Reducing the use of natural resources in health and social care

2018 report

- Health and social care carbon footprint - down by 18.5% at 27.12MtCO$_2$e
- Global first water footprint - 2.2bn m^3 down 21% since 2010
- Baseline NHS impact on air pollution - 9.5bn road miles, 7,285t NO$_x$ & 330t PM$_{2.5}$
- 85% of NHS provider waste is channelled away from directly going to landfill
- Targeted actions can yield progress across multiple finite natural resources

Contents

Executive summary

The NHS constitution states that the NHS is 'committed to providing the most effective, fair and sustainable use of finite resources'[1]. This report summarises the footprint of the health, public health and social care system across four key impacts: water, waste, air pollution and carbon equivalent emissions[2].

This information enables the Sustainable Development Unit (SDU) and the wider health system to efficiently target activities to reduce environmental impacts. This in turn can improve health, save money and help develop a sustainable health and care system. The final sections of this document identify some targeted actions that can deliver integrated natural resource savings against all four areas of impact. The table below summarises the estimated impacts in 2017 and the progress so far.

Table 1. Summary of progress

	Carbon emissions	Water	Air Pollution (NHS only)		Waste (NHS providers only)	
Unit	Million tonnes CO_2e	Billion m^3	Tonnes NO_x	Tonnes $PM_{2.5}$	Tonnes	Tonnes directly to landfill
2017	27.1	2.23	7,286	333	589,000	55,500
Baseline	33.3 (2007)	2.83 (2010)	New 2017 baseline		New 2016/17 baseline	
% change	-18.5%	-21%				

Carbon footprint

Since 2007 the health and social care (HSC) carbon footprint has reduced by 18.5%, which equates in scale to the annual emissions from a small country such as Mauritius or Cyprus[3]. The HSC carbon footprint in 2017 was 27.1 Mega tonnes (Mt) CO_2e, representing around 6.3% of the carbon footprint of England[4]. This reduction represents significant progress against the Climate Change Act (CCA, 2008) national targets[5] and contributes to several of the United Nations' Sustainable Development Goals (UN SDGs), especially SDG 13 'Climate Action'. Reductions have accelerated in the last three years against a backdrop of increased clinical activity. Some indicators of NHS clinical activity are up by 27.5% over the last 10 years[6]. This progress in carbon reduction against increasing service delivery is a testament to the consistent and committed work of staff across the system. However, faster and more determined progress is required to keep on track to meet the future Climate Change Act targets.

Water

This report constitutes a **global first** national health and care system water footprint, looking at both direct water used in health and care delivery and 'virtual' water used in the manufacture and supply of the goods and services purchased. Water is an increasingly constrained resource, impacted by both human demand and climate change. There is pressure on water supplies both in the UK and globally. Water footprints help to identify and target the largest areas of water use to support reduction in a similar way to carbon footprinting. The inclusion of a water footprint as part of the process is the first step towards building a better understanding of the opportunities to reduce the demands that the HSC system places on limited natural resources. This particularly supports UN

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[1] NHS Constitution for England, Principle 6 https://www.gov.uk/government/publications/the-nhs-constitution-for-england/the-nhs-constitution-for-england
[2] For the remainder of the document carbon equivalent emissions ,CO_2e or GHG will be referred to as carbon emissions – (see glossary for full definition)
[3] CAIT database http://www.wri.org/resources/data-sets/cait-historical-emissions-data-countries-us-states-unfccc
[4] UK Emissions per capita for England http://www.wri.org/resources/data-sets/cait-historical-emissions-data-countries-us-states-unfccc
[5] Sustainable Development Strategy 2014-2020 https://www.sduhealth.org.uk/policy-strategy/engagement-resources.aspx
[6] NHS Digital HES https://digital.nhs.uk/data-and-information/data-tools-and-services/data-services/hospital-episode-statistics

SDGs 6 and 9 'Clean Water and Sanitation' and 'Responsible Consumption and Production'. In 2017 the HSC total water footprint was estimated at over 2.23bn m^3, which is a 21% reduction on the 2010 levels - the same water volume as 243,000 Olympic swimming pools. Direct water use places demands on local infrastructure and ecosystems. However, much of the HSC water footprint comes from the manufacture and supply of goods and services procured by the sector-particularly in areas such as pharmaceutical manufacture and food supply.

Air pollution

Health and care related travel constitutes around 5% of all road travel in England each year. The NHS related travel has been more robustly quantified at 9.5bn miles in 2017. This equated to nearly 3.5% of all road travel in England, resulting in around 7,285 tonnes of nitrogen oxide (NO$_x$) and 330 tonnes of particulates (specifically PM$_{2.5}$). An economic impact figure of £345m has been estimated for the potential mortality effects and costs to society of air pollution from NHS related travel[7]. The largest sources of pollution relates to patient travel and staff commuting. Care design can be further improved to reduce to air pollution, through avoiding travel and using low pollution modes of travel. The Chief Medical Officer's 2017 report highlighted air pollution and the potential for improvements in health related travel as a focal point of the report[8] . As of 2017 the SDU Health Outcomes of Travel Tool has been available to help NHS organisations calculate, understand, and subsequently manage their own local impacts. Managing air pollution contributes to UN SDGs 3 'Good Health & Wellbeing', 11 'Sustainable Cities & Communities' and 13 'Climate Action'.

Waste

NHS providers in 2016/17 generated nearly 590,000 tonnes of waste, 85% of which avoided going directly to landfill and 23% of which was recycled. The vast majority of NHS waste is now either incinerated or used for energy generation. Sustainable use of resources and effective waste management will be a key area for the NHS in years to come. The NHS supports the national drive to reduce plastic waste and the effect it has on our oceans. Work in this area contributes mainly to UN SDG 9 'Responsible Consumption and Production' and, through plastics, UN SDG 14 'Life under Water'.

Conclusion

Set against a backdrop of increased clinical activity and during a period of transformation, the NHS, public health and social care system has demonstrated significant progress by:

- Reducing carbon emissions by 18.5% between 2007 and 2017
- Reducing the water footprint by 21% between 2010 and 2017
- Ensuring 85% of waste is avoiding going directly to landfill[9]

Public demand and staff support for the sustainable use of resources are high. 92% of the public[10] and 93% of staff[11] expect the health and social care system to operate in a sustainable manner by, for example, improving resource efficiency, reducing carbon emissions and reducing waste.
This report is testament to the progress made so far and a call to encourage further reductions and progress.

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[7] Calculations made using the SDU HOTT – based on current DEFRA damage costs, where are in the process of being revised and are expected to reduce the overall financial impact of air pollution per tonne.

[8] Chief Medical Officer Professor Dame Sally Davis, Annual Report of the Chief Medical Officer 2017 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/690846/CMO_Annual_Report_2017 _Health_Impacts_of_All_Pollution_what_do_we_know.pdf

[9] NHS provider waste only – data from all departments covered by Greening Government Commitments shows "Government departments diverted 87% of waste from landfill in 2016 to 2017" https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/679636/ggc-annual-report-2016-17.pdf

[10] SDU Ipsos MORI 2015 https://www.sduhealth.org.uk/policy-strategy/reporting/ipsos-mori.aspx

[11] SDU Healthcheck 2018 https://www.sduhealth.org.uk/policy-strategy/reporting/sustainable-development-in-health-and-care-report-2018.aspx

Introduction

This report measures the environmental footprint of the NHS, public health and care system across four key impacts: water, waste, air pollution and carbon emissions. It helps to build a broader understanding of the sector's impacts beyond a focus on carbon emissions. This information helps the health and care system and the SDU in targeting activities to reduce these impacts and develop a more sustainable health and care system.

The health and social care system (HSC) represents over 10% of the country's economy and nearly 10% of the workforce; around 5% of all road traffic is health and care related. Delivery of high quality health and care places demands on natural resources and our environment. The NHS workforce - from national leadership to front line staff, recognises that short and longer term impacts on our environment need to be managed to protect the health of individuals and communities. The NHS in England takes a world-leading sector approach to account for its impacts. Action is encouraged and supported across many individual organisations and communities that constitute the HSC system. A more sustainable health and care system improves health and wellbeing for this and future generations whilst also making the best use of limited natural resources.

For the past 10 years, the SDU has monitored progress in reducing carbon emissions in line with the Climate Change Act (CCA, 2008). The usage and impacts of other natural resources are becoming increasingly visible and important either due to global and national constraints, for instance, on water or local health impacts in relation to air pollution. As such, and for the first time, the SDU is estimating the use of these additional natural resources in this report. Waste is also included to support resource efficiency across the system from the way goods are procured and disposed of.

Accounting for different resources and impacts provides a more comprehensive picture of where action can be taken to benefit health and reduce environmental risks locally and globally. For example, food and catering have a fairly low carbon footprint but a much higher water footprint, whilst transport contributes a significant percentage of the HSC carbon footprint the impact of air pollution on health is more significant. Measuring impacts in a holistic way means that solutions can be developed that will more effectively address these impacts and deliver maximum co-benefits.

The SDU, NHS England, Public Health England and NHS Improvement expect all NHS providers, commissioners and healthcare organisations to have a Board approved Sustainable Development Management Plan (SDMP)[12]. National agencies and health bodies have also published their own plans[13]. SDMPs are an effective approach to coordinating action and managing these impacts at an organisational level.

