Sustainable Development Unit

Working across the NHS, Public Health and Social Care system

Carbon Footprint update for NHS in England 2012

- The carbon footprint of the NHS in England is 25 MtCO2e in 2012
- Updates include using the latest international carbon intensity factors
- Carbon relating to building energy use has increased by 0.9% since 2007
- Overall NHS forecast emissions meet the 10% reduction in 2015
- Climate Change Act target requires further reductions from current forecast

December 2013

Contents

Introduction

Since 2008 the move towards a more sustainable health system has been supported by the development of a carbon footprint for the NHS in England. A series of footprints have been published relating to 2004, 2007, 2010 and now for 2012[1]. This consumption carbon footprint includes emissions from building energy use; travel to and from sites; as well as goods and services purchased by the NHS. This hybrid approach covers scopes 1, 2 and 3 as identified by the GHG Protocol[2]. The best available methods have been used, including directly measured data where this is available and supplemented with average carbon intensities from an input-output model.

Every dataset has been updated based on the most recent Defra guidance[3] and these footprints form a useful understanding of both the scale and changes in emissions over time. To ensure changes to the footprint are represented accurately the whole time series has been updated.

The Climate Change Act 2008[4] target of an 80% reduction by 2050 has been compared with the time series from 1990 to 2025. A combination of backcasting and forecasting has been used for the detailed datasets. Carbon budget targets[5] have also been overlaid showing the scale of change required to meet the Climate Change Act 2008.

This report updates the NHS, in particular against the 10% by 2015. A broader carbon footprint for the NHS, public health and social care footprint will be published January 2014.

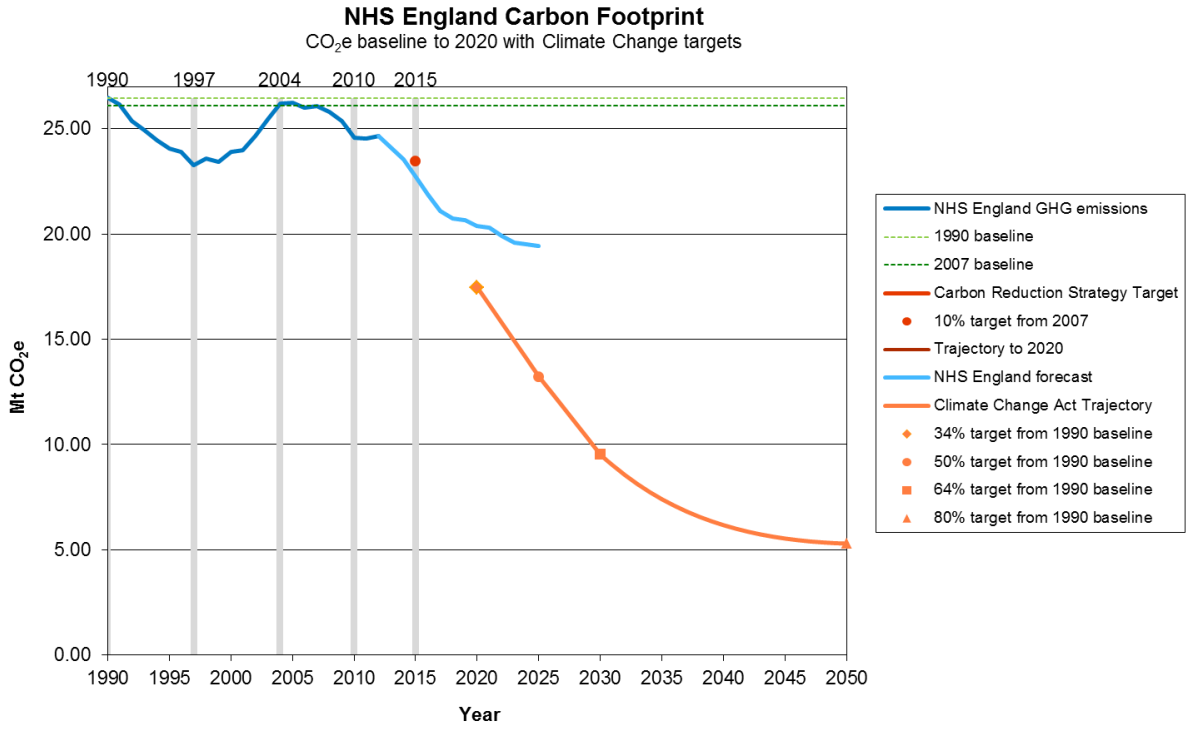
Consumption carbon footprint – includes embedded carbon emissions from goods and services as well as direct carbon emissions e.g. through burning fossil fuels.

Input-output –using an input-output model carbon intensities have been calculated using expenditure and carbon emissions from different economic sectors.

[1] Sustainable Development Unit NHS carbon footprint publications, available at: http://www.sdu.nhs.uk/corporate-requirements/measuring-carbon-footprint/nhs-carbon-footprint.aspx
[2] Greenhouse Gas Protocol accounting tool, available at: http://www.ghgprotocol.org/
[3] Defra reporting guidance, available at: https://www.gov.uk/measuring-and-reporting-environmental-impacts-guidance-for-businesses
[4] Climate Change Act 2008, available at: http://www.legislation.gov.uk/ukpga/2008/27/contents
[5] Carbon Budgets, available at: https://www.gov.uk/government/policies/reducing-the-uk-s-greenhouse-gas-emissions-by-80-by-2050/supporting-pages/carbon-budgets

NHS England footprint 2012 – summary

The carbon footprint of the NHS in England for 2012 is 25 $MtCO_2e$. The latest methods have been used in line with Defra's recommendations. Improvements in the method used for measurement mean this is higher than previous calculations (see Appendix 1 – Overview of major changes for the 2012 update for more information).



Between 2007 and 2012 there has been a 5.5% reduction in five years. Overall a further 4.5% reduction over the next three years will be needed to meet the 10% reduction by 2015. However it is worth noting that building energy use carbon footprint has increased by 0.9% since 2007 and will need concerted effort to reduce as patient activity is increasing. For direct emissions in the NHS to be in line with the Climate Change Act, building energy use emissions need to decrease by over 10% between 2012 and 2015.

The Climate Change Act targets applied to all scopes are more achievable than on previous forecasts and currently forecast to meet the 10% reduction in 2015. The main reasons are:

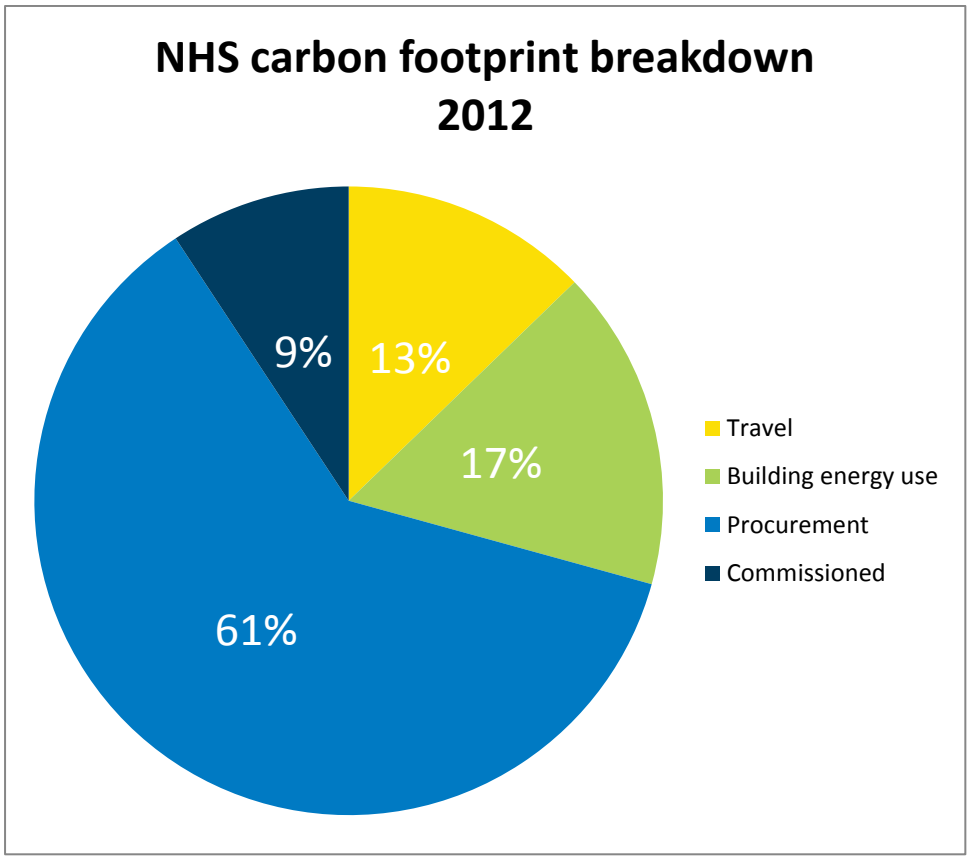
- A reduction in the forecast spend for the health service
- A reduction in the carbon intensity of goods and services we buy, as carbon intensities are mostly decreasing across the board

