Widening the scope of unit costs to include environmental costs

Guest editorial
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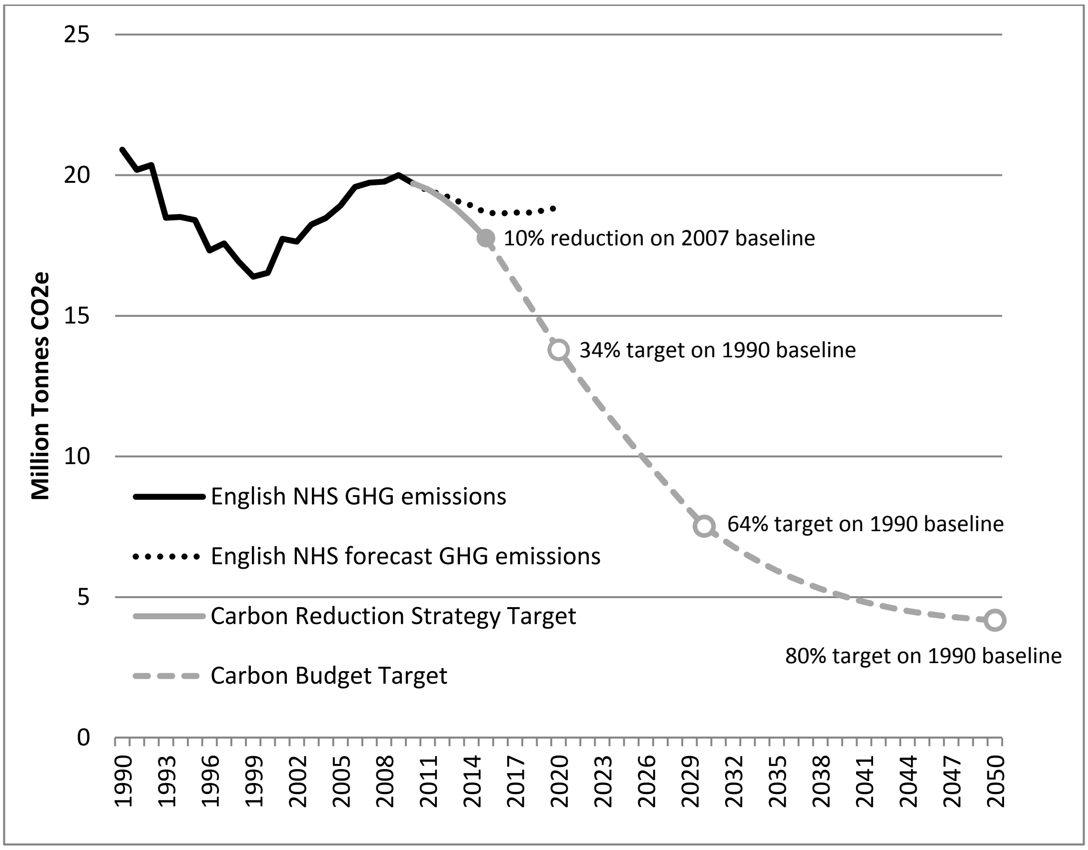
Introduction
It has been five years since the publication of the *Climate Change Act* which committed the UK to cut carbon emissions by at least 80 per cent by 2050, and with a reduction of 34 per cent by 2020. As the largest public sector contributor to climate change via its direct and indirect generation of greenhouse gases, the implications of these commitments for the health and social care sector are significant.

The response by the NHS in England was to set up the Sustainable Development Unit (SDU) to 'develop organisations, people, tools, policy and research which will enable organisations to promote sustainable development, to mitigate and to adapt to climate change'. In 2009 the SDU published the *NHS Carbon Reduction Strategy for England* (Sustainable Development Unit, 2009). Meeting the *Climate Change Act's* emission cuts in stages to 2050 (see figure 1) was central to the strategy.

Figure 1. English NHS carbon footprint with *Climate Change Act* targets (source: SDU 2012a)



As the figure shows, the reduction goals are hugely ambitious and will require transformative action on the part of the NHS, including radical new ways of delivering health care. Increasingly, decisions about what care to provide and the ways in which services are provided will need to weigh up not just the direct financial costs to the NHS anwd health benefits to patients, but the costs (and benefits) to the environment.

As Walker et al. (2012) have noted, expanding the scope of decision-making in the NHS to include more general impacts in society – including, in this case, environmental impacts – raises not just fundamental questions about the role of economic evaluations in social choice, but technical issues too. The former includes problems in valuing the gains in health on the one hand versus the losses incurred elsewhere in the economy (i.e. not just the financial costs incurred by the NHS in generating the health benefit). The NICE-type question 'Is it worth it?' starts to become much trickier to answer. Technical issues include the question of what financial value to place on a unit of carbon. Carbon trading prices, for example, have varied considerably over recent years.

While there is already an acceptance – for example, in terms of the impact assessments carried out by the government on major public policy change – that environmental impacts need to be included on the costs side of the policy equation, such assessments usually leave a lot to be desired in terms of their detail and sophistication.

