Goods and services carbon hotspots

Shared Business Services

uk PLC

NHS England breakdown of goods and services carbon footprint by organisation type

Full Report

Contents

Summary

The 2010 carbon footprint identified procurement as 65% of the NHS England carbon footprint[1].

Building on this with this exciting new research, the goods and services carbon hotspots for the NHS are identified by organisation type. Using expenditure data from 228 NHS trusts to produce a bottom-up carbon footprint for different categories of spend this reveals the patterns of carbon emissions. This cutting edge research provides a first view for prioritising action which will be improved through feedback from the health system and further research.

This research also supports the NHS in understanding the Public Services (Social Value) Act 2012[2], which requires all public services to consider taking into account economic, social and environmental value, not just price, when commissioning and buying goods and services.

Pharmaceuticals remain at 22% of the NHS England carbon footprint, most of this (79%) in GP prescribing, primary care and community services. With at least 48% of the goods and services carbon footprint for GPs coming from pharmaceuticals this highlights the importance of improved prescribing practices which reduce waste. Acute and mental health services contribute 13% and 5% of the pharmaceuticals footprint respectively.

Medical instruments contribute 13% to the NHS England carbon footprint with most of this (75%) from acute services and a further 13% in primary care and community services.

Building energy use remains at 18% of the NHS England carbon footprint with the largest contribution from acute services (73%), of which gas (45%) and electricity (51%). The scale of the footprint from medical instruments (1.96 $MtCO_2e$) is similar to that for electricity (1.3 $MtCO_2e$) in acute services.

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[1] NHS SDU: NHS England Carbon Emissions: Carbon Footprint Report Published 2012. Available at: http://www.sdu.nhs.uk/corporate-requirements/measuring-carbon-footprint/nhs-carbon-footprint.aspx

[2] Public Services (Social Value) Act 2012. Available at: http://www.legislation.gov.uk/ukpga/2012/3/pdfs/ukpga_20120003_en.pdf

Key messages

- Pharmaceuticals are 22% of the NHS England carbon footprint
  - 79% of pharmaceuticals are prescribed in primary care and community services
- Building energy use remains a key area of focus for acute organisations
- Medical instruments are 13% of the carbon footprint
  - 75% of medical instruments are used in acute services

Given that the majority of acute, mental health and ambulance services are commissioned these contribute to the carbon footprint for CCGs. The greatest improvements in sustainability are through an analysis of the whole impact. Services commissioned from acute, mental health and ambulance services are therefore included in the carbon footprint for commissioning organisations.

Commissioned services are at least 63% of the footprint for commissioning organisations with procurement carbon footprint contributing a further 34%, making low carbon commissioning and procurement crucial for carbon reduction in commissioning organisations.

Monitoring building energy use remains much more significant for acute, ambulance, community and specialist.

In summary, this research supports the current focus on acute building energy use and also quantifies of the contribution from different categories of goods and services. Quantification of the carbon footprint from health services could be further enhanced through modelling of the travel carbon footprint.

Guidance for action on the goods and services carbon footprint is already available from the Procuring for Carbon Reduction (P4CR) documents and tools[3].

NHS England results

NHS England carbon hot spots:

Category	Non-pay spend (£)	Carbon (tCO2e)	Percentage
NHS England	40.1b	20m	100%
Pharmaceuticals	12.9b	4.4m	22%
Primary care and community	10.2b	3.5m	18%
Acute	1.6b	0.6m	3%
Medical instruments	5.7b	2.6m	13%
Acute	4.3b	2.0m	10%
Mental health	0.3b	0.2m	1%
Building energy use	0.8b	3.5m	18%
Acute electricity	0.3b	1.3m	7%
Acute gas	0.2b	1.2m	6%
Business services	8.0b	1.8m	9%
Acute	3.8b	0.9m	4%
Primary care and community	2.9b	0.6m	3%

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[3] NHS SDU: Procuring for Carbon Reduction (P4CR). Available at: http://www.sdu.nhs.uk/corporate-requirements/interventions/procurement.aspx
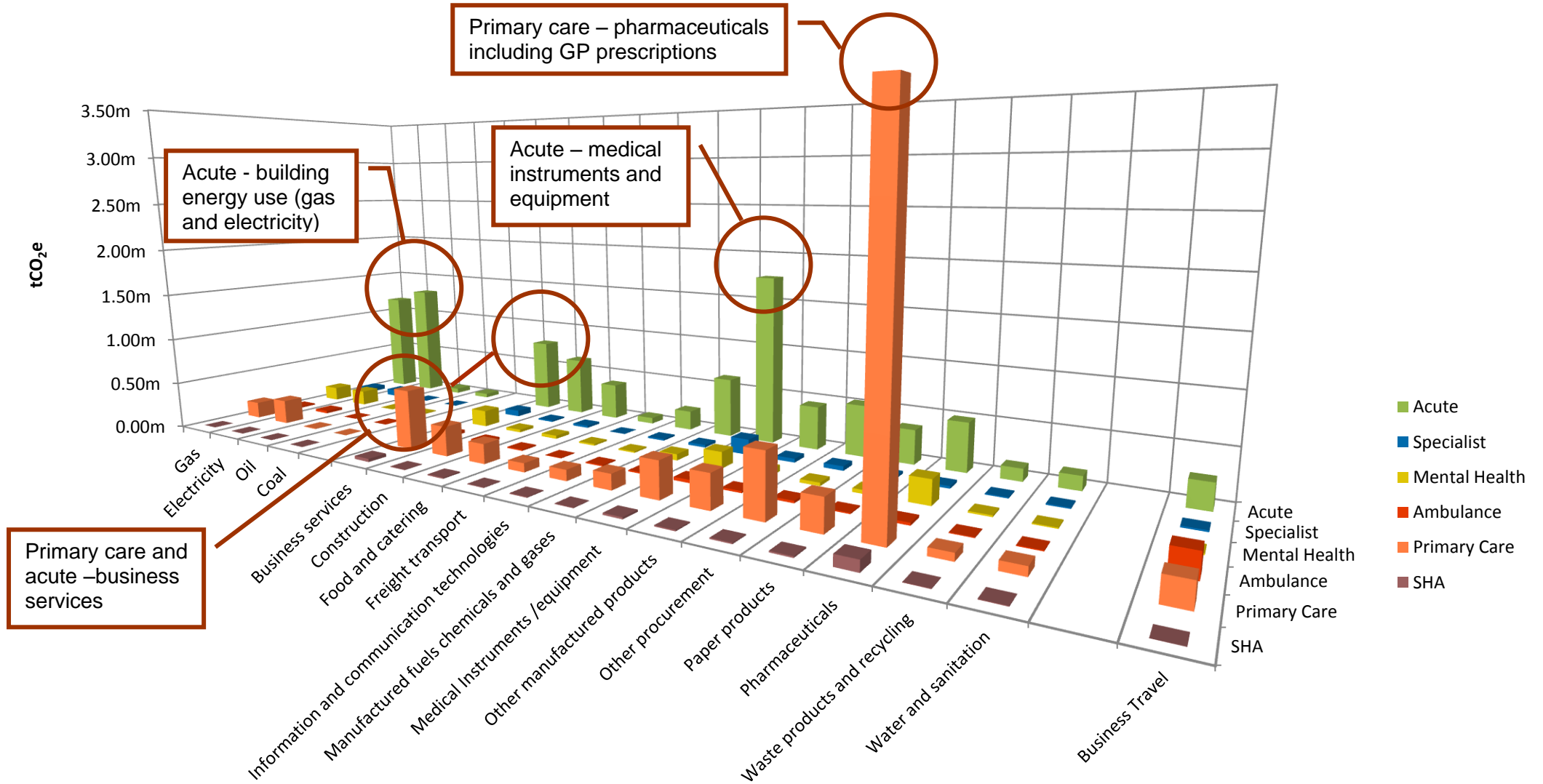
NHS England hotspots summary

- Pharmaceuticals are 22% of the NHS England carbon footprint of which:
    - 79% is in primary care and community services
    - 13% is in acute services and 5% in mental health services
- Medical Instruments account for 13% of the NHS England carbon footprint of which:
    - 75% is acute services
    - 13% is primary care and community services
- Building energy use is 18% of the NHS England carbon footprint of which 73% is acute services of which:
    - 51% electricity
    - 45% gas
- Business services is 9% of the NHS England carbon footprint of which:
    - 50% is acute services
    - 34% is primary care and community services

For ambulance services fleet vehicles, gas and electricity together make up 55% of the carbon footprint from goods, services and building energy use.

