



ENERGY EFFICIENCY IN THE HEALTHCARE SECTOR: EASY WINS THROUGH BEHAVIOUR CHANGE

What is energy efficiency?

“Achieving the same service with less energy” is how the International Energy Agency (IEA) defines energy efficiency.¹ This greatly depends on practices and technologies that can guarantee the same or improved quality of service, while using less energy. The benefits of such practices, however, go far beyond energy saving and a reduction in energy costs: energy efficiency also has positive consequences for both human and environmental health, and can improve the quality of patient care. The healthcare sector can benefit immensely from improving energy efficiency.

This factsheet explores the link between the healthcare sector's energy choices and their impact on air quality and climate change, providing practical examples of how to improve energy efficiency in healthcare settings through behaviour change.

THE 'TRIPLE WIN' FOR HEALTHCARE

Air pollution is the single largest environmental risk to human health, and the fourth greatest overall risk factor worldwide, after high blood pressure, dietary risks, and smoking.² Latest estimates attribute 6.5 - 7 million premature deaths to air pollution, equivalent to one in eight deaths globally.³ Energy production and use accounts for the majority of air pollution from human activity - mostly due to the combustion of fossil fuels and biomass.²

Not only does air pollution harm human and environmental health, but many air pollutants also contribute to global warming, further exacerbating the adverse impacts of climate change.

The healthcare sector is a hugely energy-intensive sector that contributes large amounts of greenhouse gas (GHG) emissions and air pollutants. In England, for example, the total carbon footprint of the public healthcare sector in 2012 was 32 million tonnes of carbon dioxide equivalents (MtCO₂e),⁴ accounting for 38% of all public sector emissions.⁵ These harmful emissions undermine the health of the same communities the sector aims to heal.

The energy choices of hospitals and health systems (including their activities, services, and supply chains) have a great impact on their patients, staff, communities, and surrounding environments. The healthcare sector has the opportunity to achieve a triple win in this regard, by making smart energy choices that will reduce air pollution and environmental and health impacts, mitigate climate change, and save energy costs.

Energy and air pollution

Air pollution is the concentration of gases, liquids, and/or solids in the air that negatively impact upon the environment and people.² While there are some pollutants that occur naturally from wildfires, volcanoes, and natural environmental phenomena - the vast majority of pollutants trapped in our atmosphere today are caused by human activity, specifically the production and use of energy. These include: sulphur oxides (SO_x), nitrogen oxides (NO_x), particulate matter (PM), carbon monoxide (CO), volatile organic compounds (VOCs), ammonia (NH₃), and ground-level ozone (O₃).²

Some energy sources produce higher concentrations of certain pollutants. Burning coal, for example, produces the highest concentrations of sulphur dioxide, whilst emissions from oil combustion contain the largest concentration of nitrogen oxides. Biomass is by far the greatest source of particulate matter emissions.²

Energy choices therefore matter a great deal when it comes to air pollution.

Air pollution and health

Exposure to unsafe levels of air pollution is linked to a wide range of diseases and health hazards. Ozone (O₃), nitrogen dioxide (NO_x), and sulphur dioxide (SO₂) are linked to asthma, bronchial disease, reduced lung function, and lung disease.² These pollutants mostly come from energy production and use.

Fine particulate matter (PM_{2.5}) is associated with an array of illnesses that can cause significant harm to human health (even at very low concentrations) due to their ability to penetrate deep into the lungs.² PM_{2.5} can cause cardiovascular and pulmonary diseases, including lung cancers and strokes.⁶ Airborne PM has been categorised as a Group 1 human carcinogen by the International Agency for Research and Cancer.⁷

Emerging evidence also suggests that PM_{2.5} pollution may be associated with common non-communicable diseases such as diabetes, decreased cognitive function, attention deficit disorders, autism in children, and dementia in adults.⁶ In 2015, more than 175,000 premature deaths in the EU were attributed to high PM exposure.²

Different pollutants have different health impacts depending on an individual's health profile; even at a relatively low exposure some pollutants may have high health risks for vulnerable groups of the population, such as the very young and the elderly.⁶

International Energy Agency data for 2015 shows that 350,000 premature deaths in the EU were attributable to outdoor air pollution, average life expectancy was reduced by six months, and half of the EU's population was exposed to PM_{2.5} levels above the WHO safety guidelines.^{1,2}

Energy, air pollution, and climate change

The extraction and combustion of fossil fuels is not only a major source of air pollution that is harmful for human health, but also a primary source of GHG emissions such as carbon dioxide (CO₂). GHG emissions are responsible for accelerating the rate at which the planet is warming; energy use, air pollution, and climate change are closely related.

