

Alliance for Transformative Action on Climate and Health (ATACH)

Waste and WASH actions for low-carbon,
sustainable and resilient health care facilities

19 March 2026
15h30 – 17h00 CET



ATACH
Alliance for Transformative
Action on Climate and Health



World Health
Organization

Interpretation



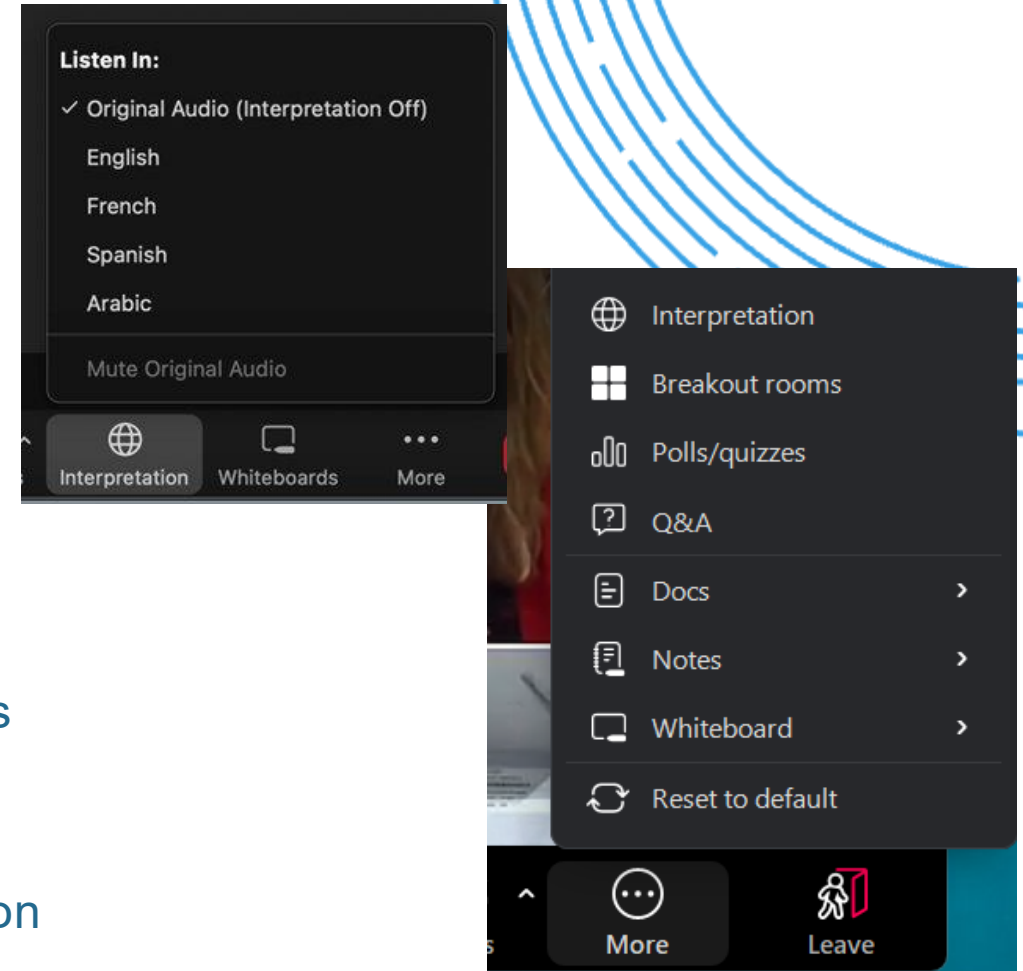
in Spanish and French

Para activar interpretación (en español)

1. Haga clic en el icono de interpretación (o en la opción "Más")
2. Seleccionar "Español"
3. **Opcional:** silenciar el audio original

Pour activer les interprétations (en français):

1. Cliquez sur l'icône d'interprétation (ou dans l'option "More")
2. Sélectionnez "Français"
3. **Facultatif :** couper le son d'origine



Click on "More" to see interpretation option

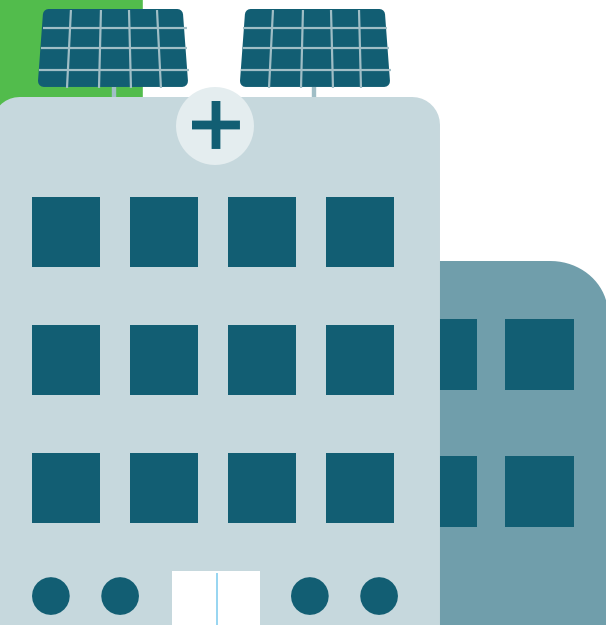
Meeting agenda

| Time (CET) | Agenda Item | Speaker |
|---------------------------------|--|---|
| 15:30 - 15:35 <i>5 mins</i> | Welcome remarks | Diana Picon Manyari , International Climate Senior Director, HCWH |
| 15:35 - 15:50 <i>15 mins</i> | Technical presentations: <ul style="list-style-type: none"> • WHO Tools on Building Climate-resilient and low carbon health care facilities • Climate resilient, sustainable and low carbon WASH in Health Care Facilities • Reducing carbon emissions from health care waste management interventions | Elena Villalobos Prats , ATACH Secretariat Lead, WHO Lindsay Denny Naughton , UNICEF focal point for WASH in Health Care Facilities Ruth Stringer , International Science and Policy Coordinator, HCWH |
| 15:50 - 16:30 <i>40 min</i> | Country experiences: <ul style="list-style-type: none"> • Belize • Nigeria • Brazil | Dr. Isani Chan , Ministry of Health and Wellness, Belize Chiranjibi Tiwari , Climate Change & WASH Manager, UNICEF Nigeria Fernando Lira , Sustainability Coordinator, Santa Casa da Bahia, Brazil |
| 16:30 - 16:55 <i>25 min</i> | Discussion and Q&A | Diana Picon Manyari , International Climate Senior Director, HCWH |
| 16:55 - 17:00 <i>5 min</i> | Closing remarks / next steps | Diana Picon Manyari , International Climate Senior Director, HCWH |

End of meeting

WHO tool for building climate resilient and low carbon sustainable HCFs

Elena Villalobos Prats
ATACH Secretariat Lead



ATACH
Alliance for Transformative
Action on Climate and Health



World Health
Organization

Climate change

Health risk

Vulnerability factors

- Demographic
- Geographical
- Biological factors & health status
- Sociopolitical
- Socioeconomic
- Health system capacity
- Gender & equity

Climate-related hazards

- Extreme weather events
- Heat
- Sea level rise
- Air pollution
- Vector distribution & ecology
- Water scarcity
- Reduced food production

Exposure

- People & communities
- Health workforce
- Infrastructure
- Energy systems
- Water systems
- Food systems
- Health systems

Environmental threats and GHG emissions

Health outcomes



Injury and mortality from extreme weather events



Heat-related illness



Respiratory illness



Water-borne diseases and other water-related health impacts



Zoonoses



Vector-borne diseases



Malnutrition and food-borne diseases



Noncommunicable diseases (NCDs)



Mental and psychosocial health



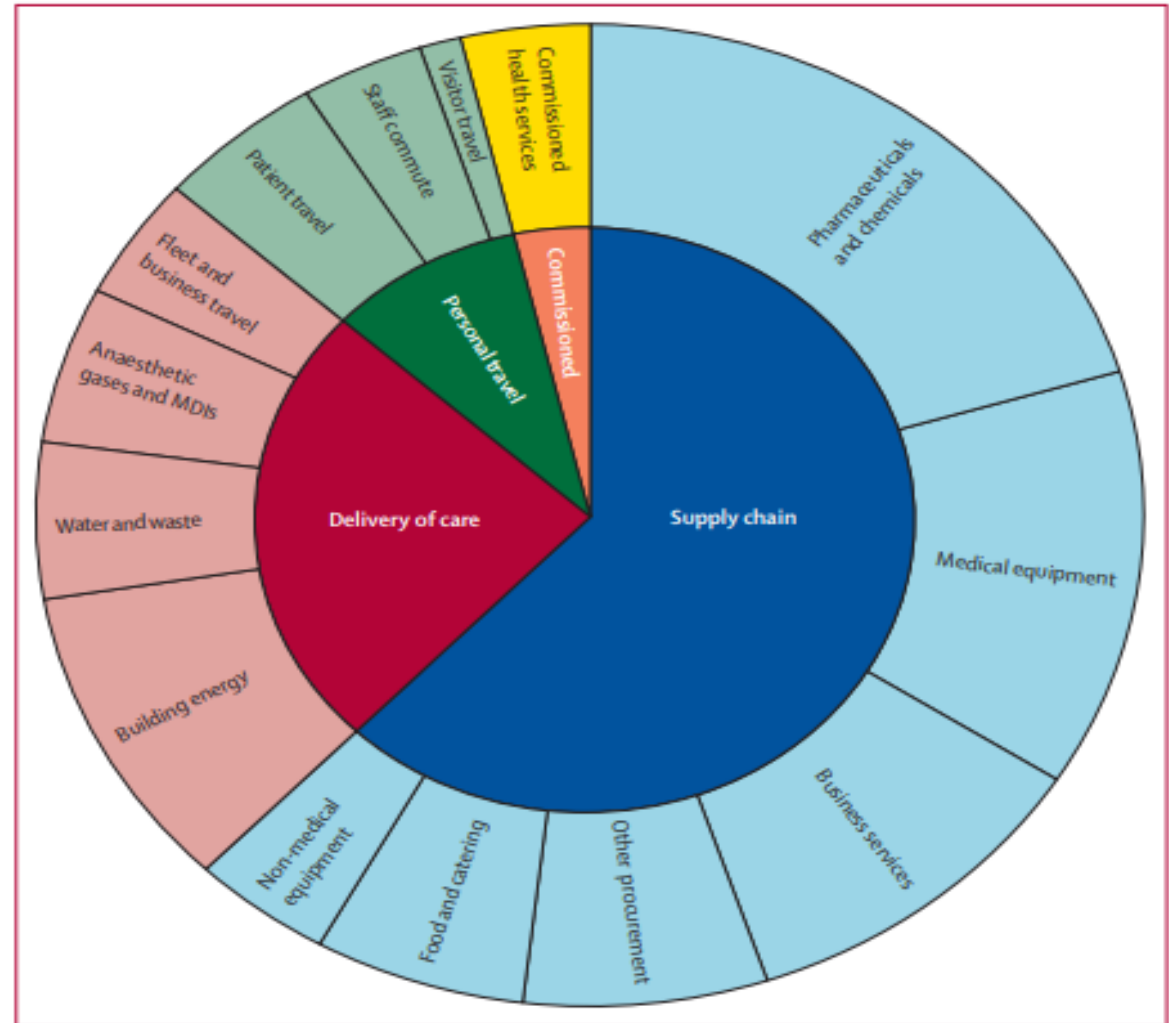
Impacts on health care facilities



Effects on health systems

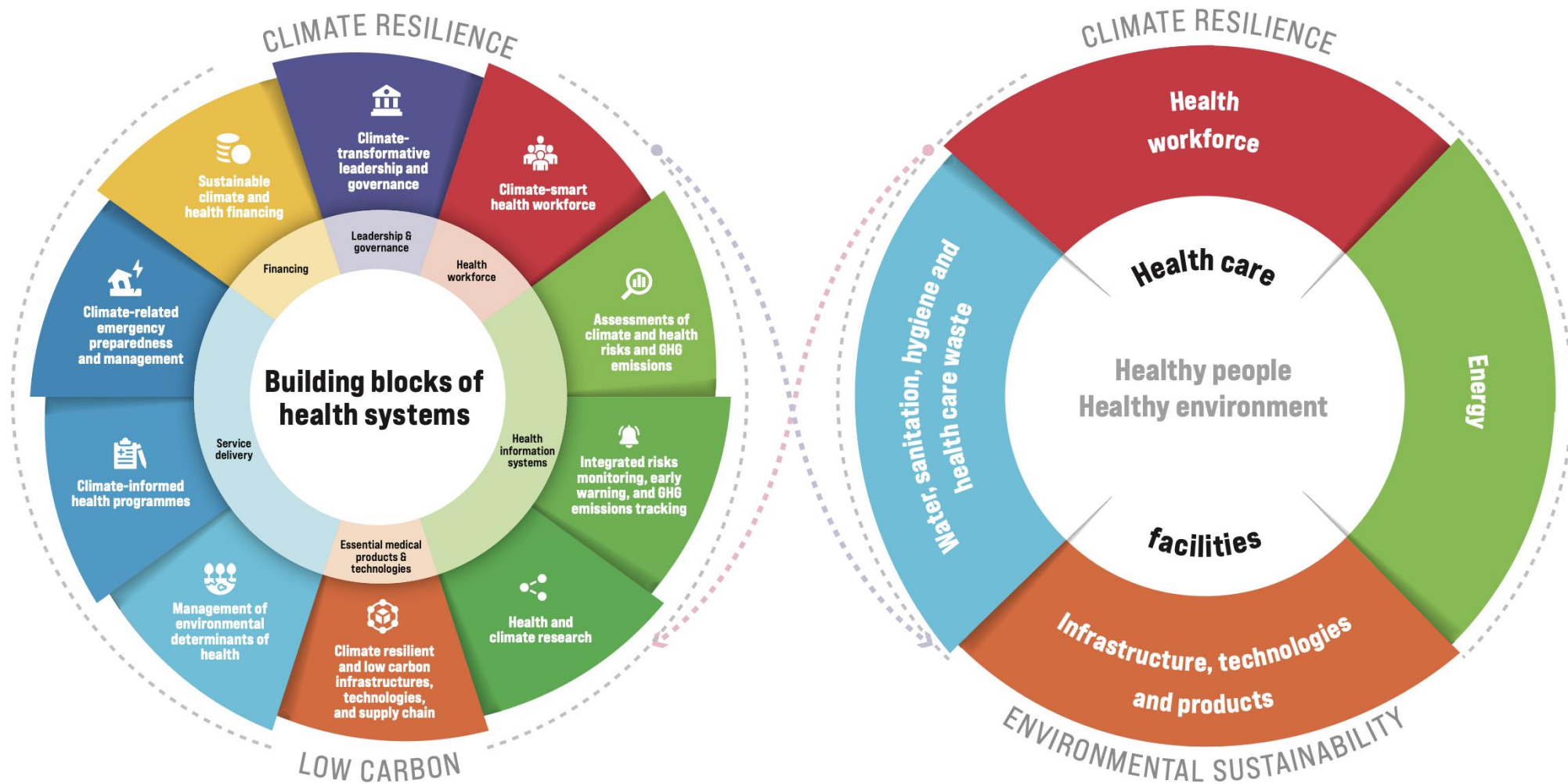
Health Care's Climate Footprint

- Between 4.4% to 5.2% of World's GHG emissions are from the Health care sector
- Emissions equal to over 500 coal gas fired thermal power plants
- Over 70% of the global climate footprint is from Supply chain procurement