Impacts and influence:

These are the four key impacts covered in this report:

Carbon emissions   Air pollution from travel and transport

Water footprint   Waste

These impacts are split where feasible into three Areas of Influence (AoI) as described below:
- **Core:** Impacts within the direct control of the HSC organisations such as utilities, direct water use, business travel etc.
- **Supply chain:** Impacts outside of the direct control of the HSC organisations, as a result of the supply of goods, services and capital projects to the sector.

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[12] SDMP guidance from NHS Improvement and the SDU is available at https://www.sduhealth.org.uk/delivery/plan.aspx
[13] Please see ALB and national agency commitments and SDMPs at https://www.sduhealth.org.uk/policy-strategy/reporting/sustainable-development-in-health-and-care-report-2018.aspx

- **Community:** Impacts outside of the direct control of the HSC system, such as patient travel, staff commuting and emissions from the use of propellant inhalers.

These AoIs reflect the source of impacts and the different levels of influence the system has on these impacts and hence the different mechanisms that are needed to manage reductions. For instance:
- **Core:** through direct investment
- **Supply chain**: through supplier engagement or clearer specification and contract management
- **Community**: through patient staff and partner engagement, information and guidance.

The table below summarises the area of influence, the system's level of influence and what scope each area covers.

Table 2. Areas of Influence (AoI) description

Area	System level of influence	Scope of impact	Area		Scope of impact
Core	High	Elements in direct control of the HSC such as our building's energy usage and NHS travel- i.e. Utilities, waste, business and fleet travel and anaesthetic gases	Commissioned healthcare	Medium level of influence	Healthcare commissioned outside of the NHS which is made up of core, supply chain and community, however the data and/or method cannot determine the exact segmentation across the three areas
Supply chain	Medium	Supply chain activities to supply goods, services and capital projects to the HSC system			
Community	Lowest	Patient travel, staff commuting and the use of inhalers (i.e. not building related).			

The split also helps highlight where emission changes in one area might correlate to changes in another area i.e. an increase in district nursing travel represented in the business mileage area (core) might have a corresponding reducing effect on patient travel (community).

In general, core impacts can be quantified with a higher level of certainty and are easier to influence directly. Community and supply chain impacts can be very high, but are typically subject to a greater degree of uncertainty and require more collaborative approaches to address. Both offer potential savings, health gains and other non-monetary benefits, such as improved staff engagement and retention. Positive change in all areas should underline the value that health and social care organisations have as 'anchor organisations'. Organisations can lead by example, as well as supporting suppliers, staff and communities to make choices that protect health locally and globally.

SDU action

The SDU is working with partners and stakeholders to drive, support and encourage system wide transformation towards a more sustainable healthcare system. For example, through 2018/19 SDU is focussing efforts on three key areas of work related to this report:

The plastics challenge

- Through system wide engagement with suppliers, innovators and health and care providers we will identify appropriate targeted approaches and incentives to systematically reduce plastics and plastics waste in HSC.
- Identify where the use of plastics can be avoided through supplier engagement, innovation and efficient processes and how this can be embedded in current NHS procurement processes.
- Where plastic must be used, whether in packaging, clinical products or non-clinical products, we will work to establish how value can be maximised and environmental impact minimised from safe re-use, recycling or disposal.

In line with the expected 'Resources and Waste Strategy', the 25 Year Environment Plan and national action on plastics, we will work with Government and sector partners to ensure that HSC shapes a more circular approach to the use of resources, saving money and reducing waste.

Carbon and water efficiency

The SDU will focus on addressing carbon hotspots that will help the NHS and wider system progress towards the Climate Change Act targets. This includes:

- Reducing the nearly 1 million tonnes of CO_2e per year from Metered Dose Inhaler use. The SDU are working with NICE on a shared decision making resource for GPs and patients identifying, where appropriate, lower carbon, clinically equivalent options.
- Working in close partnership with NHS Improvement and others to provide support, encouragement and where possible funding or financing to implement energy and water efficiency schemes across the system.
- To encourage a systematic and transparent approach to water, waste and carbon efficiency across the system we are working in partnership with NHS Improvement to ensure that:
  - 100% of NHS providers have a Sustainable Development Management Plan and report consistently on progress.
  - Environmental impacts are included in the NHS Improvement 'Model Hospital'
  - That great practice is identified, highlighted, celebrated and shared through our local and regional networks, case studies and the Sustainable Health and Care Awards

Air quality improvement

The SDU will:

- Identify appropriate targeted approaches and incentives to ensure that NHS organisations are using the Health Outcomes of Travel Tool to identify and realise their potential in improving local health inequalities through action on air pollution.
- Support STPs to design out local air pollution in the commissioning of new models of care to deliver wider population health benefits.
- Work with partners such as PHE and Clean Air Day to raise the profile of the opportunities to address air pollution across the system.
- Identify, celebrate and share good practice through our local and regional networks, case studies and the Sustainable Health and Care Awards

We will work to ensure that the HSC is playing its part in achieving the government's ambition in the national Clean Air Strategy.

Carbon footprint

Intro

Carbon reporting helps monitor the system's contribution to meeting the UK's Climate Change Act targets (CCA, 2008) and the UK's commitments on climate under the UN Sustainable Development Goals. HSC carbon emissions have fallen by 18.5% to 27.1 Mega tonnes (Mt) CO_2e since 2007. The progress made is testament to commitment and effort throughout the sector. Significant work is now required to accelerate emissions reduction to ensure the sector is playing its part in meeting the future CCA targets. This report identifies where further improvement can be made and how the SDU and partners will continue to work with the HSC system to achieve this.

Scope / method

The scope of the carbon footprint includes energy, waste, water, travel, supply chain, commissioning and fugitive gases. Different methods of footprinting have been used depending on data availability as outlined below:

- Raw data supplied by the NHS, applied to UK Government published standard conversion factors for carbon equivalent emissions. This is typically used in the NHS core footprint.
- A Multi Regional Economic Input Output (MRIO) model. Spend data with a bespoke carbon conversion factor for each budget code. This is typically used in the supply chain and commissioned areas and all non-NHS core elements.
- Data on fugitive gas emissions, inhalers and anaesthetic gases is derived from the National Atmospheric Emissions Inventory (NAEI).

For full details please see the Technical Annexe here.

Progress

Since 2007, the HSC system has made strong progress, exceeding the 10% target set in the Carbon Reduction Strategy[14]. The HSC system reduced carbon emissions by 14% by 2015. Emissions have continued to reduce, falling by 18.5% up to 2017. While the rate of reduction has accelerated over the last two years, this is still behind the trajectory needed to achieve the Climate Change Act 2020 target of 34%, highlighting the need to redouble and accelerate efforts going forward.

The table below summarises the carbon emissions by AoI between 2007 and 2017 and the corresponding percentage reduction.

Table 3. Carbon emissions reduction progress since 2007 by AoI

| AoI	2007 baseline (kt CO_2e)	2017 (kt CO_2e)	% reduction
Core	8,051	6,564	-18.5%
Commissioned	1,810	1,201	-33.6%
Supply chain	19,587	15,548	-20.6%
Community	3,811	3,806	-0.2%
Total	33,259	27,119	-18.5%

The table shows the significant progress that has been made across the sector, particularly the 20% reduction in supply chain emissions representing close to $4MtCO_2e$. This is due to reductions in the impact intensity of many supply chains that support the HSC system. This momentum can be harnessed to create further improvements. Headway has been less in community emissions, although, overall this is a relatively small area it can be managed via staff and patient engagement, such as supporting a shift to lower global warming impact inhalers, which on their own represent around 3.2% of HSC carbon emissions.

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[14]Carbon Reduction Strategy: https://www.sduhealth.org.uk/crs

The chart below shows the contribution the different AoI are making towards the HSC sector reductions and the progress towards the 2020 34% Climate Change Act target.
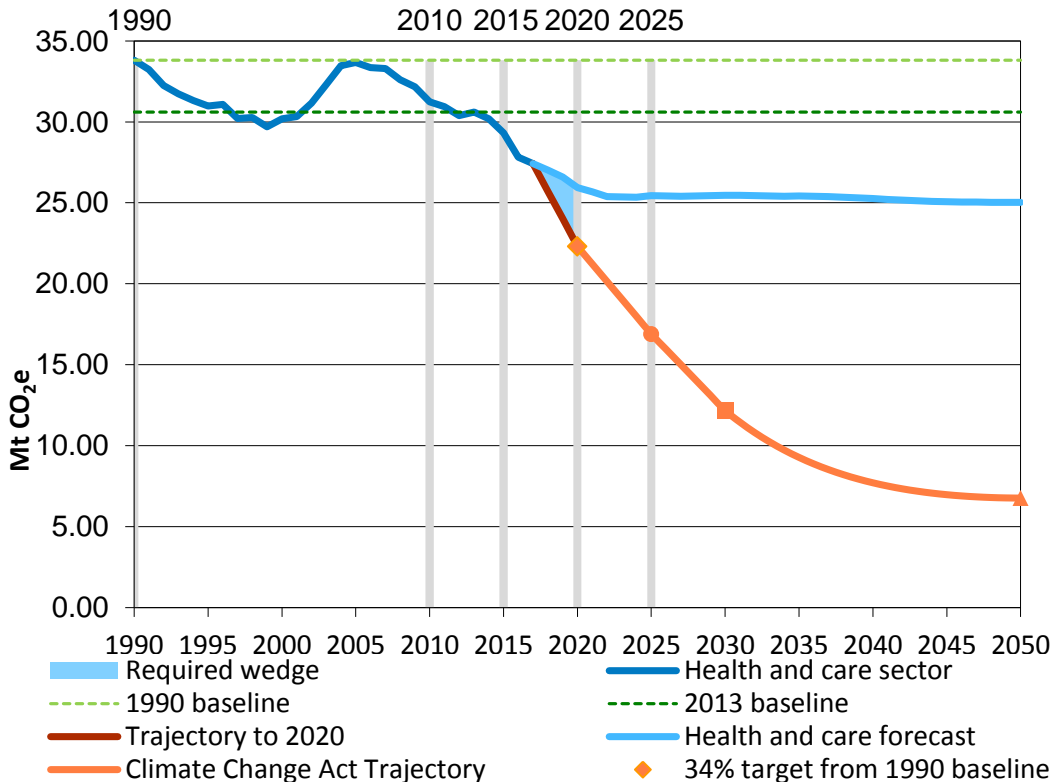
Figure 1. HSC progress against the Climate Change Act (using a 2007 baseline)

