Climate and Environment: Challenges for Hospitals and Healthcare Services

European Hospital & Healthcare Federation

Report on the HOPE Agora

Brussels, 2-3 June 2023

Contents

Introduction

Dr. Urmas Sule, HOPE President and Chairman of the Board of the Estonian Hospitals Association, inaugurated this year's Agora conference and marked the 40th edition of the HOPE Exchange Programme. During the month of May 2023, 109 nurses, doctors, anaesthesiologists, physiotherapists, and hospital managers among other healthcare professionals, participated in a 4-week hospital exchange across 20 countries in Europe.

This intensive exchange culminated in Brussels. During the two-day Agora conference, HOPE welcomed 170 people, including the national coordinators who made the exchange happen.

In keeping with previous themes, which reflect the most pressing challenges hospitals and healthcare providers face in Europe, this year's topic was "Climate and Environment: Challenges for Hospitals and Healthcare Services."

Participants observed green practices in different hospitals, identified the best, and shared them at the conference. Presenters focused on the impact the sector has on the climate and the environment, and vice versa. The challenges are enormous, but there is reason to hope given the actions, commitment, and strategies observed and showcased by each exchange team.

This document summarises the proceedings of the event.

Conference

HOPE President Urmas Sule, chair of the day, welcomed the 170 participants from across Europe. He was then joined by former head of HOPE, Eva Weinreich-Jensen, who moderated the panel discussions.

Following a video message[1] from EU Commissioner for the Environment, Oceans and Fisheries, Virginijus Sinkevičius, the panel discussion opened with four presentations:

- Sarada Das, Secretary General of the Standing Committee of European Doctors (CPME) focused on the various challenges hospitals and health services face vis-à-vis climate change.
- Rudy Chouvel, project manager at the French Hospital Federation presented different approaches to supporting hospital initiatives on and involvement in ecological transitions.
- Marc Schreiner, managing director of the Berlin Hospitals Association, discussed the climate protection strategy in Berlin.
- Mehreen Kassam Chief Sustainability Officer's Clinical Fellow at the National Health Service - England (NHS) outlined the steps the NHS - England is taking to reduce waste and emissions.

Each presenter provided contexts for their approaches to environmental reform and policies; how their organizational structures, members and staff, and institutional profiles, affect their policy priorities. Below, we review each of the panel presentations.

Presentation 1 - Climate and environment: Challenges for hospitals and healthcare services

Sarada Das, Secretary General, CPME

CPME contributes to the debate on climate change to highlight that the implications for health as climate change is the biggest global health threat in the 21st century. Since 2018, CPME has co-published the annual Lancet Countdown policy briefs for European policymakers. As of 2022, CPME has been part of the World Health Organization's (WHO) Working Group on Climate Change and Health, and is actively engaged in promoting the WHO 'One Health'[2] approach.

[1] Link to video message - https://hope.be/wp-content/uploads/2023/06/LR_I241537EN1W.mp4.

[2] The 'One Health' approach seeks to address the health threats that emerge at the interface of animal-human-environment interactions; particularly in relation to (1) food safety, (2) control of zoonotic diseases, (3) laboratory services, (4) neglected tropical diseases, (5) environmental health, and (6) antimicrobial resistance.

Learn more here: https://www.who.int/europe/initiatives/one-health#:~:text=One%20Health%20is%20an%20approach,animal%2Dhuman%2Denvironment%20interface.

Within the framework of environmental health, a One Health priority, CPME emphasises that doctors must be prepared to respond to the health threats resulting from climate change. Comparing to 2009 when CPME drafted some of its first policy positions highlighting the challenges global warming will pose to health, doctors have become increasingly engaged and interested in environmental topics, particularly recent generations.

CPME has adopted a broad approach to climate change and health, but it monitors closely several areas where its members and the secretariat at the EU level can play a role. These include:

- Air pollution - The Ambient Air Quality Directives set EU air quality standards and they are now being revised. CPME's 2019 policy position on air quality and health calls on the EU to fully align the EU standards with the WHO guidelines and the latest scientific evidence.

- Health impact - CPME highlights climate change's impact on health, specifically extreme weather events, communicable diseases, mental health, health inequalities, and food systems.

- Doctors' role in sustainable healthcare - Healthcare services have a key role to play in reducing their own carbon footprint and achieving net-zero emissions. Globally, the health sector accounts for 4.4% of greenhouse gas emissions, and even more in many European countries. Without action, the healthcare sector's absolute global emissions would grow enormously from a 2014 baseline and more than triple by 2050.

To help address the issues outlined above, CPME provides recommendations to help the healthcare sector adapt and become resilient to climate change. These include:

- Increasing efforts to make healthcare delivery more sustainable and climate neutral, and de-carbonizing healthcare services. Firstly, it must be acknowledged that the most sustainable healthcare is the reduced need for healthcare. Therefore, prevention is essential.

- Investing in research in sustainability and patient-safe healthcare.

- Using renewable energy sources (e.g., solar and wind) and advocating for a rapid phasing-out of fossil fuels to improve their energy efficiency. This transition requires investments in low carbon technologies and better building designs.

- Greening public procurement from start to finish: manufacturing, packaging, transporting, raising awareness on the prudent use of pharmaceuticals, shortening the supply chains, etc.

- Reducing waste by improving management and recycling practices, e.g., paying attention to the use of plastics and single-use medical devices, pharmaceuticals disposal, practicing reprocessing and remanufacturing of single-use medical devices, promoting reusable products such as reusable gowns or tableware, selecting surgical equipment more carefully, optimising food purchases to reduce food waste, and redirecting food waste (donation, recycling, composting, etc.), among other things.
- Curbing pharmaceutical pollution by establishing governmental and regulating authorities with clear evidence-based and enforceable targets to cap pharmaceutical discharges. This is especially important because pharmaceutical effluent greatly contributes to antimicrobial resistance (AMR). Therefore, the European Union should consider the impact of offshore pharmaceutical manufacturing on pollution, and the spread of AMR, including in imports and trade agreements.

Presentation 2 - Supporting public hospital initiatives and involvement in the ecological transition

Rudy Chouvel, Project Manager, French Hospital Federation

The French Hospital Federation (FHF) was created in 1924 by 5 regional federations; today there are 18 members covering 1,000 public hospitals, 3,800 public social and social-medical establishments (e.g., nursing homes, day care centers for persons with disabilities, etc.). The federation focuses primarily on (1) promoting and representing public institutions, (2) monitoring health policies and informing members, and (3) drafting recommendations for public authorities.

In the environmental context, the FHF is supporting public hospital initiatives and involvement in their ecological transitions. A snapshot of the current situation in France demonstrates why this has become a priority item:

Hospitals and health care facilities produce up to 700,000 tons of waste of which 150,000 tons represents infectious clinical waste
(Sources: ANAP/ADEME, 2010 & HCSP 12/11/20)

1.5bn meals consumed
(Source: ADEME, 2016 + Resah 2021)

€29bn spent in hospital procurement
(Source: DGOS, 2021; public hospitals only)

400-1200 litres of water used per bed/per day
(Source: ADEME, 2020).

21.5 TWh/year consumed
(Source: ADEME, 2020)

47 MtCO2 in carbon emissions - 8% of the national carbon emissions
(Source: The Shift Project, 11/2021, updated 04/2023)

To help meet the challenges climate change poses from the health sector, the FHF has created a multidisciplinary group called the Ecological Transition in Health. Its activities include organizing webinars on green hospitals (8 in 2022 and 10 so far in 2023). These webinars cover topics such as food waste and management, reducing operating room emissions, biodiversity, saving water, biologically friendly cleaning techniques, etc.

Furthermore, the FHF has drafted and continues to draft policy briefs and recommendations for public authorities. To maintain momentum, they have also created nomination calls for awards in ecological transition in health and appropriateness of care.

The federation also publishes clear to inform hospitals and departments of their legal obligations regarding food, travel, transport, environmental health, and waste, etc. And in a recent special edition of the FHF institutional magazine, *Le cahier: Techniques hospitalières*, the federation focused on the ecological and energy transition in the context of hospital and healthcare.

Presentation 3 - Climate protection strategy for the German capital

Marc Schreiner, Managing Director, Berlin Hospitals Association

Echoing other speakers, Marc Schreiner began by illustrating the context in which German hospitals, including in Berlin, are working to address climate change and health challenges.

In Germany there are 1,887 hospitals under three types of ownership: public, charity-based, and private for profit. These institutions provide almost 500,000 beds, 20 million inpatient

services and inpatient services each, and employ nearly 1.2 million people (including 185,000 doctors and 400,000 nurses).

The Hospital Federation of Berlin (BKG) covers 60 hospitals with a gross annual income of approximately €5bn. The BKG is a partner of politics and self-government system, and its legal tasks/mandates include:

- Negotiating hospital prices and plans
- Determining training funds
- Quality assurance
- Overseeing an arbitration board and the admission committee for ambulatory services in hospitals

Following recent assessments regarding the environmental impact of hospitals (e.g., massive resource consumption, emissions) and vice versa (e.g., the rise of climate-associated illnesses, conditions that hinder the delivery of care), the BKG has established five priority areas where various mitigating measures must be implemented.

Hospital building and other health care facility designs and refurbishments should meet energy-saving standards. Procurement and waste disposal processes need to be optimized. In addition to buying recyclable or re-usable materials, another way to reduce plastics, for instance, is to procure medical devices that are not wrapped in plastic. Food supplies must care about sourcing as well as waste. Logistics and mobility practices should meet the standards set by each institution. And finally, employees and management must be involved every step of the way.

To achieve this, Marc Schreiner discussed practices BKG has identified and observations they have made. Firstly, helping address climate change requires conviction and action amongst management and staff. In fact, BKG has observed that having a green strategy and proof of its implementation draws in young workers who are concerned about climate action.

Secondly, it is important that authorities, organizations, and experts are politically involved. For instance, the BKG has adopted a political position laid out in a strategy paper. They have also formed an expert group that shares good practices and assesses the implementation of various approaches to reduce the negative environmental impact of hospitals. Finally, financial resources are needed to fund necessary structural changes, trainings, research to collect evidence and set indicators, as well as green initiatives (e.g., the ‘Green Hospital Program’).

Schreiner closed his presentation by sharing expert recommendations, including creating low-hurdle options to on-boarding people, leading by example, and persisting – the path towards ‘greening’ hospitals will be complex and long-term.

Presentation 4 - Delivering a greener NHS

Mehreen Kassam, Chief Sustainability Officer's Clinical Fellow, NHS England

For Mehreen Kassam and **NHS England, the climate emergency is a health emergency**. Climate change can affect health in many ways, including through:

- Severe weather
- Extreme heat
- Increased risk of vector-borne, foodborne & waterborne diseases
- Air pollution
- Water and food insecurity

The health sector contributes around 5% of global greenhouse gas emissions – for perspective, if the health sector were a country, it would be the fifth largest emitter. Because the two are so intertwined, many of the actions needed to tackle climate change directly improve health and health equity.

