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Application of a **Financial Resource-Allocation Modelling Tool** for Carbon Mitigation Interventions in **Healthcare** Facilities  
(**CARBOMICA**)

# A Multi-Country Study from Mt Darwin Hospital, Zimbabwe & AKHS Mombasa Hospital, Kenya



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**Cultivating Resilience in Health Towards Unified Equitable Strategies  
for Climate Adaptation & Mitigation in Africa**





# Background

## Healthcare's Carbon Footprint

Healthcare is responsible for approximately **4-8% of global carbon emissions**

## Numerous Mitigation Opportunities

Over **200 carbon mitigation interventions** have been identified offering a wide range of strategies to reduce emissions.

## Challenges in Implementation

Despite the essential nature of these interventions, **insufficient funding** and **competing healthcare priorities**, limiting progress toward sustainability.

## Urgent Need for Resource Optimization

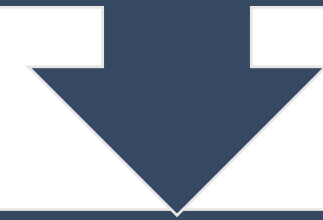
There is a critical need to **maximize the use of available funds** allocated for carbon mitigation, ensuring the greatest possible impact in reducing healthcare's carbon footprint.





# Introduction

CARBOMICA is a **data-driven resource** allocation tool from the HIGH Horizons initiative that **optimizes resource use** for **carbon mitigation** in healthcare, particularly in LMICs, **guiding** decision-makers to effectively reduce emissions.



## Objectives

1. To allocate available funds effectively towards carbon mitigation strategies, prioritizing those with quantifiable high impact based on criteria such as carbon reduction potential, cost and cost saving within specified budget constraints.

2. Determine achievable carbon reduction % for each budget scenario

3. Provides healthcare operations mitigation co-benefits



# Methodology

## Carbon Emission Measurement & Hotspot Identification

- Emission Measurement: Carbon emissions assessed using the AKDN tool.
- Hotspot Analysis: Identification of key emission sources and contributing factors.

## Mitigation Intervention Identification & Selection

- Intervention Discovery : Over 200 mitigation interventions considered for healthcare.
- Context-Specific Selection: Stakeholders select, and cost interventions based on local context.

## Development & Utilization of CARBOMICA

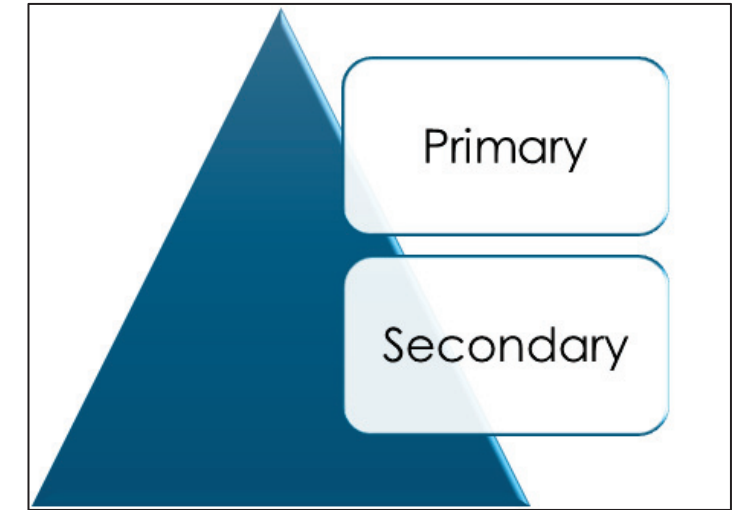
- Development of CARBOMICA
- Leveraging CARBOMICA to streamline and optimize mitigation strategies, ensuring effective implementation.

# Sites Description



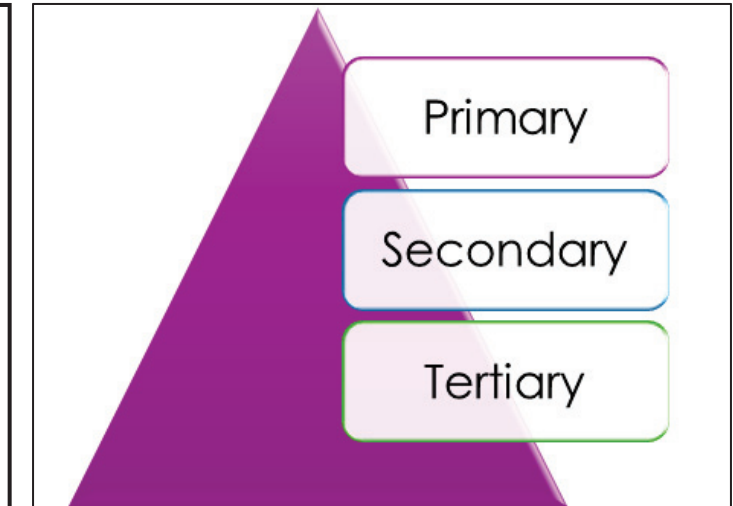
## Mt Darwin Hospital, Zimbabwe

- 296 bed hospital
- Located in **rural area** of Mt Darwin
- Primary care and secondary facility.
  - Provides **general medical services**, emergency care, and surgical services:



## AKHS Mombasa, Kenya

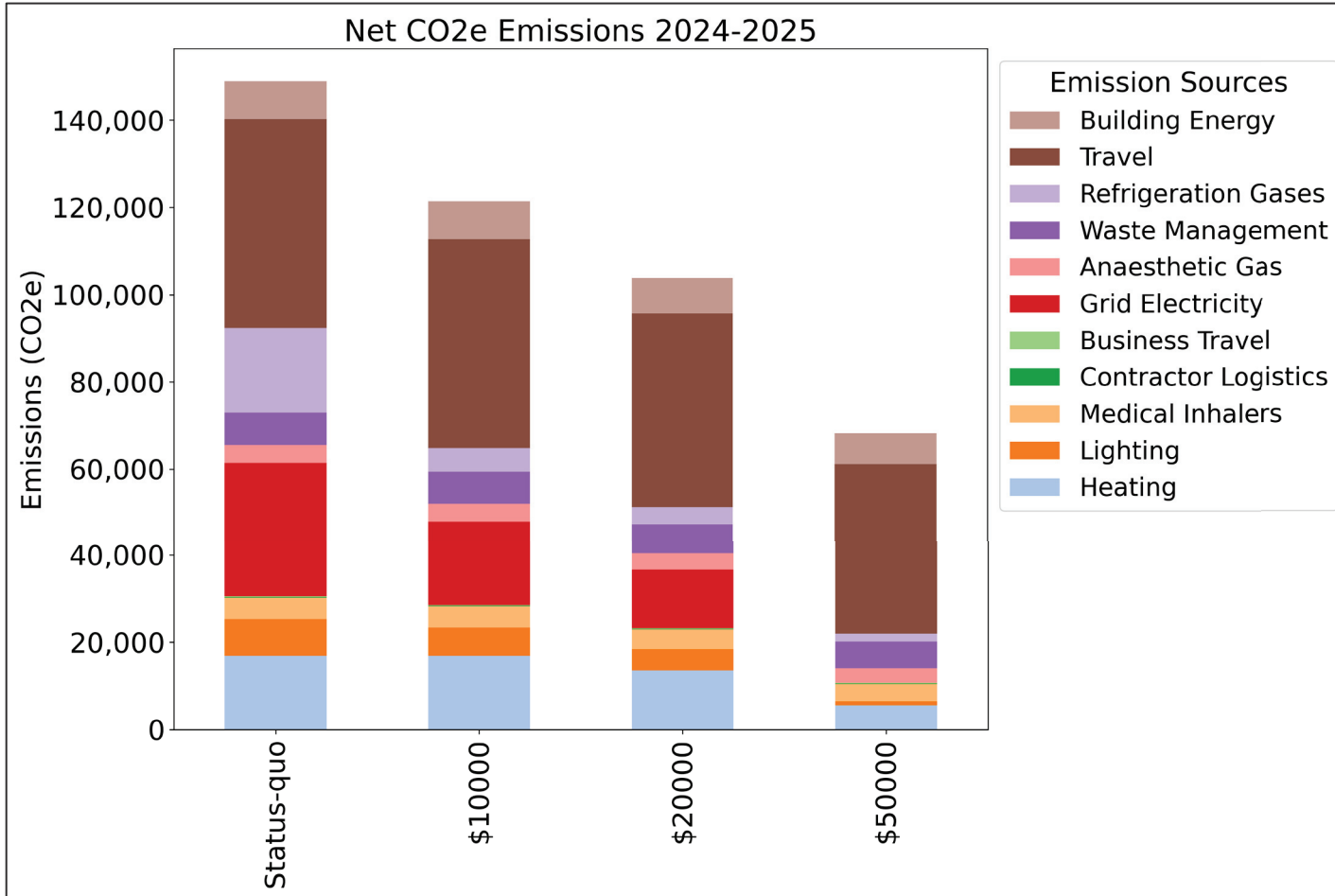
- 96-bed hospital
- Located in the **urban area** of Mombasa city.
- Primary, secondary, and some **tertiary level care**.
  - It features emergency services available 24/7, general medical services, **specialist clinics**, and **high-tech diagnostic services**