Core · Commissioned · Supply Chain · Community · Climate Change Act
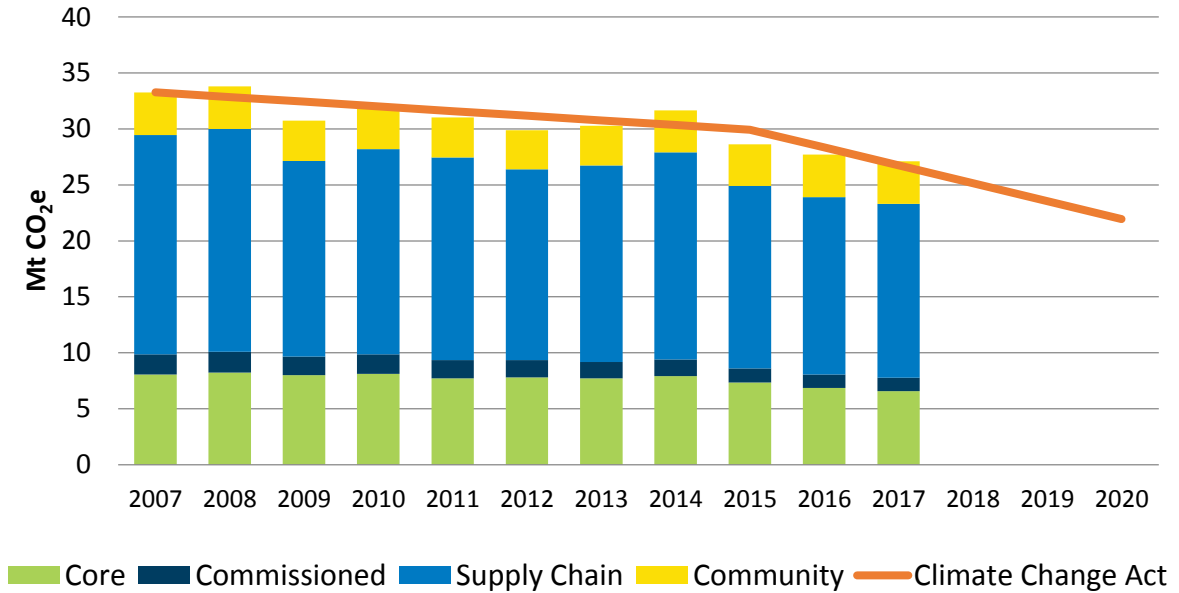
2050 projections

The diagram below highlights the significant progress that is still required to meet the 2020 and 2050 CCA targets.

Figure 2. Health and Social Care in England Carbon Footprint (CO$_2$e baseline to 2050 with Climate Change targets)

Required wedge — Health and care sector
1990 baseline ----- 2013 baseline
Trajectory to 2020 — Health and care forecast
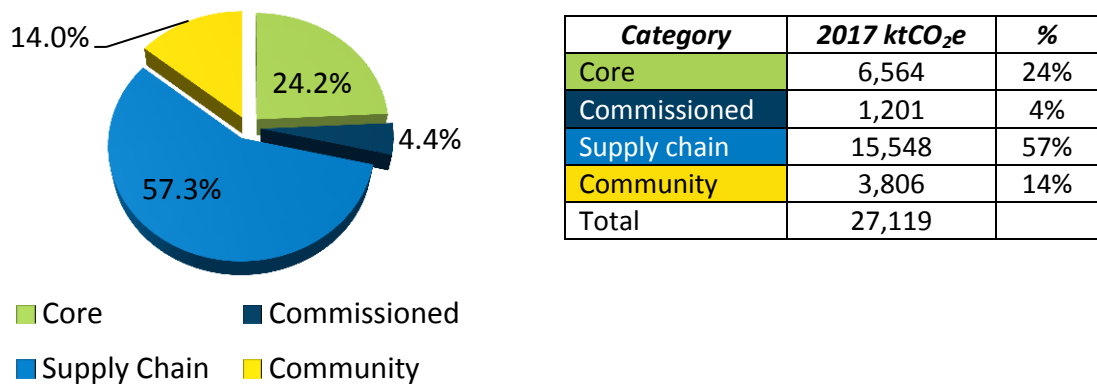Climate Change Act Trajectory — 34% target from 1990 baseline

The SDU calculation in 2015 estimated that the carbon impact of a 'do nothing' scenario relates to a 31% rise in emissions by 2050 (based on a 1990 baseline)[15] which would translate into significant financial costs. Some healthcare clinical activity indicators have shown an increase of 27.5% in activity since 2007, demonstrating that the system is reducing carbon during times of significant need for HSC system resources.

2017 Breakdown and hotspots

In 2017 the HSC carbon footprint was 27.12MtCO$_2$e, a reduction of 18.5% from 2007. The breakdown across the three AoI shows that supply chain emissions remain the largest element at nearly two thirds of carbon emissions. The core, over which the sector has considerable direct influence, is nearly a quarter of the total. The impact of community emissions, where the HSC system can nudge staff and patients to act in more sustainable ways, is just over an eighth.

The diagram below summarises the breakdown across the areas of influence and their contribution of the overall footprint.

Figure 3. 2017 breakdown of HSC carbon emissions

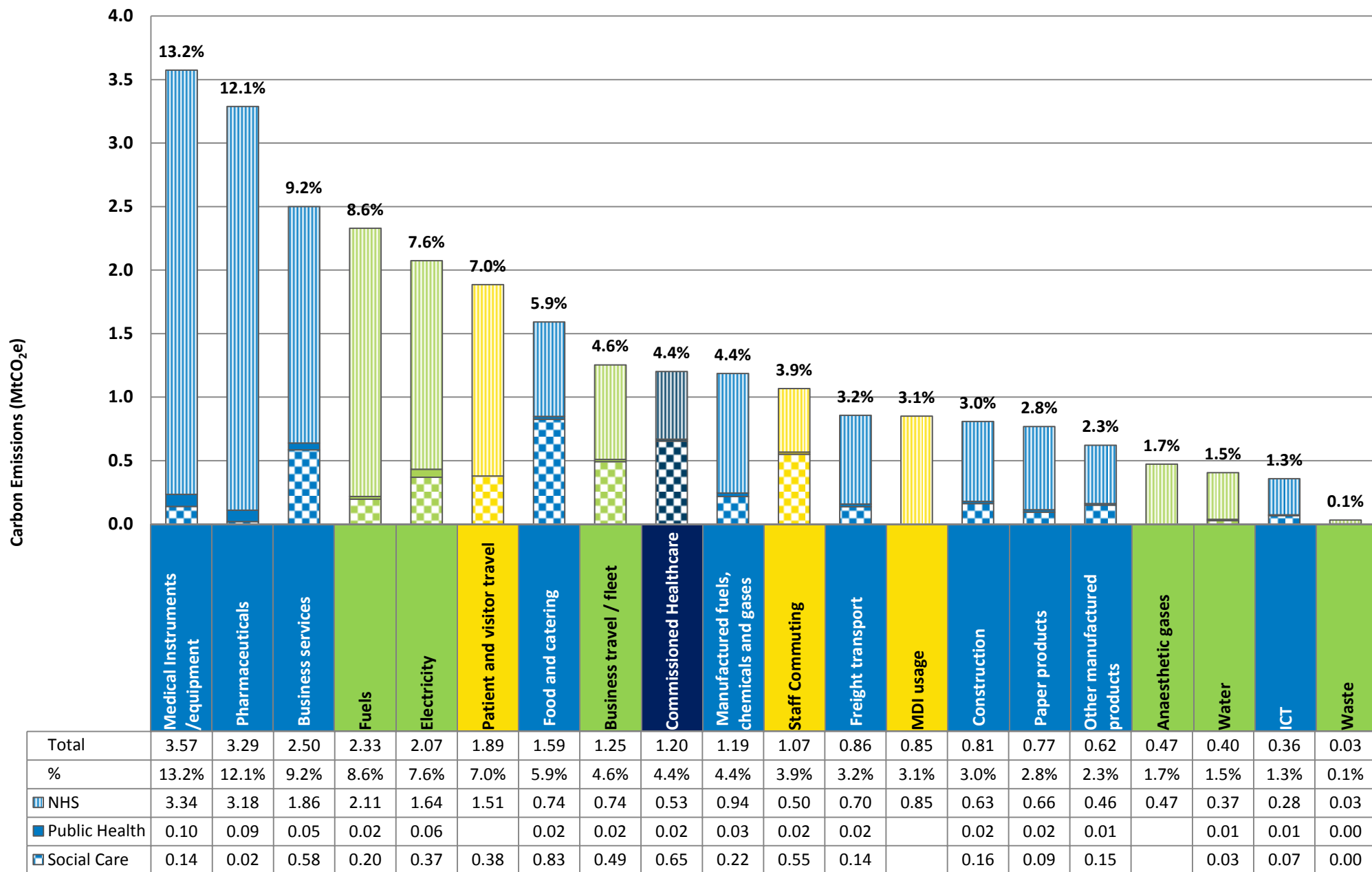| Category	2017 ktCO$_2$e	%
Core	6,564	24%
Commissioned	1,201	4%
Supply chain	15,548	57%
Community	3,806	14%
Total	27,119	

