ORIGINAL RESEARCH

Call for action: European strategy for a net zero healthcare sector in the European Union

Laetitia Römer[1], Kristin Sieberger[1], Jannik Christopher Wagner[1], Johanna Waschke[1], Marina Oosterhuis - Loete[1] and John Middleton[2]

[1] Maastricht University, Faculty of Health, Medicine and Life Sciences, Maastricht, Netherlands

[2] Immediate Past President Association of Schools of Public Health in the European Region (ASPHER) Brussels, Belgium

Corresponding author: Wagner, Jannik Christopher
Faculty of Health, Medicine and Life Sciences, Maastricht University
Address: Hillmannplatz 5-7, 28195 Bremen
Phone: +49151 58326809
Email: jc.wagner@student.maastrichtuniversity.nl

Abstract

Introduction/Context:

The urgency of addressing climate change's impact on healthcare is emphasised and we, as public health professionals, are advocating for a net zero strategy in the EU's healthcare sector. With climate change posing severe threats to vulnerable populations, the paradox of healthcare contributing to climate change underscores the need for immediate action.

Evidence:

The healthcare sector, accounting for 4.4% of global greenhouse gas emissions, is a significant contributor to climate change. As climate change intensifies, healthcare systems face increased challenges. However, current efforts, including the European Green Deal, Climate Law and National Energy and Climate Plans, lack explicit strategies for the healthcare sector.

Policy Options:

We propose a three-step process for EU Member States to achieve a net zero strategy until 2030 and a reduction of the healthcare systems' emission by 2050. The first step focuses on Communication, Cooperation, and Collaboration through stakeholder meetings to foster collaboration and share best practices. The second step emphasises improving funding accessibility, urging transparency in available funds for sustainable healthcare. The third step calls for the development of a European Action Plan, consolidating experiences and results at the EU level.

Recommendations:

To enhance collaboration, regular stakeholder meetings and written updates are recommended. The accessibility of funding options for the healthcare sector should be improved, with transparent assessment tools. The establishment of a European Action Plan is proposed, integrating experiences and strategies for decarbonizing the healthcare system.

Keywords: Climate change, healthcare sector, net zero, European Union, Green Deal, National Energy and Climate Plans

Introduction

"A ruined planet cannot sustain human lives in good health. A healthy planet and healthy people are two sides of the same coin." – Dr. Margaret Chan, Executive Director of the World Health Organization (WHO).

Change and action is needed as climate change effects are felt more progressively in the healthcare sector. This is why we, as public health professionals, are calling for a net zero strategy for the healthcare sector in every country of the European Union (EU). We advocate for all Member States to establish a strategy by 2030, with the goal of achieving a net zero healthcare system by 2050.

Climate change is a threat to European health

The world is burning and drowning. **Climate change is a massive problem for European health** and poses a significant threat to populations worldwide. Dangerous weather events, storms, heatwaves, intense drought spells, the melting of glaciers and the warming of the oceans, are increasing in frequency and becoming more severe (1). These meteorological influences impact the health of populations, through various diseases, health related outcomes, impacts migration and risks food systems (1). For three summers, Europe has experienced directly this growing impact, in forest fires, heatwaves and floods. Additionally, climate change makes it easier for many animals, like mosquitoes and ticks, to expand into new geographic areas and infect more people, such as the spread of the West Nile Virus in Europe (2). As the surface temperature rises, healthcare systems worldwide are experiencing more significant impacts.

Action is needed now!

WHO suggests that around 3.6 billion people live in areas significantly impacted by climate change. It is expected that between 2030 and 2050, climate change will make an additional **250.000 people pay the ultimate price** each year. It poses a significant health risk for the 21st century, with one in four premature deaths attributed to environmental factors (3). The effects will mostly be felt in countries with weak infrastructures, generally the poorer developing countries, as they will be the least able to cope. The Sixth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) concluded that the **risks of climate change are appearing faster and are becoming more severe than expected**. It will be challenging to adapt to the increased global heating (4). Record-breaking heat reports for October 2023 indicate the hottest year to date, showing a significant rise in temperatures around the world (5).

Context

Healthcare is one of the bigger contributors

The healthcare sector is one of the more prominent contributors to climate change. The healthcare sector is estimated to **account for 4.4% of net Greenhouse Gas emissions globally** (GHG). If the healthcare sector were compared to countries, it would be the fifth largest emitter of GHG (6-7). The burden on the healthcare sector increases because of climate change. The

sector also significantly contributes to climate change, and it will increase its contribution by increasing healthcare usage. People can keep their health and experience less impact of climate change by reducing their carbon footprint and GHG emissions in the healthcare sector. Stronger actions by European health systems are needed. Doing so will stop the negative loop between healthcare and climate change.

Stronger actions by European health systems are needed

The European Green Deal was presented in 2019 (8). Its roots are founded in global climate agreements: the United Nations Framework Convention on Climate Change (UNFCCC) in 1992 and the Paris Agreement in 2015 (8, 9). The urgency was apparent then and remains so today: the European Green Deal is the EU's commitment to achieve net zero emissions by 2050 and aligns with the global mission to combat climate change (8). However, **current efforts are not enough**. The clock is ticking, and crucial steps are needed now (10).

