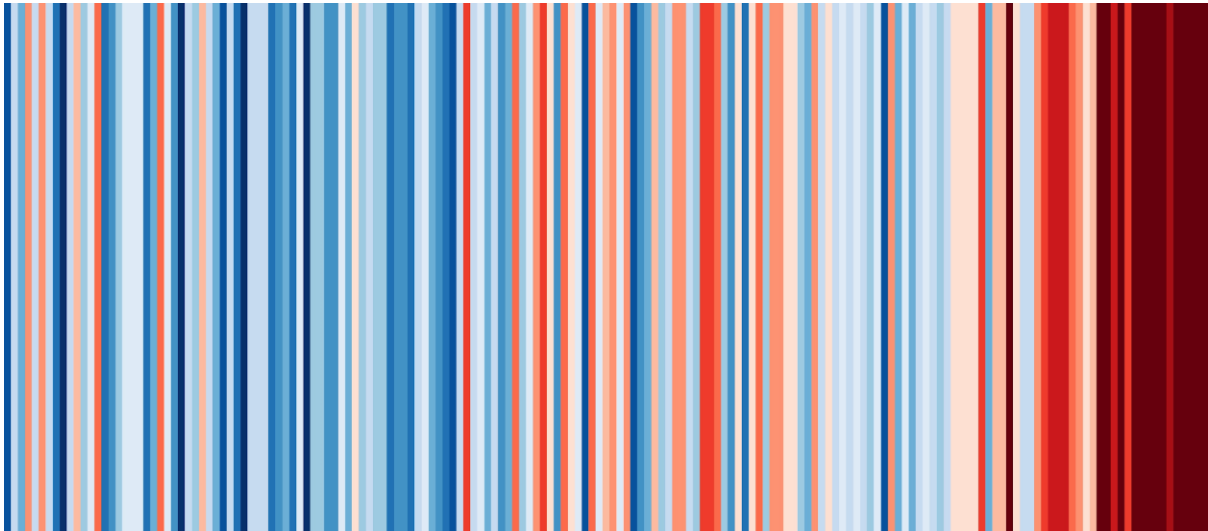# Project: "Building Capacity towards sustainable capital development in North Macedonia"

Activity Area II - Development and Delivery of Capacity Building activities on Climate Change and Health

Action Plan for Decarbonization of the Health Sector

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Green development
Republic of North Macedonia

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Abbreviations

CO_2e	CO_2 equivalent
E	Emission
EE	energy efficiency
EF	Emission Factor
GHG	greenhouse gas
GHGs	greenhouse gases
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH
GWP	Global Warming Potential
IPCC	International Panel on Climate Change
IPH	Institute of Public Health of the Republic of North Macedonia
MoH	Ministry of Health
NAP	National Adaptation Plan
NCCC	National Climate Change Council
NDA	National Designated Authority
NDC	Nationally Determined Contribution
RES	Renewable Energy Sources
RNM	Republic of North Macedonia
SDGs	Sustainable Development Goals
UNFCCC	United Nations Framework Convention on Climate Change
WHO	World Health Organization

Executive Summary

The Action plan aims to support the decarbonization of the health sector in North Macedonia by reducing greenhouse gas emissions from the healthcare facilities operations and enhancing climate resilience. It outlines key strategies to achieve these goals, including energy efficiency upgrades, renewable energy integration, sustainable and green transport, and waste management improvements.

The Action plan sets specific measures for reducing greenhouse gas emissions from the health sector, contributing to North Macedonia's overall national targets as outlined in its NDC[1]. The NDC outlines the country's targets and strategies for reducing greenhouse gas emissions, including a commitment to a 51% reduction by 2030 and a 72% reduction by 2050 compared to 1990 levels. In the health care sector, GHG emission reductions will be mainly achieved by implementing energy efficiency measures, integrating renewable energy sources, and promoting sustainable practices within healthcare facilities.

It is highly advisable for the Ministry of Health to officially commit to achieving climate neutrality in the health sector by 2050, and set interim targets (e.g. 2030, 2040). Carrying out annual or biennial progress assessments is highly recommended.

The current Macedonian NDC is primarily focused on mitigation, however, the document mentions the intention to incorporate an adaptation component in future submissions. The government is actively working on developing its first National Adaptation Plan (NAP). This plan will address the challenges posed by climate change on ecosystems, agriculture, and water resources, and will include strategies to integrate climate change considerations into national policies and planning processes. The adaptation component will be designed to enhance the capacity of national stakeholders, ensure the use of gender-sensitive tools, and increase public awareness and support for climate adaptation efforts.

The Action plan was developed based on the knowledge gained during the first two activities of the project and on meetings with stakeholders. The Action plan includes 13 policy areas:
- Governance
- Energy Efficiency upgrades
- Renewable Energy Integration
- Climate Resilient Design
- Water Conservation

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[1] Source: https://unfccc.int/documents/497726

- Sustainable Transport
- Waste Reduction and waste treatment
- Early Warning Systems
- Health Promotion and Education
- Vulnerable Population Support
- Nutrition & Food
- Chemicals

Although the primary purpose of the action plan is to support low carbon development, also adaptation actions are included, as these had a very high importance for the stakeholders.

The Action plan includes measures to upgrade healthcare infrastructure to be more resilient to extreme weather events and other climate impacts. This involves retrofitting buildings, improving insulation, and installing advanced heating, ventilation, and air conditioning (HVAC) systems that are both energy-efficient and resilient to climate variability.

Strengthening emergency preparedness and response capabilities within the health sector is a critical component. This includes developing and implementing plans for managing health emergencies related to climate change, such as heatwaves, floods, and outbreaks of climate-sensitive diseases.

Efficient management of water resources and healthcare waste is essential for climate resilience. The plan promotes the use of water-saving technologies and practices, as well as sustainable waste management systems that reduce environmental impact and enhance the sector's overall resilience.

The Action plan advocates for the integration of renewable energy sources, such as solar and geothermal heat pumps, into healthcare facilities. This transition not only reduces the sector's carbon footprint but also ensures a reliable and sustainable energy supply.

Implementing energy efficiency measures across healthcare facilities shall be a priority. This includes upgrading lighting, heating, and cooling systems, as well as improving building insulation and adopting smart energy management systems to optimize energy use.

The plan encourages the adoption of low-carbon transportation options for healthcare operations, including electric vehicles for medical transport and encouraging staff to use sustainable commuting methods. In addition, building supportive infrastructure for smart low-carbon transportation within the health care facilities is an integral part of the commitments to reducing the carbon footprint.

The Action plan is designed to integrate seamlessly with existing national policies and frameworks, such as the National Energy and Climate Change Plan[2], the National Development Strategy[3], Health System Transformation Plan[4], Environmental Health North Macedonia 2023 Country Profile[5] etc. This ensures a cohesive approach to achieving national climate goals and enhances the overall effectiveness of the plan.

The Energy Efficiency Law mandates the reduction of energy demand through the efficient use of energy by implementing energy-saving measures. The action plan contributes to sustainable energy development by reducing energy consumption through efficiency measures and minimizing the negative impact on the environment. This directly supports the legal objective of lowering energy demand and environmental impact. Buildings owned and used by the public sector, both central and local, are required to meet the minimum energy performance standards as prescribed by the law. The action plan supports this by including provisions for energy audits and retrofits to ensure these standards are met. It also aligns with the requirement that 3% of state-owned buildings be modernized annually, with energy audits conducted by licensed organizations employing certified energy auditors.

Effective implementation of the Action plan requires collaboration with a wide range of stakeholders, including government ministries, institutions on central and local level, healthcare providers, civil society organizations, and the private sector. The plan outlines strategies for engaging these stakeholders and ensuring their active participation in the planning and implementation process.

The Action Plan for Decarbonization of the Health Sector in North Macedonia represents a comprehensive and integrated approach to addressing the dual challenges of climate change and public health. By aligning with the commitments under the Paris Agreement and the country's NDCs, the plan not only contributes to global efforts to combat climate change but also ensures that the health sector in North Macedonia is prepared to face and adapt to the impacts of a changing climate. Through targeted actions in emission reduction, resilience building, capacity enhancement, and stakeholder collaboration, the plan aims to create a sustainable, low-carbon, and climate-resilient health system for the future.

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[2] Source: https://www.energy-community.org/news/Energy-Community-News/2022/06/01.html
[3] Source: https://northmacedonia.un.org/en/221034-national-development-strategy
[4] Source: https://www.who.int/news-room/feature-stories/detail/who-and-partners-highlight-way-forward-to-improve-health-equity-across-north-macedonia
[5] Source: https://www.who.int/publications-detail/environmental-health-north-macedonia-2023-country-profile

North Macedonia progresses towards EU enlargement and is contracting party to the Energy Community, it is required to align with EU climate and energy policies, such as the implementation of the EU governance regulation. The Sofia declaration endorsing the Green Agenda, which aligns with the EU Green Deal, was signed in 2020.

North Macedonia must harmonize its national legislation with EU directives on climate action and public health. This involves adopting and implementing EU regulations on greenhouse gas emissions, air quality, and health sector sustainability.

Enhancing the capacity of national institutions to effectively manage and implement climate and health policies is crucial. This includes improving data collection, monitoring, and reporting systems to meet EU requirements.

Investing in resilient health infrastructure that can withstand climate impacts is essential. This includes upgrading healthcare facilities to be energy-efficient and capable of operating under extreme weather conditions.

By fulfilling these commitments, North Macedonia can advance in its EU enlargement process while ensuring that its health sector is on a low carbon development path and capable of protecting public health in the face of climate change.

The first chapter of the Climate Action plan outlines the purpose and scope, including the main objectives to be achieved. The second chapter describes the work which has been undertaken in the preparation of this action plan, which includes the assessment of the GHG emissions of the health sector. The third chapter elaborates on the climate risks imposed on the health sector. In the fourth chapter, the focus is on the approach for implementation, while the fifth chapter focuses on the stakeholders to be involved. Then the governance mechanism is described, which needs to be established to ensure continuous implementation, monitoring and evaluation (Chapter 6). A description of the actions to be implemented across 13 policy fields is included in Chapter 7, followed by a set of key performance indicators to monitor progress (Chapter 8). The last chapters address financial resources needed and their mobilization (Chapter 9) and finally a description of risk mitigation measures during implementation.

1 Purpose and Scope of the Action Plan

The main objectives of this Action plan is   to support a low carbon development of the health sector. It was created based on the performed institutional analysis, assessment of GHG emissions of the health sector and consultations performed with the health and climate sector stakeholders. The action plan aims to:

- To propose specific interventions to reduce GHG emissions and climate risks.
- To guide health sector professionals in addressing climate-related health risks through collaboration.
- To strengthen health system functions for climate resilience and low carbon health approaches.
- To define roles and responsibilities for health decision-makers in climate resilience.

Detailed elaboration of the objectives is presented in this section of the Action plan.