The HSC system's two largest hotspots are medical equipment and pharmaceuticals. The third largest, also within the HSC supply chain, relates to business services. The following hotspots relate to core emissions - heating /fuel (gas, oil, coal, biomass etc.) and electricity. Patient and visitor travel and meter dose inhalers (MDI) are also significant impacts. The most common use of MDIs is in the treatment of asthma and chronic obstructive pulmonary disease (COPD). MDIs represent over 3.2% of the entire HSC carbon footprint. The impact is not in their manufacture but in the high global warming potential (GWP) of the propellants used as the delivery mechanism. Lower emission and safe alternatives are available.

Action to reduce carbon emissions can also reduce embodied water impacts and air pollution, and vice versa. Some examples of these types of action are provided in the *Examples of good practice* section at the end of this document. The SDU and NHS Improvement will continue to work to support reductions in carbon emissions related to buildings. The SDU will also focus some attention on hotspot areas, such as potential options to consider lower emission inhalers, subject to the clinical and financial case being made. More detail is provided on this in the *SDU actions* section.

The following diagram highlights the relative contributions from key areas and gives an indication of the range of opportunities available to reduce the HSC carbon footprint.

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[15] SDU Health and Social Care Wedges https://www.sduhealth.org.uk/policy-strategy/reporting/hcs-carbon-footprint/wedges.aspx

Figure 4. Health and Social care detailed breakdown 2017

	Medical Instruments /equipment	Pharmaceuticals	Business services	Fuels	Electricity	Patient and visitor travel	Food and catering	Business travel / fleet	Commissioned Healthcare	Manufactured fuels, chemicals and gases	Staff Commuting	Freight transport	MDI usage	Construction	Paper products	Other manufactured products	Anaesthetic gases	Water	ICT	Waste
Total	3.57	3.29	2.50	2.33	2.07	1.89	1.59	1.25	1.20	1.19	1.07	0.86	0.85	0.81	0.77	0.62	0.47	0.40	0.36	0.03
%	13.2%	12.1%	9.2%	8.6%	7.6%	7.0%	5.9%	4.6%	4.4%	4.4%	3.9%	3.2%	3.1%	3.0%	2.8%	2.3%	1.7%	1.5%	1.3%	0.1%
NHS	3.34	3.18	1.86	2.11	1.64	1.51	0.74	0.74	0.53	0.94	0.50	0.70	0.85	0.63	0.66	0.46	0.47	0.37	0.28	0.03
Public Health	0.10	0.09	0.05	0.02	0.06		0.02	0.02	0.02	0.03	0.02	0.02		0.02	0.02	0.01		0.01	0.01	0.00
Social Care	0.14	0.02	0.58	0.20	0.37	0.38	0.83	0.49	0.65	0.22	0.55	0.14		0.16	0.09	0.15		0.03	0.07	0.00

Water footprint

Intro

This is the first time the amount of water used directly and indirectly by the HSC system has been estimated. Indeed this is the first time any health and care system globally has calculated an estimate of its water footprint. With the NHS constitution stating that it is 'committed to providing the most effective, fair and sustainable use of finite resources' and with the significant cost and risk associated with more constrained water resources in the future, it is important to measure the water that is used to support healthcare.

In 2017 the total HSC consumption of water (direct and indirect) was 2,319 million m^3, similar to that of a country such as Estonia[16]. Direct water use is only a small proportion of our overall footprint, less than 2%. In 2017 NHS providers alone used 35.8 million m^3 of potable water, a direct financial cost of over £80m a year. However, 'virtual' water, embedded in the manufacture and supply of food, products and services, makes up the vast majority of the water footprint.

Scope / method

The same MRIO methodology used to estimate carbon emissions (described on page 7) has been used for the water footprint. Specific water intensity factors have been applied for water used directly or indirectly by the HSC system and we have included only 'green' and 'blue' water (as defined below).

- Green water covers water usage indirectly through soil moisture from precipitation used by plants via transpiration (as part of the hydrogen cycle).
- Blue water covers the usage of fresh water from surface or ground water. Typically this is treated for use in processes such as manufacture, to cool and heat systems as well as 'drinking' water.

Other water impacts such as grey water (which is the impact of any water that is polluted and usually returned to the drain) and black water (the creation of sewage/effluent) are not included.

The community water footprint of patient and visitor travel and staff commute has been estimated by using the impact of NHS business travel as a proxy, as the expenditure on patient and visitor travel is not available.

Water footprinting is a very useful tool to identify hot-spots. Whereas one tonne of CO$_2$e will have the same impact regardless of where it is released, water impacts will be different depending on geography: water extracted from the Lake District during winter is likely to have less impact than water from a Saharan country during the dry season. This impact is not reflected in this assessment.

Progress

The HSC water impact has reduced since 2010 to 2,319 million m^3 in 2017 representing a 21% reduction. This shows that progress is being made by the HSC system.

AoI	2010 baseline (million m^3)	2017 (million m^3)	% reduction
Core	194	165	-15.2%
Commissioned	144	150	4.7%
Supply chain	2,452	1,889	-23.0%
Community	138	115	-16.4%
Total	2,928	2,320	-20.8%

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[16] National Water footprint explorer http://waterfootprint.org/en/resources/interactive-tools/national-water-footprint-explorer/

The largest reduction has been through the supply chain, by inherent cost savings and associated improvement in water resiliency within many industries that supply HSC. The impact of the core water footprint has also decreased. A move from coal or gas energy production to renewables is likely to have contributed to this reduction.
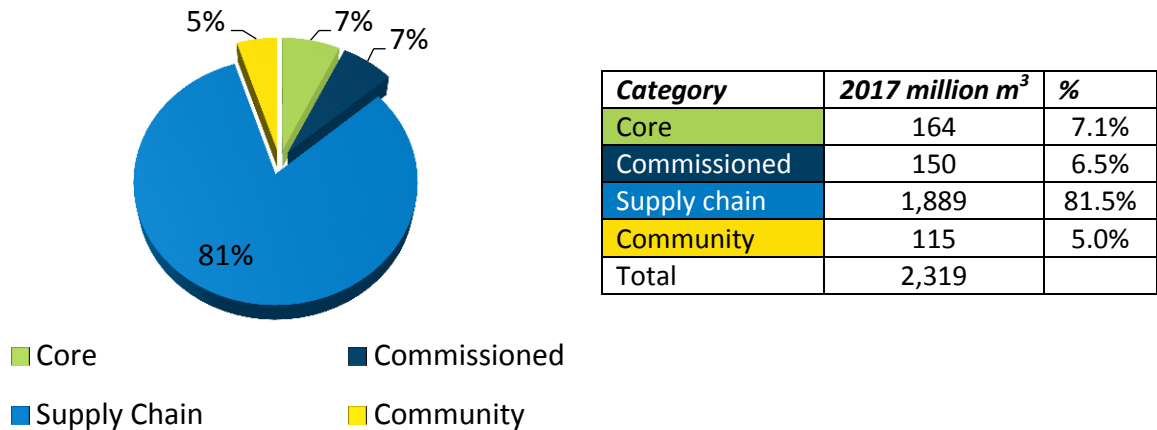
Figure 5. Progression in the HSC water footprint
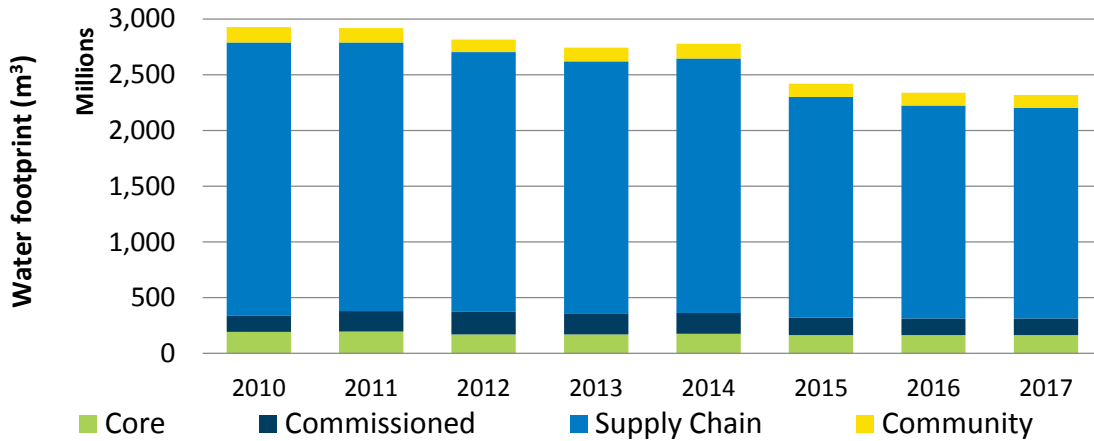
2017 Breakdown and hotspots

In 2017 the water footprint of HSC was 2,319 million m^3, enough to fill nearly 1.1 million Olympic sized swimming pools. The HSC supply chain being the largest area responsible for over 80% of the impact:

Figure 6. HSC water footprint breakdown 2017

Category	2017 million m^3	%
Core	164	7.1%
Commissioned	150	6.5%
Supply chain	1,889	81.5%
Community	115	5.0%
Total	2,319	

The chart below shows that over 60% of the HSC water impact is made up of three areas - food and catering (28.7%), pharmaceuticals (19.3%) and business services (13.1%), with medical instruments and commissioned healthcare being the 4th and 5th largest areas. The top six areas are all supply chain or commissioned healthcare impacts.