In part this is due to some of the 'value' problems noted by Walker et al. (2012), but there is also an empirical difficulty (also noted in general by Walker et al., 2012) concerning the identification and measurement of the environmental costs of NHS activities. Such problems are not new, of course. As the *Unit Costs of Health and Social Care* has developed over the last two decades, it has had to grapple with decisions about, among other things, what counts as a 'cost', how shared costs or overheads are best allocated to particular activities or jobs, and what values – market or otherwise – are most appropriate.

In other areas of NHS decision-making, boundaries regarding what is counted as a cost are drawn fairly strictly. For example, in its assessments of value for money, NICE only counts costs falling on the NHS and specifically excludes other costs, such as those borne by carers or the wider economy, including the environment. However, as we go on to elaborate, there is an argument for widening the scope of economic evaluation (where appropriate) to account for environmental costs, such as carbon and other greenhouse gas emissions.

The rationale for including carbon costs

In considering the case for including carbon alongside other costs, it is important to understand the scale of the contribution that the health and social care sector makes to the national environmental footprint. The NHS in England is responsible for around 20 million tonnes of carbon dioxide and other greenhouse gas emissions each year, exceeding total emissions from all flights departing from Heathrow airport (Naylor & Appleby, 2012). This accounts for 25 per cent of all public sector carbon emissions, and does not include social care and non-NHS provision.

As a result, the system is under increasing pressure to reduce its environmental impact. Progress on this to date is mixed. Although the NHS has become more efficient in its use of carbon (per £ spent), spending has increased at a faster rate and so the overall use of carbon has also increased (Sustainable Development Unit, 2012a). A projected fall in total greenhouse gas emissions from 2009 to 2014 broadly reflects the slowdown in NHS funding over this period. Projections to 2020 suggest emissions will start to increase, diverging from the reduction path set out by the SDU.

Over time it is to be expected that pressure will grow for the health and social care sector to reduce its environmental impact. There are also more immediate reasons to engage with the issue. Health and social care providers face direct costs created by rising energy prices. The NHS energy bill is already in excess of £500 million each year. Environmental policy tools such as the CRC (Carbon Reduction Commitment) Energy Efficiency Scheme create a further financial incentive to reduce carbon emissions.

Marginal abatement cost (MAC) curves are often used to show graphically where carbon and financial savings are aligned. By plotting cost-effectiveness data against carbon savings, these provide a useful tool to support decision-making, and a straightforward way of evaluating carbon and financial costs or benefits at the same time. A modelling exercise using this approach assessed the benefits of measures such as reduced drug wastage or improved uptake of telecommunication technologies. If implemented across the NHS in England, the 29 measures could save an estimated £180 million and over 800,000 tonnes of CO_2 a year (Hazeldine et al., 2010). Reviewing just three high-impact innovations suggests a carbon saving of over 25,000 tonnes of CO_2 a year (Sustainable Development Unit, 2010).

Health professionals have also highlighted the opportunities to improve public health while reducing environmental impacts, for example by promoting active travel (walking and cycling) instead of driving, reducing meat consumption, improving insulation in housing, and improving access to green spaces (Haines et al., 2009). The most environmentally sustainable approach to health is likely to be one that prioritises prevention, minimising avoidable use of resources by promoting good health in the population and preventing those who become unwell from going on to need highly resource-intensive care.

Generating better information on the unit carbon costs of care will be an important step in allowing progress in reducing the carbon footprint of health and social care. Inclusion of carbon costs in cost-benefit analyses will not be possible until researchers are able to easily access data on the carbon costs of standardised units of care. Similarly, service commissioners will be more able to take environmental costs and benefits into account when these costs are internalised into the decision-making process (with carbon costs acting as a proxy for environmental costs more generally).

Measuring unit carbon costs

Carbon footprinting methodologies are still evolving as standards emerge. There are significant trade-offs between existing methodologies, with no single method offering a perfect approach for all purposes. An important distinction is between bottom-up and top-down methodologies. Life Cycle Analysis is an example of a bottom-up method based on monitoring individual items used in an organisation or process, and could be used to create unit costs. As with reference costs calculations, the boundaries can make a significant difference to the outputs.

Top-down methods use international datasets and extend existing economic input-output models to include carbon emissions alongside financial values. This allows the carbon intensity per unit spend to be calculated for each economic sector, and brings two benefits: the boundaries are comparable for calculations across different goods and services; and it is possible to capture the whole carbon footprint. The input-output approach does not, however, distinguish between products in a given economic sector, making comparison between similar products or services less straightforward. Top-down approaches work well in identifying hotspots where more detailed investigation is needed. Tools and methods are emerging which allow a combination of bottom-up and top-down datasets using the strengths of both methods.