1.1 To propose specific interventions to reduce GHG emissions and climate risks

Addressing climate change within the healthcare sector is crucial for both environmental sustainability and public health resilience. Healthcare facilities are significant consumers of energy and resources, contributing to greenhouse gas emissions. Implementing climate mitigation strategies in healthcare not only reduces the sector's carbon footprint but also enhances the resilience of healthcare services to climate impacts. North Macedonia, like many countries, faces the dual challenge of improving healthcare services while reducing environmental impacts. By adopting energy-efficient practices, transitioning to renewable energy, promoting sustainable transport modes, and implementing sustainable design and waste management, healthcare facilities can play a pivotal role in national and global climate efforts. The interventions proposed include:

- Implement energy-efficient practices in healthcare facilities, such as upgrading to LED lighting, optimizing heating, ventilation, and air conditioning (HVAC) systems, and using energy-efficient medical equipment.
- Transition to renewable energy sources like solar, wind, or geothermal energy to power healthcare facilities.

- Incorporate sustainable design principles in the construction and renovation of healthcare facilities, such as using green building materials and implementing water-saving technologies.
- Develop and implement waste reduction programs that include recycling, composting, and proper disposal of hazardous medical waste.
- Adopt sustainable procurement policies that prioritize the purchase of eco-friendly and energy-efficient products.
- Encourage the use of low-emission vehicles for transportation and implement telemedicine practices to reduce the need for patient and staff travel.
- Support and fund research on innovative technologies and practices that reduce greenhouse gas emissions in the healthcare sector.
- Implement pilot programs to test new mitigation strategies and scale up successful initiatives.
- Establish systems to monitor and evaluate the effectiveness of climate risk and emissions reduction interventions, using indicators such as energy use, emissions levels, and health outcomes.
- Advocate for national and local policies that support climate mitigation efforts, such as regulations on emissions, incentives for renewable energy, and support for sustainable healthcare practices.
- Use monitoring data to continuously improve interventions and ensure they are effective and adaptive to changing conditions.
- Make use of the health sector as a multiplier for climate change awareness reaching a large number of people from different backgrounds.

1.2 To guide health sector professionals in addressing climate-related health risks through collaboration

The primary objective is to provide clear guidance to health sector professionals on how to address climate-related health risks. This objective emphasizes the importance of collaboration among various stakeholders to effectively mitigate and adapt to the impacts of climate change on health. Achievements under this objective shall include:

- Raise awareness for the need to act to mitigate GHG emissions and increase acceptance for the implementation of climate mitigation measures.

- Recognize the direct and indirect health impacts of climate change, such as increased prevalence of heat-related illnesses, vector-borne diseases, respiratory conditions, and mental health issues.
- Conduct comprehensive risk assessments to identify vulnerable populations and regions most affected by climate change.
- Foster collaboration between health professionals, environmental agencies, government bodies, non-governmental organizations (NGOs), and the community to develop integrated strategies.
- Encourage partnerships between the public health sector and private entities to leverage resources and expertise.
- Provide ongoing training and education for health professionals on climate change and health, ensuring they have the knowledge and skills to address emerging health threats.
- Ensure adequate resources are allocated for capacity building, including financial, technological, and human resources.
- Advocate for policies that support climate resilience in the health sector, including funding for research, infrastructure improvements, and public health initiatives.
- Launch campaigns to raise awareness about the health risks associated with climate change and promote community involvement in adaptation and mitigation efforts.
- Implement community-based interventions that address specific local health risks and vulnerabilities.
- Establish systems for continuous monitoring and evaluation of health outcomes related to climate change. Use data to inform decision-making and improve intervention strategies.
- Develop reporting mechanisms to track progress and share best practices and lessons learned among health professionals and stakeholders.
- Regularly report outcomes and progress to stakeholders, including government agencies, healthcare organizations, and the public.

1.3 To strengthen health system functions low carbon health approaches and for climate resilience

The objective aims to enhance the resilience of health systems to climate change impacts while promoting low carbon health approaches. This involves both adapting health systems to withstand and respond to climate-related stresses and transitioning to sustainable practices that minimize the carbon footprint of healthcare operations.

Strengthening health system functions for climate resilience and low carbon health approaches requires a clear commitment and appropriate governance mechanisms for implementation,

monitoring and evaluation. This involves a multi-faceted approach, including risk assessment, infrastructure resilience, sustainable practices, capacity building, policy development, research, and continuous monitoring. The Action Plan at hand, represents the basis for the development of a low carbon and climate resilient health sector in North Macedonia.

1.4 To define roles and responsibilities for health decision-makers in climate resilience and decarbonization.

The implementation of climate related interventions requires well-restructured institutional, procedural, and legislative arrangements, defining roles and responsibilities. Decision making is one part of it, but implementing the actions requires support throughout the health sector. A clear governance mechanism is therefore key to achieve real changes and improvement for the benefit of the people and the environment.

The Minister of Health and senior health officials are responsible for providing strategic direction and publicly committing to decarbonizing the health sector by 2050 and integrate these goals into the Nationally Determined Contribution and coordinate through the National Climate Change Committee. The following results shall be achieved:

- Establish a focal point within the Ministry of Health (MoH) or Public Institute of Health (PIH), preferably in the Department for Analytics, Planning and Projects.
- Ensure the focal point is supported by relevant personnel and has procedural arrangements for cooperation.
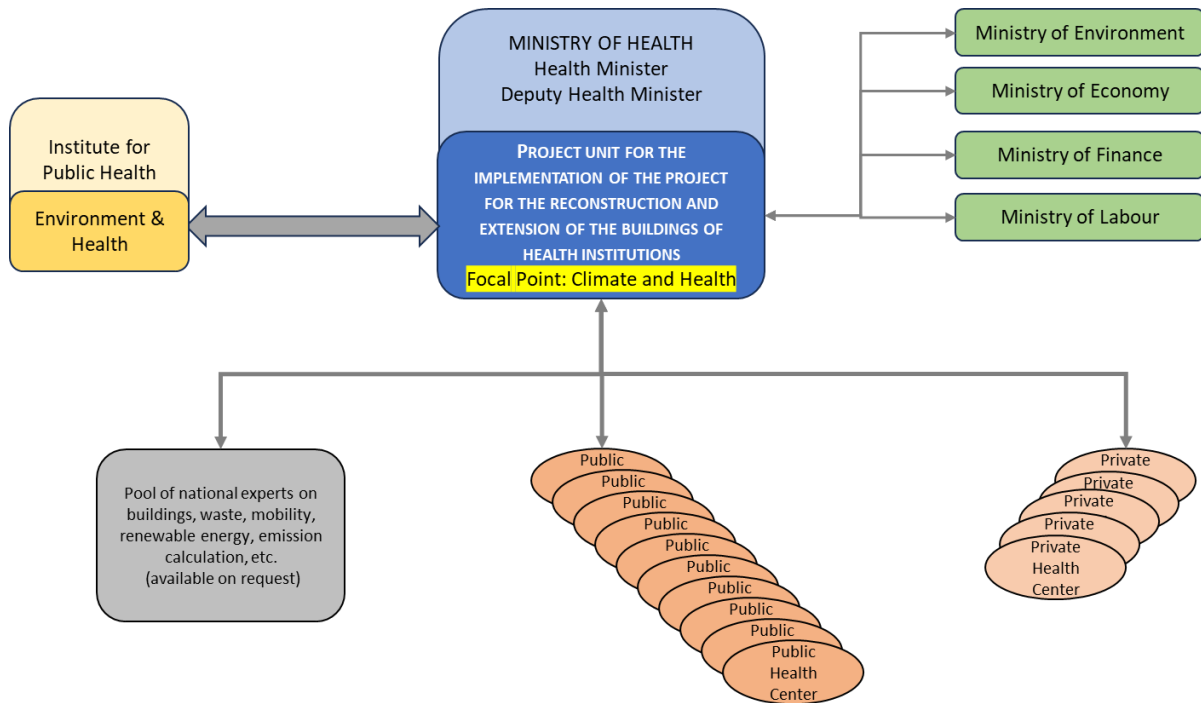
Figure 1 Proposed Focal point at Ministry of Health

- Develop digital platform for collecting and analyzing data on emissions and energy consumptions, as well as other climate-related data relevant for the health decision-makers.
- Facilitate direct contacts with other ministries for horizontal mainstreaming.
- Support health institutions in decarbonization efforts and promote intersectoral collaboration through working groups and regular meetings.
- Secure funding for mitigation projects and capacity-building initiatives.
- Advocate for increased resource allocation and explore diverse financing options, including green bonds and international climate funds.
- Engage with funding institutions and consult health centers on financing opportunities.

2 Preparatory work

As the first step in drafting this Action plan, we conducted a thorough review and analysis of institutional and organizational gaps within the Health Sector, focusing on the Ministry of Health (MoH) and the Institute for Public Health (IPH). This analysis included specific recommendations for establishing a dedicated climate change focal point or team within the health sector. The goal was to enhance coordination, planning, implementation, and monitoring of climate change measures. This effort aims to ensure that the health sector is well-prepared to address the impacts of climate change effectively.

Second step was assessment of the GHG emissions from the health sector in North Macedonia. It follows the GHG Protocol Corporate Accounting and Reporting Standards, accounting for direct emissions arising in the institutions and indirect emissions from purchased electricity and heat. The data has been collected through questionnaires, personal contacts, and research on available public procurement documents. Emission and conversion factors are documented, and allow for an update of the emission inventory in future years. In total 93 institutions of the Health Sector in North Macedonia have been consulted, from secondary and tertiary health care.

For the estimation of GHG emissions in the health sector of North Macedonia, scope 1 (direct emissions) and scope 2 (indirect emissions from purchased electricity and heat) were considered. Scope 3 emissions, which are indirect emissions resulting from the production of clinical material or emissions from waste treatment were not considered, due to incomplete data gathered from the institutions.

The following data for calculation of GHG emissions from the health sector have been collected:
- Grid electricity consumption
- Purchased central heating
- Fuel consumption for on-site electricity production:
- Fuel consumption for heating: extra light oil (diesel), mazut, wood
- Use of gasoline, diesel, LPG for transport
- Use of GHG relevant
    - Refilled refrigerants
    - Anesthetic gases
    - Analytical gases.

Based on the activity data collected from health institutions of North Macedonia and the emission factors used (mainly from IPCC), **the total emissions result in 88 kt CO_2e in the year 2022**.