Air pollutants can also contribute to climate change when they absorb or reflect radiation from incoming sunlight.⁶ Black carbon, for example, a pollutant emitted from the burning of solid fuels and diesel engines, absorbs solar radiation and is one of many pollutants that simultaneously contaminates the air we breathe and warms our atmosphere.⁸

According to The Lancet, fossil fuel combustion in developed countries and the burning of biomass in the developing world accounts for 85% of airborne particulate pollution globally.⁶ Major sources of CO₂ emissions include electricity plants, chemical manufacturing facilities, mining, deforestation, and petroleum vehicles. The healthcare sector's reliance on these carbon intensive activities to produce goods and services is significant, and accounts for a vast amount of the sector's climate footprint.



ENERGY TRENDS IN EU BUILDINGS

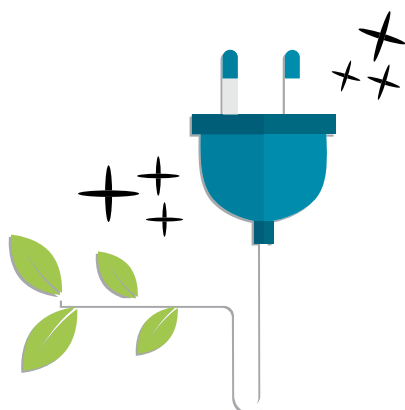
Building emissions relate to space heating, cooling, water heating, lighting, appliances, and cooking equipment from residential, commercial, and institutional buildings (such as hospitals).² In the EU today, buildings are responsible for 40% of energy consumption and 36% of CO₂ emissions.⁹ Dependence on coal has been steadily decreasing since the 1990s; 70% of the coal currently used in the EU is consumed by Poland, where half of the population still rely on coal and solid biomass for space heating.²

Less than 5% of energy used to heat buildings in the EU today comes from coal, however this small percentage is responsible for nearly 75% of SO₂ emissions from all EU buildings, illustrating both the potency of toxic emissions from certain fuels, and the great opportunity to reduce such emissions from buildings.

Recently, the EU has taken legislative steps to reduce air pollution and dependence on coal by encouraging the use of renewable sources of energy, such as wind, solar, tidal, and geothermal, but also by promoting increased reliance on bioenergy.

Bioenergy

“Bioenergy is energy content in solid, liquid, and gaseous products derived from biomass feedstocks; this includes solid biomass (wood, charcoal, agricultural, and animal waste etc.), biofuels, and biogas.”
- International Energy Agency (2016)²



Is bioenergy sustainable and climate-smart?

It is misleading, however, to classify all bioenergy sources as sustainable – unfortunately it is not that straightforward. There is a big difference in overall emissions between using agricultural and municipal organic waste or industrial residues (e.g. from saw and paper mills that would otherwise be wasted) versus mass-harvested biofuel crops (i.e. those grown for the sole-purpose of biofuel combustion, such as trees, rapeseed, and corn). The use of biofuel crops is currently rising in the EU, and 5 million hectares of agricultural land is currently devoted to biofuel crops¹⁰ - this raises a several environmental concerns, and misleads public understanding of sustainable energy sources.

Purpose-grown biofuel crops are problematic as they further contribute to large-scale deforestation and agricultural GHG emissions, whilst also reducing the amount of land available for climate mitigation activities, such as carbon-sequestration and reforestation.¹⁰ Purpose-grown biofuel crops also reduce the amount of land available for food and feed production.

There are strong links between bioenergy and climate change - as more forests are felled for biofuel crop production, and more land is allocated for growing these crops, bioenergy is increasingly contributing to agricultural carbon emissions and deforestation. In 2015, 40% of PM_{2.5} emissions in the EU came from the use of biofuels in buildings, and the International Energy Agency predicts that this trend will continue to increase.² Hospitals are increasingly looking to biofuels as a sustainable and climate-smart energy source. This, however, will only replace high concentrations of SO₂ emissions from fossil fuels with high concentrations of PM from biofuels. This will not reduce air pollution and is not a climate-smart alternative.

It is important to include bioenergy in the energy efficiency discussion so that we avoid falsely categorising biofuels as a sustainable energy source in all circumstances.