Goods and Services carbon footprint – carbon hotspots

Primary care – pharmaceuticals including GP prescriptions

Acute - building energy use (gas and electricity)

Acute – medical instruments and equipment

Primary care and acute –business services

tCO₂e

3.50m
3.00m
2.50m
2.00m
1.50m
1.00m
0.50m
0.00m

Gas
Electricity
Oil
Coal
Business services
Construction
Food and catering
Freight transport
Information and communication technologies
Manufactured fuels chemicals and gases
Medical Instruments /equipment
Other manufactured products
Other procurement
Paper products
Pharmaceuticals
Waste products and recycling
Water and sanitation
Business Travel

Acute
Specialist
Mental Health
Ambulance
Primary Care
SHA

Acute
Specialist
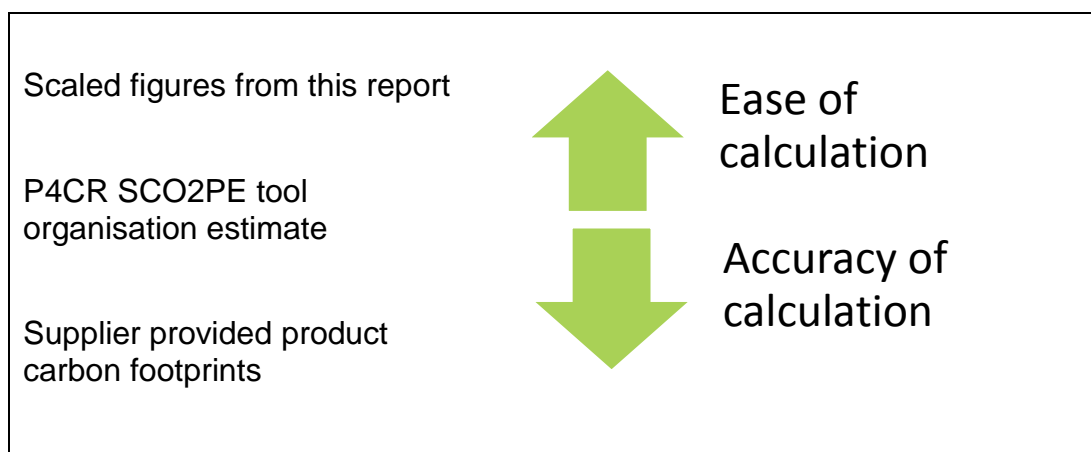Mental Health
Ambulance
Primary Care
SHA

Organisation estimates

The following sections focus on different types of NHS organisation. Figures are provided here to support organisations to estimate and prioritise action to reduce the goods and services carbon footprint.

Further guidance for action and producing a more detailed carbon footprint is available in the Procuring for Carbon Reduction (P4CR)[4] guidance.
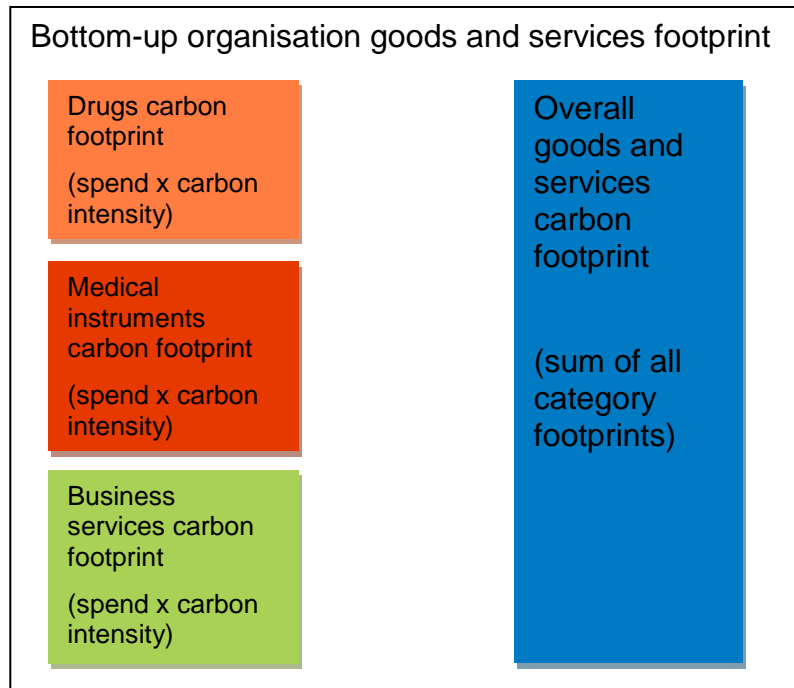
Different levels of estimates can be used for example:

Scaled figures from this report

P4CR SCO2PE tool organisation estimate

Supplier provided product carbon footprints

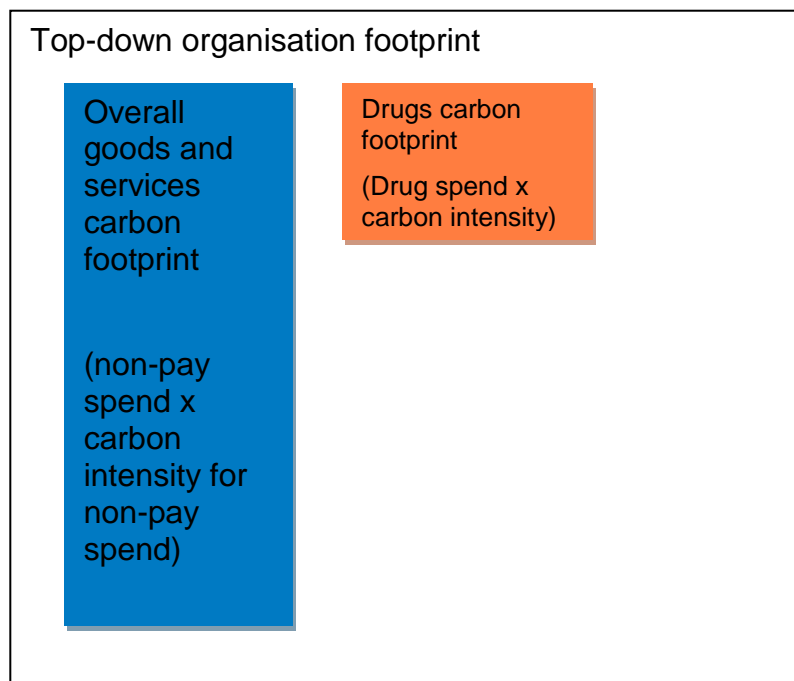Ease of calculation

Accuracy of calculation

Organisations will need to select an appropriate level for each category of the footprint based on local priorities as well as the information and resources available. There are two approaches for procurement carbon footprinting, building from the bottom up or top down which can also be used in combination. From the bottom up, every line of spend is classified to build the carbon footprint for each spend category.

A bottom up method was used to produce this report:

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[4] NHS SDU Procuring for Carbon Reduction (P4CR). Available here: http://www.sdu.nhs.uk/publications-resources/23/Procuring-for-Carbon-Reduction-P4CR--NEW/

Bottom-up organisation goods and services footprint

Drugs carbon footprint

(spend x carbon intensity)

Medical instruments carbon footprint

(spend x carbon intensity)

Business services carbon footprint

(spend x carbon intensity)

Overall goods and services carbon footprint

(sum of all category footprints)

At organisation level this pattern of spend from the top down can be used to estimate the overall carbon footprint. In addition it can be used to estimate that within the drugs footprint based on the drugs spend.

Top-down organisation footprint

Overall goods and services carbon footprint

(non-pay spend x carbon intensity for non-pay spend)

Drugs carbon footprint

(Drug spend x carbon intensity)

Organisations can use this report as the basis for top-down estimates. For example this report may indicate medical instruments are important for the organisation. Figures from this report can be used to estimate the scale of emissions from this category.

A bottom-up approach might supplement this information by using the SCO_2PE tool[5] to compare the organisation goods and services carbon footprint with the benchmark of the national averages. The SCO_2PE tool could also be used to understand the breakdown e.g. for medical instruments into service lines within the organisation.

Throughout these calculations care should be taken in estimating carbon emissions over time from expenditure. Given that carbon estimates are based on price this can be problematic: price rises do not imply increased carbon emissions. Other indicators, for example measuring the quantities of specific items purchased provide a more accurate change in the carbon footprint over time.

For example the recycled content of paper has been identified as having a positive impact on sustainability[6]. Monitoring volume of paper, both recycled and from virgin material, provides a more accurate estimate and can replace part of the paper products carbon footprint. Care should be taken to ensure coverage and remove duplication in using more accurate footprint information.

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[5] NHS SDU: Procuring for Carbon Reduction SCO_2PE tool. Available here:
http://www.sdu.nhs.uk/corporate-requirements/interventions/procurement.aspx

[6] Defra Government Buying Standards: Paper. Available here:
http://sd.defra.gov.uk/advice/public/buying/products/paper/paper/

Acute organisations

Estimates

The average carbon footprint for an acute organisation is around 70 ktCO$_2$e which includes building energy use, goods and services, business travel and commissioning. Patient, visitor and staff travel is not included in here as there is currently no model available to calculate carbon emissions breakdown by organisation type. Including travel will increase the footprint so 70 ktCO$_2$e is an under estimate.