The latest national total GHG emission have been published as part of the 4th National Communication. Here it is reported that national total GHG emissions amount to 11 267 kt CO_{2e} (excluding forestry and land use) for the year 2019. Although the referenced year is not the same, for a rough estimate also data from 2019 are accepted. **The share of the health sector amounts to 0.8% of total national GHG emissions** (excluding FOLU).
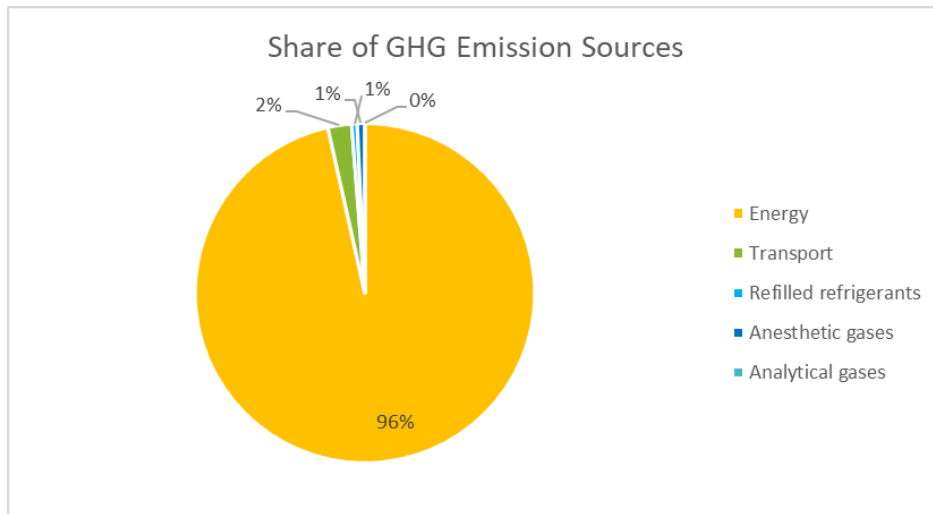
Figure 2 Share of GHG emission sources of the health sector

3   Overview of Climate Change and Health Impacts

Climate change is increasingly recognized as one of the greatest global health threats of the 21st century. The impacts of climate change on health are diverse and multifaceted, affecting both the physical and social determinants of health. In North Macedonia, rising temperatures, more frequent heatwaves, and changing precipitation patterns are already impacting public health. These environmental changes bring about significant health risks such as heat-related illnesses, vector-borne diseases, and respiratory conditions exacerbated by air pollution. Understanding the connection between climate change and health is critical for developing effective adaptation and mitigation strategies within the health sector.

3.1.1 Heat-Related Illnesses and Deaths

Heatwaves: The frequency, intensity, and duration of heatwaves are increasing due to climate change. These extreme heat events can lead to heat exhaustion, heatstroke, and exacerbate existing health conditions such as cardiovascular and respiratory diseases. Vulnerable populations, including the elderly, children, and those with pre-existing health conditions, are at a higher risk.

Urban Heat Islands: Urban areas often experience higher temperatures than rural areas due to the heat island effect, which can intensify the health impacts of heatwaves. This phenomenon poses additional risks for urban populations, particularly those living in densely populated and poorly ventilated housing.

Climate change has significantly impacted North Macedonia, leading to an increase in the frequency, intensity, and duration of heatwaves. These extreme heat events pose serious health risks and exacerbate existing health conditions.

North Macedonia has experienced a marked increase in average temperatures over recent years. For instance, the summer of 2021 recorded some of the highest temperatures in decades, with multiple days exceeding 40°C. Similarly, the summer of 2023 saw prolonged periods of extreme heat, resulting in public health warnings and measures to protect vulnerable populations.

In 2024 North Macedonia experienced temperatures exceeding 40°C multiple times throughout the summer, with peaks reaching 42°C. This prolonged heatwave is part of a broader trend affecting southern Europe and the Balkans.

The number of heatwave days has doubled in the last two decades. According to the Macedonian Hydro-meteorological Service, the frequency of heatwaves has increased by approximately 20% over the past 30 years[6].

During heatwaves, there is a significant increase in hospital admissions for heat-related conditions such as heat exhaustion, heatstroke, and dehydration. Vulnerable populations, including the elderly, children, and individuals with pre-existing health conditions, are particularly at risk.

High temperatures exacerbate cardiovascular and respiratory diseases, leading to increased emergency room visits and hospitalizations.

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[6] Source: http://www.meteo.gov.mk/

3.1.2 Increased Incidence of Vector-Borne Diseases

Changing Habitats: The country is experiencing shifts in climate patterns that can influence the spread of vector-borne diseases. Climate change alters the habitats and life cycles of vectors such as mosquitoes, ticks, and flies, leading to the spread of diseases like malaria, dengue fever, Zika virus, Lyme disease, and chikungunya to new regions. Warmer temperatures and increased rainfall create favorable conditions for these vectors to thrive and expand their range.

Malaria and Dengue Fever: Warmer temperatures and increased rainfall create suitable conditions for mosquitoes to breed. Although malaria was eradicated in North Macedonia, the changing climate could potentially reintroduce it or introduce new mosquito-borne diseases like dengue fever. Zika Virus and Chikungunya: These viruses, transmitted by Aedes mosquitoes, could become a concern if the mosquitoes extend their range into North Macedonia. Lyme Disease: Warmer temperatures and changing ecosystems can lead to an increase in tick populations. North Macedonia could see a rise in tick-borne diseases such as Lyme disease, which is already present in Europe and North Macedonia.

Public Health Challenges: The increased spread of vector-borne diseases poses significant public health challenges, particularly in areas where these diseases were previously uncommon, leading to a lack of immunity and preparedness among the population.

3.1.3 Respiratory and Cardiovascular Diseases

Air Quality: Climate change is interacting with air quality through increased levels of pollutants such as ozone, particulate matter (PM), and allergens. These pollutants can exacerbate respiratory conditions like asthma and chronic obstructive pulmonary disease (COPD), as well as cardiovascular diseases.[7]

Particulate Matter (PM10 and PM2.5):

PM10 Levels: Skopje and all other bigger towns, often experiences PM10 levels that far exceed the World Health Organization (WHO) recommended limits. The daily average PM10 levels frequently surpass the EU limit of 50 µg/m³, particularly in winter months due to increased heating and industrial activities.

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[7] Source: https://www.who.int/data/gho/data/themes/air-pollution

PM2.5 Levels: PM2.5, which can penetrate deep into the lungs and enter the bloodstream, also remains a significant concern. Levels of PM2.5 often exceed safe limits, contributing to serious health issues.

Ozone (O3): Ozone pollution is a problem during the summer months when higher temperatures facilitate the chemical reactions that form ground-level ozone. This pollutant is particularly harmful to people with respiratory conditions.

Allergens: Climate change extends the pollen season and increases the concentration of airborne allergens, exacerbating conditions like asthma and allergic rhinitis.

Poor air quality exacerbates asthma, leading to increased hospital admissions and emergency room visits, especially during high pollution episodes.[8] COPD patients suffer more frequent and severe exacerbations during periods of high particulate pollution. Exposure to high levels of particulate matter is linked to an increased risk of heart attacks, strokes, and other cardiovascular diseases.

Wildfires: Wildfires have increasingly become a significant issue in North Macedonia, exacerbated by climate change. The rising temperatures and prolonged dry periods have led to more frequent and severe wildfires, impacting both the environment and public health.

Data indicates a rising trend in the number and intensity of wildfires in North Macedonia. The country experiences numerous wildfires each year, particularly during the hot, dry summer months. For instance, in 2021, the country faced a severe wildfire season, with hundreds of fires reported across various regions. In 2021, North Macedonia recorded over 300 wildfires, with the largest fires occurring in the regions of Kumanovo, Staro Nagorichane, and Kochani. These fires led to the evacuation of several villages and significant damage to property and infrastructure. According to the Macedonian Information Agency (MIA), the wildfire season in 2021 saw some of the highest recorded temperatures and the most extensive fire activity in recent decades.[9]

As of mid-July 2024, approximately 15 major wildfires have been reported in different parts of the country, with 10 of these fires remaining active. Key affected areas include Kumanovo and Mount Serta, where the fires have caused significant damage.

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[8] Real-time air quality data available on platforms such as AirVisual, link: https://www.iqair.com
[9] Source: https://mia.mk/

North Macedonia requested assistance from the European Union to combat these wildfires. In response, the EU Civil Protection Mechanism was activated, leading to the deployment of firefighting aircraft and helicopters from various countries, including Serbia, Slovenia, Türkiye, and Croatia.[10]

The wildfires have severely impacted air quality, increasing levels of particulate matter and other pollutants, which exacerbate respiratory and cardiovascular conditions. Authorities have banned movement in forests during certain hours to prevent further incidents and ensure public safety.

3.1.4   Water-Related Illnesses

Water Scarcity: Changes in precipitation patterns and increased evaporation rates due to higher temperatures can lead to water scarcity. This scarcity affects water quality and availability, increasing the risk of waterborne diseases such as cholera, dysentery, and other diarrheal diseases.

Flooding: Increased frequency and intensity of heavy rainfall and flooding can contaminate water supplies with pathogens and pollutants, leading to outbreaks of waterborne illnesses. Flooding can also disrupt sanitation systems, further exacerbating the spread of diseases.

3.1.5   Food Security and Nutrition

Agricultural Impacts: Climate change affects agricultural productivity through changes in temperature, precipitation, and the frequency of extreme weather events. These changes can lead to crop failures, reduced yields, and food shortages, impacting food security and nutrition.

Nutritional Quality: Rising CO_2 levels can reduce the nutritional quality of staple crops, such as wheat and rice, by lowering their protein, zinc, and iron content. This can exacerbate malnutrition, particularly in vulnerable populations.

3.1.6   Mental Health and Wellbeing

Psychological Stress: The direct and indirect impacts of climate change, including natural disasters, loss of livelihoods, and displacement, can lead to increased psychological stress, anxiety, depression, and other mental health issues.

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[10] Source: https://www.ekathimerini.com/news/environment/1245206/north-macedonia-is-seeking-eu-assistance-as-wildfires-burn-across-the-balkans/

Community Disruption: Displacement and migration due to climate change can disrupt communities, leading to social isolation and loss of social support networks, which are crucial for mental health and wellbeing.

3.1.7 Displacement and Migration

Climate Refugees: Extreme weather events, and environmental degradation can force communities to relocate, creating climate refugees. Displacement can lead to overcrowding in urban areas, straining healthcare services and infrastructure.

Health Services Strain: Migration and displacement due to climate change can strain existing health services in receiving areas, leading to increased demand for healthcare and challenges in providing adequate care to all affected populations.

3.1.8 Vulnerable Populations

Certain populations are more vulnerable to the health impacts of climate change, including:

Elderly: Older adults are more susceptible to heat-related illnesses, respiratory problems, and the health impacts of extreme weather events.

Children: Children are particularly vulnerable to the impacts of poor air quality, waterborne diseases, and nutritional deficiencies.

Low-Income Communities: These communities often have limited access to healthcare, live in areas more prone to environmental hazards, and lack resources to adapt to climate change.

People with Pre-existing Health Conditions: Individuals with chronic illnesses such as asthma, diabetes, and heart disease are at higher risk of adverse health outcomes due to climate change.

4 Description of Approach in implementation of the Action Plan

4.1 Definition of key areas to be targeted by the action plan.

The Action plan is focusing on the following areas within the health sector:

- Governance
- Energy Efficiency upgrades
- Renewable Energy Integration
- Climate Resilient Design
- Water Conservation
- Sustainable Transport
- Waste Reduction and waste treatment
- Early Warning Systems
- Health Promotion and Education
- Vulnerable Population Support
- Nutrition & Food
- Chemicals

4.2 Methodologies and frameworks to be used for implementing the action plan, bottom-up approach.

Implementing the Action Plan for Decarbonization of the Health Sector in North Macedonia requires a holistic and inclusive approach to ensure its success and sustainability. A bottom-up approach is particularly important in this context as it involves local stakeholders in decision-making processes, fostering ownership, and ensuring that the strategies are tailored to specific local needs and conditions. This approach not only enhances the relevance and effectiveness of the interventions but also empowers communities and local health facilities to actively participate in climate action.

