment Recharge		76	Medical, precision and optical instruments
R2257	Laboratory Bone Marrow		76	Medical, precision and optical instruments
R2258	Laboratory Control Materials		76	Medical, precision and optical instruments
R2259	Laboratory Consumables		76	Medical, precision and optical instruments
R2260	Laboratory Ins Services		101	Insurance and pension funding
R2261	Laboratory Enzymes		43	Pharmaceuticals etc.
R2263	Laboratory Neqas Scheme		111	Business / management consultancy activities
R2269	Laboratory Accreditation		111	Business / management consultancy activities
R2277	Theatres New Instruments		76	Medical, precision and optical instruments
R2278	Theatres Instrument Repairs		76	Medical, precision and optical instruments
R2281	Med/Surg Bone Transport		94	Other land transport; transport via pipelines
R2282	Med/Surg Bone Other		43	Pharmaceuticals etc.
R2287	Seeds		43	Pharmaceuticals etc.
R2289	Med/Surg Disposables		76	Medical, precision and optical instruments
R2290	ISCUS		43	Pharmaceuticals etc.
R2294	Plasmaphoresis		43	Pharmaceuticals etc.
R2296	National Blood Contract		43	Pharmaceuticals etc.
R2297	Other Blood Products		43	Pharmaceuticals etc.
R2299	Autologous Blood		43	Pharmaceuticals etc.
R2311	Instrumentation (Non-Theatres)		76	Medical, precision and optical instruments
R2312	Instrument Repairs		76	Medical, precision and optical instruments
R2313	Medical Equipment		76	Medical, precision and optical instruments
R2314	Medical Equipment Repairs		76	Medical, precision and optical instruments
R2315	Medical Equipment Maintenance Cont		76	Medical, precision and optical instruments
R2316	Non-Medical Equipment		43	Pharmaceuticals etc. (50%)
R2317	Non-Medical Equipment Repairs		63	Other general purpose machinery (25%)
R2318	Non-Medical Equipment Maintenance		72	Electrical equipment (25%)
R2325	Biomedical Equipment Spares		76	Medical, precision and optical instruments
R2360	Med/Surg Non Disposable		76	Medical, precision and optical instruments
R2361	Medical Loan Equipment		76	Medical, precision and optical instruments
R2362	Med/Surg Orthopaedic Trauma		76	Medical, precision and optical instruments
R2363	Med/Surg Orthopaedic Elective		76	Medical, precision and optical instruments
R2367	Med/Surg Repairs		76	Medical, precision and optical instruments
R2391	Other Reagents		37	Inorganic basic chemicals (50%)
			38	Organic basic chemicals (50%)
R2400	Food Supplies		9	Fish, fruit and vegetables (50%)
			17	Other food products (50%)
R2406	Beverages And Beverage Contract		17	Other food products (50%)
			19	Mineral waters & soft drinks (50%)
R2411	Special Foods		17	Other food products
R2412	Cook-Chill Contract		17	Other food products
R2414	Ward Provisions - Food Recharge To		17	Other food products
R2451	Staff Uniforms		28	Wearing apparel, fur
R2460	Patients Clothing		28	Wearing apparel, fur
R2461	Incontinence Supplies		28	Wearing apparel, fur
R2470	Laundry Washing Materials		44	Soap, detergents etc.

CUH NHS Foundation Trust Account code		2007-08 accounts spend	Standard Industrial Classification (SIC)	
Code	Description		Code	SIC Description
R2472	Water Softening Materials		44	Soap, detergents etc.
R2490	Dry Cleaning Outside Contract		122	Other service activities
R2491	Laundry Outside Contract		122	Other service activities
R2501	Hardware & Crockery		48 61	Plastic products (50%) Other fabricated metal products (50%)
R2509	Vending Rental		63	Other general purpose machinery
R2510	Bedding - Disposable		24	Made-up textile articles
R2520	Bedding - Non-Disposable		24	Made-up textile articles
R2524	Linen - Towels		24	Made-up textile articles
R2525	Linen - Theatre Drapes		24	Made-up textile articles
R2526	Linen - Operating Gowns		24	Made-up textile articles
R2527	Linen - Nightwear		24	Made-up textile articles
R2528	Linen - Laundry Bags		24	Made-up textile articles
R2900	Entereal Feed Sets		76	Medical, precision and optical instruments
R3500	Office Consumables		32 84	Pulp, paper and paperboard (50%) Miscellaneous manufactured products (50%)
R3501	Printing		32 69	Pulp, paper and paperboard (50%) Office machinery and computers (50%)
R3503	Telephone directories		34	Publishing and printing
R3504	Imaging Charges		76	Medical, precision and optical instruments
R3511	Books, Journals And Newspapers		121	Recreational, cultural and sporting activities
R3520	Postage And Carriage		98	Post and courier services
R3525	PACS Contract		76	Medical, precision and optical instruments
R3530	Quarterly Line Rental		99	Telecommunications
R3531	Pay Phone - Rental		106	Renting of machinery and equipment
R3532	Patients Bedside Phone Systems - R		106	Renting of machinery and equipment
R3533	Staff Telephones - Rental		106	Renting of machinery and equipment
R3534	Telephone System maintenance		99	Telecommunications
R3535	Monthly Line Rental		99	Telecommunications
R3538	Telephone Equipment Recharge		99	Telecommunications
R3540	Monthly Telephone Calls		99	Telecommunications
R3541	Pay Phones - Calls		106	Renting of machinery and equipment
R3542	Teleconferencing Charges		99	Telecommunications
R3543	Staff Telephones - Calls		99	Telecommunications
R3550	Advertising - Medical & Dental		113	Advertising
R3551	Advertising - Nursing Staff		113	Advertising
R3560	Advertising - Non Medical & Nursin		113	Advertising
R3561	Non-Advertising Recruitment & Inte		114	Other business services
R3562	Non-Advertising Recruitment & Inte		114	Other business services
R3569	Advertising - Non Recruitment		113	Advertising
R3600	Contract Travel Costs		94	Other land transport; transport via pipelines
R3610	Medical & Dental Travel		94	Other land transport; transport via pipelines
R3612	Medical & Dental Interview Expense		94	Other land transport; transport via pipelines
R3613	Jnr Medical Staff Interviews		93	Transport via railways (30%)
R3614	Medical & Dental Assessor Fees		94	Other land transport; transport via pipelines (70%)
R3615	Jnr Medical Staff Travel			
R3620	Nursing Staff Travel			
R3630	Other Staff Travel			
R3631	Other Staff Subsistence			
R3640	Volunteers Travel Expenses			
R3670	Patients Travel			
R3671	Non Contract Patient Transport			
R3673	Contract Patient Transport		94	Other land transport; transport via pipelines
R3676	Accommodation Patients		92	Hotels and restaurants
R3680	Course Fees - Medical & Dental		116	Education
R3681	Course Fees - Nursing		116	Education
R3682	Course Fees - Other Staff		116	Education
R3687	Supervision Fees		116	Education
R3689	Education & Training Materials		116	Education
R3701	Removal Expenses Consultants		94	Other land transport; transport via pipelines



CUH NHS Foundation Trust Account code		2007-08 accounts spend	Standard Industrial Classification (SIC)	
Code	Description		Code	SIC Description
R3713	Jnr Medical Staff Removals Travel/		94	Other land transport; transport via pipelines
R3714	Jnr Medical Staff Removals Purchas		94	Other land transport; transport via pipelines
R3715	Jnr Medical Staff Removals/Cost Of		94	Other land transport; transport via pipelines
R3717	Jnr Medical Staff Removals Misc Gr		94	Other land transport; transport via pipelines
R3903	Vehicle Running Costs		89	Sale, maintenance and repair of motor vehicles; retail sale of automotive fuel
R3930	Hire Of Vehicle		106	Renting of machinery and equipment
R3931	Human Tissue Transport		94	Other land transport; transport via pipelines
R3932	Vehicle Leasing		106	Renting of machinery and equipment
R3944	Hire Of Private Ambulance		106	Renting of machinery and equipment
R4010	Oil		35	Refined petroleum etc.
R4020	Electricity		85	Electricity
R4021	Steam		86	Gas, steam and hot water
R4030	Gas Including Propane		86	Gas, steam and hot water
R4050	Water		87	Water supply
R4052	Sewerage Charges		119	Sewage and refuse disposal
R4060	Cleaning Equipment		63	Other general purpose machinery
R4061	Cleaning Materials		44	Soaps, detergents, etc (50%)
			84	Miscellaneous manufactured products (50%)
R4070	Domestic Cleaning Contract		114	Other business services
R4071	Window Cleaning Contract		114	Other business services
R4110	Furniture & Fittings		81	Furniture
R4122	Portable Communication Devices		91	Retail trade
R4123	Telephone Installation Costs		99	Telecommunications
R4124	Bleeps		99	Telecommunications
R4127	Photocopier Maintenance / Rental		69	Office machinery and computers
R4130	Computer Hardware		69	Office machinery and computers
R4131	Computer Software		69	Office machinery and computers
R4134	Bureau Fees		114	Other business services
R4148	IT Recharge		99	Telecommunications
R4170	Rent		105	Real estate activities on a fee or contract basis
R4180	Business Rates		105	Real estate activities on a fee or contract basis
R4181	Rates - Residences		105	Real estate activities on a fee or contract basis
R4200	Abortive Capital Schemes		88	Construction
R4201	Engineering Equipment		88	Construction
R4202	Engineering Materials And Tools		88	Construction
R4203	External Engineering Contracts		88	Construction
R4208	Waste Collection Service		119	Sewage and refuse disposal
R4210	Building Equipment, Materials and		88	Construction
R4212	External Buildings Contracts		88	Construction
R4217	Equipment Repairs		63	Other general purpose machinery
R4219	Equipment Maintenance Contract		63	Other general purpose machinery
R4222	CHP Maintenance		62	Mechanical machinery
R4225	Other Materials		62	Mechanical machinery
R4251	Minor Works Recharges		88	Construction
R4301	Gardening Consumables		64	Agricultural and forestry machinery
R4302	Gardening Machinery		64	Agricultural and forestry machinery
R4304	Gardening Contract		1	Agricultural products
R4620	Internal Audit Costs		110	Accounting etc.
R4630	Redundancy Costs		100	Banking and financing
R4640	Bank Charges		100	Banking and financing
R4641	External Audit Fees		110	Accounting etc.
R4642	Sales ledger rounding		100	Banking and financing
R4643	Sales ledger foreign exch loss		100	Banking and financing
R4650	Health & Safety		114	Other business services
R4662	Legal Fees Non NHS		109	Legal activities
R4672	Funeral Expenses		120	Activities of membership organisations
R4673	Chapel Expenses		120	Activities of membership organisations

CUH NHS Foundation Trust Account code		2007-08 accounts spend	Standard Industrial Classification (SIC)	
Code	Description		Code	SIC Description
R4682	Lecture Fees Medical Staff		116	Education
R4683	Lecture Fees Non Medical Staff		116	Education
R4684	Simulated Patients		116	Education
R4689	General Equipment & Materials		63	Other general purpose machinery
R4700	Security Services Contracts		114	Other business services
R4719	Insurance - CNST Contribution		101	Insurance and pension funding
R4720	Hospitality		92	Hotels and restaurants
R4722	Liability Third Party Scheme		101	Insurance and pension funding
R4723	Commission On Debt Collecting		114	Other business services
R4725	Car Parking Fees		94	Other land transport; transport via pipelines
R4732	Property Expenses Scheme		103	Real estate activities with own property
R4734	Insurance (non-CNST)		101	Insurance and pension funding
R4743	Living Patient Donor Expenses		94	Other land transport; transport via pipelines
R4750	Miscellaneous		43	Pharmaceuticals, etc (50%)
			76	Medical, precision and optical instruments(50%)
R4753	Med Audit Allocation		110	Accounting etc.
R4757	Interpretation Services		114	Other business services
R4760	Open Day Expenses		92	Hotels and restaurants (50%)
			94	Other land transport; transport via pipelines (50%)
R4766	Subscriptions		34	Publishing and printing
R4771	Compliance Testing		114	Other business services
R4778	Multi-Storey Service Charge		105	Real estate activities on a fee or contract basis
R4779	Multi-Storey Lease Charge		105	Real estate activities on a fee or contract basis
R4782	Central Leases		105	Real estate activities on a fee or contract basis
R4783	Other Operating Leases		105	Real estate activities on a fee or contract basis
R4816	Clinical Practice Facilitator		116	Education
R4830	Desensitisation		116	Education
R5000	Services Received Non WGA		117	Health care
R5001	Film Badge Service		76	Medical, precision and optical instruments
R5002	Services Received WGA		117	Health care
R5003	Lithography Service Received		76	Medical, precision and optical instruments
R5004	MRI Usage Fee		76	Medical, precision and optical instruments
R5008	Service Contract		117	Health care
R5009	Royalties		114	Other business services
R5012	Initiatives		114	Other business services
R5013	Vac Pumps		76	Medical, precision and optical instruments
R5022	PF1 Serv Paymt		92	Hotels and restaurants
R5035	Chiropody - IUT's		117	Health care
R5037	Occupancy - IUT's		117	Health care
R5061	Psychology - IUTs		117	Health care
R6715	Patient Travel Contract		93	Transport via railways (30%)
R6716	Patient Related Travel		94	Other land transport; transport via pipelines (70%)
R7003	Research Salaries & Wages		108	Research & Development (50%)
R7004	Research Consumables		108	Research & Development
R7005	Research Equipment		108	Research & Development
R7006	Books & Journals		108	Research and development
R7007	Lecture Fees		108	Research and development
R7008	Travel		108	Research and development
R7009	Stationery & Sundries		108	Research and development
R7011	Catering		108	Research and development
R7013	Equipment		108	Research and development
R7021	Pay-Admin & Clerical		108	Research and development
R7031	Non-Pay-Office Expenses		108	Research and development
R7032	Non-Pay-Office Equipment		108	Research and development
R7035	Conference Expense		108	Research and development

CUH NHS Foundation Trust Account code		2007-08 accounts spend	Standard Industrial Classification (SIC)	
Code	Description		Code	SIC Description
R7128	Staff Subst		108	Research and development
R7144	Hospitality		92	Hotels and restaurants
R7147	Advertising		113	Advertising
R8201	Bus Tickets Subsidy		94	Other land transport; transport via pipelines
R8202	Park & Ride Subsidy		94	Other land transport; transport via pipelines
R9001	WDD		114	Other business services
R9002	Course Fees		116	Education
R9006	Non Pay Other		114	Other business services
<b>Intermediate Expenditure (Total)</b>		<b>£239,346,917</b>		

**Table 4.13: 2007-08 CUH NHS Foundation Trust financial ledger mapped to SIC sector**

Notes:

1. In some cases the expenditure is allocated to more than one SIC sector. This is normally done if the account code is ambiguous or if the review of the receipts indicates more than one sector may be appropriate. For example, account code R4061 (cleaning materials) is split 50% each to SIC sector 44 (Soaps, detergents, etc) and SIC sector 84 (Miscellaneous manufactured products)

#### 4.4.4 SIC sector emissions

Now that the SIC sector allocations are complete, the account codes can be grouped by SIC class, and then multiplied by the carbon intensities, to produce the overall carbon emissions for the SIC classified expenditure. The results are summarised in Table 4.14 overleaf:

Sectors (SIC)		2007 CUH NHS Trust expenditure at 2004 prices <sup>1</sup> (£)	2007 Carbon intensity of UK SIC sectors <sup>2</sup> (kgCO <sub>2</sub> /£spent)	2007 Carbon emissions (tCO <sub>2</sub> )
1	Agriculture			4
2	Forestry			0
3	Fishing			0
4	Coal extraction etc			0
5	Oil & gas extraction			0
6	Metal ores extraction			0
7	Other mining & quarrying			0
8	Meat processing			0
9	Fish & fruit processing			196
10	Oils & fats processing			0
11	Dairy products			0
12	Grain milling & starch			0
13	Animal feed stuffs			0
14	Bread, biscuits etc			0
15	Sugar			0
16	Confectionery			0
17	Other food products			829
18	Alcoholic drinks			0
19	Soft drinks			45
20	Tobacco			0
21	Textile fibres			0
22	Textile weaving			0
23	Textile finishing			0
24	Made-up textiles			795
25	Carpets & rugs			0
26	Other textiles			0
27	Knitted goods			0
28	Wearing apparel & fur products			354
29	Leather goods			0
30	Footwear			117
31	Wood & wood products			0
32	Pulp, paper & paperboard			1,394
33	Paper & paperboard products			0
34	Printing & publishing			36
35	Coke, refined petroleum & nuclear fuel			13
36	Industrial gases & dyes			654
37	Inorganic chemicals			0
38	Organic chemicals			0
39	Fertilisers			0
40	Synthetic resins			0
41	Pesticides			0
42	Paints, varnishes, printing ink etc			0
43	Pharmaceuticals			29,643
44	Soap & toilet preparations			162
45	Other chemical products			0
46	Man-made fibres			0
47	Rubber products			0
48	Plastic products			29
49	Glass & glass products			0
50	Ceramic goods			0
51	Structural clay products			0
52	Cement, lime & plaster			0
53	Articles of concrete etc			0
54	Iron & steel			0

Sectors (SIC)		2007 CUH NHS Trust expenditure at 2004 prices <sup>1</sup> (£)	2007 Carbon intensity of UK SIC sectors <sup>2</sup> (kgCO <sub>2</sub> /£spent)	2007 Carbon emissions (tCO <sub>2</sub> )
55	Non-ferrous metals			0
56	Metal castings			0
57	Structural metal products			0
58	Metal containers, etc			0
59	Metal forging, pressing etc			0
60	Cutlery, tools etc			0
61	Other metal products			34
62	Mech. Power equipment			408
63	General purpose machinery			995
64	Agricultural machinery			10
65	Machine tools			0
66	Special purpose machinery			0
67	Weapons & ammunition			0
68	Domestic appliances nec			0
69	Office machinery & computers			1,528
70	Electric motors & generators etc			0
71	Insulated wire & cable			0
72	Electrical equipment nec			376
73	Electronic components			0
74	Transmitters for TV, radio & phone			0
75	Receivers for TV & radio			0
76	Medical & precision instruments			16,347
77	Motor vehicles			43
78	Shipbuilding & repair			0
79	Other transport equipment			158
80	Aircraft & spacecraft			0
81	Furniture			1,850
82	Jewellery & related products			0
83	Sports goods & toys			0
84	Misc. manufacturing nec, recycling			596
85	Electricity production & distribution			25,998
86	Gas distribution			6,076
87	Water supply			108
88	Construction			7,235
89	Motor vehicle distribution & repair, etc			13
90	Wholesale distribution			0
91	Retail distribution			13
92	Hotels, catering & pubs etc			2,052
93	Railway transport			544
94	Other land transport			3,456
95	Water transport			0
96	Air transport			0
97	Ancillary transport services			0
98	Postal & courier services			245
99	Telecommunications			179
100	Banking & finance			30
101	Insurance & pension funds			1,069
102	Auxiliary financial services			0
103	Owning & dealing in real estate			1
104	Letting of dwellings			0
105	Estate agent activities			1,341
106	Renting of machinery			94
107	Computing services			129
108	Research & development			551
109	Legal activities			18
110	Accountancy services			38
111	Market research			82

Sectors (SIC)		2007 CUH NHS Trust expenditure at 2004 prices <sup>1</sup> (£)	2007 Carbon intensity of UK SIC sectors <sup>2</sup> (kgCO <sub>2</sub> /£spent)	2007 Carbon emissions (tCO <sub>2</sub> )
112	Architectural activities etc			424
113	Advertising			133
114	Other business services			6,548
115	Public administration			0
116	Education			193
117	Health & veterinary services			3,676
118	Social work activities			0
119	Sewage & sanitary services			180
120	Membership organisations nec			2
121	Recreational services			6
122	Other service activities			4
123	Private households with employed persons			0
<b>Totals / Averages</b>		<b>£225.6M (Total)</b>	<b>0.49kgCO<sub>2</sub>/£ (Average)</b>	<b>117,054tCO<sub>2</sub> (Total)</b>

**Table 4.14: 2007 CUH NHS Foundation Trust intermediate expenditure breakdown by SIC code (at 2004 prices)**

Notes:

1. As the 2007 carbon intensities were based by 2004 prices, the 2007-08 expenditure must be deflated by 6% to be in 2004 prices, as stated earlier in Section 4.1.4. Thus the 2007 £239.4M expenditure reduces to £225.6M in equivalent 2004 prices.
2. The carbon intensities listed are for 2007 but based on 2004 prices – as explained in Section 4.1.4. To limit confidential data, only carbon intensities are given where non zero expenditure is recorded.
3. Some SIC sectors at the Trust level record expenditure which were not recorded at the national level, and so carbon intensities were not provided by the SEI for the NHS England analysis. To resolve this, the carbon intensities in such sectors have been estimate dby the author, based on the carbon intensities of similar / adjacent sectors. As the contribution of these sectors is <5% on the overall procurement emissions, this was deemed to be an appropriate step in order to complete the research analysis.
4. Sector 117 (health and veterinary services) emissions were excluded from the NHS England studies (SDC, 2008, SEI and Arup, 2009), as expenditure within this sector was considered to be mainly inter-Trust spending, and was thus removed to avoid double counting. On this basis, the CUH NHS Foundation Trust Sector 117 emissions are excluded from the analysis beyond this point. This reduces the overall footprint by around 2%, so statistically is not very significant at this Trust level.