The usage of water itself in the HSC system is a large area of impact (both in terms of the water used and the impact of treating water to create clean potable water for the system) and is the single largest area in the core AoI. Travel and transport by patients and staff business mileage, equates to a total of nearly 7% of the entire water footprint.

While many actions are currently focussed on carbon, waste and air pollution, it is important to note where there are co-benefits in relation to a reduced water footprint. Identifying hotspots is the first step. Some areas that can provide co-benefits in terms of water saving are identified in the *Examples of good practice* section.

Table 4. Breakdown of the HSC water footprint in 2017

	Food and catering	Pharmaceuticals	Business services	Medical Instruments /equipment	Commissioned Healthcare	Manufactured fuels, chemicals and gases	Water	Staff Commuting	Patient & Visitor travel	Paper products	Business travel / fleet	Other manufactured products	Construction	Freight transport	Information and communication technologies	Electricity	Waste	Heating / Fuel
Total	665.25	446.70	303.97	185.80	150.36	136.74	85.61	65.55	49.93	43.68	36.82	31.54	29.20	25.26	21.18	15.49	15.48	11.18
%	28.7%	19.3%	13.1%	8.0%	6.5%	5.9%	3.7%	2.8%	2.2%	1.9%	1.6%	1.4%	1.3%	1.1%	0.9%	0.7%	0.7%	0.5%
NHS	339.04	431.40	161.60	173.39	74.22	94.52	44.58	31.84	42.04	36.52	22.63	22.76	23.16	19.71	16.60	13.26	14.21	9.00
Public Health	9.93	12.40	4.78	5.47	2.28	2.83	1.31	0.56	-	1.16	0.82	0.69	0.71	0.61	0.51	0.40	0.43	0.28
Social Care	316.28	2.91	137.60	6.94	73.86	39.39	39.72	33.15	7.89	6.00	13.37	8.09	5.33	4.93	4.07	1.83	0.84	1.90

Air pollution – travel and transport

Intro

Air pollution has a significant impact on human health, annually contributing to over 3 million deaths across the globe[17]. Each year there are estimated to be around 40,000 air pollution related deaths[18] in the UK alone. According to the World Health Organisation (WHO), 92% of the world's population live in areas where air pollution levels exceed WHO guideline limits[19]. The Government is targeting air pollution as a priority by publishing a Clean Air Strategy. This is supported by local action and the development of clean air zones in major cities such as London and Nottingham.

There are over 9.5bn NHS related road miles per year, which is around 3.5% of all road travel in England: this means that the NHS unintentionally impacts on air quality, particularly because of the need for staff and patients to travel to and from NHS sites. Health impacts from the resulting nitrogen oxides (NO_x) and particulate matter ($PM_{2.5}$) emissions are estimated to cost the economy around £345m per year. This is from mortality impacts alone.

"We need to understand that there is a price to pay for this scale of transport and travel, not just in terms of time or money but in terms of air pollution (NO_x, PM_{10} and $PM_{2.5}$) and greenhouse gas generation. Because no-one pays today for the true, full social cost of fossil fuel use and pollution (much of the cost is deferred to the future)."[20]

Annual Report of the Chief Medical Officer 2017

The SDU's Health Outcomes of Travel Tool (HOTT) is designed to support health care organisations understand, monitor and assess where and how to reduce air pollution and other travel and transport impacts on health.

Scope / method

The data provided in this report only relates to NHS travel in England as the data for other areas of the HSC and movement outside of England is not available (i.e. air / rail travel out of England and the movement of goods before they enter England).

The air pollution impacts are focused on NO_x and $PM_{2.5}$ and do not include any other pollutants. The $PM_{2.5}$ includes generation from combustion as well as brake and tyre wear. The outcomes are from HOTT (please see a full explanation of method in the supporting guidance[21]). HOTT also covers other impacts such as road traffic incidents, noise and GHGs – but here the focus is on air pollution. The air pollution impacts are also limited to mobile sources as detailed above. Due to limitations of the available evidence, health and economic impacts are restricted to mortality and life years lost only. Illness caused through exposure to air pollution is not covered.

The NHS also contributes to air pollution where fuels are burnt to produce electricity and heat. These, alongside air travel will also have an impact on health. These are not included because of lack of data.

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[17] World Health Organisation, Air pollution, http://www.who.int/airpollution/en/

[18] Every Breath We Take, Royal College of Physicians, https://www.rcplondon.ac.uk/projects/outputs/every-breath-we-take-lifelong-impact-air-pollution

[19] World Health Organisation, Ambient air pollution http://www.who.int/airpollution/ambient/en/

[20] Chief Medical Officer Professor Dame Sally Davis, Annual Report of the Chief Medical Officer 2017 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/690846/CMO_Annual_Report_2017_Health_Impacts_of_All_Pollution_what_do_we_know.pdf

[21] HOTT full guide https://www.sduhealth.org.uk/delivery/measure/health-outcomes-travel-tool.aspx

2017 Breakdown and hotspots

Each year NHS related travel equates to 9.5 billion miles by all modes of land transport - nearly 3.5% of all road miles in England. Health and social care road transport is estimated to be responsible for up to 5% of all road travel. The table below shows the purpose of travel by organisation type:

Table 5. Breakdown of total mileage by purpose of travel in miles
(N.B: the darker the purple, the higher the value)

	Providers (non-ambulance)	Ambulance providers	Primary care and CCGs	Governance bodies	Subtotal
Business Mileage	432,891,565	15,434,358	155,109,096	57,670,313	661,105,332
Fleet		229,486,293		33,890	229,520,183
Supply Chain	219,356,350				219,356,350
Staff Commute	1,423,643,939	54,586,579	200,159,820	24,509,997	1,702,900,335
Patient and Visitor	5,075,848,259	Captured as fleet	1,621,253,027	N/A	6,697,101,286
Subtotal (exclusive of supply chain)	6,932,383,763	299,507,230	1,976,521,942	82,214,199	**9,509,983,485**

The road miles detailed above result in over 7,285 tonnes of NO_x and 333 tonnes of $PM_{2.5}$ which contributes to the loss of 10,358 quality adjusted life years (QALYs[22]) each year. The economic impact on society of these lost life years is nearly £345million.

In contrast to this, there is an added health benefit from regular active travel from staff commuting. The value of regular active travel in increasing the health and wellbeing of NHS staff has also been quantified at nearly £18m per year, in the reduction of treatment costs alone.

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[22] 'A measure of the state of health of a person or group in which the benefits, in terms of length of life, are adjusted to reflect the quality of life. One QALY is equal to 1 year of life in perfect health' NICE.

Figure 7. Air pollution impact by pollutant and areas of influence in 2017

Sources of PM2.5 released by purpose of travel / Sources of NOx released by purpose of travel
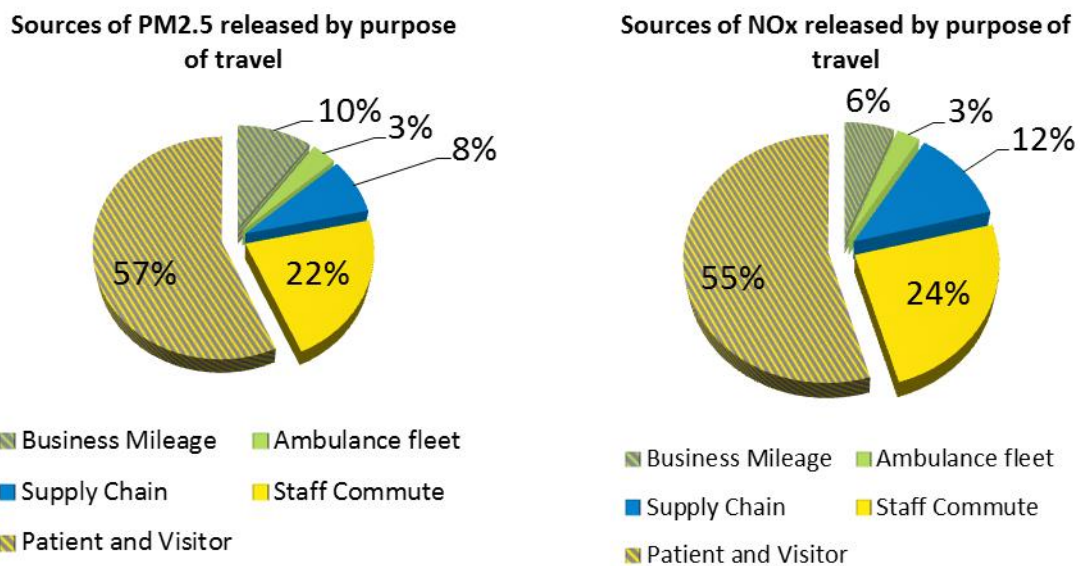
	tPM$_{2.5}$ in 2017		tNO$_x$ in 2017	
Business Mileage	33.75	10%	433.99	6%
Fleet	11.16	3%	205.67	3%
Supply Chain	26.98	8%	891.16	12%
Staff Commute	72.48	22%	1780.00	24%
Patient and Visitor	188.60	57%	3974.75	55%
Total	332.98		7285.58	

Air pollution has both a health and economic cost that should be factored into future planning and decision making. With 162 million (non–ambulatory) patient contacts each year, the largest contribution to air pollution is from patients and visitors travelling to and from healthcare services. This and staff commute fall into the 'community' area of influence. Over half of the air pollution impact is generated by patient and visitor travel: in their own vehicles, as passengers, or by using public transport. The location for delivery of healthcare is a major influencing factor on patient travel, especially as this can be avoided by improved preventative services, care closer to home and tele-health services.