Organisations can estimate their goods and services carbon footprint using non-pay spend, for example multiplying by 0.42 kgCO$_2$e/£ will give an estimate of the goods and services carbon footprint. If non-pay spend is not available then operating expenditure could be used for the estimate. Operating expenditure multiplied by 0.16 kgCO$_2$e/£ will give an estimate of the goods and services carbon footprint. Carbon intensity based on income gives similar values to information returned on Sustainability Reporting templates[7] to the SDU.

Building energy use figures are already calculated based on ERIC returns[8] as this provides a more accurate figure.

A more detailed breakdown of the carbon footprint can be produced using the SCO$_2$PE tool.

Carbon hotspots

The main contributions to the carbon footprint for acute organisations are: building energy use (25%); medical instruments (19%); business services, construction and manufactured fuels and gases (22% combined). Commissioned activity from other providers is 2% of the carbon footprint.

Benchmarking

Calculating the carbon footprint for activity using an existing method[9] gives each inpatient admission a carbon footprint of 446 kgCO$_2$e (plus patient, visitor and staff travel not calculated here). Changes in beddays have a carbon footprint of 91 kgCO$_2$e and outpatient appointments 56 kgCO$_2$e.

Adding together the estimated footprint from inpatient admissions and outpatient appointments given the level of activity will provide a benchmark for the organisation.

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[7] Sustainability Reporting template, part of the Annual Report for NHS organisations. Available at: http://www.sdu.nhs.uk/corporate-requirements/governance/reporting.aspx

[8] Erpho Carbon Indicator Energy Waste and Water. Available at: http://www.erpho.org.uk/viewResource.aspx?id=21509

[9] Erpho Indicative carbon per unit of healthcare activity. Available at: http://www.erpho.org.uk/viewResource.aspx?id=20967

Acute sector characteristics

Acute Sector	Source	Unit	Value	Goods and services	Building energy use	Travel (business only)	Commissioned activity
Number of organisations	HEFS 2010/11		147				
Operating expenditure	AC 2009/10	£	45.0b				
Non-pay spend	modelled	£	17.5b	15,893m	586m	243m	809m
Non-pay spend per organisation	modelled	£	119m	108m	4m	2m	6m
Carbon footprint NHS England	modelled	tCO2e	10.36m	7.32m	2.56m	0.29m	0.19m
Average Carbon footprint per organisation	modelled	tCO2e	70,489	49,819	17,445	1,963	1,262
Carbon intensity based on total income	modelled	kgCO2e/£	0.23	0.16	0.06	0.01	0.00
Carbon intensity based on total non-pay spend	modelled	kgCO2e/£	0.59	0.42	0.15	0.02	0.01
Carbon intensity of category	modelled	kgCO2e/£	0.59	0.46	4.38	1.19	0.23
Patient activity – inpatient admissions	IC HES 2010/11 IP	admissions	14.75m				
Patient activity – outpatient attendances	IC HES 2010/11 OP	attendances	67.79m				
Carbon footprint per inpatient admission	modelled	kgCO2e	446	315	110	12	8
Carbon footprint per bedday	modelled	kgCO2e	91	65	23	3	2
Carbon footprint per outpatient appointment	modelled	kgCO2e	56	39	14	2	1

Acute sector
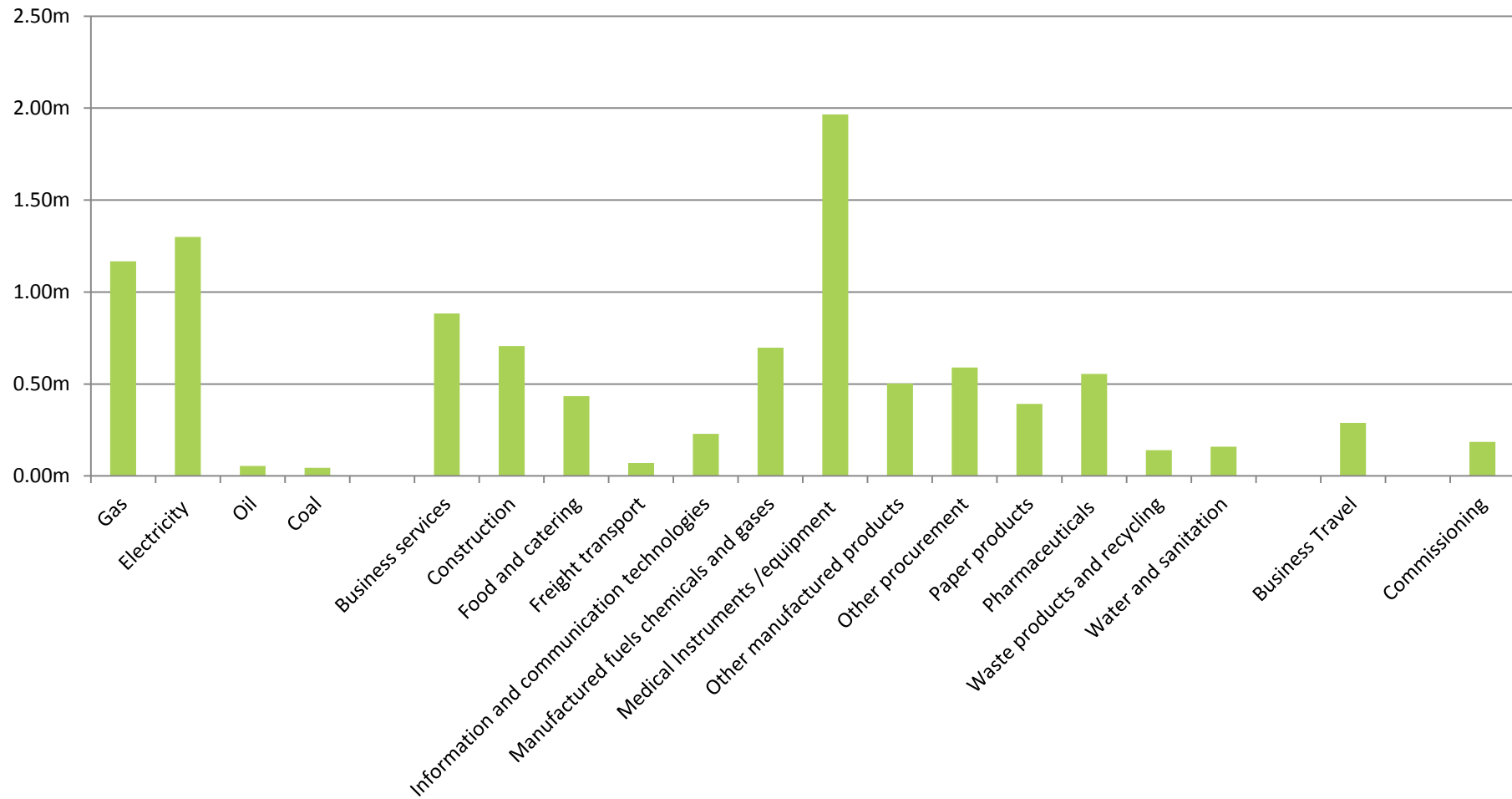
Acute sector carbon hotspots

Carbon hotspots for acute organisations:

Acute sector	NHS England tCO2e	Organisation average tCO2e		
Gas	1.17m	7,935	43%	65%
Electricity	1.30m	8,841		
Medical Instruments /equipment	1.96m	13,367		
Business services	0.88m	6,007		
Construction	0.71m	4,805		
Manufactured fuels chemicals and gases	0.70m	4,743		
Other excluding travel	**3.10m**	**21,084**		
Other procurement	0.59m	4,014		
Pharmaceuticals	0.55m	3,772		
Other manufactured products	0.50m	3,416		
Food and catering	0.43m	2,950		
Paper products	0.39m	2,663		
Information and communication technologies	0.23m	1,559		
Water and sanitation	0.16m	1,081		
Waste products and recycling	0.14m	958		
Oil	0.05m	368		
Coal	0.04m	301		
Included travel	**0.36m**	**2,445**		
Freight transport	0.07m	482		
Business Travel	0.29m	1,963		
Commissioned healthcare activity	**0.19m**	**1,262**	2%	
Grand total for listed items	**10.36m**	**70,489**		

Primary care, commissioning and community services organisations

As this report is based on historical information it has not been possible to separate primary care, commissioning and community services in this section.

Given that the majority of acute, mental health and ambulance services are commissioned these contribute to the carbon footprint for CCGs. The greatest improvements in sustainability are through an analysis of the whole impact. Services commissioned from acute, mental health and ambulance services are therefore included in the carbon footprint for commissioning organisations.

This report supports a more enhanced view of the carbon emissions from primary care, acute and other services than previously available.

Estimates

With 212 CCGs the average carbon footprint per organisation is 93 ktCO$_2$e. Patient, visitor and staff travel is not included in here as there is currently no model available to calculate carbon emissions breakdown for organisation type. Including travel will increase the footprint so 93 ktCO$_2$e is an under estimate.