Further reductions will be required for the NHS to be in line with the Climate Change Act 2008 targets. The scale of change required to support this ambition is outlined in the Sustainable Development Strategy January 2014.

NHS breakdown – summary

Embedded carbon in goods and services bought by the NHS contributes 61% of the carbon footprint. Travel to and from NHS sites by patients, visitors, staff commuting and business travel contribute 13%. Heating, lighting and providing power for NHS sites contributes 17% of the carbon footprint. Health services commissioned from outside the NHS contributes a further 9%.

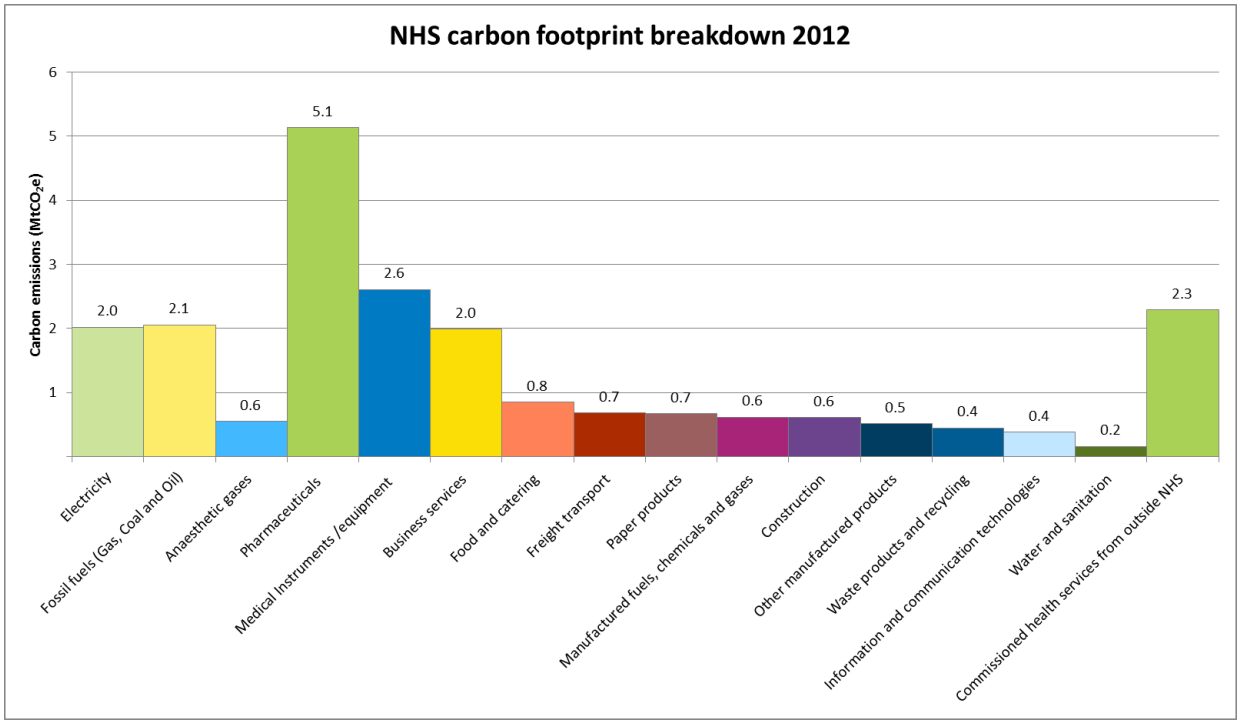
The updated chart includes outsourced healthcare services from outside the NHS. (See Appendix 1 – Overview of major changes for the 2012 update for more information.)



Category	2012 ($MtCO_2e$)	%
Travel	3.15	13%
Building energy use	4.07	17%
Procurement	15.16	61%
Commissioned	2.29	9%

A more detailed breakdown is presented overleaf:

NHS breakdown – detail



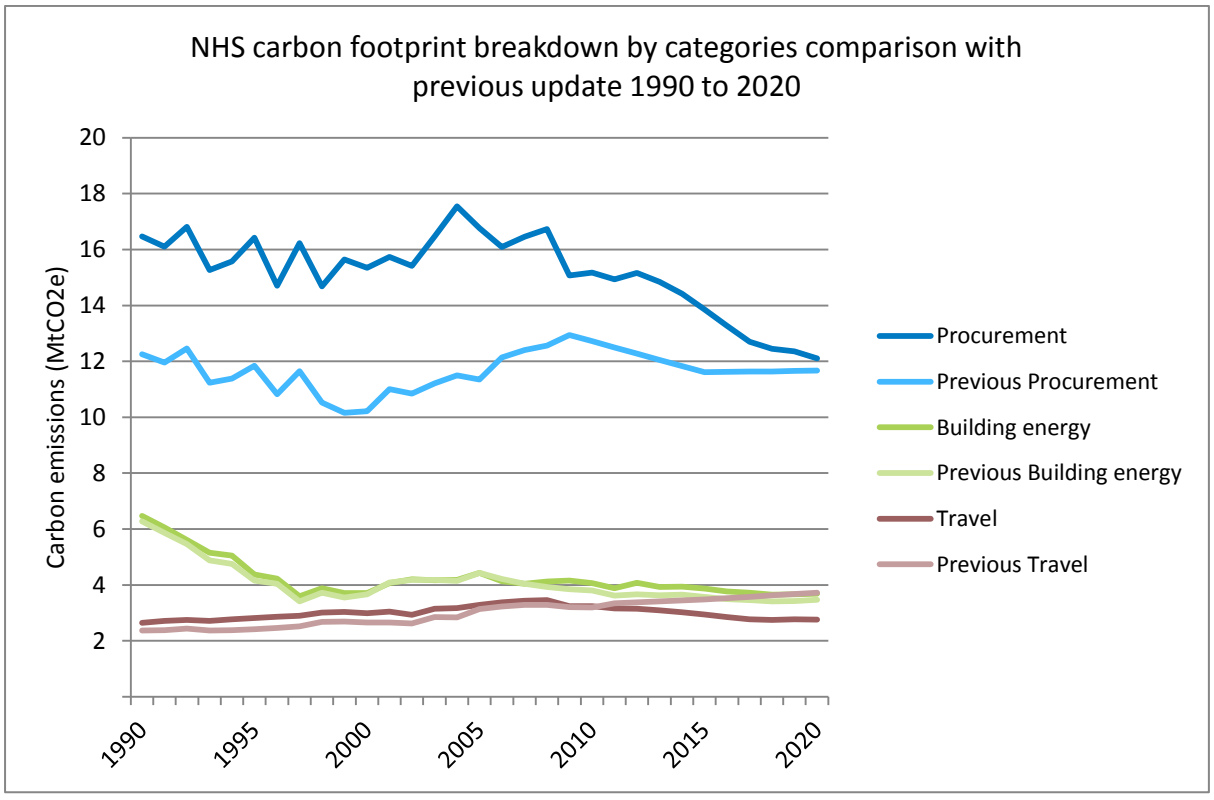
Category	Carbon emissions breakdown	2012 ($MtCO_2e$)	%
Building energy use and direct emissions	Electricity	2.0	8%
	Fossil fuels (Gas, Coal and Oil)	2.1	8%
	Anaesthetic gases	0.6	2%
Travel	Patient	1.4	6%
	Visitor	0.4	2%
	Staff commute	0.6	2%
	Business	0.8	3%
Procurement of goods and services	Pharmaceuticals	5.1	21%
	Medical Instruments /equipment	2.6	11%
	Business services	2.0	8%
	Food and catering	0.8	3%
	Freight transport	0.7	3%
	Paper products	0.7	3%
	Manufactured fuels, chemicals and gases	0.6	3%
	Construction	0.6	2%
	Other manufactured products	0.5	2%
	Waste products and recycling	0.4	2%
	Information and communication technologies	0.4	2%
	Water and sanitation	0.2	1%
Commissioned health services	Commissioned health services from outside NHS	2.3	9%
	Total	**24.7**	