#### 4.4.5 NHS England sub-sector emissions

Now that the SIC sector allocations are complete, the account codes can be grouped into the same emissions sectors as was completed for the NHS England studies (SDC, 2008, SEI and Arup, 2009a).

To do this, a concordance matrix was developed to re-allocate emissions from the 123 SIC sectors into the 17 sub-sector categories relevant for NHS England. The 123x17 sector matrix is too large to re-produce in its original form, and so a summary is produced below in Table 4.15. This is the raw output data combined with other travel and building energy emissions data (see Sections 4.2 and 4.3) which are then used to produce the carbon emissions results in Section 5.

Main sector	Sub sector	123 industrial SIC sector numbers allocation to NHS emissions sector		2007 emissions (tCO <sub>2</sub> )
		Sole allocation	Shared allocation <sup>1</sup>	
<b>Travel</b>	NHS business travel <sup>2</sup>	77-80, 89	35 (95%) 93 (70%) 94 (20%) 106 (50%)	1,345
<b>Building energy</b>	Electricity production	85 <sup>3</sup>		29,445
	Gas distribution	86 <sup>4</sup>		5,151
<b>Procurement</b>	Pharmaceuticals	43		29,643
	Medical Instruments/equipment	76		16,347
	Business services	98, 100-105, 107-114, 122	92 (20%)	11,024
	Construction	51-57, 88		7,235
	Other manufactured products	21-30, 46-50, 58-68, 81-83,	84 (71%)	5,009
	Freight transport	95-97	93 (30%) 94 (80%)	2,928
	Food and catering	1, 8-20	92 (80%)	2,715
	Information & Communication	69-75, 99	34 (5%)	2,098
	Paper products	32-33,	34 (95%)	1,430
	Manufactured fuel,chemicals,gases	4-7, 36-42, 44-45	35 (5%)	816

Main sector	Sub sector	123 industrial SIC sector numbers allocation to NHS emissions sector		2007 emissions (tCO <sub>2</sub> )
		Sole allocation	Shared allocation <sup>1</sup>	
	Waste products and recycling		84 (29%) 119 (45%)	260
	Water & sanitation	87	119 (55%)	207
	Other procurement	2-3, 31, 90-91, 115-116, 120-121, 123	106 (35%)	246
<b>Total</b>				<b>106,923</b>

**Table 4.15: SIC sector mapping to NHS emissions sectors from IO analysis**

Notes:

1. Certain SIC sectors are split proportionately between categories, on the same basis as the national footprint study (p.28, SEI and Arup, 2009a).
2. NHS Business travel emissions are produced solely from the IO data analysis. All other travel emissions are calculated from travel survey data – refer to Section 4.2.
3. The top-down calculation of electricity emissions in Sector 85 (25,998tCO<sub>2</sub>) is replaced by the bottom-up ERIC calculation of electricity emissions (19,543tCO<sub>2</sub>) - refer to Section 4.3. In addition, the comparison between the two separate electricity emissions values provides a further check on the credibility of the results.
4. These gas production and transmission emissions are added to the bottom-up on-site combustion emissions – refer to Section 4.3 and also the main results in Section 5.



## 5 CUH NHS Foundation Trust carbon footprint: analytical results

The results of the CUH NHS Foundation Trust carbon footprint analysis are presented and discussed in this section. Firstly, the results are given in section 5.1, before the results are compared to the NHS England emissions in section 5.2. Lastly, the results are discussed in section 5.3. The review of this technique being applied more widely by NHS Trusts is then given in Section 6.

### 5.1 Emissions results

#### 5.1.1 Total and primary sector emissions

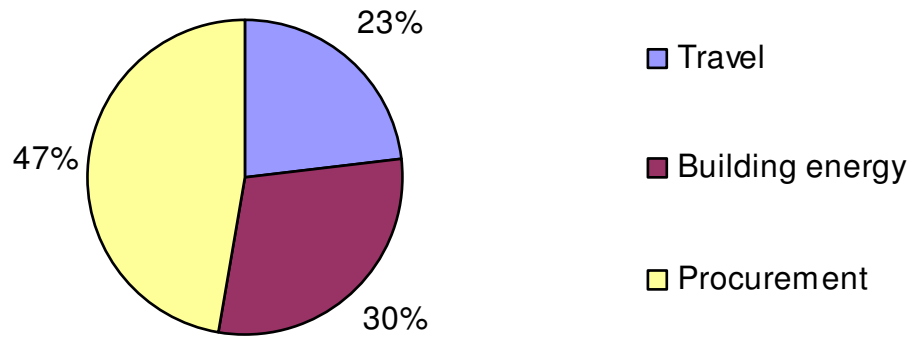
The total consumption-based carbon footprint for 2007 for CUH NHS Foundation Trust is estimated to be 168,902tCO<sub>2</sub>. Procurement (47%) is the largest emissions sector – comprising around half of all CO<sub>2</sub> emissions – followed by building energy (30%) and travel (23%) sectors. The emissions results are shown in Table 5.1 and Figures 5.1 and 5.2:

Sector	2007 CO <sub>2</sub> emissions	
	tCO <sub>2</sub> <sup>1</sup>	% of total <sup>1</sup>
Travel	39,058	23%
Building energy	49,885	30%
Procurement	79,958	47%
<b>Total</b>	<b>168,902</b>	<b>100%</b>

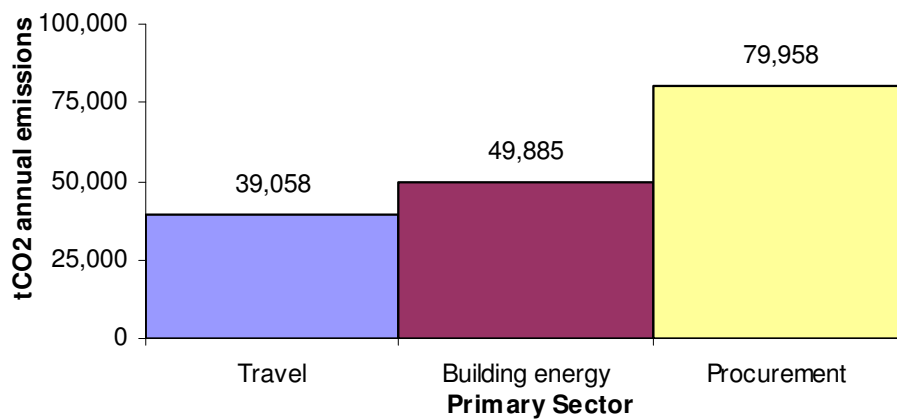
**Table 5.1: 2007-08 CUH NHS Foundation Trust CO<sub>2</sub> emissions: primary sector breakdown**

Notes:

1. Emissions are given in tCO<sub>2</sub> for Trust emissions, and in ktCO<sub>2</sub> when comparing Trust to NHS England emissions. Percentages are rounded to nearest whole number. This has remained consistent throughout Section 5.



**Figure 5.1: 2007 CUH NHS Foundation Trust CO<sub>2</sub> emissions: primary sector breakdown**



**Figure 5.2: 2007 CUH NHS Foundation Trust CO<sub>2</sub> emissions: primary sector breakdown**

In 2007, the total consumption-based CO<sub>2</sub> emissions of NHS England were estimated to be 20.0 million tonnes (SEI and Arup, 2009a), meaning that CUH NHS Foundation Trust in 2007 accounted for 0.84% of the total NHS England consumption carbon footprint. The comparison to NHS England results is presented in more detail in Section 5.2.

## 5.1.2 Sub-sector emissions

The main emissions sectors are split into sub-sectors as shown below in Table 5.2, and overleaf in Figures 5.3-5.8. The largest sub-sectors in each main sector are patient travel (12%); on-site gas (18%) and pharmaceuticals (18%).

Sector	Sub sector	2007 CO <sub>2</sub> emissions	
		tCO <sub>2</sub>	% of total
<b>Travel</b>	Patient: own travel <sup>1</sup>	19,526	12%
	Visitor travel <sup>1</sup>	4,881	3%
	Staff: commuting <sup>1</sup>	13,306	8%
	NHS travel: business mileage/fleet/PTS <sup>3</sup>	1,345	1%
	<b>Travel: sub total</b>	<b>39,058</b>	<b>23%</b>
<b>Building energy<sup>2</sup></b>	Grid-supplied electricity	19,543	12%
	On-site fossil fuels: gas	29,702	18%
	On-site fossil fuels: oil	615	0%
	On-site fossil fuels: coal	0	0%
	Renewables	0	0%
	<b>Building energy use: sub total</b>	<b>49,885</b>	<b>30%</b>
<b>Procurement<sup>3</sup></b>	Pharmaceuticals	29,643	18%
	Medical Instruments /equipment	16,347	10%
	Business services	11,024	7%
	Construction	7,235	4%
	Other manufactured products	5,009	3%
	Freight transport	2,928	2%
	Food and catering	2,715	2%
	Information and communication technologies	2,098	1%
	Paper products	1,430	1%
	Manufactured fuels, chemicals and glasses	816	0%
	Waste products and recycling	260	0%
	Water and sanitation	207	0%
	Other procurement	246	0%
	<b>Procurement: sub total</b>	<b>79,958</b>	<b>47%</b>
	<b>Total CUH NHS Foundation Trust emissions</b>		<b>168,902</b>

**Table 5.2: 2007 CUH NHS Foundation Trust CO<sub>2</sub> emissions: sub-sector breakdown**

Notes:

<sup>1</sup> patient/visitor/staff travel estimated from national travel survey (NTS) level data.

<sup>2</sup> emissions based ERIC energy return data

<sup>3</sup> emissions based on national level IO data table analysis

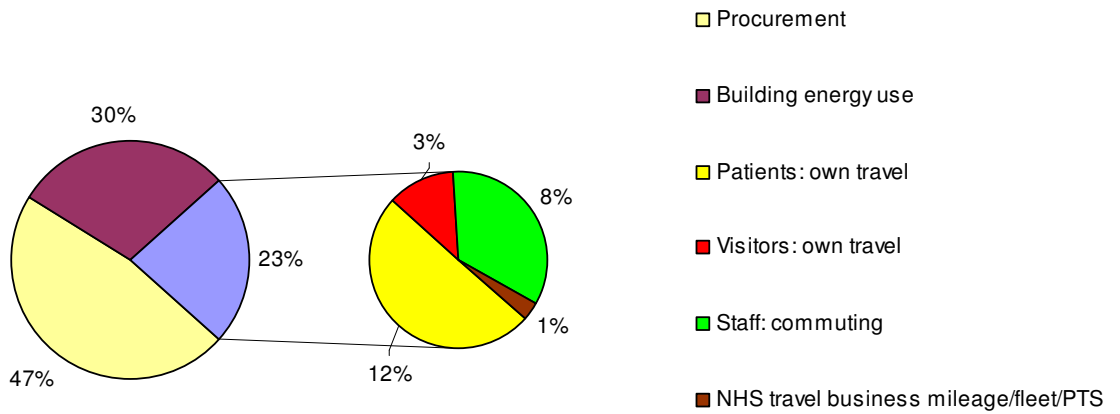


Figure 5.3: 2007 CUH Foundation NHS Trust CO<sub>2</sub> emissions: travel sub-sector breakdown

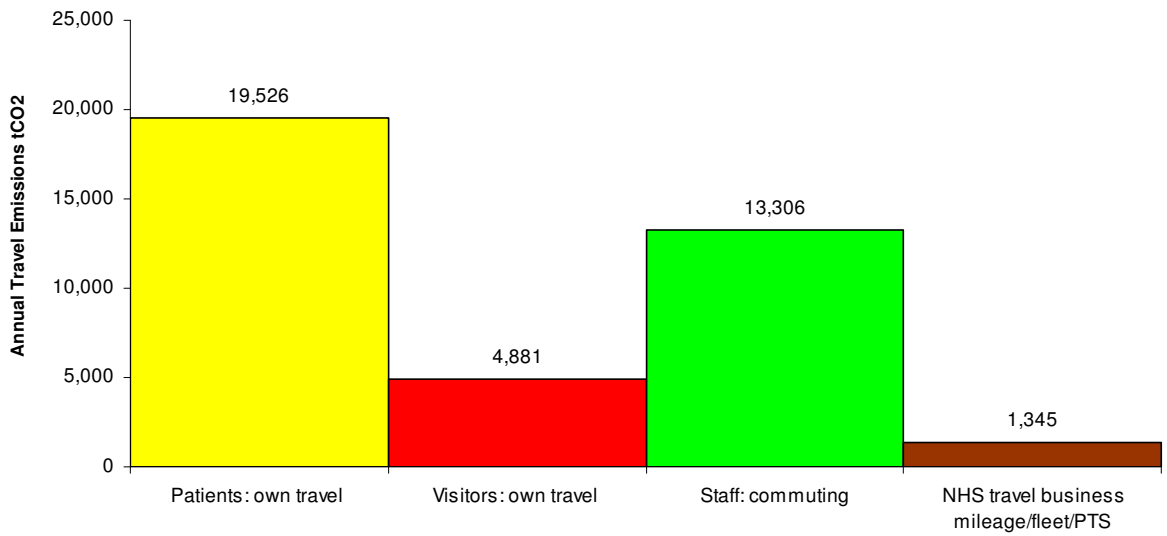
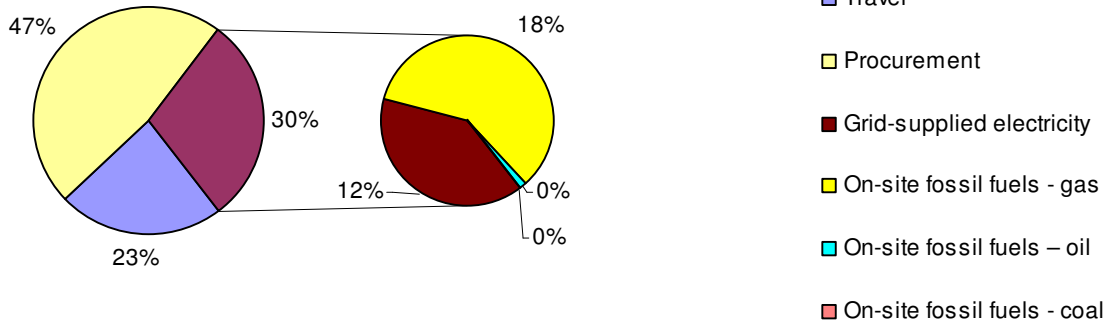
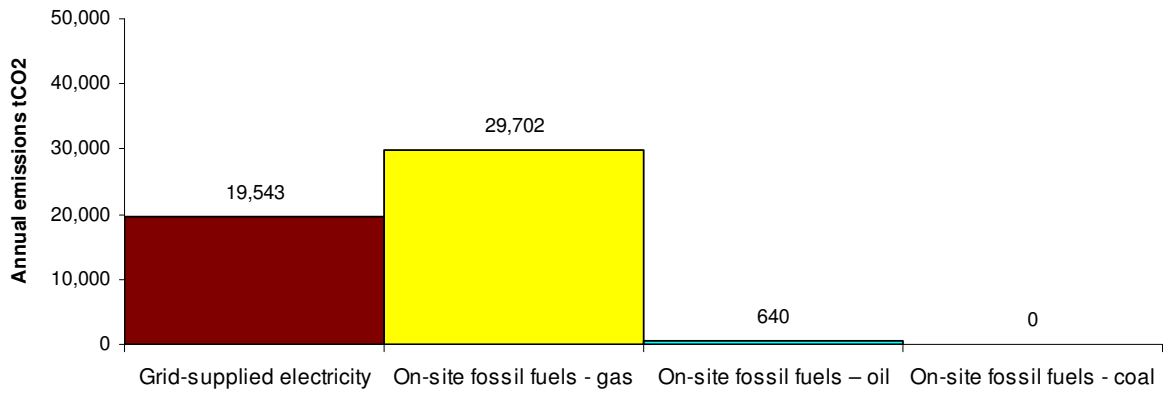


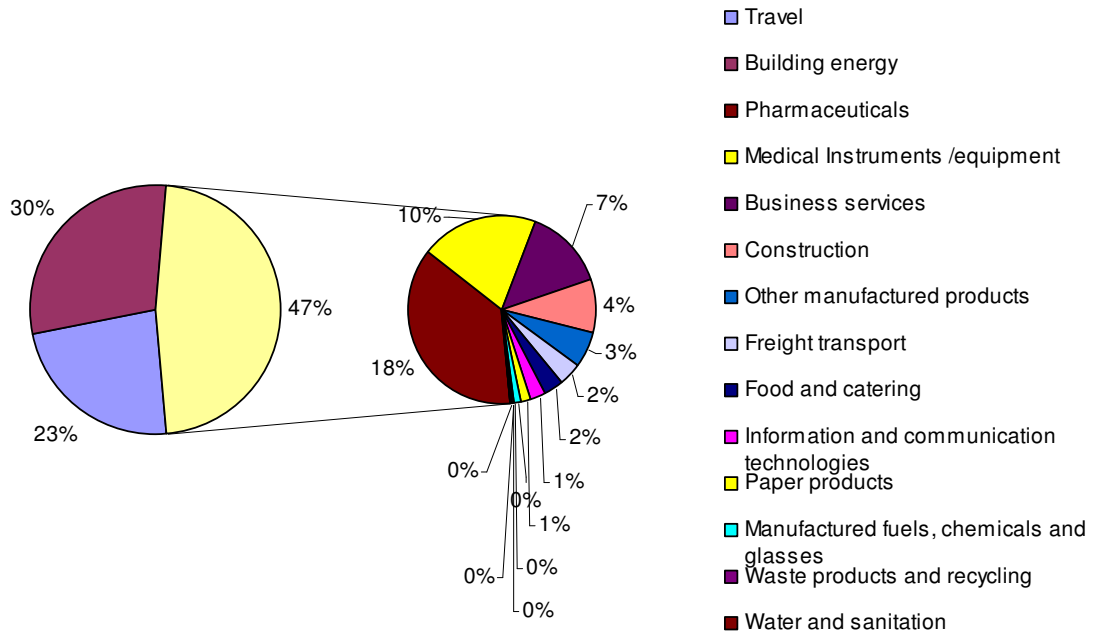
Figure 5.4: 2007 CUH Foundation NHS Trust CO<sub>2</sub> emissions: travel sub-sector breakdown



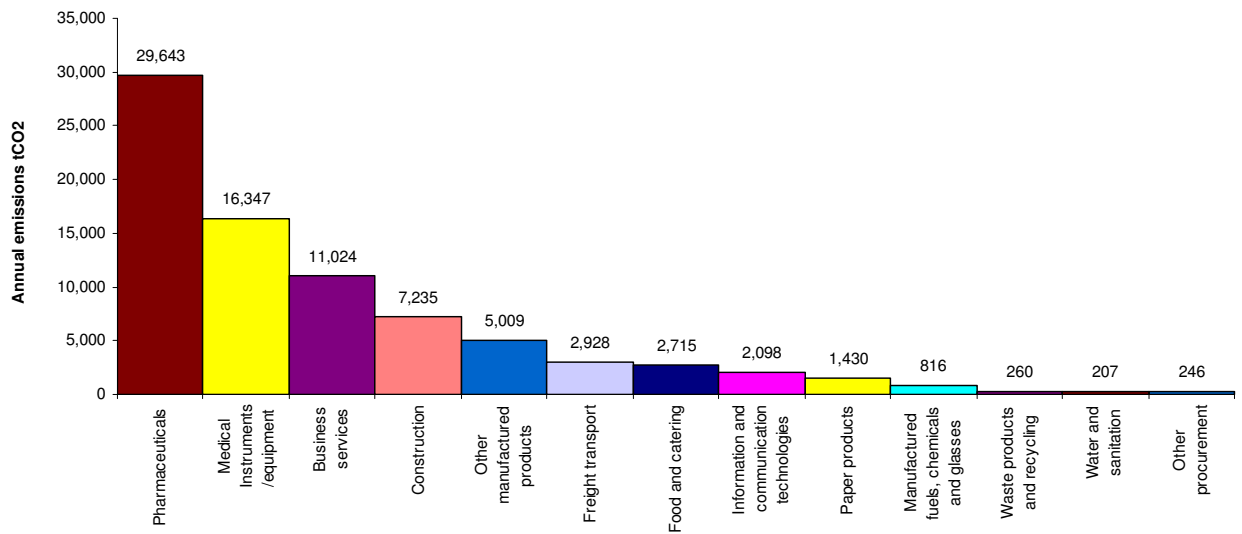
**Figure 5.5: 2007 CUH Foundation NHS Trust CO<sub>2</sub> emissions: building energy sub-sector breakdown**



**Figure 5.6: 2007 CUH Foundation NHS Trust CO<sub>2</sub> emissions: building energy sub-sector breakdown**



**Figure 5.7: 2007 CUH Foundation NHS Trust CO<sub>2</sub> emissions: procurement sub-sector breakdown**



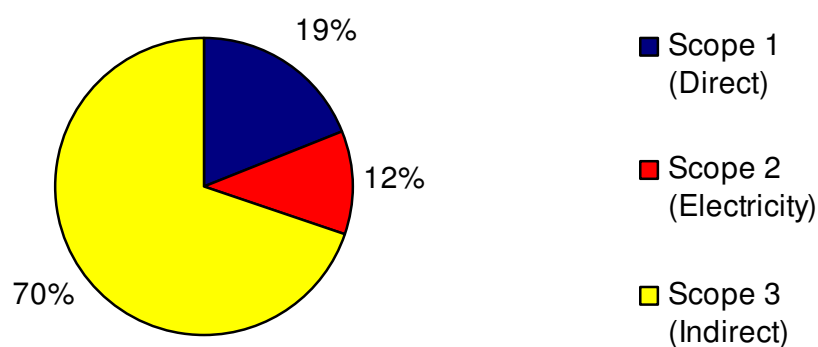
**Figure 5.8: 2007 CUH Foundation NHS Trust CO<sub>2</sub> emissions: procurement sub-sector breakdown**

### 5.1.3 GHG Scope 1-3 emissions

The breakdown of the consumption footprint into Scope 1, 2 and 3 emissions categories is shown by Table 5.3 and Figure 5.9 below.