Commissioning organisations can estimate their total carbon footprint using operating expenditure multiplied by 0.23 kgCO$_2$e/£. If commissioning spend is known more accurate estimates can be calculated using each category in turn and summing the result. The factors are as follows: commissioning spend multiplied by 0.18 kgCO$_2$e/£, non-pay spend (excluding commissioning and pharmaceuticals) multiplied by 0.35 kgCO$_2$e/£, pharmaceuticals spend multiplied by 0.34 kgCO$_2$e/£ plus calculations for building energy use and travel.

Building energy use figures are already calculated based on ERIC returns[10] as this provides a more accurate figure.

A more detailed breakdown of the carbon footprint can be produced using the SCO$_2$PE tool[11].

Carbon hotspots

Commissioned services contribute 63% of this carbon footprint while community services, prescribing and primary care is the remaining 37%.

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[10] Erpho Carbon Indicator Energy Waste and Water. Available at:
http://www.erpho.org.uk/viewResource.aspx?id=21509

[11] NHS SDU: Procuring for Carbon Reduction SCO$_2$PE tool. Available here:
http://www.sdu.nhs.uk/corporate-requirements/interventions/procurement.aspx
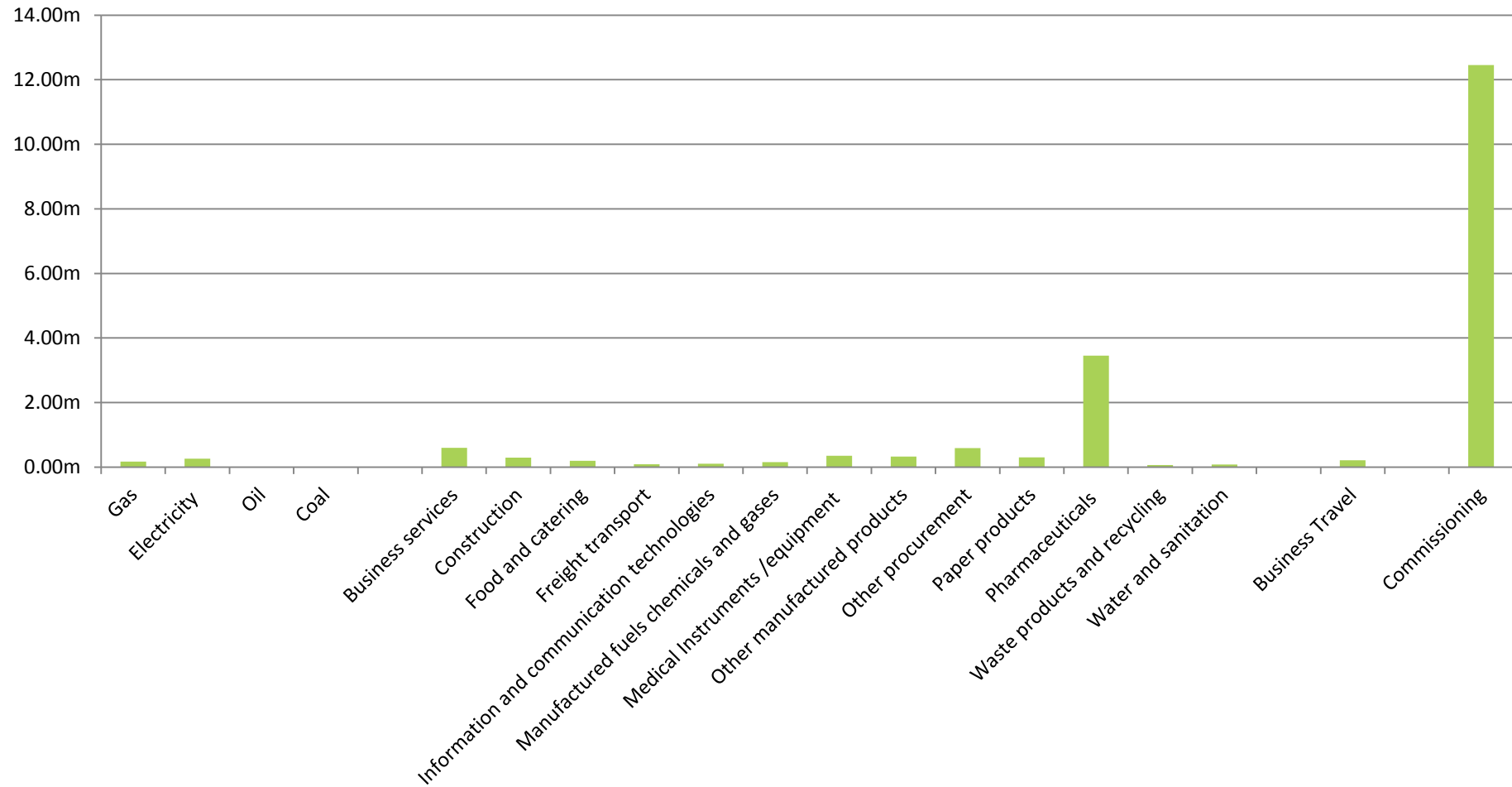
Primary care, commissioning and community services characteristics

Primary care, commissioning and community services Sector	Source	Unit	Value	Goods and services	Building energy use	Travel (business only)	Commissioned activity
Number of commissioning organisations	NHC CB CCG		212				
Operating expenditure (including commissioning)	AC 2009/10	£	85.9b				
Non-pay spend (including commissioning)	modelled	£	86.5b	18,558m	102m	325m	67,484m
Carbon footprint NHS England	modelled	tCO2e	19.71m	6.61m	0.44m	0.21m	12.45m
Average Carbon footprint per organisation	modelled	tCO2e	92,959	31,165	2,070	984	58,740
Carbon intensity based on total income	modelled	kgCO2e/£	0.23	0.08	0.01	0.00	0.14
Carbon intensity based on total non-pay spend	modelled	kgCO2e/£	0.23	0.08	0.01	0.00	0.14
Population	ONS	population	53.56m				
Patient activity – GP appointments	CHE RP 76 2009/10	consultations	300.40m				
Patient activity – prescription items	CHE RP 76 2009/10	items	897.73m				
Carbon footprint per person	modelled	kgCO2e	368	123	8	4	232
Carbon footprint per GP appointment	modelled	kgCO2e	66	22	1	1	41
Carbon footprint per prescription item	modelled	kgCO2e	7	7			

Primary care, commissioning and community services

Primary care and community services organisations (excluding commissioning)

Excluding services commissioned provides an estimate of primary care and community services.

Estimates

With around 139 community services providers, the average carbon footprint per organisation is 52 $ktCO_2e$. Patient, visitor and staff travel is not included in here as there is currently no model available to calculate carbon emissions breakdown for organisation type. Including travel will increase the footprint so 52 $ktCO_2e$ is an under estimate.

Primary care and community services organisations can estimate their total carbon footprint using operating expenditure multiplied by 0.35 $kgCO_2e/£$. Non-pay spend (excluding pharmaceuticals) multiplied by 0.36 $kgCO_2e/£$, pharmaceuticals spend multiplied by 0.34 $kgCO_2e/£$ plus calculations for building energy use and travel.

Building energy use figures are already calculated based on ERIC returns[12] as this provides a more accurate figure.

A more detailed breakdown of the carbon footprint can be produced using the SCO_2PE tool[13].

Carbon hotspots

For community services, prescribing and primary care, pharmaceuticals is 48% of the carbon footprint. Pharmaceuticals together with business services and procurement classified as other account for 64% of the carbon footprint.

In primary care the carbon footprint from the manufacture and use of pharmaceuticals is around 10 times the carbon footprint from electricity or gas.

Benchmarking

Calculating the carbon footprint for activity using primary care consultations gives a carbon footprint of 66 $kgCO_2e$ (plus patient, visitor and staff travel not calculated here). Of this, 41 $kgCO_2e$ is from referrals to secondary care.

Taking the number of prescription items in primary care the footprint of pharmaceuticals is 7 $kgCO_2e$ per prescription item.