Appendix 1 – Overview of major changes for the 2012 update

To maintain alignment with the latest methods and information available a number of changes have been included in the 2012 update:

Update	**2012 ($MtCO_2e$)**	**%**
Healthcare services commissioned from outside the NHS are now included	2.3	9%
Carbon intensity factors for goods and services updated	0.9	4%
Meter Dose Inhalers (MDIs) now included	1.4	6%
Anaesthetic gases now included	0.6	2%
Total	5.2	21%

An overview of the change to the carbon footprint breakdown follows at the end of this appendix. All four of these changes impact on the procurement emissions. Smaller updates to both travel and buildings include the two latest years.

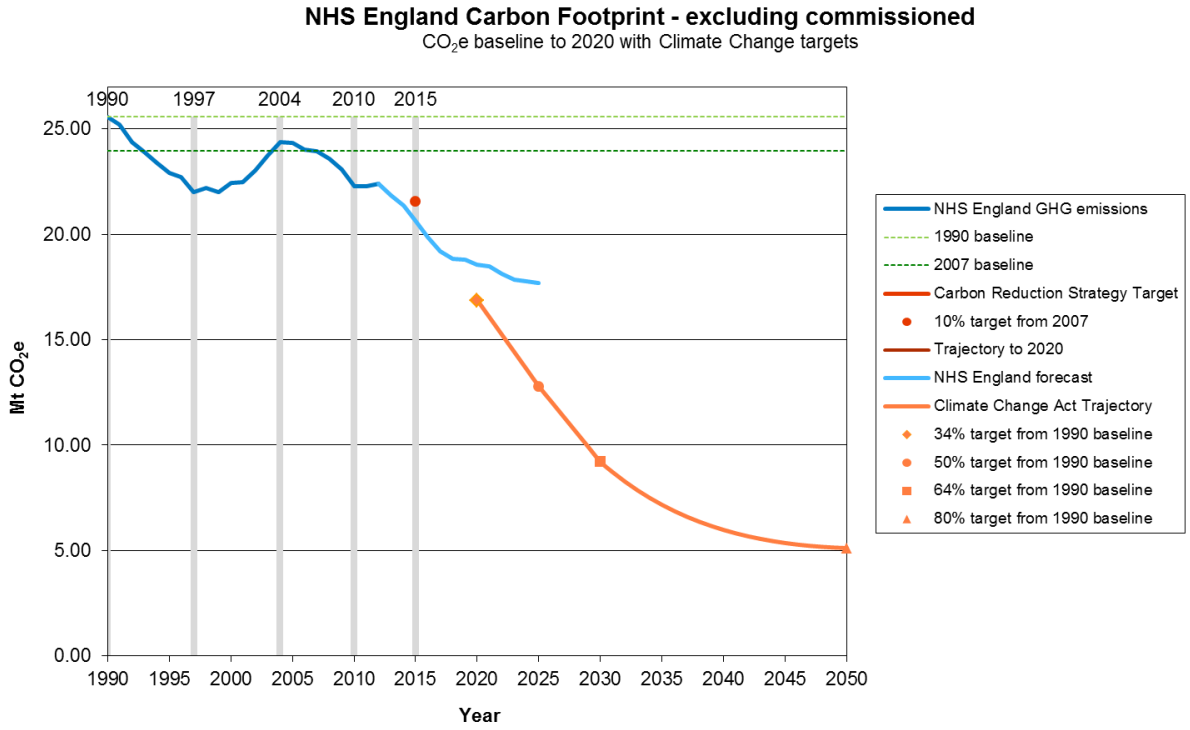


Outsourced healthcare services

The updated chart includes outsourced healthcare services from outside the NHS. These were previously excluded to avoid the possibility of double counting. Greater clarity about services commissioned from outside the NHS means these can be included without the risk of duplication.

Health services commissioned from outside the NHS are now included and contribute 2.3 $MtCO_2e$ (9%) in 2012.

For consistency, the chart below shows the same scope as previous NHS England carbon footprints updated to 2012 and with a revised forecast to 2025.



Carbon intensity factors for goods and services

For the first time the procurement update includes the carbon intensity from a four region model (UK, EU, China and rest of world). Previously input-output model used UK carbon intensities because international carbon intensities were not available. Using a four region model provides a greater level of accuracy and is in line with the Defra UK carbon footprint[6].

Overall the update of expenditure and carbon intensity gives a higher carbon footprint by 4%. See

[6] UK Consumption Emissions by Sector & Origin - EV0466, Defra, 2011. Available at: http://randd.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&ProjectID=17718

Appendix 2 – International breakdown for analysis of the carbon footprint for the four regions.

Meter Dose Inhalers (MDIs)

Metered Dose Inhalers use Hydrofluorocarbons gases (HFC-134a and HFC-227ea) as aerosol propellants. Both the gases used have over 1000 times the impact on global warming compared with the same weight of carbon dioxide gas. The majority of the emissions are released during the 'in use' phase and occurs mostly outside NHS premises and were not previously included. The UK reports emissions of 1.6 $MtCO_2e$ in 2011 from meter dose inhalers[7].

England emissions of have been estimated using population for UK and England of 1.4 $MtCO_2e$ (6% in 2012). These emissions from use at home have now been included in the NHS carbon footprint because the type of prescription can significantly influence this.

Anaesthetic gases

Anaesthetic gases are potent greenhouse gases with between 130 to 2000 times the impact on global warming compared with the same weight of carbon dioxide gas. The scale of these emissions has been estimated for the first time[8] and has been included in the NHS carbon footprint for England.

This represents an additional 2% (0.6 $MtCO_2e$ for 2012) from anaesthetic gases including Nitrous Oxide.