Healthcare is not yet included in the National Energy and Climate Plans (NECPs)

The introduction of the Climate Law in 2021 (EU 2021/1119) (11) under the Green Deal binds Member States to defined targets. It includes the 2030 target, where countries are obliged to reduce at least 55% of their net emissions of GHG compared to 1990. It also contains the long-term 2050 goal of net zero GHG emissions and reaching climate neutrality. However, the **European Green Deal policy initiatives or the Climate Law do not explicitly address the healthcare sector**. No uniform strategy exists among Member States to reduce GHG emissions in the healthcare sector. With more emergencies impacting the healthcare systems, the healthcare sector should take responsibility for reducing its impacts on climate change. National strategies that address the healthcare sectors' emissions are needed. The National Energy and Climate Plans (NECP) that member states have implemented for reaching the targets under the Climate Law, do not address the healthcare sector yet (12).

Euro not as one zone? - Time for change!

In Europe, it is evident that **only a few countries have a clear strategy** for achieving net zero in their healthcare systems, leaving others needing a defined route. The EU does not explicitly recommend net zero strategies for the healthcare sector. Member States have different healthcare per capita emission (*see Figure 1*). However, only a limited number of Member States are committed to a net zero goal in healthcare (*see Figure 2*) and between the two charts you can see discrepancy between the emitters and the committers. The Member States are responsible for their own healthcare sector, but on EU level there is the possibility to start faster and better progress in a net zero healthcare sector in the future (7, 13-16).
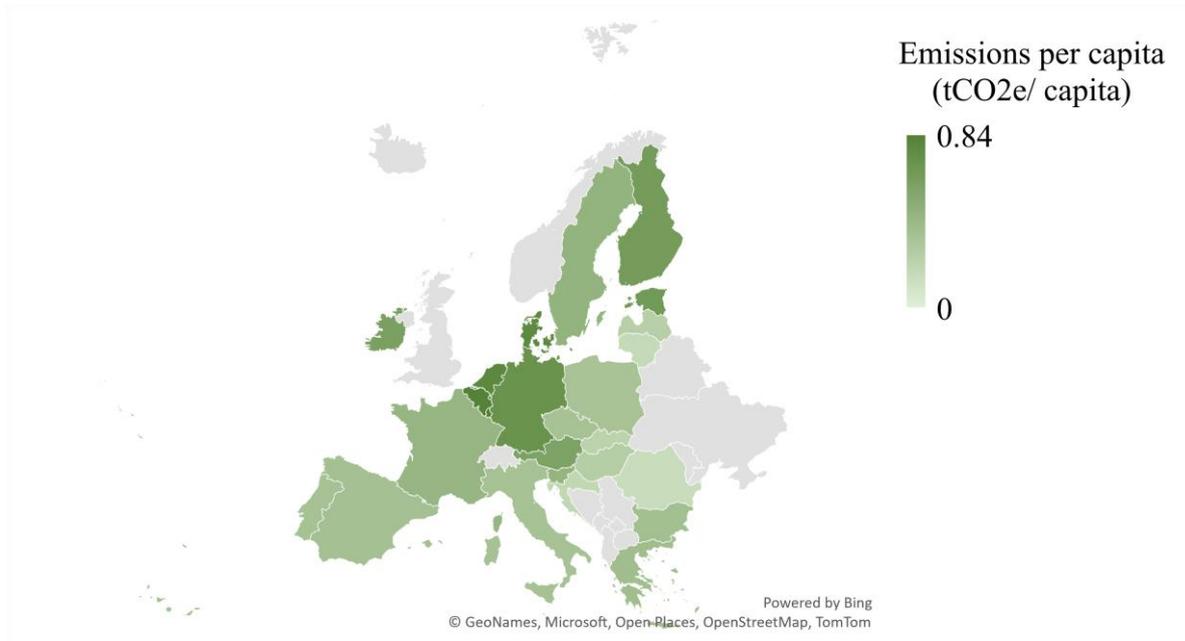
Figure 1. Healthcare emissions per capita (2014) (7)
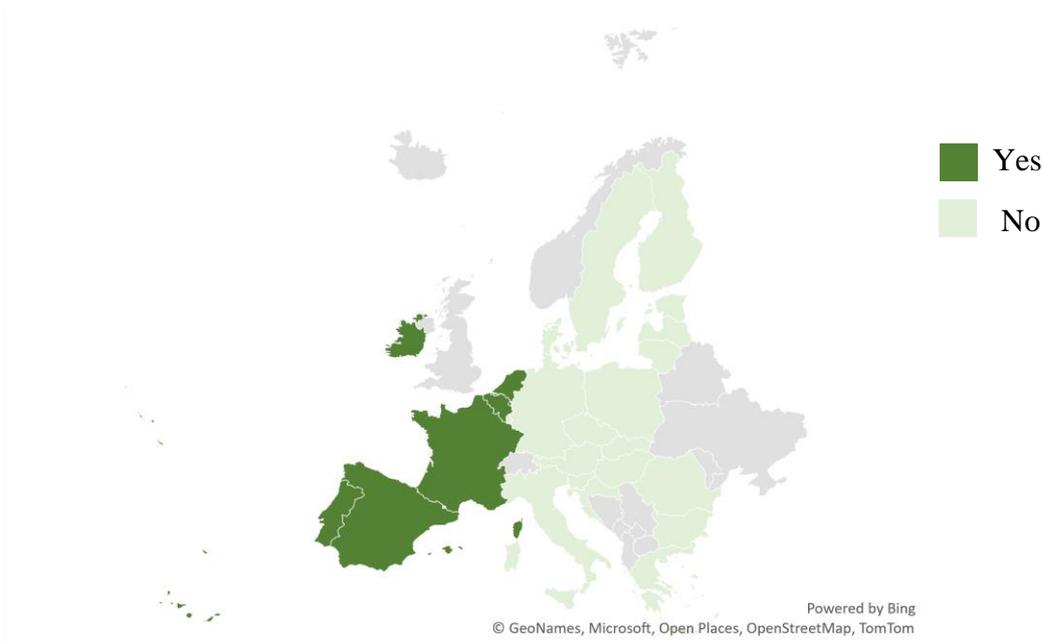
Figure 2. Map of European countries with a commitment to net zero in healthcare (2023) (13-16)