Delivering a net zero NHS by 2040 entails tackling the emissions we control directly, with a mid-range goal of reducing 80% by 2028-2032. Net zero by 2045 involves the broader emissions we can influence, with an 80% reduction by 2036-2039.

Every intervention will seek to:

- improve health and patient care outcomes
- reduce system inefficiencies
- reduce health inequalities
- deliver a more resilient healthcare system.

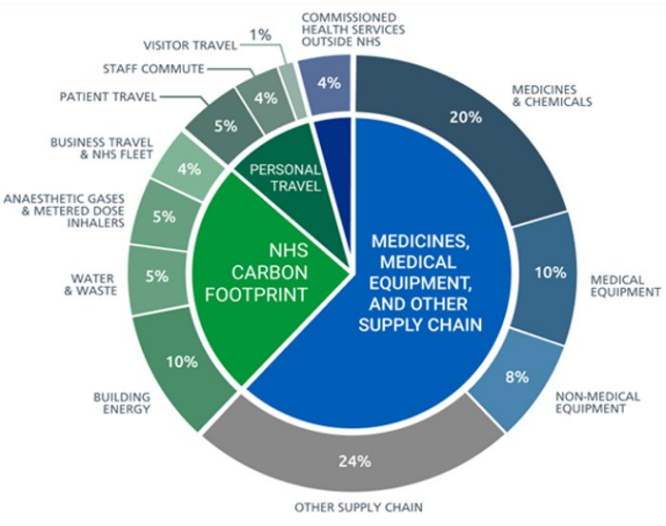


Figure - Sources of carbon emissions by proportion of NHS Carbon Footprint Plus

Mehreen Kassam reviewed the "Delivering a Net Zero NHS" report (2020), which sets out how the service will reach its net zero ambition through action across the NHS. The Health and Care Act 2022 placed new duties on NHS organizations to contribute towards statutory emissions targets, making the NHS the first health system to embed net zero in legislation.

To date, the NHS has reduced its emissions by 30% since 2010, ahead of the UK Climate Change Act target.

One of the next tasks is to turn national ambition into local action. NHS England, trusts,[3] and integrated care boards (ICBs)[4] have a legal responsibility to address the UK's net zero emissions target. In response. every trust and ICB has developed a green plan to cover the next three years. Polling has shown commitment to these goals; indeed, nine out of ten staff support the NHS net zero ambition.

The Greener NHS programme is structured around key areas for action, which are all underpinned by data collection, analytics, and monitoring:

- Medicines
- Supply chain
- Estates and facilities
- Travel and transport
- Food and nutrition
- Research and innovation
- Clinical Transformation
- Digital
- Workforce engagement & training
- Adaptation

To highlight current initiatives and practices, Mehreen Kassam presented three case studies within three of the workstreams listed above, specifically, Clinical Transformation, Medicines, and Supply Chains.

CLINICAL TRANSFORMATION

The focus here is to transform models of care to keep people healthy over the course of their lives. When they are unwell, this involves providing right care, at the right time, in the right place. Every component of care, however, carries a carbon footprint. Therefore, the challenge is to reduce carbon across patient pathways whilst maintaining a high level of quality of care.

In surgical settings, for instance, NHS England together with the Royal College of Anaesthetists announced the decommissioning of gas desflurane by early 2024. Desflurane is a volatile anaesthetic used for surgery. It is a safe option for putting patients to sleep but it has greater global warming potential than carbon dioxide.

Furthermore, there are safe alternatives with a significantly lower global warming potential (e.g., regional anaesthetics, alternative general anaesthetic gases). Such an example represents how environmentally friendlier options can be implemented without compromising safety.

MEDICINES

The NHS is also working with patients to improve asthma care and reduce the carbon footprint of prescribe inhalers by encouraging lifestyle changes (e.g., no smoking), optimising inhaler use, and – when appropriate – supporting the transition to dry powder inhalers.

"Why asthma still kills" (https://www.rcplondon.ac.uk/projects/outputs/why-asthma-still-kills) is the first national investigation of asthma deaths in the UK and the largest study worldwide to date. It was commissioned to understand the circumstances surrounding asthma deaths, identify avoidable factors, and make recommendations to improve care and reduce the number of deaths.

Findings show that asthma is triggered by many factors: from viral infections and allergens to environmental factors such as climatic variation, tobacco smoke, and air pollution.

Poor disease control for respiratory patients results in lower quality of life and avoidable deaths. The report found that inhalers are often not used in an optimal way, and it is calculated that they account for 3% of the total NHS carbon emissions.

The selection, use, and disposal of inhalers needs to be optimised and environmentally friendlier inhalers should be encouraged and prioritised when appropriate. Moreover, 85% patients & carers think asthma patients should be encouraged to use more environmentally friendly inhalers (Asthma UK survey 3).

Actions could include:

- Supporting the use of lower carbon propellants
- Optimising inhaler choice through shared decision-making
- Improving inhaler technique and adherence
- Increasing greener inhaler disposal Policy developed with the support of the NHSEI Inhaler Working Group includes members of the British Thoracic Society (BTS), the Primary Care Respiratory Society, Asthma UK and the British Lung Foundation, the various practical documents produced by NICE Patient decision aids, and others, etc.

SUPPLY CHAINS: A ROADMAP

From April 2022, all NHS procurements will include a minimum 10% net zero and social value weighting. The net zero and social value guidance for NHS procurement teams will help unlock health-specific outcomes (building on PPN 06/20).

From April 2023, for all contracts above £5 million, the NHS will require suppliers to publish a carbon reduction plan for their UK Scope 1 and 2 and a subset of scope 3 emissions (building on PPN 06/21).

From April 2024, the NHS will extend this requirement to cover all procurements.

From April 2027, all suppliers will be required to publicly report targets, emissions and publish a carbon reduction plan for global emissions aligned to the NHS net zero target, for all of their Scope 1, 2 and 3 emissions.

New requirements will be introduced overseeing the provision of carbon foot printing for individual products supplied to the NHS. The NHS will work with suppliers and regulators to determine the scope and methodology.

Almost 60 countries have committed to develop low carbon health systems since COP26, as part of the WHO-led Alliance for Transformative Action on Climate Change and Health (ATACH). The World Health Organisation and NHS England are working together to support joint action across ATACH members and share learning, tools, and resources.

World Café

HOPE organised the fifth annual *World Café* during this year's Agora. Each year, exchange participants share their opinions regarding the most interesting examples of good practices identified the HOPE Exchange Programme. Members of each team split into various groups to take part in three rounds of discussions. On this occasion, discussions centred on the impact hospitals and healthcare services have on the climate and the environment.

The *World Café* methodology is a simple, effective, and flexible format for group dialogue. It aims at harnessing collective wisdom and not at reaching a resolution. The process began with the first of three 20-minute rounds of conversation for the group seated around a table. At the end of the round, each group member moved to a different table. Staying behind on each table was the table host for the next round, who welcomed the following group and briefly filled them in on what happened in the previous round. Each round had been prefaced with a question designed for the specific context and desired purpose of the session. Afterwards the individual group members were invited to share the insights of other results from their conversations with the rest of the large group.

In the context of this year's thematic, discussions revolved around one question: What were the most interesting practices that you discovered during your exchange programme? This question was answered in relation to the following areas: Mobility and sustainable transport; Waste, water, and single-use products; the Circular economy and food; Buildings, energy, and air conditioning.

In addition, two projects (**SAFEST** and **PERISCOPE**) in which HOPE is a consortium partner hosted roundtable discussions on (1) patient safety and climate change, and (2) COVID and climate change.

Presentations by HOPE Exchange Programme participants

Every year, following four weeks abroad, HOPE's Exchange Programme participants gather for the Agora conference, where they share a maximum of three examples of good practices they identified during their exchange. This year, participants focused on climate change and healthcare. In the following pages, we summarise their presentations for each host country.

The presentations are available online: **https://hope.be/hope-agora-2023/**.

MALTA

HOPE National Coordinator: Michelle Galea
Exchange participant 2023: Katharina Jauker, Austria

Katharina Jauker profiled Malta's climate challenges, highlighting that the country is known for warm to hot temperatures, high humidity, dusty air, and limited water resources. Climate change has prolonged and intensified periods of heat, it has also contributed to periods of drought and higher intensity and frequent storms, a complex relationship that does not always alleviate drought conditions.[5]

To respond to these challenges, Malta has implemented various policies (e.g., road-based traffic rules limiting speed and keeping track of distances travelled) under the guidance of the Climate Action Board (CAB). CAB was set up under the 2015 Climate Action Act (chapter 543) of the Laws of Malta; members include representatives from different ministries.

Broadly speaking, the Climate Action Board has emphasized the importance of educating the public on the realities and threats of climate change. CAB has also suggested expanding pedestrian areas and improving micro-mobility (e.g., e-Bikes).

[5] Learn more about the complex relationship between rainfall and drought conditions:
MIT - https://news.mit.edu/2011/drought-risk-climate-change.
USGS - https://www.usgs.gov/faqs/why-doesnt-a-drought-end-when-it-rains.

In the context of medical care provision, the Foundation for Medical Services (FMS) is tasked with providing Health Care Infrastructures. Some things to consider as Malta's health services seek to address climate change include:

- When refurbishing old hospitals and building new centres careful attention must be paid to ensure designs that help save energy and reduce emissions.
- Evolving practices, e.g., in Malta there used to be a culture of open windows and high ceilings for natural ventilation. However, these days windows are kept close for air conditioning.

During her visit to the Paola Hub Project (a primary healthcare centre), Katharina Jauker observed good practices in creating a healing atmosphere (e.g., a terrace for the psychiatric outpatient section) and building with materials that reduce noise levels.

To help reduce the energy consumption of Mater Dei Hospital, which uses as much energy as the whole island of Gozo, the Department of Technical Engineering has installed a new ventilation system. The system cools or heats air before it is transferred to the wards depending on the time of the year. It also removes humidity in summer, warms the spaces in the winter. As a result, 1.1 million litres of fuel are saved, and 3,000 tons of CO2 emissions per year are cut. This achievement was recognised by the Public Service Award for the Best Green Initiative 2023.

Next during her presentation, Katharina Jauker introduced the link between the environment and mental health. A 2021 study by Abdullah Mohammed Hassan Ramadan and Ahmed G. Ataallah reviews these links, citing for example, that air pollution seems to be associated with schizophrenia, and urban births has been listed as a factor in early onset psychosis.

The largest public general hospital in Malta (1,243 beds) is the Mater Dei Hospital (MTH). Nurses from the Clinical Education programme facilitated Katharina Jauker's exchange at MTH, where they employ various informal approaches to mental health, for instance, visits to the garden, Beauty Day for oncology patients, etc.

Katharina Jauker also visited the Mount Carmel Hospital, Malta's only psychiatric hospital where she was able to give a presentation about (psychiatric) nursing in Austria.