Methodologies:
1. **Risk Assessment and Prioritization:** Conducting comprehensive risk assessments to identify and prioritize the most critical climate risks to the health sector.
2. **Stakeholder Engagement:** Involving all relevant stakeholders in the planning and implementation process through consultations, workshops, and collaboration platforms.

3. **Capacity Building:** Providing training and resources to health professionals and institutions to build their capacity to respond to climate risks and implement mitigation measures.

Frameworks:
1. **Climate Resilient Health Systems Framework (WHO):** Adapting the WHO framework to enhance the resilience of health systems to climate change impacts.
2. **Sustainable Development Goals (SDGs):** Aligning the action plan with relevant SDGs, particularly Goal 3 (Good Health and Well-being) and Goal 13 (Climate Action).
3. **ISO 14001 Environmental Management Systems:** Implementing ISO 14001 to establish an effective environmental management system within healthcare facilities.

Bottom-Up Approach:
1. Encouraging local health facilities to develop and implement their own climate action plans based on local risks and resources.
2. Engaging community health workers and local organizations in awareness campaigns and resilience-building activities.

4.3 How the action plan integrates with existing policies and frameworks

Integration with Existing Policies:

National Energy and Climate Change Plan (NECP)[11]: The Action Plan for Decarbonization of the Health Sector should be closely linked to North Macedonia's National Energy and Climate Plan (NECP), which outlines the country's overall strategy for reducing greenhouse gas emissions and enhancing climate resilience. The NECP provides a framework for integrating climate action across various sectors, including healthcare.

Responsible Entities:
Ministry of Health: Leading the implementation of health sector-specific interventions.
Ministry of Environment and Physical Planning: Coordinating overall climate action and ensuring alignment with the NECP.
National Council for Sustainable Development: Facilitating stakeholder engagement and overseeing the integration of climate policies across sectors.

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[11] Source: https://ec.europa.eu/energy/topics/energy-strategy/national-energy-climate-plans_en

Ongoing development of the National Adaptation Plan (NAP) under the GCF UNDP project: Ensuring that health sector-specific climate adaptation measures are incorporated into the NAP to address the unique vulnerabilities and risks faced by healthcare services.

Nationally Determined Contributions (NDCs): Including the healthcare sector's commitments to emission reductions and resilience-building in the country's NDCs under the Paris Agreement.

Local Self-Governance Frameworks: Collaborating with local self-governments to implement climate action plans at the regional and municipal levels, ensuring alignment with local climate policies and development plans.

National Development Strategy: North Macedonia's National Development Strategy (NDS) outlines a comprehensive vision for sustainable development, emphasizing economic growth, environmental sustainability, and social inclusion. The Action Plan for Decarbonization of the Health Sector integrates with this strategy by contributing to multiple key areas, ensuring that health sector initiatives align with broader national goals.

Sustainable Economic Growth:
Energy Efficiency and Renewable Energy: By implementing energy-efficient practices and transitioning to renewable energy sources, the health sector reduces operational costs and reliance on fossil fuels. This aligns with the NDS's emphasis on promoting sustainable economic growth through efficient resource utilization and the adoption of green technologies.

Environmental Sustainability:
Reduction of Greenhouse Gas Emissions: The decarbonization efforts in the health sector contribute to North Macedonia's overall goal of reducing greenhouse gas emissions. This supports the NDS's commitment to mitigating climate change impacts and preserving natural resources.
Waste Management: Developing and implementing waste reduction programs in healthcare facilities aligns with the NDS's environmental objectives by promoting sustainable waste management practices and reducing environmental pollution.

Social Inclusion and Public Health:
Health Resilience: By building climate-resilient health systems and ensuring healthcare services are prepared for climate impacts, the action plan supports the NDS's goal of improving public health outcomes and ensuring equitable access to quality healthcare services for all citizens.
Community Engagement: Engaging local communities in the implementation of climate adaptation measures promotes social inclusion and empowers vulnerable populations, which is a core principle of the NDS.

Capacity Building and Innovation:

Training and Research: The action plan's focus on capacity building and supporting research on innovative technologies aligns with the NDS's goal of fostering education, skills development, and technological innovation. This ensures that the health sector is equipped with the knowledge and tools needed to address climate challenges effectively.

5   Stakeholder Engagement

5.1   Identification of primary stakeholders and their roles.

Identifying stakeholders is a crucial step in the successful implementation of any project, including the Action Plan for Decarbonization of the Health Sector in North Macedonia. Stakeholders are individuals, experts, groups, employees or government representatives who have an interest in the project's outcome and can influence or be affected by its implementation. Engaging stakeholders ensures that the plan is inclusive, leverages diverse expertise, and aligns with the needs and priorities of the community. In North Macedonia, an institutional analysis was performed at the beginning of the project to identify key stakeholders and their roles, which is essential for the coordinated and effective execution of the action plan.

1. **Ministry of Health (MoH):** Provides overall leadership, policy direction, and coordination for the action plan. Responsible for integrating climate resilience into health sector policies and practices.
2. **Institute of Public Health (IPH):** Implements and monitors climate resilience and health programs. Conducts research and data collection on climate-related health impacts.
3. **Healthcare Facilities:** Hospitals, clinics, and other healthcare providers implement on-the-ground interventions, adopt sustainable practices, and report data on emissions and climate impacts.
4. **Ministry of Environment and Physical Planning:** Collaborates with the MoH to ensure environmental policies align with health sector goals. Provides expertise on climate adaptation and mitigation.
5. **Ministry of Energy, Mining, and Mineral Resources:** Supports the transition to renewable energy and energy efficiency in the health sector. Facilitates access to financial resources and incentives.
6. **Ministry of Finance:** Allocates funding for climate resilience projects and ensures financial sustainability of the initiatives.

7. **Local Self-Governments:** Implement and enforce climate resilience measures at the regional and municipal levels. Engage with local communities and health facilities.
8. **Non-Governmental Organizations (NGOs):** Provide technical support, advocacy, and community engagement. Facilitate public awareness and education campaigns.
9. **International Organizations and Donors:** Offer funding, technical assistance, and best practices. Support capacity building and research initiatives.
10. **Academic and Research Institutions:** Conduct research on climate change impacts on health and develop innovative solutions. Provide training and education for health professionals.
11. **Private Sector:** Invest in and adopt sustainable practices. Collaborate on innovative solutions for reducing emissions and enhancing resilience.

5.2 Strategy for engaging stakeholders throughout the planning and implementation phases.

The successful implementation of the climate adaptation and mitigation strategies in North Macedonia's health sector heavily relies on active stakeholder engagement. Over the past year, the project has made significant strides in fostering collaboration and gathering input through workshops and consultative meetings. These efforts have ensured that the Action Plan is comprehensive, inclusive, and reflective of the diverse perspectives of all involved parties.

Identifying and engaging stakeholders is essential for ensuring the success and sustainability of the Action Plan for Decarbonization of the Health Sector. Stakeholders include government employees and representatives, representatives from IPH, WHO, healthcare providers, international partners and experts, NGOs. The ongoing consultation process has been instrumental in integrating stakeholder feedback and building a sense of ownership and commitment among all parties.

The project organized an initial workshop to introduce the objectives, scope, and expected outcomes of the Action Plan. This workshop provided a platform for stakeholders to express their initial thoughts and concerns, which were meticulously documented and considered in subsequent planning stages.

Two consultative meetings were held, bringing together a wide range of stakeholders from different sectors. These meetings served as progress updates and feedback sessions, where stakeholders were informed about the ongoing developments and had the opportunity to provide

their remarks and suggestions. All feedback was carefully reviewed and integrated into the action plan.

Early Involvement:
    Consultation Workshops: Organize workshops with key stakeholders at the beginning of the planning phase to gather input and ensure buy-in.
    Needs Assessment: Conduct a comprehensive needs assessment involving all stakeholders to identify priorities, capacities, and gaps.

Collaborative Planning:
    Working Groups: Establish multi-stakeholder working groups to co-develop the action plan. Include representatives from all primary stakeholder groups.
    Joint Decision-Making: Ensure that decisions are made collaboratively, with input from all relevant parties, to foster ownership and accountability.

Regular Communication:
    Progress Updates: Provide regular updates on the planning and implementation progress through meetings, newsletters, and online platforms.
    Feedback Mechanisms: Create channels for stakeholders to provide continuous feedback and suggestions, such as surveys, focus groups, and public forums.

Capacity Building:
    Training Programs: Offer training and capacity-building programs for stakeholders, focusing on climate resilience, sustainable practices, and data management.
    Resource Sharing: Share resources, tools, and best practices among stakeholders to build collective capacity and knowledge.

Monitoring and Evaluation:
    Stakeholder Involvement in M&E: Involve stakeholders in the monitoring and evaluation processes to ensure transparency and accountability.
    Adaptive Management: Use feedback from stakeholders to make necessary adjustments to the action plan and improve its effectiveness.

Partnerships and Collaboration:
    Formal Agreements: Establish formal partnerships and memorandums of understanding to define roles, responsibilities, and collaboration mechanisms.
    Intersectoral Collaboration: Promote collaboration between different sectors (e.g., health, environment, energy) to integrate efforts and leverage synergies.

Public Engagement and Advocacy:
    Awareness Campaigns: Conduct public awareness campaigns to inform and engage the broader community on climate-related health risks and the importance of resilience measures.
    Advocacy Efforts: Advocate for supportive policies and increased funding for climate resilience and decarbonization initiatives within the health sector.

6 Governance and Institutional Framework

6.1 Structures and mechanisms for managing and overseeing the Action plan implementation.

Effective governance and institutional frameworks are essential for the successful implementation of the action plan for climate resilience and decarbonization in the health sector. These structures ensure that activities are coordinated, progress is monitored, and objectives are achieved.

Steering Committee:
    Function: Provides strategic direction, oversight, and decision-making authority for the action plan.
    Composition: Includes high-level representatives from the Ministry of Health (MoH), Ministry of Environment, Ministry of Energy, Ministry of Finance, and other relevant bodies.
    Responsibilities: Approving policies, allocating resources, and reviewing progress reports.

Focal Point/Coordination Unit:
    Function: Acts as the central hub for coordinating all activities related to the action plan.
    Placement: Ideally within the MoH or Public Institute of Health (PIH).
    Responsibilities: Day-to-day management of the action plan, liaising with stakeholders, and ensuring integration with other national policies.