Some examples already exist of both top-down and bottom-up methods used to calculate unit carbon costs in health care. Tennison (2010) calculated the average of four different methods for determining carbon per unit of activity. Using a combination of costs across the health service and levels of some types of activity, the approach created an estimate of average carbon footprint. As with reference costs, the level of granularity used makes a large difference to the outcome. The Goods and Services Carbon Hotspots report (Sustainable Development Unit, 2012b) used more detailed procurement spend information for activity in different settings: acute, mental health and community services. Results from both of these methods are presented in table 1.

Table 1

	Indicative[1] ($kgCO_2e$)	Acute[2] ($kgCO_2e$)	Mental health[2] ($kgCO_2e$)	Ambulance[2] ($kgCO_2e$)	Primary care[2] ($kgCO_2e$)
Inpatient admission	380	446	476	-	-
Bed day (additional)	80	91	97	-	-
Outpatient appointment	50	56	59	-	-
Ambulance journey	-	-	-	68	-
GP appointment	-	-	-	-	66[3]
Prescription item	-	-	-	-	7

1 Tennison, 2010

2 SDU, 2012b

3 GP appointments are an over-estimate as community services and prescription items have both been included in this figure

These calculations could easily be improved by aligning more closely with financial accounting and using more detailed activity and cost information, combined with more detailed carbon datasets.

Carbon footprints for care pathways and service lines

A number of studies have been published examining the carbon footprint of particular care pathways, often based on a combination of bottom-up and top-down approaches. Nephrology has been a particular target for research. One study compared different treatment regimes for haemodialysis and allows the carbon footprint of alternative service delivery options to be considered (Connor et al., 2011a). An analysis of a renal service in the UK used a combined approach to produce a per patient carbon footprint, as shown in table 2 (Connor et al., 2010).

Table 2

	Indicative emissions[1] ($kgCO_2e$)	Renal service emissions[2] ($kgCO_2e$)
Inpatient admission	380	
Bed day (additional)	80	161
Outpatient appointment	50	22

1 Tennison, 2010
2 Connor et al., 2010

The findings from this work illustrate the scale of the environmental impact associated with some forms of care. Receiving dialysis treatment nearly doubles the annual carbon footprint for an individual, compared to the average footprint of a UK citizen. A further study found that environmental impacts associated with after-care for renal transplant recipients could be reduced using telephone follow-up, which also delivered benefits for patients and the financial cost (Connor et al., 2011b).

Service delivery options were also examined using a bottom-up approach in Cornwall, where centralised and local provision of services were compared using a model of the carbon footprint from building energy use, waste, water and travel (Pollard et al., 2012). Although the boundaries were set to exclude goods and services purchased, it does allow like-for-like comparison across different service delivery options using the same medical supplies.

Service-line footprinting of carbon emissions in a mental health trust in Nottingham (Starr, 2012) included the buildings, travel and procurement carbon footprint broken down by service line. As with the data flows for reference costing, the more detail collected in the information, the more accurate the carbon footprint.

In another study, delivery options for smoking cessation services were considered using a bottom-up approach combining Life Cycle Analysis information where available with top-down estimates where datasets did not exist (Smith et al., 2013). The research calculated carbon emissions per quitter for a number of delivery options (see table 3):

Table 3

	Carbon emissions per 1000 quitters ($kgCO_2e$)	Carbon emissions per lifetime quitter ($kgCO_2e$)
Text message support	8143	636
Telephone counselling	8619	1051
Group counselling	16114	1143
Individual counselling	16372	2823

All these approaches to calculating carbon to use alongside costs have their advantages. The calculations all show that there are variations in the carbon per unit activity which depend on the services being provided. Limitations of the datasets available have been overcome through the use of hybrid methods combining detailed information where available and maintaining the overall scope of emissions included.

Conclusion

Carbon emissions are the most widely-used proxy for wider environmental impacts. Including carbon costs in unit cost data could be a key step in allowing the health and social care system to respond to the pressure it is under to improve the environmental sustainability of its activities. Decision-makers will need this information if they are to identify opportunities to reduce environmental impacts in a way that also delivers financial benefits and improvements in quality.

There are a variety of methods already available for including carbon in unit cost calculations. While none of these is perfect, by using a pragmatic combination of different methods it is possible to find an acceptable balance between rigour and feasibility with existing techniques. In a similar way to the evolution of reference costing, over time methods will become more sophisticated, calculations more accurate, and the ease with which unit carbon costs can be included as a standard part of the process can be expected to improve.

There are several directions that could be explored for including carbon costs in future volumes of the *Unit Costs of Health and Social Care*. First, with the information already available it would be possible to produce indicative figures for different types of activity. Once initial figures were produced in this way they could be tested and refined using comparisons with life-cycle footprinting work at the local level. A second approach would be to improve data flows from providers, extending existing data collection mechanisms to allow for the submission of carbon data alongside costing information. Making standard submissions available would allow carbon calculations to be improved in future.

Choices must be made regarding how carbon costs are presented. These could be included as a component of the unit cost (like labour or building costs) or presented separately alongside the usual financial costs. The latter option may be preferable initially, while methodologies are still under development.

Whatever approach is taken, researchers and decision-makers both stand to benefit from having access to the information that would be generated.

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