[7] UK Meter Dose Inhaler emissions reporting category 2F4. Available at: http://naei.defra.gov.uk/data/data-selector

[8] Sustainable Development Unit, Carbon Footprint from anaesthetic gas use, 2013. Available at: http://www.sduhealth.org.uk/news-events/news/245/Carbon-Footprint-from-Anaesthetic-gas-use/

Appendix 2 – International breakdown

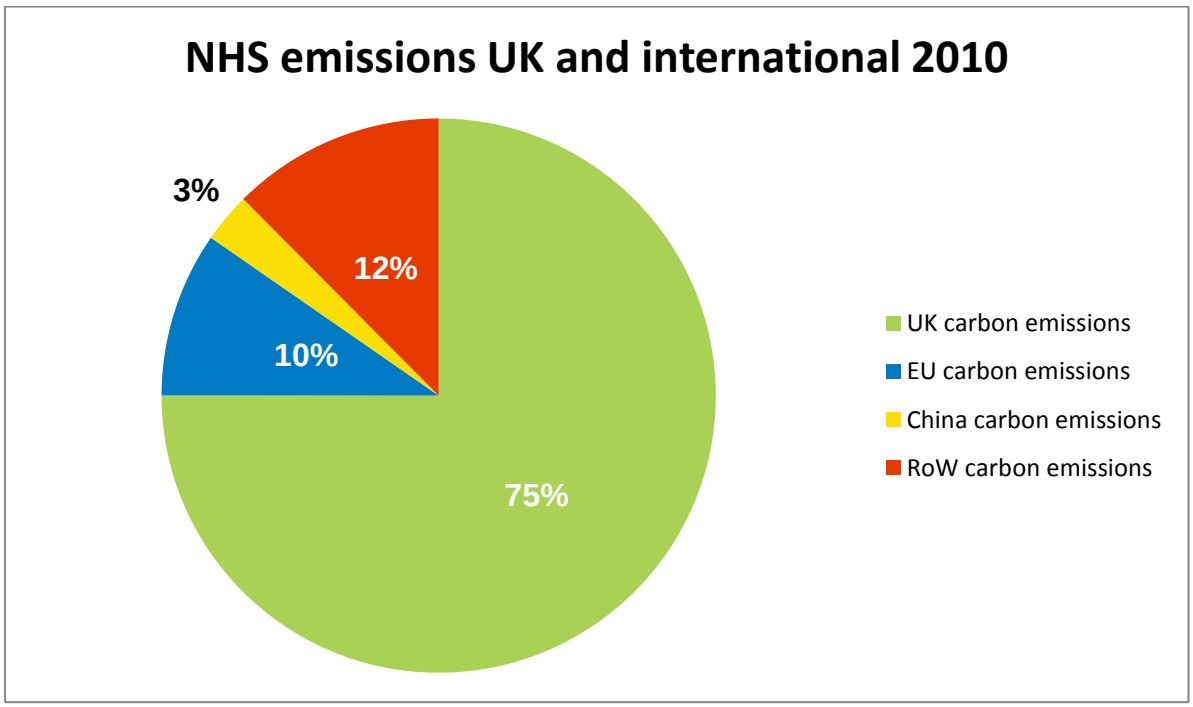
The consumption carbon footprint for the NHS in England includes emissions taking place in the UK as well as the embedded emissions in goods and services sourced internationally. As the latest update uses a four region model (in line with Defra) and gives the breakdown of emissions into the four international areas: UK, EU, China and Rest of World (RoW). The NHS international carbon footprint breakdown is available here for the first time. The latest international dataset is from 2010 so this is the basis of this analysis.

Goods and services are purchased by the NHS from abroad while buildings and travel take place in the UK. Both the procurement of goods and services and the full carbon footprint (including buildings and travel) are included here to show the scale of each.

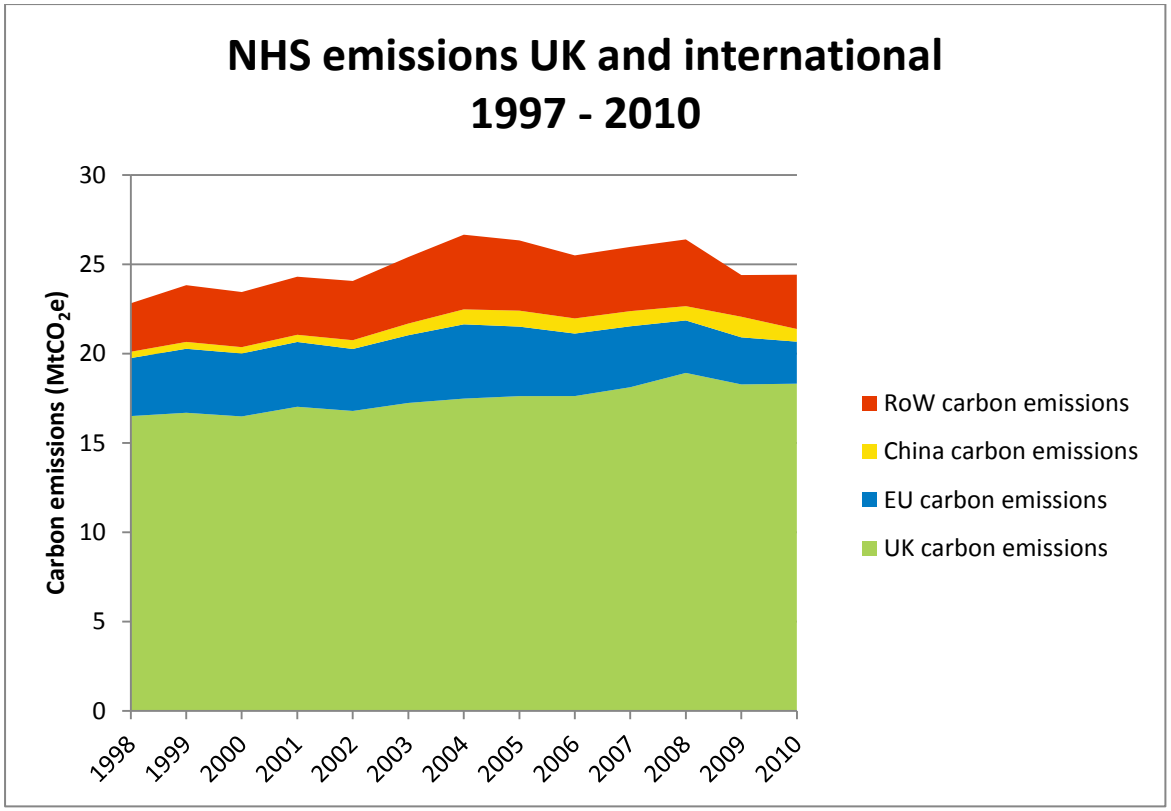
Both expenditure and carbon emissions international breakdown are given here to show the impact of both levels of spend and carbon intensity.

NHS total emissions international breakdown

The total consumption carbon footprint has been broken down into emissions that occur in the UK and into 3 other world regions: EU, China and Rest of World (RoW). Embedded emissions from goods and services bought by the NHS can occur in UK or internationally. The analysis includes procurement (including meter dose inhalers and anaesthetic gases), travel and building energy use meaning a greater proportion is UK emissions compared with the procurement analysis. Including all the emissions shows that 75% of NHS emissions are in the UK. The chart below shows NHS emissions, highlighting the region where the emissions occur.