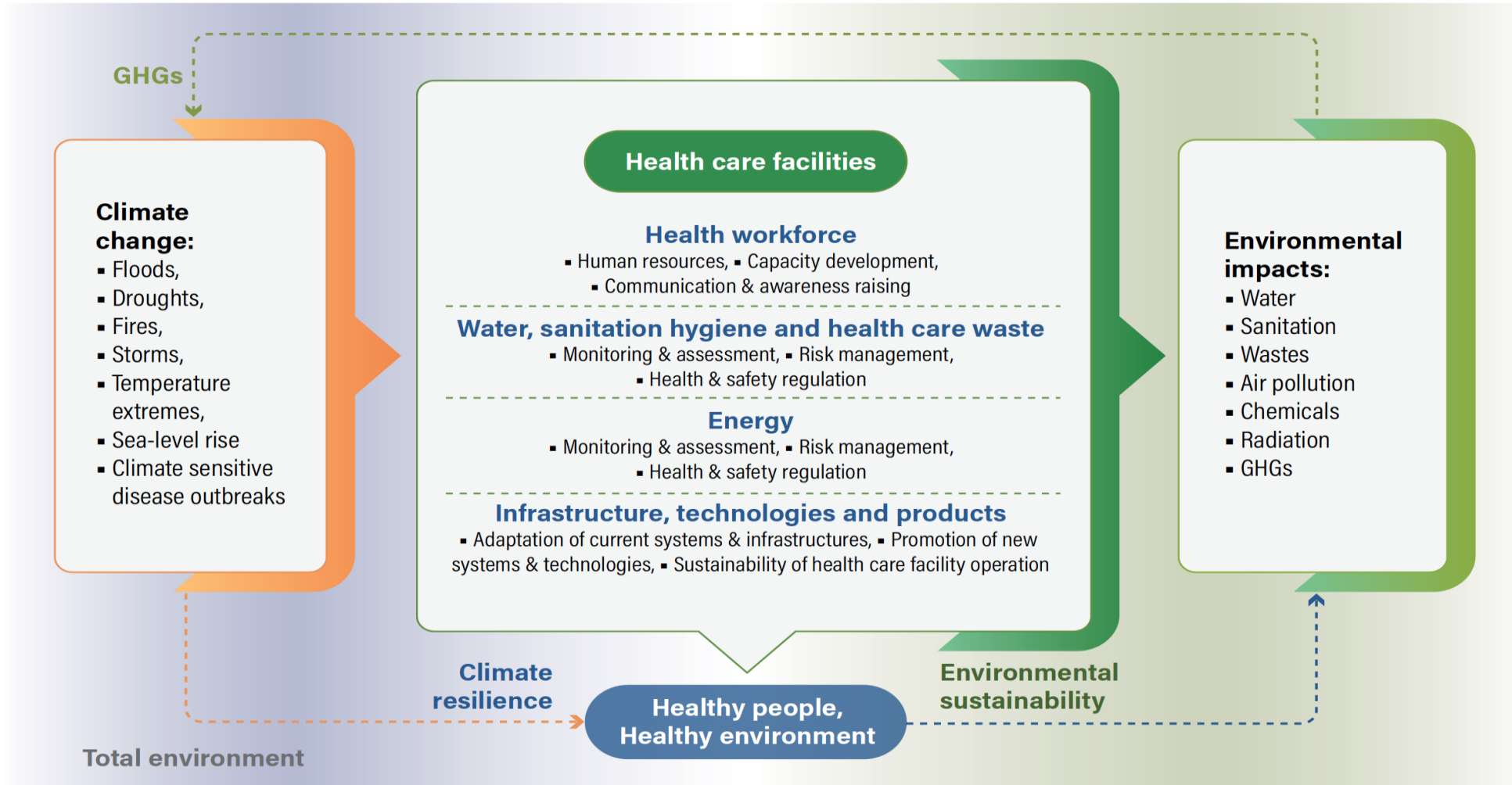


Contribution of different sectors to the greenhouse gas emissions of the NHS England, 2019

Efforts to build climate resilience and low carbon sustainability within health systems and facilities



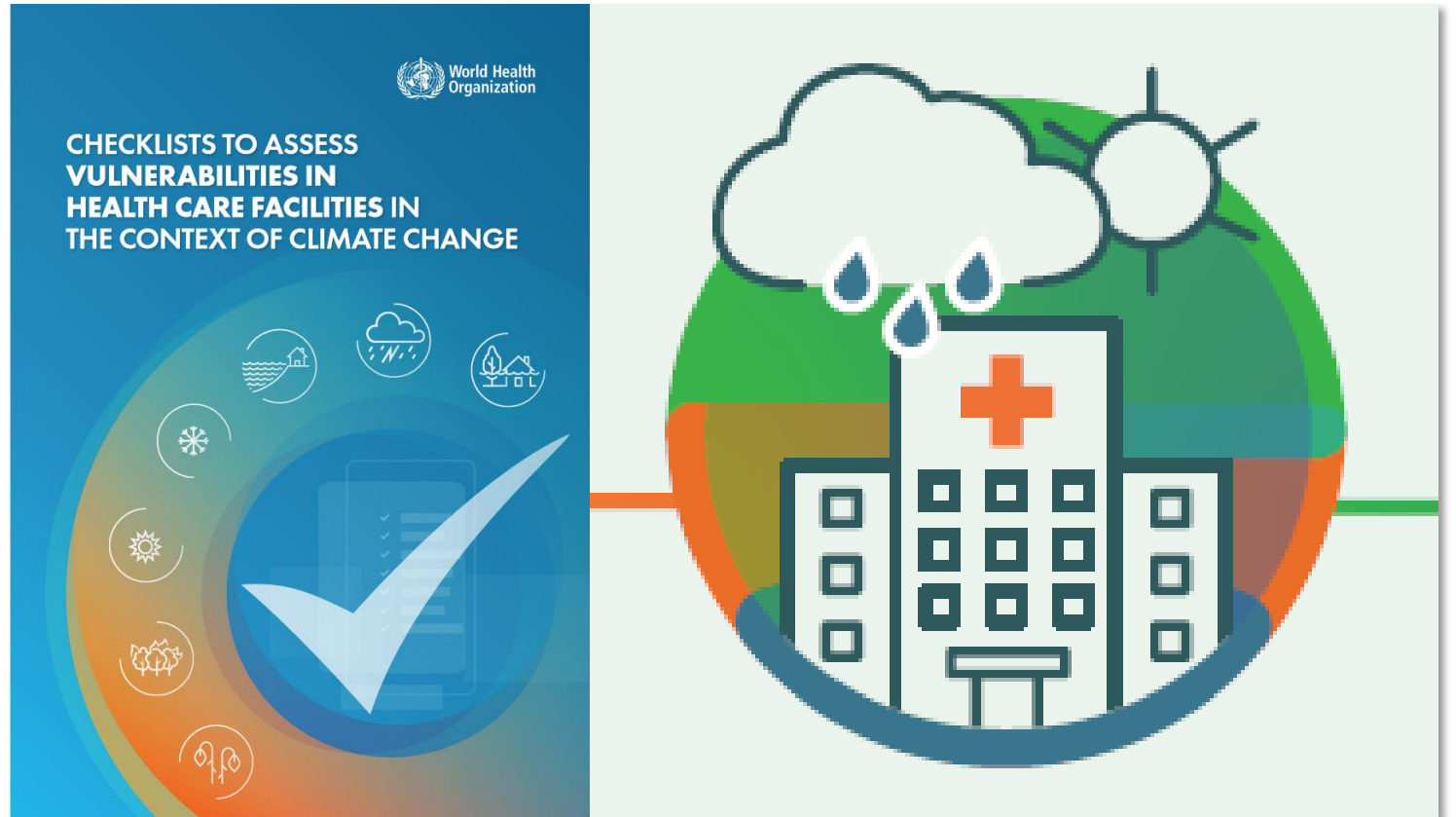
Framework for building CRESHCFs



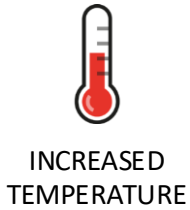
Assessing Vulnerabilities in Health Care Facilities

Steps:

1. Identify climate **hazards** of concern
2. Assess current **vulnerability** for each of the hazards, in each of the key components of health care facilities
3. Understand potential **impacts** posed by climate variability and change in each of the key components of health care facilities



3. Understand potential impacts



Health workforce

WASH and healthcare waste

Energy

Technologies, infrastructure, products

- Affecting workers with pre-existing conditions (respiratory and cardiovascular diseases, overweight)
- Reduced access to freshwater
- Water source contamination by pathogens and metals
- Gradual increase in the use of electricity for cooling purposes
- Additional treatment of drinking water
- Need insulation, cooling and dehumidification



Health workforce

WASH and healthcare waste

Energy

Technologies, infrastructure, products

- Increased threat of noncommunicable diseases from poor air quality and higher temperatures to the health workforce
- Insufficient water availability to provide health care services
- Low water quality
- Disruption of energy-dependent water pumping and treatment
- Intermittent power delivery
- Interruption of water and food supply chains



- Health workers are not able to arrive at or depart from the health care facility
- Water contamination
- Lost sharps containers and hazardous waste bins
- Damage to emergency generator or other sources of energy
- Damage to building access
- Damage to medical equipment and devices



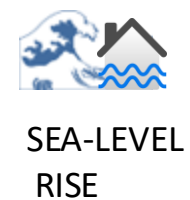
- Increased heat stress effects (heat exhaustion and heat stroke)
- Increased water demand
- Water source contamination
- Power outages
- Loss of vaccines, drugs, and other medical supplies
- Damage to medical equipment
- Increased demand for cooling and rest areas for staff



- Reduced performance capacity,
- Deaths, injuries or illness
- Disruption of water supply, wastewater and sewage systems
- Power outages (wind- and lightning-related)
- Interruption of acute medical care
- Damage to infrastructure from high winds
- Disruption to building access



- Loss of work capacity due to smoke, ash and high temperature
- Effects on mental health of staff
- Shortage of safe water
- Reduced capacity to use equipment that require potable water
- Increased demand for energy consumption from air conditioning
- Increasing indoor air contamination from smoke, threatening the health of patients and staff



- Impacts on respiratory disease due to indoor mold growth
- Saltwater intrusion in water and wastewater containment systems
- Disruption of internal and external communication and information systems
- Damage to access systems (elevators, ramps, corridors, garage)
- Increased costs of building maintenance

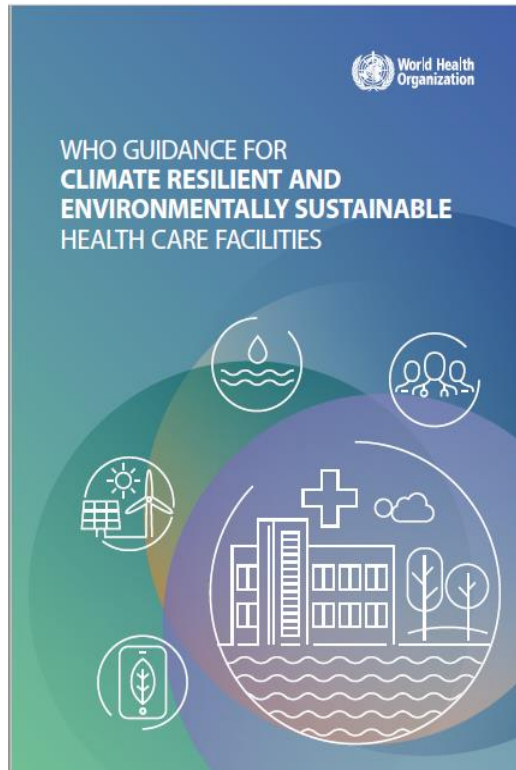


- Life-threatening risks from exposure to excessive cold
- Reduced performance capacity
- Increased likelihood of water pipes bursting and water freezing
- Loss of water pressure
- Disruption of internal heating systems
- Difficulty in providing thermal comfort
- Increased electricity demand
- Damage to water pipes from cold exposure

Interventions

- X 4 areas
- X 3 objectives each
- For climate resilience and environmental sustainability

24 tables of interventions



Climate resilience

Environmental sustainability



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Interventions table 4.2.1B – Risk management: Strengthened capacity of health care facilities to manage water, sanitation, chemicals and health care waste risks to workers, patients and served communities, by including assessments of climate resilience and environmental sustainability in responding to hazards and identifying and reducing exposures and vulnerabilities.

(Water, sanitation and health care waste – climate resilience)

| Interventions (level of achievement) ■ Low, unavailable, unable ■ Medium, in progress, incomplete ■ High, completed, achieved | Action level | | | Observations |
|---|--------------------------|--------------------------|--------------------------|--------------|
| | | | | |
| Developed a long-term drought management plan, including the identification of available alternative safe water sources* | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Health care facility conserves and manages water to reduce water usage | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Water services not affected by seasonality or climate change related weather extremes* | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| WASH climate risk management plan implemented* | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Improved training and support to health workforce on how and when to deliver water messaging | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Safe water storage available, avoiding mosquito breeding sites* | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Water is not contaminated in the health care setting during storage, distribution and handling* | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Kitchens have adequate supplies of clean potable water* | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Water storage tanks have appropriate covers to prevent access or contamination | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Non-return valves on water supply pipes installed to prevent back flows* | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Water storage in the health care facility sufficient to meet the needs of the facility in case of an extreme weather event* | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Storm water safely managed (avoiding standing water near the facility or affecting nearby households)* | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Health care facility drinking water treated with a | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |

(Water, sanitation, chemical safety and health care waste – environmental sustainability)

| Interventions (level of achievement) ■ Low, unavailable, unable ■ Medium, in progress, incomplete ■ High, completed, achieved | Action level | | | Observations |
|--|--------------------------|--------------------------|--------------------------|--------------|
| | | | | |
| Reinforced messaging about water use through signs and notices to promote saving | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Increased patient and visitor awareness about water conservation including signs and notices in patient rooms and visitor restrooms | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Plastic bottled water eliminated where drinking tap water is available* | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Eating utensils are washed immediately after use (reducing water and energy) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Wastewater is safely managed through use of on-site treatment (such as septic tank followed by drainage pit) or sent to a functioning sewer system* | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Established recycling programme for all types of non-hazardous waste* | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Established segregation collection of different types of waste according to hazards* | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Phased out of incineration of medical waste: a variety of non-burn technologies are available to safely disinfect, neutralize or contain waste (such as autoclaving) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |



Evolution of ATACH with growing attention on CCH

105 Countries
117 Partners



2021

COP26

UK establishes COP26 Health Programme raising ambition on Climate-Resilient and Low Carbon Sustainable Health Systems.



Nov 2022

COP27

Egypt as COP27 Presidency launches Initiative on Climate Action and Nutrition (I-CAN). I-CAN integrated into ATACH.



ATACH formed

ATACH is formed to support country-level and global delivery of climate resilient and low-carbon health systems.

June 2022



May 2024/25

WHA 77 /78

77th WHA Climate change and health resolution
78th WHA Global Action Plan on Climate and Health adopted.

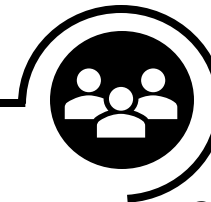


COP28

COP28 UAE Declaration on Climate Change and Health endorsed by 151 Member States. ATACH referenced as a key collaboration initiative.