Katharina Jauker concluded her presentation with a summary of her visit to the only hospital in Gozo (312 beds, public) where learned more about Barts Medical School, which opened in 2019. Thanks to this collaboration with the UK's Queen Mary University of London's Faculty of Medicine and Dentistry, Gozo Hospital now serves as a teaching hospital. Students, medical consultants, and other physicians from across Malta can do their clinical residences at Gozo, further connecting the island to the rest of the country's medical institutions.

THE NETHERLANDS

HOPE National Coordinator: Ton Roelofs

Exchange participant(s) 2023: Lise Elsburg, Denmark
Tiago Botelho, Portugal
Andra Migur, Estonia
Andrea Di Pilla, Italy
Olga Nadal, Spain
Geraldine Munn-Mace, UK

The exchange participants who spent time in various cities in The Netherlands (Zwolle, Amsterdam, and Rotterdam), began by explaining the national Green Deal Healthcare Agreement 3.0, which provides a roadmap for green action. The stated end goal is to reduce carbon dioxide emissions by 49% by 2030 and achieve carbon neutrality by 2050.

One way to track efforts towards reaching the ambitions set forth by the Green Deal in healthcare is via a certification system that awards bronze, silver, and gold standards. Its structure is meant to promote collaborative action, making results visible, and committing to maintaining standards.

To bolster bottom-up change, personnel are encouraged to form 'Green Teams' on hospital sites. This has proven effective; in the hospitals HOPE exchange participants visited, there were 10-15 active green teams. Their roles range from monitoring a hospital's waste and consumption to implementing green projects and initiatives.

HOPE exchange participants shared good practices they observed during their time in The Netherlands. They started with higher impact measures. For example, Maasstad Hospital uses surplus heat generated at the port of Rotterdam to warm its hospital buildings. In Amsterdam, the OLVG hospital complex recycles staples and packaging. And Zwolle's regional hospital, Isala, is off the gas grid, making it the first fossil fuel-free hospital in the country.

Next, the presenters introduced smaller scale, but very important, practices under the headings: Re-use, Rethink, and Reduce. Operating rooms produce a lot of waste, to help reduce it there are several items that have been identified which can be safely re-used following proper cleaning and sterilisation procedures. These include:

- Anaesthetic tubing (Maasstad found that it saved €20,000 and 700kg of plastic in one year.)
- Surgical caps
- Blankets
- Suction containers used by machines like the 'Neptune' (a surgical waste management system).

Under the heading Rethink, HOPE exchange participants in The Netherlands focused on patient pathways, underscoring the centrality of patient safety and care considerations. The need to rethink patient pathways has arisen in a context of aging demographics, staff shortages, the need to meet and maintain quality standards, and the need to make healthcare provision more sustainable. While these issues cannot be solely addressed by restructuring patient pathways, the latter can help by improving hospital capacity, for example.

One way to achieve this is by extending home care. For instance, in the Netherlands, nearly 50% of follow-up consultations happen online. This is often more convenient for patients who do not need a physical check-up. Furthermore, it can help reduce CO2 emissions involved in commuting (road traffic accounts for 17% of CO2 emissions in The Netherlands).

Under the heading Reuse, exchange participants cited Isala's "No Risk, No Glove" campaign as an example of good practice. Following the COVID pandemic, glove use rose significantly, sometimes in unnecessary circumstances. To reduce the use of gloves in a safe manner. The "No Risk, No glove" campaign in Isala Hospital and the "Proper Use of Gloves" campaign in Southwest region helped guide health professionals to determine when it is appropriate to use gloves. The key aim is to reduce emissions, waste, costs, and the spread of microorganisms (as the use of gloves started to correlate with a decrease in hand hygiene practices).

Finally, the practice HOPE exchange participants found most impactful in terms of policy, fell under a heading not currently in use: "Refuse." Participants observed that The Netherlands refuses unnecessary care by allowing General Practitioners (GPs) to act as gatekeepers, indeed 94% of all complaints are treated by GPs. Furthermore, evidence-based recommendations guide health professionals to avoid over-treating and over-diagnosing.

Take home message: Everyone can look at quality and cost effectiveness through Green Glasses (and there is no excuse…!) Start now.

POLAND

HOPE National Coordinator: Bogusław Budziński
Exchange participant(s) 2023: Marine Castaing, Italy
Mette Nielsen, Denmark
Jose-Luis Sampedro, Spain
Tassilo Bauer, Germany

During the introductory summary, the team offered contextual information about the Polish approach to climate change, including its participation in the Paris Agreements, as well as the obstacles they face.

At the healthcare level, hospitals and regional centres are taking individual steps to address their role in emissions. The exchange team observed energy-saving practices in hospitals in Gdansk and Opole.

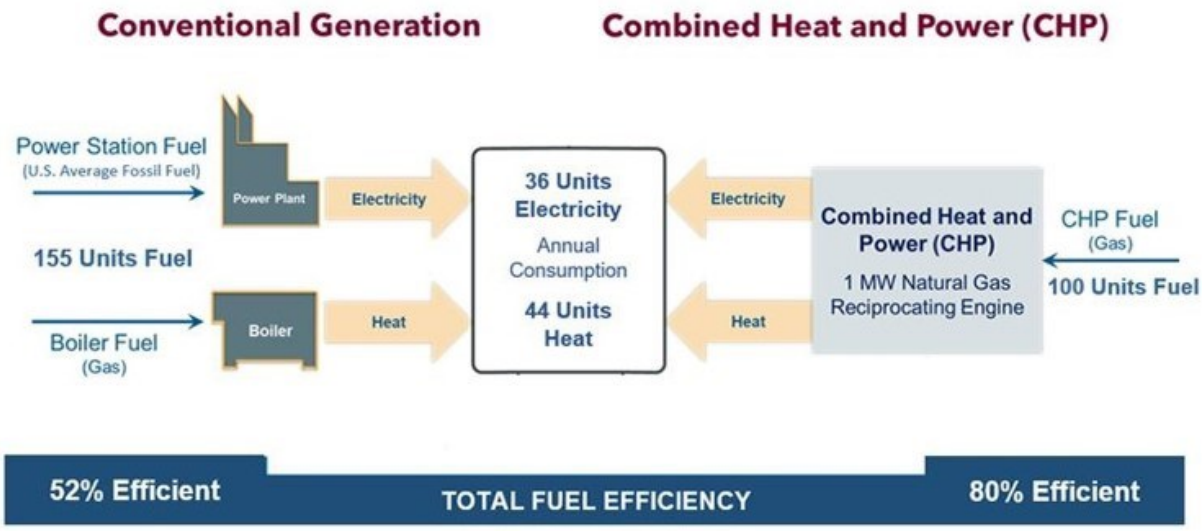
First, hospitals in these cities are seeking to decrease the demand of energy of the buildings. To this end, they have installed detectors to turn lights on/off, they have also instructed staff to switch lights off in areas that are not in use and installed triple glazed windows and thermal isolation in walls. Second, hospitals are using equipment more efficiently. This includes using LED Lighting, aerators in faucets, centralizing data processing, and planning the introduction of cogeneration installations (CHP). Third, hospitals are also looking into renewable sources of energy. Solar heating is already in use, as it photovoltaic energy. Institutions are also planning to use Biogas in future.

Within the scope of these priorities, exchange participants selected and expanded on three examples of good practises:

- Insulation modernisation
- Cogeneration installations
- Data processing centralisation

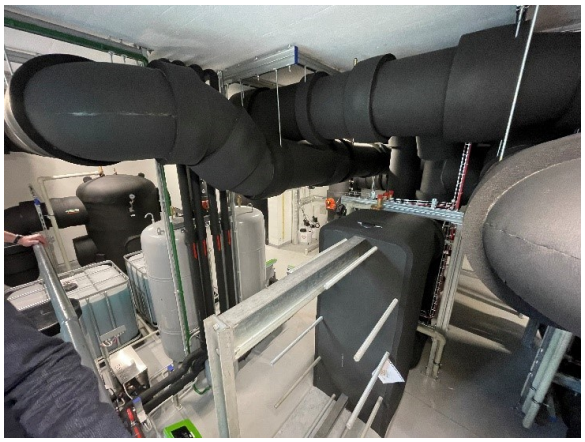
To modernise the heat retention of Opole's hospital walls, works are underway to install insulation boards, fiberglass mesh reinforcements, and other layers, which will result in a 50% decrease in demand for heat.

Up until 2021, the Opole University hospital ran its own coal-fired power plant. Today, they are transitioning to a more efficient model using a cogeneration installation that produces electricity and heat at the same time. This method helps reduce the amount of heat released into the environment.



Source: Prof. Zbyszek Plutecki // University of Opole

The Copernicus Hospital in Gdansk has been running several data centres onsite cooled by split climatisation systems. These are considered to be inefficient for several reasons, including the fact that heat is no recuperated. To address this issue, the Copernicus Hospital has begun transferring its serves to a regional data processing server equipped with high energy-saving mechanisms. For example, the building that houses the servers utilizes 25% less energy to achieve the same cooling power as the split climatisation systems, furthermore, heat from the cooling system is recuperated to warm rooms and water.



Source: Tassilo Bauer // HOPE Exchange team - Poland

The Poland HOPE exchange team concluded by summarising their findings and thanking their hosts for their month-long stay!

LATVIA

HOPE National Coordinator Ieva Leijniece
Exchange participant(s) 2023 Lilia Casim, Moldova
Katrin Forstner, Austria
Rob Garner, UK

The Latvia HOPE exchange team kicked off their presentation with a brief profile of the country of 1.8 million people with a population density of only 30 per km2 (more than 1/3 people live in Riga). Their presentation on good practices contributing towards climate change mitigation focused on their observations at the Children's University Hospital in Riga and the Strenči Psychoneurological Hospital in the Valmiera Municipality in the northwest.

Medical gases are significant (>25%) contributors to carbon impact in healthcare. In standard practice, these gases are vented to the outside world untreated. Thus, the Riga Children's University Hospital is looking towards eco-friendly alternatives exist that destroy gases with up to 95% efficiency (e.g., capturing gas by breaking down N_2O into O_2 and N_2).

Currently, Riga Children's University Hospital is taking the following actions:

- Implementing medicine management policies to reduce environmental impact (e.g., preventing expiration, stocking medicines reasonably, etc.).
- Reducing hazardous chemical waste
- Reducing the risk of household waste contamination
- Reducing the risk of spreading vapours in the air and inhalation
- Dissolving high-risk drugs in the hospital pharmacy
- Reducing medication use
- Implementing combination of non-drug treatment.

Strenči Psychoneurological Hospital's Environmental Protection Plan seeks to reduce carbon emissions and the hospital's environmental impact, as well as promote widespread staff involvement in green initiatives. These achievements have earned them the Gold Standard in the Latvian Sustainability Index two years in a row (2021 and 2022).