Policy Options – A three-step process

Healthcare systems are the Member States showpieces, with national implemented policies that vary greatly among Member States. We advocate for all Member States to establish a strategy by 2030, with the goal of achieving a net zero healthcare system by 2050 – all together. To accomplish the primary objective, we envisage a three-step process:

Figure 3. Three-step process (developed by the authors)

Step 1: Communication – Cooperation – Collaboration

In Europe, only a few countries have a clear strategy for achieving net zero in their healthcare systems, leaving others needing a defined route *(see Figure 3)*. The Netherlands has the HSE Climate Action Strategy 2023-2050, which targets net zero emissions by 2050, aligning with government climate plans and emphasising a commitment to socially and environmentally sustainable healthcare. Demonstrating leadership, the strategy integrates sustainability into infrastructure, transportation, procurement, healthcare models, and adaptation, fostering resilience in critical infrastructure and resources (15).

The Central Administration of the Health System (ACSS) is actively involved in the Portuguese project "Designing a Net Zero Road Map for Healthcare" under the coordination of the non-governmental organisation (NGO) "Health Care Without Harm". This effort includes setting the baseline for GHG emissions in Portugal's healthcare sector, defining the targeted route for emissions reduction, and projecting future emissions (16).

Spain's Health Minister, José Miñones, revealed the nation's initial Carbon Footprint Reduction Plan for the health sector, aiming to pioneer decarbonization in European healthcare. Aligned with the 2022-2023 Action Programme, the plan includes a groundbreaking study on healthcare centres' consumption and emissions, emphasising Spain's commitment to climate-friendly health practices (17).

Among other nearby non-EU countries, Switzerland and England, have formulated strategies to achieve net zero objectives became the first health service globally to commit to carbon net zero, addressing climate-related health risks. The "Delivering a Net Zero Health Service" report details the NHS's progress in reducing emissions, equivalent to powering 1.1 million homes annually, within a year of setting ambitious targets (18). Switzerland's Bundesrat adopted the "Health2030" strategy on December 6, 2019, to continue "Health2020", focusing on key challenges such as technological advancements and demographic changes. With eight goals and 16 measures, the strategy encourages collective responsibility and integrates environmental concerns in alignment with the UN Agenda 2030 for sustainable development (19). *Appendix 1*, showcasing the *countries' best practices.*

However, a notable challenge is the need for more communication among the countries in the global healthcare community. More dialogue and coordination between countries and stakeholders are needed to ensure the exchange of **valuable insights, best practices and innovations**. This lack of communication may lead to missed opportunities for mutual learning and collaboration, impeding progress in addressing shared healthcare challenges.

Furthermore, healthcare systems vary in diverse requirements among Member States. These variations encompass various factors, including infrastructure, funding mechanisms, regulatory frameworks and cultural considerations (20). Understanding and guiding these diverse requirements is crucial for developing effective and tailored healthcare strategies that can address the specific needs and challenges of each nation's healthcare landscape.

This calls for a more cohesive approach, where centralised information is provided to Member States interested in adopting a net zero strategy in healthcare. Simultaneously, climate change disregards borders, making it imperative for Member States of the European Union to **Communicate, Cooperate, and Collaborate**.

To enhance collaboration, it is essential to facilitate communication between Member States and healthcare providers. Sharing best practices and examples of overcoming challenges during implementation can significantly benefit the overall strategy. In every aspect of the European approach, a focus on stakeholders, utilizing existing structures and practices, is crucial. Success depends on allowing each stakeholder the opportunity to participate and contribute their knowledge. The stakeholder meeting should involve Member States and relevant experts in healthcare facilities and climate change. Learning from global best practices, the project aims to integrate national and international organisations, including government authorities, to address specific country challenges and leverage global expertise. Collaborators from

healthcare associations, NGOs and environmental agencies should cooperate closely, ensuring an equitable exchange, partnership expectations and defined roles (*see Appendix: list of relevant stakeholders*). Box 1 shows an existing example for collaboration of stakeholders (21).