Technical Working Groups:
    Function: Provide specialized expertise and support for different aspects of the action plan, such as energy efficiency, waste management, and disease surveillance.
    Composition: Includes experts from relevant fields, including academics, researchers, and practitioners.
    Responsibilities: Developing technical guidelines, conducting research, and advising on best practices

Monitoring and Evaluation (M&E) Framework:
    Function: Tracks progress, measures outcomes, and ensures accountability.
    Components: Includes indicators, data collection methods, and reporting schedules.
    Responsibilities: Regularly assessing the effectiveness of interventions, identifying challenges, and making recommendations for adjustments

6.2   Roles and responsibilities of different actors and institutions.

Clearly defining the roles and responsibilities of various actors and institutions is crucial for coordinated and effective action. Each stakeholder has a specific role that contributes to the overall success of the action plan.

Ministry of Health (MoH):
    Role: Lead agency responsible for overall coordination and implementation of the action plan.
    Responsibilities: Policy development, resource allocation, and integration of climate resilience into health sector strategies.

Institute of Public Health (IPH):
    Role: Implementing agency for climate resilience programs.
    Responsibilities: Conducting research, data collection, and monitoring health impacts of climate change.

Ministry of Environment and Physical Planning:
    Role: Collaborator for environmental policies and initiatives.
    Responsibilities: Providing expertise on climate adaptation and mitigation, supporting environmental health initiatives.

Ministry of Energy, Mining and Mineral Resources:
    Role: Supporting energy-related interventions in the health sector.
    Responsibilities: Facilitating access to renewable energy and energy efficiency programs, providing financial incentives.

Ministry of Finance:
    Role: Financial oversight and resource allocation.
    Responsibilities: Securing funding for climate resilience projects, integrating climate considerations into budgeting processes.

Local Self-Governments:

    Role: Implementing local-level interventions.

    Responsibilities: Enforcing regulations, engaging communities, and supporting local health facilities in resilience efforts.

Non-Governmental Organizations (NGOs):

    Role: Advocacy and technical support.

    Responsibilities: Conducting awareness campaigns, providing training, and supporting community-based initiatives.

International Organizations and Donors:

    Role: Funding and technical assistance.

    Responsibilities: Offering financial support, sharing best practices, and providing capacity-building resources.

Academic and Research Institutions:

    Role: Research and innovation.

    Responsibilities: Conducting studies on climate impacts, developing innovative solutions, and training health professionals.

Private Sector:

    Role: Investment and innovation.

    Responsibilities: Implementing sustainable practices, investing in green technologies, and collaborating on decarbonization projects.

7   Action Areas and Strategies

7.1   Detailed description of specific actions to be taken in key sectors.

A questionnaire has been developed which was shared with 93 institutions. This questioner includes a variety of open questions, in total 42 questions. The number of replies received amounted to 65. The collection of activity was carried from February to April 2024 after consultation with the Ministry of Health, the Ministry of Environment and Physical Planning, the Macedonian Academy of Sciences and Arts, as well as the developed templates of the Energy Agency used in the previous years. The data collected through questionnaires, personal contacts, and research on available public procurement documents, sets the basis of this Action plan. The intention was to cover the whole public health sector, excluding facilities from primary health care.

7.2   Health Infrastructure and Facilities

7.2.1   Governance

Governance is essential for the successful implementation of the health sector decarbonization Action plan because it provides clear leadership, ensures accountability, and integrates the plan with other policies. It facilitates resource allocation, stakeholder engagement, and ongoing monitoring, while also managing risks and enforcing compliance. Effective governance ensures that the plan is implemented efficiently, stays on track, and achieves its sustainability goals.

Project title	Project/ Initiative/ Measure title	Project/ Initiative/ Measure objective	Key Performance Indicators (KPI)
Commitment to climate neutrality and sustainability	1.Include climate neutrality and sustainability in mission statement/vision; 2.Identification of Climate focal Point (CFP) in Health Sector; 3.Coordination of Climate actions across Health sector	To coordinate climate activities in the health sector	included in Mission statement CFP in place and active Number of coordination meetings per year
Knowledge Management	1. Training of employees on the topics of climate protection and sustainability; 2.Install environment/climate officer in each public hospital; 3.Training of employees on the topic of "climate-related illnesses"; 4.Provide information to patients, e.g. notices or information events	To raise education level on climate and sustainability and raise awarness for the need of action	Number of trainings per year; Number of climate officers; Track record
Monitoring	1. Establish a reporting system on GHG emissions to track progress; 2. Legal anchoring of a consumption data reporting obligation for large healthcare facilities	To allow progress tracking in achieving the long-term target of climate neutrality	Annual GHG reporting

7.2.2 Energy Efficiency Upgrades

Implementing energy-efficient practices and technologies in health facilities to reduce energy consumption and greenhouse gas emissions.

Project title	Project/ Initiative/ Measure title	Project/ Initiative/ Measure objective	Key Performance Indicators (KPI)
Detailed Energy Audits	To identify areas for improvement in energy use and enhance energy efficiency in healthcare facilities.	1. Conducting thorough assessments of current energy consumption patterns. 2. Identifying inefficiencies and potential areas for energy savings. 3. Developing detailed reports with recommendations for energy-saving measures.	Number of energy audits conducted, percentage of energy savings identified.
Energy-Efficient Lighting Systems Upgrade	To reduce energy consumption by replacing conventional lighting with LED lights.	1. Assessing current lighting systems. 2. Procuring and installing LED lights. 3. Training staff on energy-saving practices related to lighting.	Reduction in energy consumption from lighting, number of LED lights installed.
HVAC Systems Upgrade	To improve energy efficiency and indoor air quality by upgrading HVAC systems.	1. Assessing current HVAC systems. 2. Procuring and installing energy-efficient HVAC units. 3.Training staff on the operation and maintenance of new systems.	Reduction in energy consumption from HVAC systems, improvement in indoor air quality.
Building Envelope Insulation	To reduce heating and cooling demands by improving the thermal insulation of healthcare facilities.	1. Conducting thermal imaging surveys to identify areas of heat loss. 2. Installing high-quality insulation materials in walls, roofs, and floors. 3. Sealing windows and doors to prevent air leakage.	Reduction in energy consumption for heating and cooling, improvement in indoor temperature regulation
Energy-Efficient Windows and Glazing	To improve energy efficiency by upgrading windows and glazing to reduce heat loss and gain.	1.Assessing existing windows and glazing. 2.Installing double or triple-glazed windows. 3.Applying low-emissivity (Low-E) coatings to windows.	Reduction in energy consumption for heating and cooling
Smart Building Management Systems	To optimize energy use through advanced building management technologies	1.Installing smart meters and sensors to monitor energy use. 2.Implementing automated controls for lighting, HVAC, and other systems. 3.Using data analytics to identify and address inefficiencies.	Improvement in energy efficiency metrics, reduction in operational costs
Energy-Efficient Water Heating Systems	To reduce energy consumption by upgrading to more efficient water heating systems	1. Installing solar water heating systems. 2.Upgrading to energy-efficient boilers and heat pumps. 3.Implementing water-saving fixtures.	Reduction in energy consumption for water heating, cost savings on energy bills
Micro and Small Cogeneration	To implement micro and small cogeneration systems to enhance energy efficiency and reduce greenhouse gas emissions.	Install micro and small cogeneration (combined heat and power) systems where's possible. This involves conducting feasibility studies, selecting appropriate cogeneration units, and integrating these systems with existing infrastructure.	Number of cogeneration units installed

7.2.3 Renewable Energy Integration

Incorporating renewable energy sources to power health facilities, thereby reducing reliance on fossil fuels.

Project title	Project/ Initiative/ Measure title	Project/ Initiative/ Measure objective	Key Performance Indicators (KPI)
Solar Panel Installation on Rooftops or On-Site Solar Farms	To generate electricity using solar energy, reducing reliance on the grid and lowering energy costs.	1. Conducting site assessments to determine optimal locations for solar panels. 2. Installing up to 40 kW photovoltaic (PV) systems on rooftops or on-site. 3.Integrating solar power systems with existing electrical infrastructure. 4.Training staff on the maintenance and monitoring of solar installations.	Amount of electricity generated from solar power: 40 kW system can generate approximately 50,000 kWh per year, depending on location and efficiency.
Wind Turbine Installation	To harness wind energy to generate electricity, reducing carbon emissions and energy costs.	1.Conducting wind assessments to identify suitable locations for wind turbines. 2.Installing small to medium-sized wind turbines where feasible. 3.Integrating wind energy systems with existing electrical infrastructure. 4.Training staff on the maintenance and monitoring of wind turbines.	Amount of electricity generated from wind energy (kWh), reduction in grid electricity consumption
Geothermal Heating and Cooling Systems	To implement geothermal systems for heating and cooling, reducing reliance on conventional energy sources and enhancing energy efficiency	1.Conducting geothermal assessments to identify suitable locations. 2.Installing geothermal heat pumps and associated infrastructure. 3.Integrating geothermal systems with existing HVAC systems. 4.Training staff on the operation and maintenance of geothermal systems.	Reduction in energy consumption for heating and cooling, improvement in indoor climate control
Battery Storage	To store excess energy generated from renewable sources for use during peak demand or outages, enhancing energy reliability and efficiency	1.Assessing energy storage needs and potential. 2.Procuring and installing battery storage systems. 3.Integrating battery storage with solar and wind energy systems. 4.Training staff on the operation and maintenance of battery storage systems.	Storage capacity installed: Typically, a 40 kW solar PV system would need a battery capacity of around 80 kWh to store a full day's generation, depending on usage patterns and storage technology.

7.2.4 Climate-Resilient Design

Designing health facilities that can withstand climate impacts and ensure continuity of care during extreme weather events.

Project title	Project/ Initiative/ Measure title	Project/ Initiative/ Measure objective	Key Performance Indicators (KPI)
Flood protection	Comprehensive Flood Protection for Healthcare Facilities	1.Conducting flood risk assessments for healthcare facilities. 2.Elevating critical building components and facilities in flood-prone areas. 3.Installing flood barriers and levees around vulnerable healthcare facilities. 4.Developing and improving drainage systems to manage floodwaters. 5.Training staff on flood preparedness and response.	Number of facilities protected from floods, reduction in flood-related damage costs
Heat-Resistant Materials	Heat-Resistant Building Materials and Technologies	1.Assessing existing building materials and identifying areas for improvement. 2.Installing cool roofs and applying reflective paint on building exteriors. 3.Incorporating heat-resistant materials in new constructions and renovations. 4.Training maintenance staff on the application and upkeep of heat-resistant materials.	Reduction in internal temperatures, decrease in energy consumption for cooling
Natural Ventilation	To design and retrofit buildings to maximize natural ventilation, reducing reliance on air conditioning.	1.Conducting ventilation assessments to identify opportunities for natural airflow. 2.Designing and retrofitting buildings to incorporate passive ventilation techniques. 3.Installing operable windows, vents, and other ventilation-enhancing features. 4.Training building staff on optimizing natural ventilation systems.	Reduction in energy consumption for air conditioning, improvement in indoor air quality
Emergency Preparedness	To ensure that healthcare facilities have backup power supplies, emergency response plans, and adequate resources to remain operational during disasters	1.Developing and regularly updating emergency response plans. 2.Installing backup power supplies, such as generators and battery storage systems. 3.Stockpiling essential supplies and resources for disaster scenarios. 4.Conducting regular emergency drills and training for staff. 5.Establishing communication protocols and coordination mechanisms with local emergency services.	Number of facilities with updated emergency response plans, availability of backup power systems, staff trained in emergency response.