GHG Protocol emissions sector (Scope)	2007 CO <sub>2</sub> emissions	
	tCO <sub>2</sub>	% of total
Scope 1 (direct)	31,687	19%
Scope 2 (electricity)	19,543	12%
Scope 3 (indirect)	117,671	70%
<b>Total</b>	<b>168,902</b>	<b>100%</b>

**Table 5.3: 2007 CUH Foundation NHS Trust CO<sub>2</sub> emissions: Scope 1-3 emissions breakdown**



**Figure 5.9: 2007 CUH Foundation NHS Trust CO<sub>2</sub> emissions: Scope 1-3 emissions breakdown**

## 5.2 Comparison to NHS England footprint

The total and primary sector emissions of CUH NHS Foundation Trust and NHS England for 2007 are shown below in Table 5.4:

Sector	Overall 2007 CO <sub>2</sub> emissions				
	CUH NHS Foundation Trust		NHS England		Ratio of CUH NHS Foundation Trust / NHS England emissions (%)
	ktCO <sub>2</sub>	% of total	ktCO <sub>2</sub>	% of total	
Travel	39	23%	3,095	15%	1.26%
Building energy use	50	30%	4,863	24%	1.03%
Procurement	80	47%	12,087	60%	0.66%
<b>Total</b>	<b>169</b>	<b>100%</b>	<b>20,045</b>	<b>100%</b>	<b>0.84%</b>

Table 5.4: 2007 CUH NHS Foundation Trust vs NHS England primary sector CO<sub>2</sub> emissions

Table 5.5 presents the sub-sector emissions comparison between CUH NHS Foundation Trust and NHS England for 2007:

Sector	Sub sector	2007 Overall CO <sub>2</sub> emissions				
		CUH NHS Foundation Trust		NHS England		% Ratio of CUH / NHS England emissions
		ktCO <sub>2</sub>	% of total	ktCO <sub>2</sub>	% of total	
<b>Travel</b>	Patient: own travel	20	12%	1,329	7%	1.47%
	Visitor travel	5	3%	332	2%	1.47%
	Staff: commuting	13	8%	743	4%	1.79%
	NHS travel: business mileage/fleet/PTS	1	1%	690	3%	0.19%
	<b>Travel: sub total</b>	<b>39</b>	<b>23%</b>	<b>3,095</b>	<b>15%</b>	<b>1.26%</b>
<b>Building energy</b>	Grid-supplied electricity	20	12%	2,331	12%	0.84%
	On-site fossil fuels - gas	30	18%	2,296	11%	1.29%
	On-site fossil fuels – oil	1	0%	109	1%	0.58%
	On-site fossil fuels - coal	0	0%	126	1%	0.00%
	Renewables	0	0%	0	0%	0.00%
	<b>Building energy use: sub total</b>	<b>50</b>	<b>30%</b>	<b>4,863</b>	<b>24%</b>	<b>1.03%</b>



Sector	Sub sector	2007 Overall CO <sub>2</sub> emissions				
		CUH NHS Foundation Trust		NHS England		% Ratio of CUH / NHS England emissions
		ktCO <sub>2</sub>	% of total	ktCO <sub>2</sub>	% of total	
<b>Procurement</b>	Pharmaceuticals	30	18%	4,544	23%	0.65%
	Medical Instruments /equipment	16	10%	1,813	9%	0.90%
	Business services	11	7%	1,179	6%	0.94%
	Construction	7	4%	372	2%	1.94%
	Other manufactured products	5	3%	699	3%	0.72%
	Freight transport	3	2%	798	4%	0.37%
	Food and catering	3	2%	363	2%	0.75%
	Information and communication technologies	2	1%	279	1%	0.75%
	Paper products	1	1%	1,061	5%	0.13%
	Manufactured fuels, chemicals and glasses	1	0%	528	3%	0.15%
	Waste products and recycling	0	0%	94	0%	0.28%
	Water and sanitation	0	0%	128	1%	0.16%
	Other procurement	0	0%	230	1%	0.11%
	<b>Procurement: sub total</b>	<b>80</b>	<b>47%</b>	<b>12,087</b>	<b>60%</b>	<b>0.66%</b>
<b>Total emissions</b>	<b>169</b>	<b>100%</b>	<b>20,045</b>	<b>100%</b>	<b>0.84%</b>	

**Table 5.5: 2007 CUH Foundation NHS Trust vs NHS England sub-sector CO<sub>2</sub> emissions**

### 5.3 Discussion

Following the presentation of the results from the data analysis in Sections 5.1 and 5.2, the results are now discussed in more detail.

#### 5.3.1 Overall emissions

At 168,902tCO<sub>2</sub>, the overall CUH NHS Foundation Trust emissions are 0.84 % of NHS England's footprint, and would be the equivalent in carbon dioxide emissions terms of heating annually around 50,000 homes in Cambridge.

To assess if the 0.82% share of the national footprint, similar comparator values are established for other metrics, as shown in Table 5.6:

<b>Metric</b>	<b>CUH NHS Foundation Trust</b>	<b>NHS England</b>	<b>CUH / NHS England ratio</b>
Annual patients/visitors medical return trips/year	3,200,000 <sup>1</sup>	1,102,000,000 <sup>2</sup>	0.29%
Whole Time Equivalent (WTE) staff	6,187 <sup>5</sup>	1,150,000 <sup>2</sup>	0.54%
Intermediate procurement spend (2007-08) at 2004 prices	£225M <sup>3</sup>	£34,223,000 <sup>4</sup>	0.66%
Floor area (m2)*	190,168 <sup>6</sup>	26,000,000 <sup>7</sup>	0.73%
2007 Consumption based carbon footprint (ktCO <sub>2</sub> )	169	20,045	0.84%
Energy consumption (GJ)*	533,498 <sup>6</sup>	45,000,000 <sup>7</sup>	1.19%

**Table 5.6: Comparison of other 2007-08 metrics between CUH Foundation NHS Trust and NHS England**

Notes:

<sup>1</sup> Value obtained from Table 4.4.

<sup>2</sup> Calculated from Appendix B1.2 data in NHS England carbon footprint report (SDC, 2008)

<sup>3</sup> Value obtained from Table 4.14.

<sup>4</sup> Value from NHS England carbon footprint report (p.52, SEI and Arup, 2009a)

<sup>5</sup> Value obtained from Table 4.5.

<sup>6</sup> Values from ERIC data (DH, 2009a)

<sup>7</sup> Values extrapolated from NHS England carbon footprint report (p.88, SDC, 2008)

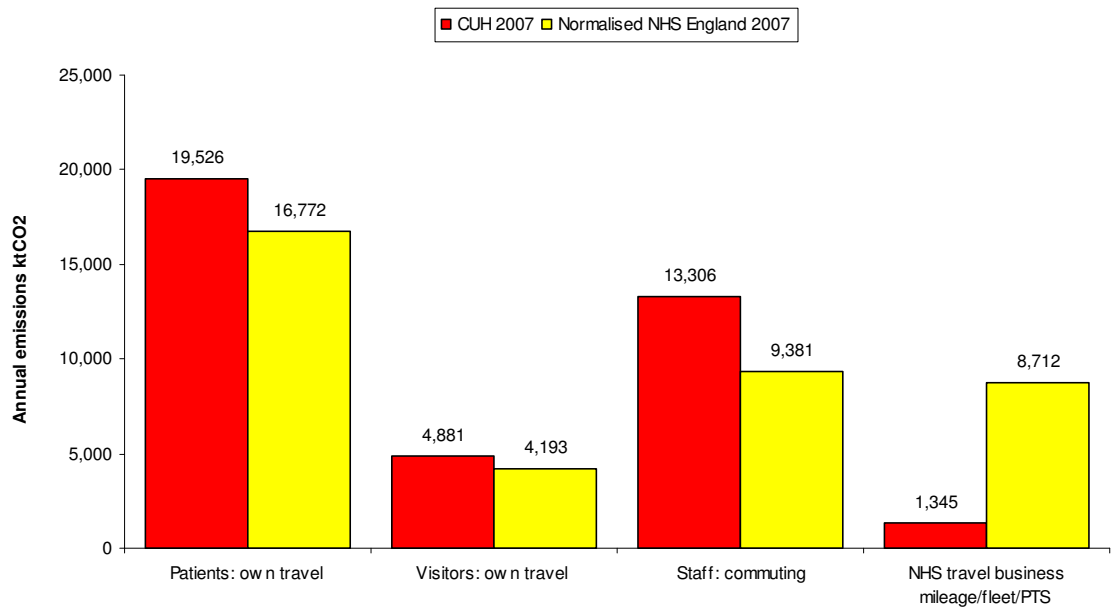
Table 5.6 shows that the consumption footprint value (0.84%) lies within the 0.29%-1.19% banding of 5 other comparison metrics. Arguably, the floor area (0.73%) and energy consumption (1.19%) provide the most suitable comparisons, as they relate to hospitals only data obtained from the ERIC datasets (DH, 2009a). Other metrics (e.g. patient/visitor travel and WTE staff) will include other NHS sites in addition to hospitals. This will have the effect of increasing the national values, and reducing the Trust vs NHS comparison % value.

Therefore, the overall emissions for CUH NHS Foundation Trust is within the 0.73% - 1.19% banding identified above, and on this basis the overall CUH NHS Foundation Trust carbon footprint appears to be a credible value. Further consideration of the individual emissions sectors will provide an additional check of the overall footprint – this is subsequently done in Sections 5.3.2 – 5.3.4.

In addition, the importance of considering the total consumption footprint is revealed by Section 5.1.3, as only 30% of CUH NHS Foundation Trust carbon emissions would be captured by traditional carbon accounting techniques, which consider only scope 1 and 2 emissions as defined under the GHG protocol.

### 5.3.2 Travel emissions

23% of CUH NHS Foundation Trust emissions originate from travel, which is greater than the 2007 NHS England estimate (15%). Indeed, the travel emissions ratio in Table 5.4 is 1.26%, indicating higher than NHS average emissions. The difference in emissions between CUH NHS Foundation Trust and normalised NHS England travel emissions is studied overleaf in Figure 5.10, and indicates that both staff commuting and patient/visitor emissions are proportionately higher than the NHS England average.



**Figure 5.10: Comparison of CUH NHS Foundation Trust and normalised NHS England travel emissions**

The key reason for this result appears to be the longer travel trip distances used for the Trust level travel emissions calculation, as calculated in Section 4.2, and shown in Table 5.7 below:

Travel category / sub-class	Average single trip distance	
	CUH NHS Foundation Trust	NHS England
Staff commuting	12.8kms	6.8kms
Patient/visitors	19.6kms	2.8kms

**Table 5.7 – Comparison of CUH Foundation NHS Trust and NHS England trip distances**

For commuting, the modal shift away from car use at the Trust has helped to mitigate the increase in comparative emissions, as has proportionately lower number of patients/visitors that attend the hospital site compared to over NHS England visits. Analysis of other Trust’s travel data would help to establish how CUH NHS Foundation Trust compares to other hospitals. In addition, collecting patient/visitor modal distance data would remove the travel distance assumptions made and improve the analysis.

Overall, the benefits of bottom-up survey data are demonstrated by the footprint analysis, as taking NTS data applied to the Trust level may not be reliable due to the variable locations (i.e. town versus rural location) and differences in travel distances and modes of travel. The data generated is of importance at a Trust level for understanding the difference travel demands of staff, patients and visitors, as shown in Figure 5.11 below. It would also be useful at a national level to help quantify and share best practice.

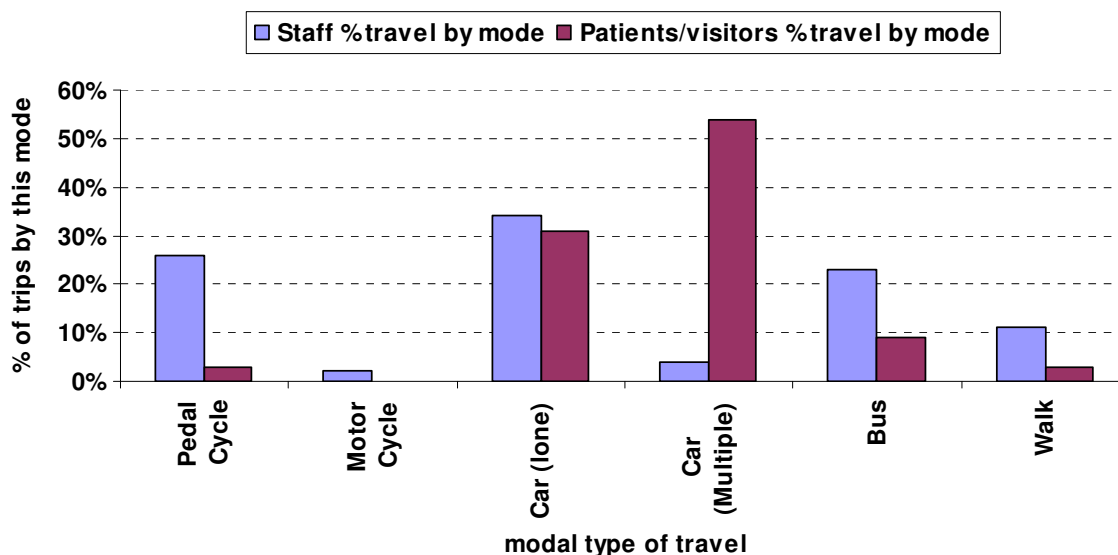


Figure 5.11: CUH NHS Foundation Trust travel survey modal breakdown

### 5.3.3 Building energy emissions

Overall, building energy emissions are 1.03% of NHS England's, which is higher than the 0.84% overall footprint ratio. Table 5.8 indicates that this is mainly due to the Trusts' higher proportionate normalised use of on-site energy (nearly all gas):

Sector	Normalised building energy consumption				CUH / NHS England Ratio
	CUH NHS Foundation Trust data (2007)		NHS England ERIC data (2007)		
	GJ/m <sup>2</sup>	% of total	GJ/m <sup>2</sup>	% of total	
On-site fossil fuel use	2.21	76%	1.25	71%	177%
Electricity	0.59	24%	0.51	29%	116%
<b>Total</b>	<b>2.81</b>	<b>100%</b>	<b>1.76</b>	<b>100%</b>	<b>159%</b>

Table 5.8: 2007 CUH NHS Foundation Trust vs NHS England building energy consumption

This result is shown below with the CUH NHS Foundation Trust data for 2007-08 superimposed on an NHS England study (SDC, 2008) graph:

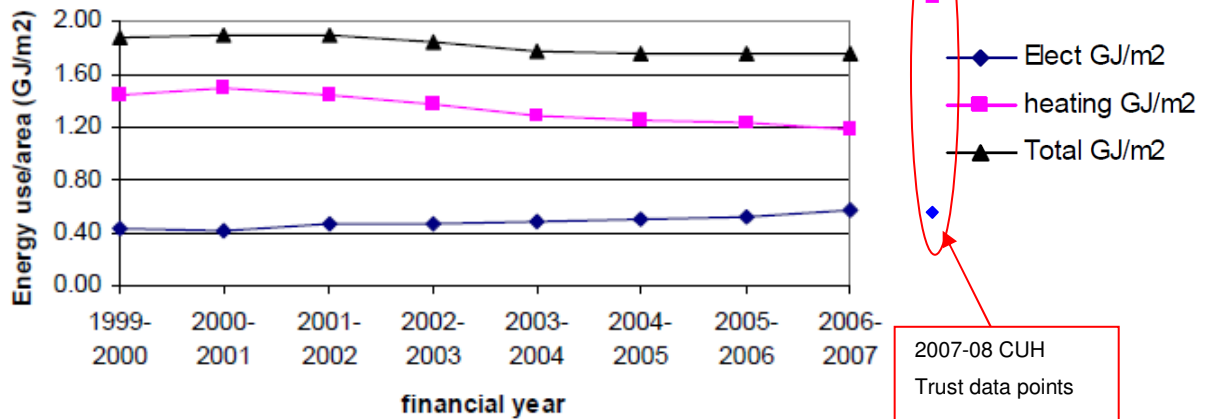
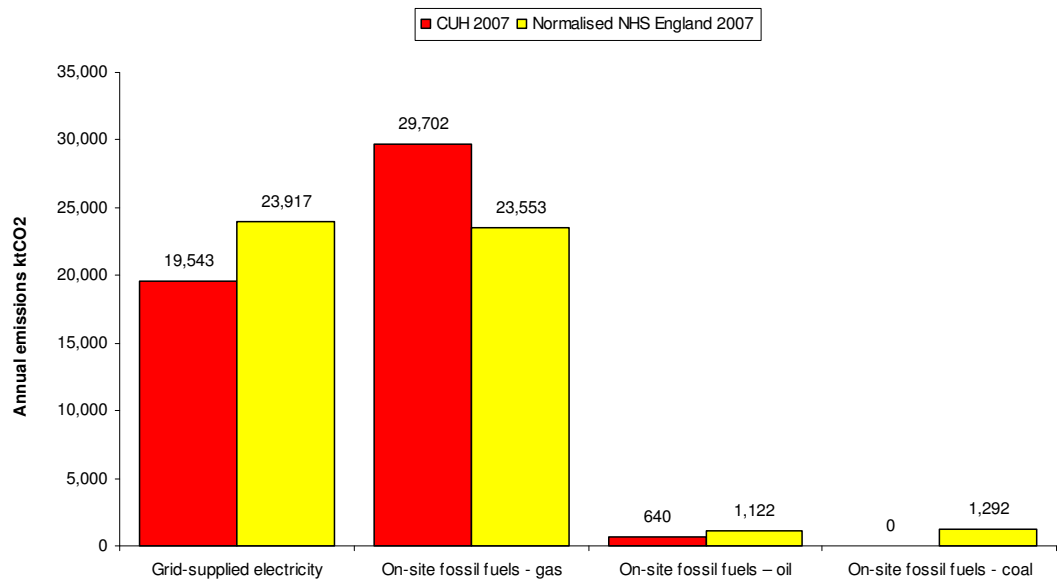


Figure 5.12: ERIC returns for NHS England estates buildings (p89, SDC, 2008)

EnCO<sub>2</sub>de (DH, 2007c) provides benchmark comparisons for NHS Trusts to review their individual energy consumption. The graph was shown previously in Figure 3.4. The calculated energy consumption value is calculated from ERIC data (DH, 2009a) to be 1.16 GJ/m<sup>3</sup> (533,498GJ / 459,529m<sup>3</sup>), and when marked on Figure 3.4 it shows a much higher energy consumption value than the quoted range for Acute teaching hospitals outside London (56.9-81.2 GJ/m<sup>2</sup>).

Finally, the normalised energy comparison extends in Figure 5.13 to on-site fuel types, and provides further evidence of the higher than NHS average gas related consumption and emissions.



**Figure 5.13: Comparison of CUH NHS Foundation Trust and normalised NHS England building energy emissions**

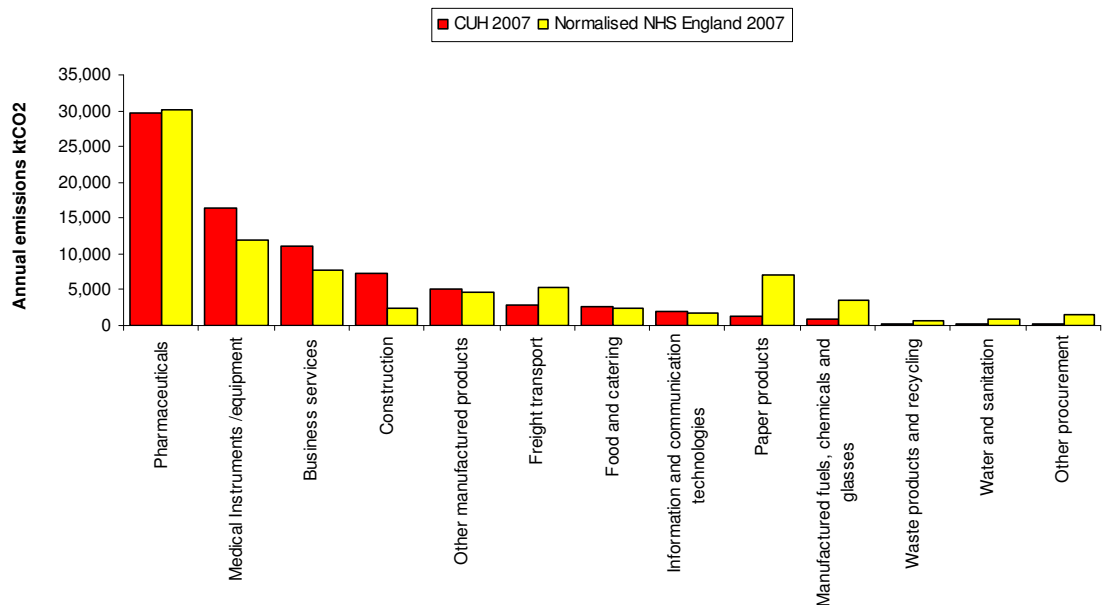
#### 5.3.4 Procurement emissions

Similar to the NHS England study (SDC, 2008), procurement is CUH NHS Foundation Trust's the largest emissions sector. As noted earlier, this is indicative of a service-based industry, where the main activity is in providing care to patients, which demands the consumption of goods and services.