Staff commuting is the second largest area due to the daily movement of 1.3 million NHS staff[23] . Business mileage has a smaller impact, but is typically one the NHS has more control over. Currently 57% of NHS providers have a Healthy Travel Plan[24] in place in an effort to address changes. The movement of goods and services is the third largest contributing factor, based on overall NHS spend. Unfortunately we are unable to segment this by organisation type.

The SDU will continue to focus attention on air pollution as detailed in the SDU action section. To support increased coverage of Healthy Travel Plans, the SDU has recently strengthened the guidance on organisations Sustainable Development Management Plans including travel, transport and air pollution. Reducing air pollution also reduces carbon emissions and embodied water impacts in fuels. Some examples are covered in the *Examples of good practice* section at the end of this document.

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[23] Healthcare Workforce statistics, NHS Digital, http://digital.nhs.uk/catalogue/PUB23540
[24] SDU Healthcheck Score card 2018, https://www.sduhealth.org.uk/policy-strategy/reporting/sustainable-development-in-health-and-care-report-2018.aspx

Table 5. Map of NO$_x$ pollution by purpose of travel (tonnes)

	Providers (non-ambulance)	Ambulance providers	Primary care and CCGs	Governance bodies	Subtotal
Business Mileage	250.1	8.9	68.3	106.6	434.0
Fleet		205.6		0.1	205.7
Supply Chain	891.2				891.2
Staff Commute	1,485.8	48.3	220.2	25.6	1,780.0
Patient and Visitor	3,001.9	Captured as fleet	972.8	N/A	3,974.8
Subtotal (exclusive of supply chain)	4,737.9	262.8	1,261.4	132.3	7,285.6

Table 6. Map of PM$_{2.5}$ pollution by purpose of travel (tonnes)

	Providers (non-ambulance)	Ambulance providers	Primary care and CCGs	Governance bodies	Subtotal
Business Mileage	13.45	0.48	3.67	16.14	33.75
Fleet		11.16		0.003	11.16
Supply Chain	26.98				26.98
Staff Commute	60.15	2.03	9.27	1.04	72.48
Patient and Visitor	142.27	Captured as fleet	46.33	N/A	188.60
Subtotal (exclusive of supply chain)	215.88	13.67	59.27	17.18	332.98

Waste

Intro

In 2016/17 NHS providers alone generated nearly 590,000 tonnes of direct waste[25]. Waste in this context means items put into recycling receptacles, skips and bins in NHS trusts. This represents around 2% of all commercial and industrial waste in England[26].

There are two key waste management challenges for the HSC sector. Firstly, avoid as much waste as possible, as far up the supply chain as possible. This may include buying fewer products in the first place, through lean processes, or avoiding unnecessary treatment. Secondly, ensure HSC organisations treat waste in the most efficient and productive way possible. Indeed all waste should be seen as having potential material value.

Figure 8. Waste Hierarchy (adapted from DEFRA)
Stages[27]

Stages	Includes
Prevention / Avoidance	Preventing illness. Creating processes that use fewer raw materials. Using less material in design and manufacture. Keeping products longer, reusing where possible and reducing single use devices. Using lower toxicity materials and avoiding hazardous materials where possible
Preparing for re-use	Checking, cleaning, repairing and refurbishing whole items or spare parts – developing circular approaches to procurement, moving from products to services. Creating value from items that can't be reused in clinical processes.
Recycling	Turning 'waste' into a new substance or product.
Other recovery	Recovering waste – typically to create energy, such as energy recovery through incineration, anaerobic digestion, gasification and pyrolysis technologies/processes.
Disposal	Landfill disposal or incineration without energy recovery is the least favoured option.

Context

85% of NHS providers' waste avoids going directly to landfill[28] entirely. Some of this is used to produce energy; 23% is recycled / recovered to make new products. While incineration of waste is far better than landfill, this still results in the loss of potentially valuable resources. Re-use platforms have helped save substantial sums: for example in 2017 the WarpIt platform saved 34 NHS trusts in

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[25] ERIC, 2016/17 data https://digital.nhs.uk/data-and-information/publications/statistical/estates-returns-information-collection/estates-return-information-collection-2016-17
[26] DEFRA 2016 stated Commercial and Industrial waste in England was 32.2Mt
[27] DEFRA, 2011, Guidance on applying the waste hierarchy **Error! Hyperlink reference not valid.**https://digital.nhs.uk/data-and-information/publications/statistical/estates-returns-information-collection/estates-return-information-collection-2016-17

excess of £1.6m in 2017[29]. The British Red Cross in Nottinghamshire, through a community equipment return and re-use scheme, saved the NHS over £1.7m[30] over the same time period. It is difficult to show a consistent time series across the system in waste due to changes in the breakdown of how waste has been reported. When exploring data from around 10% of providers it can be seen that overall waste volumes have increased by around 11%, however more waste than ever is avoiding going directly to landfill. In the same sample, even though overall waste volumes have increased, waste to landfill has decreased by 13%.

The pressure to reduce the use and impact of plastics both on our environment in terms of carbon emissions and of poor waste treatment processes has never been greater. The most effective way to avoid low 'value' disposal (i.e. lower down in the waste hierarchy) is to avoid the creation and use of plastic in the first place; then ensuring that the currently essential plastics are disposed of safely at the highest value position in the waste hierarchy. It is appreciated that in the health and care sector infectious waste has to be disposed of through incineration for safety reasons, but not all healthcare waste needs to be classified as infectious.

The SDU will focus some attention on plastics; more detail is provided on this in the SDU action section. Reducing waste also reduces carbon and water impacts as well as some unnecessary air pollution impacts from logistics. Some examples are covered in the *Examples of good practice* section at the end of this document.

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[29] Data from WarpIt league tables and provided directly by WarpIt https://www.warp-it.co.uk/leagues
[30] British Red Cross http://www.redcross.org.uk/What-we-do/Health-and-social-care/Independent-living/Mobility-aids

Integrating the results

This report highlights significant progress made across the HSC system to reduce the impact of natural resources and in particular that:

- The carbon emissions from health and social care are down by 18.5% on 2007, at 27.12MtCO$_2$e with further progress required to meet the 2020 Climate Change Act targets.
- The system wide water footprint is 2.2bn m^3, representing a reduction of 21% since 2010.
- A first assessment of the NHS impact on air pollution has been estimated to support action towards cleaner air.
- 85% of NHS provider waste is now directed away from going directly to landfill, with further action required to reduce waste and the use of plastics.

Integrating these results also helps to identify the connections and co–benefits of managing natural resources in a coordinated and holistic way. It helps to broaden the measurement and interpretation of the system's impact on the environment and to plan where to focus action. The table below highlights the potential co-benefits of managing hotspots across the different impacts and the following two sections describe how these can be used to identify areas of action across the system

Table 7. Integrated results		Carbon	Water	Air pollution from transport (NHS only)	
		MtCO$_2$e	million m^3	tNO$_x$	tPM$_{2.5}$
Core	Electricity	2.07	15.49	Static sources of air pollution currently unquantified.	
	Heating / Fuel	2.33	11.18		
	Water	0.40	85.61	-	-
	Business travel / fleet	1.25	36.82	639.8	44.9
	Anaesthetic gases	0.47	-	-	-
	Waste	0.03	15.48	891.2	27.0
Commissioned	Commissioned Healthcare	1.20	150.36		
Supply Chain	Pharmaceuticals	3.29	446.70		
	Medical Instruments /equipment	3.57	185.80		
	Freight transport	0.86	25.26		
	Business services	2.50	303.97		
	Paper products	0.77	43.68		
	Other manufactured products	0.62	31.54		
	Manufactured fuels, chemicals and gases	1.19	136.74		
	Food and catering	1.59	665.25		
	Construction	0.81	29.20		
	ICT	0.36	21.18		
Community	Staff Commuting	1.07	49.93	1780.0	72.5
	Patient and Visitor travel	1.89	65.55	3974.8	188.6
	MDI usage	0.85	-	-	-

Examples of good practice

On the evidence above the table below highlights some areas where focus is needed and can yield progress across several resource impacts. There are also great examples of work across the system to reduce the hotspots described. The challenge is to accelerate the uptake of best practice and explore innovative solutions to tackle these impacts in a holistic and healthy way.