7.2.5 Water Conservation

Implementing water-saving measures to reduce water consumption in health facilities and ensure availability during droughts.

Project title	Project/ Initiative/ Measure title	Project/ Initiative/ Measure objective	Key Performance Indicators (KPI)
Installation of Low-Flow Fixtures and detection and repair of leaks	To reduce water use, water leaks and promote water conservation by installing low-flow faucets, toilets, and showerheads. Rehabilitation and Replacement of Old Pipes. Regular maintenance and replacement of old and damaged water pipes to reduce the likelihood of leaks and water losses.	1.Conducting assessments to identify existing fixtures and water usage patterns. 2. Regular Network Inspections: Utilizing modern technologies like acoustic detectors or pressure sensors to identify leaks in underground water pipes 3.Procuring and installing low-flow faucets, toilets, and showerheads. 4.Training maintenance staff and users on the benefits and proper use of low-flow fixtures. 5. Use of High-Durability Materials. Replacing old and damaged pipes with materials that are less prone to corrosion and mechanical damage.	Reduction in water usage (liters per day), number of low-flow fixtures installed
Rainwater Harvesting Systems Installation	To collect and store rainwater for non-potable uses such as irrigation and flushing toilets, reducing reliance on municipal water supplies.	1.Conducting site assessments to determine the feasibility of rainwater harvesting. 2.Installing rainwater collection systems, including gutters, storage tanks, and filtration units. 3.Integrating rainwater systems with existing plumbing for non-potable uses. 4.Training staff on the operation and maintenance of rainwater harvesting systems.	Amount of rainwater harvested and utilized (liters per year), reduction in municipal water consumption
Water-Efficient Landscaping	To minimize water use in facility landscaping by using native plants and xeriscaping techniques.	1.Designing water-efficient landscaping plans using native and drought-resistant plants. 2.Removing water-intensive plants and turf. 3.Installing efficient irrigation systems, such as drip irrigation. 4.Training landscaping staff on xeriscaping techniques and maintenance.	Reduction in water use for landscaping (liters per year), percentage of landscaped area converted to xeriscaping.
Green Areas	1. Avoid sealing of surfaces; 2. Protect and enlarge green areas	This measure involves development, expansion, and maintenance of green spaces within health care instititions. It aims to improve environmental quality, enhance biodiversity, and promote public health by increasing the amount of natural vegetation and recreational areas available to the public. This includes planting trees, creating parks, green corridors, and rooftop gardens, as well as protecting existing natural habitats from urbanization and degradation. The measure supports climate resilience by reducing urban heat islands, improving air quality, and offering spaces for social and community activities	m² of sealed surface; m² of green area

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7.2.6 Sustainable transport

Promoting sustainable transportation options to reduce emissions from healthcare-related transport activities.

Project title	Project/ Initiative/ Measure title	Project/ Initiative/ Measure objective	Key Performance Indicators (KPI)
Transition to Electric Ambulances and Service Vehicles	To reduce greenhouse gas emissions and operational costs by transitioning to electric ambulances and service vehicles	1.Assessing the current fleet of ambulances and service vehicles. 2.Procuring electric vehicles (EVs) and necessary charging infrastructure. 3.Training drivers and maintenance staff on the operation and upkeep of EVs. 4.Monitoring and reporting on the performance and benefits of the EV fleet. 5. Installing EV charging stations at the hospital can encourage the use of electric vehicles by patients, staff, and visitors.	Number of electric vehicles in operation, reduction in fuel consumption and emissions (CO_2 equivalent)
Incentives for Staff and Patients to Use Public Transportation, electric vehicles, bicycles, or carpooling through subsidized passes, bonuses, or other perks.	To reduce the environmental footprint of healthcare facilities by encouraging the use of public transportation among staff and patients	1. Developing a subsidy or incentive program for public transportation passes for staff and patients. 2. Collaborating with local public transport authorities to improve service routes to healthcare facilities. 3. Conducting awareness campaigns on the benefits of using public transportation.	Increase in public transportation usage among staff and patients, reduction in private vehicle use.
Development of Cycling Infrastructure	To encourage cycling as a sustainable mode of transport by developing infrastructure such as bike racks and shower facilities	1.Installing secure bike racks and storage facilities at healthcare centers. 2. Constructing or upgrading shower and changing facilities for staff who cycle to work. 3. Promoting cycling through awareness campaigns and incentive programs.	Number of staff cycling to work, usage of cycling facilities, reduction in transportation emissions
Automated Traffic and Parking Management Systems	To reduce traffic congestion and CO_2 emissions around large hospitals and clinical centers by optimizing vehicle movement and parking through automated systems, ultimately improving access to healthcare facilities and reducing the environmental impact of hospital-related traffic.	1. instalation of Smart Parking Sensors; 2. Digital Signage and Wayfinding Systems; 3. Automated Barriers and Payment Systems; 4. Traffic Flow Optimization Software; 5. Mobile Application Integration; 6. Automated License Plate Recognition (ALPR)	1. Reduction in Average Time to Find Parking; 2. Reduction in CO_2 Emissions, 3. Improvement in Traffic Flow; 4. Patient and Visitor Satisfaction: Survey-based measurement of satisfaction levels regarding parking and access to the hospital.
Expansion of Telemedicine Services	To reduce the need for travel to healthcare facilities by expanding telemedicine services, thereby decreasing transportation-related emissions and improving access to healthcare.	1. Developing and implementing telemedicine platforms and infrastructure. 2. Training healthcare providers on telemedicine technologies and best practices. 3. Promoting telemedicine services to patients and integrating them into standard care practices. 4. Monitoring and evaluating the effectiveness and reach of telemedicine services.	Number of telemedicine consultations, reduction in patient travel, improvement in healthcare access and satisfaction.

7.2.7 Waste Reduction and Waste Treatment

Effective healthcare waste management is crucial for reducing environmental impact, protecting public health, and ensuring sustainable operations within the health sector.

Project title	Project/ Initiative/ Measure title	Project/ Initiative/ Measure objective	Key Performance Indicators (KPI)
Waste Reduction	To minimize the volume of waste generated by healthcare facilities, promoting sustainability and reducing environmental impact.	Digitization: Transition to electronic health records (EHRs) to reduce paper waste. Activities: Digitize patient records, implement digital communication systems, and provide training for staff on using digital tools. Benefits: Reduces the need for physical storage and decreases paper consumption. Example: A hospital can switch from paper-based patient records to a digital system, significantly reducing paper waste.	Reduction in paper waste (kg per month), number of digital records implemented.
Bulk Purchasing	To minimize the volume of waste generated by healthcare facilities	Activities: Identify frequently used supplies, negotiate bulk purchasing agreements with suppliers, and streamline storage solutions. Benefits: Reduces packaging materials and transportation emissions. Example: Hospitals can order bulk quantities of commonly used items like gloves, reducing the amount of packaging waste generated.	Reduction in packaging waste (kg per month), cost savings from bulk purchasing
Reusable Containers	To minimize the volume of waste generated by healthcare facilities	Activities: Source durable, reusable containers, establish cleaning and sterilization processes, and educate staff on their use. Benefits: Decreases single-use plastic waste. Example: Hospitals can implement reusable containers for items like surgical instruments, medications, and food services.	Reduction in single-use plastic waste (kg per month), number of reusable containers implemented.
Sterilizable Surgical Instruments	To minimize the volume of waste generated by healthcare facilities	Activities: Procure high-quality, sterilizable instruments, train staff on proper sterilization techniques, and monitor compliance. Benefits: Reduces the need for disposable instruments. Example: Hospitals can invest in reusable surgical instruments that can be sterilized and reused, cutting down on medical waste.	Reduction in disposable surgical instrument waste (kg per month), number of reusable instruments implemented
Efficient Inventory Management	To minimize the volume of waste generated by healthcare facilities	Activities: Implement inventory management software, train staff on inventory best practices, and regularly review stock levels. Benefits: Reduces waste from expired or unused supplies. Example: A hospital can use inventory management software to track the usage and expiration dates of medical supplies, ensuring that items are used before they expire.	Reduction in expired medical supplies (kg per month), improvement in inventory turnover rates.

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Project title	Project/ Initiative/ Measure title	Project/ Initiative/ Measure objective	Key Performance Indicators (KPI)
Staff Training on Waste Reduction:	To minimize the volume of waste generated by healthcare facilities	Activities: Develop training programs, conduct regular workshops, and provide resources and guidelines for waste reduction. Benefits: Increases awareness and compliance with waste reduction practices. Example: Hospitals can conduct training sessions for staff on proper waste segregation, recycling practices, and the use of reusable items.	Number of staff trained, improvement in waste segregation practices, reduction in overall waste generated (kg per month).
Segregation at Source	To ensure proper handling, treatment, and disposal of healthcare waste, minimizing environmental impact and protecting public health.	Activities: Establish waste segregation protocols, provide color-coded bins for different types of waste (e.g., general waste, infectious waste, hazardous waste), and train staff on proper segregation practices. Benefits: Reduces the risk of cross-contamination and ensures that waste is treated and disposed of appropriately. Example: A hospital can implement a segregation system where infectious waste is placed in red bins, hazardous waste in yellow bins, and general waste in black bins.	Percentage of waste correctly segregated, reduction in incidents of cross-contamination
Appropriate Treatment	To ensure proper handling, treatment, and disposal of healthcare waste, minimizing environmental impact and protecting public health.	Activities: Implement appropriate treatment methods for different types of waste, such as autoclaving for infectious waste, chemical treatment for hazardous liquid waste, and incineration for certain types of biomedical waste. Benefits: Ensures that waste is treated safely and effectively, reducing environmental and health risks. Example: A hospital can install an autoclave for treating infectious waste and establish protocols for chemical treatment of hazardous liquid waste.	Percentage of waste treated using appropriate methods, reduction in untreated waste.
Installation of a New Incinerator with Advanced Filtration Systems	To significantly reduce CO_2 emissions and other harmful pollutants generated by the current incinerator by replacing it with a modern incinerator equipped with advanced filtration systems. The goal is to ensure environmentally responsible disposal of medical waste while protecting public health.	1. High-Efficiency Combustion Technology: A new incinerator using high-temperature rotary kiln or two-stage combustion systems designed to achieve complete combustion of medical waste, reducing CO_2 and other harmful emissions. Higher combustion efficiency results in lower residual waste and emissions. 2. Advanced Filtration Systems: Gas Scrubbers: To neutralize acidic gases such as SO2 and HCl. Baghouse Filters: To remove particulate matter and reduce the emission of fine particles. Activated Carbon Filters: To capture dioxins, furans, and heavy metals, ensuring that these pollutants do not enter the atmosphere. 3. Continuous Emission Monitoring Systems (CEMS): Installation of CEMS to monitor real-time emissions, ensuring that the incinerator operates within permitted limits. Provides data for regulatory compliance and operational adjustments to minimize emissions.	Reduction in CO2 Emissions: Measured by the decrease in emissions from the incinerator before and after the installation of the new system. Reduction in Particulate Matter (PM) and Other Pollutants: Monitored through emissions data, showing a significant decrease in pollutants such as sulfur dioxide (SO2), nitrogen oxides (NOx), and dioxins. Compliance with Emission Standards: Ensuring that the new incinerator consistently meets national and EU emission standards. Operational Efficiency: Evaluating the incinerator's performance in terms of waste throughput, energy recovery, and downtime due to maintenance or technical issues.