ENERGY TRENDS IN EU BUILDINGS

Energy consumption in hospitals

The healthcare sector is a highly energy-intensive sector that requires vast amounts of energy for its operations and throughout its supply chain – from the manufacture and transport of goods and services to the provision of care in healthcare facilities.

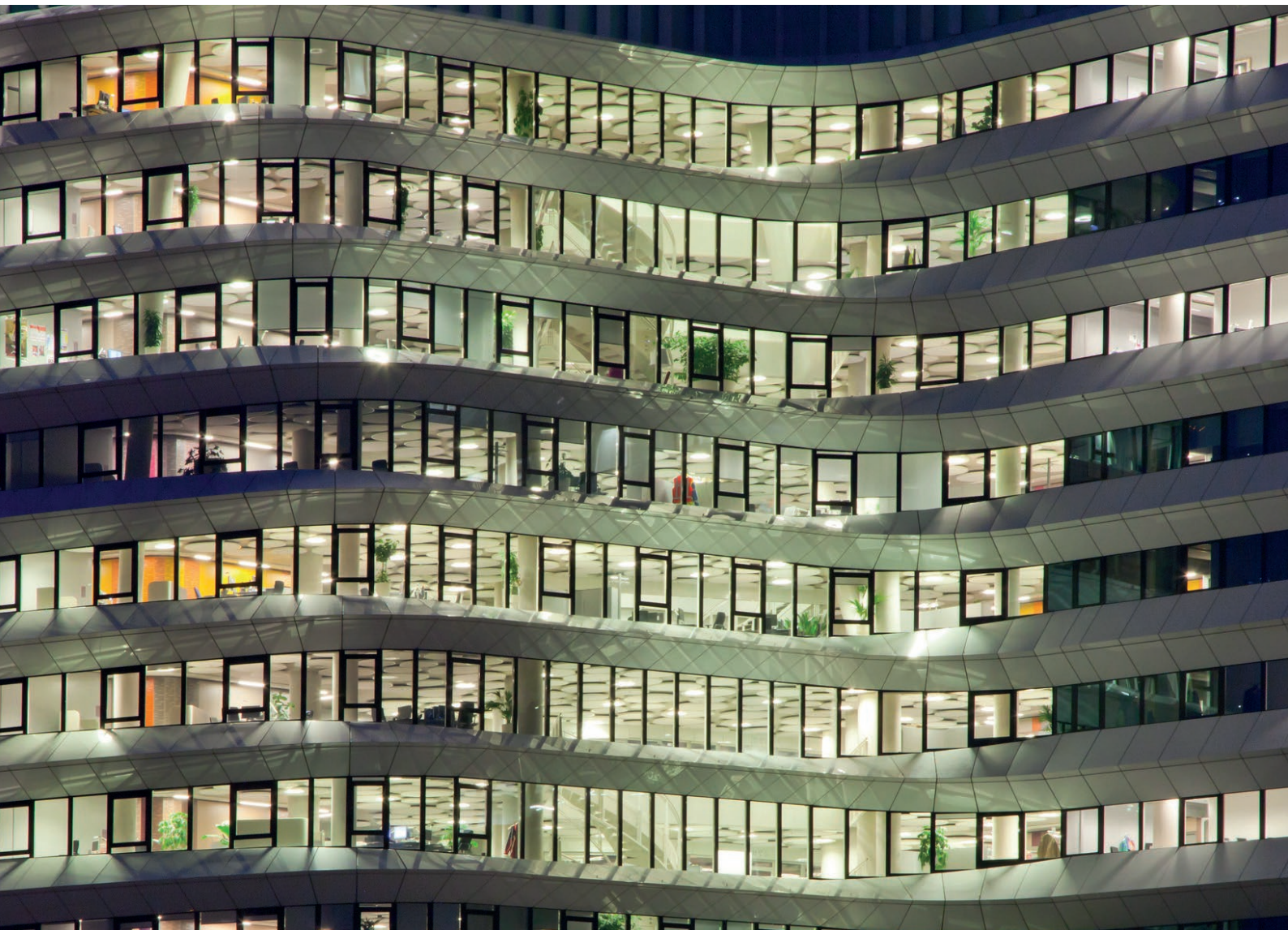
A major source of GHG emissions within health systems is high-energy consumption from buildings and medical procedures, for example kitchens, laundry rooms, sterilisation, radiology, laboratories, operating theatres, ventilation, air conditioning, and heating.¹¹ Health facilities, especially hospitals, require an uninterrupted power supply to provide care 24 hours a day. Health facilities also rely heavily on secondary generation capacity for emergency use.