However, procurement forms only 47% of total Trust emissions, compared to 60% for NHS England, and the emissions ratio – at 0.66% - is below the 0.84% overall footprint ratio. This may be typical of a hospital, but as no other consumption-based footprints have been completed this cannot be verified.

CUH NHS Foundation Trust's procurement emissions are dominated by the pharmaceuticals and medical equipment sectors, and comprise 58% of all procurement emissions. When combined, they form a quarter of the overall CUH Foundation NHS Trust footprint, and are nearly the same magnitude as building energy sector emissions.

There are some notable differences in procurement sub-sector emissions – such as paper and construction, when compared to NHS England emissions, as shown in Figure 5.14. The reasons for these differences would be worthy of further study.



**Figure 5.14: Comparison of CUH NHS Foundation Trust and normalised NHS England procurement emissions**

In addition, it is useful to review the granularity of the input data and results for the procurement sector analysis, since this is an innovative feature of this research study. Considering the account ledger information and the SIC mapping process:

- **Financial Ledger:** the 408 codes were quite coarse in some cases, which meant that allocation to SIC sector was not straightforward, and involved varying degrees of judgement based on experience. For example, account code R3500 (office consumables) was split 50% to SIC sector 32 (pulp, paper and paperboard) and 50% to sector 69 (office machinery and computers). An improved dataset may result from the use of E-Class data (PASA, 2009b), which with around 2000 account codes has a much finer resolution of detail, that would aid the SIC mapping.
- **SIC sector mapping:** firstly, although the ledger account codes are mapped to one of more of the 123 SIC sector codes, not all SIC sectors are used. In fact, 71/123 are used for the national study (SDC, 2008) whilst only



55/123 are allocated in the Trust level footprint. However, as 44 of the SIC sectors are common to both Trust and national studies, a reasonably common SIC sector mapping process seems to have occurred. Secondly, the distribution of SIC sector allocation shown in Figures 5.15 and 5.16. reveal some interesting features:

- Most SIC sectors have 0-5 ledger codes allocated
- 150 (out of 408) account codes are allocated to 2 SIC sectors (43 – Pharmaceuticals and 76 – medical equipment)
- The 16 SIC sectors with more than 5 account codes allocated to them contribute 73,164tCO<sub>2</sub> out of the total 117,054 tCO<sub>2</sub> for all 123 sectors.

No of ledger codes (out of 408 codes) mapped to the same SIC sector	No of 123 SIC sector codes for which that occurs	Total emissions in this group (tCO <sub>2</sub> )	% of total SIC sector emissions
<b>0-5</b>	107	43,891	37%
<b>5.1-10</b>	8	8,766	7%
<b>10.1-15</b>	2	7,428	6%
<b>15.1-20</b>	2	975	1%
<b>20.1-25</b>	1	3,456	3%
<b>25.1-30</b>			
<b>30.1-35</b>	1	29,643	25%
<b>35.1-40</b>			
<b>40.1-45</b>			
<b>45.1-50</b>			
<b>50.1-55</b>			
<b>55.1-60</b>			
<b>60.1-65</b>			
<b>65.1-70</b>	1	16,347	14%
<b>70.1-75</b>			
<b>75.1-80</b>			
<b>80.1-85</b>			
<b>85.1-90</b>	1	6,548	6%
<b>Total</b>	<b>123</b>	<b>117,054</b>	<b>100%</b>

**Table 5.9: Summary of Mapping from CUH NHS Foundation Trust ledger codes to SIC sectors**

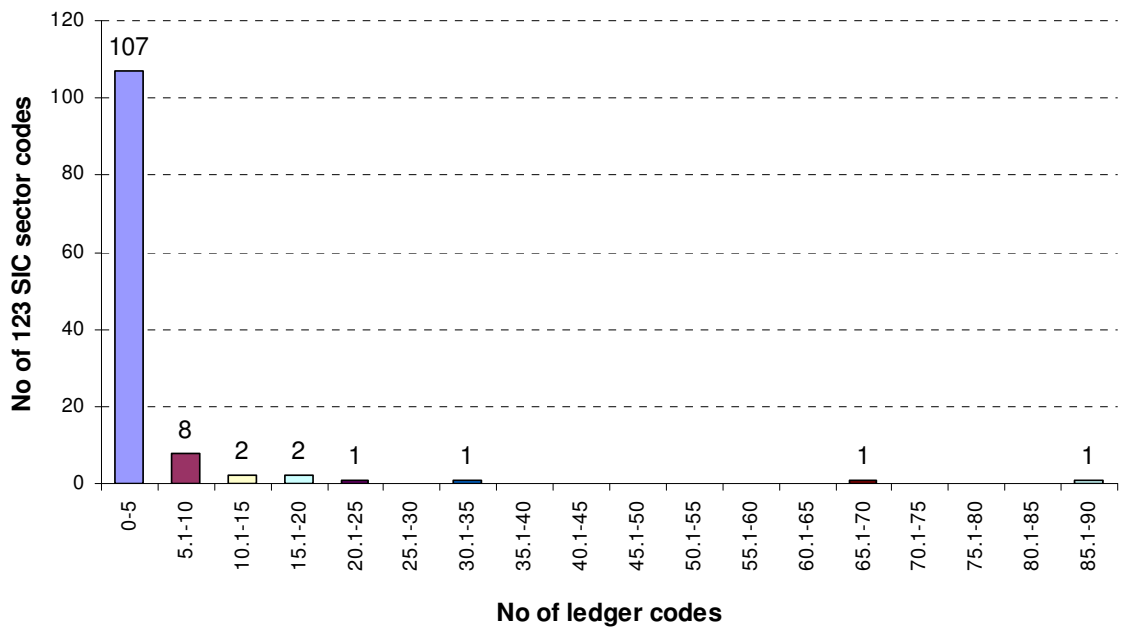


Figure 5.15: Histogram of SIC sector codes versus ledger code allocation

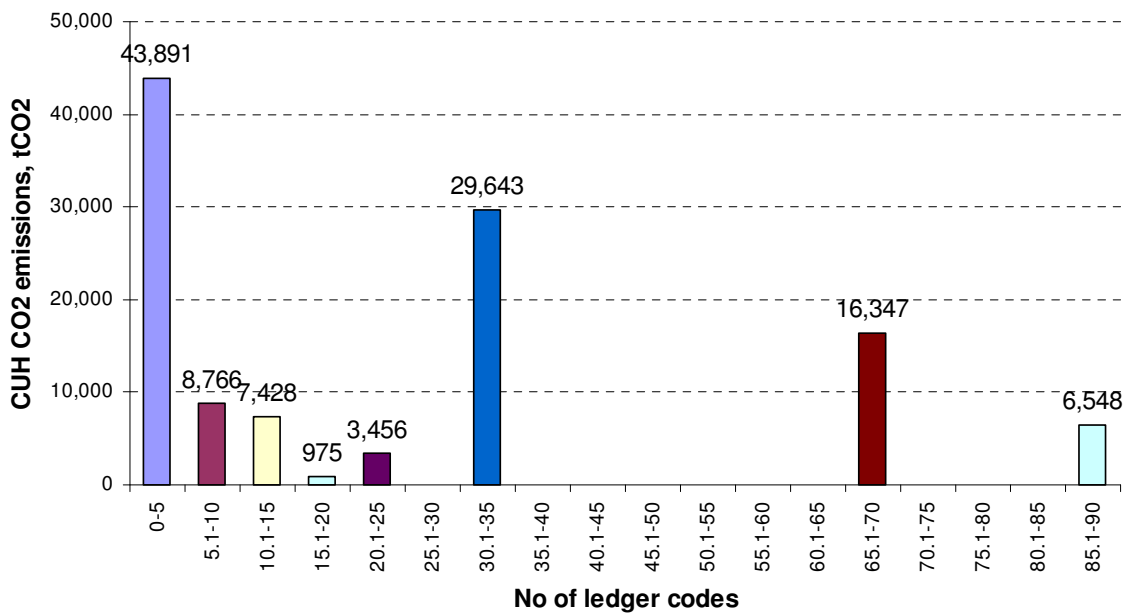


Figure 5.16: Histogram of SIC sector emissions versus ledger code allocation

### 5.3.5 Implications for CUH NHS Foundation Trust

The main focus of the research study is to develop a pilot methodology for Trust level consumption-based carbon footprinting. The main merits of this research conducted are discussed within that context in Section 6. However, it is worth recording some observations which may prove useful for CUH NHS Foundation Trust. Considering each of the 3 main emissions sectors in turn:

- **Travel data:** it would be useful to include patient and visitor modal travel distances in future travel surveys. Currently the travel plan focuses on staff, but as patient and visitor travel emissions may account for the majority of the travel emissions, consideration of travel patterns for patients and visitors will help site travel planning and also reduce error margins associated with emissions calculations.
- **Procurement:** the use of E-class datasets will help to resolve ambiguities associated with the ledger account datasets when mapping SIC sectors. In addition, it will help provide a strong profile of consumption of different goods and services by the Trust. For example, with around 200 codes just for drugs, this very high level of detail will enable the Trust to identify and review its consumption of large volume items. Comparison to other Trusts E-class data would also yield valuable data, and help identify best (and worst) practice.
- **Building energy:** firstly, the use of on-site energy (gas use) should be reviewed in detail, as the consumption profile appears to be high on an NHS England level and when compared to similar Trust types. There may be clear reasons as to why the energy demand is high. Secondly, according to the ERIC datasets, CUH NHS Foundation Trust does not have a CHP system, nor does it have any installed renewable electricity generation on-site.

## **6 Technical viability and benefits of applying the consumption-based footprint technique across all NHS Trusts**

### **6.1 Technical viability**

#### 6.1.1 Research aims

In order to assess the technical viability and benefits of this technique for NHS Trusts, and assist in reaching overall conclusions and recommendations in Section 7, the content of the research thesis is first reviewed against the two original aims given in Section 1.3.

#### **Research aim #1: develop a suitable methodology and undertake a consumption based carbon footprint for an NHS Trust**

- 1.1 Methodology:** a methodology was developed based on the consumption-based approach used for the national studies (SDC, 2008; SEI and Arup, 2009a). The key difference between the national footprinting methodology and the Trust level technique lay in the consumption data: the former used top-down data whereas the latter used bottom-up Trust level data.
- 1.2 Input data:** the consumption data was collected for the travel, building energy and procurement sectors. This was all directly obtained bottom-up data, except for patient/visitor modal trip distances, where the data was not available, and so estimated data was used in its place. The carbon intensity data collated were the same values as used for the NHS England study (SEI and Arup, 2009a), to ensure consistency.
- 1.3 Carbon footprint analysis:** this was undertaken in accordance with the developed methodology. The raw data results were then mapped to the same categories as used for the NHS England study (SEI and Arup, 2009a), to ensure comparability.

## **Research aim #2: review the analysis results and investigate the technical viability of applying the consumption-based methodology to NHS Trusts**

**2.1 Review results and compare to national footprint:** the results and comparison were presented in Section 5. The overall footprint was found to be broadly comparable to the NHS England results, with procurement remaining the largest emissions sector. Travel emissions were proportionately higher than for NHS England, which was attributed to longer trip distances. Building energy emissions were also proportionately higher, but the reasons for the higher on-site gas consumption have not been identified in this study. Procurement emissions were proportionately lower than NHS England, but comparisons to other Trusts would help assess if the result is low, or typical for a hospital.

**2.2 Review footprint research and identify limitations:** analytical limitations have been identified and discussed, largely in Section 4.1.4, but also in Section 5.3. The key limitations focus on the procurement sector, and include:

- **Ledger account codes:** the code descriptions were sometimes quite broad (e.g. office consumables), which in some cases made accurate SIC sector allocation more difficult.
- **Granularity of SIC sectors and carbon intensities:** due to the health-related nature of the Trust activity, 150 out of 408 account codes were allocated to just 2 SIC sectors (pharmaceuticals and medical equipment). In addition, using average UK carbon intensity values for each SIC sector means all products within that sector share the same carbon intensity. At a purchaser level this is problematic: as there is no carbon reward for buying 'eco-friendly' products which may be more expensive and thus (according to the analysis) will result in higher attributed emissions.

The discussion above covers objectives 1-6 in Section 1.3. The second part of research aim #2 is now undertaken. Objective 7 (technical viability and benefits of

wider use by NHS Trusts) is completed below, before reaching overall research conclusions and recommendations (objective 8) in Section 7.

### 6.1.2 Technical viability of wider use by NHS Trusts

Based on the analytical results presented, and the comparisons made to NHS England's footprint values, the technique appears viable for use by CUH NHS Foundation Trust. The methodology is consistent with that used for the NHS England footprint (SDC, 2008), ensuring that the correct fraction of the national footprint is attributed to the Trust. The accuracy of future CUH NHS Foundation Trust analyses would improve by collecting patient/visitor travel modal distances, and using E-class data in lieu of the financial ledger.

To adopt the technique more widely, other Trusts will require the following detailed input data:

- **Travel:** detailed travel survey data for staff, patients and visitors;
- **Building energy:** ERIC energy data;
- **Procurement:** Trust expenditure breakdown, ideally by E-class.

Overall, a common methodology and input data framework would need to be developed and then tested with other pilot NHS Trusts, before the technique could be endorsed nationally. However, the potential benefits - as outlined below - illustrate that this area of carbon research is worth progressing.

## 6.2 Benefits of wider adoption by NHS Trusts

The key potential benefits to various NHS organisations of NHS Trusts more widely adopting a consumption-based footprint technique are now summarised.

### 6.2.1 Trust level

There are several advantages to this technique being applied at the Trust level.

- **A 'real-time' footprint:** the financial data is a particular strength in this regard, as the top-down national footprint IO data is several years behind, which has implications for monitoring of national emissions. This means that Trusts can measure their individual progress towards the 2015 target of a 10% reduction in consumption emissions relative to 2007. It will also mean that the Trust will be able to report annual progress.
- **Consistency with the national approach:** this ensures that we are comparing like with like when reviewing the local Trust footprint against the national footprint results.
- **Identification of carbon hotspots:** the pilot Trust's footprint results have identified key emissions hotspots, and in addition noted differences in consumption patterns relative to the national results. This could enable the Trust to set better strategic priorities than if it adopted the national footprinting profile.
- **Saving carbon = saving money:** real-terms annual growth in NHS expenditure since 2002 has averaged around 6% (Wanless et al, 2007). Future restrictions on NHS expenditure after the 'credit crunch' will mean that it will be increasingly important for Trusts to save money as well as carbon. A consumption-based carbon footprint analysis could be a strategically important tool for meeting this aim.

### 6.2.2 Regional & national level

Benefits could also occur to higher level organisations in the NHS:

- **Baseline monitoring:** as noted above, a 'real-time' footprint can be calculated, and thus progress towards the 2015 target can be tracked at a regional and national level.
- **Regional reporting:** a regional footprint would help regions report on progress to the 2015 target, and also meet the national strategy requirements, which state that "every SHA [Strategic Health Authority]

Board should receive at least annually a report about progress in meeting the requirements of this strategy in their region” (p.63, SDU, 2009a).

- **Best practice:** collation footprinting data would enable comparison of Trusts and also NHS regions - helping to identify best practice consumption patterns. Ideally this comparison would compare both consumption and carbon intensities. However, whilst consumption profiles can be reviewed simply by commonly adopting the detailed E-class system, carbon intensities – which are average UK SIC sector values - do not account for ‘low carbon’ product choices. Notwithstanding this, significant benefits could be realised from consumption savings via the E-class system, whilst in time greater carbon intensity information (e.g. PAS 2050) will help inform product choice.
- **‘Low carbon pathways’:** if the footprint technique becomes established, it could be used as a basis for developing a patient level carbon system. Currently CUH NHS foundation Trust are developing a patient costing system, to calculate the financial cost of patient ‘journeys’ through their healthcare system, as shown in Figure 6.1. By mapping carbon emissions to each item of expenditure the total consumption-based emissions could also be calculated, and thus alternative ‘low carbon pathway’ models of care can be tested.

**Admission Date:** 12/07/2006  
**Admission Method:** Elective  
**Spell HRG:** H80 - Primary Hip Replacement Cemented  
**Dominant Procedure:** W371 - Primary total prosthetic replacement of hip joint using cement  
**Spell LOS:** 6

<u>Area</u>	<u>Date</u>	<u>Item</u>	<u>Description</u>	<u>Cost £</u>	<u>Tariff £</u>
<u>Drugs</u>	14/07/2006	Drug157	ATENOLOL	£0.33	
	18/07/2006	Drug157	ATENOLOL	£0.33	
<u>Pathology</u>	14/07/2006	Path203	U/E	£1.59	
	16/07/2006	Path203	U/E	£1.59	
	14/07/2006	Path102	Urea	£0.96	
	16/07/2006	Path102	Urea	£0.96	
	14/07/2006	Path80	Full Blood Count	£3.02	
	16/07/2006	Path80	Full Blood Count	£3.02	
	18/07/2006	Path203	MRSA broth screen	£6.62	
<u>Wards</u>	18/07/2006	Ward C8	WARD C8 T&O	£1,026.43	
	12/07/2006	Consultant Ward Costs	Mr. X	£48.79	
<u>Theatre</u>	13/07/2006	Theatre Costs	Theatre Time – Mr. Surgeon	£766.97	
	13/07/2006	Anaesthetic Costs	Anaesthetics – Dr Anaesthetist / Consultant	£1,234.90	
	13/07/2006	Recovery Costs	Recovery	£53.67	
<u>Radiology</u>	17/07/2006	X-ray	PELVIS & LATERAL RIGHT HIP	£25.73	
<u>Prosthesis</u>	12/07/2006	HowMedica	Primary total prosthetic replacement of hip joint	£1,035.49	
<u>Allied Health</u>	12/07/2006	Physio	Physiotherapy	£17.12	
<u>Other</u>	12/07/2006	Other	Other	£44.15	
<b>TOTAL</b>				<b>£4,272</b>	<b>£6,015</b>

**Figure 6.1: Extract of CUH NHS Foundation Trust Patient Level Costing System**



## 7 Conclusions and Recommendations

### 7.1 Conclusions

The need to swiftly reduce global carbon emissions should not be understated: as Hansen et al (2007) suggests, “recent greenhouse gas emissions place the Earth perilously close to dramatic climate change that could run out of our control”.

NHS England’s carbon reduction strategy (SDU, 2009a) targets a 10% consumption-based carbon footprint reduction by 2015 from the 20MtCO<sub>2</sub> estimated in 2007. A key limitation for Trusts is that currently no consumption-based footprint technique is being used to measure progress towards the national target.

To address this issue, this research study set out to develop and trial a technique for measuring the first consumption-based carbon footprint of an NHS Trust. Based on the research presented in this thesis, it is suggested that this aim has largely been met, as a methodology was developed and then used to calculate the CUH NHS Foundation Trust consumption-based carbon footprint.

In addition, based on the review of the results and interpretation, the following key conclusions are made:

- Firstly, the overall 2007 footprint value of 168,902tCO<sub>2</sub> seems consistent with the national NHS emissions value of 20MtCO<sub>2</sub>. However there are variances from the national results within emissions sectors: emissions from travel (23%) and building energy (30%) are proportionately higher, whilst procurement emissions (47%) are proportionately lower. Procurement, however, remains the largest emissions sector.
- Secondly, key limitations exist in the footprint methodology, mainly in relation to the SIC sector classifications and associated carbon intensities. Whilst these are acknowledged limitations of the top-down analysis, the technique could still be developed as there are benefits which occur from the systems that are put in place. For example, formal adoption of E-class procurement datasets across all NHS Trusts would yield important

benchmarking data, enabling consumption best practice to be established and shared. In addition, progress in LCA footprinting (GHG Protocol, 2009) will in future reduce the top-down IO limitations as combined EIO-LCA analyses develop.

- Thirdly, there are potentially widespread benefits in applying an accredited consumption-based carbon footprint technique to NHS Trusts, using a methodology consistent with the national approach. A 'real-time' footprint would be useful for baseline monitoring and strategic planning at Trust as well as regional and national levels. In addition, there is potential for apply the technique to develop cross-cutting 'low carbon pathway' analysis.