Nov 2023



COP29

Baku COP Presidencies Continuity Coalition
COP29 Declaration on Multisectoral Action Pathways to resilient and healthy Cities

Nov 2024



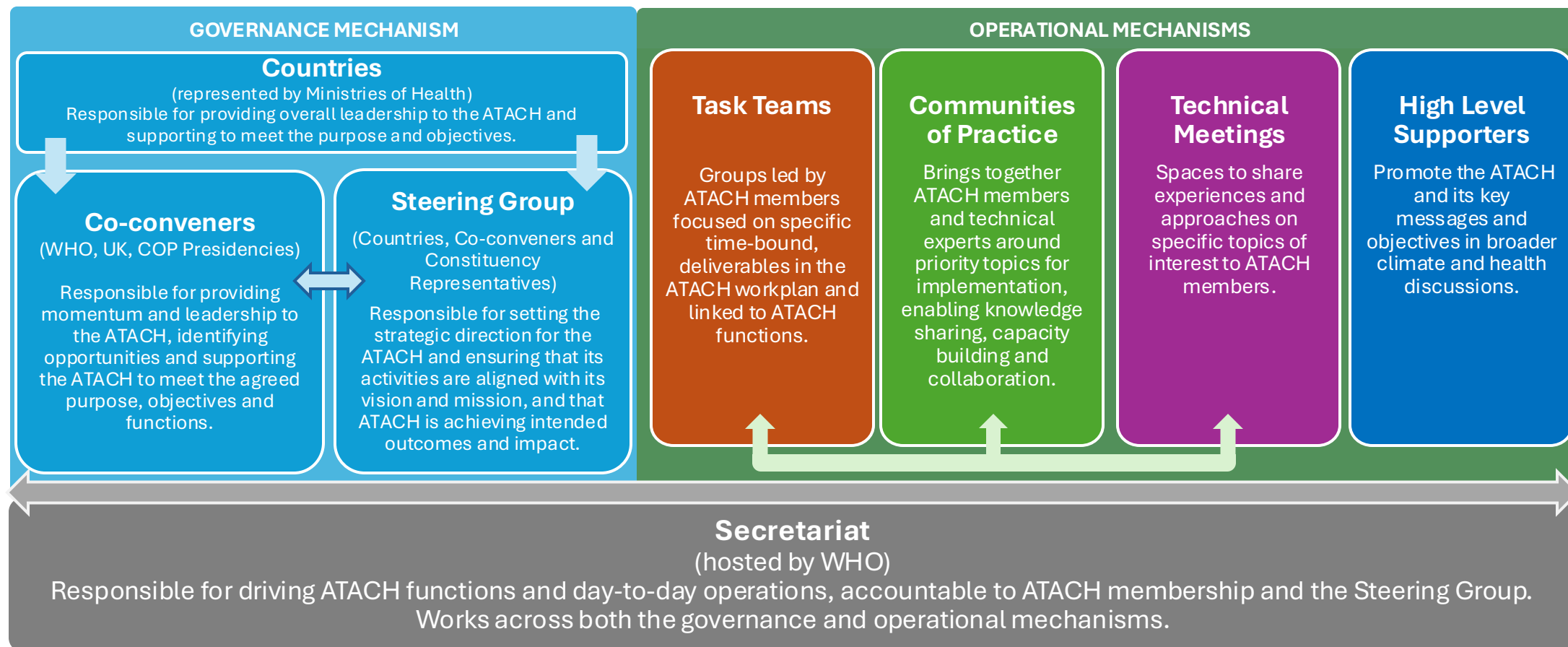
Belém Action Plan



Overview of ATACH 2.0 Structure (revised)

ATACH Membership

ATACH membership comprises countries/areas (represented by Ministries of Health), governmental technical agencies, multilateral and UN organizations, global climate-health financing mechanisms, and non-state actors.



Thank you for attending

Please direct any questions to atach@who.int

Merci d'avoir participé

Veillez adresser vos questions à atach@who.int

Gracias por atender

Por favor dirija cualquier pregunta a atach@who.int

أشكركم على مشاركتكم

يرجى إرسال أي أسئلة إلى atach@who.int



World Health
Organization

WASH
in Health Care Facilities

unicef 
for every child

Climate resilient, sustainable and low carbon WASH in Health Care Facilities

Two horizontal lines composed of colored segments (light blue, green, purple, pink, red, orange) are positioned above the text.

Global efforts and local actions

ATACH Technical Meeting

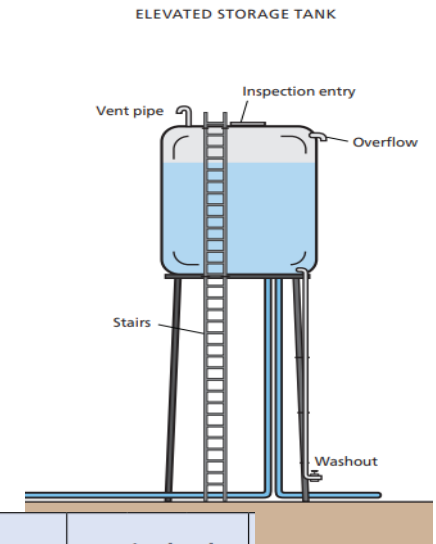
19 March 2026

Quality and safety an empty promise without the fundamentals

- **1 in 4 health care facilities, globally**, lack basic water, sanitation, hygiene, cleaning and electricity services
- Lack of basic services puts **1.8 billion people at greater risk of infection**
- **8.6 million** deaths per year in 137 LMICs are due to inadequate access to quality care.
- Maternal rates stagnant since 2015; **70% of maternal deaths** occur in sub-Saharan Africa where only **60% of health care facilities** have basic water

CRESH climate resilient, sustainable and low-carbon water interventions

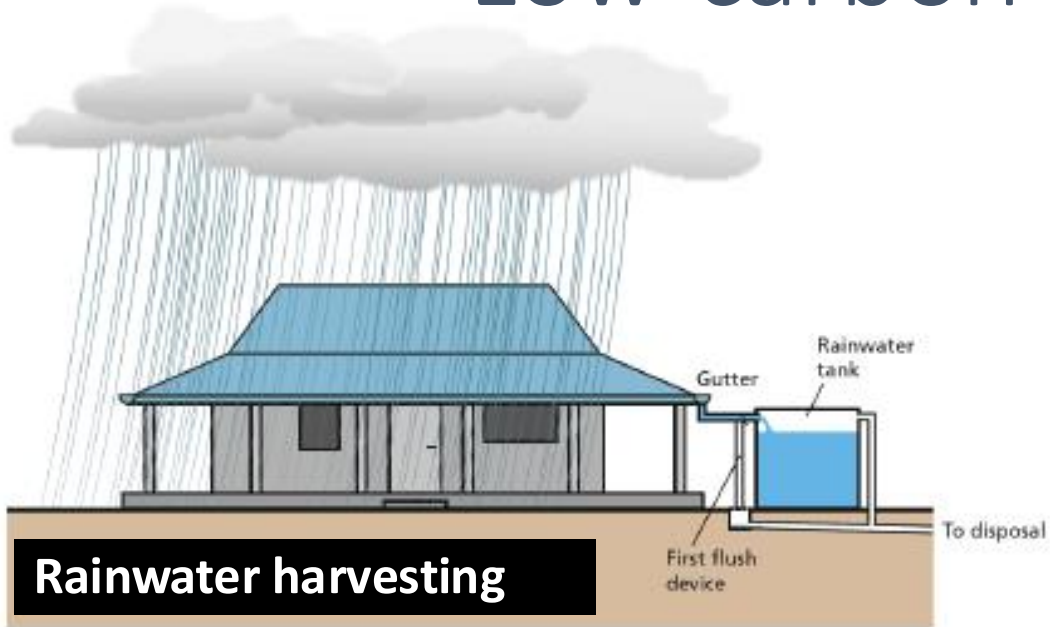
- Raise water storage tanks
- Rainwater harvesting with sufficient water storage
- Back-up water supplies
- Water reduction strategies:
 - Reuse of greywater for irrigation, flushing
 - Fix leaking taps and pipes (1 hospital can loose 5.5 million liters/year from leaks)
 - Turn off water when scrubbing hands
- Clear drainage
- Prioritize water for drinking, cleaning and other essential services



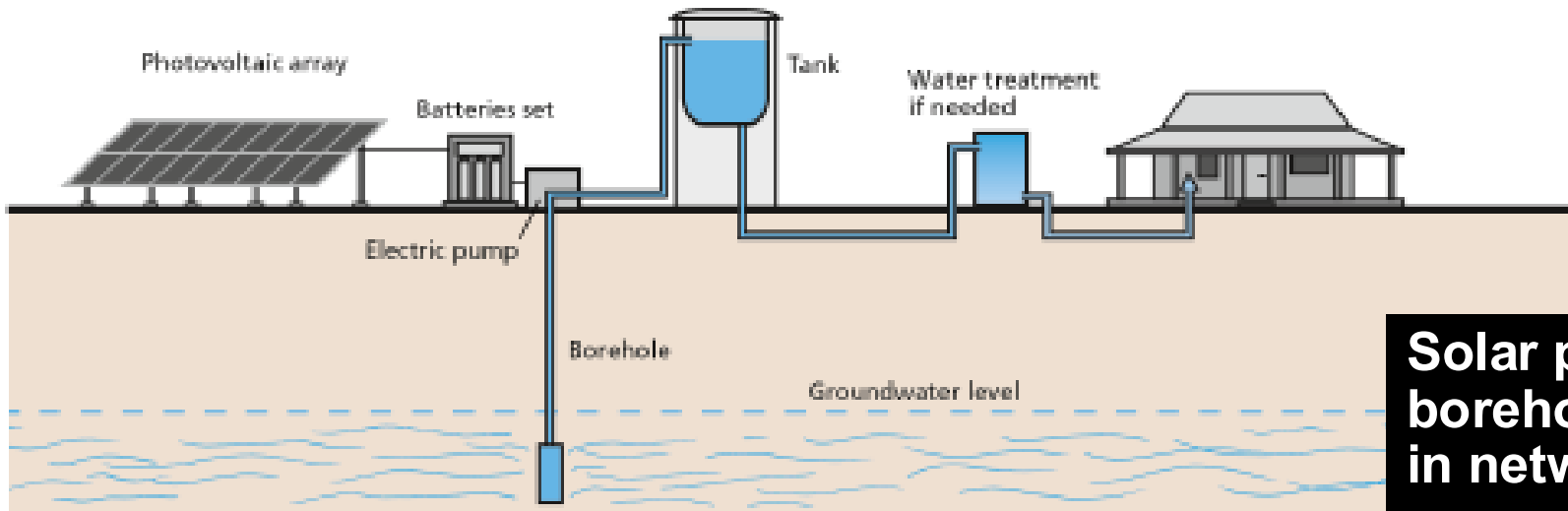
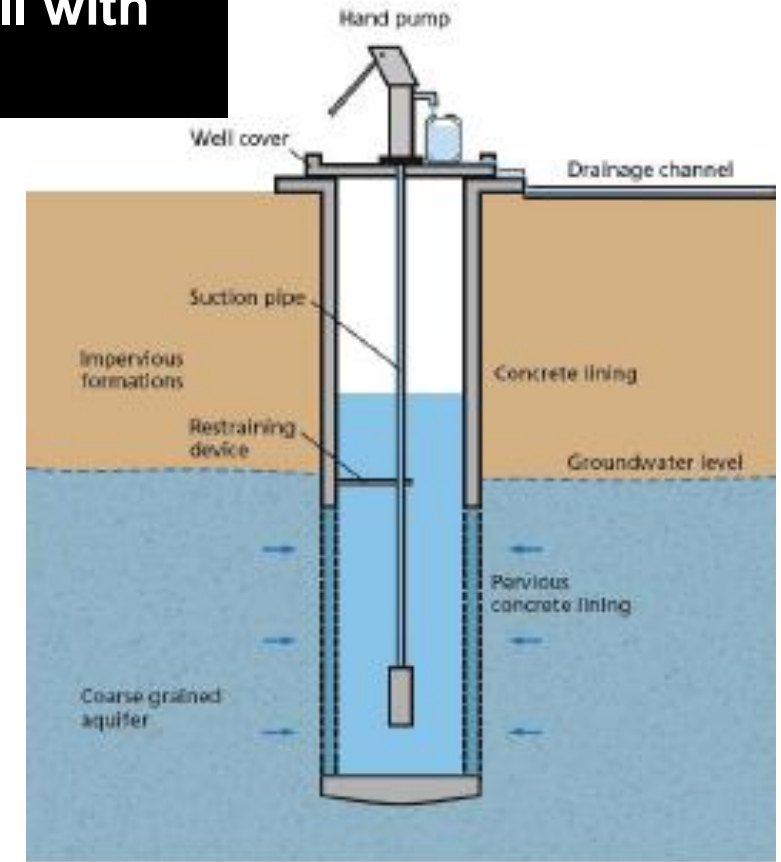
| Interventions (level of achievement) | Action level | | |
|---|--------------------------|---------------------------------|---------------------------|
| | Low, unavailable, unable | Medium, in progress, incomplete | High, completed, achieved |
| Verified safety conditions and proper functioning of all elements of the water distribution system, including storage tanks, valves, pipes and connections, and water disinfection* | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Water pipe connections checked regularly for signs of deterioration* | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Developed a monitoring mechanism to verify compliance with national standards, including the operation and maintenance of water and sanitation facilities* | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Developed climate-resilient water safety plans | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Water quality supply monitored regularly, including in emergencies | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Water supply monitored regularly during emergencies to ensure adequate access throughout the duration of the event, ensuring that protocols are in place to guide rationing if required | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

WASH interventions in CRESH guidance

Low-carbon water supply



Protected well with handpump

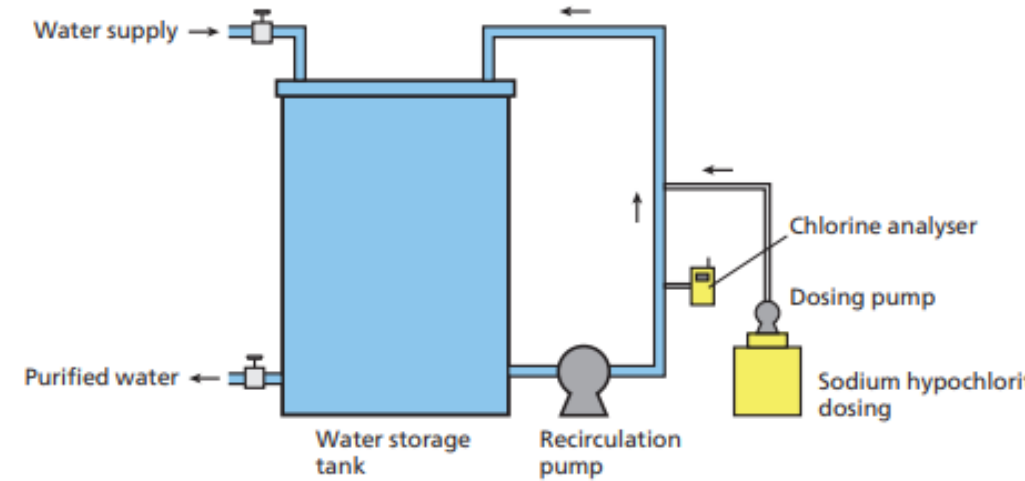


Low carbon on-site water treatment and storage

- On-site water treatment preferred to bottled water, trucked water
- Check performance against key microbiological and chemical contaminants
- Source local options and consumables
- Refer to WHO to see if product works:
<https://www.who.int/tools/international-scheme-to-evaluate-household-water-treatment-technologies/products-evaluated>