BELGIUM

HOPE National Coordinator Emmanuelle Ceysens
Exchange participant(s) 2023 Maria Adelaide Caligo, Italy
Cécile Bergot, France

The HOPE exchange duo in Belgium concentrated on one hospital in the Walloon city of Liège – the Citadelle Hospital.

During their visit, they learned about the Festival Hospi'durable (2022), which took place within the framework of the European Sustainable Mobility and Development Week. The hospital organised during this week various activities (mainly for its staff) involving soft mobility (e.g., cycling, walking, etc.), cooking with leftovers, workshops on how to repair household appliances and discovering the world of bees, among other things.

Beyond the festival, Citadelle Hospital is working year-round to promote sustainable mobility. For instance, the 'Citacar' platform encourages users to carpool. In addition, employees can test electric bikes for a period of 15 days to test their commutes and/or obtain a bicycle mileage allowance. For those who prefer public transit, the hospital provides free shuttles for staff, patients, and visitor ('Citabus'), and staff are reimbursed in full for their seasonal commuting tickets in the bus and train networks.

Source: Beekeeping // Citadelle Hospital

Echoing other presentations, one of the biggest challenges Citadelle and hospitals across Belgium face is reducing the environmental impact of operating theatres. While there is a need for more coherent, nationwide approaches, Citadelle is already implementing the following measures to reduce waste and emissions produced during surgery:

- Waste is sorted (e.g., PMC bottles and packaging, carboard and paper, etc.) and recovered (electric scalpels, cables, laryngoscopes, etc. are recovered and sold; proceeds go to the Hospital Charity Project).
- With the support of the VinylPlus Project, Citadelle is working towards ensuring that laryngeal masks, infusion lines, endotracheal tubes, etc. are recycled to their full extent (i.e., 30% of hospital plastic waste can be recycled up to 10 times).
- Closed circuit system installed to manage biological liquids. (Infected or radioactive hospital waste are not disposed via this system.)

- Anaesthetic gas use is being monitored and reduced when appropriate; especially halogenated agents and nitrous oxide, which are harmful to the environment. The latter is only used in children, and in the case of the former, the use of sevoflurane is favoured over desflurane. Newer methods are also encouraged, for instance, monitoring and flow ventilation systems of low fresh gas, which results in a significant reduction in gas quantities needed to maintain intraoperative sedation. Finally, Citadelle is currently evaluating the recovery and reutilisation of halogenated gases.

Source: Waste management and strategic documents // Citadelle Hospital

FRANCE

HOPE National Coordinator: Antoine Malone
Exchange participant(s) 2023: Sandrine Balon, Belgium
Rosa Trolla, Belgium
Luca Iodice, Italy
Beatrice Pevarello, Italy
Michael Spalek, Austria
Mila Larrayoz Dutray, Spain
Iro Tsara, Greece
Hester Wain, UK

French law obliges institutions in the entire tertiary sector to reduce energy consumption. Furthermore, "*Décret tertiaire*" sets objectives for public and private collective catering to enable the transition to quality and sustainable food.

Energy and environmental advisors are available nationwide to support France's sustainability transition in healthcare. The French Government created this new profession. As of 2021, around 50 advisors have undertaken energy audits, initiated action plans to reduce energy consumption and improve air quality and developed tools and recommendations to limit pollution.

For their examples of good practices, the HOPE exchange team in France focused on:

1. Life cycle assessment of image-guided therapy
2. Waste recovery
3. The Maternity Charter for Eco-responsibility

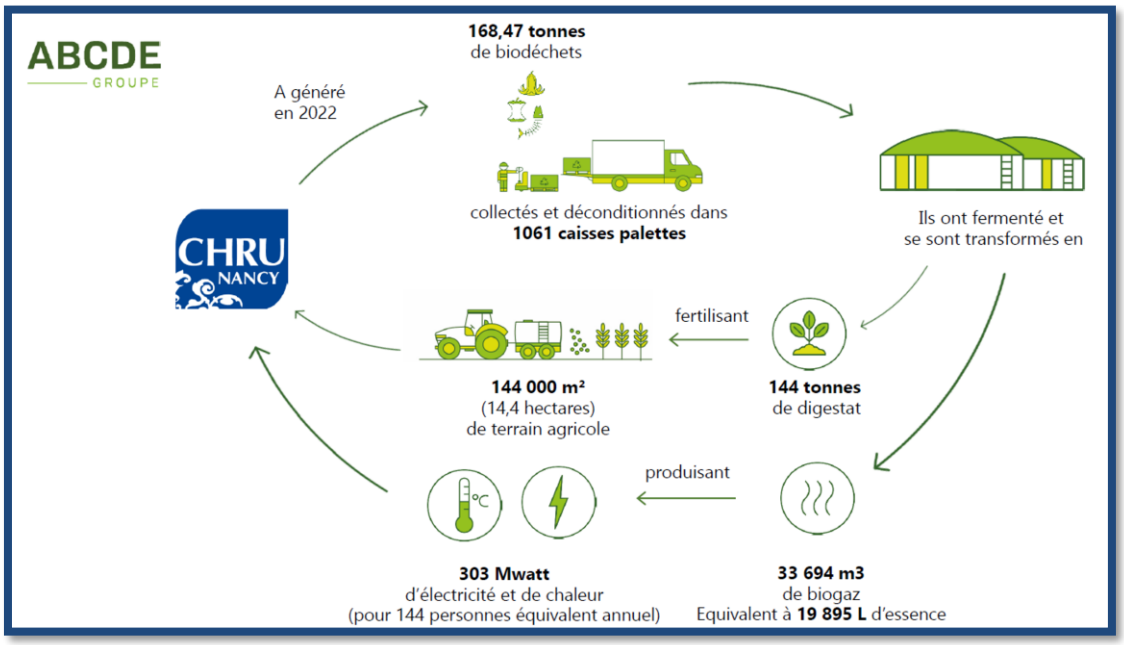
The participants observed their first example at the Rennes University Hospital where the Stroke Centre has installed a biplane system for neurological interventions. It has been evaluated using Life Cycle Assessment (LCE) Methodology, which evaluates the environmental and human health impacts, as well as resource consumption associated with a product and its processes.[6]

While the results are currently under audit by an independent third party, the preliminary findings were worth noting. The image-guided therapy-system contributes to 6 tons of CO_2 per year (for scale, this equals to the annual carbon footprint of 1.3 citizens). The biplane

[6] See https://eplca.jrc.ec.europa.eu/lifecycleassessment.html.

system's use phase, however, has a relatively low impact due to the large share of nuclear power in the French energy mix (roughly 4.5 times more CO_2 emissions with EU grid average). The LCE study found that powering down the machine to standby during non-working hours has great energy saving potential. Furthermore, circular updates and refurbishments could extend the system's lifetime by 10-20 years, thereby reducing its carbon footprint by 40%. Conducting such assessments helps hospitals and their staff make informed decisions about mitigating the environmental impact of healthcare.

Next, exchange participants reviewed the waste recovery process at University Hospital of Nancy and the Hospital Centre of Boulogne-sur-mer. In the latter, a new machine has been installed that uses water from the boiler room to wash the drapes, scrubs, linens, etc. In the former, waste food is recycled in an onsite bio-plant to produce fertiliser for local farmers and biogas for use by the hospital and the city.



Source: Waste management cycle // CHRU de Nancy

The third and final good practice identified by HOPE exchange participants focuses on the environmental footprint of birth. At the hospital centre of Carcassonne, the Maternity Charter for Eco-responsibility is preparing for future generations, equipping new parents with information that promotes the wellbeing of their infants and the environment. For instance, the charter encourages breast feeding (except in certain cases due to medical barriers or conditions,) recycling baby feeding bottles and using tote bags, re-usable water jugs, and eco-friendly care (e.g., locally produced soap).

To conclude, the presenters noted that all professionals are consistently reminded to take individual action: e.g., switch off the lights, computers, and equipment, prioritise sustainable transport, monitor water consumption and report leaks, and reduce and sort waste, and decrease unnecessary digital consumption, etc.

> "We have not inherited the Earth from our parents, we are borrowing it from our children."
>
> Lester Brown

ITALY

HOPE National Coordinator: Marco di Marco

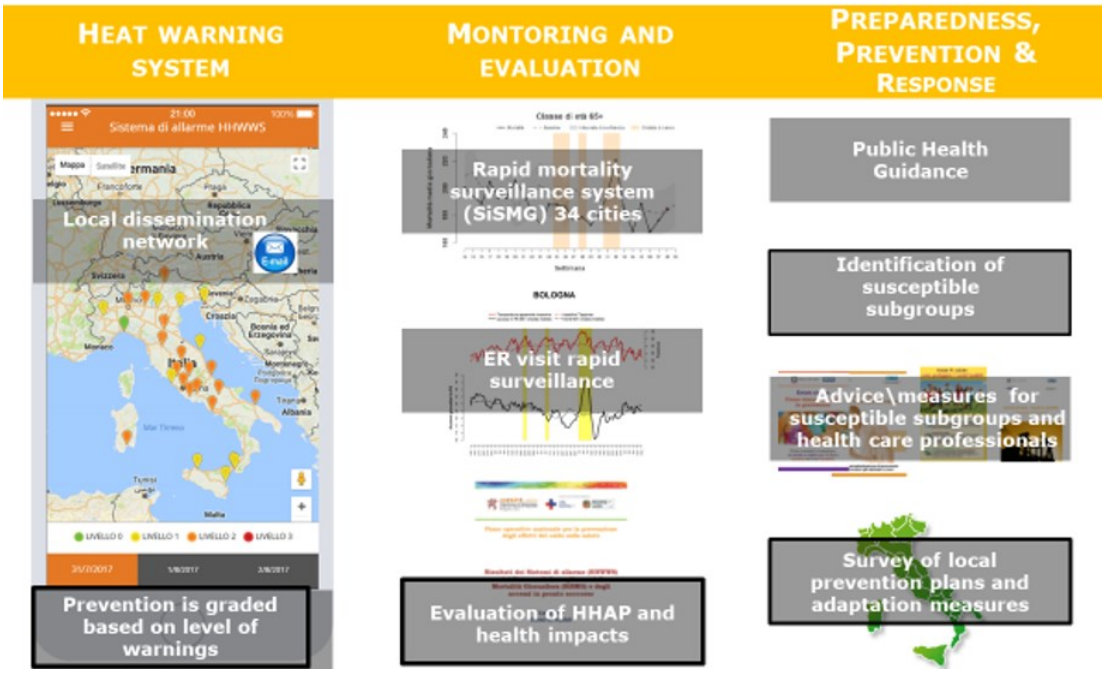
Exchange participant(s) 2023:

Francisco Matoso, Portugal
Rosario Reis, Portugal
Cristina Costa, Portugal
Gloria Ribeiro, Portugal
Marco Sameiro, Portugal
Ana Craveiro, Portugal
Renia Kourletaki, Greece
Stephen Curtis, Ireland
Sara Bernicke, Germany
Marek Blanologa, Poland
Szukay Beata, Poland
Cecile Dau, Austria
Irina Blcos, Moldova
Concetta Tisserand, France
Catherine Chubilleau, France
Pablo Vázquez, Spain
Carmen Pajares, Spain
Paloma Diez, Spain
Tomás Ruiz Albi, Spain
María Eloisa Sánchez Torres, Spain
Yolanda Benavente, Spain
Celia Arnaiz, Spain
Ana Nicolás, Spain

The HOPE exchange team in Italy kicked off their presentation by presenting the combination of climate challenges the country is facing and how it is responding to them.