## 7.2 Recommendations

Five key recommendations are made, to encourage future progress in this area:

1. **E-class data:** if this technique is to be widely adopted, it will require a common yet detailed procurement system, such that results can be easily collated and compared at regional and national levels. Currently the most suitable candidate appears to be the E-class procurement system, which contains over 2000 account codes.
2. **Further NHS Trust Pilots:** the development of this technique would benefit from other Trusts acting as pilots. Ideally, these would use E-class procurement data and have Trust travel survey data for staff, visitors and patients. This will further confirm the validity of the technique, and also start to benchmark different sectors of the consumption footprint between Trusts.
3. **Pharmaceutical and medical equipment carbon intensities:** half of the NHS procurement emissions are contained within the medical equipment and pharmaceutical sectors. Currently there is no sub-classification of carbon intensity values within these two sectors. Therefore a key requirement of future progress is that pharmaceuticals and medical equipment carbon intensities are sub-divided. For example, large pharmaceutical companies (e.g. GlaxoSmithKline) could provide bottom-up

data which would help to differentiate emissions between generic and branded medicines.

4. **CUH NHS Foundation Trust:** firstly, patients and visitor travel forms the majority of travel emissions and 15% of all the Trust's emissions, and so greater attention should be given to collecting modal travel data for this group and devising carbon reduction strategies. Secondly, a review of building energy consumption seems valid, given the high consumption values. The review could also include consideration of lower / zero carbon technology such as CHP and on-site renewables.
5. **Low carbon pathways:** further research is required to assess the potential for mapping the carbon emissions results to the patient level costing system, as both techniques are in an early development phase.

## References

Arup (2009) *Total Carbon Footprint of Stockton-on-Tees Borough Council*, accessed 03 August 2009 at

<http://www.stockton.gov.uk/resources/techsvcs/envkway/dlcarbman/totalcarb.pdf>

Barrett J., Chambers N., Cherret N., Jenkin N., Lewis K., Vergoulas G. (2004) *Material Health – A mass balance and ecological footprint analysis of the NHS in England and Wales*, accessed 03 August 2009 at

<http://www.materialhealth.com/download2.htm>

Barrett, J. (2009). *Personal communication to author.*

Department for Business, Enterprise & Regulatory Reform (BERR) (2007) *Efficiency of electricity generation from fuel sources: Table 5.10 Plant loads, demand and efficiency*, accessed 03 August 2009 at

<http://www.berr.gov.uk/whatwedo/energy/statistics/source/electricity/page18527.html>

British Standards Institution (BSI) (2008) *PAS 2050:2008 - Specification for the assessment of the life cycle greenhouse gas emissions of goods and services*, accessed 03 August 2009 at

<http://www.bsigroup.com/en/Standards-and-Publications/Industry-Sectors/Energy/PAS-2050>

Cambridge University Hospitals (CUH) NHS Foundation Trust (2009) *Addenbrookes Hospital: Cardiology Services*, accessed 03 August 2009 at

[http://www.cuh.org.uk/addenbrookes/services/clinical/cardiology/cardiology\\_index.html](http://www.cuh.org.uk/addenbrookes/services/clinical/cardiology/cardiology_index.html)

Carbon Trust (2009a) *NHS carbon management brochure*, accessed 03 August 2009 at

<http://www.carbontrust.co.uk/publications/publicationdetail?productid=CTX606>

Carbon Trust (2009b) *NHS Carbon Management Programme*,

<http://www.carbontrust.co.uk/carbon/PublicSector/nhs/>

Chapagain, A.K., Hoekstra, A.Y., (2007) *The water footprint of coffee and tea consumption in the Netherlands* *Ecological Economics*, **64** (1), pp.109-118

Clean Air-Cool Planet and Forum for the Future (2008) *Getting to Zero: Defining Corporate Neutrality*, accessed 03 August 2009 at <http://www.cleanair-coolplanet.org/documents/zero.pdf>

Committee on Climate Change (CCC) (2009) *Carbon Budgets*, accessed 03 August 2009 at <http://www.theccc.org.uk/carbon-budgets>

Crawford, R.H. (2008) *Validation of a Hybrid Life-Cycle Inventory Analysis Method*, *Journal of Environmental Management*, **88(3)**, pp. 496-506

Darzi (2008) *High quality care for all: NHS Next Stage Review - final report*, accessed 03 August 2009 at [http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH\\_085825?IdcService=GET\\_FILE&dID=168197&Rendition=Web](http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_085825?IdcService=GET_FILE&dID=168197&Rendition=Web)

Department of Health (DH) (2000) *The NHS Plan: a plan for investment, a plan for reform*, accessed 03 August 2009 at [http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH\\_4002960?IdcService=GET\\_FILE&dID=23612&Rendition=Web](http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_4002960?IdcService=GET_FILE&dID=23612&Rendition=Web)

Department of Health (DH) (2001) *New targets set to improve energy efficiency in the NHS*, accessed 03 August 2009 at [http://www.dh.gov.uk/en/Publicationsandstatistics/Pressreleases/DH\\_4010728](http://www.dh.gov.uk/en/Publicationsandstatistics/Pressreleases/DH_4010728)

Department of Health (DH) (2004) *The NHS Improvement Plan : Putting people at the heart of public services*, accessed 03 August 2009 at [http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH\\_4084476?IdcService=GET\\_FILE&dID=28792&Rendition=Web](http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_4084476?IdcService=GET_FILE&dID=28792&Rendition=Web)

Department of Health (DH) (2005) *Creating a patient-led NHS: Delivering the NHS Improvement Plan*, accessed 03 August 2009 at [http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH\\_4106506](http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_4106506)

Department of Health (DH) (2007a) *Statistics and analysis - Estates and facilities management. NHS England 1999/00 to 2005/06*. The Stationery Office, London

Department of Health (DH) (2007b) *Our NHS Our future: NHS next stage review - interim report*, accessed 03 August 2009 at

[http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH\\_079077?IdcService=GET\\_FILE&dID=150497&Rendition=Web](http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_079077?IdcService=GET_FILE&dID=150497&Rendition=Web)

Department of Health (DH) (2007c) Health Technical Memorandum 07-02: EnCO<sub>2</sub>de- *Making energy work in healthcare: environment and sustainability*, accessed 03 August 2009 at

[http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH\\_4131671](http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_4131671)

Department of Health (DH) (2008) *Operation Plans 2008/09 – 2010/11*

[http://www.dh.gov.uk/prod\\_consum\\_dh/groups/dh\\_digitalassets/@dh/@en/documents/digitalasset/dh\\_082560.pdf](http://www.dh.gov.uk/prod_consum_dh/groups/dh_digitalassets/@dh/@en/documents/digitalasset/dh_082560.pdf)

Department of Health (DH) (2009a) *Estates Return and Information Collection (ERIC) annual returns*, accessed 03 August 2009 at <http://www.hefs.ic.nhs.uk>

Department of Health (DH) (2009b) *Energy Efficiency Fund*, accessed 03 August 2009 at

[http://www.dh.gov.uk/en/Managingyourorganisation/Estatesandfacilitiesmanagement/Sustainabledevelopment/DH\\_074290](http://www.dh.gov.uk/en/Managingyourorganisation/Estatesandfacilitiesmanagement/Sustainabledevelopment/DH_074290)

Department of Energy, Food and Rural Affairs (DEFRA) (2007) *Guidelines to Defra's GHG conversion factors for company reporting*, accessed 03 August 2009 at <http://www.defra.gov.uk/environment/business/reporting/pdf/conversion-factors.pdf>

Department of Energy, Food and Rural Affairs (DEFRA) (2009) *The Carbon Reduction Commitment – an overview*, accessed 03 August 2009 at

<http://www.defra.gov.uk/environment/climatechange/uk/business/crc/pdf/crc-overview.pdf>

Department for Transport (DfT) (2009a) *Transport Statistics Great Britain*, accessed 03 August 2009 at

<http://www.dft.gov.uk/pgr/statistics/datatablespublications/tsgb>

Department for Transport (DfT) (2009b) *Smart moves: your travel plan news issue 5*, accessed 03 August 2009 at

[www.dft.gov.uk/pgr/sustainable/smarterchoices/smartmoves/issue5smartmove.pdf](http://www.dft.gov.uk/pgr/sustainable/smarterchoices/smartmoves/issue5smartmove.pdf)

G8 Summit (2009) *Responsible Leadership for a Sustainable Future*, accessed 03 August 2009 at

[http://www.g8italia2009.it/static/G8\\_Allegato/G8\\_Declaration\\_08\\_07\\_09\\_final.0.pdf](http://www.g8italia2009.it/static/G8_Allegato/G8_Declaration_08_07_09_final.0.pdf)

Global Carbon Project (2007) *Recent carbon trends and the Global Carbon Budget*, accessed 03 August 2009 at

[http://www.globalcarbonproject.org/global/ppt/GCP\\_CarbonCycleUpdate2.ppt](http://www.globalcarbonproject.org/global/ppt/GCP_CarbonCycleUpdate2.ppt)

Global Footprint Network (2009) *Glossary: Ecological Footprint definition*, accessed 03 August 2009 at

[www.footprintnetwork.org/en/index.php/GFN/page/glossary](http://www.footprintnetwork.org/en/index.php/GFN/page/glossary)

Gray, M. and Keeble, B. (1989). Greening the NHS - A plan to make the NHS more environmentally friendly. *BMJ*, 299 (1)

The Greenhouse Gas Protocol Initiative (GHG Protocol, 2009) *Standards - Product and Supply Chain* accessed 03 August 2009 at

<http://www.ghgprotocol.org/standards/product-and-supply-chain-standard>

Hansen, J., Sato, M., Kharecha, P., Russell, G., Lea, D. W., Siddall, M. (2007) *Climate change and trace gases*, *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences*, **365 (1856)**, pp.1925-1954

Her Majesty's Government (HMG) (2008) *Climate Change Act 2008*. (c.27), accessed 03 August 2009 at

[http://www.opsi.gov.uk/acts/acts2008/pdf/ukpga\\_20080027\\_en.pdf](http://www.opsi.gov.uk/acts/acts2008/pdf/ukpga_20080027_en.pdf)

Hertwich, E.G. and Peters, G.P., (2009) *Carbon Footprint of Nations: A Global, Trade-Linked Analysis*. *Environmental Science & Technology* in press, accessed 03 August 2009 at <http://dx.doi.org/10.1021/es803496a>.

Idso, S.B. (1974) *Climatic effects of increased industrial activity upon the world's established agro-ecosystems*, *Agro-Ecosystems*, **1**, p.7-17

Imperial College Healthcare NHS Trust (2009) *About the NHS*, accessed 03 August 2009 at [http://www.imperial.nhs.uk/nhs60/about\\_the\\_NHS/index.htm](http://www.imperial.nhs.uk/nhs60/about_the_NHS/index.htm)

Intergovernmental Panel on Climate Change (IPCC) (2007a) *Climate Change 2007: The Physical Science Basis, Summary for Policymakers*, accessed 03 August 2009 at

[http://ipcc-wg1.ucar.edu/wg1/docs/WG1AR4\\_SPM\\_PlenaryApproved.pdf](http://ipcc-wg1.ucar.edu/wg1/docs/WG1AR4_SPM_PlenaryApproved.pdf)

Intergovernmental Panel on Climate Change (IPCC) (2007b) *Climate Change 2007: Mitigation of Climate Change – Chapter 3*, accessed 03 August 2009 at <http://www.ipcc.ch/pdf/assessment-report/ar4/wg3/ar4-wg3-chapter3.pdf>

Johnson, E. (2008) *Disagreement over carbon footprints: A comparison of electric and LPG forklifts* Energy Policy, **36 (4)**, pp.1569-1573,

Karlsson, M., Pigretti O. D. (2005) *Material consumption in the healthcare sector: Strategies to reduce its impact on climate change-The case of Region Scania in South Sweden*, Journal of Cleaner Production, **13 (10)**, pp.1071-1081.

Kovats, S., (2008). *Health effects of climate change in the UK 2008: an update of the Department of Health report 2001/2002*. London: Department of Health & Health Protection Agency

Lenton, T., Held, H., Kreigler, E., Hall, J., Lucht, W., Rahmstorf, S., Schellnhuber, H. (2008) *Tipping elements in the Earth's climate system*, Proceedings of the National Academy of Sciences of the United States of America, 105 (6) p.1786-1793

Lenzen, M. (2001). *Errors in Conventional and Input-Output based Life-Cycle Inventories*. Journal of Industrial Ecology **4(4)**: pp. 127-148.

Lomas, K.J. and Ji, Y. (2009) *Resilience of naturally ventilated buildings to climate change: Advanced natural ventilation and hospital wards*, Energy & Buildings, **41 (6)**, p.629-653

Matthews, H. S., Hendrickson, C. T., Weber, C. L. (2008) *The importance of carbon footprint estimation boundaries*, Environmental science & technology, **42 (16)**, pp.5839-5842.

Meinshausen, M. (2006) *What does a 2 °C target mean for greenhouse gas concentrations?*, in H. Schellnhuber, et al., (eds.) *Avoiding Dangerous Climate Change*, Cambridge University Press, New York

New Scientist (2008) *33% of China's carbon footprint blamed on exports* New Scientist, **199 (2667)**, p.6-6



NHS Confederation (2007) *Taking the Temperature-Towards an NHS response to Global Warming*, accessed 03 August 2009 at

<http://www.nhsleadtheway.co.uk/Uploads/documents/NHS-Report-Taking-the-Temperature.pdf>

Purchasing and Supply Agency (PASA) (2009a) *Procuring for carbon reduction*, accessed 03 August 2009 at

<http://www.pasa.nhs.uk/PASAWeb/NHSprocurement/Sustainabledevelopment/Procuringforcarbonreduction/LandingPage.htm>

Purchasing and Supply Agency (PASA) (2009b) *NHS E-class*, accessed 03 August 2009 at <http://www.pasa.nhs.uk/PASAWeb/NHSprocurement/NHSeClass>

Padgett, J.P., Steinemann, A.C., Clarke, J.H., Vandenberg, M.P., (2008) *A comparison of carbon calculators*. *Environmental Impact Assessment Review*, **28 (2)**, p.106-115,

Perry, A.M., Araj, K.J., Fulkerson, W., Rose, D.J., Miller, M.M., Rotty, R.M. (1982) *Energy supply and demand implications of CO<sub>2</sub>*, *Energy*, **7 (12)**, pp.991-1004.

Peters, G.P. (2008) *From production-based to consumption-based national emission inventories*, *Ecological Economics*, **65 (1)**, p.13-23.

Rees, W. E. (1992) *Ecological footprints and appropriated carrying capacity: what urban economics leaves out*, *Environment and Urbanisation*. **4(2)**.

Pacala, S. and Socolow, R. (2004) *Stabilization wedges: solving the climate problem for the next 50 years with current technologies*. *Science* **305**, pp.968–972.

Spencer, P. (2005) *Tsunami aid*, *Refocus*, **6 (1)**, p.3-3.

Somner, J., Scott, K., Morris, D., Gaskell, A., Shepherd, I., (2009) *Ophthalmology carbon footprint: Something to be considered?* *Journal of Cataract & Refractive Surgery*, **35 (1)**, pp.202-203

Stockholm Environment Institute (SEI) and Arup (2009a) *NHS England Carbon Emissions: Carbon Footprint Modelling to 2020*, accessed 03 August 2009 at [http://www.sdu.nhs.uk/downloadFile.php?doc\\_url=1232983829\\_VbmQ\\_nhs\\_england\\_carbon\\_emissions\\_carbon\\_footprint\\_mode.pdf](http://www.sdu.nhs.uk/downloadFile.php?doc_url=1232983829_VbmQ_nhs_england_carbon_emissions_carbon_footprint_mode.pdf)

Stockholm Environment Institute (SEI) and Arup (2009b) *Carbon Footprint of NHSScotland (1990-2004)*, Health Facilities Scotland, unpublished.

Sustainable Development Commission (SDC) (2008) *NHS England Carbon Emissions: Carbon Footprint Report 2008*, accessed 03 August 2009 at [http://www.sdu.nhs.uk/downloadFile.php?doc\\_url=1233327092\\_mHfy\\_nhs\\_england\\_carbon\\_emissions\\_carbon\\_footprinting\\_r.pdf](http://www.sdu.nhs.uk/downloadFile.php?doc_url=1233327092_mHfy_nhs_england_carbon_emissions_carbon_footprinting_r.pdf)

Sustainable Development Commission (SDC, 2009), *Good Corporate Citizenship Assessment Model*, accessed 03 August 2009 at [www.corporatecitizen.nhs.uk](http://www.corporatecitizen.nhs.uk)

NHS Sustainable Development Unit (SDU) (2009a). *Saving Carbon, Improving Health; A Carbon Reduction Strategy for the NHS in England*, accessed 03 August 2009 at [http://www.sdu.nhs.uk/page.php?page\\_id=94](http://www.sdu.nhs.uk/page.php?page_id=94)

NHS Sustainable Development Unit (SDU) (2009b) *Carbon footprints for the NHS in England – National, Regional and Local*, accessed 03 August 2009 at [http://www.sdu.nhs.uk/page.php?page\\_id=111](http://www.sdu.nhs.uk/page.php?page_id=111)

NHS Sustainable Development Unit (SDU) (2009c) *About the SDU*, accessed 03 August 2009 at [http://www.sdu.nhs.uk/page.php?area\\_id=1](http://www.sdu.nhs.uk/page.php?area_id=1)

Tesco plc (2009) *Key Performance Indicators for 2009*, accessed 03 August 2009 at [http://www.tescopl.com/plc/corporate\\_responsibility\\_09/approach/kpi\\_2009](http://www.tescopl.com/plc/corporate_responsibility_09/approach/kpi_2009)

UK National Statistics (2009a) *Standard Industrial Classification (SIC)*, accessed 03 August 2009 at <http://www.statistics.gov.uk/StatBase/Product.asp?vlnk=14012>

UK National Statistics (2009b) “*Guide to Input-Output accounting framework for all transactions in the UK*”, accessed 03 August 2009 at <http://www.statistics.gov.uk/cci/nugget.asp?id=179>

UK National Statistics (2009c) *United Kingdom Environmental Accounts* accessed on 31 July 2009 at <http://www.statistics.gov.uk/STATBASE/Product.asp?vlnk=3698>

United Nations (1997) *Kyoto Protocol to the United Nations Framework Convention on Climate Change*, accessed 03 August 2009 at <http://unfccc.int/resource/docs/convkp/kpeng.pdf>

United Nations (2009) *Countdown to Copenhagen*, accessed 03 August 2009 at <http://unfccc.int/2860.php>

Wackernagel, M. (2009) *Methodological advancements in footprint analysis*, *Ecological Economics*, **68 (7)**, pp.1925-1927.

Wanless, D., Appleby, J., Harrison, A., Patel, D. (2007) *Our Future Health Secured?*, accessed 03 August 2009 at [http://www.kingsfund.org.uk/research/publications/our\\_future.html](http://www.kingsfund.org.uk/research/publications/our_future.html)

Wiedmann, T., Wood, R., Lenzen, M., Minx, J., Guan, D. and Barrett, J. (2008) *Development of an Embedded Carbon Emissions Indicator – Producing a Time Series of Input-Output Tables and Embedded Carbon Dioxide Emissions for the UK by Using a MRIO Data Optimisation System*, Report to the UK Department for Environment, Food and Rural Affairs by Stockholm Environment Institute at the University of York and Centre for Integrated Sustainability Analysis at the University of Sydney, June 2008. Defra, London, UK

Wiedmann, T., Lenzen, M. and Wood, R. (2008) *Uncertainty Analysis of the UK-MRIO Model – Results from a Monte-Carlo Analysis of the UK Multi-Region Input-Output Model (Embedded Emissions Indicator)*; Report to the UK Department for Environment, Food and Rural Affairs by Stockholm Environment Institute at the University of York and Centre for Integrated Sustainability Analysis at the University of Sydney. Defra, London, UK

Wiedmann, T. and J. Minx (2008). *A Definition of 'Carbon Footprint'*. *Ecological Economics Research Trends*. C. C. Pertsova: Chapter 1, pp. 1–11. Nova Science Publishers Inc, Hauppauge NY, USA

Wilkinson, P., Smith, K.R., Beevers, S., Tonne, C., Oreszczyn, T. (2007) *Energy, energy efficiency, and the built environment*, *The Lancet*, **370 (9593)**, pp.1175-1187

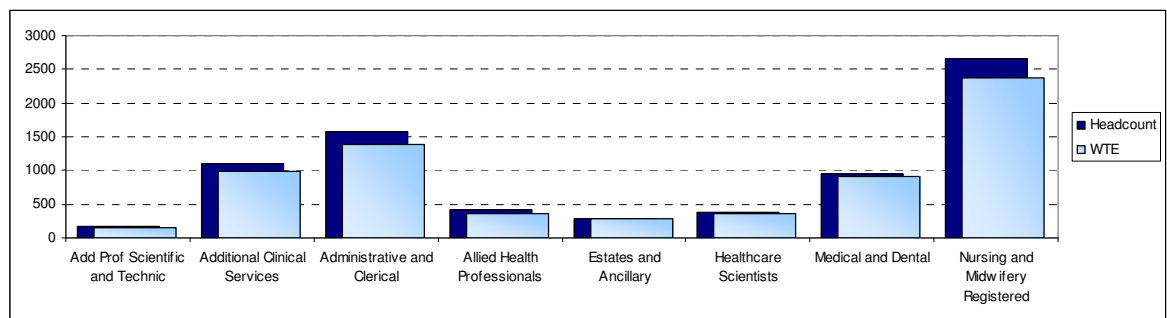
World Wide Fund for Nature (WWF) (2006) *Living Planet Report 2006*, accessed 03 August 2009 at [http://assets.panda.org/downloads/living\\_planet\\_report.pdf](http://assets.panda.org/downloads/living_planet_report.pdf)

## Appendix A: CUH NHS Foundation Trust structure

Cambridge University Hospital (CUH) NHS Foundation Trust is located in Cambridge, England. Addenbrookes hospital first opened in 1766, and moved to its current campus location at the southern edge of Cambridge in the 1960s. The Trust now includes the following main components/functions:

- **Addenbrooke's Hospital:** a large acute teaching hospital, with accident & emergency, and a wide range of inpatients and outpatients services.
- **The Rosie Hospital:** a 4 ward maternity hospital also with a special care baby unit.
- **Biomedical Research Centre:** a world-class research centre combining University and external organisations ([www.cambridge-biomedical.co.uk](http://www.cambridge-biomedical.co.uk))
- **University of Cambridge School of Clinical Medicine:** a large undergraduate and postgraduate school of medicine ([www.medschl.cam.ac.uk](http://www.medschl.cam.ac.uk))

There are around 1,170 beds, with around 7,000 NHS staff employed in the following work groups:



**Figure A1: Staff Headcount breakdown**

The clinical structure of CUH NHS foundation Trust is shown overleaf in Table A1. The location map is shown in Figure A2. CUH NHS Foundation Trust is noted for its pro-active approach to sustainable development such a site wide travel plan (DfT, 2009b), and the appointment of a full-time Sustainable Development manager.