NaDCC



In-line chlorination



Membrane ultrafiltration (no external power)



Membrane ultrafiltration (no external power)

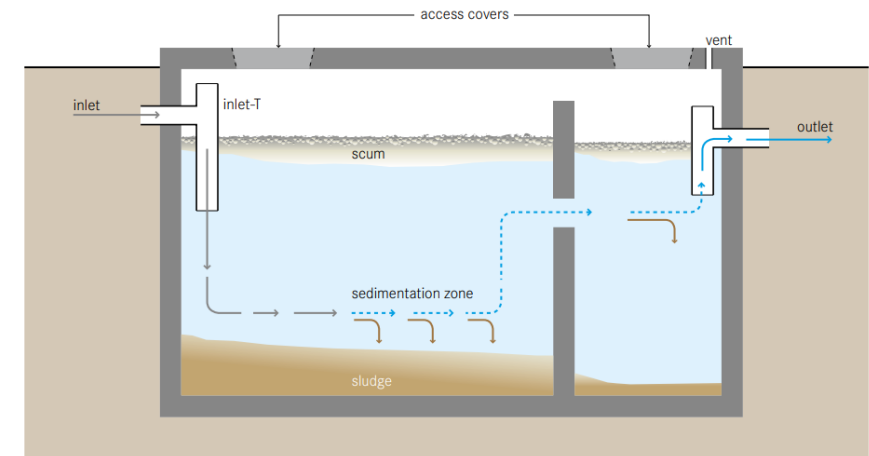
Climate resilient, sustainability and low-carbon of sanitation technology

- Locate toilets in an area of the facility which is less prone to floods, erosion, etc.
- Toilets with an open pit or soak-away should be located upgradient at least 30 m away from water sources and 1.5 m above the water table.
- Raised and/or are temporary enclosed toilets with a ramp that can be regularly emptied
- Use low or waterless toilet designs
- Where no safely managed sewerage, consider on-site treatment (e.g. septic tank, anaerobic baffle reactor) rather than trucking
- More frequent emptying of on-site sanitation during seasonal rainfall.
- All toilets should be accessible to those with limited mobility and with menstrual hygiene

Raised latrines



Septic tank



| Interventions (level of achievement) | Action level | | | Observations |
|---|--------------------------|---------------------------------|---------------------------|--------------|
| | Low, unavailable, unable | Medium, in progress, incomplete | High, completed, achieved | |
| Wastewater is safely managed through use of on-site treatment (such as septic tank followed by drainage pit) or sent to a functioning sewer system* | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |

Bringing together WASH and climate communities to support quality care for all

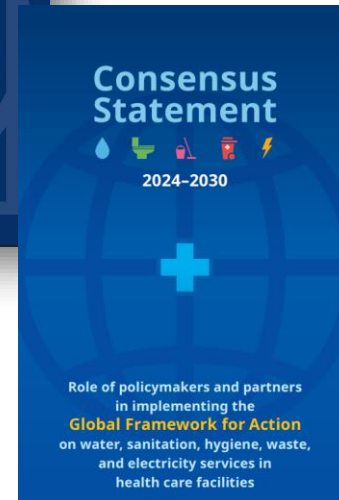
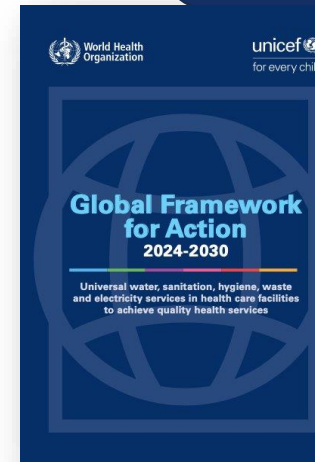
- **Country commitments**

- World Health Assembly Resolution (2019)
- UN General Assembly Resolution (2023); 2026 (forthcoming)
- Global IPC Action Plan and Monitoring Framework (2024)

- **Ways to engage**

- Join ATACH community of practice on climate resilient and sustainable health systems
- Use WHO/UNICEF WASH monitoring data to inform actions
- Join up climate, WASH and waste actors on joint training and implementation
- Download resources (training, country roadmaps, etc)

VISION: All health care facilities have safe, sustainable, and inclusive water, sanitation, hygiene, and health care waste management and reliable electricity for quality care.



Country leaders and partners

“We will work to develop the sustainability and climate resilience of health care facilities as part of comprehensive approach.”

Global monitoring data on WASH and waste in HCF: www.washdata.org

Global knowledge portal on WASH and waste in HCF : www.washinhcf.org



Thank you

WHO/UNICEF knowledge portal:
www.washinhcf.org

WHO/UNICEF Joint Monitoring Programme:
www.washdata.org



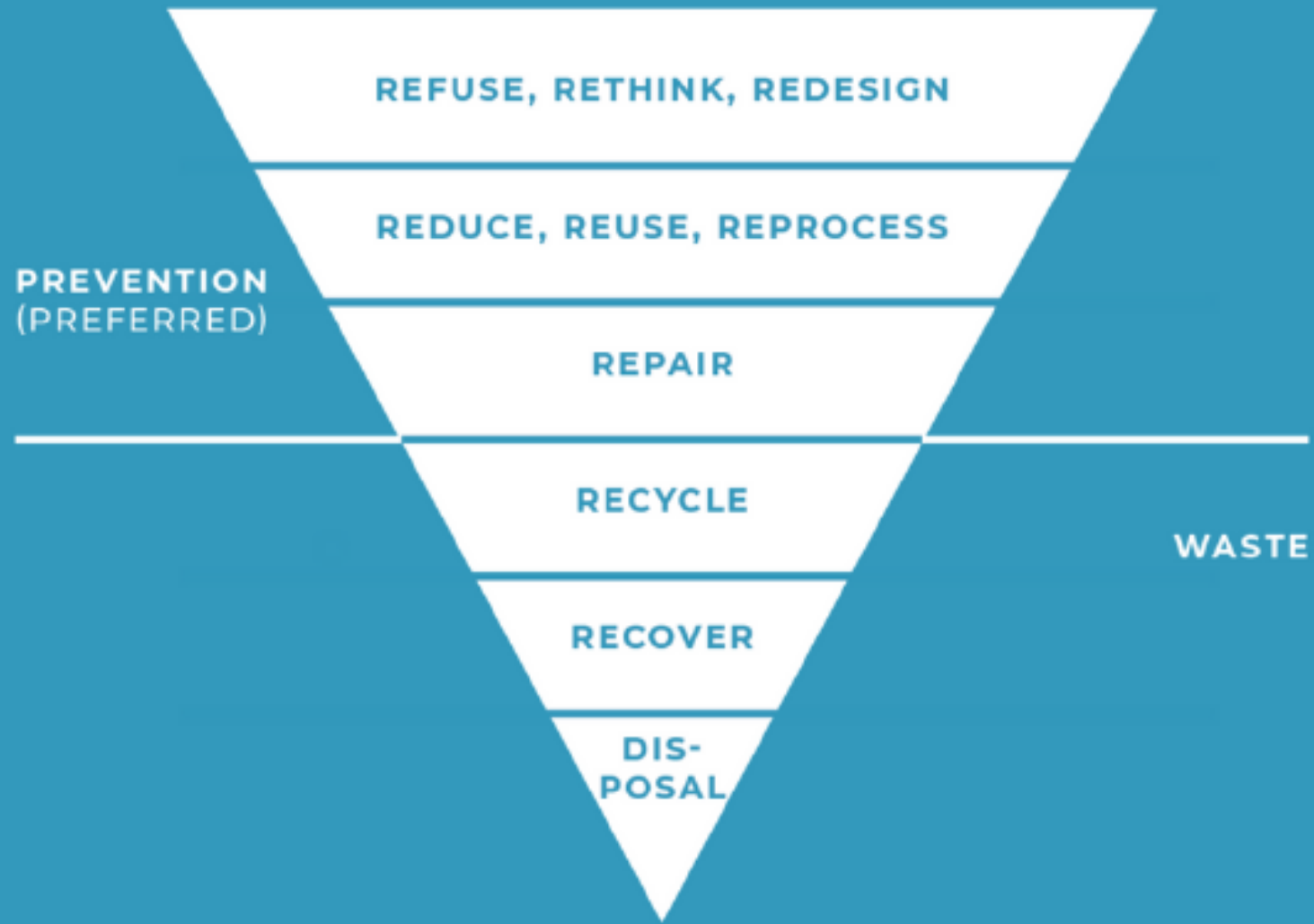
Reducing carbon emissions through healthcare waste management

Ruth Stringer, Health Care Without Harm
19th March 2026

HCWH in ATACH

- Co-organizer of the COP26 Health Programme, WHO, UNFCCC, UK (COP Presidency)
- Steering Committee Member 2023-2024
- Contributed to guidance on emissions measurement, supply chains, target setting.
- Thematic technical discussions on action planning for low-carbon health systems
- Promoting integration of adaptation and mitigation for resilient health systems
- Our Climate Impact Checkup tool -in several languages, along with an online course to guide users.

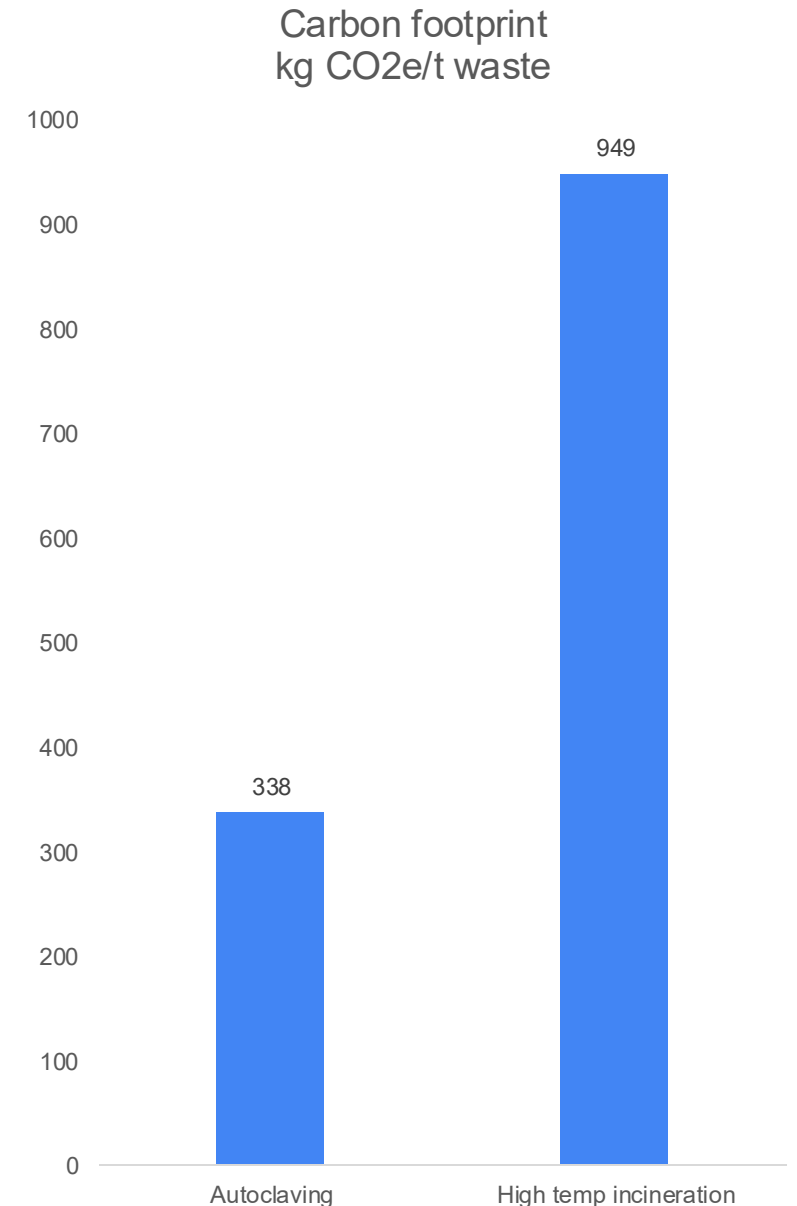
- In 2025
- Direct support to 10 countries (8 ATACH members):
 - action planning, emissions footprinting, NDCs, climate and health policies
- Indirect support to 28 countries
 - Action at national and sub-national level



The waste hierarchy

Treatment and disposal

- Incineration aims to turn all the carbon in a waste stream into CO₂
- Autoclaving has around one third of the footprint of high temperature incineration
- Waste microwaves require less energy overall and lower current than autoclaves so are better suited for remote environments
- Energy from waste is the most carbon intensive and polluting form of waste generation
- Biodigestion can treat organic waste- both food and pathological waste



Rizan *et al.* (2021)

Reduce, reuse

- Eliminate unnecessary products, and reuse the essential ones
- 15 billion medical gloves are made/year, equivalent to ~500,000 kgCO₂e.
 - Over half are unnecessary and can be eliminated
- In the USA, two thirds of the carbon footprint of surgery is linked to disposables, like drapes and gowns
- Remove little used products in surgical and other kits.
- Buy reusable textile products- reusable surgical gowns have 66% lower carbon footprint than disposables.