> **Box 1. Seventh Ministerial Conference on Environment and Health**
>
> The Seventh Ministerial Conference on Environment and Health, part of the European Environment and Health Process (EHP), will shape future priorities and commitments for the WHO European Region. Focusing on the health aspects of the triple environmental crisis—climate change, biodiversity loss, and environmental pollution—the conference considers opportunities for a healthy recovery aligned with the 2030 Agenda for Sustainable Development. The conference aims to catalyse collaborative action, showcase good practices, launch partnerships, and conclude with a ministerial declaration addressing health dimensions and recovery strategies (21).
>
> Drawing inspiration from the mentioned example, a conference and stakeholder meetings at the EU level should be organised to discuss achieving net zero in healthcare facilities.

Recommendation

To facilitate collaboration, as highlighted in *Step 1: Communication – Cooperation – Collaboration*, we encourage establishing **regular stakeholder meetings accompanied by routine written updates**, which will be valuable for spreading essential information, best practices and progress reports. A collaborative approach aims to advance the healthcare sector towards achieving net zero in healthcare facilities. The recurrent meetings will serve as forums for exchanging knowledge from diverse perspectives, fostering a comprehensive understanding of the challenges and opportunities involved. Besides sharing information, the stakeholder meetings will emphasise the visibility of the specific needs and priorities of each stakeholder and country involved. We anticipate a more **holistic and well-informed approach to formulating and implementing net zero strategies in healthcare**.

Step 2: Better Accessibility to Funding

The European Green Deal provides substantial funding to make various areas of public life more sustainable. Different budgets have been made available to facilitate the transition to more sustainable healthcare (22). Among the most noteworthy funds are the **European Investment Banks** "InvestEU" and the "Just Transition Fund" (22). Other available funds are the "European Social Fund+" and the "European Regional Development Fund", which can be used by several sectors to have a better chance of achieving and realising the goals (23).

What becomes apparent when looking at the funding websites is that more attention should be paid to the healthcare sector. On the European Investment Bank's website, the "Green Eligibility Checker" offers different sections where funding options can be found for various sectors. "Industry" and "Agriculture" have rubrics that provide transparent information about

possible funding for sustainable projects (24). For the healthcare sector, transparency and accessibility to explore funding options are more difficult, hindering further progression. The funds' websites only provide vague information that is not comprehensive and convenient for its users.

Recommendation
We advocate for **revising the websites and eligibility checks to access the available funding, end the dispersal of financial support and stop the hindering of change**.

The European Investment Bank's "Green Eligibility Checker" can be expanded. A further section should be added that is adapted to the unique needs of hospitals and other areas of the healthcare system. To quickly demonstrate which measures and funding options are available and orientate on other sectors' examples.

Furthermore, we recommend establishing a different website combining the "European Social Fund+" and the "European Regional Development Fund" and other options to create a new assessment tool focusing only on the healthcare sector. It is recommended to connect and build a shared website that makes it possible to cover all funding options for increasing the efficiency of change.

Step 3: Development of a European Action Plan
The third policy option is the final, overarching step towards an EU Net Zero strategy in healthcare systems. In the short term, the responsibility lies with the Member States, which, as already described in *Step 1*, exchange their experiences through Communication, Cooperation and Collaboration. Targeted funding enables support as a second step at the European level. This can already be successful, but to consolidate the process, it would be desirable for the EU to take on an observational role in the third step. The experiences and results should be documented and made available to the Member States through a European Action Plan.

Other EU examples show that transnational cooperation between neighbouring states can develop into a common European Action Plan. An example of this would be the commitment in the Danube region. Over a longer period, several neighbouring countries have already joined forces to exchange their interests and cooperate. Over the years, a common EU strategy has developed, which also includes an action plan (25).

Recommendation
We recommend providing a **European Action Plan, which could create efficient measures for decarbonising the healthcare system.** The action plan should consider sectors in healthcare, such as pharmaceutics, transport, buildings, and waste management because each sector contributes differently to the overall carbon footprint (7). Addressing them collectively allows for a more effective reduction strategy. The concrete design of the action plan can be carried out in cooperation with the "European Climate and Health Observatory", among others. The Observatory already provides information and tools to help understand the impact of

climate change on health and how to adapt to it (26). Through the Observatory, this collection can be expanded to include information on approaches and experiences in the decarbonisation of healthcare, processed and ultimately integrated into the action plan.

A notable example that can serve as a basis for the European Action Plan is the *"Global road map for healthcare decarbonization"* from the non-governmental organisation Health Care Without Harm (27). This navigation tool is designed to support countries in decarbonising their healthcare systems and offers three pathways: firstly, decarbonising healthcare provision, facilities and operations; secondly, considering the healthcare supply chain; and thirdly, considering the broader economy and society. In addition, the guide outlines seven practical actions, including transitioning to 100% renewable electricity, investing in zero-emission buildings, infrastructure and transport, ensuring a sustainable food supply, promoting low-carbon medicines, implementing sustainable waste management practices and improving overall health efficiency (27). Due to its comprehensive coverage of various aspects of the health sector, this tool is suitable as a navigation instrument that can be adopted for the European Action Plan. Furthermore, embracing such tools saves resources and can significantly accelerate developing and implementing effective net zero strategies. Action must be taken in the issue of a missing net zero healthcare strategy in the NECPs. **The European Action Plan supports the Member States in formulating a net zero strategy and represents a proactive measure to contribute to a sustainable future for the European healthcare sector.**

