

Guiding principles from a pilot project: How to get started on carbon footprinting in European Healthcare

This document describes some basic guiding principles for healthcare organisations that are getting started or want to get started on carbon footprinting. It covers basic data measurement phases, scoping, and processes.

This document was developed following a pilot project carried out with five hospitals in five countries across Europe. The project had a special focus on anaesthetic gases and the data collection forms used during the pilot can be found in the annexes to this document.

Introduction

Healthcare organisations have a responsibility to reduce their impact on climate change. The sector makes up an estimated 5% of the European carbon emissions and has a significant role to play in contributing to the European 2030 climate and energy targets.

The health sector carries a special responsibility to mitigate climate change because of the impacts it has on the health of individuals and communities. The sector also has an opportunity, however, to link these actions with the potential health benefits. Promoting active travel and reducing car travel for example, can improve air quality and can be the physical fitness of individuals. There are many win-win actions that can be taken and the health sector is well positioned to capitalise on these.

The ministries of health and of the environment across Europe signed a declaration in June 2017 in Ostrava, stating that health systems need to build their environmental sustainability and reduce their environmental impacts. By reducing its own emissions, the healthcare sector can demonstrate to other sectors that this is a requirement for communities' health. Developing a carbon footprint baseline is an important first step to achieve this goal, establishing a mechanism for measuring and reporting on progress thereafter is also key.

Carbon footprinting work in health settings has highlighted that some health sector specific areas need attention. Anaesthetic gases are potent greenhouse gases: comparing with energy use (measured in many acute hospitals) anaesthetic gases are an additional 15% of carbon equivalent emissions. These potent greenhouse gases need to be specifically measured and factored into clinical decision-making. Clearly anaesthetics are a core component of providing healthcare for the benefit of patients; this document proposes ways of measuring and reducing their impact whilst maintaining the quality and safety of patient care.

How to get started on carbon footprinting in healthcare?

Starting the carbon footprinting journey can be daunting - it is sometimes difficult to know where to start. A phased approach can be useful and help engage with the wider organisation and local health system.

A carbon footprint baseline is a useful starting point because it is concrete, gives a sense of scale, and can help identify areas of action to reduce carbon. This can be carried out based on a minimal dataset for some (such as energy use only), whilst others may wish to extend their footprinting to include wider areas e.g. travel, anaesthetic gases, or all purchased products and services.

The following principles can be used in any setting to make sure the process is embedded in wider organisational processes.

Principles:

1. Getting started is key – and the process will evolve over time
2. Try to establish a baseline from which to measure changes
3. Share with others and be open about the data, ask questions
4. Transparency about data collection and reporting mechanisms is key
5. Track the baseline going forward so that it is possible to evidence progress
6. The bottom number matters less than identifying areas of focus for action
7. Share the information and proposed action plan at board level
8. Share with your community and the public - by publishing a summary of the data, actions, and any progress in your annual report for example
9. Engage with people across the organisation because this matters to everyone and will impact on most areas of healthcare provision
10. Set a reduction target that your organisation can aim for
11. Review progress and actions at least yearly
12. Stay positive and keep trying to make progress

Clinical engagement

Some of the most potent gases and carbon intensive products are used as part of the clinical decision-making process including anaesthetic gases. This means that clinicians are clearly vital to any carbon reduction programme and can help find solutions that will not impact on the quality of outcomes for patients. Choices can be made that will be beneficial to patients and can reduce impacts on the environment; there are also areas, however, where the level of impact is unknown and so more research is needed to identify eco practices in medicine.

Data, benchmarking, targets, and monitoring progress

This section is an introduction to core concepts underpinning the carbon footprinting journey. Carbon footprinting is based on individual data sets that are each multiplied by their relevant carbon intensity factors. The data from a hospital's national grid electricity bills, for example, are multiplied by the grid carbon intensity factors relevant to that country.

The first process of data collection helps to establish a baseline from which further (yearly) data collections can be compared - it will support the organisation to identify areas with potential for carbon reduction and to develop an action plan to address these. This helps build understanding, establish early action as well as a process of learning what is important to the organisation. Over time, this data can be compared with other organisations (benchmarking) and monitored to track changes. The baseline and yearly changes can be reported within the organisation and in annual public reports. These form a time series.