Reprocess, Repair, Recycle

- Sterilize or reprocess medical devices
 - In-house or at certified companies
- Repair equipment- specify generic parts, local engineers and maintenance contracts
- 85% of medical waste is similar to municipal waste, and 60% of that can be recycled
- Experience in Nepal: 30% recycled, 30% biodigested, 30% residue
- Mechanically recycled plastic has 10% of the carbon footprint of virgin plastic

Refuse, rethink, redesign

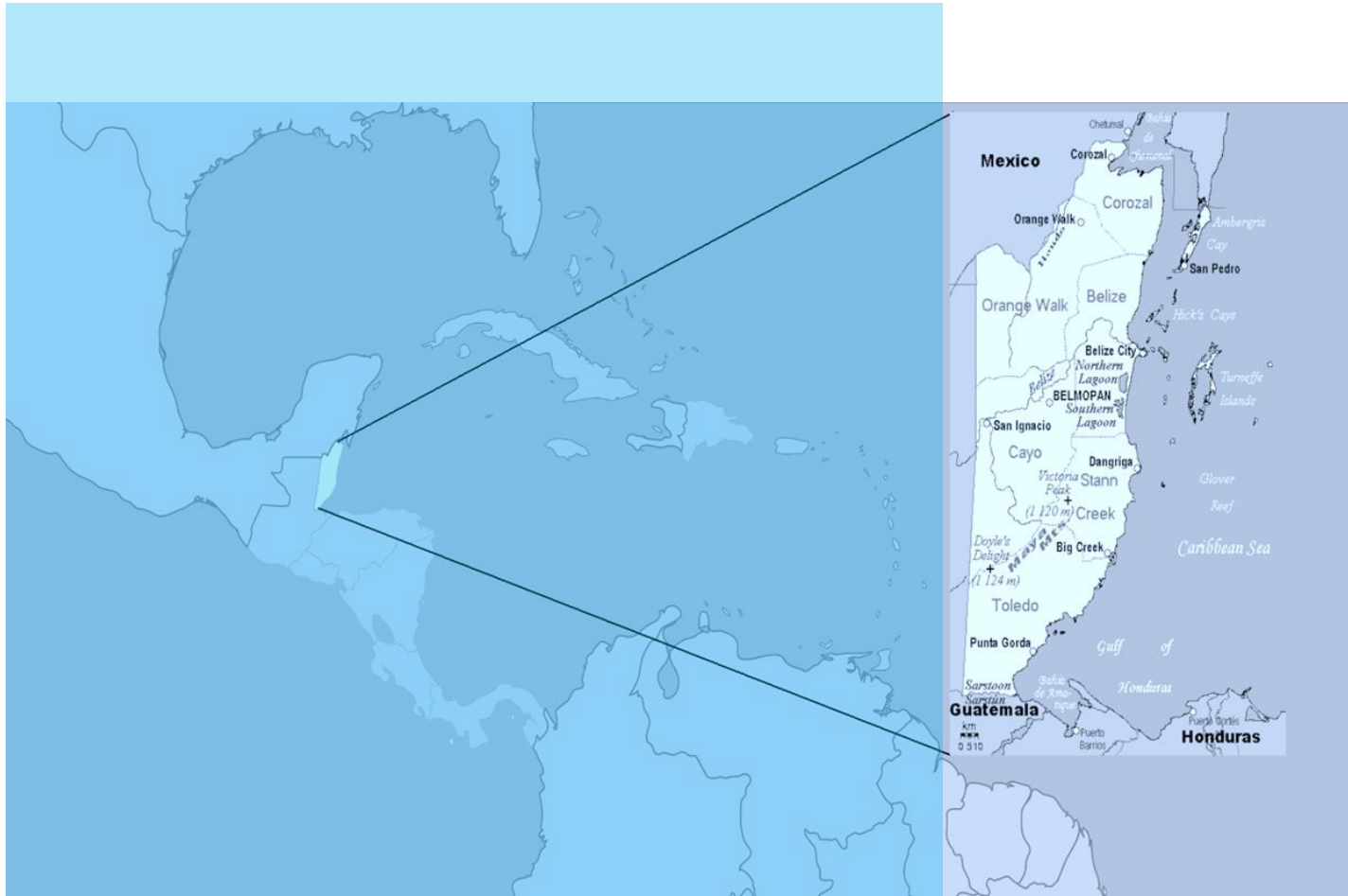
- Health facility action is essential but integrated systems are most efficient
- Up to date regulations prioritising low carbon waste management technologies and reusable products
- Reverse logistics to bring waste from remote areas to centralised treatment or hub hospitals with non-burn treatment
- Well regulated device reprocessing and medical waste recycling
- Waste management metrics in health management information systems (HMIS)

Resources

- [Climate Impact Checkup tool](#)
- [Reusable Textiles: training course and tool](#)
- [Waste trackers](#)
- [Safe Management of waste from health-care activities](#)
- [Joint Monitoring Program](#)

Smart Hospitals Initiative Belize

*Funding provided by (UK-Funds and EU-Funds),
In efforts to retrofit Hospital facilities and to address Waste and
WASH actions for Low Carbon, Sustainable and Resilient Health
Care Facilities.*

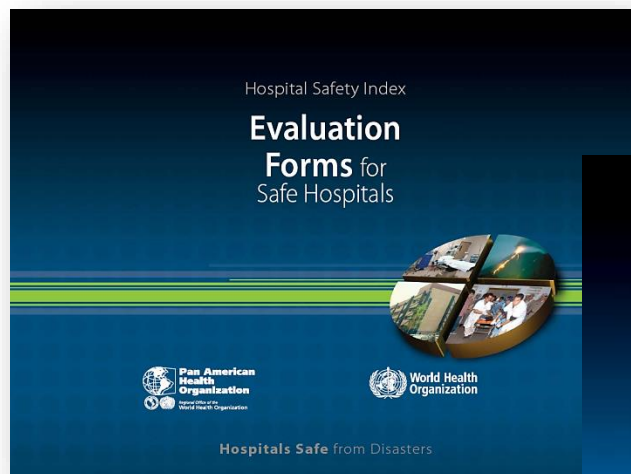


In Collaboration with the Ministry of Health and Wellness (MOHW)

Presented by: Dr. Isani Chan



Safe Hospitals Initiative



PAHO/WHO 45th Directing Council, 2004

To urge Member States to adopt “Hospitals Safe from Disasters” as a national risk reduction policy, set the goal that all new hospitals are built with a level of protection that better guarantees their remaining functional in disaster situations,

.....and implement appropriate mitigation measures to retrofit existing health facilities and to address Waste and WASH actions for Low Carbon, Sustainable and Resilient Health Care Facilities, particularly those providing primary care.



From Safe Hospitals to Smart Hospitals



$$\text{SAFE} + \text{GREEN} = \text{SMART}$$

Output 1: Trainings & Assessments

- **COMPLETED**
- Hospital Safety Index (HSI) and Green Checklist Assessment training - 24 persons
- HSI and Green Checklist Refresher training
- - 25 persons
- Conservation training - 27 persons
- Contingency training - 25 persons
- Market Engagement training - 27 persons
- Ancillary Training - 22 persons
- Health facilities assessed – 26 facilities



Output 3: Awareness Building & Multi-sectorial linkages

Activities

KAP baseline survey

User satisfaction survey

Town Hall meetings

National multi-stakeholders meetings

PR activities

Other smart hospitals projects

Making Health Care Facilities SMART:

A platform for integrating Disaster Risk Reduction, Climate Change Adaptation, Environmental Management and Conservation Efforts.



RESILIENCY

SAFE *(A+)*

- Sound Roof & Foundation
- Improved Security & Signage
- Secured Equipment & Fuel Storage
- Protected & Efficient Doors and Windows
- Good Drainage
- Back-up Power
- Water Reserve
- Disaster Management Plans
- Comprehensive Maintenance Planning
- Disability Access

ENVIRONMENTALLY SOUND

GREEN 70+

- Water Efficiency
- Waste Minimization & Management
- Pollution Reduction
- Rain Water Harvesting
- Alternative Power Using Renewable Energy
- Efficient Lighting & Cooling
- Improved Indoor Air Quality

SUSTAINABILITY

SMART

- Reduced Downtime
- Resilient Structure
- Reduced Operating Cost
- Improved Safety
- Satisfied Patients and Staff
- Environmentally Sound Operations
- Improved emergency care and services for the community

Output 2: Design & Retrofit



Hospital Safety Index (HSI) *Grade A-C*

- The HSI assesses hospitals based on key areas, including structural safety, non-structural safety, functional safety, and communication systems.
- The higher the HSI grade, the better the facility is able to function safely and effectively during emergencies such as natural disasters, disease outbreaks, etc.
- By assessing the safety and security of hospitals, the HSI helps to protect patients, staff, and visitors and ensures that hospitals can provide the essential services needed to save lives and promote health.

Output 2: DESIGN & RETROFITTING WORKS

| Health Facilities | HSI/GC Score before retrofitting | HSI/GC Score before retrofitting | Score Increase |
|--------------------|---|---|----------------|
| Cleopatra White PC | C17 | A76 | 59 |
| Palm Centre NH | C33 | A72 | 39 |
| San Ignacio CH | B34 | A81 | 47 |
| Independence PC | C23 | A76 | 53 |
| Isabel Palma PC | B25 | A68 | 43 |

Cleopatra White Polyclinic:

The Handover Ceremony for this facility was successfully conducted on February 21st, 2022.



San Ignacio Hospital:

The Handover Ceremony for this facility was successfully conducted on February 17th, 2022.



Independence Polyclinic:

The Handover Ceremony for this facility was successfully conducted on March 10th, 2022.



Isabel Palma Polyclinic:

The Handover Ceremony for this facility was successfully conducted on March 9th, 2022.



Palm View Centre:

The Handover Ceremony for this facility was successfully conducted in September 2021.



EU- Health Sector Support Programme (HSSP) in Belize

- The Health Sector Support Programme (HSSP), funded by the European Union (EU), was developed as a comprehensive and strategic initiative aimed at transforming the nation's health system to better meet the needs of its population.
- Under Strategic Objective 1 (to develop efficient, effective, disaster resilient, and environmentally friendly health facilities), and in partnership with the Ministry of Health and Wellness (MoHW), PAHO/WHO.

1. Strategic Objective:

1.1 System-Level Objectives

- Improve health facility resilience and safety (aligned with Hospital Safety Index).
- Reduce carbon emissions through renewable energy adoption.
- Lower water and energy consumption.
- Strengthen waste management systems.
- Institutionalize maintenance and documentation systems.

1.2. Low-Carbon and Waste Management Objectives

- Deploy solar PV systems across six (6) facilities.
- Introduce battery backup systems for critical loads.
- Install energy-efficient HVAC systems.
- Reduce water use through low-flow plumbing (faucets and toilets).
- Install solar water heating systems.

2. Implementation of Core Interventions

2.1. Energy Resilience Activities

| LOCATION | INSTALLED POWER (KW) | # PANELS INSTALLED | PANEL MOUNTING | # INVERTORS INSTALLED | SOLAR SYSTEM TYPE |
|--------------------------------|----------------------|--------------------|-------------------|-----------------------|------------------------------|
| Corozal Community Hospital | 85 | 216 | Ground | 6 | Grid-Tie |
| Northern Regional Hospital | 85 | 216 | Roof | 6 | Grid-Tie with battery backup |
| Western Regional Hospital | 43 | 120 | Roof | 3 | Grid-Tie |
| Punta Gorda Community Hospital | 60 | 150 | Roof | 3 | Grid-Tie with battery backup |
| Southern Regional Hospital | 64 | 160 | Roof | 2 | Grid-Tie with Battery backup |
| Central Medical Laboratory | 32 | 80 | Ground (Car Port) | 2 | Grid-Tie with battery backup |

Punta Gorda Community Hospital: The Handover Ceremony for this facility was successfully conducted on June 9th, 2023.



Southern Regional Hospital:



Corozal Community Hospital:

The Handover Ceremony for this facility was successfully conducted on March 20th, 2024.



Central Medical Laboratory:

The Handover Ceremony for this facility was successfully conducted on May 16, 2025.





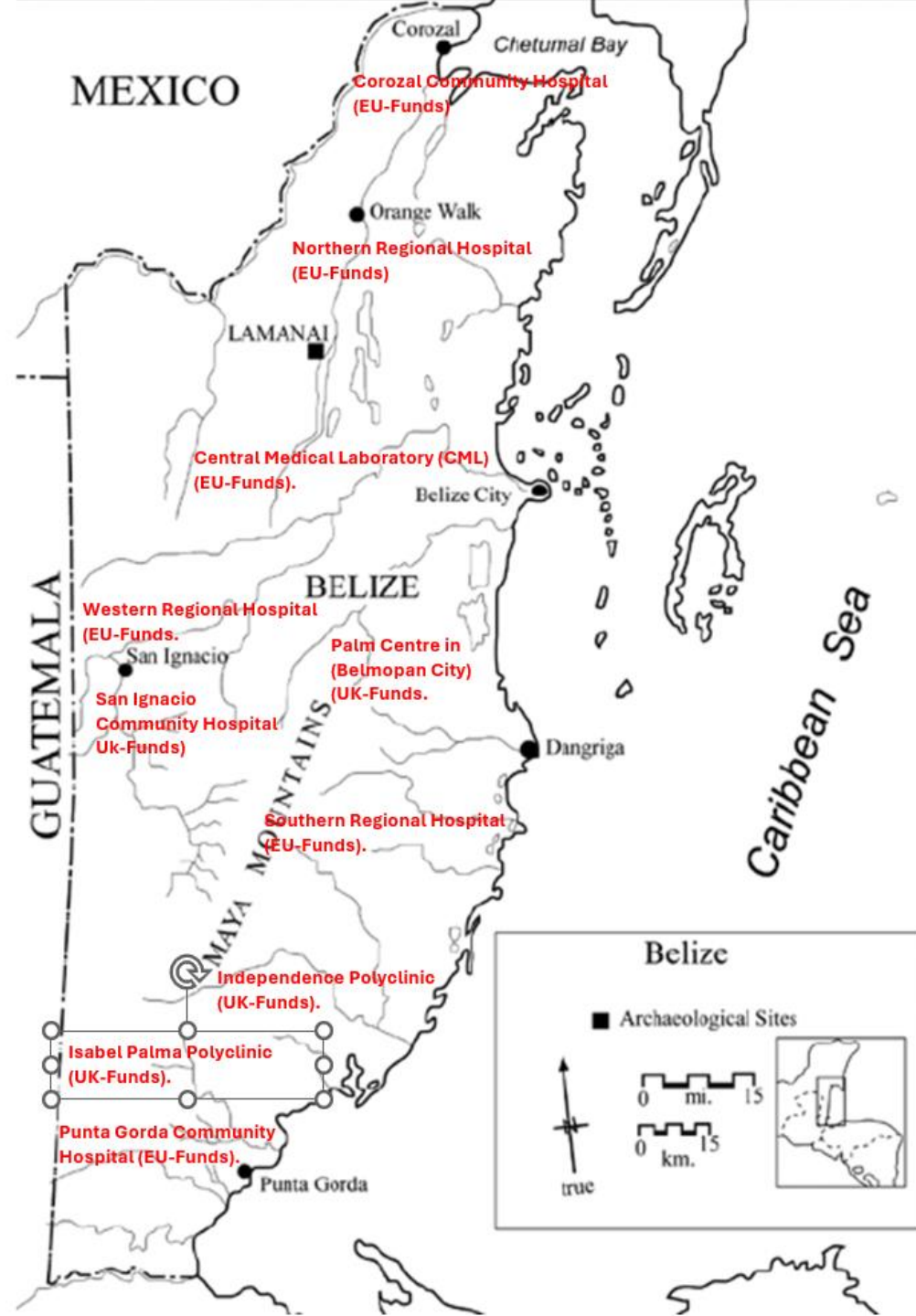
Northern Regional Hospital





Western Regional Hospital





Retrofitted facilities completed in Belize Central America.