Key

Water	Waste	Air Pollution	Carbon	Core	Supply chain	Community

Impacts	Area of focus	Resource impacts	Description and examples of actions
	Efficient use of pharmaceuticals	**Pharmaceuticals** The second largest area in both carbon emissions and water footprint shows the management of pharmaceuticals can have significant benefits. The transportation of pharmaceuticals also has an impact on air pollution and pharmaceutical waste, through unused or over prescribed medicines and packaging. These areas present opportunities for further action across the system to reduce emissions and water footprint.	Through further supply chain engagement and NHS targeted programmes such as efficiently using medicines[31] to avoid over treatment. Northumberland Healthcare NHS Foundation Trust worked with care homes to review medicines to optimise and achieved savings of up to £184 per patient per year[32]. East Staffordshire CCG "What a Waste" campaign reduced costs on average by £60 per patient through better repeat prescription management.
	Reducing the over-prescribing of pharmaceuticals		Social prescribing is an important new method of treating certain types of illness, especially those associated with mental ill health. Loneliness, anxiety and other known social issues that lead to poor health are growing in prevalence[33]. Social prescribing is usually a longer-term lifestyle change, e.g. learning a new skill, attending a group or helping people access the outdoors. It can be used to tackle underlying causes of illness, and also build resilience through social connectedness and improve future health and wellbeing. These lifestyle changes may increase the efficacy of and/or reduce the need for pharmaceuticals in some instances and prevent illness in the future.

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[31] NICE guidelines https://www.nice.org.uk/guidance/ng5
[32] NHS England, 2015, Pharmaceutical waste reduction in the NHS https://www.england.nhs.uk/wp-content/uploads/2015/06/pharmaceutical-waste-reduction.pdf
[33] http://www.nhsconfed.org/~/media/Confederation/Files/Publications/Documents/MHN%20key%20facts%20and%20trends%20factsheet_Fs1356_3_WEB.pdf

Impacts	Area of focus	Resource impacts	Description and examples of actions
	Business service integration and improvement	**Business services** This encompasses a broad range of services from real estate to the full range of back of office functions and is the third largest area for carbon and water footprint of the HSC system.	Across the NHS - the STP and local integration processes (e.g. integrated care systems) are leading to the merging of the back of house functions creating efficiencies for both providers and CCGs. NHS Property Services is embedding a new corporate social responsibility strategy across the business. The strategy will support continued flow of utilities data to tenants and support the communities in which they operate.
	Reducing carbon emissions from energy	**Energy** Energy has a significant carbon and water impact through the use of heat and fuels, onsite production and grid purchased electricity. Something the system has complete control over. The grid is decarbonising which is supporting carbon reduction but more can be made of the HSC estate to generate clean energy.	Significant progress has already made, between 2013/14 and 2016/17. NHS provider building-related carbon emissions have reduced by 9.6%. Northern Devon Healthcare NHS Trust is expected to save 2,500 tCO_2e and £600k per annum[34] through their energy efficiency work
	Reducing reliance on plastics	**Plastics** Reducing waste addresses concerns about the levels of plastics entering the environment. While most NHS waste is recycled or incinerated, reduced plastics use also reduces embodied carbon and water impacts in plastics production, carbon from incineration and potentially air pollution impacts from logistics.	Work is already happening across the system, such as organisations using the NurSus toolkit[35] to engage with staff to use resources smartly. Barts NHS Trust has increased their recycling of plastic items in clinical processes such as in Nephrology which created value by re-selling/ re-vending it back to manufacturers[36].

[34] Northern Devon case study https://www.sduhealth.org.uk/documents/case_study/North_Devon_Salix_case_study_DESIGNED.pdf
[35] NurSus toolkit http://nursus.eu/uk/
[36] SDU case study https://www.sduhealth.org.uk/documents/case_study/Case_Study_Barts_Renal_Bottle_Compacting_FINAL.pdf

Impacts	Area of focus	Resource impacts	Description and examples of actions
	Use of resources	**Medical instruments / equipment** This is the largest area of carbon emissions and the fourth largest water impact area. Many medical items have significant impacts from their manufacture and through their lifecycle, using natural resources like energy, water and disposable items. The natural resource impacts of equipment such as sterilisation and medical devices should be evaluated including the costs of disposal. Many single use items are made of plastic or high value materials such as metal which has a value beyond their "useable" life either as a material or as an entire product.	Lean processes should be developed to avoid the use of unnecessary products and resources, through approaches such as Getting It Right First Time[37] (GIRFT) especially in high value areas such as pharmaceuticals and medical devices. The system must also work in partnership with the supply chain to explore and accelerate the use of circular economy approaches to minimise the creation of waste. And further embedding resource efficiency in HSC by maximising the value of the proposed government waste and resources strategy.
	Re-use		The British Red Cross in Nottinghamshire saved the NHS over £1.7m[38] through re-use of community equipment. Equipment reuse networks such as WarpIt saved 34 NHS trusts over £1.64m combined in 2017[39]. A reusable sharps containers project at University Hospitals Coventry & Warwickshire NHS Trust over 10 year duration will have saved over 2,000 tCO_2e[40].

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[37] The Getting It Right First Time (GIRFT) Programme is helping to improve the quality of care within the NHS by reducing unwarranted variations, bringing efficiencies and improving patient outcomes

[38] British Red Cross http://www.redcross.org.uk/What-we-do/Health-and-social-care/Independent-living/Mobility-aids

[39] Data from WarpIt league tables and provided directly by WarpIt https://www.warp-it.co.uk/leagues

[40] SDU case study https://www.sduhealth.org.uk/documents/case_study/2018_Sharpsmart_SWM_Cov_Warwick.pdf

Impacts	Area of focus	Resource impacts	Description and examples of actions
	Food	**Food-** The water used to grow, clean, process, transport, cook and dispose of food is the single largest area of water impact. Food is the 7th largest area of carbon emissions. Impact is spread over a wide area depending on where and how the system sources food. Food waste is also a significant cost to the health and social care system. Food logistics can add to the air pollution impacts of the health system.	There are opportunities in how the system procures, prepares, orders and serves food to reduce food waste and promote local healthy food. Several providers are using the Soil Association Catering Mark to reduce food waste and embed sustainability into their catering. Nottingham University Hospitals NHS Trust has reduced food waste and 77% of their raw ingredients spend is on local ingredients which is cost neutral and allowed the Trust to invest £2m per year in local sustainable businesses[41].
	Engaging staff in healthy travel	**Staff, and patient & visitor travel** Air pollution emissions caused by patient and visitor travel is the largest area of impact and has a significant impact on human health. Staff commute has the second largest impact. Though all health related travel and transport is also linked to impacts on wellbeing through air pollution, noise and traffic accidents. Supporting active modes of transport can help develop happier, healthier people and reduce healthcare demand across the system. Action can also cut carbon emissions and embodied water impacts in fuel production.	Support staff to make choices at the lower end of the travel hierarchy (see appendix 1) as part of their daily commute and also during work hours. HOTT provides an integrated measurement and planning tool for the NHS. Central Manchester University Hospitals NHS Foundation Trust ran a staff engagement programme and increased their cycling infrastructure which enabled a 4% increase in active travel and 5% increase in bus use. Using HOTT they calculated they avoided health costs of £870k. Leeds CCG reduced unnecessary travel through an increase in virtual meetings. Changing one meeting a week to a virtual meeting the group saved £878, 628kg carbon and 1,569 miles in three months.
	Telehealth		Greater use of telehealth, health apps and video/remote monitoring of patients to provide quality healthcare interactions can make net gains in resource usage. The University Hospitals North Midlands app[42] reduced the need for patient travel transforming how clinical resources were used.
	Promoting active travel for patients and visitors		Supporting patients and visitors to make healthier travel choices (see the travel hierarchy appendix 1) benefiting their own health and the wider community: better site planning, patient appointment information and creating a healthier culture around travel. Staff and patient engagement around Clean Air Day[43] can support action to reduce air pollution.

[41] Soil Association https://www.soilassociation.org/certification/catering/news-and-updates/2016/october/the-value-of-your-catering-mark/
[42] https://www.sduhealth.org.uk/documents/case_study/20151027%20UHNM%20-%20APP%20-%20DESIGNED.pdf
[43] Clean Air Day 2018 https://www.cleanairday.org.uk/

Conclusion

The health and social care system is working successfully to reduce its natural resources footprint and minimise its environmental impacts. In the process we are supporting healthier, more sustainable and resilient services and communities. We now have a more comprehensive picture of our opportunities to sustainably manage our use of natural resources and contribute to national policy and ambition on carbon, waste, air pollution and natural resources.

Significant progress has been made across the system with accelerating reductions in carbon and water footprints in recent years. This footprint highlights areas where we need to focus our efforts to maintain this momentum.

It is clear that we will need to make even greater progress in reducing our carbon emissions, focussing on where we can make the greatest impact, to continue to play a key role in achieving the UK Climate Change Act targets for 2020 and beyond.