The process from moving from data collection to action plan includes the following steps:

1. Setting a baseline
2. Benchmarking against other organisations using indicators
3. Identifying areas to reduce carbon and set reduction targets
4. Estimating the scale of action needed to achieve these reductions
5. Reporting processes both in organisation and public reporting
6. Monitoring progress using a time series

Data process phases:

Setting a baseline

Data collection for energy, gases, travel, and goods and services are multiplied by relevant carbon intensity factors. Tools such as [Hippocrates](#) are available with country adjusted carbon intensity factors for many common categories of measurement. These tools can help establish the first baseline for a given year and monitor yearly changes thereafter. The baseline is generally set on a year where there is sufficient data to make the calculations meaningful and can then be updated regularly. The data set collected over years becomes known as a time series. It is important that each time series uses the same methodology throughout so that year on year comparisons can be made.

After a baseline is established, further information may come to light improving the accuracy of the calculations. Carbon footprinting best practice includes incorporating any changes of this kind in the whole time series i.e. if there is improvement of measurement for paper use then this should update the whole time series. This approach means that all the years in a time series are comparable and that the baseline figures might be updated several years later because the methodology has improved.

Benchmarking

Benchmarking is a mechanism to allow comparison between organisations. The detail of any method used can determine the results so it can be useful to utilise a number of different indicators as highlighted below:

- Turnover (also known as operating expenditure) (euros per year)
- Number of beds (inpatient beds)
- Number of patient contacts - note that often different definitions are used and therefore are not always comparable between organisations
- Number of staff - usually Full Time or Whole Time equivalents (FTE or WTE)
- Operating room or theatre use (hours per year)
- Number of operations
- Key standard procedures for anaesthetic gas benchmarking (which procedures are most suitable still needs to be determined)

The scope of data collection and analysis is often defined by the areas under consideration and is described further in the next section.

Scope of data collection and therefore carbon footprinting

The scope of data collection described here can help organisations get started and compare emissions. These are based on standard carbon footprinting and reporting guidance (e.g. GHG Protocol accounting guidance) which use a range of “scopes”. Scopes provide boundaries for measuring emissions based on how directly the organisation controls the emissions. Scope 1 emissions are mostly directly controlled emissions taking place on the sites controlled by the organisation, Scope 2 emissions are energy (electricity and heat) used by the organisation but produced by a different organisation (district heating, electricity producers etc.), and Scope 3 emissions are indirectly influenced by the organisation and usually include the embedded carbon emission in the production and supply of all the goods and services purchased by the organisation. Other emissions are outside the scopes including patient, visitor, and staff travel to and from the site as well as logistics and deliveries to site. Most emissions from travel are not directly financed or controlled by the organisation; physical infrastructure, public transport, and delivery scheduling by the organisation, however, will strongly influence these emissions.

- Scope 1: Fossil fuels and direct emissions of greenhouse gases including anaesthetic gases (Desflurane, Sevoflurane, Isoflurane and Nitrous Oxide)
- Scope 2: Electricity and district heating
- Scope 1 and 2: Travel and transport paid for by the organisation (business travel, air travel and fleet vehicle fuel use)
- Scope 3: Goods and services purchased

Three distinct levels of measurement can be used to get started or increase understanding of impacts. One level is through direct measurement and usually includes energy use for an organisation i.e. scope 1 and 2. A second approach and level of measurement is to use

financial information to estimate overall emissions for scope 3. The third level is to look at specific products and put in place accurate measurement for these products. These three approaches map onto the GHG Protocol standards: corporate standard; corporate value chain; and product/project. All three levels provide processes for increasing understanding and reducing carbon emissions, so can be used to get started and progress is made through a number of data process stages as shown below:

Table illustrating the footprinting processes and the scope of data covered

	Level	Corporate measurement e.g. energy and anaesthetic gases	Corporate Value Chain i.e. all goods and services	Product or Project e.g. some products or services
Data Process stages				
Scopes		Scope 1 and 2	All scope 3	Specific scope 3
Setting a baseline		Corporate measurement	Corporate Value Chain	Product or Project
Benchmarking against other organisations using indicators				
Identifying areas to reduce carbon and set reduction targets				
Estimating the scale of action needed to achieve these reductions				
Reporting processes both in organisation and public reporting				
Monitoring progress using a time series				

An example from the pilot project across five hospitals:

The starting point for measurement was a baseline for the core scope of directly monitored fossil fuels, anaesthetic gases, electricity, district heating, and hospital funded travel and transport. In order to provide a level of comparison between the sizes of the hospitals, some benchmarking data was collected as follows (note that benchmarking information was not available for hospital 3):

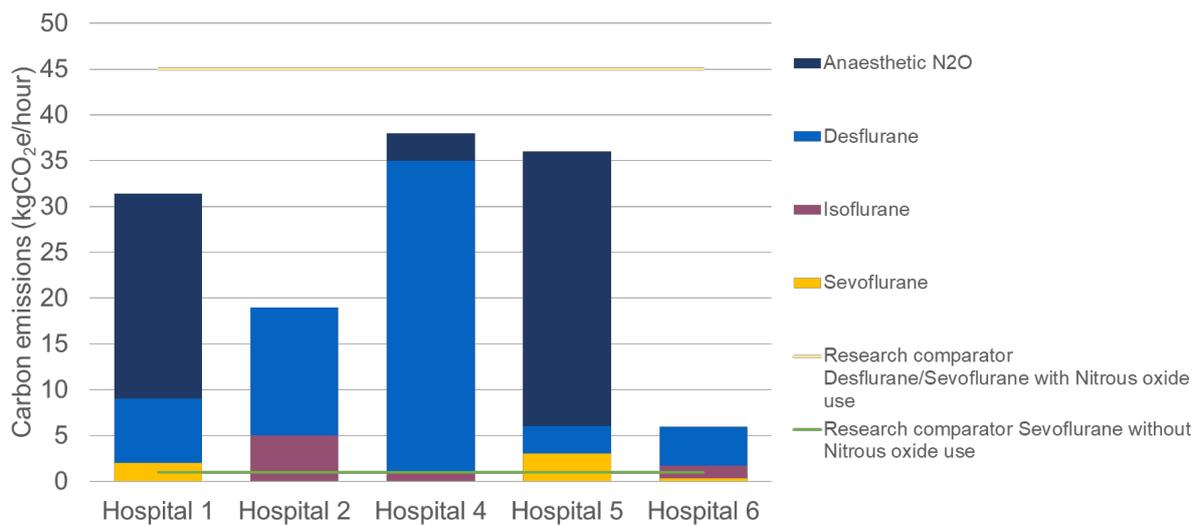
Energy use

Benchmarked total energy use						
Benchmark	Hospital 1	Hospital 2	Hospital 4	Hospital 5	Hospital 6	Unit
Beds	9.81	-	5.47	22.74	2.68	tonnes CO2e/bed
Number of operations/surgical procedures	469	865	120	176	60	kg CO2e /operation
Staff (Full Time Equivalent)	-	-	838	-	202	kg CO2e /FTE
Staff (Headcount)	1912	-	869	3728	-	kgCO2e /Staff employed
Turnover/money in €	-	74.7	19.66	29.96	1.69	g CO2e/€