Thank you for your time and attention

Flooded Kaura Goje Special Primary School, in Nasarawa LGA of Kano State, on 1 July 2024

Climate Resilient Infrastructure for Basic Services (CRIBS)

A Low-Carbon Approach to PHCs and Schools

Chiranjibi Tiwari
Climate Change and WASH Manager, UNICEF Nigeria
19 March 2026

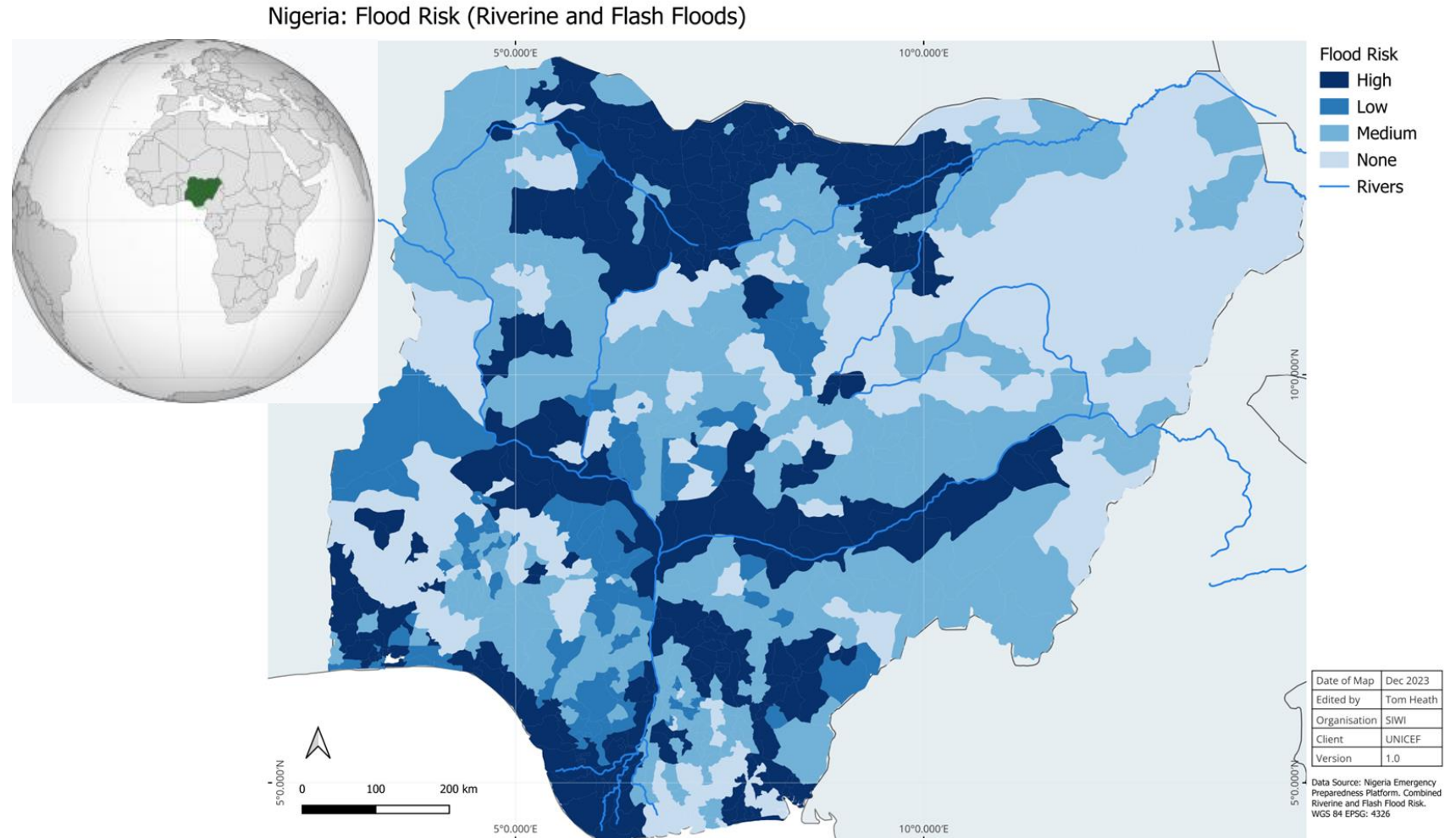


Overview

- **Nigerian Context**
- **Introduction to CRIBS – An approach to making the PHCs low-carbon**
- **Low-carbon interventions selection approach**
- **Examples of low-carbon interventions implemented**
- **Considerations for low carbon WASH and Waste**
- **Conclusions**

The Context – Nigeria (1)

- **Population > 230 m**
- Among the **top four economies in Africa**, with very-high inequality
- Among the **top ten most climate-vulnerable countries in the world** >> Health, Education, WASH services severely affected.
- About **6% of PHCs** have safe WASH
- Proactively working on health sector revitalisation with **low-carbon transformation** (HNAP, NDC)



The Context – Nigeria (2)

63 million tons (0.45 kg/capita/day) of domestic solid waste generated per year

About Around 350,000–400,000 hectares of forest is lost each year in Nigeria due to desertification, affecting **30 million children each year** in Northern Nigeria

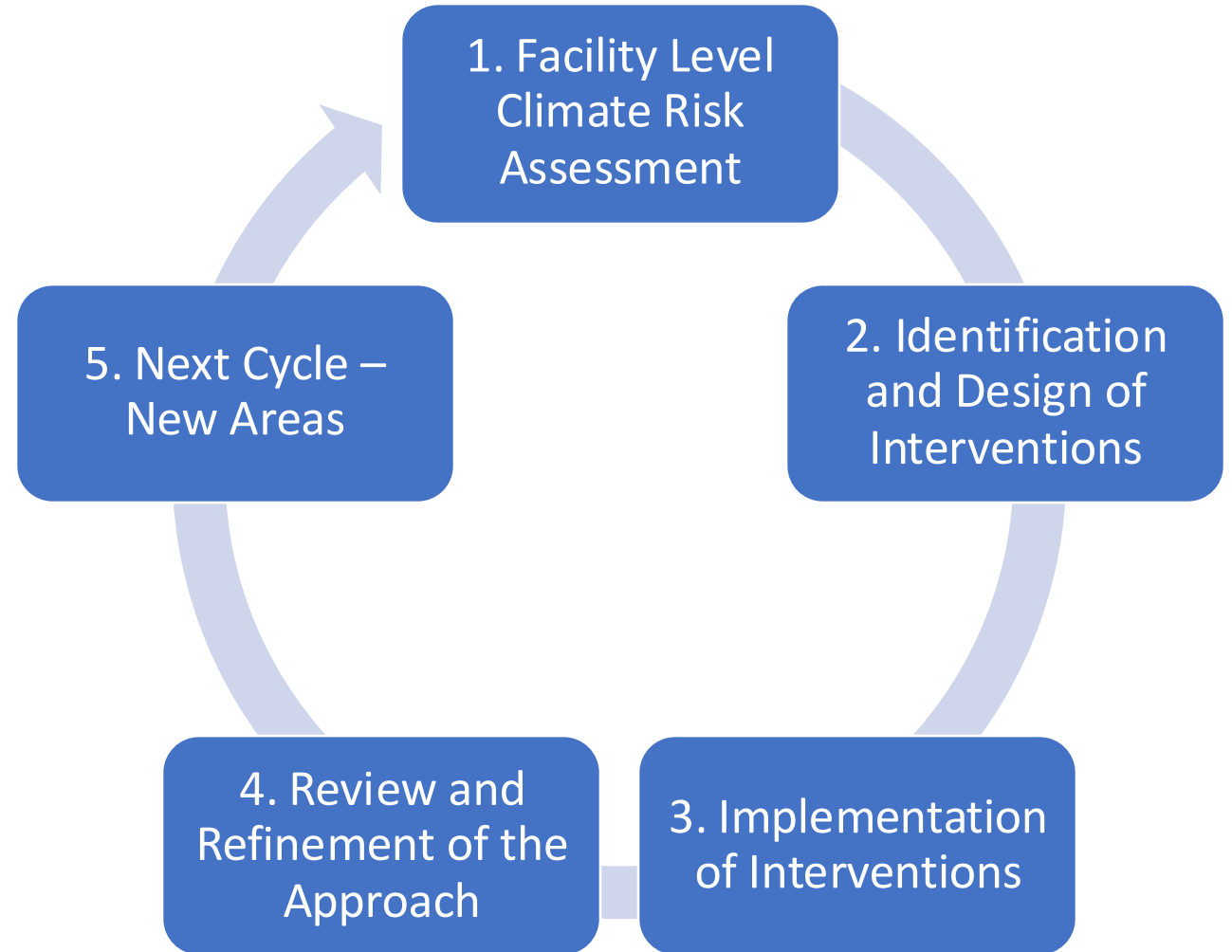
The floods of 2022 affected **4.4 million** people, and displaced about **2.4 million** people

Children and Women bear the highest burden...

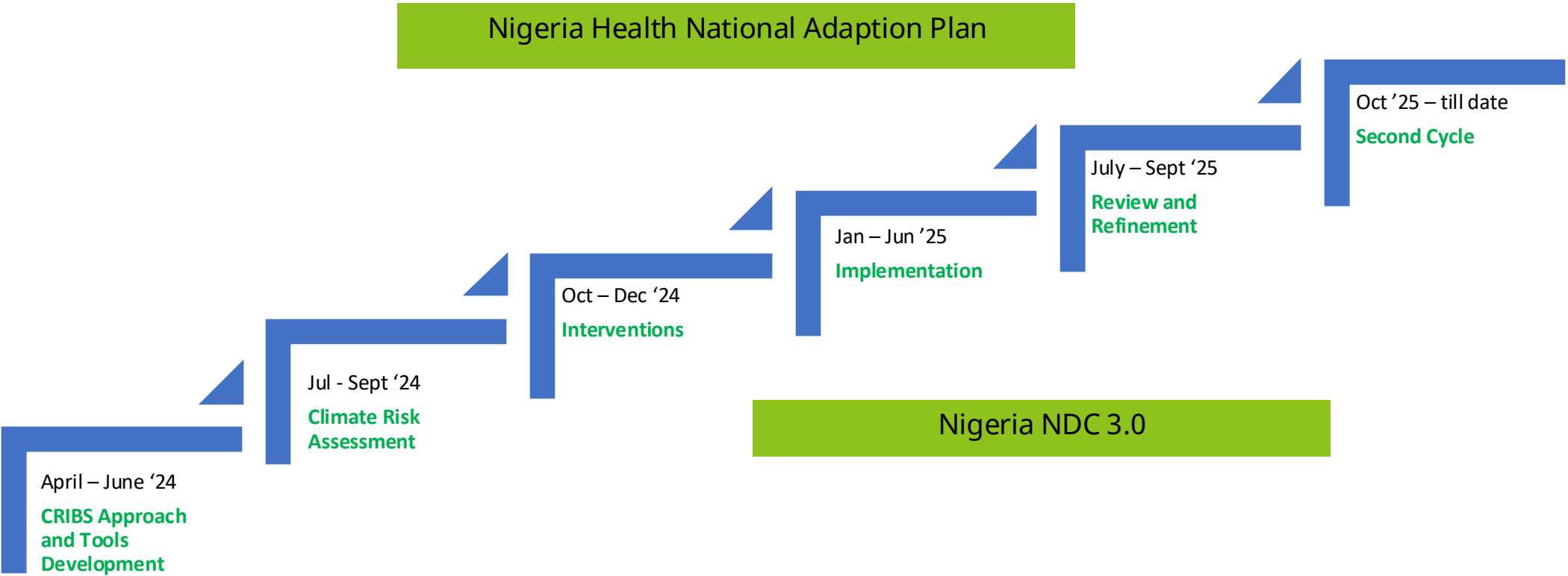


Introduction to CRIBS Programme

- A low-carbon, scalable model for addressing climate vulnerabilities in primary healthcare and education sectors
- Developed through collaboration among FCDO, UNICEF, WHO, Government of Nigeria, World Bank, Palladium, Crown Agents, FabInc etc
- The approach includes climate risk assessment > identification >> implementation of interventions – ref. diagram
- Assessing the climate resilience outcomes after one year - research component to assess expected outcomes and lessons

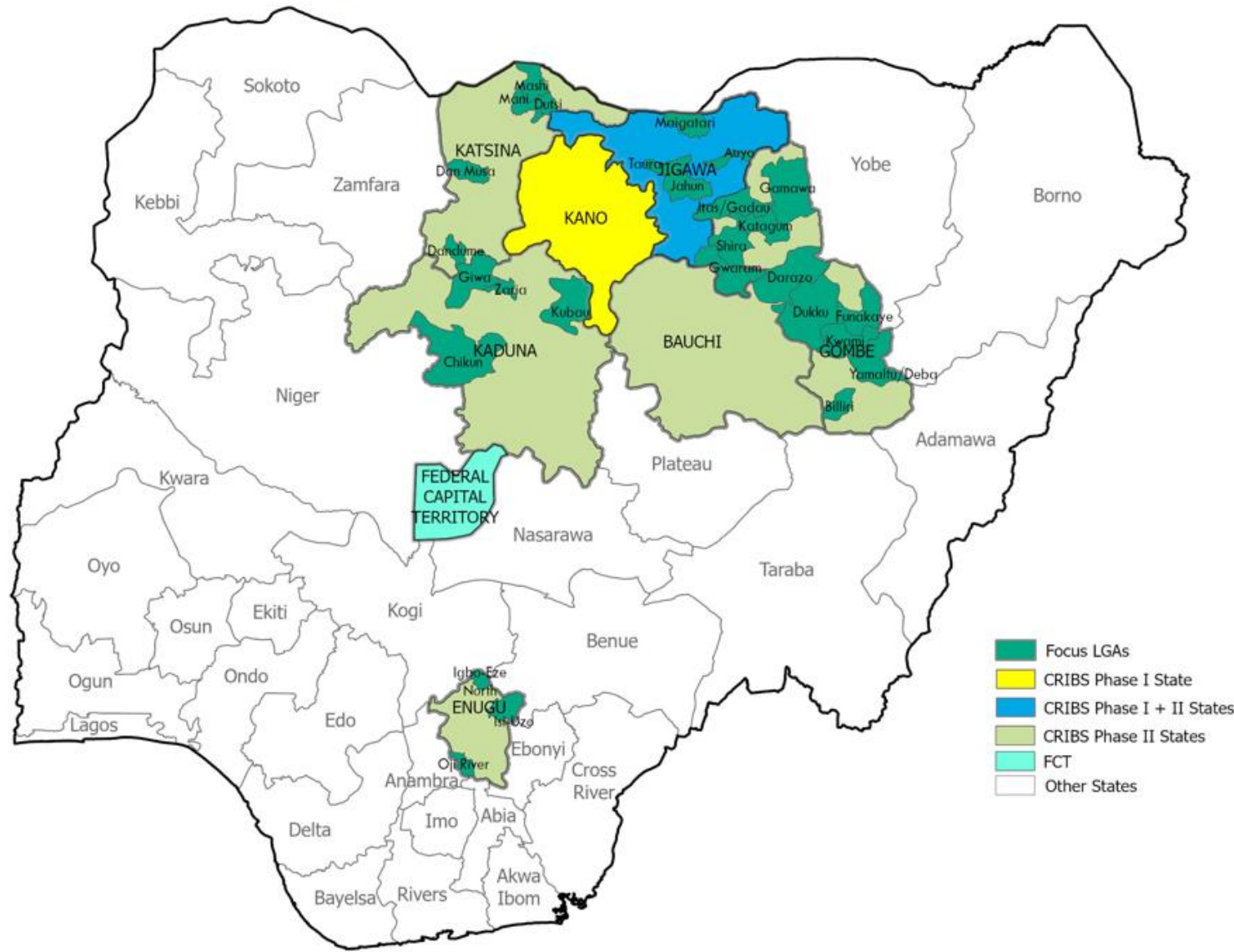


CRIBS vs NDC and HNAP Timelines



CRIBS has informed and benefitted from the Health National Adaption Plan as well as NDC3.0 process of Nigeria

CRIBS Geographic Focus



Focusing on 27 Local Government Areas in seven states

Low-Carbon Interventions Selection Approach

A long list of interventions is developed, and short-listing done using the following four key parameters:

- Contribution to Climate Resilience of Facilities
- Contribution to GHG reduction
- Other Co-benefits (Gender / Equity)
- Feasibility and Risks (Costs / Social / Environmental)

| Contribution to Resilience (by Hazard) | | | | | |
|---|--------|----------|-----------|-----------|----------------|
| Floods | Storms | Droughts | Heatwaves | Wildfires | Sea-Level Rise |
| 2 | 2 | 2 | 2 | 2 | 2 |
| 1 | 1 | 1 | 2 | 1 | 1 |

| Contribution to GHG Emissions Reduction | | | |
|---|-------------|---|---------------------------------|
| Direct (boilers, vehicles, generators) | Electricity | Indirect (waste, cooling, travel, supply) | Score - GHG emissions reduction |
| 1 | 1 | 2 | 4 |
| 1 | 1 | 2 | 4 |

| Other Co-Benefits | | | |
|-------------------|-----------------|--------------------------------|---------------------------|
| Gender and equity | Energy security | Health, Wellbeing, Air Quality | Score - other co-benefits |
| | | 2 | 4 |
| | | 3 | 5 |

| Feasibility & Risk | | | |
|--------------------|---------------|--------------------|----------------------------|
| Estimated cost | Risks: social | Environmental Risk | Score - feasibility & risk |
| | 3 | 2 | 7 |
| | 2 | 3 | 8 |