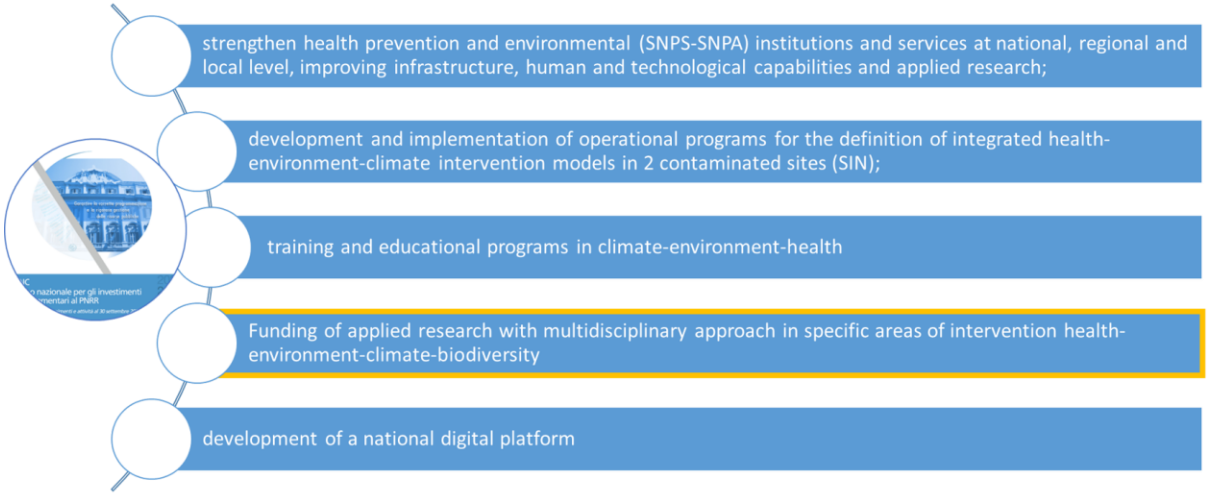
2022 saw record temperatures across Europe and the world, prompting Italy to declare a state of emergency for the drought-stricken north. During May 2023, the same regions (specifically Emilia-Romagna and parts of Marche) were badly affected by heavy rain, flooding, and landslides. By August 2022, heat waves and wildfires spread in the South.

In response to the disasters that have unfolded in recent years, climate expert warnings, and research findings, the Italian government has drawn up mitigation strategies, policy changes, and response programmes, including the National Heat Health Prevention Plan (see below).



Source: www.salute.gov.it/caldo

Following the COVID crisis, the European Union (EU) created the Recovery Plan for Europe funding programme. Italy received €191.5 billion (Next Generation) to develop and implement its National Recovery and Resilience Plan (PNRR). It is organized around 6 missions including health. The PNRR will fund research and innovation projects, as well as the development telemedicine and modernization of public health infrastructure. Furthermore, the *Piano Nazionale Complement*are (PNC), which targets, health, biodiversity, and the climate, among other things, will work in tandem with the PNRR. (Examples of health and climate aims included in the PNC below.)



At local levels, exchange participants identified three examples of good practices. The Italy team started with the Ferrara Healthcare Service and what they're doing to reduce CO_2 emissions. They have created a programme to motivate employees to use bikes to go to

work. In additions, Emergency Medical services are also using bikes where appropriate. In smaller areas, community care patients are encouraged to walk to check on their patients.

The second example of good practice was observed at the Community House of Villa Minozzo, where several energy-saving measures have been integrated into the design of the building:

- Photovoltaics produce a large amount of the energy necessary to use the building.
- Using the same electricity produced in part by photovoltaics, a heat pump heat and cools the building.
- The building's radiant floor optimizes the use of heat produced.
- Automatic monitoring systems monitor and control the quantities of CO_2 and other polluting agents to maintain indoor air quality. The control of the quantities of CO2 and other polluting agents is controlled by automatic monitoring systems.
- The rainwater recovery system uses recovered water to irrigate green areas and where possible, flush toilets.

Finally, exchange participants reviewed the green dimension of the Regione Lombardia's digital transformation. In the Lombardia region, 19 hospitals and all care settings have centralized patient information into a new regional electronic medical record. All appointments are also now made via a new regional booking system. To support managers, they also have access to region-wide digital management tools.

One of the key innovations is how the region is implementing telemedicine. Besides the type of teleconsultations (follow-ups, where appropriate, etc.) we are growing accustomed to seeing, Lombardia is mapping out new possible care pathways where telemedicine can be integrated. This is a research stage, but one example could be providing specialist support online for GPs in rural areas.

Because Regione Lombardia's digital transition is financed partly by the PNRR, each hospital in the region must track and evaluate all their projects, which will be verified in 2025.

SWITZERLAND

HOPE National Coordinator: Ines Trede
Exchange participant(s) 2023: Magdalena Westa, Poland
Nelle Kappeller, Austria

"The climate emergency is a race we are losing, but it is a race we can win."

António Guterres

Starting with the definition of 'Medical Emergency' – a situation in which a person is directly exposed to the risk of suffering harm. Rapid intervention is essential to avert the harm – the HOPE exchange team in Switzerland drew a strong analogy to the current 'Climate Emergency'. Successful treatment requires time management, situational awareness, and solidarity.

The Westa and Kappeller identified three examples of good practice related to food, energy, and infrastructure in the Swiss hospitals they visited during their exchange.

To begin with, Basel University Hospital and Reha Rheinfelden (a rehabilitation centre) are putting in a lot of effort to reduce food waste. At Basel University Hospital, food consumption is monitored, and eco-labels indicate the impact of the dishes on offer each day. Meanwhile, Reha Rheinfelden has launched the "Take all what you eat but eat all you can take!" in tandem with the installation of water fountains throughout the building to reduce plastic.

In terms of green infrastructure. Our presenters focused on temperature management, which is particularly important as some patients are unable to regulate their body temperatures and this can affect their health outcomes. Because hospitals are often located in urban areas, green spaces can be limited, and this creates heat domes. Furthermore, older buildings are not air conditioned; those that are consume large amounts of energy, as

it is not only patients that need to remain cool, but large devices such as the Magnetic Resonance Imaging machines.

To help meet these challenges, Swiss hospitals are integrating green design into building and refurbishment plans. For example, green areas are being expanded and new buildings have planted roofs. Other hospitals are taking advantage of the Rhine River to cool devices.

The final example of good practice observed in Switzerland referred to energy consumption. The approach in places like Basel's University Hospital is two-fold: individual and institution-wide. The university's energy-saving campaign reminds staff to switch off lights and light equipment when rooms and devices are not being used. Radiologists conducted in-house research to monitor and test the safety and benefits of powering down MRI machines during the weekend. This resulted in a research paper that may be used in evidence-based practice. Such examples show the importance of actions at different scales, from individual to institutional to wide scale.

Radiology

ORIGINAL RESEARCH • HEALTH POLICY AND PRACTICE

Turn It Off! A Simple Method to Save Energy and CO_2 Emissions in a Hospital Setting with Focus on Radiology by Monitoring Nonproductive Energy-consuming Devices

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GERMANY

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In Germany, the healthcare system is responsible for 5.2% of national greenhouse gas emissions. At the global scale, the healthcare sector is responsible for 4.4% of greenhouse gas emissions, in comparison to shipping traffic (1.7%) and aviation (1.9%).

HOPE exchange participants observed three examples of good practices, which German hospitals are implementing to reduce the sector's greenhouse gas emissions and address other environmental problems.

First, among the German hospitals the participants chose to highlight one is working to curb food waste. Currently, the average waste of a single meal in one of the visited hospitals is 108 grams. In food warehouses in this specific hospital, immediate actions taken include producing only for short term consumption and re-evaluating food storage procedures. Next, the storage equipment will also be evaluated. In terms of communication, meals are planned every day according to needs, e.g., the hospital is trying to improve communication with kitchen staff so that they are informed when patients are discharged. The hospital is also planning to improve IT, assess standard portion sizes, and re-structure menu choices.

Second, energy consumption management plans are being developed and implemented to help address the compounded problems created by consumption, emissions, and water and chemical waste related to energy production. Resource-sharing has proven effective in reducing materials and energy. Furthermore, transportation networks and infrastructure has been improved.

However, problems persist. Older buildings suffer from design, insulation, and heating deficits in comparison to newer buildings. Technology integration has proven tricky as well, therefore, important tools like energy monitors are missing in some key areas. Finally, kitchens have not been standardized to meet energy-saving needs.

To help address these issues, older buildings have installed LED lighting (leading to a 11% reduction in energy costs) and improved insulation. Another way in which older hospital buildings are working to reduce their impact is through centralized heating distribution via

underground pipes, and by exploring green energy sources (e.g., photovoltaics). Furthermore, by centralizing meal production and improving logistics, food production can veer away from multiple 'energy-draining' kitchens to one efficient kitchen that meets greener standards.

To conclude, the HOPE exchange trio shared the example of the freshwater management system in one of the hospitals they visited. One way in which this hospital manages water contamination, scarcity, and waste, is through reverse osmosis and the reutilization of purified water.

With reverse osmosis, tap water passes through a semi-permeable, laser-perforated membrane pressed through its ultrafine pores. A molecular separation process takes place: The water molecules can pass through the membrane, while the dissolved substances such as salts, lime, nitrate, heavy metals, radioactive particles, organic compounds, and pesticides, are retained at a rate of 90-99%, depending on the molecular diameter.

In a context where huge amounts of energy and water are needed in hospitals to maintain high standards of hygiene in patient care and clinical operations, the average water consumption results in 300 to 600 litres per bed/per day). Therefore, some hospitals need to re-utilize purified water. This water comes from a softening system, passes through reverse osmosis, and is then transported into the pure steam of the sterilization system or the kitchen. The degree of utilization of the new system increases roughly from 70 to 90%, water savings are at 4,500m^3/year, electricity savings are 12,800 kWh/year.

Behind these good practices lies the mind set of the personnel and administration, the driving force on sustainable innovation in a hospital. Every small step forward can inspire people around us and bring about changes for a sustainable healthcare future. If we want to improve the quality of the environment in which we live, the only way is to involve everyone.