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Project title	Project/ Initiative/ Measure title	Project/ Initiative/ Measure objective	Key Performance Indicators (KPI)
Compliance with Regulations	To ensure proper handling, treatment, and disposal of healthcare waste, minimizing environmental impact and protecting public health.	Activities: Ensure adherence to local, national, and international regulations and guidelines for healthcare waste disposal, and regularly audit practices to ensure compliance. Benefits: Ensures that waste management practices meet legal standards and protect public health and the environment. Example: Hospitals can establish compliance monitoring systems and conduct regular audits to ensure adherence to waste management regulations.	Compliance rate with waste management regulations, number of successful audits conducted

7.2.8 Early Warning Systems

Building climate resilience within public health systems is essential to mitigate the health impacts of climate change. This involves creating robust systems that can withstand and quickly recover from climate-related health threats. Early warning systems (EWS) are critical for anticipating and responding to climate-related health threats. These systems provide timely and accurate information that enables healthcare providers and communities to take proactive measures to protect health.

Project title	Project/ Initiative/ Measure title	Project/ Initiative/ Measure objective	Key Performance Indicators (KPI)
Early Warning Systems (EWS) for Climate-Related Health Threats	To develop and implement a comprehensive early warning system that anticipates and responds to climate-related health threats, thereby protecting public health by enabling timely and accurate information dissemination and proactive measures.	1. Enhance disease surveillance systems to detect early signs of climate-sensitive diseases such as vector-borne diseases (e.g., malaria, dengue) and waterborne diseases (e.g., cholera). This involves setting up monitoring and reporting mechanisms across healthcare facilities and integrating with national health databases. 2.Integrate meteorological and health data to predict and track climate-related health risks. This includes establishing data-sharing protocols between meteorological agencies and health departments, and developing analytical tools to monitor climate variables such as temperature and precipitation. 3.Integrate meteorological and health data to predict and track climate-related health risks. This includes establishing data-sharing protocols between meteorological agencies and health departments, and developing analytical tools to monitor climate variables such as temperature and precipitation. 4. Train healthcare workers and community members on how to respond to early warnings and take appropriate actions to prevent and mitigate health impacts. This includes developing training modules, conducting workshops, and establishing regular drills and exercises.	Number of surveillance sites established; Number of integrated data systems established; Number of alert mechanisms implemented; Number of training sessions conducted

7.2.9 Health Promotion and Education

Engaging and educating communities about climate-related health risks and resilience strategies is vital for public health preparedness. Informed and empowered communities can take proactive steps to protect their health and contribute to overall resilience.

Project title	Project/ Initiative/ Measure title	Project/ Initiative/ Measure objective	Key Performance Indicators (KPI)
Public Awareness Campaigns	To increase public awareness and education on the health risks associated with climate change, empowering individuals and communities to take proactive measures to protect their health.	Launch public awareness campaigns using various media channels (TV, radio, social media, print) to educate the public about the health risks associated with climate change and the steps they can take to mitigate these risks. Campaigns could focus on the dangers of heatwaves, air pollution, and vector-borne diseases, providing tips on staying safe during extreme weather events.	Reach and engagement metrics for media campaigns; Increase in public awareness and knowledge about climate-related health risks
Educational Materials	To increase public awareness and education on the health risks associated with climate change, empowering individuals and communities to take proactive measures to protect their health.	Develop and distribute educational materials such as brochures, posters, and online resources that explain the impact of climate change on health and provide practical advice for individuals and communities.	Number of educational materials distributed
Training for Health Professionals	To enhance capacity of healthcare professionals to address climate-related health issues.	Provide training for healthcare providers on the health impacts of climate change, how to recognize and treat climate-related health conditions, and how to counsel patients on climate adaptation measures.	Number of healthcare providers trained

7.2.10 Vulnerable Population Support

Supporting vulnerable populations involves identifying and addressing the specific needs of groups that are disproportionately affected by climate change, such as the elderly, children, low-income communities, and those with pre-existing health conditions.

Project title	Project/ Initiative/ Measure title	Project/ Initiative/ Measure objective	Key Performance Indicators (KPI)
Identification of Vulnerable Groups	To identify and protect populations most vulnerable to climate-related health risks through targeted interventions, community-based programs, access to healthcare, and emergency preparedness.	Conduct assessments to identify populations most vulnerable to climate-related health risks based on factors such as age, socioeconomic status, health status, and geographic location.	Number of assessments conducted Number of vulnerable groups identified Geographic areas mapped
Targeted Interventions	To ensure that the decarbonization of the healthcare sector is inclusive and equitable by addressing the specific needs and challenges of vulnerable groups, including low-income communities, elderly patients, and those with chronic health conditions.	Develop and implement targeted interventions to protect and support vulnerable groups. This could include providing cooling centers during heatwaves, improving air quality in low-income neighborhoods, and ensuring access to clean water.	Number of targeted interventions implemented

7.2.11 Green Procurement in the Health Sector

Green procurement in the health sector refers to the process of acquiring products, services, and works in a way that minimizes environmental impact and promotes sustainability. This approach is crucial in reducing the carbon footprint of healthcare facilities, promoting the use of sustainable materials, and ensuring that healthcare operations align with broader environmental goals. Moreover, the procurement process shall lead to engagement of entities with lower CO_2 emissions.

Project title	Project/ Initiative/ Measure title	Project/ Initiative/ Measure objective	Key Performance Indicators (KPI)
Green procurment	To implement green procurement practices across all health sector institutions in North Macedonia, promoting environmental sustainability, reducing the carbon footprint, and ensuring eco-friendly operations.	Develop and implement green procurement policies that prioritize the purchase of environmentally friendly products and services. This includes setting criteria for sustainable procurement, such as energy efficiency, reduced packaging, and the use of non-toxic materials.	Number of green procurement policies implemented Percentage of eco-friendly products purchased

7.2.12 Nutrition & Food

Implementing sustainable nutrition and food practices in the health sector can significantly reduce GHG emissions (mainly N_2O and CH_4), which arise during food production (e.g. use of fertilizer, livestock) or treatment and disposal of food (biogenic) waste. Hospitals and healthcare facilities are large consumers of food and can act as role models in nutrition. By adopting environmentally friendly food procurement, dietary planning, cooking and waste management practices, they can lower the amount of food wasted, support climate-friendly agriculture, contribute to people's health by serving less meat and save costs.

7.1.4 Nutrition & Food	Climate-Friendly Menus and Introduction of collective catering for all employees in the healthcare sector.	To promote climate-friendly menus and reduce food waste in the nutrition and food services across all institutions in North Macedonia, enhancing environmental sustainability and resource efficiency.	Ministry of Health, IPH, in collaboration with the Ministry of Agriculture, Forestry and Water Economy		Direct: All institutions Indirect: Local farmers, broader community	Develop and promote menus that prioritize plant-based foods, locally sourced ingredients, and seasonal produce. Reduce the use of high-impact animal products such as red meat and dairy, and replace them with more sustainable protein sources like legumes, nuts, and fish.	Percentage of plant-based meals offered Reduction in the use of high-impact animal products Increase in locally sourced ingredients
	Reducing Food Waste	To promote climate-friendly menus and reduce food waste in the nutrition and food services across all institutions in North Macedonia, enhancing environmental sustainability and resource efficiency.	Ministry of Health, IPH, in collaboration with the Ministry of Environment and Physical Planning		Direct: All institutions Indirect: broader community	Implement strategies to reduce food waste at all stages of food service, including procurement, preparation, and consumption. This includes conducting regular food waste audits, optimizing portion sizes, improving food storage and handling practices, and promoting food waste awareness among staff and consumers.	Reduction in food waste generated (kg) Number of food waste awareness programs conducted

7.2.13 Chemicals

Refrigerants are crucial in the operation of healthcare facilities, particularly for cooling systems, medical storage, and air conditioning. However, traditional refrigerants like hydrofluorocarbons (HFCs) have an extremely high Global Warming Potential (GWP) for which reason leakages should be avoided and replace with gases of lower GWPs. Implementing sustainable refrigerant management practices can drastically reduce these emissions.

Anesthetic gases used in surgeries and medical procedures, such as nitrous oxide, sevoflurane, isoflurane and desflurane, are significant contributors to greenhouse gas emissions. These gases have high Global Warming Potential (GWP) and are released during use and handling. Implementing sustainable anesthetic management practices can reduce these emissions and improve the environmental sustainability of healthcare facilities.

Analytical gases, used in various diagnostic and laboratory procedures, can contribute to greenhouse gas emissions, especially methane with a GWP of 28. Other gases such as propane, butane, are less relevant. Sustainable management of these gases, including the transition to low-GWP alternatives and optimizing their usage, can significantly reduce the carbon footprint of healthcare facilities.

Project title	Project/ Initiative/ Measure title	Project/ Initiative/ Measure objective	Key Performance Indicators (KPI)
Sustainable Refrigerant Management in Healthcare Facilities	To reduce CO_2 emissions and other greenhouse gases by transitioning to low-GWP refrigerants, optimizing refrigerant use, and improving the energy efficiency of cooling systems in healthcare facilities.	1. Replacing existing high-GWP refrigerants such as HFCs with low-GWP alternatives like hydrofluoroolefins (HFOs), ammonia, or CO_2-based refrigerants. 2. Implementing advanced leak detection systems and conducting regular maintenance checks to minimize refrigerant leakage, which is a major source of emissions. 3. Upgrading cooling and refrigeration systems to more energy-efficient models that are compatible with low-GWP refrigerants.	Reduction in GWP of Refrigerants Used; Reduction in Refrigerant Leakage
Sustainable Anesthetic Management in Healthcare Facilities	To reduce CO_2 emissions and other greenhouse gases by transitioning to low-GWP anesthetics, optimizing the use of anesthetic gases, and improving the efficiency of anesthesia delivery systems in healthcare facilities.	1. Phasing out high-GWP anesthetics such as desflurane and nitrous oxide, and replacing them with lower-GWP alternatives like sevoflurane or isoflurane. 2. Upgrading anesthesia machines to those with lower fresh gas flow rates, which minimize the volume of anesthetic gases used during procedures. 3. Implementing technologies that capture and safely destroy waste anesthetic gases rather than venting them into the atmosphere.	Reduction in GWP of Anesthetics Used; Reduction in Anesthetic Gas Usage; Increase in the Use of Low-GWP Anesthetics:
Sustainable Management of Analytical Gases in Healthcare Facilities	To reduce CO_2 emissions and other greenhouse gases by transitioning to low-GWP analytical gases, optimizing gas usage, and improving the efficiency of gas delivery systems in healthcare facilities.	1. Phasing out high-GWP analytical gases, such as certain refrigerants and solvents used in gas chromatography, and replacing them with lower-GWP alternatives like hydrogen, helium, or carbon dioxide in their pure form. 2. Upgrading gas delivery systems to reduce leakage and minimize waste. This includes installing high-efficiency regulators, valves, and piping systems. 3. Implementing technologies that capture unused or waste gases during laboratory procedures and either recycle them for further use or safely destroy them.	Reduction in GWP of Analytical Gases Used; Reduction in Gas Usage

8 Performance Indicators and Monitoring

Key Performance Indicators (KPIs) are crucial metrics used to measure the effectiveness and progress of the action plan. They provide quantifiable data that helps in assessing whether the objectives are being met and identify areas that need improvement.