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[12] Erpho Carbon Indicator Energy Waste and Water. Available at: http://www.erpho.org.uk/viewResource.aspx?id=21509

[13] NHS SDU: Procuring for Carbon Reduction SCO_2PE tool. Available here: http://www.sdu.nhs.uk/corporate-requirements/interventions/procurement.aspx

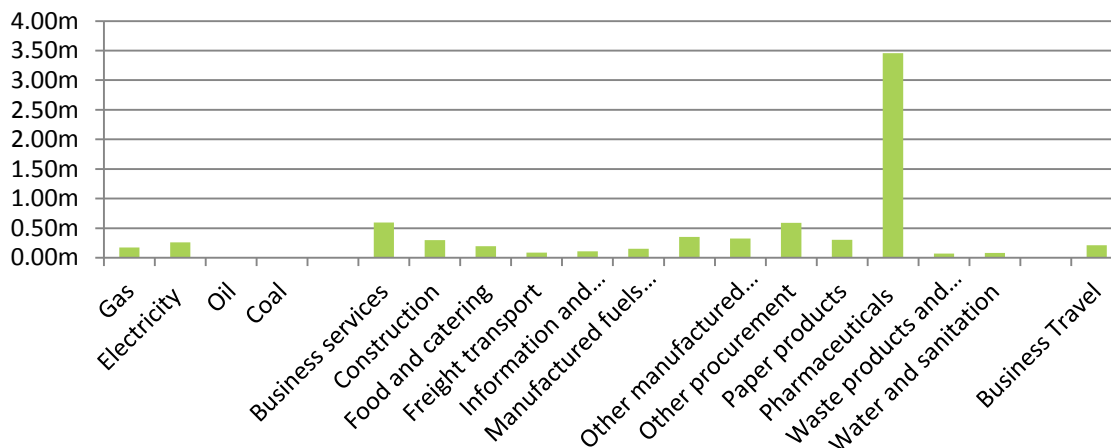## Primary care and community services characteristics

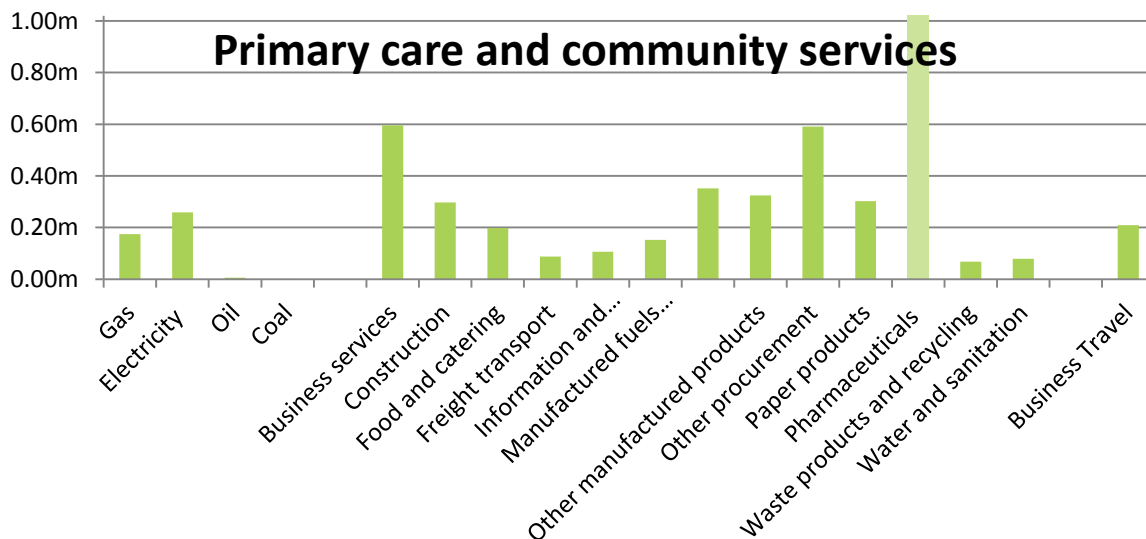| Primary care and community services Sector	Source	Unit	Value	Goods and services	Building energy use	Travel (business only)	Commissioned activity
Number of community services organisations	HEFS 2010/11		139				
Operating expenditure (primary care and community)	AC 2009/10	£	97.7b				
Non-pay spend (primary care and community services)	modelled	£	19.0b	18,558m	102m	325m	
Carbon footprint NHS England	modelled	tCO2e	7.25m	6.61m	0.44m	0.21m	
Average Carbon footprint per organisation	modelled	tCO2e	52,189	47,532	3,157	1,500	
Carbon intensity based on total non-pay spend	modelled	kgCO2e/£	0.38	0.35	0.02	0.01	
Carbon intensity of category	modelled	kgCO2e/£	0.38	0.36	4.28	0.64	0.18

Primary care and community services (excluding commissioning)

Whole footprint for primary care and community services:

Primary care and community services

Focusing on non-pharmaceuticals carbon footprint:

Primary care and community services

Primary care, commissioning and community services sector carbon hotspots

Carbon hotspots for primary care, commissioning and community services organisations:

Primary care, commissioning and community services sector	NHS England tCO2e	Organisation average tCO2e		
Commissioned healthcare activity	**12.45m**	**58,740**	63%	
Pharmaceuticals	3.46m	16,298	48%	
Business services	0.60m	2,813		64%
Other procurement	0.59m	2,785		
Other excluding travel	**2.31m**	**10,896**		
Electricity	0.26m	1,218		
Gas	0.17m	823		
Construction	0.30m	1,400		
Food and catering	0.20m	930		
Information and communication technologies	0.11m	500		
Manufactured fuels chemicals and gases	0.15m	717		
Medical Instruments /equipment	0.35m	1,660		
Other manufactured products	0.32m	1,530		
Paper products	0.30m	1,424		
Waste products and recycling	0.07m	321		
Water and sanitation	0.08m	372		
Included travel	**0.30m**	**1,398**		
Freight transport	0.09m	414		
Business Travel	0.21m	984		
Total excluding commissioning	**7.25m**	**34,190**		
Grand total including commissioning	**19.71m**	**92,959**		

Mental Health services

Estimates

The average carbon footprint for mental health organisations is 27 $ktCO_2e$. Patient, visitor and staff travel is not included in here as there is currently no model available to calculate carbon emissions breakdown for organisation type. Including travel will increase the footprint so 27 $ktCO_2e$ is an under estimate.

Organisations can estimate their goods and services carbon footprint using non-pay spend, for example multiplying by 0.25 $kgCO_2e/£$ will give an estimate of the goods and services carbon footprint. If non-pay spend is not available then operating expenditure could be used for the estimate. Operating expenditure multiplied by 0.10 $kgCO_2e/£$ will give an estimate of the goods and services carbon footprint.

Building energy use figures are already calculated based on ERIC returns[14] as this provides a more accurate figure.

A more detailed breakdown of the carbon footprint can be produced using the SCO_2PE tool[15].

Carbon hotspots

Pharmaceuticals is 16% of the carbon footprint with building energy use contributing a further 22%. Business service and medical instruments are 12% and 11.0% respectively.

Benchmarking

Calculating the carbon footprint for activity using an existing method[16] gives each inpatient admission a carbon footprint of 476 $kgCO_2e$ (plus patient, visitor and staff travel not calculated here). Changes in beddays have a carbon footprint of 97 $kgCO_2e$ and outpatient appointments 59 $kgCO_2e$.

Adding together the estimated footprint from inpatient admissions and outpatient appointments given the level of activity will provide a benchmark for the organisation.

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[14] Erpho Carbon Indicator Energy Waste and Water. Available at:
http://www.erpho.org.uk/viewResource.aspx?id=21509

[15] NHS SDU: Procuring for Carbon Reduction SCO_2PE tool. Available here:
http://www.sdu.nhs.uk/corporate-requirements/interventions/procurement.aspx

[16] Erpho Indicative carbon per unit of healthcare activity. Available at:
http://www.erpho.org.uk/viewResource.aspx?id=20967

Mental Health services characteristics

Mental Health Sector	Source	Unit	Value	Goods and services	Building energy use	Travel (business only)	Commissioned activity
Number of organisations	HEFS 2010/11		54				
Operating expenditure	AC 2009/10	£	8.3b				
Non-pay spend	modelled	£	3.5b	2,249m	74m	12m	1,147m
Carbon footprint NHS England	modelled	tCO2e	1.47m	0.87m	0.32m	0.01m	0.26m
Average Carbon footprint per organisation	modelled	tCO2e	27,144	16,059	5,965	247	4,873
Carbon intensity based on total income	modelled	kgCO2e/£	0.18	0.10	0.04	0.00	0.03
Carbon intensity based on total non-pay spend	modelled	kgCO2e/£	0.42	0.25	0.09	0.00	0.08
Carbon intensity of category	modelled	kgCO2e/£	0.42	0.39	4.38	1.13	0.00
Patient activity – inpatient admissions	CHE RP 76 2009/10	admissions	151,116				
Patient activity – outpatient attendances	CHE RP 76 2009/10	attendances	23.44m				
Carbon footprint per inpatient admission	modelled	kgCO2e	476	281	105	4	85
Carbon footprint per bedday	modelled	kgCO2e	97	58	21	1	17
Carbon footprint per outpatient appointment	modelled	kgCO2e	59	35	13	1	11