Dashboard - Climate Risk Analysis

State **Kano**

LGA **Kiru**

Facility **Sabongarin yelwa PS**

Vulnerability Assessment Score Card

Educational Facility



Overall Summary

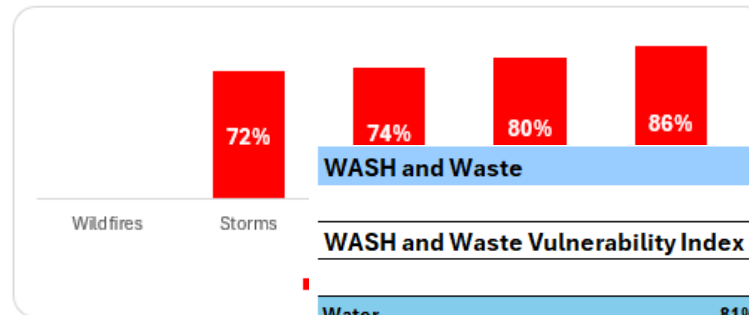
Facility Name **SABONGARIN YELWA PS**
 State **Kano**
 Facility Code: **KN/KR/SCH/024**
 Ward: **Yalwa**
 Type: **Government Public school (formal, public)**
 Address: **Sabon Garin Yelwa pri. Sch. Yelwa ward**

Overall Vulnerability Index



0.91
High

| Hazards | Status | Index | Indicator | Priority |
|-----------|--------------|-------|-----------|----------|
| Flood | Assessed | 0.86 | High | High |
| Storms | Assessed | 0.72 | High | High |
| Drought | Assessed | 0.74 | High | High |
| Heatwaves | Assessed | 0.80 | High | High |
| Wildfires | Not assessed | 0.00 | | |



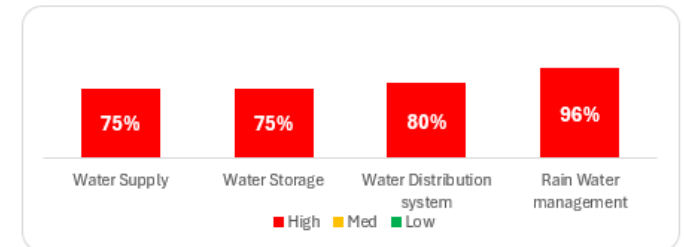
For Each Component

WASH and Waste

WASH and Waste Vulnerability Index

0.93 High

| Water | Indicator | Priority |
|---------------------------|-----------|----------|
| Water | 81% | High |
| Water Supply | 75% | High |
| Water Storage | 75% | High |
| Water Distribution system | 80% | High |
| Rain Water management | 96% | High |



| Sanitation and Hygiene | Indicator | Priority |
|------------------------|-----------|----------|
| Sanitation and Hygiene | 94% | High |
| Sanitation | 88% | High |
| Hygiene | 100% | High |

| Waste | Indicator | Priority |
|------------------|-----------|----------|
| Waste | 100% | High |
| Waste Management | 100% | High |
| Waste Treatment | 100% | High |

Examples of Low-Carbon Interventions

- Roof-paints with solar reflective ultra-white paint
- False ceilings to reduce solar radiating heat / rainfall noise
- Natural ventilation - high ceilings, large windows and skylights
- Indigenous trees and plants – for windbreaks, shade etc.
- Solar energy to run facilities including for pumping water
- Rainwater harvesting systems when feasible
- Waste management value chain: **Reduction > Segregation > Transportation > Treatment/Recycle**
- PHC Capacity strengthening on low-carbon solutions

Interventions – Climate Considerations



Flooding

- Flood drainage control measures
- Raised platform for borehole
- Raised toilet platforms
- Strong walls to prevent flood from entering the facility premises



Drought

- Deeper boreholes, solar powered
- Water storage to meet increased demand



Heat-stress

- Heat reflective paints
- False ceiling
- Natural air circulation and ventilation
- Tree cover to minimize heat-stress
- Cooling system – solarized



Wind-storm

- Wind barrier trees
- Wind-barrier perimeter walls

Interventions that withstand climate risks in a given facility / location !

Examples of Interventions Types

Building Infrastructure Adaptation (Low-Carbon)

- Rehab of walls, false-ceilings, roofs
- Alignment of windows and doors for cooling and ventilation
- Solar reflective paints
- Raised floors / plinth levels

WASH and Waste – in Extreme Situations

- Deep boreholes (75-120m) with solar pumps/raised platforms.
- 5,000 litre water storage tank on steel towers up to 4m high.
- Flood-proofed toilets/raised platform
- Waste segregation and recycle/treatment

Clean Energy Resilience

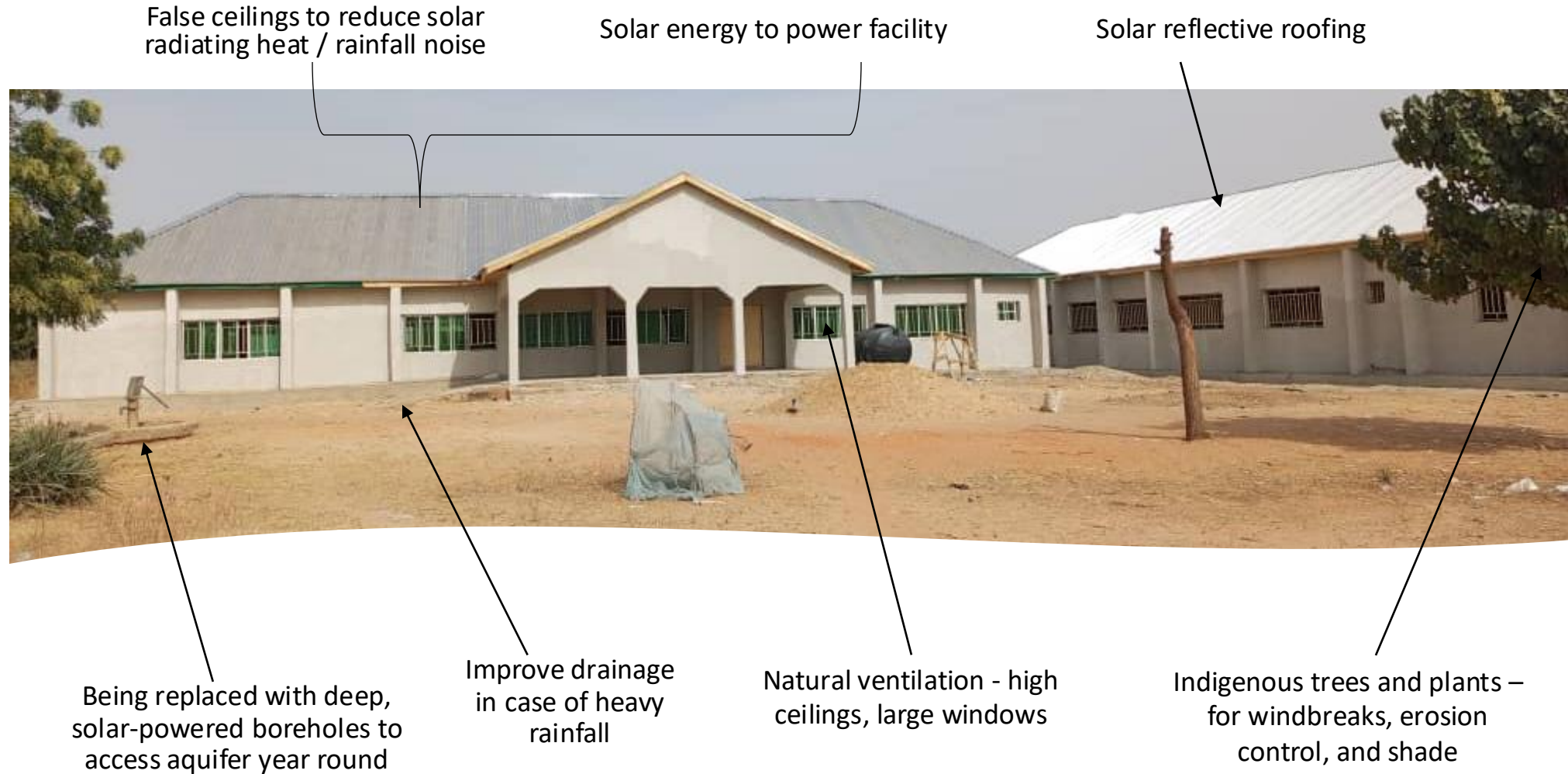
- 5KVA / 48V hybrid inverter system including battery and solar panels
- Solarized cold chain equipment
- Solar energy to run facilities

Facility Premises Adaptation

- Trees for sun-shade / barrier to wind/dust
- Walls/structures to divert flooding
- Raised access routes
- Internal drainage system

Engaging Facility Management Team, LGAs and Communities for their ownership and accountability.

CRIBS Interventions: A Typical PHC



Considerations for Low-Carbon WASH and Waste

- Focus on reducing waste at source, recycling when feasible, and working across waste management value chain: **segregation > transport > storage > recycling**
- Training of health workers, cleaners, and waste handlers on safe practices.
- Use of simple standard operating procedures.
- Clean/Solar energy for PHC operation as well as for pumping water
- All interventions designed taking into consideration of GHG emission and climate risks; focus on energy efficiency measures
- Use of deep boreholes, solar pumping and elevated storage with sufficient capacity
- Embrace efficient water management practices
- Embed low-carbon waste practices within national and sub-national healthcare waste strategies.
- Link healthcare waste management NDC and NAP processes.



Thank You.





ATACH Technical Meeting

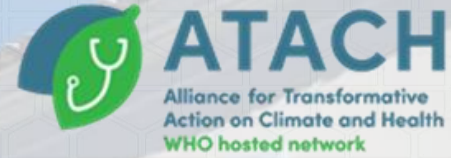


Water as a Strategic Asset: Efficient Water Management in Hospitals



Santa Casa da Bahia

A mission-driven philanthropic organization | Since 1549



Santa Izabel Hospital



Misericórdia Museum



Educational Centers
Sociocultural Activities



SantaCasaBA



Campo Santo
Cemetery

Novo Campo Santo



Santa Casa Faculty



Fundado em 1893

Santa Izabel Hospital

Founded in 1893



Employees
3,500



Building Area
63,000 m²



483 beds
(90 ICU's)



19 thousand
procedures/year



Surgery Center
24 rooms

Water Management



1

Internal departmental assessment

2

Metering segmentation

3

Water loss reduction

Water Management

1

**Internal
departmental
assessment**

Sterile Department Processing (SPD)



Some questions to be answered:

How many Autoclaves?

**How many washer-
disinfectors?**

**How many reverse
osmosis systems?**

Water Management

2

Metering
segmentation

Monitoring



Sterile Department Processing (SPD)



Water Management

3

Water loss reduction

Sterile Department Processing (SPD)

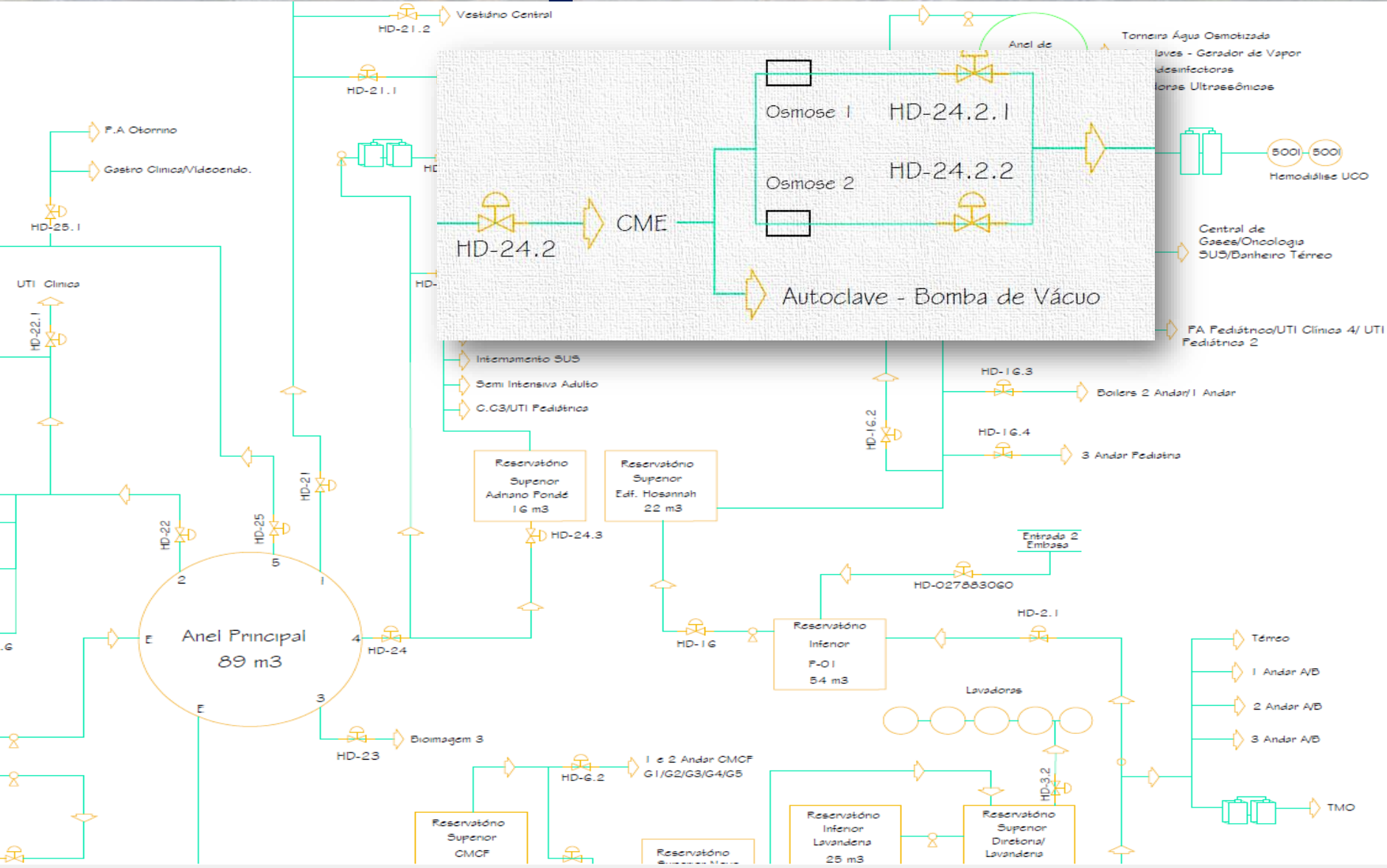


Are autoclaves consuming as expected?

Are the reverse osmosis systems operating efficiently?

Is consumption within the expected range?

Internal Departmental Assessment



Caso o reservatório do VNZ continue com o nível baixo após a manobra mencionada acima, inicialmente deverá ser fechado o registro da rede do Joaquim Neto (JN) que alimenta o reservatório inferior P1 e em seguida ser aberta a entrada da Embasa do P1 para alimentar o reservatório inferior P1.