DENMARK

HOPE National Coordinator: Lise Elsberg
Exchange participant(s) 2023: Petra Portenschlager, Austria
Marcus Mueller, Switzerland
Stefanie Seierl, Germany
Triin Arujõe, Estonia
Michele Gilio, Italy
Marianna Tomita, Moldova
Johan Jonker, The Netherlands

The HOPE exchange team in Denmark opened their presentation with a question: "Have you ever asked yourself where sustainability starts?" This is the type of question the healthcare sector is asking to reflect on the health-related environmental impact of people, from birth to old age.

In Denmark, midwives, physicians, and other health professionals are working together to put into action the 'Green Family Start'. Thus far, Danish hospitals have cut the use of antiseptic sponges by 500,000. 1.8 tonnes of CO_2 by using multi-use cups. Furthermore, paper sheets are no longer used during examinations; instead, beds are washed using microfiber cloths and soap and water. Yet, there are barriers in the reduction of pharmaceutically related waste. For example, surplus contraction pills cannot be administered to other patients once the packaging has been breached for safety reasons.

Another example of good practice the exchange participants observed consisted of a joint project with a local textile company. During birth, single-use surgical sheets have been replaced with recycled cloth sheets. Meanwhile, gowns are washed and reused.

The Danish healthcare sector is also investing in education for new families, who receive a checklist of what to bring to hospital, as well as information for green home care ideas.

In daily clinical practice at Righospitalet, Professor Anders Perner (Intensive Care) has been analysing how to implement green practices without causing direct or indirect harm. In a field where most health interventions are not based on high certainty evidence, physicians like Professor Perner are trying to chart ways to reduce harmful interventions.

This is line with overall Danish policy: the *Vælg Klogt* – Choosing Wisely – initiative was launched in the spring of 2020. It aims to:

- Reduce unnecessary and potentially harmful tests, treatments, and procedures in healthcare.
- Implement shared decision-making.
- Explored knowledge of the Danish *Vælg Klogt* initiative among patient associations and scientific societies in Denmark.

Using cross-sectional questionnaires targeting patient associations and scientific societies, researchers found that both the patient associations and the scientific societies had little knowledge of *Vælg Klogt*. Respondents still agreed that that overuse and waste occurs in Danish healthcare. The reasons are multifactorial, but both parties mentioned a fear of making mistakes and a lack of communication between departments to be persistent issues.

Uneven knowledge notwithstanding, the initiative has been welcomed when health care providers become aware. 'Choose Wisely' has provided evidence-based recommendations, which are being integrated into clinical guidelines. Furthermore, has strengthened its implementation strategy to include broader communication, education, and research.

It is considered a win-win when patients are not overtreated and resource-waste is reduced, which can then be deployed for better healthcare. Denmark considers greening its health care sector to be a matter of national and regional policy, for them, with their big climate footprint comes big responsibility.

ESTONIA

HOPE National Coordinator: Hedy Eeriksoo
Exchange participant(s) 2023: Carol Clark, UK
Wouter Veenis, The Netherlands
Avital Ratnitsky, Switzerland

The HOPE exchange team in Estonia journeyed through country to visit: eEstonia, the Health Insurance Fund, the Health and Welfare Information System, East Tallinn Central Hospital, East Viru Central Hospital, the North Estonia Medical Centre, Tartu University Hospital, South Estonia Hospital, Pärnu Hospital, and the Haapsalu Neurological Rehab Centre.

The speakers began by providing a snapshot of the current challenges. Estonia's population is decreasing and aging, health care workers are migrating to other countries, climate change and the recent geopolitical situation have also strained the healthcare sector, and there is a shortage of resources. In this context, Estonia is working to improve equity and access to care services, as well as strategizing to meet changing health needs and increase preventive/awareness campaigns.

The exchange team observed good practices at various scales in Estonia. At national level, the country launched its Hospital Master Plan in 2019, which responds to internal environmental concerns, as well as external factors such as the COVID pandemic and the invasion of Ukraine. Besides supporting the pandemic recovery, Estonia allocated 42% of the resilience and recovery fund to green transition efforts and reserved 22% for digitisation.

In line with the European Green Deal, Estonia seeks to reduce emissions by 24% by 2030, as well as its reliance on oil and gas. Furthermore, the country is investing in green energy, modernizing processes and systems, and shifting to paperless modes of work. To achieve this last aim, authorities are working to close the digital divide between rural and urban areas.

To date, Estonia has one of the best digital health systems: 99% of state services are online (E-Health Record, E-Ambulance, E-Prescription). This has resulted in increased health literacy and reductions in patient travel, clinician travel, paper printing, accommodation utilization, etc.

At the organizational level, the Estonian HOPE exchange team highlighted waste management practices. The overarching policy is to recycle as much as possible and produce as little waste as possible. Structures, equipment, and food production processes have

changed to help reduce and manage waste. Other initiatives include using eco-label dishwashing liquids, using bread ends, improving diets, and doing away as much as possible with single-use plastics.



At the individual level, ‘Green Teams’ and ‘Innovation Ambassador’ groups have formed hospitals and other health-related institutions. These are organized groups comprising volunteer members that advocate for change within the organization or institution they work in. They communicate via intranet, posters, and other online and offline campaigns. Furthermore, they encourage staff to engage in green initiatives and submit ideas.

The speakers concluded that energy along with healthcare should be seen as an investment into peoples and society health. And that holistic and promising green plans often integrate the green and digital transitions.

SWEDEN

HOPE National Coordinator: Erik Svanfeldt
Exchange participant(s) 2023: Elisa Daniele, Italy
Lucinda Edge, Ireland

The HOPE exchange team in Sweden visited the Skåne University Hospital campuses of Malmö and Lund, as well as the emergency and physiotherapy units in Hässleholm, Orup Hospital's brain injury rehabilitation centre in Höör, and Malmö palliative care ward and mobile teams, among other sites.

Elisa Daniele and Lucinda Edge observed various practices at national and organizational levels. At the national level, the Public Health Agency of Sweden has released a study titled "Health consequences of Climate Change in Sweden: a risk and vulnerability analysis," which identifies seventeen climate-related health risks:

- Heatwaves
- Tick-borne infections
- Pollen allergies
- Floods
- Drinking water impact
- Water-borne infections
- Rodent-borne infections
- Mosquito-borne infections
- Food-borne infections
- Zero-crossing
- Warmer winters
- Air pollution
- Forest fires
- Drought
- Indoor environmental impact
- Landslides
- Cold snaps

The country's policies must work to address these threats, prepare for the unforeseen, and build resiliency. In 2021, the Skåne Regional Council set the environmental targets to be reached by 2030. Since 2017, the region has met environmental management standards (ISO 14001:2015). And today, the university hospital campuses of Malmö and Lund have sustainability strategists working onsite.

Some of the targets for improvement include reducing the amount of municipal waste by at least 40% and food waste from patient meals by at least 50%; reducing the amount of discarded medicine by at least 30% and the emissions of nitrous oxide and anaesthetic gases by at least 50%. In terms of real estate, improvement targets include reducing the climate impact of construction by 40%, increasing the use of recycled materials, fully transitioning to fossil-fuel-free ground transport by 2030, and installing renewable power plants on properties owned by the region where possible.

How will they achieve their targets? Strategies include strengthening environmental knowledge and awareness amongst employees (at least 50% of staff should take part in digital environmental education). Other measures include improving food waste and management practices, as well as monitoring the quantity of disposable materials purchased and used.

The HOPE exchange team identified specific initiatives that are already in practice. For instance, in relation to food waste, the Swedish Food Agency has released a handbook for reducing waste. In the hospitals they visited, the hospital restaurant keeps track of the weight of wasted food, and ask visitors to eat all their food and request smaller portions. At the tables, signs remind visitors of the weighing of food waste.

In surgical wards, sorting and recycling has been instituted, for plastic, paper, and surgical instruments (where possible).

In terms of transportation, all vehicles owned by Skåne University Hospital use biogas. And buildings are powered as much as possible by solar power and wind turbines. In fact, the Skåne region owns six large wind turbines in Småland and one in Trelleborg.

Finally, environmental standards are applied to new buildings. A new building at the Malmö hospital campus has an integrated waste centre, while the Forensic Psychiatric Centre in Trelleborg is a highly energy-efficient building. The new hospital campus planned in Helsingborg is set to be the first climate neutral hospital in Sweden.

AUSTRIA

HOPE National Coordinator: Ines Vukic

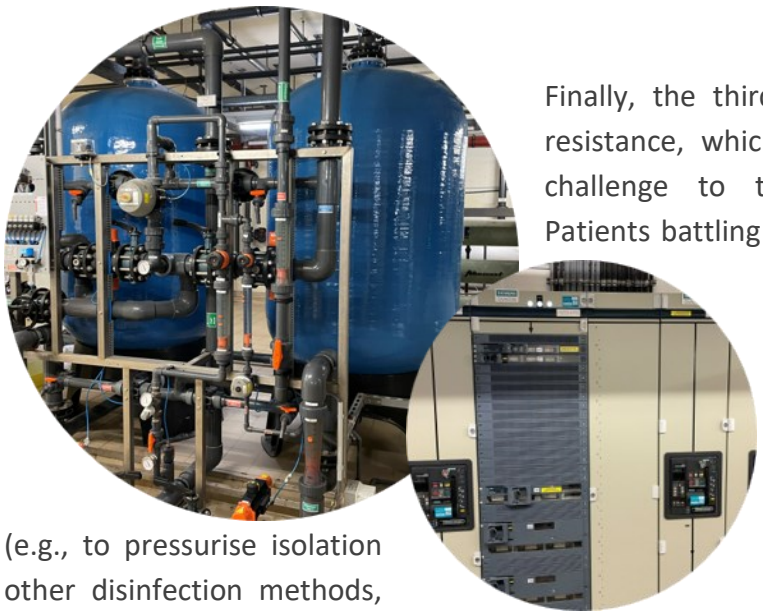
Exchange participant(s) 2023: Aurora Pratali, Italy
Andris Voronins, Latvia
Anna Robinson, Poland
Angelina Böckeler, Germany
Bruno Nielsen, Denmark
Lucia Mangone, Italy
Sarah Krieg, Germany

The HOPE exchange team in Austria began their presentation by describing nation-wide green efforts in the following fields of action:

- **Energy, buildings, and green spaces:** transitioning towards renewable energy (solar panels, heat pumps, etc.), improved insulation, greening rooftops, installing LED lighting.
- **Waste and resources:** reducing bottled water use, transforming food waste into biogas.
- **Food systems:** increasing output of regional and seasonal organic produce.
- **Pharmaceuticals & medical products:** recycling of anaesthetic gases, purchasing organic packaging for pills (e.g., cellulose).
- **Mobility and transport:** mobility applications, encouraging the use of public transport and bicycles, improving transportation infrastructure, providing electric charging points.
- **Awareness raising and communications:** offering multilingual workshops, improving health literacy, using health professionals as multipliers for these efforts.
- **Sustainable supply chain:** increasing use of certified suppliers, integrating environmental criteria in the procurement process.