Mental Health
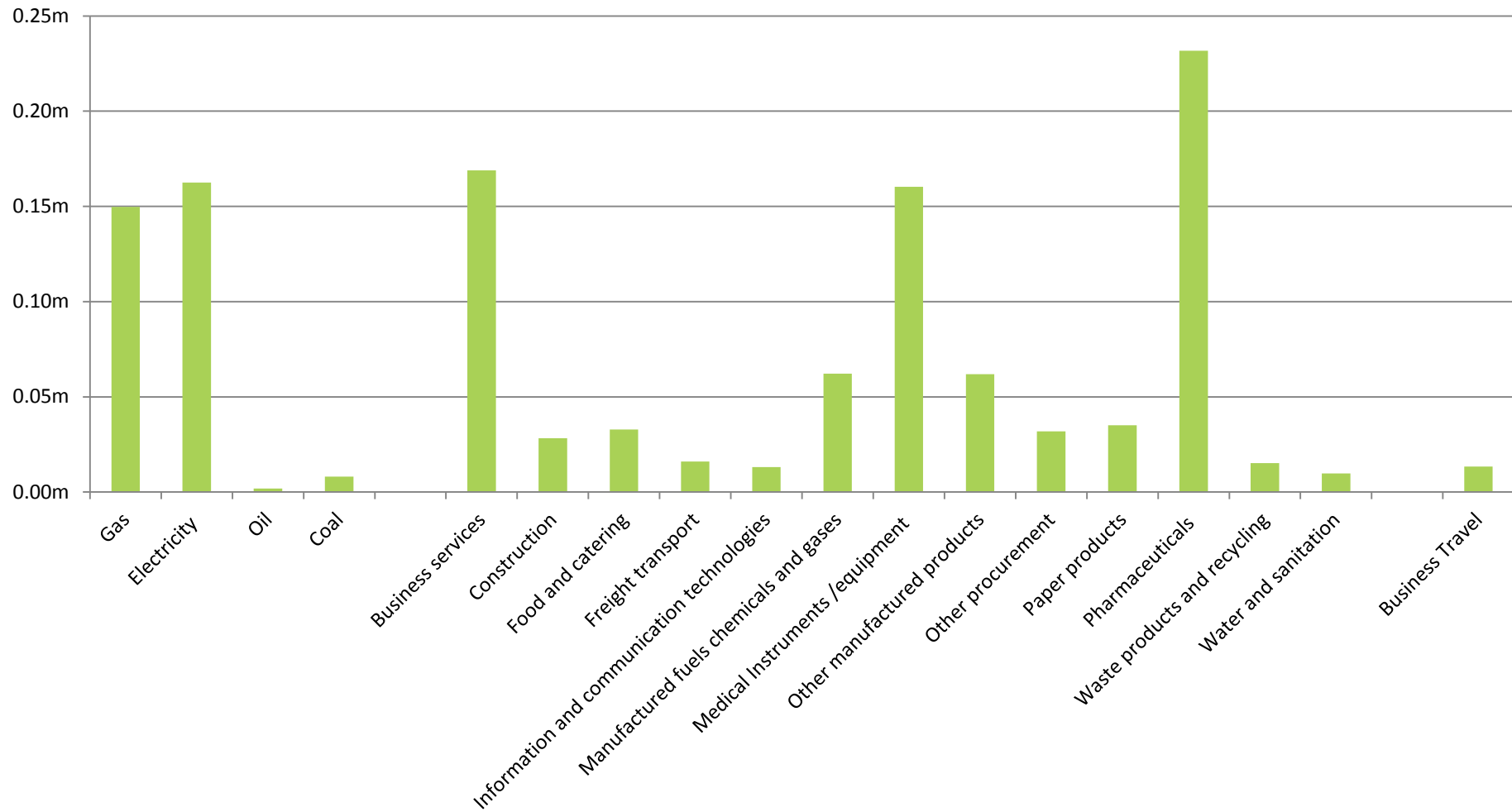
Mental Health services sector carbon hotspots

Carbon hotspots for mental health services organisations:

Mental health services sector	NHS England tCO2e	Organisation average tCO2e		
Pharmaceuticals	0.23m	4,292	16%	
Business services	0.17m	3,128		38%
Medical Instruments /equipment	0.16m	2,969		
Other excluding travel	**0.61m**	**2,888**		
Gas	0.15m	2,773		
Electricity	0.16m	3,009		
Oil	0.00m	34		
Coal	0.01m	149		
Construction	0.03m	524		
Food and catering	0.03m	608		
Information and communication technologies	0.01m	241		
Manufactured fuels chemicals and gases	0.06m	1,151		
Other manufactured products	0.06m	1,147		
Other procurement	0.03m	591		
Paper products	0.04m	650		
Waste products and recycling	0.02m	282		
Water and sanitation	0.01m	181		
Included travel	**0.03m**	**200**		
Freight transport	0.02m	296		
Travel	0.01m	247		
Total	**1.20m**	**22,272**		
Commissioning	**0.26m**	**4,873**	18%	
Grand total	**1.47m**	**27,144**		

Ambulance services

Estimates

With 11 ambulance organisations the average carbon footprint per organisation is 42 $ktCO_2e$. Patient, visitor and staff travel is not included in here as there is currently no model available to calculate carbon emissions breakdown for organisation type. Including travel will be a small increase the footprint so 42 $ktCO_2e$ is a good estimate.

Organisations can estimate their goods and services carbon footprint using non-pay spend, for example multiplying by 0.30 $kgCO_2e$/£ will give an estimate of the goods and services carbon footprint. Travel carbon footprint for business including emergency and non-emergency can be calculated more accurately using fuel consumption or vehicle emissions and mileage.

Building energy use figures are already calculated based on ERIC returns[17] as this provides a more accurate figure.

A more detailed breakdown of the goods and services carbon footprint can be produced using the SCO_2PE tool[18].

Carbon hotspots

Travel including business and fleet is 45% of the carbon footprint. Building energy use, business services, medical instruments, pharmaceuticals and construction contribute another 32%.

Benchmarking

Calculating the carbon footprint for activity using emergency response calls gives a carbon footprint of 68 $kgCO_2e$ per response. Of this, 31 $kgCO_2e$ is from travel.

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[17] Erpho Carbon Indicator Energy Waste and Water. Available at:
http://www.erpho.org.uk/viewResource.aspx?id=21509

[18] NHS SDU: Procuring for Carbon Reduction SCO_2PE tool. Available here:
http://www.sdu.nhs.uk/corporate-requirements/interventions/procurement.aspx

Ambulance services characteristics

Ambulance Sector	Source	Unit	Value	Goods and services	Building energy use	Travel (fleet and business only)	Commissioned activity
Number of organisations	HEFS 2010/11		11				
Operating expenditure	AC 2009/10	£	2.1b				
Non-pay spend	modelled	£	0.7b	502m	10m	168m	7m
Carbon footprint NHS England	modelled	tCO2e	0.46m	0.20m	0.04m	0.21m	0.00m
Average Carbon footprint per organisation	modelled	tCO2e	41,548	18,626	4,005	18,765	152
Carbon intensity based on total income	modelled	kgCO2e/£	0.22	0.10	0.02	0.10	0.00
Carbon intensity based on total non-pay spend	modelled	kgCO2e/£	0.66	0.30	0.06	0.30	0.00
Carbon intensity of category	modelled	kgCO2e/£	0.66	0.41	4.23	1.23	0.00
Patient activity – emergency response calls	IC 2011/12	calls	6.71m				
Carbon footprint per emergency response	modelled	kgCO2e	68	31	7	31	0