There are high expectations from society that the health and social care system takes action, particularly in areas like climate change, plastics and air pollution. While there are still many opportunities to make gains from centralised action and investment, a significant proportion of our impacts can only be addressed through engaging staff, patients and the public on their own values and choices; for example moving to lower impact inhalers, healthy seasonal food or sustainable travel. To ensure this support is mobilised we need to identify and celebrate success, as well as highlighting challenges.
Stimulating and encouraging behaviour change at work and at home, can create social norms that will have wider population health and wellbeing benefits in the communities we serve.

Identifying a wider range of resource dependencies like water and plastics will help us reduce our impacts and costs, but also mitigate cost risks in an increasingly resource constrained world.
There are also opportunities presented by an increasing national policy focus on sustainability and climate change. The UK approach to the UN Sustainable Development Goals, the 25 Year Environment Plan, Clean Growth Strategy and forthcoming Waste and Resources and Clean Air strategies provides a clear signals that the health and care sector is expected to lead the way in addressing some of the greatest challenges of the 21st century.

This report shows that we are prepared for that challenge.

Glossary

25 Year Environment Plan - a strategy written by DEFRA to "set out what we will do to improve the environment, within a generation" https://www.gov.uk/government/publications/25-year-environment-plan

Active Travel – relates to walking and cycling primarily but also includes any other modes of travel powered by human energy. Regular active travel has a health benefit because it is a form of exercise.

AoI or Area of influence – is a new way of segmenting the impact in relation to the methodology, level of control and size of the impact to better support managing the impact (see page 7)

Carbon emissions / GHG / CO$_2$e – in the report carbon emissions has been used interchangeably with CO$_2$e, all measurement of carbon is inclusive of the main greenhouse gases based on their global warming potential as per standard UK government reporting.

Circular economy / approaches - A circular economy is a regenerative process or system in which resource input and waste, emission, and energy loses are minimised by closing material and energy loops.

Clean Air Strategy – currently in consultation (until 14th August 2018): https://consult.defra.gov.uk/environmental-quality/clean-air-strategy-consultation/

Clean Growth Strategy – "An ambitious blueprint for Britain's low carbon future." https://www.gov.uk/government/publications/clean-growth-strategy

DPIs or Dry Powder Inhalers –are inhalers that can be used to treat both chronic obstructive pulmonary disease and Asthma that don't require any high global warming potential propellants.

Fugitive gases – are emissions of gases usually without any combustion (in health typically from MDIs and anaesthetic gases, as well as leaks from air conditioning and refrigeration) that have a negative effect on both climate change and air pollution.

GWP or Global Warming Potential – each different greenhouse gas has a GWP with shows how many times more potent it is compared to carbon dioxide over 100 years, which means all the effects of the different GHGs can be calculated as carbon dioxide equivalents or CO$_2$e. For example methane is around 38 times more potent than CO$_2$.

HSC – Health and Social Care referring to the NHS, social & residential care and public health as one system.

ICS or Integrated care systems – is the evolution of STPs to a new type of even closer collaboration. Integrated care system can be formed from several NHS organisations, in partnership with local councils and others, to take collective responsibility for managing resources, delivering NHS standards, and improving the health of the population they serve. https://www.england.nhs.uk/integratedcare/integrated-care-systems/

MDIs or Pressurised Meter Dose Inhalers – are inhalers used to treat both chronic obstructive pulmonary disease and Asthma and use propellants to get the active pharmaceutical ingredient into the patient's lung. The propellants are bad for the environment and increase the effects of climate change.

Mega tonnes – 1 mega tonne = 1,000 kilo tonnes or 1,000,000 tonnes

MRIO or Multi Region (Economic) Input Output – is a methodology to attribute impact (in this case carbon emissions and water footprint) to per unit of expenditure in four different regions; UK, EU, China and Rest of World budget codes (or SIC – Standard Industry Codes) which represent over 100 different industries. The Office of National Statistics provides health and social care spend data against these SIC codes which are applied to the intensity factors (see technical annex here).

NO$_x$ – is a generic term for nitrogen oxides which are a pollutant, they have no global warming potential but are hazardous to health when breathed in.

PM$_{2.5}$ or Particulate matter $_{2.5}$ - refers to atmospheric particulate matter (PM) with a diameter of less than 2.5 micrometres, which is about 3% the diameter of a human hair, and are hazardous to health when breathed in.

Quality-adjusted life year (QALYS): A measure of the state of health of a person. One QALY is equal to one year of life in perfect health. It is often measured in terms of the person's ability to carry out the activities of daily life, and freedom from pain and mental disturbance.

STP or Sustainability Transformation Partnerships - NHS organisations and local councils are developing shared proposals to improve health and care, working in 44 areas covering all of England. Providing a coordinated place based approach to local care.
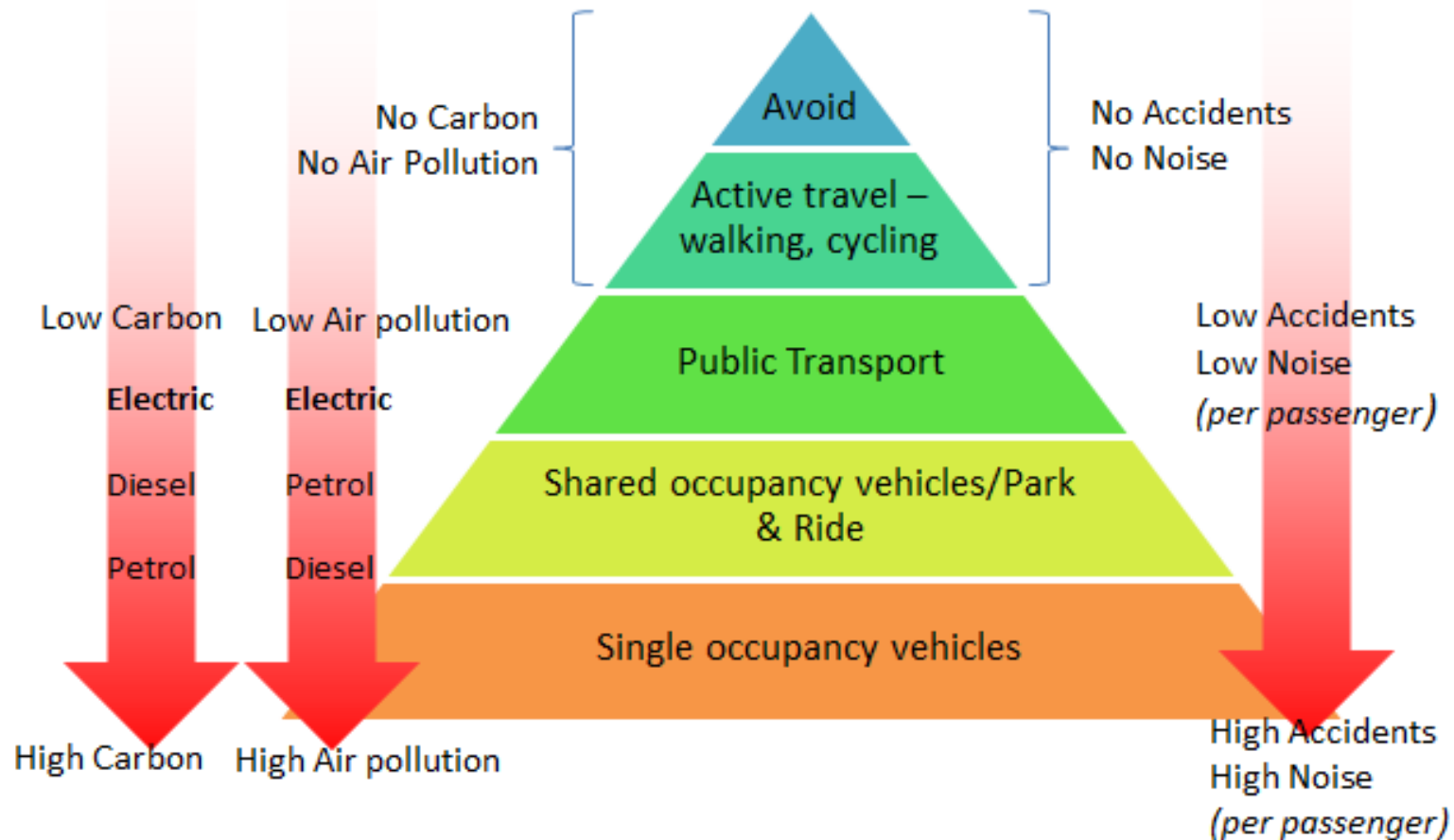https://www.england.nhs.uk/integratedcare/stps/

UN SDGs or United Nations Sustainable Development Goals – "The Sustainable Development Goals (SDGs) are a universal call to action to end poverty, protect the planet and ensure that all people enjoy peace and prosperity." There are 17 interconnected goals.
http://www.undp.org/content/undp/en/home/sustainable-development-goals.html

Appendix

Appendix 1 – Travel hierarchy:

No Carbon
No Air Pollution

Avoid

Active travel – walking, cycling

No Accidents
No Noise

Low Carbon   Low Air pollution

Electric   **Electric**

Diesel   Petrol

Petrol   Diesel

Public Transport

Shared occupancy vehicles/Park & Ride

Single occupancy vehicles

Low Accidents
Low Noise
(per passenger)

High Carbon   High Air pollution

High Accidents
High Noise
(per passenger)

Sustainable Development Unit
Working across the NHS, Public Health and Social Care system