Not only do these energy-intensive activities have a significant impact upon human and environmental health, they also affect economies. According to the German foundation Viamedica's programme Klinergie,¹² a hospital's energy consumption per bed uses as much electricity and heating as two households.¹¹

In the UK, the healthcare sector spends over £400 (€450) million annually on energy and in 2015, the healthcare sector in England emitted 4.9 MtCO₂e from energy-consumption used to power its buildings alone.^{13,14}

The majority of European hospitals are powered by fossil fuel based energy sources, and approximately 75% of energy consumed in EU buildings is for heating.¹⁵ Evidently, the mix of energy sources that a health system uses to heat buildings has a significant impact on that system's carbon footprint and energy costs.

Energy efficiency is not only about the choice of energy sources and the quality and efficiency of the systems, but also the management of these systems. According to Carbon Trust, a 1°C heating rise can raise energy costs by up to 8%.¹³ By developing energy efficient policies and processes, health systems can significantly reduce their energy consumption.





ENERGY EFFICIENCY THROUGH BEHAVIOUR CHANGE

Several energy-consuming activities and systems work together for health systems to function and guarantee safe, quality healthcare - energy choices and the quality of these systems greatly determine the efficiency of energy use. There are, however, several low-investment measures that can increase energy efficiency in healthcare facilities, many of which simply guide behaviour change towards more conscious energy use. Engaging hospital staff in this effort is an important step that can significantly enhance energy efficiency in health facilities, empower staff, and improve patient satisfaction.

Educating the workforce about the health and environmental impacts of healthcare activities is necessary in order to increase the understanding of the benefits that improved energy efficiency can bring to the working environment and community. Some hospitals are already taking the lead in providing training and capacity building to empower their workforces to take action to improve the energy efficiency of everyday activities.

Case Studies



Operation TLC (Turn off equipment, Lights out, Control temperatures) is an award-winning behaviour change programme in the UK developed by Barts Health National Health Service (NHS) Trust in collaboration with behaviour change NGO Global Action Plan. The programme seeks to train hospital staff by providing education and knowledge that helps them adopt best practices to save energy and money, whilst maintaining and improving the healing environment for patients.

In 2012, Operation TLC was brought to life by the sustainability team of Barts Health NHS Trust. The pilot project aimed to address avoidable energy-wasting behaviour at the six hospital sites of the Trust, such as leaving lights on in unattended rooms or high energy-consuming machinery being left on after use. The project sought to find ways to inspire staff to take control of their environments and be stewards for energy efficiency.

The team identified three focus areas for the project; lighting, temperature, and equipment control, and interventions to improve energy consumption in these areas:

- **Close doors and windows to control heating** - this also helps improve patients' levels of comfort and privacy
- **Dim or turn off unnecessary lighting, and switch off unused equipment (day and night)** - this reduces noise, heat, and bright light, which helps patients rest
- **Open blinds so patients benefit from daylight, rather than artificial light** - this helps patients follow a more natural sleep cycle

Four barriers were identified that prevented staff from actively engaging in reduced energy use:

- **Familiarity with the buildings** - staff were often unfamiliar with the layout and control systems of the building, so they were unaware of how to make the most efficient use of the facilities
- **Lack of expectation** - staff did not know that intervention was expected of them, or that they were even allowed to adjust lighting and control systems
- **Habit and memory** - some staff would simply forget
- **Maintenance and facilities** - sometimes equipment would be broken and would take a long time to fix

Developing solutions to these challenges empowered staff with the knowledge, confidence, and authority to take control of their building. By focusing on ways to save energy, staff began to notice improved patient satisfaction.

Other methods to improve patient comfort were also developed, for example: patients in shared rooms would be constantly disturbed by bright lights when nurses visited neighbouring patients, so the Trust implemented "quiet times" in their wards, giving patients the opportunity to rest in a dark room for an hour after lunch without disturbances. Nurses noticed that improving patients' resting conditions also significantly improved the quality of interaction with them - patients could be more comfortable, get more rest, ultimately improving patient and staff relationships, as well as resulting in the saving of energy and money. This is just one of many examples of simple, low-cost energy

efficiency strategies developed as part of Operation TLC.