Next, the presenters focused on three specific cases exemplifying good practices in hospitals. Austrian hospitals are targeting food waste by asking employees to order lunch in advance (deadline is 09h00 same day), reducing meat portions in favour of vegetables, and customising portions according to staff and patient needs and requests (small, medium, large).

The second example refers to efficient usage, specifically re-using surplus heat from the servers to heat hospital rooms.



Finally, the third example focuses on antibiotic resistance, which, among other things, poses a challenge to the climate and environment. Patients battling antibiotic resistant infections are likely to use far more hospital resources than those who are not. Furthermore, the risk of spread results increased disposal of single-use equipment and energy usage rooms, power UV lights and etc.). like: Greater amount of (e.g., to pressurise isolation other disinfection methods, single use equipment that needs to be later safely utilized. Finally, prolonged hospital stay can result in worse outcomes and risk to other patients.

While antibiotics are essential life-saving medicines, they are also pollutants. Therefore, there are steps that need to be taken to promote safe and responsible use. Steps could include:

- Having infection control teams to ensure disease reporting, assessment, and control.
- Ensuring reasonable antibiotic stewardship.
- Providing training in infectious diseases.

In conclusion, the HOPE exchange team in Austria observed that the country is moving forward towards significant change by adopting innovative best practices in the overall health system and planning for sustainability across all sectors.

UNITED KINGDOM

HOPE National Coordinator: Lee Anderson
Exchange participant(s) 2023: Ann Charlotte Roberts, Sweden
Mark Van Den Broek, The Netherlands
Maria Bernadette Di Sciascio, Italy
Zaid Alnakeeb, Spain

Climate change poses a major threat to our health as well as our planet. The environment is changing, that change is accelerating, and this has direct and immediate consequences for patients, the public and the NHS and health care systems across Europe.

The UK's HOPE exchange team discussed the Greener NHS programme, the comprehensive framework to address the environmental impact of the hospital and healthcare sector in the UK. The programme will work with its staff, hospitals, and partners to build on the work being done by trusts across the country, sharing ideas on how to reach net zero, implement save money, and reduce the damage to the environment and public health.

What is a Green Plan? A Green Plan is a central document that states the strategy, actions, and timescales to reduce carbon emissions and deliver care in a more sustainable way. Every NHS organization in England is required to produce a Green Plan.

Two main targets are set for 2040 and 2045: For the emissions controlled directly (the NHS Carbon Footprint), the NHS will reach net zero by 2040, with an ambition to reach an 80% reduction by 2028 to 2032. And for the emissions the NHS can influence (the NHS Carbon Footprint Plus), it will reach net zero by 2045, with an ambition to reach an 80% reduction by 2036 to 2039.

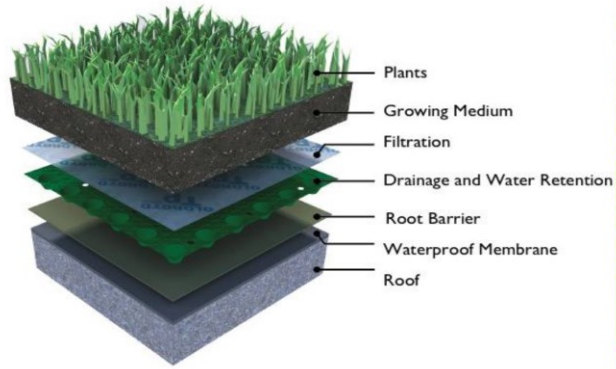
The plans and targets are produced at the national (NHS), regional (integrated care boards), and local (hospitals) levels. In turn, each level assesses results and reports on the strategy and its implementation.

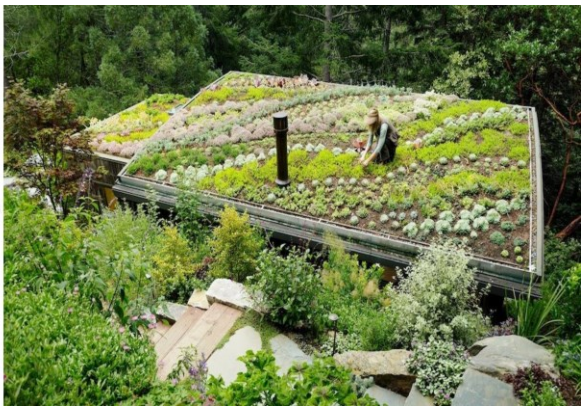
To promote openness and transparency, new NHS regulations make the data and reports available in different formats.

In terms of specific good practices, the UK HOPE exchange team observed efforts to reduce carbon emissions, encourage biodiversity, and distribute medication more efficiently.

The first example shows Bridlington Hospital's progress towards reducing 60-80% of its carbon emissions. The institution hopes to achieve this by installing solar panels on the roof and mounting a solar farm nearby to meet 100% of the electricity demanded by the heat pumps. In other words, 100% of the heat demand of the hospital will be met via a 100% renewable source.

Hospitals are also considering installing sedum roofs where appropriate, which help keep buildings cool in summer and warm in winter. They provide insulation and encourage wildlife.





These considerations involve weighing the pros and cons:

PROS

- They last longer than conventional roofs (up to twice as long).
- They are good at controlling building temperatures in summer and in winter.
- They are thermally efficient, meaning, they can heat effectively and lower the cost of doing so.
- They can lower the building's carbon footprint.
- They have aesthetic value.

CONS

- They are expensive to install.
- The maintenance can be very costly.

Finally, the third practice the team wished to highlight was the drone chemotherapy delivery system to Isle of Wight patients. The medication used to be delivered from the Portsmouth Hospitals University NHS trust by courier, followed by a ferry or hovercraft, and then taxi. Today, the transportation of life-saving drugs to St. Mary's Hospital in Newport has reduced a four-hour journey to a 30-minute drone flight.

GREECE

HOPE National Coordinator: George Tsimopoulos
Exchange participant(s) 2023: Darren Carroll, Ireland
Lea Bak Christensen, Denmark
Stefano Guicciardi, Italy
Liisi Virgebau, Estonia

The HOPE exchange team in Greece kicked off their presentation by providing key figures, providing a snapshot of the context in which the Greek hospital and healthcare system operates.

The Ministry of Health is the leading authority, both supervising public and private health sector.

The team shared three good practices they observed mainly in two hospitals: (1) At Venizelio General Hospital in Heraklion, and (2) at Papageorgiou General Hospital in Thessaloniki. Venizelio is a public Hospital of the 7th Health Region (Crete). It provides primary, secondary, and tertiary care. Papageorgiou is a legal entity under private law, a non-profit organisation that offers preventive, diagnostic, treatment, and rehabilitation services. Built in 1999 partly through private donations, it is one of the two biggest hospitals in Thessaloniki (9 hospitals in total).

In relation to climate and environment challenges, the team focused on the following examples. First, the DIANYA system for on-site hospital wastewater management.

This project aims to develop, at competitive costs, an integrated process for the management of hospital wastewater that will allow:

- the biodegradation of toxic pharmaceutical substances;
- the removal of multi resistant bacteria and organic micropollutants contained in them;
- the safe disposal and reuse of the treated wastewater.

The project, currently being piloted at the Venizelio General Hospital is funded by the National Action: Research-Create-Innovate [Operational program: “Competitiveness, Entrepreneurship & Innovation (EPAnEK) 2014-2020” (NSRF 2014- 2020), with co-financing of Greece and the European Union].

Every day, hospital wastewater is collected and treated for major threats. However, checks are uncommon for pharmaceuticals and toxic by-products, viruses, or antibiotics resistant

genes and bacteria. Since conventional treatment plants aren't designed for the degradation of these elements and of emerging pollutants, the consequences could be significant and affect human health, pathogens in the environment, and plants and animals.

While it is too early to draw final conclusions, initial results seem promising. Researchers have noticed reductions in the value of biochemical parameters and the concentration of most substances. The wastewater management process has successfully of the microbial load (over 99% reduction). Low concentration of bacteria in the effluent with lower risk the spread of antibiotic-resistant bacteria. Now they are experimenting with reusing the effluent water for irrigation purposes of the green areas of the hospital.

The next example that was discussed involved photocatalytic paint. Photo-Catalytic Nano Materials is a spin-off company of the Foundation for Research and Technology Hellas (FORTH) based in Heraklion. They designed a series of patents on innovative photocatalytic nanomaterials (PCN) that degrade gaseous and liquid pollutants, purify waste, disrupt polluting and toxic odours, and degrade pathogenic organisms. The company is aiming to produce photocatalytic materials operating under the influence of solar and/or artificial (indoor) lighting, proved most effective both, inn improving indoor/outdoor air quality and in the disinfection of health-sensitive areas. Extensive tests by independent National and International bodies have shown enhanced de-pollution functionalities and strong disinfection properties.

Some large-scale applications have already been tested, such as the Tunnel of Stalida in Heraklion, which was coated in 2014 with 4,000 square meters of photocatalytic PCN. It was also tested at the Greek Army Medical Centre where cadets train. Results included:

- lower concentrations of Nitrogen Oxides;
- improved air quality; and
- healthier and safer environment through the total elimination of bacteria concentration.
- New applications are planned for their future.

Researchers are now exploring the possible application of PC nanotechnology in hospital settings. For instance, photocatalytic paint would be used for indoor walls and metallic surfaces. Another option could be to coat textiles (e.g., curtains, doctor's coats, surgery caps etc.) using photocatalytic spray, as well as furniture or common medical devices. At present, the PAGNI Hospital is conducting large-scale piloting in the application of high-performance photocatalytic modified TiO2 powder within the ICU.

Finally, the HOPE exchange team in Greece presented the country's Mosquito Control and Entomological Surveillance Programme.

Every year, more than 1 billion people suffer from vector-borne diseases such as malaria, dengue, zika, or yellow fever. These diseases are caused by viruses, bacteria, and parasites transmitted via living organisms such as insects, and account for more than 17% of all infectious illnesses.

Globalised travel and trade, unplanned urbanisation, and environmental challenges such as climate change, significantly contribute to their spread. In April 2018, the European Commission launched a €5 million prize for a scalable, reliable, and cost-effective early-warning system. The winning prototype, **EarlY WArning System for Mosquito-borne diseases** (EYWA), provides early-warning capabilities to help prevent and mitigate the impact of infectious diseases at local, regional, and global scales. It was developed in collaboration with Greek research centres (mainly BEYOND: Centre of EO Research and Satellite Remote Sensing of the Institute for Astronomy, Astrophysics, Space Applications and Remote Sensing [IAASARS] of the National Observatory of Athens), as well as key partners such as SMEs, the Laboratory of Atmospheric Physics of the University of Patras, and European organisations in Italy, France, Germany, and Serbia.

EYWA analyses entomological, epidemiological, Earth Observation, crowd- and ancillary geospatial data, along with dynamic and data driven models, to generate knowledge on the mosquito abundance and pathogen transmission.