INFORMAÇÕES ETA e POÇOS

ETA - Poços artesanais:

- Empresa: General Water
- Contato: Gilliam (71 98461-0485)

ETA - Requalificações Embasa:

- Empresa: MaqFiltros
- Contato: Renan (71 99191-8438)

ETA - Lavandaria:

- Empresa: MaqFiltros
- Contato: Renan (71 99191-8438)

LEGENDA

| | | | |
|--|---------------------------------------|--|----------------------|
| | Fluxo da água | | Hidrômetro |
| | Bomba de água | | E Entrada de Água |
| | Registro p/ bypass | | 1 a 5 Saídas Anel P. |
| | Sistema interno de filtração | | |
| | E.T.A.: Estação de Tratamento de Água | | |

Metering Segmentation



Metering Segmentation

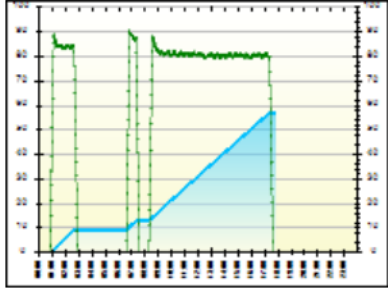


47 water meters

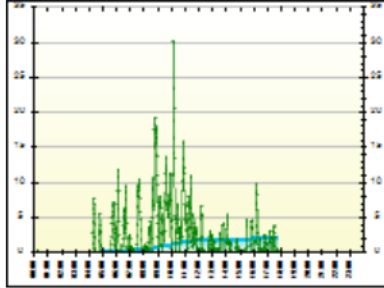
20 remotely monitored water meters

Metering Segmentation

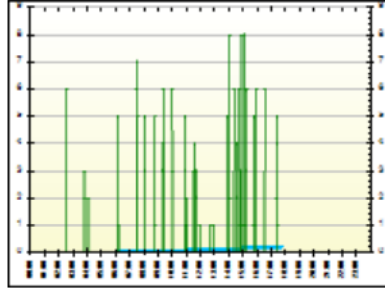
HD-02 - Reserv Superior Joaquim Neto



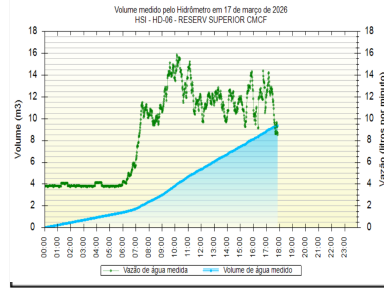
HD-02.3 - Laje do JN (Lado B esquerdo)



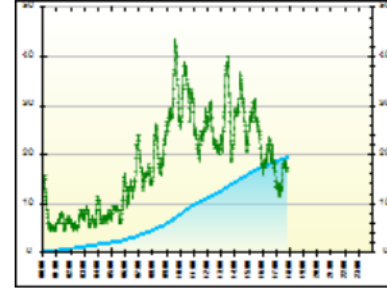
HD-02.4 - Laje do JN (Lado B direito)



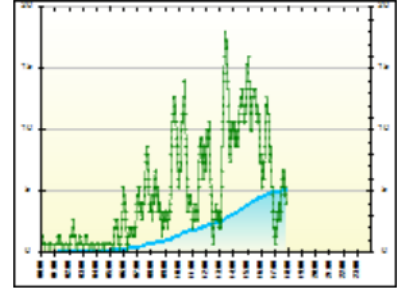
HD-06 - Reserv Superior CMCF



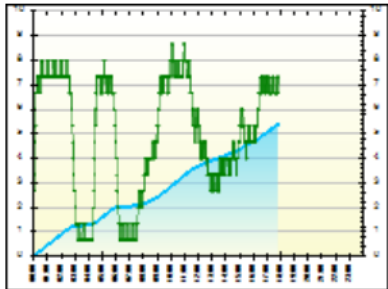
HD-16.1 - PA Pediát - UTI Clínica 4 - UTI Ped 2



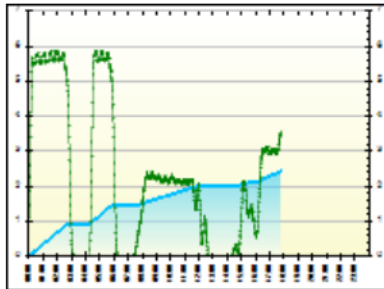
HD-16.1.1 - Prédio Histórico e Gruta



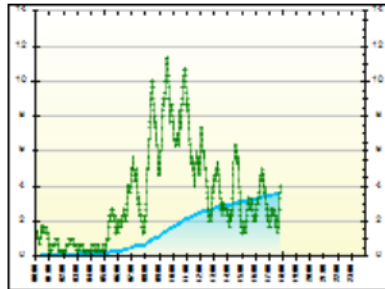
HD-16.2 - Res Erick Loeff/Hemodialise



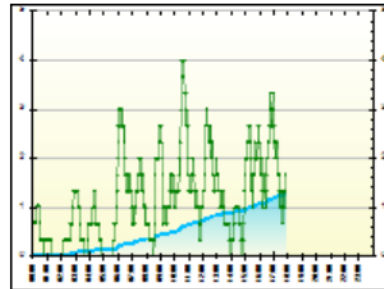
HD-16.2.1 - Sistema Hemodiálise UCO



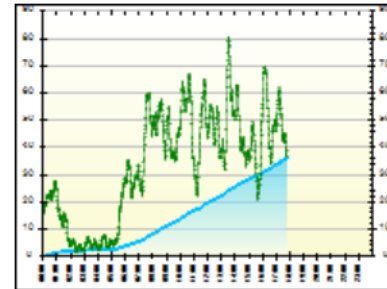
HD-16.3 - Boilers Hosannah-1o. e 2o. Andar



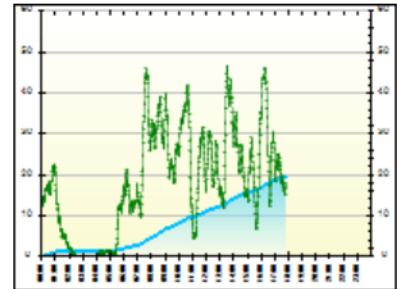
HD-16.4 - 3o. Andar Ped



HD-21 - Saída 1 do Anel Principal



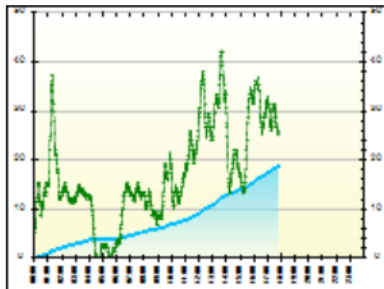
HD-21.3 - Nutrição



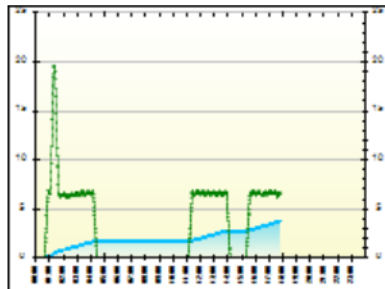
HD-22 - Saída 2 do Anel Principal



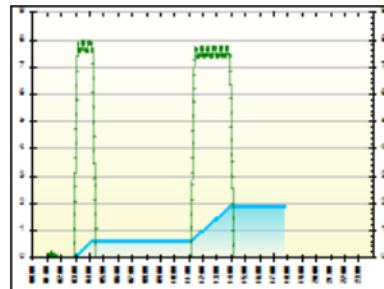
HD-24 - Saída 4 do Anel Principal



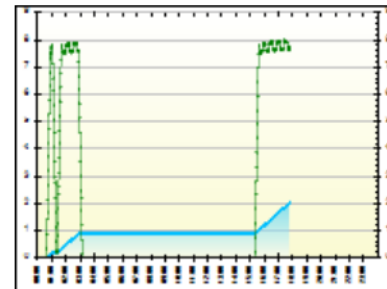
HD-24.2 - Sistema de Tratamento CME



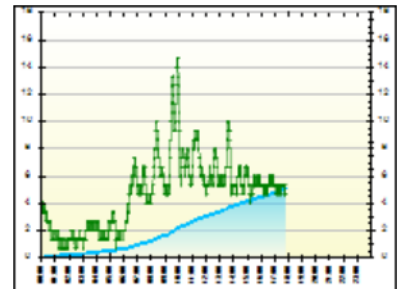
HD-24.2.1 - CME (Osmose 1)



HD-24.2.2 - CME (Osmose 2)

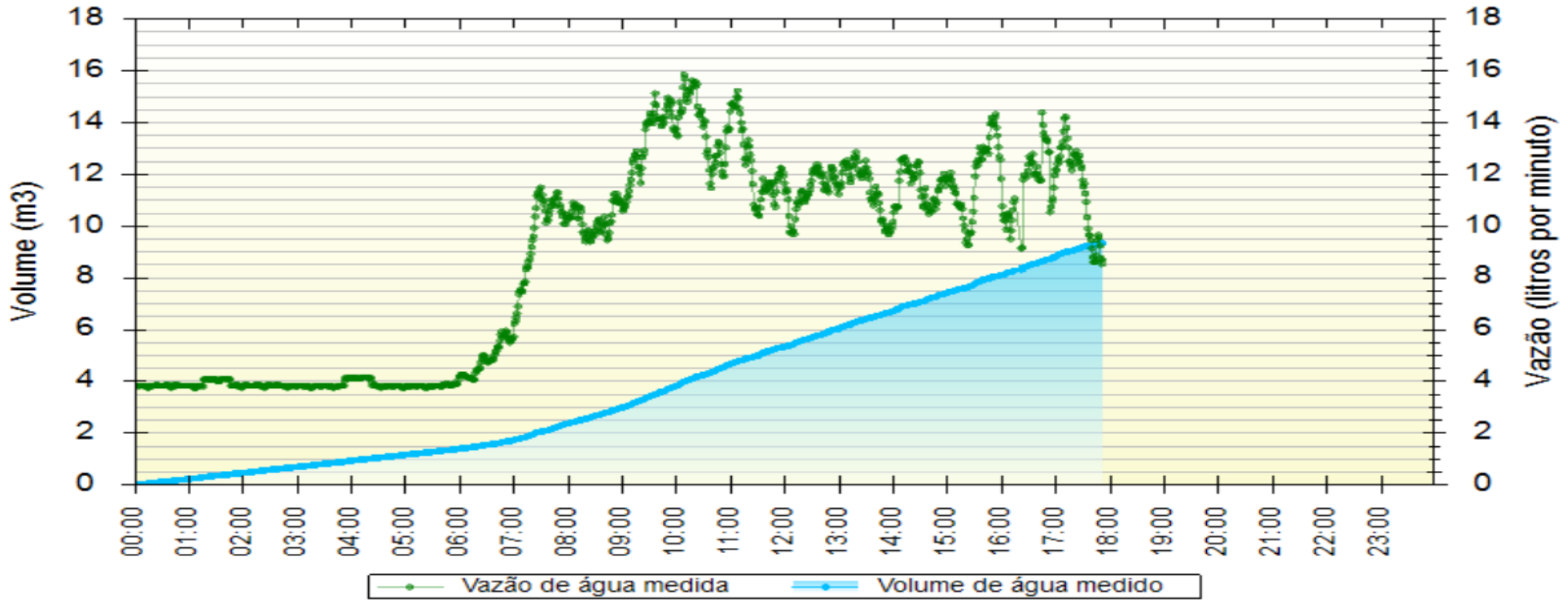


HSI - HD-24.3 - Reserv Adriano Pondé



Metering Segmentation

Volume medido pelo Hidrômetro em 17 de março de 2026
 HSI - HD-06 - RESERV SUPERIOR CMCF



Water Loss Control

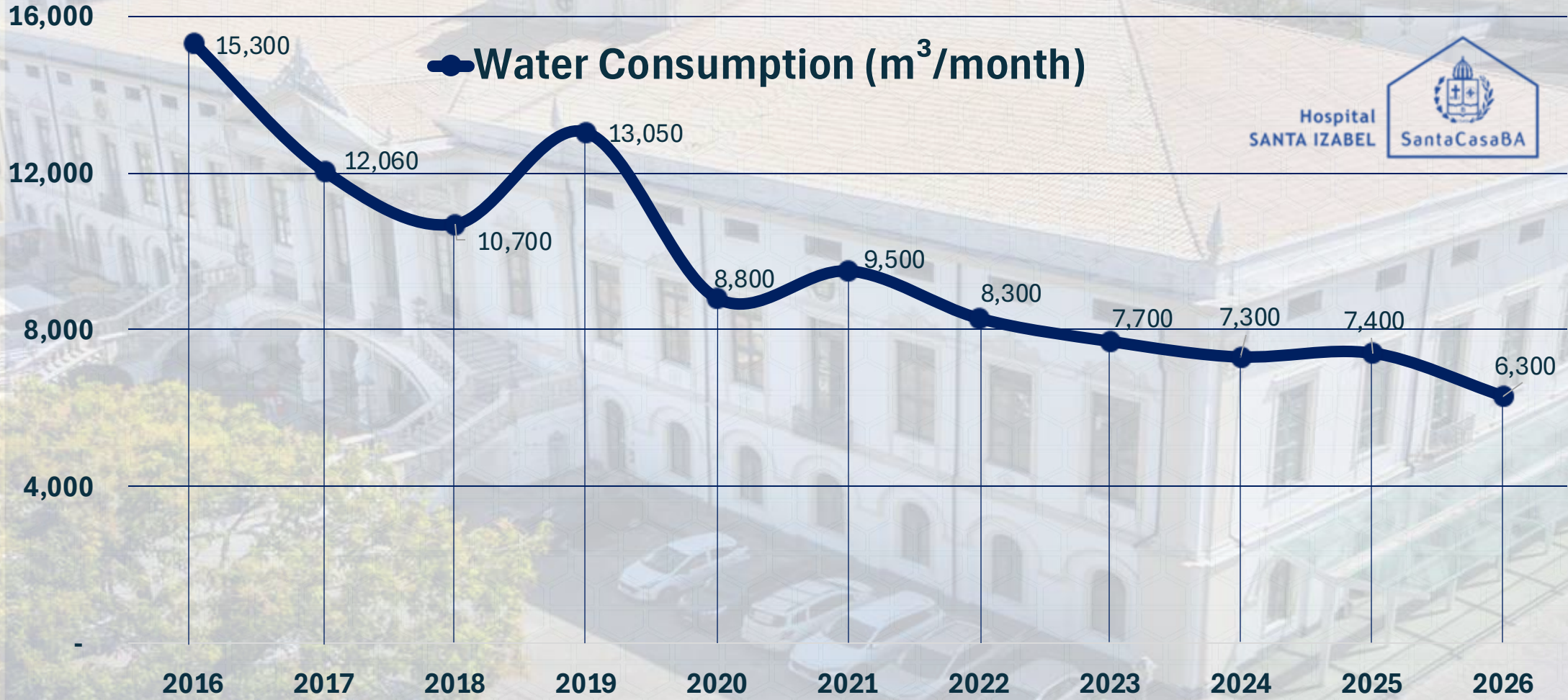


60 liters/minute

**2,5 million
liters/month**

**US\$ 18.000
/month**

Results



Strategic Asset

Next 
Generations

SCBA

future

present

Operational
Efficiency



Santa Casa da Bahia

 **Fernando Lira**

 **fernando.lira@santacasaba.org.br**

 **@sustentabilidadeasaude**

Hospital
SANTA IZABEL