Ambulance service
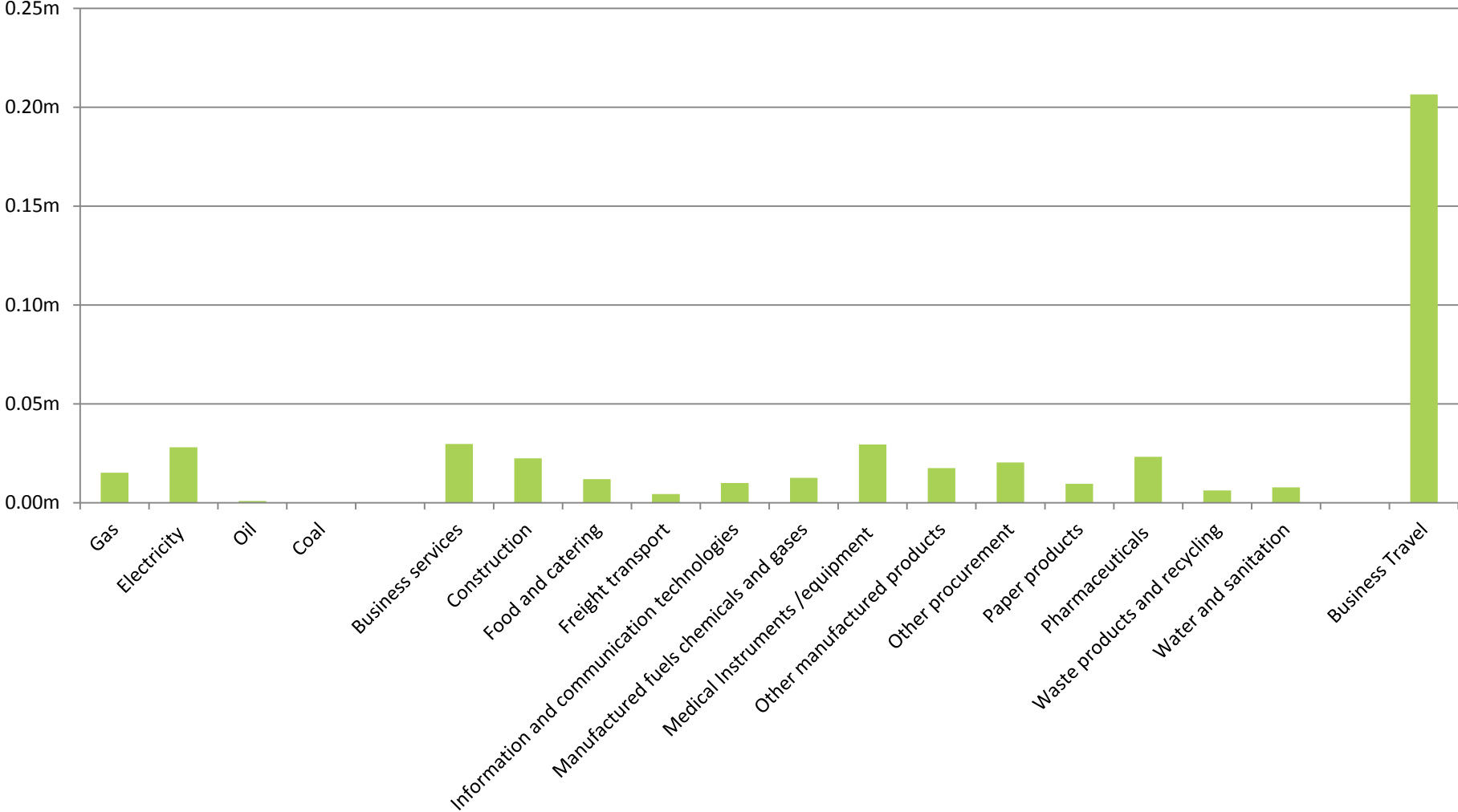
Ambulance services sector carbon hotspots

Carbon hotspots for mental health services organisations:

Ambulance services sector	NHS England tCO2e	Organisation average tCO2e		
Travel	0.206m	18,765	45%	
Electricity	0.028m	2,546		55%
Gas	0.015m	1,378		
Other	**0.206m**	**18,707**		
Business services	0.030m	2,700		
Medical Instruments /equipment	0.029m	2,674		
Pharmaceuticals	0.023m	2,110		
Construction	0.022m	2,039		
Other procurement	0.020m	1,853		
Oil	0.001m	80		
Coal	0.000m	0		
Procurement	0.000m	0		
Food and catering	0.012m	1,079		
Freight transport	0.004m	400		
Information and communication technologies	0.010m	909		
Manufactured fuels chemicals and gases	0.013m	1,139		
Other manufactured products	0.018m	1,591		
Paper products	0.010m	873		
Waste products and recycling	0.006m	557		
Water and sanitation	0.008m	701		
Total	**0.455m**	**41,396**		
Commissioning	**0.002m**	**152**	0.4%	
Grand total	**0.457m**	**41,548**		

Next steps

The cutting edge research contained in this report will only be of value if it is used for decision making. NHS organisations have an opportunity to quantify the scale of their procurement carbon footprint much more easily given this information. Combining procurement data with building energy use for different organisation types gives an indication of the relative scale of emissions in these areas.

Adding information about the travel carbon footprint would provide comparison with the NHS England pie chart showing building energy use, travel and procurement.

Organisations can use this information to quantify and estimate their carbon footprint. The organisation carbon footprint can be used to compare with peers, compare with a more detailed calculation and identify areas for action.

One recommendation flowing from this report is to produce a tool to estimate and quantify the carbon footprint for different types of NHS organisation based on operating expenditure, non-pay spend and level of activity.

Another recommendation is a tool for benchmarking carbon footprints for organisations based on activity levels.

Further research could build on this report for example more robust research into the footprint of patient care such as interventions and diagnostics. The NHS England carbon footprint could also be updated with the latest international expenditure and carbon intensity factors.

Appendix 1 - Method

The NHS England carbon footprint was originally estimated using top-down information on total expenditure on the health sector.

This report supplements the top-down data through the addition of bottom-up spend information. As this information is already provided at organisational level it can easily be divided into organisation type.

The process used to model the NHS England level information included a number of datasets from different sources to provide the best available estimate.

Spend on commissioned activity has been considered separately throughout this analysis to avoid double counting. Commissioning organisations should consider both spend on NHS providers and other goods and services in their carbon footprint.

Patient, visitor and staff travel have not been included in this report as there is no direct expenditure by NHS organisations in these areas. Business travel is included using expenditure estimates as well as building energy figures.

Carbon (or carbon dioxide equivalent) is being used here as an indicator of environmental impact. Although carbon does not capture all the impacts on human health it does give a quantifiable measure and indicates the relative impact of different activities.

Procurement spend data from NHS organisations

NHS Shared Business Services (NHS SBS) has the largest database of NHS spend in England and together with @UK can deliver carbon footprint reporting services ("GreenInsight") to trusts based on an analysis of this data. Goods and Services carbon footprints were produced for NHS organisations following the call for data from the NHS in 2011. The expenditure lines from this procurement data are allocated to e-class using the SpendInsight spend analysis system.

Carbon intensity factors on different economic sectors

E-class expenditure lines are combined with the carbon intensities provided by CenSA to estimate the carbon footprint of goods and services purchased by the NHS. This uses the same methodology as the Defra greenhouse gas reporting guidance[19] and the P4CR SCO_2PE tool[20] to produce organisation

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[19] Defra guidance on reporting greenhouse gas emissions. Available here: http://www.defra.gov.uk/environment/economy/business-efficiency/reporting/

[20] NHS SDU: Procuring for Carbon Reduction SCO_2PE tool. Available here: http://www.sdu.nhs.uk/corporate-requirements/interventions/procurement.aspx

level carbon footprints. In line with the GHG Protocol[21] the most detailed level of data available in the Defra factors[22] have been used. E-class data was used as this uses a greater level of detail in the calculations and gives a more accurate result than the Defra factors published here[23].

Multiplied up to NHS England level

The goods and services dataset included a proportion of spend for each NHS organisation type in England. These proportions were estimated using the number of organisations included as follows:

Type	Sample		NHS England	
	Number	Spend	Number scaled	Spend scaled
Acute	78	5,852m	147	16,722m
Ambulance	4	120m	11	681m
Mental Health	5	1,031m	54	2,334m
PCT and community	129	4,821m	149	18,986m
SHA	8	351m	10	648m
Specialist	4	118m	20	708m
Total	228	12,292m	382	40,078m

The model used to multiply to NHS England level used low multiplication factors and also adjusted for inflation. Given this combination it looks likely that the model creates an under estimate of greenhouse gas emissions. This under estimate has been used as it reconciles with the NHS England carbon footprint.

ERIC buildings data added

Building energy use carbon footprint should be estimated based on energy use data where available. The ERIC database[24] records energy use data and has been used to supplement the footprint information where available.

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[21] GHG Protocol: Corporate Value Chain (Scope 3) Accounting and Reporting Standard. Available here: http://www.ghgprotocol.org/standards/scope-3-standard

[22] GHG Protocol: Third party databases Defra. Available here: http://www.ghgprotocol.org/Third-Party-Databases/Defra

[23] Defra 2012 greenhouse gas conversion factors for company reporting. Available here: http://www.defra.gov.uk/publications/2012/05/30/pb13773-2012-ghg-conversion/

[24] The Health and Social Care Information Centre: Hospital Estates and Facilities Statistics (HEFS). Available here: http://www.hefs.ic.nhs.uk/

Carbon equivalents were used from the calculation by erpho[25] using a standard methodology.

Pharmaceuticals from GP prescriptions added

Pharmaceuticals expenditure in the dataset was identified as well below the £12.9b for NHS England[26]. The NHS England figure is assumed to be accurate with £8.8b spend in primary care on pharmaceuticals.