Using data provided by Copernicus satellites and Copernicus Core Services, EYWA reliably depicts the dynamics of mosquito habitats and breeding sites. The system also capitalises on European investments in Earth observation and cloud-based data repositories (e.g., DIAS, GEOSS, NextGEOSS).

EYWA has yielded various results, including:

- enhanced mosquito surveillance and control at various spatiotemporal scales and in different climatic zones, guiding day to day prevention and mitigation actions;
- reduced entomological risk in thousands of villages where EYWA is employed;
- implemented the One Health approaches by investigating arbovirus infections, while considering environmental and socio-economic resilience.

All the examples the team presented proved to be simple but at the same innovative, cost-effective, and scalable. They represent valid approaches to locally address the impact of global environmental challenges, highlighting the role of national healthcare systems and their potential contribution, even with limited resources.

IRELAND

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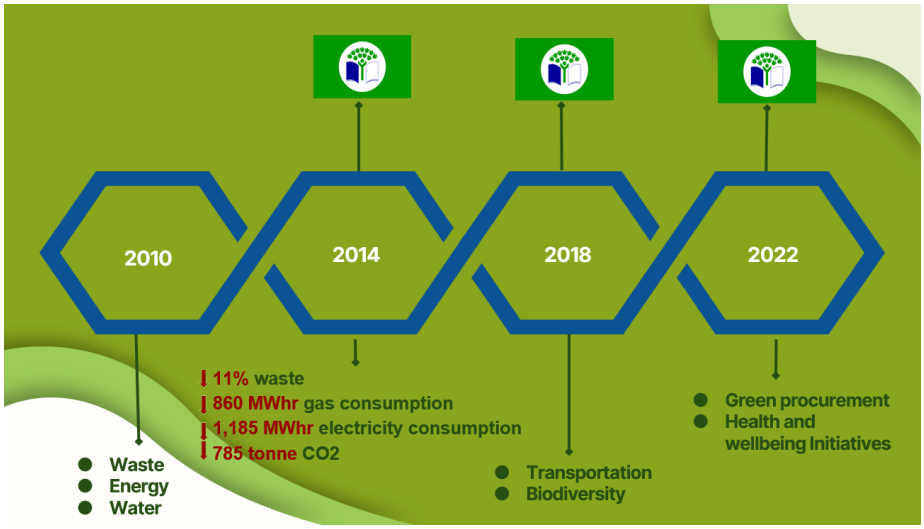
The Sláintecare reforms aim to transform healthcare delivery in Ireland. The motto, Right Care - Right Place - Right Time, helps capture the aim to provide equitable access, based on need and not the ability to pay. In concrete terms, the Sláintecare Healthy Communities Programme was launched in 2021 to provide increased health and wellbeing services in 19 community areas across Ireland. The approach not only aims to improve access to health and social care, but also improve preventive approaches to health.

Within this broad national framework, the HOPE exchange team in Ireland identified three examples of good practices to help combat climate change in Ireland's hospital and healthcare sector.

First, the International Foundation for Environmental Education has awarded Cork University Hospital three green flags (the third one as recently as March 2022). Green Flags are awarded to campuses that demonstrate they have implemented a seven-step programme of environmental management at the institutional level.



Second, the HOPE exchange team in Ireland focused on the “Cycle to Work” initiative. The scheme has led to a 48% reduction in new biking and equipment purchases by offering a full range of repairs cost-free. Furthermore, on-site bicycle parking, shower, lockers, and drying room facilities, as well as e-bikes for staff encourages the use of this mode of transportation. This approach has both occupational health and environmental benefits.

Finally, the third example of good practice focuses on the use of electric ambulances. These are fully equipped and produce zero emissions. While they are not used everywhere, Cork University Hospital is helping pave the way towards greener practices.

SPAIN

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The HOPE exchange team in Spain dove straight into three good practices they identified at national, regional, and local levels.

At the national level, presenters focused on the health and environment strategic plan. Its overall mission is to promote healthy environments that help achieve the health objectives of the population and reduce the risks derived from environmental factors and their conditioning elements, thus reducing the burden of diseases, and helping scientists identify new threats.

The thematic areas of the Health and Environment Strategic Plan are:

- Climate change and health
  - Climate risks

    - Extreme temperatures
    - Air quality
    - Water quality
    - Vectors
- Pollution
    - Chemical products
    - Waste
    - Industrial pollution
- Radiation
    - Natural radioactivity
    - Electromagnetic fields
    - Ultraviolet radiation
- Habitat and health
    - Noise and vibration
    - Indoor environments
    - Healthy cities

The lines of intervention under the subheading “Climate risks” (see 1st heading above) include:

The mission of the Health and Environment Strategic Plan, in the thematic area of **Climate Risks**, is to protect people's health from the adverse effects of climate change.

Lines of intervention	
Prevention and health protection	Reduce morbidity and mortality due to climate change-related events.
Management, organization and coordination	Establish mechanisms to promote the work and coordination of the actions planned among all the actors involved.
Training and risk communication	Improve knowledge on the incidence of climate change.
Research	Improve knowledge about the impact of climate change on human and animal health and biodiversity.

Source: Sub-directorate General Environmental Health and Occupational Health (Ministry of Health, Spain)

Next, at the regional level, presenters focused on PITeco, a plan for ecological transition implemented by the regional health service of Murcia. With an investment of 52.2 million euros during the next 8-10 years, the plan aims to:

- Transition to self-sufficiency and renewable energy;

- Rehabilitate and renovate infrastructure, as well as make it more energy resilient;
- Support the digital transition and the adoption of energy, water and waste control, and monitoring technologies;
- Promote low-carbon mobility
- Promote circularity by reduction of inputs and surpluses; and
- Expand resources and innovative tools for sustainability.

Presenters closed their presentation with a local level example of good practice in relation to energy and CO_2 emissions.

Hospitals in Spain have taken various steps to reduce energy consumption and carbon emissions, including:

- Installing solar panels;
- Raising awareness (e.g., campaigns to switch of lights or use fewer plastic bottles);
- Switching off heating, air conditioning, and lighting in unused rooms and buildings;
- Promoting the use of electric cars by installing electric charging points; and
- Reducing waste by using sustainable products (e.g., reusable model organs manufactured with gelatine instead of silicone for surgical simulations).

PORTUGAL

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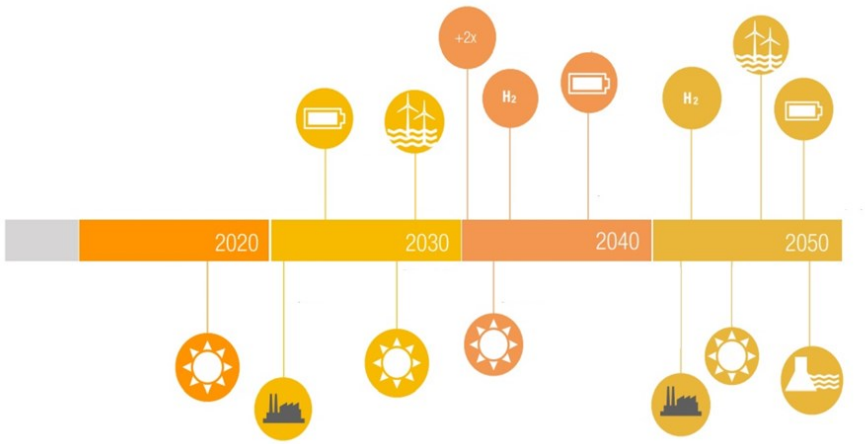
The HOPE exchange team in Portugal provided the ways in which the country's health sector is contributing to tackling the current climate crisis.

It starts with governance. Various institutions collaborate to monitor energy, gas, and electricity consumption via dashboards and improve sustainability. EU and national efforts towards the digital transformation also support initiatives in the health sector, such as telemedicine, and shared information systems.

The road to NET-ZERO in the Portuguese NHS:

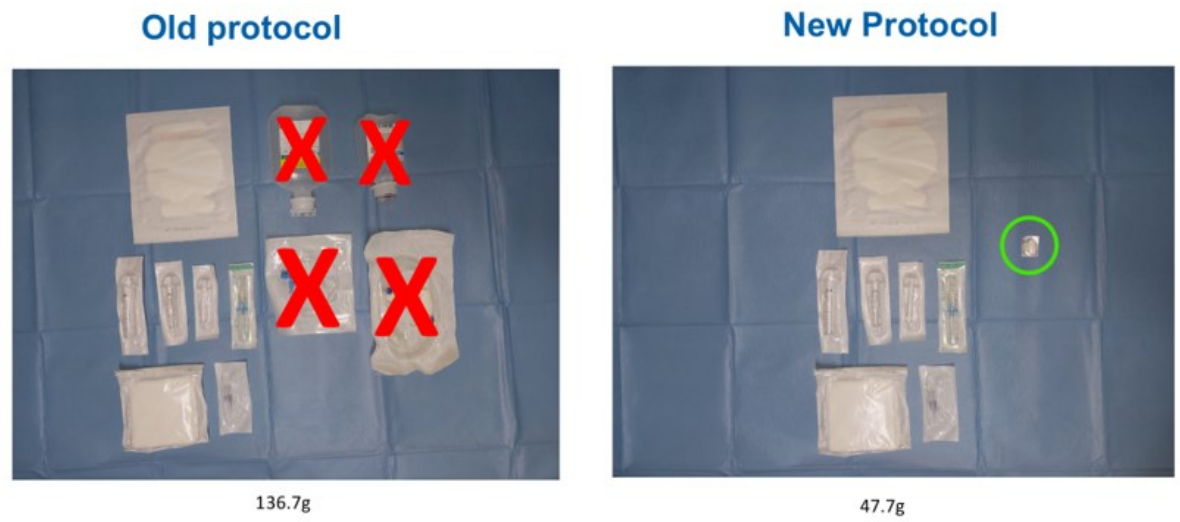


Source: Government of Portugal

At the level of individual and institutional praxis, the focus is on the 5 R's: **R**efuse – **R**educe – **R**euse – **R**epurpose – **R**ecycle.

In one of the hospitals participants visited, for example, they are working with a local initiative to repurpose and reuse surgical packaging and textiles.

In operation theatre, hospitals have identified ways to reduce waste and CO_2 emissions during cataracts surgery by changing medical and procedural protocols.



Source: Centro Hospitalar de Entre o Douro e Vouga, E.P.E.

The HOPE Exchange team in Portugal also observed the link between social practices and health. They shared a unique programme where young children begin their green education by learning about healthy and sustainable lunches, helping maintain green gardens, becoming familiar with the cycle of life, and participating in recycling efforts.

European Hospital and Healthcare Federation

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HOPE represents national public and private hospitals and healthcare associations, national federations of local and regional authorities and national health services from 30 European countries.

HOPE mission is to promote improvements in the health of citizens throughout Europe, high standard of hospital care and to foster efficiency with humanity in the organisation and operation of hospital and healthcare services.