Anaesthetic gases use

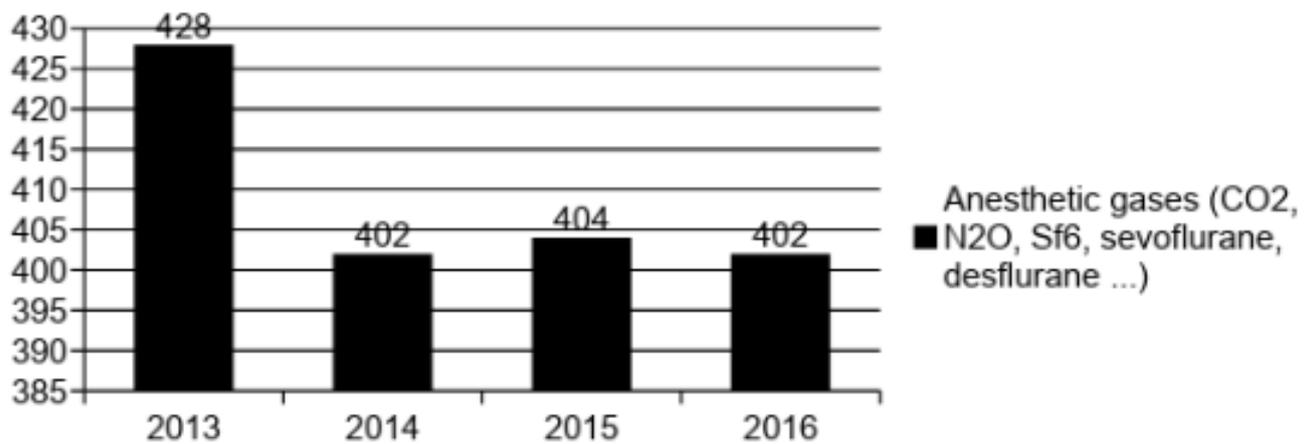
Benchmarked surgical anaesthetic gases carbon footprint						
Benchmark	Hospital 1	Hospital 2	Hospital 4	Hospital 5	Hospital 6	Unit
Number of hours of surgery/operations	31	19	38	36	6	kgCO2e/hour
Number of hours of anaesthetic gases use	-	13	-	-	-	kgCO2e/hour
Number of operations/surgical procedures	99	14	64	41	8	kgCO2e/operation

Benchmarked anaesthetic use per hour of surgery with research comparator:



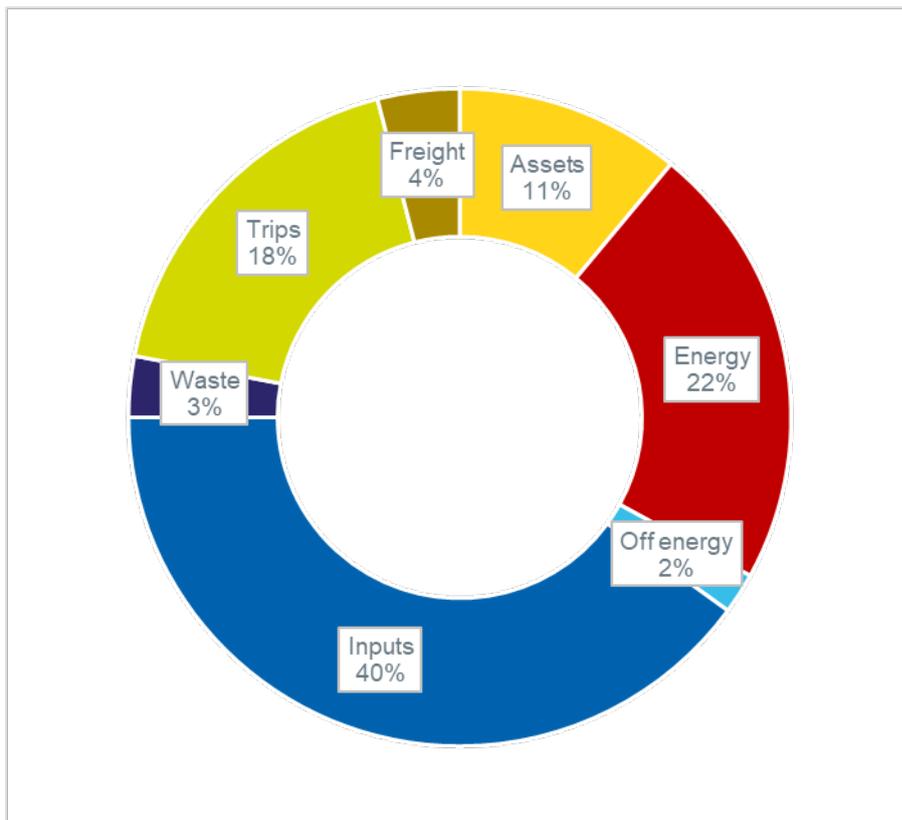
Anaesthetic gas use results from one hospital over time:

Anesthetic gases (CO₂, N₂O, Sf₆, sevoflurane, desflurane ...)