8.1 Key performance indicators for measuring progress towards the action plan's goals.

Greenhouse Gas (GHG) Emissions Reduction:
Measurement: Total GHG emissions from healthcare facilities (in CO_2 equivalents).
Target: Percentage reduction in GHG emissions compared to a baseline year.

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Energy Efficiency:
Measurement: Energy consumption per square meter of healthcare facility space (kWh/m²).
Target: Percentage reduction in energy consumption.

Renewable Energy Usage:
Measurement: Proportion of energy derived from renewable sources.
Target: Percentage increase in renewable energy use.

Water Conservation:
Measurement: Total water consumption per patient treated.
Target: Percentage reduction in water usage.

Waste Management:
Measurement: Amount of medical and general waste generated per patient.
Target: Percentage reduction in waste generated and percentage of waste recycled or safely disposed of.

Climate-Resilient Infrastructure:
Measurement: Number of healthcare facilities upgraded or constructed with climate-resilient features.
Target: Percentage of facilities meeting climate resilience standards.

Public Health Preparedness:
Measurement: Number of healthcare workers trained in climate resilience and emergency response.
Target: Percentage increase in trained personnel.

Community Engagement:
Measurement: Number of public awareness campaigns conducted and the reach of these campaigns.
Target: Percentage increase in community awareness and engagement.

Disease Surveillance:
Measurement: Number of climate-sensitive disease outbreaks detected and responded to.
Target: Percentage improvement in outbreak detection and response times.

8.2   Monitoring and evaluation mechanisms.

Monitoring and Evaluation (M&E) mechanisms are essential for tracking progress, assessing the impact of interventions, and making necessary adjustments to the action plan. These mechanisms ensure accountability and continuous improvement.

Monitoring Mechanisms:

Data Collection Systems:
Action: Implement robust data collection systems to gather real-time data on KPIs from healthcare facilities and other relevant sources.
Tools: Establishment of digital based platform for the Ministry of Health on data collection on GHG emissions and energy consumption of health care facilities on the central and local level and data analysis and reporting as per the needs of the institutions and the country.

Regular Reporting:
Action: Establish regular reporting protocols to track progress on KPIs.
Frequency: Monthly, quarterly, and annual reports to stakeholders and the public.
Platforms: Utilize digital dashboards and online platforms for transparent reporting.

Stakeholder Involvement:
Action: Engage stakeholders in the monitoring process to ensure transparency and accountability.
Method: Create stakeholder advisory committees and involve them in reviewing progress reports and providing feedback.

Evaluation Mechanisms:

Baseline Assessments:
Action: Conduct baseline assessments to establish initial values for KPIs before implementing the action plan.
Purpose: Provides a reference point for measuring progress.

Mid-Term Evaluations:
Action: Perform mid-term evaluations to assess the progress and effectiveness of the action plan.
Frequency: Every 2-3 years.
Method: Use surveys, interviews, and field visits to gather qualitative and quantitative data.

Final Evaluations:
Action: Conduct final evaluations at the end of the action plan's cycle to measure overall success and impact.
Purpose: Identify lessons learned and best practices for future initiatives.

Feedback Loops:
Action: Establish feedback loops to incorporate findings from evaluations into ongoing and future activities.
Method: Regularly update action plans based on evaluation outcomes and stakeholder feedback.

9   Financial Resources and Mobilization

Effective financial planning and resource allocation are critical for the successful implementation of the action plan. A clear understanding of the budget requirements ensures that adequate resources are available to support climate resilience and decarbonization efforts in the health sector.

9.1   Overview of budget requirements.

Key Components of Budget Requirements:

Infrastructure Upgrades:
Climate-Resilient Design: Costs associated with retrofitting existing healthcare facilities and constructing new, climate-resilient buildings.
Renewable Energy Integration: Expenses for installing solar panels, wind turbines, and other renewable energy systems.
Energy Efficiency Improvements: Investments in energy-efficient lighting, HVAC systems, and building insulation.

Operational Costs:
Staff Training: Budget for training healthcare workers on climate resilience and sustainable practices.
Monitoring and Evaluation: Costs related to data collection, analysis, and reporting systems for tracking progress.
Public Awareness Campaigns: Funding for educational and outreach programs to raise awareness about climate-related health risks.

Healthcare Services:
Disease Surveillance: Investments in enhanced surveillance systems and early warning mechanisms.
Emergency Preparedness: Budget for emergency response plans and resources to handle climate-related health emergencies.

Research and Development:
Health and Climate Research: Funding for studies on the health impacts of climate change and the effectiveness of mitigation strategies.
Technological Innovation: Investments in developing and implementing new technologies to support sustainable healthcare practices.

Community Engagement:
Support for Vulnerable Populations: Resources for targeted interventions to protect and support vulnerable communities.
Capacity Building: Costs associated with capacity-building programs for healthcare professionals and community leaders.

9.2 Strategies for financial resource mobilization including potential funding sources

Mobilizing financial resources is essential for supporting the implementation of the action plan. This involves identifying and securing funding from various sources, including international funds, national budgets, and private investments.

International Climate Funds:

Green Climate Fund (GCF): Apply for funding from the GCF, which supports projects that mitigate climate change and enhance resilience.

Global Environment Facility (GEF): Leverage GEF funds for projects focused on environmental sustainability and climate resilience.

Development Finance Institutions (DFIs):

World Bank Group: Secure funding and technical assistance from the World Bank for climate-related health projects.

European Bank for Reconstruction and Development (EBRD): Access EBRD funds for projects that promote sustainable development in healthcare.

National Funding:

Government Budgets: Advocate for the allocation of national budget resources to support climate resilience and decarbonization initiatives in the health sector.

Environmental Taxes and Levies: Utilize revenues from environmental taxes and levies to fund health sector initiatives.

Private Sector Investments:

Public-Private Partnerships (PPPs): Form partnerships with private companies to co-finance climate resilience projects.

Corporate Social Responsibility (CSR) Programs: Engage with corporations to fund health sector projects as part of their CSR initiatives.

Philanthropic Organizations:

Foundations and NGOs: Seek grants and donations from philanthropic organizations that support climate and health initiatives.

Innovative Financing Mechanisms:

Green Bonds: Issue green bonds to raise capital for environmentally sustainable projects in the health sector.
Climate Resilience Bonds: Develop climate resilience bonds specifically designed to fund projects that enhance the resilience of healthcare systems.

10 Risk Management and Mitigation

Identifying potential risks and developing mitigation strategies is critical to ensure the resilience and continuity of healthcare services in the face of climate change and other challenges.

10.1 Identification of potential risks and their mitigation strategies.

Climate-Related Risks:
Extreme Weather Events: Risks include hurricanes, floods, heatwaves, and storms that can disrupt healthcare services and infrastructure.

Mitigation Strategies:
Infrastructure Resilience: Strengthen healthcare infrastructure to withstand extreme weather, including flood barriers, storm-resistant buildings, and improved drainage systems.
Emergency Preparedness: Develop and regularly update emergency response plans, ensuring that healthcare facilities are equipped with backup power and essential supplies.
Early Warning Systems: Implement advanced meteorological systems to provide early warnings of extreme weather events, allowing for timely preparation and response.

Disease Outbreaks:
Climate-Sensitive Diseases: Increased risk of vector-borne diseases (e.g., malaria, dengue) and waterborne diseases (e.g., cholera) due to changing climate conditions.
Mitigation Strategies:
Enhanced Surveillance: Strengthen disease surveillance systems to detect and respond to outbreaks promptly.
Public Health Campaigns: Conduct public health campaigns to educate communities on preventive measures and symptoms of climate-sensitive diseases.
Vector Control: Implement vector control measures, such as insecticide-treated nets and environmental management to reduce breeding sites.

Supply Chain Disruptions:
Interruptions in Medical Supplies: Disruptions to supply chains due to extreme weather, geopolitical conflicts, or pandemics can lead to shortages of critical medical supplies.

Mitigation Strategies:
Diversified Suppliers: Establish multiple suppliers for critical medical supplies to reduce dependency on a single source.
Stockpiling: Maintain strategic reserves of essential medicines, equipment, and supplies.

Supply Chain Mapping: Develop comprehensive supply chain maps to identify potential vulnerabilities and alternative routes.

Financial Constraints:
Budget Limitations: Limited financial resources to implement climate resilience and decarbonization measures.

Mitigation Strategies:
Funding Diversification: Explore various funding sources, including international climate funds, national budgets, and private sector investments.
Cost-Benefit Analysis: Conduct cost-benefit analyses to prioritize interventions that offer the highest returns on investment.
Public-Private Partnerships: Form partnerships with private entities to co-finance climate resilience projects.

Human Resource Challenges:
Staff Shortages and Training Needs: Insufficient trained healthcare personnel to handle climate-related health issues.

Mitigation Strategies:
Training Programs: Implement continuous training programs for healthcare workers on climate resilience and emergency response.
Recruitment Initiatives: Develop recruitment initiatives to attract and retain skilled healthcare professionals.
Task Shifting: Utilize task-shifting strategies to delegate responsibilities to trained non-physician health workers where appropriate.

10.2 Crisis management plans to address unforeseen challenges.

Crisis management plans are essential to address unforeseen challenges effectively. These plans provide a structured approach to managing emergencies, ensuring that healthcare services continue to operate, and that patient care is maintained.

Emergency Response Plans

Action Plans: Develop detailed action plans for different types of emergencies, including natural disasters, disease outbreaks, and supply chain disruptions.

Roles and Responsibilities: Clearly define roles and responsibilities for all staff members during an emergency.

Communication Strategies:

Internal Communication: Establish robust internal communication systems to ensure that all staff members are informed and can coordinate effectively.

External Communication: Develop protocols for communicating with patients, families, the public, and external agencies.

Resource Management:

Resource Allocation: Ensure the availability and rapid deployment of critical resources, including medical supplies, equipment, and personnel.

Logistics Coordination: Implement logistics plans to manage the distribution of resources efficiently.

Training and Drills:

Regular Training: Conduct regular training sessions for all staff on crisis management procedures.

Simulation Drills: Organize simulation drills to test and improve the preparedness of healthcare facilities.

Post-Crisis Evaluation:

After-Action Reviews: Conduct after-action reviews to evaluate the response to a crisis and identify lessons learned.

Continuous Improvement: Update crisis management plans based on findings from evaluations and feedback from staff and stakeholders.

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