Conclusion

The urgency of addressing climate change's impact on healthcare is evident. Our initiative for a net zero strategy in the EU's healthcare sector is crucial. We urge all Member States to establish a strategy by 2030, with the goal to achieve a net zero healthcare system by 2050. Climate change poses severe threats, with extreme weather events and the spread of diseases affecting vulnerable populations. The paradox of healthcare contributing to climate change emphasises the need for immediate action to reduce carbon footprints. EU Member States' discrepancies underscore the need for a unified strategy to achieve a net zero healthcare sector.

The authors present a three-step approach for EU Member States to achieve a net zero healthcare system by 2050. The first step emphasises **Communication, Cooperation, and Collaboration** through regular stakeholder meetings and written updates, which are designed to foster collaboration, generate diverse knowledge, highlight varied needs, and lay the foundation for a collective journey toward achieving net zero in the healthcare sector across different countries and stakeholders. The second step focuses on **improving funding accessibility** by providing transparent and user-friendly assessment tools. The third step calls for a structural preparation of current information and possibilities for decarbonising the healthcare system in a **European Action Plan** in the long run. These policy options aim to streamline efforts, enhance collaboration, and pave the way for a sustainable future in healthcare.

We envision a transformation in the healthcare sector, where its mission to promote health is coordinated with a dedicated effort to minimise substantial emissions, ultimately establishing a sustainable and harmonious balance between well-being and environmental responsibility.

References

1. Rhea JR, Caroline B, Ruth N, Laura C, Louann P-B, Rose-Alice P-R, et al. Health effects of climate change: an overview of systematic reviews. BMJ Open. 2021;11(6):e046333.

2. European Centre for Disease Prevention and Control (ECDC) [internet]. West Nile virus - human cases compared to previous seasons, 2023 September 20. ECDC 2023 [updated 2023 September 22; cited 2023 December 6]. Available from: https://www.ecdc.europa.eu/en/publications-data/west-nile-virus-human-cases-compared-previous-seasons-20-september-2023#:~:text=Since%20the%20beginning%20of%20the,)%20and%20Cyprus%20(1).

3. World Health Organization (WHO). Climate change [internet]. WHO 2023 [updated 2023 October 12; cited 2023 December 5]. Available from: https://www.who.int/news-room/fact-sheets/detail/climate-change-and-health.

4. World Health Organization (WHO). Climate Change [internet]. WHO 2023 [cited 2023 November 18]. Available from: https://www.who.int/health-topics/climate-change#tab=tab_1.

5. Copernicus Climate Change Service (C3S). Copernicus: October 2023 - Exceptional temperature anomalies; 2023 virtually certain to be warmest year on record [press release]. [cited 2023 November 8]. Available from: https://climate.copernicus.eu/copernicus-october-2023-exceptional-temperature-anomalies-2023-virtually-certain-be-warmest-year.

6. Pichler P-P, Jaccard IS, Weisz U, Weisz H. International comparison of health care carbon footprints. Environmental Research Letters. 2019;14(6):064004.

7. Health Care Without Harm, ARUP. Health care's climate footprint how the health sector contributes to the global climate crisis and opportunities for action. [Report]. Health Care Without Harm 2019. Available from: https://noharm-global.org/sites/default/files/documents-files/5961/HealthCaresClimateFootprint_092319.pdf.

8. Council of the EU and the European Council. European Green Deal [internet]. Council of the EU and the European Council. European Green Deal 2023 [updated 2023 November 10; cited 2023 December 6]. Available from: https://www.consilium.europa.eu/en/policies/green-deal/.

9. United Nations Framework Convention on Climate Change (UNFCCC). The Paris Agreement [internet]. UNFCCC 2023 [cited 2023 December 6]. Available from: https://unfccc.int/process-and-meetings/the-paris-agreement.

10. United Nations Framework Convention on Climate Change (UNFCCC). New Analysis of National Climate Plans: Insufficient Progress Made, COP28 Must Set Stage for Immediate Action [internet]. UNFCCC 2023 [updated 2023 November 14; cited 2023 November 14]. Available from: https://unfccc.int/news/new-analysis-of-national-climate-plans-insufficient-progress-made-cop28-must-set-stage-for-immediate.

11. European Commission. European Climate Law [internet]. Directorate-General for Climate Action 2023 [cited 2023 October 26]. Available from: https://climate.ec.europa.eu/eu-action/european-climate-law_en.

12. European Commission. National energy and climate plans [internet]. European Commission 2023 [cited 2023 October 26]. Available from: https://commission.europa.eu/energy-climate-change-environment/implementation-eu-countries/energy-and-climate-governance-and-reporting/national-energy-and-climate-plans_en.

13. World Health Organization (WHO). Alliance for action on climate change and health (ATACH) [internet]. WHO 2022 [updated August 31; cited 2023 December 5]. Available from: https://www.who.int/initiatives/alliance-for-transformative-action-on-climate-and-health/country-commitments.