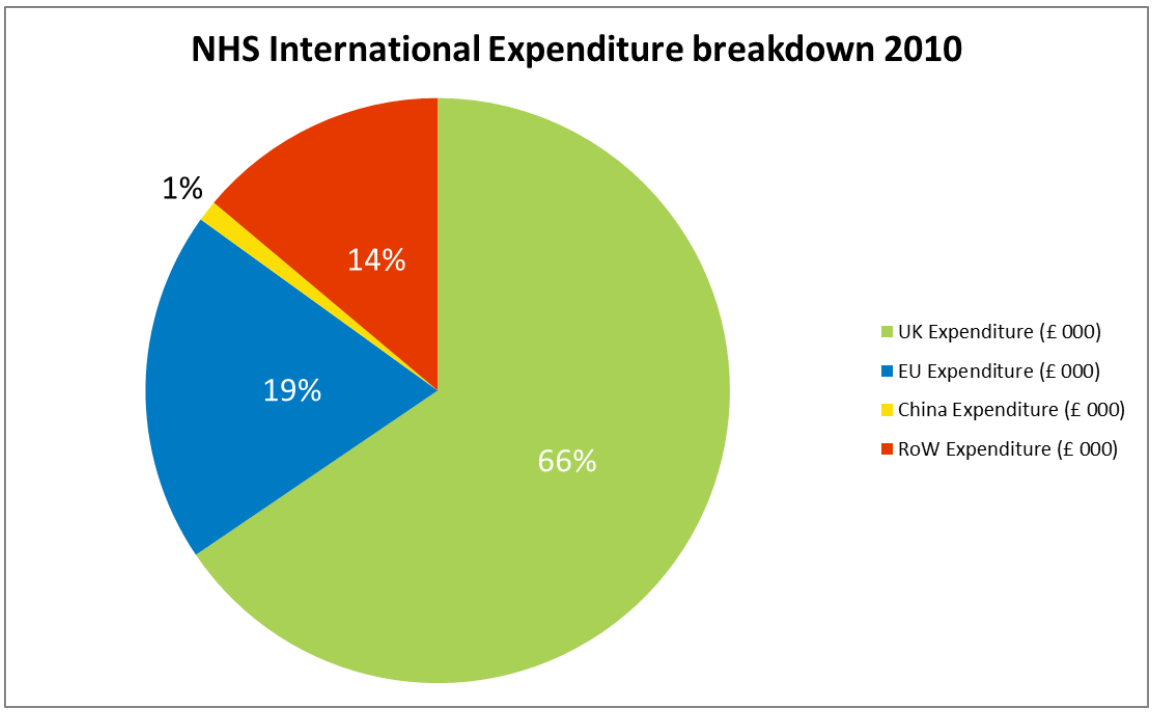


Since 1990 emissions in the UK have risen although the proportion in the UK has remained relatively constant (72% in 1990).

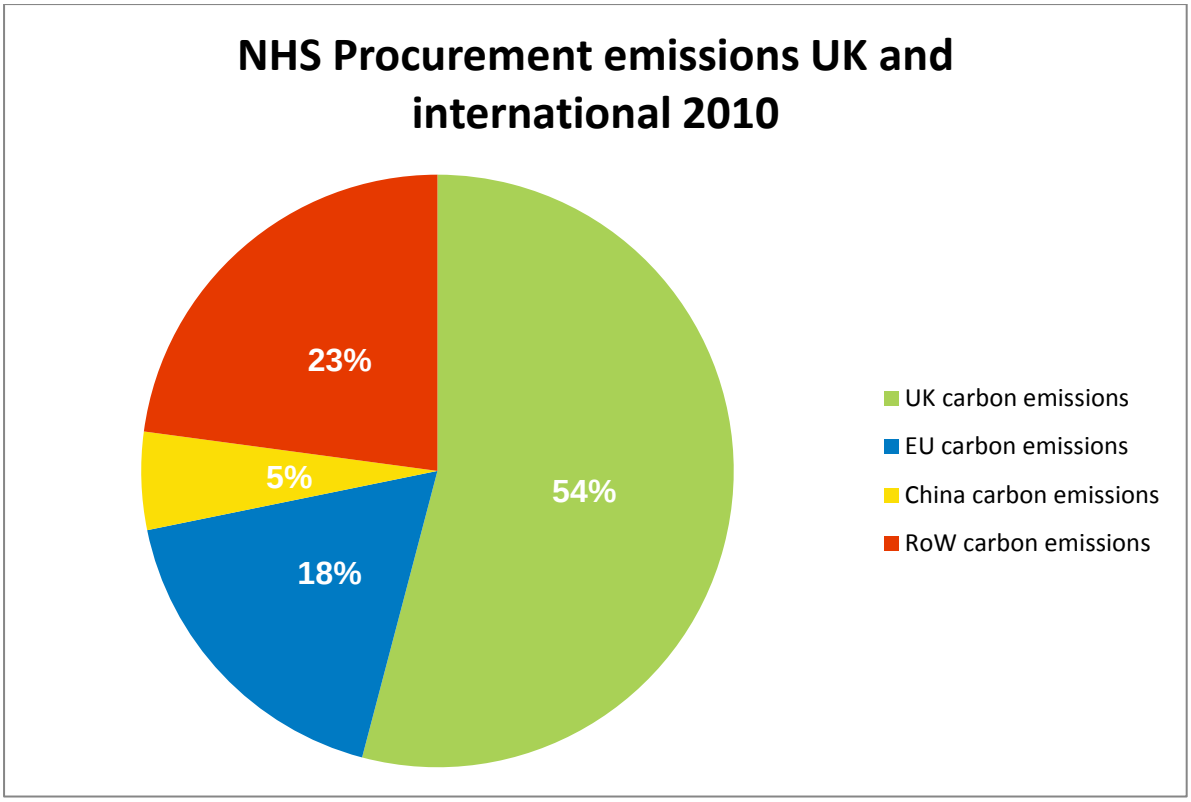


NHS Procurement international breakdown

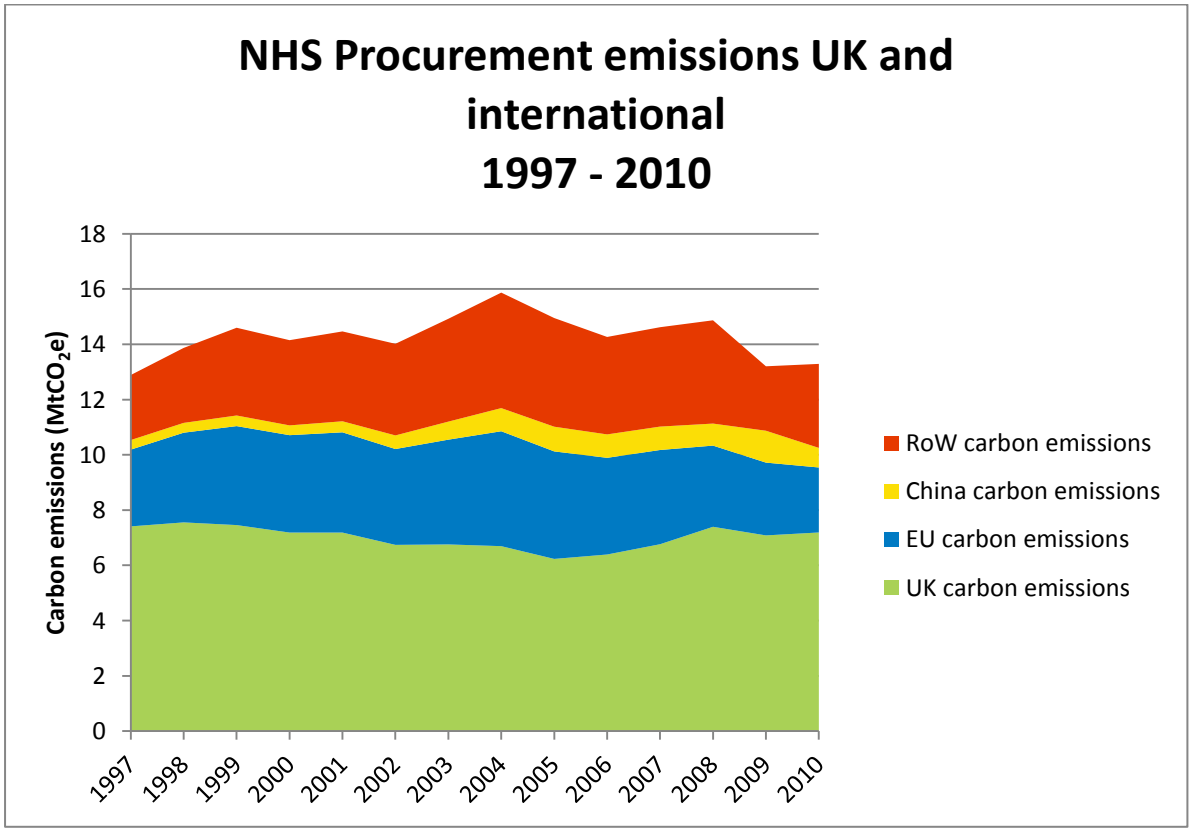
Expenditure by the NHS in England on goods and services in the four regions is given below, showing that the majority of expenditure (66%) is on goods and services provided from here in the UK.