<b>Clinical Divisions</b>		<b>management structure</b>
<p><b>1. MEDICINE</b>            Acute Medicine            Cardiology            Clinical Pharmacology            Clinical Allergy            Endocrinology &amp; Diabetes (*please see Investigative Sciences)            Gastroenterology &amp; Endoscopy            Hepatology            Nephrology &amp; Vasculitis            Infectious Diseases            Stroke Medicine            Dermatology            Genito-Urinary Medicine            Rheumatology/Metabolic Bone            Medicine for the Elderly            Metabolic Medicine            Respiratory Medicine</p>	<p>Divisional Director            Deputy Divisional Director            Associate Director of Operations            Associate Director of Nursing            Divisional Business Analyst            Divisional OD Manager            Divisional Research Lead            Divisional Medical Education Lead</p>	
<p><b>2 SURGERY</b>            General Surgery                Breast                Colorectal                Vascular                Upper GI            Hepatobiliary            Orthopaedics            Urology            Specialist Surgery            ENT  <b>Ophthalmology</b>            Oral &amp; Maxillofacial Surgery            Plastic Surgery            Transplantation            Transplantation Surgery</p>	<p>Divisional Director            Deputy Divisional Director            Associate Director of Operations            Associate Director of Nursing            Divisional Business Analyst            Divisional OD Manager            Divisional Research Lead            Divisional Medical Education Lead</p>	
<p><b>3 NEUROSCIENCES</b>            Neurology            Neurosurgery</p>	<p>Divisional Director            Deputy Divisional Director            Associate Director of Operations            Associate Director of Nursing            Divisional Business Analyst            Divisional OD Manager            Divisional Research Lead            Divisional Medical Education Lead</p>	
<p><b>4. CRITICAL CARE</b>            Acute &amp; Chronic Pain            Anaesthesia            General Intensive Care            Neuro Critical Care Unit            Intermediate dependency Area (IDA)            Theatres            Day Surgery            EAU            Emergency Department            Operations Centre</p>	<p>Divisional Director            Deputy Divisional Director            Associate Director of Operations            Associate Director of Nursing            Divisional Business Analyst            Divisional OD Manager            Divisional Research Lead            Divisional Medical Education Lead</p>	
<p><b>5. CANCER</b>            Haemato-Oncology            Palliative Care</p>	<p>Divisional Director            Deputy Divisional Director            Associate Director of Operations            Associate Director of Nursing            Divisional Business Analyst            Divisional OD Manager            Divisional Research Lead            Divisional Medical Education Lead</p>	
<p><b>6. WOMEN'S &amp; CHILDREN'S</b>            Neonatal Intensive Care            Gynaecology            Obstetrics            General &amp; Acute Paediatrics            Paediatric Intensive Care            Paediatric Neurology / Child Development Centre            Paediatric Oncology            Paediatric Surgery</p>	<p>Divisional Director            Deputy Divisional Director            Associate Director of Operations            Associate Director of Nursing            Divisional Business Analyst            Divisional OD Manager            Divisional Research Lead            Divisional Medical Education Lead</p>	
<p><b>7. INVESTIGATIVE SCIENCES</b>            Radiology            Pathology            Nuclear Medicine            Breast Imaging            Clinical Biochemistry &amp; Immunology            Clinical Microbiology &amp; Virology            Haematology            Histopathology &amp; Cytology            Medical Genetics / Cytogenetics            Medical haematology            Tissue Typing            Blood Transfusion            *Laboratory related Diabetes</p>	<p>Divisional Director            Deputy Divisional Director            Associate Director of Operations            Associate Director of Nursing            Divisional Business Analyst            Divisional OD Manager            Divisional Research Lead            Divisional Medical Education Lead</p>	

**Table A1: CUH NHS Foundation Trust Clinical Structure**

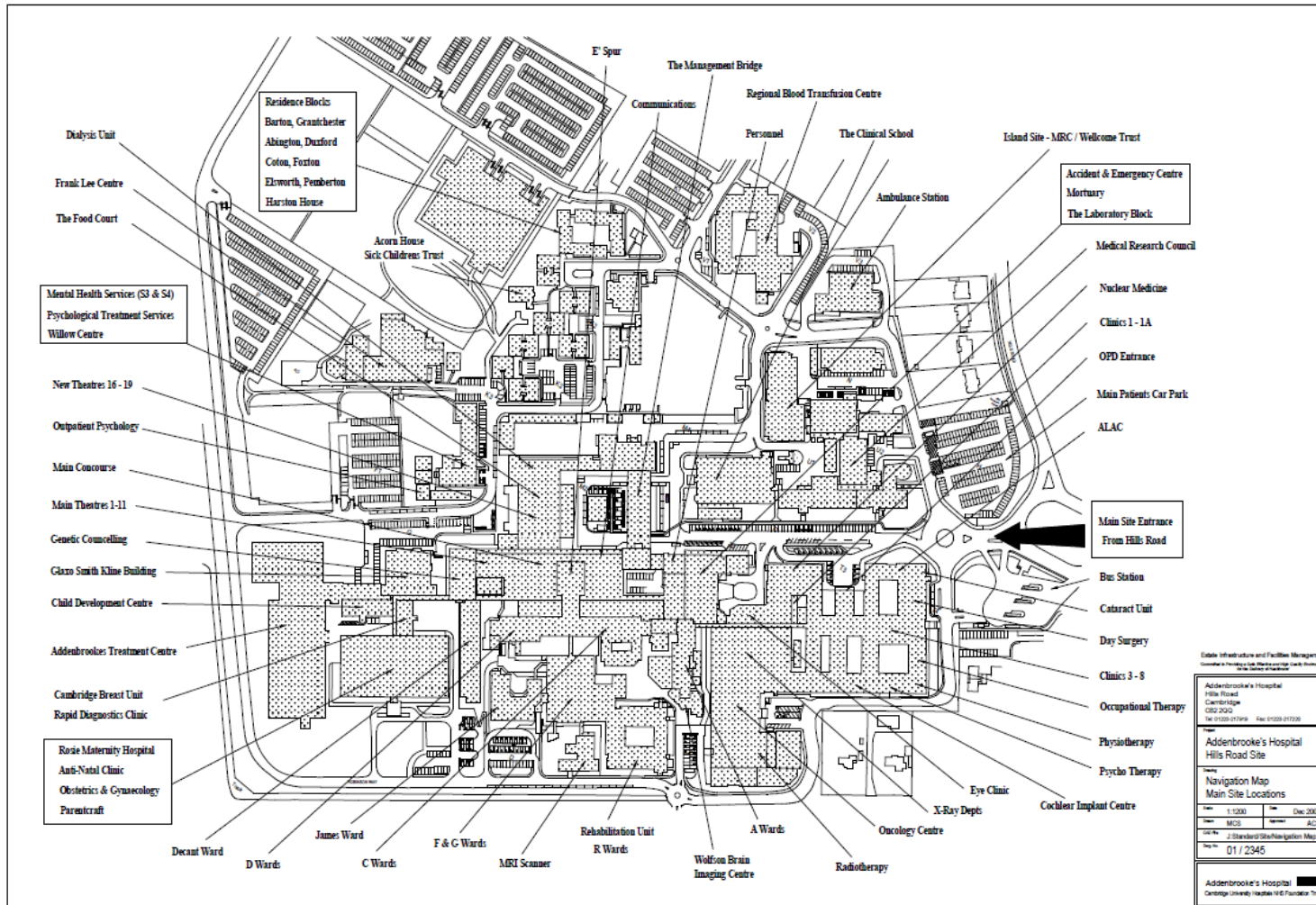


Figure A2: CUH NHS Foundation Trust - Site map

## Appendix B: CUH NHS Foundation Trust 2007-08 expenditure

This appendix contains the CUH NHS Foundation Trust ledger expenditure for 2207-08. The 1215 account codes are screened to assess which are suitable for SIC sector classification. Refer to Section 4.4.2.

Account classification		Expense (+) or income (-)	Account classification		Expense (+) or income (-)
Code	Description		Code	Description	
A1000	Elective Inpatient		A7043	Non-NHS Non-recurring recharges (e	
A1001	Day Case		A7091	Other Non-Clinical Income	
A1050	Non-Elective Inpatient		A7170	NHSP	
A1100	Outpatients		A7504	Movement in Year on Year WIP	
A1200	Ward Attender		A7505	Non-Specific LBC Credit Note	
A1400	Accident & Emergency		A7507	Bad Debt Provision Brought Forward	
A1401	Breast Screening		A8020	Rents Staff Housing	
A1402	Chemotherapy		A8021	Professional Fees	
A1403	Community Services		A8025	Smithkline Beecham Income	
A1404	Critical Care		A8030	Radiopharmaceuticals Income	
A1405	Disablement Services		A8050	Call Recharges-External	
A1406	Genetics		A8051	Callbox Income	
A1407	Radiotherapy		A8092	Functions Income	
A1408	Renal Dialysis		A8111	Sale of Aids	
A1500	Direct Access Pathology		A8149	Insurance Income	
A1501	Direct Access Radiology		A8153	Photocopy Recharge	
A1502	Direct Access Cardiology		A8155	Committed Income	
A1600	Drugs - Cerezyme		A8156	Concourse Income	
A1601	Haemophilia Blood Product		A8158	Capital Charges Income	
A1700	NSCAG (Livers & Gauchers)		A8159	Distinction Award Income	
A1800	Part 4 Other Agreements a)		A8160	Commercial Research Income	
A1900	PPA Transition		A8161	Admin Income	
A6704	Transitional Funding		A8162	General Sales Income	
A6705	SIFT Income		A8168	Occupational Health Income	
A6706	Research & Development - Biomedica		A8173	MHS SLA Income	
A6707	Imaging Technology Platform		A8174	Cmb & Peter Drugs	
A6708	R&D - CRF Income Other		A8199	Miscellaneous Income	
A6709	Experimental Cancer Medicine		A8200	Sale Of Bus Tickets	
A6710	Diabetes Programme Grant		A8201	Mortuary Fees	
A6711	Diabetes LRN		A8204	Incinerator Income	
A6712	Clinical Research Initiative		A8221	Radiological Protection Income	
A6713	Comprehensive Research Network		A8222	Film Badge Service Income	
A6800	Conc Inc Cat C		A8223	Training Income	
A7001	Private Patients - RTA's		A8226	Cancer Registration Bureau Income	
A7002	Private Patients - Overseas		A8320	AVM Contract Income - Fixed	
A7003	Private Patients - IVF		A8321	AVM Contract Income - Variable	
A7008	Private Patients - Other Paying Pa		A8322	AVM GP Income - Fixed	
A7009	Private Patients Income - 50% Abov		A8324	AVM Subcontract Income	
A7011	Staff recharges - NHS		A8325	AVM Sales - Equipment	
A7012	NHS Recurring recharges		A8326	AVM Sales - Spares	
A7013	NHS Non-recurring recharges		A8370	Consultant Professional Fees Incom	
A7021	Delayed Transfers of Care		A8411	Private Patients - Inpatients	
A7031	PFI funding from DoH		A8412	Non Consultant Fees - Rosie Privat	
A7042	Non-NHS Recurring recharges (excl		A8419	Overseas Visitors - Inpatients	

Account classification		Expense (+) or income (-)	Account classification		Expense (+) or income (-)
Code	Description		Code	Description	
A8420	Private Patients - Outpatients		A8636	National Grid Electricity	
A8429	Overseas Visitors - Outpatients		A8637	Car Park Income - Patient / Visito	
A8504	Electric Wheelchair Vouchers		A8638	Car Park Income - Staff	
A8519	Deans Income Turnover		A8639	Recharge Costs External	
A8521	Jnr Doctors S.P.R. recharge		A8641	Car Park Income - Residents Permit	
A8524	Jnr Doctors Travel Recharge		A8643	Rental Income	
A8526	Academic Deans Income		A8644	Electricity Recharge	
A8527	Junior Doctor Deans Inc		A8645	Building Maintenance Recharge	
A8528	Junior Doctor Non Deans Inc		A8646	Engineering Maint. Recharge	
A8529	Jun Doc Dean Flexi Inc		A8647	Rates Recharge	
A8561	Bowel Cancer Study		A8649	Payroll Income - Mailshots Etc..	
A8594	Clinical Neurophysiology Medical S		A8650	Nursing Services	
A8595	Nephrology Medical Staffing Rechar		A8651	External Salary Recharges	
A8596	Palliative Care Medical Staffing R		A8652	External Training Recharges	
A8597	Cardiology Medical Staffing Rechar		A8655	PHLS Service Charge	
A8598	Neuropathology Medical Staffing Re		A8656	WDC External Salary Recharges	
A8600	A & E Medical Staffing Recharge		A8657	Replacement Name Badge Income	
A8601	Anaesthetics Medical Staffing Rech		A8658	Living Donor Expense Recharge	
A8602	Dermatology Medical Staffing Recha		A8659	Donor Co-ordinator Recharge	
A8603	Elderly Medical Staffing Recharge		A8660	Mammography Income	
A8604	ENT Medical Staffing Recharge		A8661	Steam Recharge	
A8605	General Medicine Medical Staffing		A8662	Water & Sewerage Recharge	
A8606	Genetics Medical Staffing Recharge		A8663	UKT - NHB Donors	
A8607	Clin Pharmacology Medical Staffing		A8999	LBC Income Control Account	
A8608	Neurology Medical Staffing Recharg		A9907	Income suspense to enable reserves	
A8609	Neurosurgery Medical Staffing Rech		B2000	TFA Residual Interest	
A8611	Obs & Gynae Medical Staffing Recha		B2110	TFA Land NBV	
A8612	Ophthalmology Medical Staffing Rec		B2210	TFA Buildings NBV	
A8614	Orthodontics Medical Staffing Rech		B2250	TFA Assets Under Constr'n NBV	
A8615	Paediatrics Medical Staffing Recha		B2310	TFA Plant & Machinery NBV	
A8616	Plastics Medical Staffing Recharge		B2320	TFA Transport Equipment NBV	
A8617	Radiology Medical Staffing Recharg		B2340	TFA Information Technology NBV	
A8618	Oncology Medical Staffing Recharge		B2360	TFA Furniture & Fittings NBV	
A8619	Rheumatology Medical Staffing Rech		B2410	TFA Intangibles NBV	
A8620	Thoracic Medical Staffing Recharge		B3210	DFA Buildings NBV	
A8622	Chem Pathology Medical Staffing Re		B3310	DFA Plant & Machinery NBV	
A8624	Medical Staffing Travel Recharge		B3370	DFA Information Technology NBV	
A8625	Urology Medical Staffing Recharge		B3380	DFA Furniture & Fittings NBV	
A8626	Histopathology Medical Staffing Re		B4110	Stock - Provisions	
A8627	General Surg Medical Staffing Rech		B4120	Stock - Staff Uniforms	
A8628	Medical Microbiology Medical Staff		B4150	Stock - Dressings	
A8631	Research Income		B4160	Stock - Medical & Surgical	
A8632	Civil Penalty Notices		B4170	Stock - Alac Hardware	
A8633	Medical Physics Services		B4180	Stock - Lab Chemicals	
A8634	Private Patients Drugs		B4190	Stock - Fuel, Light, Power	
A8635	Postage Recharges		B4210	Stock - Raw Materials Tools Eq	
B4230	Stock - Ind. & Occ. Therapy		B6123	FP10 Accruals	
B4260	Stock - Pharmacy Main Stores		B6130	PDC overpayment by DOH	
B4282	Stock - Medical Physics		B6211	Purchase Ledger Control A/C	
B4283	Mat Man Stock: Sterile Store C		B6213	Creditors from Integra	
B4399	RTA Bad Debt provision		B6223	Stationery Feeder Control	
B4400	Bad Debt Provision -Commercial		B6225	Surgical Appliances Control	
B4401	NHS Bad Debts		B6227	Barclay Card Purchases Control	
B4402	Accrued Income NHS		B6228	Pharmacy Control A/C	
B4404	Accrued Income Non NHS		B6231	Computer Scheme	
B4405	Sales Ledger Control a/c		B6232	Kids Unlimited	
B4411	Debtors Ledger - On Account / Prep		B6233	Output V.A.T.	
B4412	Sales Ledger adhoc		B6236	Patients Monies Control-Add.	
B4471	Recharge - Horis Drugs		B6237	Provision For Retirement Costs	
B4473	Mental Health Services Recharg		B6239	Provision Bldg&conts exc ins	



Account classification		Expense (+) or income (-)	Account classification		Expense (+) or income (-)
Code	Description		Code	Description	
B4474	Recharge Account - Endow Funds		B6241	Southern Syringe Services	
B4477	RTA Income Accrual		B6301	Fees J Brockelsby	
B4481	Rechg-Mary Wallace Foundation		B6302	Sand Goodburn - Professional Fees	
B4482	Recharge - Epidemiology Study		B6317	Fees-Dr Newson (Microbiology)	
B4599	Input VAT - Cont out services		B6318	Fees-Microbiology Staff	
B4621	Prepaid Expenditure NHS		B6319	Fees-Histopathology	
B4623	Crown Cars Control Account		B6320	Fees-Dr Culank (Biochemistry)	
B4624	Prepaid Expenditure Non NHS		B6321	Fees-Haematology Staff	
B4640	Bank A/c - Patient's Monies		B6326	Fees-Dr PM Chudleigh	
B4801	Bank A/c - PGO		B6329	Fees-H Missfelder-Lobos	
B4802	Bank A/c - General		B6331	Fees - Cytology	
B4803	Bank A/c - Payments		B6332	Fees - Hackett	
B4806	Bank A/c - Deposit		B6333	Fees - Lees	
B4807	Bank A/c - Wages		B6334	Fees - Prof Smith	
B4808	Remitted Receipts		B6399	Fees-Sundry Prof.Fees	
B4901	Petty Cash-Addenbrooke's Main		B6528	Injury Benefit Provision	
B4903	Petty Cash-Willow Centre		B6531	Accrued Expenditure Non NHS	
B4904	Petty Cash-Patients Fares Add.		B6532	Prepaid Income Non NHS	
B4907	PC - Patient Affairs Travel		B6541	Goods Received Not Invoiced	
B4909	Petty Cash-D.S.A		B6701	Non NHS Accruals-Sals & Wages	
B4911	Petty Cash-Occ. Therapy Add.		B6702	Deductions-Rents (CCC&SCDC)	
B4912	Petty Cash-Dispensing Charges		B6705	Deduction-G.A.Y.E. Donations	
B4914	PC - Fund for Addenbrookes		B6707	Advances on Salary Control	
B4915	PC PGME Trust		B6708	Deduction-Court Order	
B4916	Petty Cash - Cytology Lab		B6713	Deduction-Trade Union Subs.	
B4920	Petty Cash-Clinical Skills		B6714	Statutory Mater/Paternity Pay	
B4922	Petty Cash-Welcome Research		B6716	Income Tax Control	
B4937	Physiotherapy		B6717	National Insurance-Employees	
B4939	PC-Public Health Genetics Unit		B6718	National Insurance-Employer	
B4940	PC Hosp Travel Costs Scheme		B6719	Overpayments On Salary Control	
B6120	Accrued Expenditure NHS		B6720	Superannuation-Employees	
B6121	Prepaid Income NHS		B6721	Superannuation-Employers	
B6722	Net Pay Control A/C		<b>C9211</b>	<b>Buildings Planning Fees</b>	
B6724	Deductions-Social Clubs		<b>C9212</b>	<b>Buildings Consultancy Fees</b>	
B6725	Deds AVC/Stakeholder Pensions		<b>C9213</b>	<b>Buildings Planning Supervisor</b>	
B6726	Deduction-The Halifax		<b>C9214</b>	<b>Buildings Structural Engineer</b>	
B6727	Deduction-P.H.S.A.		<b>C9215</b>	<b>Buildings Electrical Installations</b>	
B6732	Deductions-Student Loan		<b>C9216</b>	<b>Buildings Removal Costs</b>	
B6735	Widows Pension		<b>C9301</b>	<b>Equipment S/L Lab Equipment</b>	
B6736	Crown Cars NI Accrual		<b>C9302</b>	<b>Equipment S/L Medical Equipment</b>	
B6740	Employees Comps Provision		<b>C9304</b>	<b>Equipment S/L Mechanical Equipment</b>	
B6742	Bicycle Loan Scheme Deductions		<b>C9305</b>	<b>Equipment S/L Electrical Equipment</b>	
B6744	Deposit Loan Scheme		<b>C9400</b>	<b>Equipment M/L Radiology Equipment</b>	
B6745	Bicycle voucher scheme		<b>C9401</b>	<b>Equipment M/L Lab Equipment</b>	
B6801	Temp NHS Expense Accrual Team1		<b>C9402</b>	<b>Equipment M/L Medical Equipment</b>	
B6806	Temp NHS Expense Accrual Team6		<b>C9404</b>	<b>Equipment M/L Mechanical Equipment</b>	
B6990	Receipts unapplied		<b>C9405</b>	<b>Equipment M/L Electrical Equipment</b>	
B6991	Temp NHS Income Accrual Team 1		<b>C9410</b>	<b>Equipment M/L Project Team Fees</b>	
B6996	Temp NHS Income Accrual Team 6		<b>C9500</b>	<b>Equipment L/L Radiology Equipment</b>	
B6997	Temp NHS Income Accrual Finacs		<b>C9501</b>	<b>Equipment L/L Lab Equipment</b>	
B6998	Debtors Ledger - Unapplied Receipt		<b>C9502</b>	<b>Equipment L/L Medical Equipment</b>	