14. Health Service Executive. Climate change and health [internet]. Health Service Executive 2023 [cited 2023 December 5]. Available from: https://www.hse.ie/eng/about/who/healthbusinessservices/national-health-sustainability-office/climate-change-and-health/.

15. Government of the Netherlands. Commitment COP 26 | The Netherlands [internet]. Government of the Netherlands 2023 [cited 2023 December 5]. Available from: https://www.government.nl/topics/climate-change/cop26-the-netherlands.

16. Health Care Without Harm. Carbon footprint of the Portuguese health sector and ways for mitigation [internet]. Health Care Without Harm 2022 [updated 2022 December 21; cited 2023 December 5]. Available from: https://noharm-europe.org/documents/carbon-footprint-portuguese-health-sector-and-ways-mitigation.

17. La Moncloa. Health will develop the first Carbon Footprint Reduction Plan for the health sector in Spain [internet]. La Moncloa 2023 [updated 2023 September 14; cited 2023 December 5]. Available from: https://www.lamoncloa.gob.es/lang/en/gobierno/news/paginas/2023/20230914_carbon-footprint.aspx.

18. National Health Service (NHS) England. Greener NHS [internet]. NHS England 2023 [cited 2023 December 5]. Available from: https://www.england.nhs.uk/greenernhs/.

19. Bundesamt für Gesundheit (BAG). Gesundheitspolitische Strategie des Bundesrats 2020–2030 [internet]. BAG 2023 [updated 2023 September 25; cited 2023 December 5]. Available from: https://www.bag.admin.ch/bag/de/home/strategie-und-politik/gesundheit-2030/gesundheitspolitische-strategie-2030.html.

20. Roncarolo F, Boivin A, Denis J-L, Hébert R, Lehoux P. What do we know about the needs and challenges of health systems? A scoping review of the international literature. BMC Health Services Research. 2017;17(1):636.

21. World Health Organization (WHO) Region Europe. Seventh Ministerial Conference on Environment and Health [internet]. WHO Region Europe 2023 [updated 2023 July 7; cited 2023 December 5]. Available from:

https://www.who.int/europe/news-room/events/item/2023/07/05/default-calendar/seventh-ministerial-conference-on-environment--and--health.

22. European Commission. The European Green Deal Investment Plan and Just Transition Mechanism explained [internet]. European Commission 2020 [updated 2020 January 14; cited 2023 December 2]. Available from: https://ec.europa.eu/commission/presscorner/detail/en/qanda_20_24.

23. European Parliament. Green Deal: key to a climate-neutral and sustainable EU [internet]. European Parliament 2023 [updated 2023 October 27; cited 2023 December 2]. Available from: https://www.europarl.europa.eu/news/en/headlines/society/20200618STO81513/green-deal-key-to-a-climate-neutral-and-sustainable-eu.

24. European Investment Bank (EIB). Green Eligibility Checker [internet]. EIB 2023 [cited 2023 December 5]. Available from: https://greenchecker.eib.org/.

25. Danube Transnational Programme. Cooperation programmes under the European territorial cooperation goal [internet]. Danube Transnational Programme 2014 [updated 2014 January 1; cited 2023 December 4]. Available from: https://www.interreg-danube.eu/uploads/media/default/0001/42/6ff7e04c2fe26221ef9c572f844e50e3061d5628.pdf.

26. European Climate and Health Observatory. About the European Climate and Health Observatory [internet]. European Climate and Health Observatory 2023 [updated 2020 February 1; cited 2023 December 4]. Available from: https://climate-adapt.eea.europa.eu/en/observatory/About/about-the-observatory/.

27. Health Care Without Harm. Global road map for health care decarbonization [internet]. Health Care Without Harm 2024 [cited 2023 December 3]. Available from: https://healthcareclimateaction.org/roadmap.

Appendix I, Towards net zero: Examples from countries exemplary

COUNTRY	EXEMPLARY PRACTICES
NHS England	In October 2020, the NHS made history by becoming the world's first health service to pledge achieving carbon net zero, acknowledging the significant and escalating health risks posed by climate change. The report titled "Delivering a Net Zero Health Service" outlines a distinct ambition and two evidence-based targets. Through the collective efforts of NHS personnel, partners, and suppliers, substantial progress has been made toward creating a more environmentally friendly NHS. One year after establishing these targets, the NHS has successfully decreased emissions, equivalent to powering 1.1 million homes annually (1).
Netherlands	The Netherlands has the HSE Climate Action Strategy 2023-2050, which targets net zero emissions by 2050, aligning with government climate plans and emphasising a commitment to socially and environmentally sustainable healthcare. Demonstrating leadership, the strategy integrates sustainability into infrastructure, transportation, procurement, healthcare models, and adaptation, fostering resilience in critical infrastructure and resources (2).
Portugal	The Central Administration of the Health System (ACSS) is actively involved in the Portuguese project "Designing a Net Zero Road Map for Healthcare" under Health Care Without Harm coordination. This effort includes setting the baseline for GHG emissions in Portugal's healthcare sector, defining the targeted route for emissions reduction, and projecting future emissions (3).
Spain	The Minister for Health in Spain, José Miñones, announced the development of the country's first Carbon Footprint Reduction Plan for the health sector. The plan will include recommendations based on a study of consumption and emissions of healthcare centres, a groundbreaking effort to calculate the carbon footprint of the National Health System (NHS) for the first time in Spain. Spain's intention is to lead the health sector's decarbonisation process in Europe. These efforts align with the 2022-2023 Action Programme of the Strategic Plan for Health and Environment (PESMA), which focuses on 14 areas to address environmental risks. The Spanish Government has also established the Health and