Carbon emissions from goods and services bought by the NHS in England shows that 54% of emission are in the UK. Embedded carbon emissions occur during manufacture or in providing goods and services. Meter dose inhalers, anaesthetic gases, travel and building energy use are not included in this breakdown.



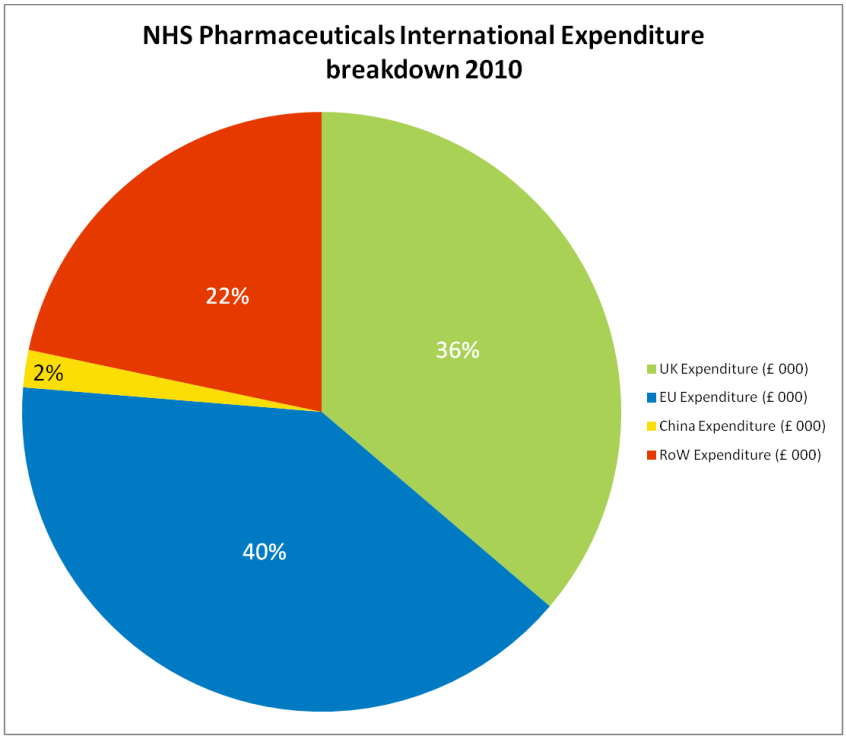
72% of emissions from procurement occur in the UK and EU.



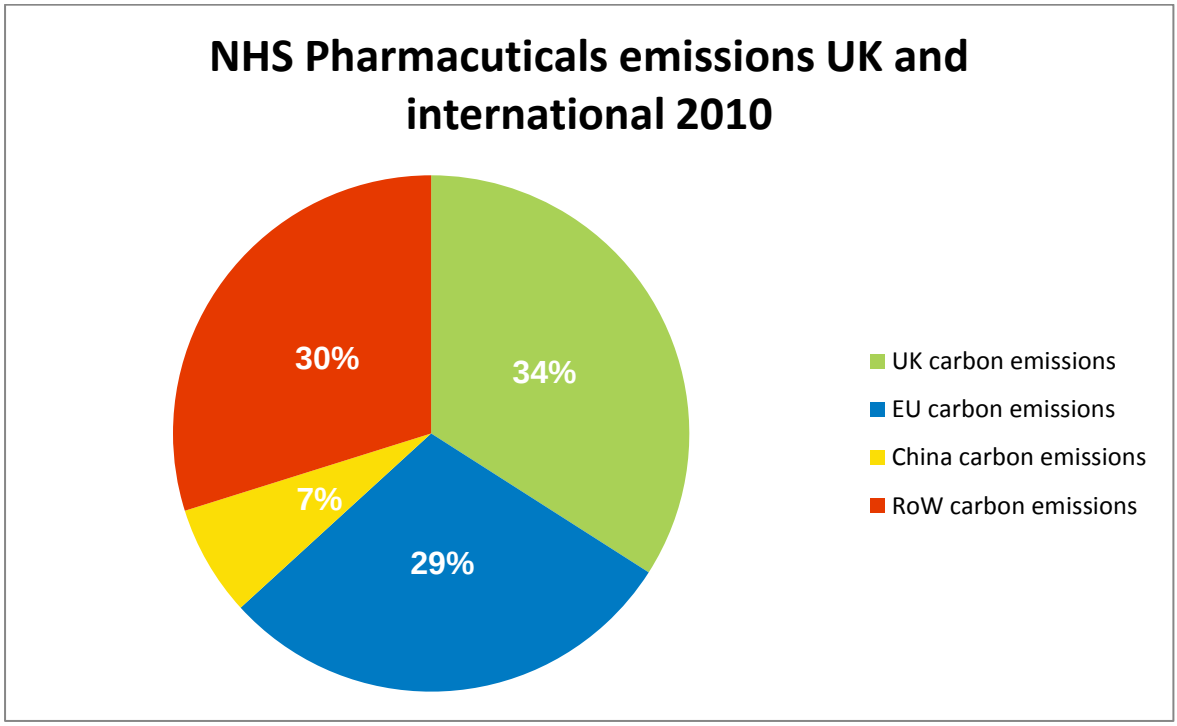
UK procurement emissions have been relatively stable 1997 to 2010. Emissions outside the UK increased to a peak in 2004 and have decreased steadily since but still remain above 1997 levels.

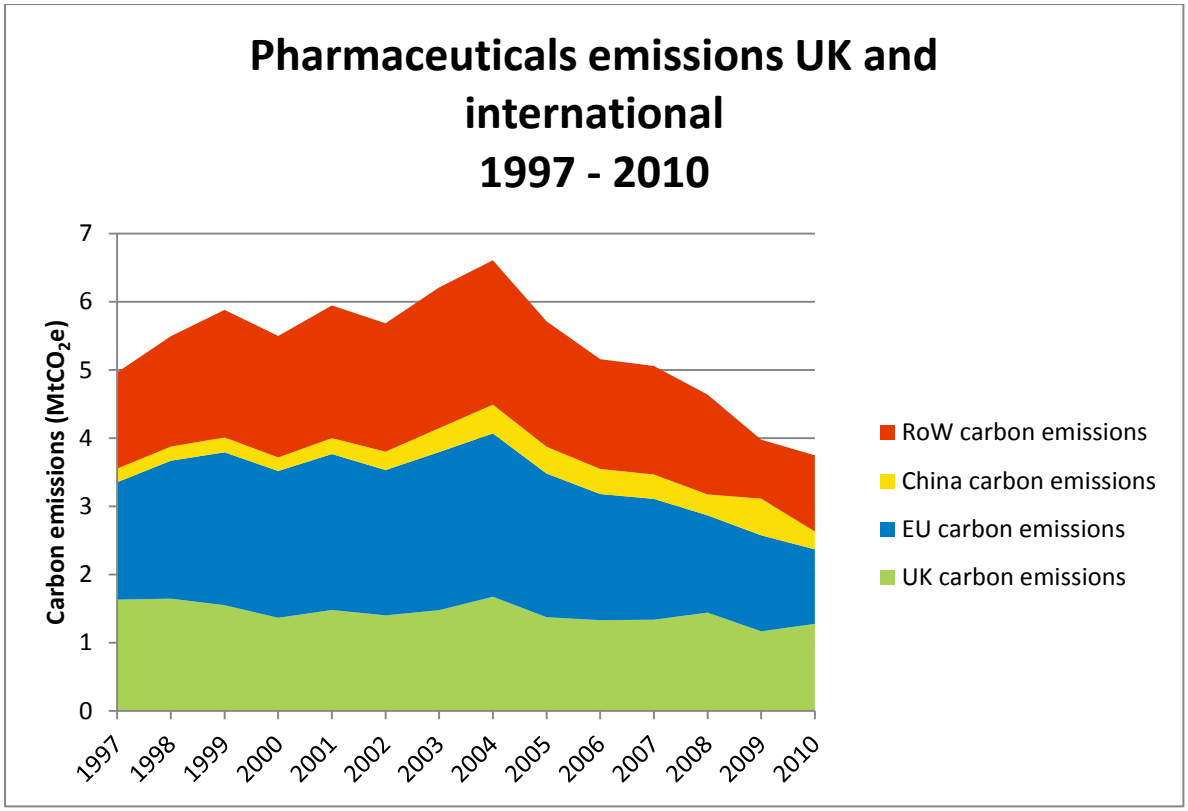
NHS Procurement of Pharmaceuticals international breakdown

Pharmaceuticals carbon footprint is 23% of the NHS in England. The expenditure breakdown shows 36% in the UK and 40% in the EU.