Barts Health NHS Trust saved £49,000 (€57,445) in the first year by simply turning off equipment that could be safely switched off during non-working hours and placing reminder stickers close to light switches. Within two years the Trust reported that sleeping disruptions were reduced by 33%, patient requests to adjust room temperatures were down by 38%, and 1,900 tonnes of CO₂ and £428,000 (€501,764) was saved. Projections show that if adopted by all NHS Trusts, Operation TLC could save the NHS £35 (€39) million a year.¹⁶

Sussex Community NHS Foundation Trust

Sussex Community NHS Foundation Trust (SCFT) delivers care from 11 community hospitals, 52 health centres, and 7 offices across nearly 1,000 square miles (2,600km²). The NHS has the largest carbon footprint of the public sector in the UK, of which the SCFT contributes 6,600 tonnes CO₂e annually; 79% of the Trust's emissions are from building activities.

SCFT's goal is to reduce its carbon footprint by 34% by 2020 - improving environmental performance is an important part of the Trust's strategy, as it also helps save money whilst contributing to an improved working environment.

In 2015 SCFT launched the **Dare to Care** staff engagement programme, which calls on staff to get involved by making pledges, known as "dares" – these are everyday actions that can be completed more efficiently to help reduce environmental impact, save money, and boost wellbeing.

The Trust sought input from the workforce before developing this staff engagement programme to find out the workforce's needs and obstacles - the feedback was clear:

- **Make it simple** - staff are too busy to get involved with anything complicated
- **Make it relevant** - demonstrate clear links to the staff's working life and identify personal gains
- **Make it accessible** - don't rely on intranet; make it broadly accessible so it can be accessed anywhere at any time, and even shared with friends and family
- **Make it sociable** - people like to engage with colleagues; peer-to-peer is important

From this feedback, the Environment and Transformation team developed the Dare to Care programme - easy pledges that add up to big impacts to the work environment. The 'switch it off' dare for example, encourages staff to switch off lights, monitors, printers, and even mobile phone chargers and microwaves in staff kitchens when not in use.

Staff engagement takes place via the Trust's sustainability strategy website: www.CareWithoutCarbon.org, the Trust's internal communications channels, and during staff events (e.g. trainings, introductions, and awards ceremonies). Staff can sign up to a dare in person at events or via the website where they can also view the total number of darers in their area and the number of people committed per dare. It is



Nurse at Barts Health NHS Trust supporting Operation TLC

up to each individual how long they do their dare - some people only commit for a few weeks, while others continue indefinitely.

Strategically placed information posters and stickers help to keep staff aware of opportunities to better manage resources through behaviour change. The team also produce posters (below) highlighting individual efforts - naming them as 'cover stars' - and every 6-9 months posters with new dares are produced. New darers receive a 'goodie bag' with tips on how to keep up their dare(s) and, where possible, the team works to provide sustainable incentive. Recent prizes include shower timers provided by water companies, organic shampoo, discount vou-



SCFT poster promoting Dare to Care campaign

chers, and even a one-night stay at an eco B&B, all made possible by collaborating with local businesses.

The work of Dare to Care is led by the Environment and Transformation team at SCFT who have a broad range of skills, from energy management expertise to communications; diverse skills are brought together to achieve the best results for behaviour change. The team is currently looking to recruit 'staff envoys' to support this work more widely.

Dare to Care is an on-going programme, and 'switch it off' has become a core dare - in 2016, energy saving measures specifically related to the programme saved approximately £14,000 (€15,800).

In 2016, SCFT ran an energy saving campaign - Phantom Energy Month - which focused on energy wasted from electrical items left on standby. Targeting specific sites, the Trust saw an average energy reduction of 3% across the month.

The Trust's biggest challenge in engaging healthcare staff in energy efficient behaviour is their wide geographical range - over 4,500 staff work across more than 70 sites. It is therefore essential that the programme is made accessible via a variety of channels. While the Trust does not own all of its estate (another key challenge), the team works closely with partner organisations to help deliver greater energy efficiency on sites not owned by SCFT.

To continue improving engagement, the Trust is working to increase face-to-face engagement and is also developing new dares that will encourage staff to take on bigger challenges and work as a team with colleagues to achieve them.

People like to feel they are contributing to positive change, and the Trust is therefore working to improve its annual reporting - it has just published the second *Annual Sustainability Progress Report*.¹⁷

To date, SCFT has achieved a 19.9% improvement in per m² energy efficiency of their buildings (against the 2010 baseline year), and staff engagement has played an important role in this achievement.

CONCLUSION

Becoming more energy efficient and reducing energy use are possibly the biggest 'easy wins' for health systems, as they also guarantee financial savings. High-investment measures such as replacing energy systems with more efficient ones or using renewable energy sources will yield much greater savings and environmental and health benefits in the long-run.