Account classification		Expense (+) or income (-)	Account classification		Expense (+) or income (-)
Code	Description		Code	Description	
B8110	Public Dividend Capital		C9504	Equipment L/L Mechanical Equipment	
B8120	Long-Term Loans		C9505	Equipment L/L Electrical Equipment	
B8130	Revaluation Reserve		C9600	Transport Vehicles	
B8140	Donation Reserve		C9700	IT Office Equipment	
B8150	Retained Earnings		C9703	IT Implementation (non-network)	
B8160	Government Grants		C9750	IT Network Equipment	
B9001	Error Suspense - Resus Stock		C9751	IT Network Points & Telephone Inst	
B9002	Error Suspense - Payroll (SPS)		C9752	IT Network Installation Works	
B9003	Error Suspense Pharm. (Ascribe)		C9753	IT Network Project Team Fees/Imple	
B9004	Err Suspense Travel Warrants		C9800	F&F Soft Furnishings	
B9008	Sales/Purchase Ledger Suspense		C9850	F&F Furniture	
B9114	Receiving Inventory Accrual		C9900	Intangibles Software Licences	
B9202	AP Prepayment		C9940	Intangibles Development Expenditur	
B9307	AR Memo Lines - MRI SCAN 2		D7001	Surgery 0708 start year	
C9000	Capital - Budget Allocations (Fin.		D7002	Childrens 0708 start year	
C9001	Capital Balances b/f (Finance use		D7004	Neuro 0708 start year	
C9010	Donations/Income		D7005	Womens 0708 start year	
<b>C9201</b>	<b>Buildings Legal Fees</b>		D7006	Pathology 0708 start year	
<b>C9202</b>	<b>Buildings Valuers &amp; Estate Agent F</b>		D7007	Oncology 0708 start year	
<b>C9203</b>	<b>Buildings Quantity Surveyor Fees</b>		D7008	Periops 0708 start year	
<b>C9204</b>	<b>Buildings Architect Fees</b>		D7009	Medical Staffing 0708 start year	
<b>C9205</b>	<b>Buildings Electrical Engineering F</b>		D7010	Transplant 0708 start year	
<b>C9206</b>	<b>Buildings Mechanical Engineering F</b>		D7011	Pharmacy 0708 start year	
<b>C9207</b>	<b>Buildings Design Team Fees</b>		D7012	Corporate Management 0708 start ye	
<b>C9208</b>	<b>Buildings Project Team Fees</b>		D7013	Medicine 0708 start year	
<b>C9209</b>	<b>Buildings Small Works</b>		D7014	Medical Physics 0708 start year	
<b>C9210</b>	<b>Buildings External Contracts</b>		D7015	Estates 0708 start year	
D7016	HR 0708 start year		D8425	Leadership Academy	
D7017	Finance 0708 start year		D8426	Marketing	
D7018	EAU 0708 start year		D8427	CVAT	
D7019	Radiology 0708 start year		D8428	Additional ITU beds x 2	
D7020	Therapies & DSA 0708 start year		D8429	Locum Plastic surgeons (RIS)	
D7021	Nurse Management 0708 start year		D8430	Urology CF x 3	
D7022	Management 0708 start year		D8431	Medical Staff study leave carry fo	
D7023	Operations centre 0708 start year		D8432	CNST	
D7024	Director of Operations 0708 start		D8433	Infection control nurse	
D7025	Corporate Development 0708 start y		D8434	Paediatric surgery costs	
D7026	Blood Products 0708 starte budget		D8435	ALS training	
D7027	CRF/CIW 0708 start year budget		D8436	Pharmacy posts	
D7051	Central Income		D8437	SIFT	
D7080	Reserves		D8438	Development funding	
D8101	Upper GI Centralisation		D8440	Genetic Counsellor	
D8103	Urology IOG		D8441	Non recurrent support Med Phys hea	
D8107	BMT Additional Scientist post		D8442	Low Value Equipment	
D8109	Cardiology (Thromobysis etc)		D8443	Effective Patient care	
D8113	Blood Tracking		D8498	Non recurrent contingency	
D8116	Clinical Trials Office		D8499	Contingency	
D8118	NPfIT		D8501	Cytology	
D8201	Saturday/Evening clinics		D8502	Sickle Cell Screening	
D8203	Private Sector		D8503	Neonatal Transport	
D8251	4th Urologist		D8504	Wheelchair Vouchers	
D8258	Spinal Surgery		D8506	PDT	
D8260	EAU Improved Emergency Pathway		D8507	Stents	
D8261	Bowel Cancer Screening Project		D8508	Baclofen Pumps	
D8301	Pay Inflation		D8510	Andersons Fabrys	
D8302	Non Pay Inflation		D8511	Childrens Fabrys	

Account classification		Expense (+) or income (-)	Account classification		Expense (+) or income (-)
Code	Description		Code	Description	
D8401	Genetics		D8512	Ceredase / Cerezyme	
D8405	WACN - Addenbrookes share		D8513	Haemophilia Blood Products	
D8406	Energy		D8551	Scobec	
D8407	Agenda for Change		D8552	HPA	
D8408	CIP		D8553	PICU Additional funding	
D8410	CRB		D8554	SCBU	
D8411	Buildings Insurance		D8555	Mental Health SLA	
D8413	System Costs		D8601	R&D - Generics	
D8414	Addenbrookes Treatment Centre		D8602	R&D - Cancer	
D8416	X-Ray Tubes		D8603	R&D - Cardiovascular	
D8417	NICE drugs (incl Beta intaferon)		D8604	R&D - Diabetes & Obesity	
D8418	Other Drugs		D8605	R&D - Imaging	
D8419	Rostering savings		D8606	R&D - Infection & Immunity	
D8420	MRSA Screening		D8607	R&D - Medical genetics	
D8422	Development posts		D8608	R&D - Musculo Skeletal	
D8423	AfC team costs		D8609	R&D - Neurosciences	
D8424	18 week project post		D8610	R&D - Transplantation	
D8611	R&D - Womens Health		P0220	SpR - Clinical Fellow	
D8612	R&D - CF Cross discipline training		P0221	SpR - Clinical Fellow Banding	
D8613	R&D - inflation		P0241	SpR - Flexi Banding	
D8614	R&D - CRF / CIW		P0246	SpR - Flexi Trainee	
D8616	Comprehensive Research Network - CL		P0300	SHO - Deans' salary	
D8620	Experimental Cancer Medicine		P0301	SHO - Banding	
D8702	Additional 0708 income re activity		P0302	SHO - Non Deans' salary	
D8703	Paediatric gastroenterology IB		<b>P0305</b>	<b>SHO Locum - vacancy</b>	
D8705	NICU 4 additional cots		<b>P0306</b>	<b>SHO Locum - sick leave</b>	
D8751	Pancreas Transplant		<b>P0307</b>	<b>SHO Locum - annual leave</b>	
D8752	Critical Care		<b>P0308</b>	<b>SHO Locum - mat/pat leave</b>	
E0001	FYE non-pay		<b>P0309</b>	<b>SHO Locum - special leave</b>	
E0002	FYE Pay		P0310	SHO - Clinical Fellow	
P0010	Consultant CUH Basic		P0311	SHO - Clinical Fellow Banding	
P0011	Consultant CUH APAs		P0316	SHO - Flexi Trainee	
P0012	Consultant CUH On Call		P0350	FY2 - Deans' salary	
P0013	Consultant CUH Local CEAs		P0351	FY2 - Banding	
P0014	Consultant NHS Recharge In		<b>P0355</b>	<b>FY2 Locum - vacancy</b>	
P0020	Non NHS Consultant Basic		<b>P0356</b>	<b>FY2 Locum - sick leave</b>	
P0021	Non NHS Consultant APAs		<b>P0357</b>	<b>FY2 Locum - annual leave</b>	
P0022	Non NHS Consultant On Call		<b>P0358</b>	<b>FY2 Locum - mat/pat leave</b>	
P0023	National CEAs		<b>P0359</b>	<b>FY2 Locum - special leave</b>	
P0030	Senior Clinical Lecturer (CAL)		P0360	FY2 - Non Deans' salary	
<b>P0045</b>	<b>Consultant Locum - vacancy</b>		P0361	FY2 - Flexi Banding	
<b>P0046</b>	<b>Consultant Locum - sick leave</b>		P0370	FY1 - Deans' salary	
<b>P0047</b>	<b>Consultant Locum - annual leave</b>		P0371	FY1 - Banding	
<b>P0048</b>	<b>Consultant Locum - mat/pat leave</b>		<b>P0375</b>	<b>FY1 Locum - vacancy</b>	
P0060	Clinical director payment		<b>P0376</b>	<b>FY1 Locum - sick leave</b>	
P0061	GP Liaison Group		<b>P0377</b>	<b>FY1 Locum - annual leave</b>	
P0100	Associate Specialist		<b>P0378</b>	<b>FY1 Locum - mat/pat leave</b>	
P0101	Staff Grade		<b>P0379</b>	<b>FY1 Locum - special leave</b>	
P0102	Hospital Practitioner		P0400	CAF - Deans' salary	
P0103	Clinical Assistant		P0401	CAF - Banding	
<b>P0105</b>	<b>Career Grade Locum - vacancy</b>		P0402	CAF - Non Deans' salary	
<b>P0106</b>	<b>Career Grade Locum - sick leave</b>		P0450	CAL - Deans' salary	
<b>P0108</b>	<b>Career Grade Locum - mat/pat leave</b>		P0451	CAL - Banding	
<b>P0200</b>	<b>SpR - Deans' salary</b>		P0460	CAL - Non Deans' salary	
<b>P0201</b>	<b>SpR - Banding</b>		P0500	STRY1 - Deans' salary	
<b>P0202</b>	<b>SpR - Non Deans' salary</b>		P0899	Medical Staffing Turnover	
<b>P0205</b>	<b>SpR Locum - vacancy</b>		P1020	Band 2 Clin Support (Nursing)	
<b>P0206</b>	<b>SpR Locum - sick leave</b>		<b>P1029</b>	<b>Band 2 Bank Nurse</b>	
<b>P0207</b>	<b>SpR Locum - annual leave</b>		P1030	Band 3 Clin Support (Nursing)	
<b>P0208</b>	<b>SpR Locum - mat/pat leave</b>		<b>P1039</b>	<b>Band 3 Bank Nurse</b>	
<b>P0209</b>	<b>SpR Locum - special leave</b>		P1040	Band 4 Nurse	
P0210	Clinical Lecturer Salary		<b>P1049</b>	<b>Band 4 Bank Nurse</b>	

Account classification		Expense (+) or income (-)	Account classification		Expense (+) or income (-)
Code	Description		Code	Description	
P0211	Clinical Lecturer Banding		P1050	Band 5 Nurse	
<b>P1059</b>	<b>Band 5 Bank Nurse</b>		P2470	Band 7 Dietitian	
P1060	Band 6 Nurse		<b>P2479</b>	<b>Band 7 Dietetics Bank</b>	
<b>P1069</b>	<b>Band 6 Bank Nurse</b>		P2480	Band 8 Dietitian	
P1070	Band 7 Nurse		P2485	Band 8C Dietician	
<b>P1079</b>	<b>Band 7 Bank Nurse</b>		P2530	Band 3 Orthoptist	
P1081	Band 8A Nurse Consultant		P2550	Band 5 Orthoptist	
P1083	Band 8B Nurse Consultant		P2560	Band 6 Orthoptist	
<b>P1089</b>	<b>Band 8 Bank Nurse</b>		P2570	Band 7 Orthoptist	
P1160	Band 6 Theatre Nurse		P2580	Band 8 Orthoptist	
P1170	Band 7 Theatre Nurse		P2650	Band 5 Chaplain	
P1220	Band 2 Midwife		P2670	Band 7 Chaplain	
P1250	Band 5 Midwife		P2681	Band 8A Chaplain	
P1260	Band 6 Midwife		P2683	Band 8B Chaplain	
P1270	Band 7 Midwife		P2770	Band 7 Clinical Psychologist	
P1283	Band 8B Midwife Consultant		P2785	Band 8C Clinical Psychologist	
P2030	Band 3 Clin Supp Worker (OT)		P2787	Band 8d Clinical Psychologist	
P2050	Band 5 Occupational Therapist		P2840	Band 4 Other AHP	
P2060	Band 6 Occupational Therapist		P2870	Band 7 Other AHP - Art Therapist	
P2070	Band 7 Occupational Therapist		P3020	Band 2 Pharmacy Support	
P2081	Band 8A Occupational Therapist		P3030	Band 3 Pharmacy Support	
P2085	Band 8C Occupational Therapist		P3040	Band 4 Pharmacy Technician	
P2130	Band 3 Clin support (Physio)		P3050	Band 5 Pharmacy Technician	
P2150	Band 5 Physiotherapist		P3060	Band 6 Pharmacist	
P2160	Band 6 Physiotherapist		P3070	Band 7 Pharmacist	
P2170	Band 7 Physiotherapist		P3081	Band 8A Pharmacist	
P2181	Band 8A Physiotherapist		P3083	Band 8B Pharmacist	
P2183	Band 8B Physiotherapist		P3085	Band 8C Pharmacist	
P2185	Band 8C Physiotherapist		P3090	Band 9 Pharmacy Manager	
P2250	Band 5 Speech Therapist		P3120	Lab Assistant	
P2260	Band 6 Speech Therapist		P3130	Band 3 Lab Assistant	
P2270	Band 7 Speech Therapist		P3140	Band 4 Lab Assistant	
P2281	Band 8A Speech Therapist		P3150	Band 5 Clinical Scientist	
P2283	Band 8B Speech Therapist		P3160	Band 6 Clinical Scientist	
P2285	Band 8C Speech Therapist		P3170	Band 7 Clinical Scientist	
P2320	Band 2 Clin Support (X Ray)		P3181	Band 8A Clinical Scientist	
P2330	Band 3 - X Ray support		P3183	Band 8B Clinical Scientist	
P2340	Band 4 Radiographer		P3185	Band 8C Clinical Scientist	
P2350	Band 5 Radiographer		P3187	Band 8D Clinical Scientist	
P2360	Band 6 Radiographer		P3190	Band 9 Clinical Scientist	
P2370	Band 7 Radiographer		P3210	Band 1 Biomed Support Worker	
P2381	Band 8A Radiographer		P3220	Band 2 Biomed Support Worker	
P2383	Band 8B Radiographer		P3230	Band 3 Biomed Support Worker	
P2385	Band 8C Radiographer		P3240	Band 4 Biomed Support Worker	
P2430	Band 3 Clin support - dietetic		P3250	Band 5 Biomedical Scientist	
P2450	Band 5 Dietitian		P3255	Biomedical Trainees	
P2460	Band 6 Dietitian		P3260	Band 6 Biomedical Scientist	
P3270	Band 7 Biomedical Scientist		P5140	Band 4 Office Services	
P3281	Band 8A Biomedical Scientist		P5220	Band 2 Finance Officer	
P3283	Band 8B Biomedical Scientist		P5230	Band 3 Finance Officer	
P3285	Band 8c Biomedical Scientist		P5240	Band 4 Finance Officer	
P3287	Band 8D Biomedical Scientist		P5250	Band 5 Finance Officer	
P3310	Band 1 Medical Technology		P5260	Band 6 Finance Officer	
P3320	Band 2 Medical Technology		P5270	Band 7 Finance Officer	
P3330	Band 3 Medical Technology		P5281	Band 8A Finance Officer	
P3340	Band 4 Medical Technology		P5283	Band 8B Finance Officer	
P3350	Band 5 Medical Technology		P5285	Band 8C Finance Officer	
P3360	Band 6 Medical Technology		P5287	Band 8D Finance Officer	
P3370	Band 7 Medical Technology		P5350	Band 5 Librarian	
P3381	Band 8A Medical Technology		P5360	Band 6 Officer	
P3383	Band 8B Medical Technology		P5370	Band 7 Librarian	
P3450	Band 5 Medical Photography		P5420	Band 2 Human Resources	
P3460	Band 6 Medical Photographer		P5430	Band 3 Human Resources	
P3520	Band 2 Cytology Screener		P5440	Band 4 Human Resources	

Account classification		Expense (+) or income (-)	Account classification		Expense (+) or income (-)
Code	Description		Code	Description	
P3540	Band 4 Cytology Screener		P5450	Band 5 Human Resources	
P3560	Band 6 Cytology Screener		P5460	Band 6 Human Resources	
P3570	Band 7 Cytology Screener		P5470	Band 7 Human Resources	
P3630	Band 3 Audiology Technician		P5481	Band 8A Human Resources	
P3650	Band 5 Audiology Technician		P5483	Band 8B HR Officer	
P3660	Band 6 Audiology		P5620	Band 2 Telephony Operator	
P3670	Band 7 Audiology		P5630	Band 3 Analyst/Technician	
P3681	Band 8A Audiology Technician		P5640	Band 4 Analyst / Technician	
P3683	Band 8B Audiology		P5650	Band 5 Analyst/Technician	
P3687	Band 8D Audiology Technician		P5660	Band 6 IM & T Specialist/Analy	
P3770	Band 7 Mortuary Technician		P5670	Band 7 IM_T Manager	
P3885	Band 8C Optometrist		P5681	Band 8a IM_T Manager	
P3920	2 Theatre Practice		P5683	Band 8b IM_T Manager	
P3950	Band 5 Theatre Practitioner		P5685	Band 8c IM_Manager	
P3960	Band 6 Theatre Practitioner		P5710	Band 1 Administrative Services	
P4040	Band 4 Dental Technician		P5720	Band 2 Administrative Services	
P4050	Band 5 Dental Technician		<b>P5729</b>	<b>Band 2 - Bank Admin &amp; Clerical</b>	
P4060	Band 6 Dental Technician		P5730	Band 3 Administrative Services	
P4530	Band 3 Phlebotomist		<b>P5739</b>	<b>Band 3 - Bank Admin &amp; Clerical</b>	
P5010	Band 1 Patient Serv. Officer		P5740	Band 4 Administrative Services	
P5020	Band 2 Patient Serv. Officer		<b>P5749</b>	<b>Band 4 - Bank Admin &amp; Clerical</b>	
P5030	Band 3 Patient Serv. Officer		P5750	Band 5 Administrative Services	
P5040	Band 4 Patient Serv. Officer		<b>P5759</b>	<b>Band 5 - Bank Admin &amp; Clerical</b>	
P5050	Band 5 Patient Serv. Officer		P5760	Band 6 Administrative Services	
P5060	Band 6 Patient Services Manage		P5770	Band 7 Administrative Services	
P5070	Band 7 Patient Services Manage		P5781	Band 8A Administrative Service	
P5085	Band 8C Patient Serv. Manager		P5783	Band 8B Administrative Service	
P5120	Band 2 Clerical Officer/Secr.		P5785	Band 8c Administrative Services	
P5130	Band 3 Secretary		P6010	Band 1 Hotel Services Asst	
P6020	Band 2 Hotel Services		R0050	Senior House Officers	
P6030	Band 3 Hotel Services		R0051	Senior House Officers ADHs	
P6040	Band 4 Hotel Services		<b>R0065</b>	<b>Locum HO Annual Leave</b>	
P6050	Band 5 Hotel Services		R0080	Clinical Assistant	
P6060	Band 6 Hotel Services		R0086	Final Year Medical Student	
P6070	Band 7 Hotel Services Manager		R0091	Clinical Medical Officer	
P6081	Band 8A Hotel Services Manager		R0100	Specialist Registrar	
P6083	Band 8B Hotel Services Manager		R0102	SPR Vacancy	
P6085	Estates 8C		R0106	SPR Flexi-Trainee	
P6150	Band 5 Security Officer		R0410	Nurse Consultant	
P6160	Band 6 Security Officer		R0430	Scale I Nurse	
P6220	Band 2 Sterile Services		<b>R0433</b>	<b>Scale I Nurse Bank</b>	
P6230	Band 3 Sterile Services		R0440	Scale H Nurse	
P6240	Band 4 Sterile Services Supprt		R0441	Scale H Midwifery	
P6250	Band 5 Sterile Servs Support		<b>R0443</b>	<b>H Nurse Bank</b>	
P6260	Band 6 Sterile Services		R0450	Scale G Nurse	
P6410	Band 1 Estates Support		<b>R0453</b>	<b>Scale G Bank Nurse</b>	
P6420	Band 2 Estates Support		R0460	Scale F Nurse	
P6430	Band 3 Estates Support		<b>R0463</b>	<b>Scale F Bank Nurse</b>	
P6440	Band 4 Estates Support		R0466	Scale E/F Nurse Midwifery	
P6450	Band 5 Estates Support		<b>R0467</b>	<b>Scale E/F Bank Nurse Midwifery</b>	
P6460	Band 6 Estates Support		<b>R0473</b>	<b>Scale E Bank Nurse</b>	
P6470	Band 7 Estates Support		R0480	Scale D Nurse	
P6481	Band 8A Estates Manager		<b>R0483</b>	<b>Scale D Bank Nurse</b>	
P6483	Band 8B Estates Support		<b>R0493</b>	<b>Scale C Bank Nurse</b>	
P6530	Band 3 Cook		R0500	Scale B Nurse	
P6820	Band 2 Orderly		<b>R0503</b>	<b>Scale B Bank Nurse</b>	
P7003	Research Salaries & Wages		R0510	Scale A Nurse	
P7050	Band 5 Professional Manager		<b>R0513</b>	<b>Scale A Bank Nurse</b>	
P7060	Band 6 Professional Manager -		R0525	H/C Assistants	
P7070	Band 7 Professional Manager -		R0714	Physiotherapist	
P7081	Band 8A Professional Manager		R0715	Physio Helper	