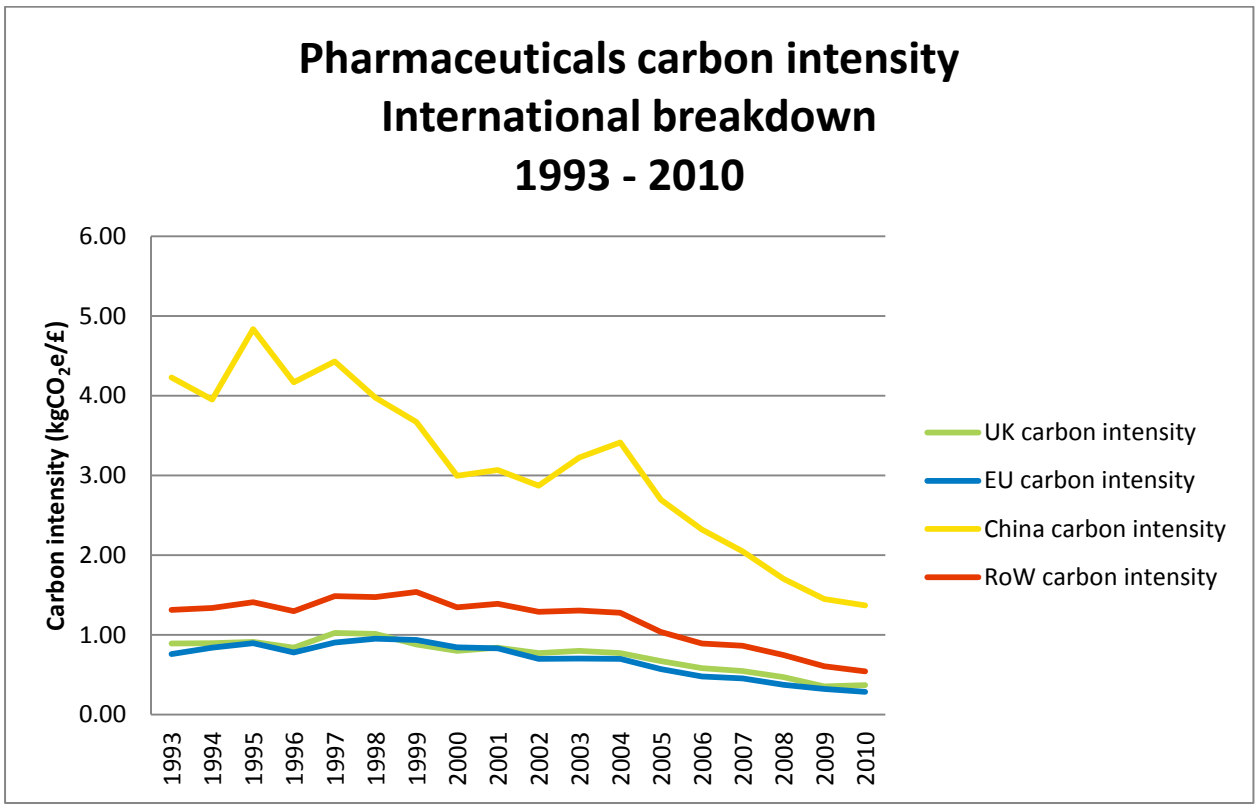


The embedded carbon for manufacture of pharmaceuticals gives the following breakdown:





Improved carbon efficiency in the EU is reflected in the emissions factors decreasing between 2004 and 2010. This improved carbon efficiency means EU emissions are lower than UK and ROW. Carbon emissions for China are 7% of pharmaceuticals emissions but only 2% of spend.



Appendix 3 – Technical details of other changes

Spend prediction changes

The following datasets have been used for NHS spend:

- HM Treasury PESA actual spend figures have been used 1990/91 to 2010/11[9]
- HM Treasury PESA plan spend figures 2011/12 to 2014/15[1]
- Flat proportion of GDP assumption 2015/16 to 2017/18
- Office for Budgetary Responsibility proportion of GDP assumptions 2018/19 to 2020/21[10]

Expenditure on pharmaceuticals is broadly in line with the predictions by the Office for Health Economics Research Paper 13/02 here http://www.ohe.org/publications/article/projecting-expenditure-on-medicines-in-the-nhs-128.cfm

The scope of expenditure has been improved to include commissioned activity. In 2010 around £7.7m of public money was spent by 'Human Health' sector on the 'Human Health' sector. Previously this spend was excluded to ensure there was no double counting of the emissions. This decision has been reviewed and this expenditure and associated carbon footprint is additional commissioned activity outside the public sector and is based on public money.

Carbon intensities changes

The dataset used for calculating procurement has been updated significantly by Defra based on internationally available datasets which are used to calculate the input-output model. The changes are as follows:

- Four world regions rather than UK only carbon intensities
- Human health coded separately
- Forecast update based on carbon intensities

Four world regions

Data is now available for carbon intensity for the UK, EU, China and Rest of World (RoW). This has changed the level of detail of the model. The following section on pharmaceuticals carbon intensity looks in detail at this change for this important area of spend for the NHS.

Human health coding

The Standard Industrial Classification (SIC) codes[11] are used in the input-output model to produce the carbon intensities. The classification of Human Health has changed between the 2004 and 2007 standards. ONS provide the following description of the change:

"More detail has been added under section Q (Human health and social work activities), creating three divisions instead of one, as in the previous version of SIC. In addition, the focus has been narrowed and includes only human health activities, providing a better tool for measuring this

[9] HM Treasury PESA, Table 1.8 Total Departmental Expenditure Limits (1), 2007-08 to 2014-15, 2012. Available at: https://www.gov.uk/government/publications/public-expenditure-statistical-analyses-2012
[10] Office for Budgetary Responsibility, Fiscal Sustainability Report, Chart B.7 (FSR-2012 Tables and Charts), 2013. Available at: http://budgetresponsibility.independent.gov.uk/data/
[11] ONS, UK Standard Industrial Classification 2007. Available at: http://www.ons.gov.uk/ons/guide-method/classifications/current-standard-classifications/standard-industrial-classification/index.html

important part of the economy. As a result, veterinary activities have been removed from this section and put in a division in section M (Professional, scientific and technical activities)."

This change has resulted in improved data used in the model and small changes in the carbon emissions.