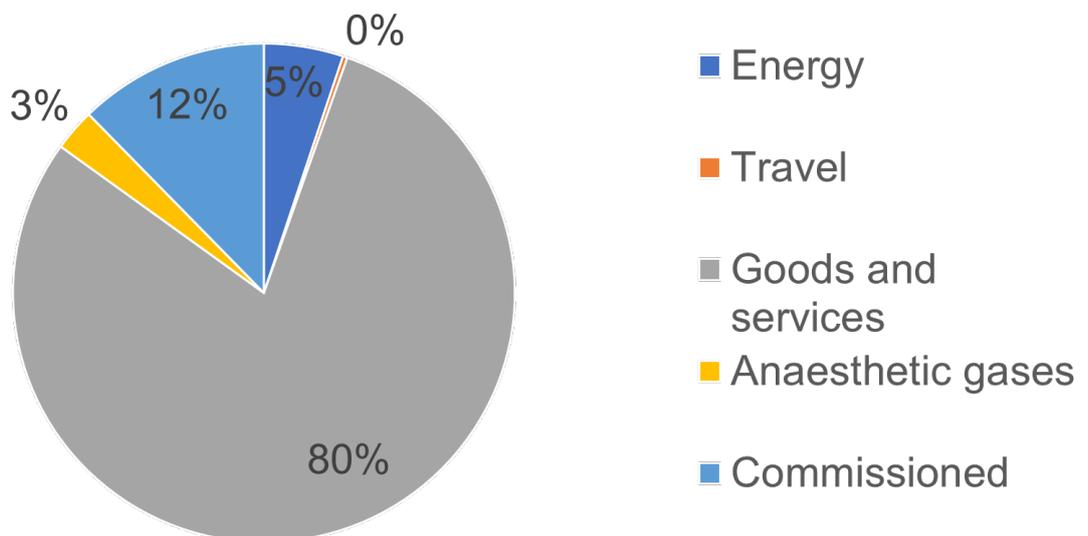


Monitoring started in 2013.

Results from another hospital representing different scopes of the footprint:



Example calculated full scope 1, 2 and 3 carbon footprint from one hospital:



Notes:

- Travel includes business travel only
- Goods and services modelled using spend and carbon intensity per Euro based on UK intensities

Annex 1: Links and references/Resources page

- Healthcare Without Harm, Hippocrates carbon footprinting tool:
- <http://www.greenhospitals.net/hippocrates/>
- GHG Protocol, Accounting Standard, scopes (available in various languages):
- <http://www.ghgprotocol.org/corporate-standard>
- Sustainable Development Unit for the NHS, public health and social care system in England, Carbon Hotspots - breakdown of carbon footprint for different types of health services: <https://www.sduhealth.org.uk/policy-strategy/reporting/hcs-carbon-footprint/carbon-hotspots.aspx>
- Sustainable Development Unit for the NHS, public health and social care system in England, Detailed carbon footprint methods paper - detailed methods for calculating energy, travel, goods and services carbon footprint
https://www.sduhealth.org.uk/documents/resources/Carbon_Footprint_carbon_emissions_2008_r2009.pdf
- Sustainable Development Unit for the NHS, public health and social care system in England, Wedges - which show the level of change needed to reduce emissions for energy, travel, goods and services <https://www.sduhealth.org.uk/policy-strategy/reporting/hcs-carbon-footprint/wedges.aspx>
- Sustainable Development Unit for the NHS, public health and social care system in England, Marginal Abatement Cost curve (MACC) - for investment and return in financial and carbon <https://www.sduhealth.org.uk/policy-strategy/engagement-resources/financial-value-of-sustainable-development.aspx>