As shown here, however, staff empowerment can also go a long way - there is enormous unexploited potential for health systems across Europe and globally to save a great deal of energy and money, and reduce GHG emissions and harmful air pollutants through behaviour change approaches.

The health sector exists to protect health. Hospitals and health systems have the moral responsibility and social obligation to be leaders in the fight against climate change by reducing their own toxic emissions and minimising the harm they cause to human and environmental health.

HCWH Europe encourages hospitals and health systems to learn from these experiences and introduce capacity building programmes in their facilities.



REFERENCES & NOTES

1. International Energy Agency (2017). Energy efficiency. Available at: <https://www.iea.org/topics/energyefficiency/>
2. International Energy Agency (2016). Energy and air pollution.
3. World Health Organization (2017). Air pollution and health. Available at: <http://www.who.int/airpollution/en/>
4. CO₂ equivalent refers to a combination of harmful greenhouse gases, not just carbon dioxide.
5. Public Health England/NHS England/Sustainable Development Unit (2014) NHS, Public Health and Social Care. Carbon Footprint 2012. Available at: www.sduhealth.org.uk/documents/publications/HCS_Carbon_Footprint_v5_Jan_2014.pdf
6. The Lancet Commission (2017). The Lancet Commission on pollution and health.
7. International Agency for Research on Cancer (2013). Air pollution and cancer. Available at: <https://www.iarc.fr/en/publications/books/sp161/AirPollutionandCancer161.pdf>
8. European Commission DG Environment (2010). Air Pollution and Climate Change, Science for Environment Policy, 24. Available at: http://ec.europa.eu/environment/integration/research/newsalert/pdf/24si_en.pdf
9. European Commission (2017). Energy efficiency, buildings. Available at: <https://ec.europa.eu/energy/en/topics/energy-efficiency/buildings>
10. WWF (2017). EU bioenergy policy – briefing paper. Available at: http://wwf.panda.org/what_we_do/footprint/one_planet_cities/key_messages/?302612/EU-bioenergy-policy---position-paper
11. C2DS (2012). Better practices; Guidelines for the health sector. Paris, France.
12. Viamedica Foundation (2017). Klinergie 2020: Energieeffizienz in Deutschen Kliniken. Available at: www.klinergie.de
13. Carbon Trust (2017). Healthcare: Energy efficiency and carbon saving advice for the healthcare sector. Available at: www.carbontrust.com/resources/guides/sector-based-advice/healthcare/
14. Sustainable Development Unit (2016). Carbon update for the health and care sector in England 2015.
15. ResHospitals (2017). What we do. Available at: www.res-hospitals.eu/about/what-we-do
16. Global Action Plan (2017). Operation TLC. Available at: www.globalactionplan.org.uk/operation-tlc
17. Care Without Carbon (2017). Annual Sustainability Progress Report 2017 for Care Without Carbon. Available at: www.carewithoutcarbon.org/2017-progress-report



HCWH Europe

Rue de la Pépinière 1,
1000 Brussels, Belgium

E. europe@hcwh.org

T. +32 2503 4911

 @HCWHEurope  HCWHEurope

www.noharm-europe.org

Author: Ana-Christina Gaeta Hernández
Climate & Resource Policy Officer, HCWH Europe

Design: prinzdesign Berlin

Published: December 2017

Photos: [onlyyouqj@Freepik](https://www.freepik.com) (P.1), [benkrut@istockphoto](https://www.istockphoto.com) (P.3),
[CreativeNature_nl@istockphoto](https://www.istockphoto.com) (P.4) / [Sturti@istockphoto](https://www.istockphoto.com) (P.5),
Global Action Plan (P.6 [top]), Sussex Community Foundation
Trust (P.6 [bottom])

Health Care Without Harm (HCWH) Europe is the European arm of a global not for profit NGO whose mission is to transform healthcare worldwide so that it reduces its environmental footprint, becomes a community anchor for sustainability and a leader in the global movement for environmental health and justice. HCWH's vision is that healthcare mobilises its ethical, economical, and political influence to create an ecologically sustainable, equitable, and healthy world.

Printed on 100% recycled paper using vegetable based ink.



HCWH Europe gratefully acknowledges the financial support of the European Commission (EC). HCWH Europe is solely responsible for the content of this publication and related materials.

The views expressed do not reflect the official views of the EC.