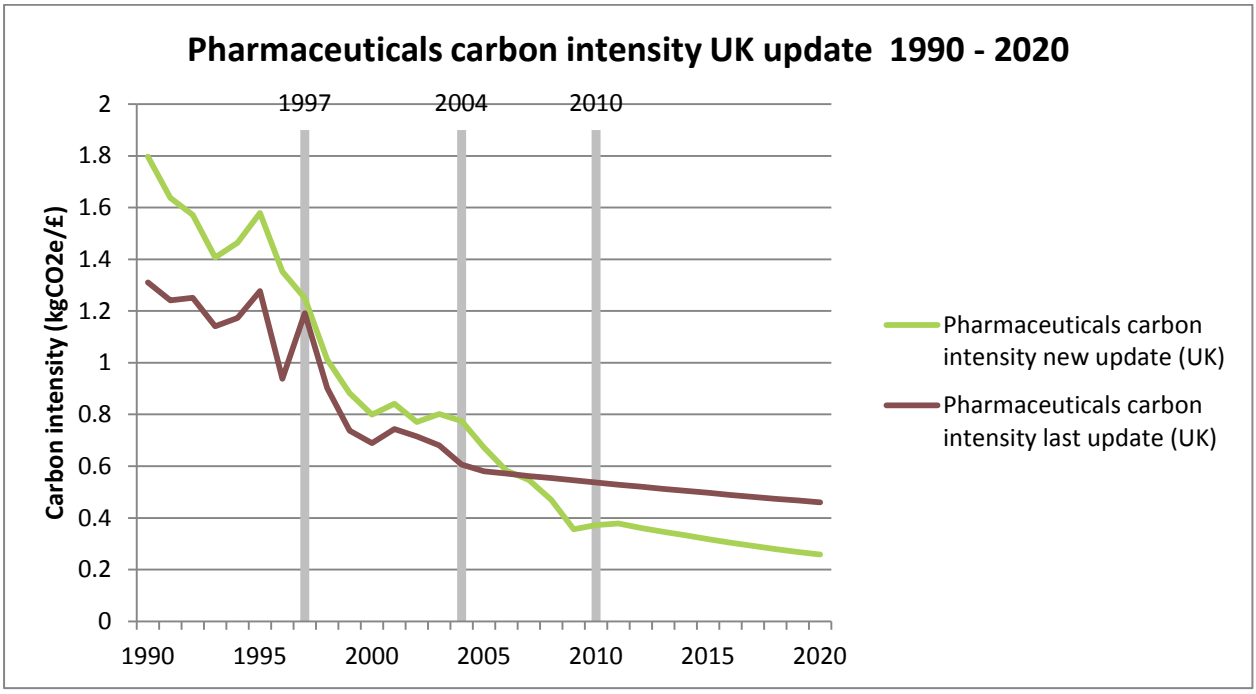
Forecast update

The forecast for a decrease in carbon emissions between 2012 and 2017 based on a combination of the spending review expenditure forecast reduction and a continuation of decreasing carbon intensities over the period 2004 to 2010.

Pharmaceuticals carbon intensity change

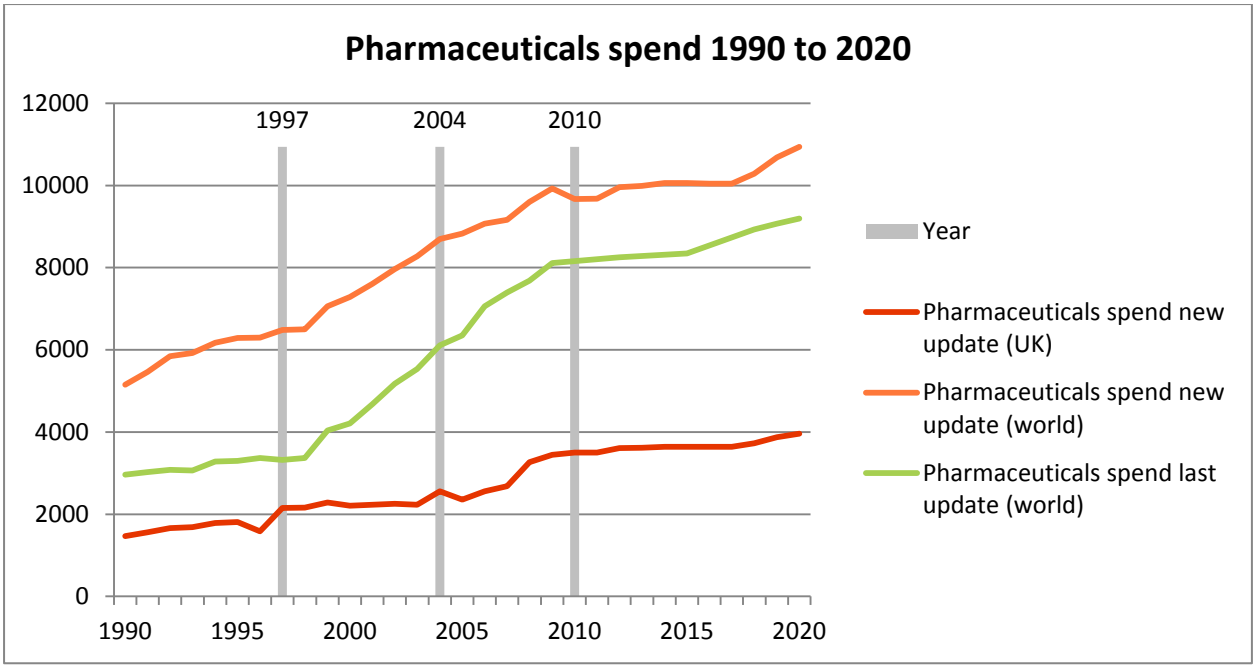
More detailed information is provided here in the change to pharmaceuticals carbon intensity following the update to a four region model (UK, EU, China and rest of world). The update is in line with the Defra UK carbon footprint and breakdown by sector and world region[12]. Considering all 4 regions the carbon intensity has changed in two ways. Firstly the overall carbon emissions from pharmaceuticals have increased over the whole period. Secondly the trend in both carbon intensity and spend between 2004 and 2010 is downward compared to the previous prediction.

The following chart shows the carbon intensity of UK production of pharmaceuticals. Between 2004 and 2010 the previous update assumed a similar gradient to 1998 and 2003.



Adjusted for national inflation, spend on pharmaceuticals has increased steadily over the period 1990 to 2010.

[12] UK Consumption Emissions by Sector & Origin - EV0466, Defra, 2011. Available at: http://randd.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&ProjectID=17718


Pharmaceuticals spend 1990 to 2020
12000
10000
8000
6000
4000
2000
0
1997
2004
2010
1990
1995
2000
2005
2010
2015
2020
Year
Pharmaceuticals spend new update (UK)
Pharmaceuticals spend new update (world)
Pharmaceuticals spend last update (world)

Appendix 4 – Glossary

Carbon footprint – carbon emissions, carbon and carbon footprint have been used interchangeably in this document to mean the carbon dioxide equivalent greenhouse gas emissions. The carbon dioxide equivalent greenhouse gas emissions is a standard measure of the impact of various activities on climate change.

Carbon intensity – carbon dioxide equivalent emissions per pound spent for an economic sector

Consumption carbon footprint – includes direct carbon emissions e.g. through burning fossil fuels as well as embedded carbon emissions from goods and services bought.

Defra – Department of Environment, Food and Rural Affairs produces the UK consumption carbon footprint and guidance on carbon footprinting.

Embedded – embedded carbon emissions is a term used for the carbon emissions generated from the manufacture, transport and provision of services and in this case includes all goods and services bought by the NHS.

Input-output – carbon intensities have been calculated using an input-output model. This uses expenditure and carbon emissions from different economic sectors (using SIC codes) to calculate the embedded carbon emissions in purchased goods and services for each economic sector.

MDI – Meter Dose Inhaler used for the treatment of asthma and Chronic obstructive pulmonary disease (COPD).

Procurement – in this document this is referring to goods and services purchased by the NHS.

RoW – rest of world: the carbon intensity input-output model uses four world regions: UK, EU, China and RoW.

SIC – Standard Industrial Classification: The Office for National Statistics (ONS) publish the SIC codes to classify economic sectors.

Travel – movement of people to and from NHS sites including patients, visitors, staff commute and business travel

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