	Climate Change Observatory (OSCC) to coordinate actions with the Ministry for Ecological Transition. Miñones highlighted Spain's commitment to becoming a European best practice in addressing climate change in the health sector, emphasising the need for a broader EU approach to health that contributes to achieving climate neutrality (4).
Switzerland	The Bundesrat (Swiss Federal Council) adopted the Health2030 strategy on December 6, 2019, as a continuation of the Health2020 initiative. Health2030 builds upon the progress made since 2013 in aligning the healthcare system with future challenges and ensuring affordability. The Health2030 strategy provides a framework for healthcare stakeholders to orient themselves. The strategy focuses on four urgent challenges: technological and digital transformations, demographic and societal changes, maintaining high-quality and financially sustainable care, and improving opportunities for a healthy life. Health2030 outlines eight goals and 16 measures for implementation, emphasising the need for collective responsibility in achieving success. The strategy encourages engagement from all stakeholders for effective implementation. The strategy also integrates environmental and occupational health concerns, aligning with the UN Agenda 2030 for sustainable development. The aim here is to reduce environmental risks, preserve nature and landscape, and enhance prevention in the economy and the workplace (5).

References:

1. National Health Service (NHS) England. Greener NHS [internet]. NHS England 2023 [cited 2023 December 5]. Available from: https://www.england.nhs.uk/greenernhs/.
2. Government of the Netherlands. Commitment COP 26 | The Netherlands [internet]. Government of the Netherlands 2023 [cited 2023 December 5]. Available from: https://www.government.nl/topics/climate-change/cop26-the-netherlands.
3. Health Care Without Harm. Carbon footprint of the Portuguese health sector and ways for mitigation [internet]. Health Care Without Harm 2022 [updated 2022 December 21; cited 2023 December 5]. Available from: https://noharm-europe.org/documents/carbon-footprint-portuguese-health-sector-and-ways-mitigation.

4. La Moncloa. Health will develop the first Carbon Footprint Reduction Plan for the health sector in Spain [internet]. La Moncloa 2023 [updated 2023 September 14; cited 2023 December 5]. Available from: https://www.lamoncloa.gob.es/lang/en/gobierno/news/paginas/2023/20230914_carbon-footprint.aspx.

5. Bundesamt für Gesundheit (BAG). Gesundheitspolitische Strategie des Bundesrats 2020–2030 [internet]. BAG 2023 [updated 2023 September 25; cited 2023 December 5]. Available from: https://www.bag.admin.ch/bag/de/home/strategie-und-politik/gesundheit-2030/gesundheitspolitische-strategie-2030.html.

Appendix II, An exemplary list of stakeholders that should be incorporated into the undertaking to attain the objective.

STAKEHOLDER	FUNCTION
ASPHER	ASPHER, the key European organization for public health, is dedicated to improving and safeguarding public health by strengthening education and training for professionals in both practice and research. Committed to advancing the professionalization of the European public health workforce, ASPHER recognises diverse contexts and focuses on aligning education, training, research, and practice with population health challenges. Their goals include supporting member schools, developing education models, promoting innovation exchange, and collaborating globally to elevate standards and strengthen the public health workforce (1).
Children hospitals association (CHA)	The Children's Hospital Association, representing over 220 children's hospitals, has partnered with the Biden administration and the U.S. Department of Health and Human Services (HHS) in the Health Sector Climate Pledge. This initiative signifies a joint commitment to reduce greenhouse gas emissions and establish a more climate-resilient infrastructure (2).
DG Sante`	The Commission's Directorate-General for Health and Food Safety is responsible for EU policy on food safety and health and for monitoring the implementation of related laws. They collect and analyse data on the environmental impact of healthcare facilities on public health, utilizing data to inform policy decisions and identify areas for improvement (3).
EU Commission	Commission plays a crucial role in setting the legislative framework and ensuring coordination among EU Member States.
European Association of hospital managers (EAHM)	EAHM is a Pan-European non-profit and non-political umbrella organization of the national and regional organizations of hospital managers and Healthcare Executives. The EAHM is one of the world's largest hospital management associations. It represents both the hospital managers of public and private hospitals in the European Union and at international level (4).
European Climate and Health Observatory	The European Climate and Health Observatory, a collaboration between the European Commission, the