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[25] Erpho Carbon Indicator Energy Waste and Water. Available at: http://www.erpho.org.uk/viewResource.aspx?id=21509

[26] The Information Centre: Hospital Prescribing 2010. Available here: http://www.ic.nhs.uk/statistics-and-data-collections/primary-care/prescriptions/hospital-prescribing-england-2010

Appendix 2 – Non-pay spend categories

The following were included in non-pay spend for Trusts:

Category	Detail
Services from PCTs	Commissioning
Services from Other NHS Trusts	Commissioning
Services from Other NHS Bodies	Commissioning
Services from Foundation Trusts	Commissioning
Purchase of Healthcare from Non-NHS Bodies	Commissioning
Supplies and Services - Clinical	
Supplies and Services - General	
Consultancy Services	
Establishment	
Transport	
Premises	
Audit fees	
Other Auditors Remuneration	
Clinical Negligence	
Research and Development	
Education and Training	
Other	
Impairments of Receivables	
Inventories write offs	
Depreciation	
Amortisation	
Impairments and Reversals of Property, Plant and Equipment	
Impairments and Reversals of Intangible Assets	
Impairments and Reversals of Financial Assets	
Impairments and Reversals for Non Current Assets held for sale	

The following were included in non-pay spend for commissioning organisations:

Category	Detail
Total goods & services from other PCTs	Commissioning
Total goods & services from other bodies (excl. Foundation Trusts)	Commissioning
Goods and services from Foundation Trusts	Commissioning
Purchase of Healthcare from Non-NHS bodies	Commissioning
Social Care from Independent Providers	Commissioning
Non-GMS Services from GPs	Commissioning
Contractor Led GDS & PDS	Commissioning
Salaried Trust Led GDS & PDS	Commissioning
General Ophthalmic Services	Commissioning
Prescribing Costs	Pharmaceuticals
TOTAL NON-STAFF COSTS	

Appendix 3 – NHS England non-pay spend calculations

Calculations of spend based on local data - DH 2009/10

Row Labels	Operating expenses	Non-pay percent	Commissioning percent	Non-pay spend	Commissioning spend	Factor
Acute	44,992m	39%	2%	17,731.0m	809.1m	3.03
Ambulance	2,119m	33%	0%	699.7m	7.3m	5.84
Community Mental Health	8,291m	30%	14%	2,474.1m	1,147.3m	2.40
PCT	88,573m	13%	76%	11,856.7m	67,484.3m	2.46
SHA	5,691m	6%	88%	353.1m	5,018.2m	1.01
Specialist	1,807m	39%	10%	712.3m	172.4m	6.04
Grand Total	**151,472m**			**33,827m**	**74,639m**	

Source:

Department of Health: Local spend data

http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_119505

Using categories from Appendix 2

Appendix 4 – Non-pay spend and carbon footprint by category

Modelled data: Greenhouse Gas (GHG) and non-pay spend by organisation type and spend category.

kgCO2e Category	Acute		Ambulance		Mental Health		Primary Care and Community Services	
	GHG	£	GHG	£	GHG	£	GHG	£
Energy	2,564m	586m	44m	10m	322m	74m	439m	102m
Gas	1,166m	233m	15m	3m	150m	30m	174m	35m
Electricity	1,300m	334m	28m	7m	163m	42m	258m	66m
Oil	54.1m	10.6m	0.9m	0.2m	1.8m	0.4m	6.0m	1.3m
Coal	44.2m	8.6m	0.0m	0.0m	8.0m	1.6m	0.0m	0.0m
Procurement	7,323m	15,893m	205m	502m	867m	2,249m	6,607m	18,558m
Business services	883m	3,794m	30m	159m	169m	776m	596m	2,919m
Construction	706m	1,530m	22m	49m	28m	63m	297m	663m
Food and catering	434m	374m	12m	11m	33m	35m	197m	288m
Freight transport	71m	44m	4m	3m	16m	8m	88m	43m
Information and communication technologies	229m	484m	10m	22m	13m	29m	106m	231m
Manufactured fuels chemicals and gases	697m	418m	13m	9m	62m	39m	152m	121m
Medical Instruments /equipment	1,965m	4,283m	29m	64m	160m	349m	352m	767m
Other manufactured products	502m	693m	18m	25m	62m	79m	324m	438m
Other procurement	590m	1,814m	20m	67m	32m	107m	590m	2,253m
Paper products	392m	652m	10m	18m	35m	68m	302m	577m
Pharmaceuticals	555m	1,633m	23m	68m	232m	683m	3,455m	10,177m
Waste products and recycling	141m	75m	6m	3m	15m	8m	68m	38m
Water and sanitation	159m	98m	8m	4m	10m	5m	79m	44m
Travel	289m	243m	206m	168m	13m	12m	209m	325m
Total	10,176m	16,722m	455.4m	680.6m	1,203m	2,334m	7,254m	18,986m
Commissioning	186m	809m	2m	7m	263m	1,147m	15,476m	67,484m
Grand total	10,362m	17,531m	457.0m	687.9m	1,466m	3,482m	22,731m	86,470m

Greenhouse Gas (GHG) and non-pay spend by organisation type and spend category.

kgCO2e	SHA		Specialist		Total GHG	Total £
Category2	GHG10	£	GHG12	£		
Energy	3m	1m	124m	29m	3,497m	802m
Gas	1m	0m	50m	10m	1,557m	311m
Electricity	3m	1m	71m	18m	1,822m	468m
Oil	0.0m	0.0m	2.8m	0.6m	66m	13m
Coal	0.0m	0.0m	0.0m	0.0m	52m	10m
Procurement	229m	645m	289m	666m	15,520m	38,513m
Business services	33m	162m	41m	186m	1,751m	7,995m
Construction	5m	11m	10m	21m	1,068m	2,336m
Food and catering	11m	19m	14m	12m	701m	739m
Freight transport	5m	3m	2m	1m	186m	102m
Information and communication technologies	8m	22m	10m	26m	376m	813m
Manufactured fuels chemicals and gases	5m	3m	17m	11m	946m	600m
Medical Instruments /equipment	18m	39m	99m	216m	2,624m	5,718m
Other manufactured products	11m	14m	24m	36m	941m	1,285m
Other procurement	11m	48m	27m	83m	1,271m	4,373m
Paper products	13m	25m	16m	22m	767m	1,362m
Pharmaceuticals	100m	294m	15m	44m	4,380m	12,900m
Waste products and recycling	5m	2m	7m	4m	241m	131m
Water and sanitation	6m	3m	7m	5m	268m	160m
Travel	1m	2m	10m	13m	728m	763m
Total	234m	648m	422m	708m	19,745m	40,078m
Commissioning	1,151m	5,018m	40m	172m	17,117m	74,639m
Grand total	1,385m	5,666m	461m	880m		

Appendix 5 – References and sources

Procurement guidance

Procuring for Carbon Reduction (P4CR), NHS SDU

http://www.sdu.nhs.uk/corporate-requirements/interventions/procurement.aspx

NHS Procurement Standards, Department of Health

http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_134377

Procurement – A best practice procurement diagnostic, QIPP National Workstream, Department of Health

http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_124556

Government Buying Standards, Defra

http://sd.defra.gov.uk/advice/public/buying/products/

Carbon footprint guidance

Corporate Value Chain (Scope 3) Accounting and Reporting Standard, Greenhouse Gas (GHG) Protocol

http://www.ghgprotocol.org/standards/scope-3-standard

Guidance on reporting greenhouse gas emissions, Defra

http://www.defra.gov.uk/environment/economy/business-efficiency/reporting/

Data sources

Local spend data, Department of Health

http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_119505

More for Less 2009/10, Audit Commission (AC 2009/10)

http://www.audit-commission.gov.uk/SiteCollectionDocuments/AuditCommissionReports/NationalStudies/20101216moreforless200910.pdf

Prescriptions, Hospital Prescribing England 2010, The Health and Social Care Information Centre

http://www.ic.nhs.uk/statistics-and-data-collections/primary-care/prescriptions/hospital-prescribing-england-2010

Ambulance services England 2012, The Health and Social Care Information Centre

http://www.ic.nhs.uk/statistics-and-data-collections/audits-and-performance/ambulance/ambulance-services--england-2011-12

Hospital Episode Statistics (HES), The Health and Social Care Information Centre (IC HES IP (inpatient) and OP (outpatient))

http://www.ic.nhs.uk/statistics-and-data-collections/hospital-care/hospital-activity-hospital-episode-statistics--hes

Productivity of the National Health Service, Centre for Health Economics (CHE) Research Paper 76

http://www.york.ac.uk/che/publications/in-house/

Hospital Estates and Facilities Statistics (HEFS), The Health and Social Care Information Centre

http://www.hefs.ic.nhs.uk/

Population projections for England, Office for National Statistics (ONS)

http://www.ons.gov.uk/ons/rel/snpp/sub-national-population-projections/2010-based-projections/stb-2010-based-snpp.html

Greenhouse gas conversion factors for company reporting, Defra 2012

http://www.defra.gov.uk/publications/2012/05/30/pb13773-2012-ghg-conversion/

Third party databases (Defra), GHG Protocol

http://www.ghgprotocol.org/Third-Party-Databases/Defra

NHS England Carbon Emissions: Carbon Footprint Report, NHS SDU

http://www.sdu.nhs.uk/corporate-requirements/measuring-carbon-footprint/nhs-carbon-footprint.aspx

Carbon Indicator Energy Waste and Water, erpho

http://www.erpho.org.uk/viewResource.aspx?id=21509

Indicative carbon per unit of healthcare activity, erpho

http://www.erpho.org.uk/viewResource.aspx?id=20967