Account classification		Expense (+) or income (-)	Account classification		Expense (+) or income (-)
Code	Description		Code	Description	
P7083	Band 8B Professional Manager -		R0716	Orthoptists	
P7085	Band 8C Professional Manager -		R0718	Assistant Practitioner	
P7087	Band 8D Professional Manager -		R0720	Radiographer	
P7090	Band 9 Professional Manager		R0730	Head III Occupational Therapis	
P7160	Band 6 Professional Manager		R0732	Senior I Occupational Therapis	
P7170	Band 7 Professional Manager		R0733	Senior II Occupational Therapi	
P7181	Band 8A Professional Manager		R0740	Senior II Radiographer	
P7183	Professional Manager Non-Clin		R0741	Senior I Radiographer	
P7185	Band 8C Professional Manager		R0746	Non-Nursing Tutor	
P7189	Band 8d Professional Manager		R0760	Speech Therapist	
P7190	Band 9 Professional Manager		R0761	Lip Reading Teacher	
R0010	Consultants		R0765	Biochemist	
R0012	<b>Locum Consultant - Vacancy</b>		R0766	Physicist	
R0015	<b>Locum Consultant-Annual Leave</b>		R0767	Psychologist	
R0770	Scientific Officer		R1255	Corp Devt - Capital Recharge	
R0771	Scientific Officer Grade A		R1399	Turnover Factor	
R0772	Audiology Scientist		<b>R1410</b>	<b>Agency Nursing (Qualified)</b>	
R0773	Scientific Officer Grade B		<b>R1411</b>	<b>Agency Nursing (Unqualified)</b>	
R0786	University Genetics Lecturer		<b>R1415</b>	<b>Agency AHPs</b>	
R0806	MLSO Trainee		R1421	Perfusion Services	
R0832	Medical Technical Officer 2		<b>R1425</b>	<b>Agency Scientists &amp; Technicians</b>	
R0833	Medical Technical Officer 3		<b>R1426</b>	<b>Agency ODA</b>	
R0835	Medical Technical Officer 4		<b>R1435</b>	<b>Agency Pharmaceutical</b>	
R0836	Assistant Technical Officer		<b>R1441</b>	<b>Agency A&amp;C Clerical</b>	
R0837	Medical Technical Officer 5		<b>R1453</b>	<b>Agency Ancillary</b>	
R0838	Sen Asst Tech Officer		<b>R1460</b>	<b>Agency - Other</b>	
R0841	Audiologist		<b>R1465</b>	<b>Bank Staff Annual Leave</b>	
R0842	Trainee Medical Technical Off.		<b>R1466</b>	<b>Recharge bank midwives</b>	
R0855	Medical Laboratory Assistant		<b>R1470</b>	<b>Management Consultant</b>	
R0856	Phlebotomist		<b>R1473</b>	<b>Professional Fees</b>	
R0870	O.D.A Manager		<b>R2000</b>	<b>Drug Issues</b>	
R0873	Trainee O.D.A		<b>R2001</b>	<b>Drugs Anti Retroviral</b>	
R0891	Engineering Officer		<b>R2003</b>	<b>Drugs Overhead</b>	
R0892	Building Officer		<b>R2007</b>	<b>Drugs Stock Adjustment</b>	
R0990	Pharmacists B & C		<b>R2010</b>	<b>Drugs Musculo Skeletal</b>	
R1003	Senior Manager 21-30		<b>R2012</b>	<b>Drugs Ceredase</b>	
R1005	Senior Manager 12-20		<b>R2013</b>	<b>Drugs Immunoglobulins</b>	
R1006	Senior Manager 1-11		<b>R2014</b>	<b>Drugs Myozyme(Pompe)</b>	
R1010	A&C Grades 6 - 10		<b>R2015</b>	<b>Drugs N.I.C.E</b>	
R1015	A&C Grade 5		<b>R2016</b>	<b>Drugs Zavesca</b>	
R1016	A&C Grade 4		<b>R2017</b>	<b>Drugs Anti TNF</b>	
R1017	A&C Grade 3		<b>R2018</b>	<b>Drugs Fabrys</b>	
R1018	A&C Grades 1 - 2		<b>R2019</b>	<b>Drugs Idursufase (Hunter's)</b>	
R1019	A&C Medical Secretaries		<b>R2070</b>	<b>Drugs FP10</b>	
R1020	Trainers Salary - Non NHS staf		<b>R2090</b>	<b>Medical Gases</b>	
<b>R1023</b>	<b>A&amp;C Grade 3 Bank</b>		<b>R2096</b>	<b>Drugs General Sale At Fulbourn</b>	
R1043	Medical Secretary		R2097	Drugs - Production Unit Transfer	
R1060	A&C Social Work Support		<b>R2098</b>	<b>Drugs Cost Of General Sales</b>	
<b>R1073</b>	<b>A&amp;C Bank Scheme</b>		<b>R2140</b>	<b>AHNR Orthoptist Prosthesis</b>	
R1111	Porters		<b>R2141</b>	<b>Paediatric IP Surgical Appliances</b>	
R1112	Post Room Staff		<b>R2142</b>	<b>Paediatric OP Foot Prosthesis</b>	
R1122	Domestic Orderly		<b>R2143</b>	<b>Paediatric OP Other Prosthesis</b>	
R1133	Laundry-Other Wet Laundry		<b>R2144</b>	<b>Adult IP Surgical Appliances</b>	
R1141	Gardener		<b>R2145</b>	<b>Adult OP Foot Prosthesis</b>	
R1155	Theatre Orderly		<b>R2146</b>	<b>Adult OP Other Prosthesis</b>	
R1188	Ward Assistants		<b>R2147</b>	<b>Self-Referred Patient Appliances</b>	
<b>R1194</b>	<b>Ward Assistant - Bank</b>		<b>R2150</b>	<b>Patients Appliances</b>	
R1210	Supervisors/Technicians		<b>R2151</b>	<b>Patients Appliances - Wigs</b>	
R1211	Engineerin Semi-Skill Trades		<b>R2152</b>	<b>Prosthesis - Other</b>	
R1250	Design Team		<b>R2153</b>	<b>Patients Appliances - Dental</b>	
<b>R2154</b>	<b>Footwear Accessories</b>		<b>R2263</b>	<b>Laboratory Neqas Scheme</b>	

Account classification		Expense (+) or income (-)	Account classification		Expense (+) or income (-)
Code	Description		Code	Description	
R2156	Hearing Aid Moulds		R2269	Laboratory Accreditation	
R2157	Lower Body Prosthesis		R2277	Theatres New Instruments	
R2158	Upper Body Prosthesis		R2278	Theatres Instrument Repairs	
R2160	Prostheses Repair		R2281	Med/Surg Bone Transport	
R2161	New Lower Limbs Conventional		R2282	Med/Surg Bone Other	
R2162	New Upper Limbs		R2285	Nutrition Recharges	
R2163	New Lower Modular Limbs		R2287	Seeds	
R2164	Limb Service Contract		R2289	Med/Surg Disposables	
R2169	Wheelchair Stocks		R2290	ISCUS	
R2170	Upper & Lower Stump Socks		R2294	Plasmaphoresis	
R2171	Wheelchair Accessories		R2296	National Blood Contract	
R2172	Wheelchair Modification		R2297	Other Blood Products	
R2173	Powered Wheelchairs		R2299	Autologous Blood	
R2174	Wheelchair Recondition		R2311	Instrumentation (Non-Theatres)	
R2175	Wheelchair Repair Contract		R2312	Instrument Repairs	
R2176	Wheelchair Vouchers		R2313	Medical Equipment	
R2181	Footwear - Stock		R2314	Medical Equipment Repairs	
R2182	Footwear - Bespoke		R2315	Medical Equipment Maintenance Cont	
R2183	Footwear - Repair		R2316	Non-Medical Equipment	
R2188	Optical Appliances		R2317	Non-Medical Equipment Repairs	
R2192	Therapy Materials And Equipment		R2318	Non-Medical Equipment Maintenance	
R2194	Aids For Disabled		R2325	Biomedical Equipment Spares	
R2195	Hearing Aids - Private		R2360	Med/Surg Non Disposable	
R2196	Batteries		R2361	Medical Loan Equipment	
R2197	Hearing Aids - Repair		R2362	Med/Surg Orthopaedic Trauma	
R2198	Hearing Aids - NHS		R2363	Med/Surg Orthopaedic Elective	
R2200	Cochlear Processors		R2367	Med/Surg Repairs	
R2218	Urology Robot Semi Disposals		R2391	Other Reagents	
R2219	Disposable Surg Instruments		R2400	Food Supplies	
R2220	Dental Equipment & Materials		R2406	Beverages And Beverage Contract	
R2230	Angio Med & Surg		R2411	Special Foods	
R2232	ICP Bolts		R2412	Cook-Chill Contract	
R2240	X-Ray Film		R2414	Ward Provisions - Food Recharge To	
R2241	X-Ray Chemicals		R2451	Staff Uniforms	
R2249	Haemophilia Blood Products		R2460	Patients Clothing	
R2250	Laboratory Chemicals		R2461	Incontinence Supplies	
R2251	Laboratory Isotopes		R2470	Laundry Washing Materials	
R2252	Laboratory Immuno Reagents		R2472	Water Softening Materials	
R2253	Blood Gas Analyser Contract		R2490	Dry Cleaning Outside Contract	
R2254	Laboratory Equipment Recharge		R2491	Laundry Outside Contract	
R2257	Laboratory Bone Marrow		R2501	Hardware & Crockery	
R2258	Laboratory Control Materials		R2509	Vending Rental	
R2259	Laboratory Consumables		R2510	Bedding - Disposable	
R2260	Laboratory Ins Services		R2520	Bedding - Non-Disposable	
R2261	Laboratory Enzymes		R2524	Linen -Towels	
R2525	Linen -Theatre Drapes		R3675	Taxi Service Contract	
R2526	Linen - Operating Gowns		R3676	Accommodation Patients	
R2527	Linen - Nightwear		R3680	Course Fees - Medical & Dental	
R2528	Linen - Laundry Bags		R3681	Course Fees - Nursing	
R2529	Linen - Stretchers/Gloves		R3682	Course Fees - Other Staff	
R2900	Entereal Feed Sets		R3687	Supervision Fees	
R3500	Office Consumables		R3689	Education & Training Materials	
R3501	Printing		R3701	Removal Expenses Consultants	
R3503	Telephone directories		R3713	Jnr Medical Staff Removals Travel/	
R3504	Imaging Charges		R3714	Jnr Medical Staff Removals Purchas	

Account classification		Expense (+) or income (-)	Account classification		Expense (+) or income (-)
Code	Description		Code	Description	
R3508	Stationery Recharge		R3715	Jnr Medical Staff Removals/Cost Of	
R3511	Books, Journals And Newspapers		R3717	Jnr Medical Staff Removals Misc Gr	
R3520	Postage And Carriage		R3903	Vehicle Running Costs	
R3525	PACS Contract		R3930	Hire Of Vehicle	
R3530	Quarterly Line Rental		R3931	Human Tissue Transport	
R3531	Pay Phone - Rental		R3932	Vehicle Leasing	
R3532	Patients Bedside Phone Systems - R		R3944	Hire Of Private Ambulance	
R3533	Staff Telephones - Rental		R4010	Oil	
R3534	Telephone System maintenance		R4020	Electricity	
R3535	Monthly Line Rental		R4021	Steam	
R3538	Telephone Equipment Recharge		R4030	Gas Including Propane	
R3540	Monthly Telephone Calls		R4050	Water	
R3541	Pay Phones - Calls		R4052	Sewerage Charges	
R3542	Teleconferencing Charges		R4060	Cleaning Equipment	
R3543	Staff Telephones - Calls		R4061	Cleaning Materials	
R3550	Advertising - Medical & Dental		R4070	Domestic Cleaning Contract	
R3551	Advertising - Nursing Staff		R4071	Window Cleaning Contract	
R3560	Advertising - Non Medical & Nursin		R4110	Furniture & Fittings	
R3561	Non-Advertising Recruitment & Inte		R4119	Voice mail	
R3562	Non-Advertising Recruitment & Inte		R4122	Portable Communication Devices	
R3569	Advertising - Non Recruitment		R4123	Telephone Installation Costs	
R3600	Contract Travel Costs		R4124	Bleeps	
R3601	Recharge Pool Cars		R4125	Network Installation Charges	
R3610	Medical & Dental Travel		R4127	Photocopier Maintenance / Rental	
R3611	Medical & Dental Subsistence		R4130	Computer Hardware	
R3612	Medical & Dental Interview Expense		R4131	Computer Software	
R3613	Jnr Medical Staff Interviews		R4134	Bureau Fees	
R3614	Medical & Dental Assessor Fees		R4148	IT Recharge	
R3615	Jnr Medical Staff Travel		R4170	Rent	
R3620	Nursing Staff Travel		R4180	Business Rates	
R3630	Other Staff Travel		R4181	Rates - Residences	
R3631	Other Staff Subsistence		R4200	Abortive Capital Schemes	
R3640	Volunteers Travel Expenses		R4201	Engineering Equipment	
R3670	Patients Travel		R4202	Engineering Materials And Tools	
R3671	Non Contract Patient Transport		R4203	External Engineering Contracts	
R3673	Contract Patient Transport		R4205	Recharge Engineering Work	
R4208	Waste Collection Service		R4771	Compliance Testing	
R4210	Building Equipment, Materials and		R4778	Multi-Storey Service Charge	
R4212	External Buildings Contracts		R4779	Multi-Storey Lease Charge	
R4215	Recharge Building Works		R4782	Central Leases	
R4217	Equipment Repairs		R4783	Other Operating Leases	
R4219	Equipment Maintenance Contract		R4816	Clinical Practice Facilitator	
R4222	CHP Maintenance		R4824	Clinical Skills	
R4225	Other Materials		R4830	Desensitisation	
R4251	Minor Works Recharges		R5000	Services Received Non WGA	
R4301	Gardening Consumables		R5001	Film Badge Service	
R4302	Gardening Machinery		R5002	Services Received WGA	
R4304	Gardening Contract		R5003	Lithography Service Received	
R4620	Internal Audit Costs		R5004	MRI Usage Fee	
R4630	Redundancy Costs		R5005	Genetics Expenditure for Income	
R4640	Bank Charges		R5006	Pharmacy Expenditure for Income	
R4641	External Audit Fees		R5008	Service Contract	
R4642	Sales ledger rounding		R5009	Royalties	
R4643	Sales ledger foreign exch loss		R5010	Activity Funding	
R4650	Health & Safety		R5012	Initiatives	
R4651	Improvement Initiatives		R5013	Vac Pumps	



Account classification		Expense (+) or income (-)	Account classification		Expense (+) or income (-)
Code	Description		Code	Description	
<b>R4662</b>	<b>Legal Fees Non NHS</b>		R5016	Cost Improvement Programme	
R4663	Legal Fees NHS		R5020	Service Charges In	
<b>R4672</b>	<b>Funeral Expenses</b>		R5021	Service Charges Out	
<b>R4673</b>	<b>Chapel Expenses</b>		<b>R5022</b>	<b>PF1 Serv Paymt</b>	
<b>R4682</b>	<b>Lecture Fees Medical Staff</b>		<b>R5034</b>	<b>Continance Advice - IUT's</b>	
<b>R4683</b>	<b>Lecture Fees Non Medical Staff</b>		<b>R5035</b>	<b>Chiropody - IUT's</b>	
<b>R4684</b>	<b>Simulated Patients</b>		<b>R5037</b>	<b>Occupancy - IUT's</b>	
<b>R4686</b>	<b>Signs</b>		<b>R5061</b>	<b>Psychology - IUTs</b>	
<b>R4689</b>	<b>General Equipment &amp; Materials</b>		<b>R5087</b>	<b>Health Centre - IUT's</b>	
<b>R4700</b>	<b>Security Services Contracts</b>		<b>R6715</b>	<b>Patient Travel Contract</b>	
<b>R4719</b>	<b>Insurance - CNST Contribution</b>		<b>R6716</b>	<b>Patient Related Travel</b>	
<b>R4720</b>	<b>Hospitality</b>		R7001	Research Balance B/fwd	
<b>R4722</b>	<b>Liability Third Party Scheme</b>		R7002	Research Income	
<b>R4723</b>	<b>Commission On Debt Collecting</b>		<b>R7003</b>	<b>Research Salaries &amp; Wages</b>	
<b>R4725</b>	<b>Car Parking Fees</b>		<b>R7004</b>	<b>Research Consumables</b>	
<b>R4732</b>	<b>Property Expenses Scheme</b>		<b>R7005</b>	<b>Research Equipment</b>	
<b>R4734</b>	<b>Insurance (non-CNST)</b>		<b>R7006</b>	<b>Books &amp; Journals</b>	
R4740	Depreciation - Purchased Assets		<b>R7007</b>	<b>Lecture Fees</b>	
<b>R4743</b>	<b>Living Patient Donor Expenses</b>		<b>R7008</b>	<b>Travel</b>	
<b>R4750</b>	<b>Miscellaneous</b>		<b>R7009</b>	<b>Stationery &amp; Sundries</b>	
<b>R4753</b>	<b>Med Audit Allocation</b>		R7010	PGME Income	
R4755	Medical Photography Recharge		<b>R7011</b>	<b>Catering</b>	
<b>R4757</b>	<b>Interpretation Services</b>		R7012	Accommodation	
<b>R4760</b>	<b>Open Day Expenses</b>		<b>R7013</b>	<b>Equipment</b>	
R4765	Settlement Discount Received		R7014	Dental CPD	
<b>R4766</b>	<b>Subscriptions</b>		<b>R7021</b>	<b>Pay-Admin &amp; Clerical</b>	
R7025	Misc		R7092	Compensation Payments	
R7026	Delegate Inc		<b>R7128</b>	<b>Staff Subst</b>	
<b>R7031</b>	<b>Non-Pay-Office Expenses</b>		<b>R7144</b>	<b>Hospitality</b>	
<b>R7032</b>	<b>Non-Pay-Office Equipment</b>		<b>R7147</b>	<b>Advertising</b>	
<b>R7033</b>	<b>Non-Pay-Staff Expenses</b>		R7180	Misc Income	
<b>R7035</b>	<b>Conference Expense</b>		<b>R8201</b>	<b>Bus Tickets Subsidy</b>	
<b>R7036</b>	<b>Non-Pay-Other Expenditure</b>		<b>R8202</b>	<b>Park &amp; Ride Subsidy</b>	
R7041	Int Recd - Dep		R9000	Cons Income	
R7054	Interest payment - Overdraft		<b>R9001</b>	<b>WDD</b>	
R7061	PDC Dividends Payable		<b>R9002</b>	<b>Course Fees</b>	
R7063	Write Offs		<b>R9006</b>	<b>Non Pay Other</b>	
R7064	Out Of Date Cheques		R9997	Manpower Contra Account	

**Table B1: CUH NHS Foundation Trust 2007-08 expenditure**

Notes:

1. The account codes in **bold** means they are to be classified by SIC coding - refer to Section 4.4 in main report