	European Environment Agency (EEA), and various organizations, strives to assist Europe in anticipating and adapting to climate change's impacts on human health. It facilitates access to pertinent information and tools, encourages information exchange and collaboration among diverse stakeholders, aligning with the European Green Deal and the EU4Health vision. As of February 1, 2020, the Observatory encompasses the 38 EEA member and cooperating countries (5).
European Environment Agency	Their fundamental responsibilities, as outlined in the founding EU regulation, encompass supporting policy development and key global processes, offering analytical expertise, establishing and maintaining an efficient reporting infrastructure for national and international data flows. In collaboration with their partner network, Eionet, they play a crucial role in keeping decision-makers and the public informed about the condition of Europe's environment, climate change, and broader sustainability matters (6).
European Federation of Pharmaceutical Industries and Associations (EFPIA)	The EFPIA serves as the representative body for the biopharmaceutical industry in Europe. With a direct membership of 37 national associations, 38 leading pharmaceutical companies, and an increasing number of small and medium-sized enterprises, EFPIA is dedicated to fostering a collaborative environment. This environment aims to empower members to innovate, discover, develop, and deliver new therapies and vaccines for the people of Europe while contributing to the European economy (7).
European Hospital and Healthcare Federation (HOPE)	HOPE, founded in 1966, is a European non-profit organization representing national hospital and healthcare associations, as well as owners of hospital, health, and social care services. Their mission is to enhance the health of citizens and uphold a consistently high standard of hospital care within the European Union. They advocate for efficiency, effectiveness, and humanity in the organization and operations of healthcare services. HOPE actively represents its members in the European arena, addressing policies that impact hospitals and health services (8).
European Investment Bank (EIB)	The EIB partners with both public and private sectors to enhance investments in climate and environmentally-friendly initiatives. Providing direct loans for major corporations and

	projects, as well as supporting smaller ventures through loans or assistance to local banks, their advisory services encompass a broad range, aiding urban and regional development, facilitating appropriate financing, and ensuring sound project development, particularly in the realm of climate projects where unique financial products, grants, and technical assistance are offered for project success (9).
European Medicines Agency (EMA)	The EMA is a decentralised agency of the European Union (EU) responsible for the scientific evaluation, supervision and safety monitoring of medicines in the EU (10).
Health Care without Harm	Health Care Without Harm strives to globally transform healthcare by minimizing its environmental impact, fostering sustainability as a community anchor, and leading the charge in the global movement for environmental health and justice. Their Programs cover various aspects, including Medical Waste, Toxic Materials, Safer Chemicals, Green Building and Energy, Healthy Food, Pharmaceuticals, Sustainable Procurement, Climate and Health, Transportation, and Water (11).
POLITICO (Media)	POLITICO is a global nonpartisan politics and policy news organization. A subsidiary of Axel Springer SE, POLITICO Europe operates with headquarters in Brussels and additional offices in London, Berlin, and Paris. The organization connects and empowers professionals through unbiased journalism and actionable intelligence on European politics and policy (12).

References

1. Association of Schools of Public Health in the European Region (ASPHER). Aspher mission, functions & objectives [internet]. ASPHER 2023 [cited 2023 December 5]. Available from: https://www.aspher.org/aspher-mission-functions-objectives.html.
2. Children's Hospital Association. Children's Hospital Association Joins Health Sector Climate Pledge [press release]. 2022 July 7. Available from: https://www.childrenshospitals.org/news/newsroom/2022/07/cha-joins-health-sector-climate-pledge.
3. European Commission. Supporting policy with scientific evidence [internet]. European Commission 2022 [updated 2022 October 28; cited 2023 December 5]. Available from: https://knowledge4policy.ec.europa.eu/organisation/dg-sante-dg-health-food-safety_en.

4. European Association of Hospital Managers (EAHM). Our mission [internet]. EAHM 2023 [cited 2023 December 5]. Available from: https://eahm.eu.org/our-mission/.

5. European Climate and Health Observatory. About the European Climate and Health Observatory [internet]. European Climate and Health Observatory 2023 [updated 2020 February 1; cited 2023 December 4]. Available from: https://climate-adapt.eea.europa.eu/en/observatory/About/about-the-observatory/.

6. European Environment Agency (EEA). Who we are [internet]. EEA 2023 [cited 2023 December 5]. Available from: https://www.eea.europa.eu/en/about/who-we-are.

7. European Federation of Pharmaceutical Industries and Associations (EFPIA). Board & Working Parties [internet]. EFPIA 2023 [cited 2023 December 5]. Available from: https://www.efpia.eu/about-us/who-we-are/.

8. European Hospital and Healthcare Federation (HOPE). The European Hospital & Healthcare Federation [internet]. HOPE 2023 [cited 2023 December 5]. Available from: https://hope.be/about-us/.

9. European Investment Bank (EIB). How to get help for your climate project [internet]. EIB 2023 [cited 2023 December 5]. Available from: https://www.eib.org/en/about/priorities/climate-action/get-support/index.htm.

10. European Medicines Agency (EMA). Who we are [internet]. EMA 2023 [cited 2023 December 5]. Available from: https://www.ema.europa.eu/en/about-us/who-we-are.

11. Health Care Without Harm. Leading the global movement for environmentally responsible health care [internet]. Health Care Without Harm 2023 [cited 2023 December 5]. Available from: https://noharm.org/.

12. POLITICO. About Us [internet]. POLITICO 2023 [cited 2023 December 5]. Available from: https://www.politico.eu/about-us/.