Annex 2: Example data sheets from pilot project

Anaesthetic gases information

Part of footprint	Description	Unit
Isoflurane	Number of bottles issued from pharmacy (250ml)	Number
Sevoflurane	Number of bottles issued from pharmacy (250ml)	Number
Desflurane	Number of bottles issued from pharmacy (240ml)	Number
Isoflurane	Litres of liquid volatile	Litres
Sevoflurane	Litres of liquid volatile	Litres
Desflurane	Litres of liquid volatile	Litres

Anaesthetic N2O	Litres of nitrous oxide gas	Litres
Portable Equanox N2O	Litres of oxygen with nitrous oxide gas	Litres
Maternity Manifold Entonox N2O	Litres of oxygen with nitrous oxide gas	Litres
Total Nitrous Oxide	Litres of nitrous oxide gas	Litres

Hospital vital statistics for benchmarking

Statistic	Description	Unit
Beds	How many beds does the hospital have which are occupied overnight?	Number of beds
Turnover/money in €	How much money does the organisation/hospital have in revenue income?	€
Non-pay spend	Money spent on goods and services rather than on paying staff	€
Activity - patient contacts	How many patients are seen during the year? Include overnight stays as additional contacts e.g. outpatient appointments + inpatient admissions + overnight stays	Number of contacts
Activity - surgery	How many patients are having a surgical procedure in the year?	Number of operations/surgeries
Staff (Full Time Equivalent)	How many people would be employed if they all worked full time e.g. 35 to 40 hours per week?	Number of Full Time Equivalents
Staff (Headcount)	How many people are employed?	Number of people
Activity - Maternity - number of births	How many babies were born in the hospital during the year?	Number of births

Activity - Emergency - number of emergency attendances	How many people attended emergency department during the year? This includes people who were admitted or sent home	Number of Emergency attendances
Population served	How many people live in the catchment area for the hospital?	Number of people

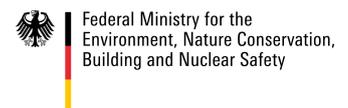
Contextual information for anaesthetic gases use

Statistic	Description	Unit
Number of operating rooms/theatres	How many operating rooms or theatres does your organisation/hospital have?	Number of operating theatres/rooms
Maternity	Does the organisation/hospital provide maternity services?	Yes/No
Emergency	Does the organisation/hospital provide emergency services?	Yes/No
Ambulance services	Does the organisation/hospital provide ambulance services?	Yes/No
Specialist hospital	Does the organisation/hospital specialise e.g. eye hospital, children or orthopaedics?	Yes/No
Teaching hospital	Is the organisation a teaching hospital or connected with a university?	Yes/No
Age of hospital pipework/buildings	Age of nitrous oxide pipework or age of building if not refurbished	Year

Goods and services scope 3 estimate

Statistic	Description	Unit
Non-pay spend	Money spent on goods and services rather than on paying staff	€
Business services	All services including post, finance and audit, consultancy etc.	Euros
Construction	Construction, maintenance, building work, new plant etc.	Euros
Food and catering	Net spend on food and catering services, not including income from the public	Euros
Freight transport	Logistics, goods transportation	Euros
Information and communication technologies	All computer equipment, phones, phone contracts, internet services	Euros
Manufactured fuels chemicals and gases	Medical gases etc.	Euros
Medical Instruments /equipment	All medical instruments and equipment including servicing contracts, hire etc	Euros
Other manufactured products	Goods not included in other categories	Euros
Other procurement	Hopefully zero	Euros
Paper products	All paper and paper derived products including hand towels, toilet roll, bedpans, paper aprons, curtains etc.	Euros
Pharmaceuticals	Drugs spend	Euros
Travel	Business travel, air travel, patient travel services, visitor transport services, vehicle maintenance	Euros

Commissioning	Health services purchased from other providers or outsourced	Euros
Water and sewerage	Exclude the spend in the above and include carbon emissions here	kgCO2e
Waste and recycling	Exclude the spend in the above and include carbon emissions here	kgCO2e
Energy	Exclude the spend in the above and include carbon emissions here	kgCO2e
Patient travel and transport not included above	Patient costs only	kgCO2e
Staff commute travel	Staff costs only	kgCO2e
Visitor travel	Visitor costs only	kgCO2e



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