# CARBOMICA Results: Mt Darwin

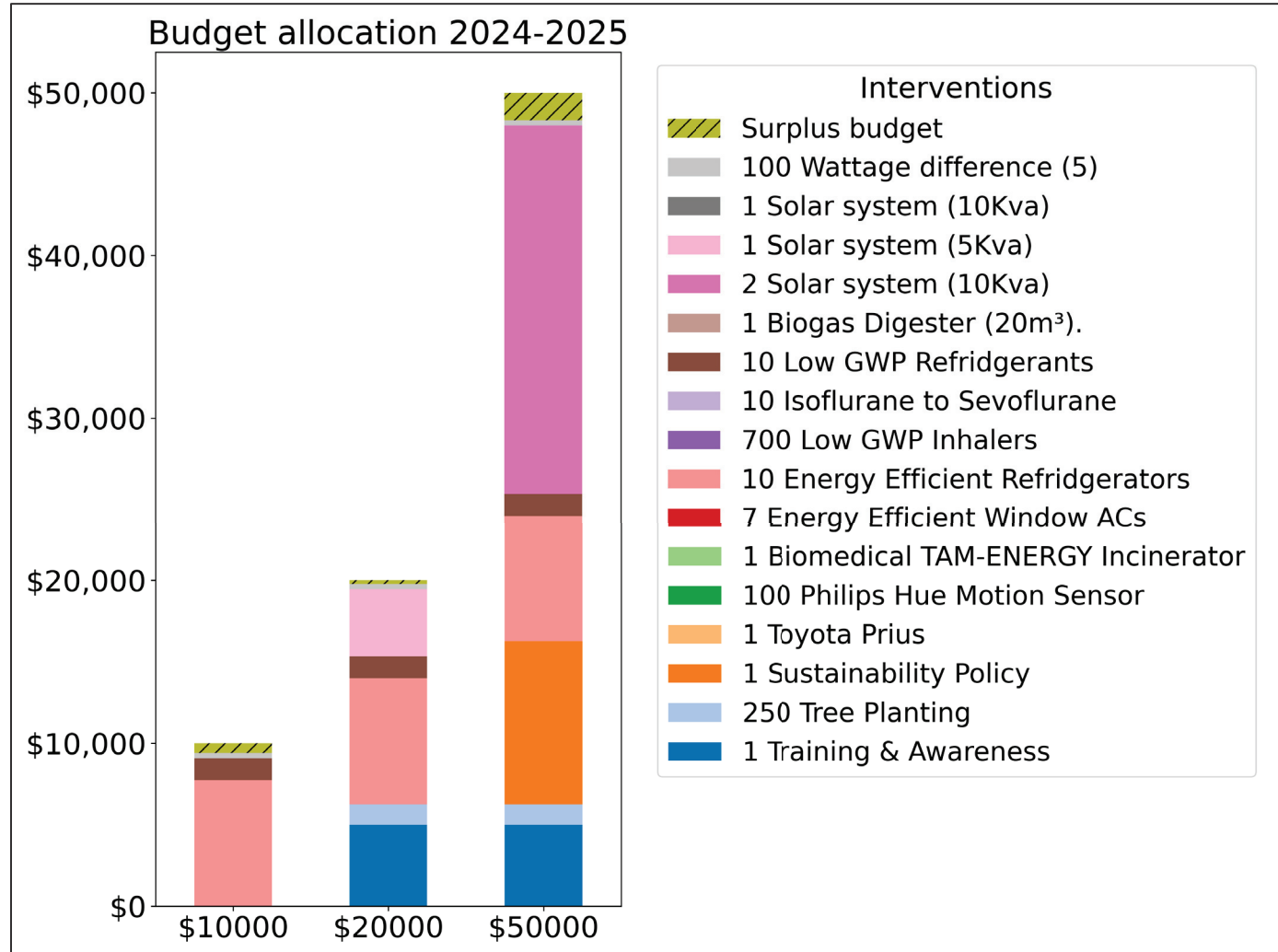


## Carbon Reduction Analysis Results

- ❖ \$10k attains **18%** reduction through 100 LED lights, 10 refridgerants, 10 refrigerators;
- ❖ \$20k reduces emissions by **30%** through 100 LED lights, 5kva system, 10 refridgerants, 10 refrigerators, 250 trees and training and awareness & at
- ❖ \$50k reduces by **54%** through 100 LED lights, 20kva system, 10 refridgerants, 10 refrigerators, a sustainability policy, 250 trees and training and awareness



# CARBOMICA Results: Mt Darwin



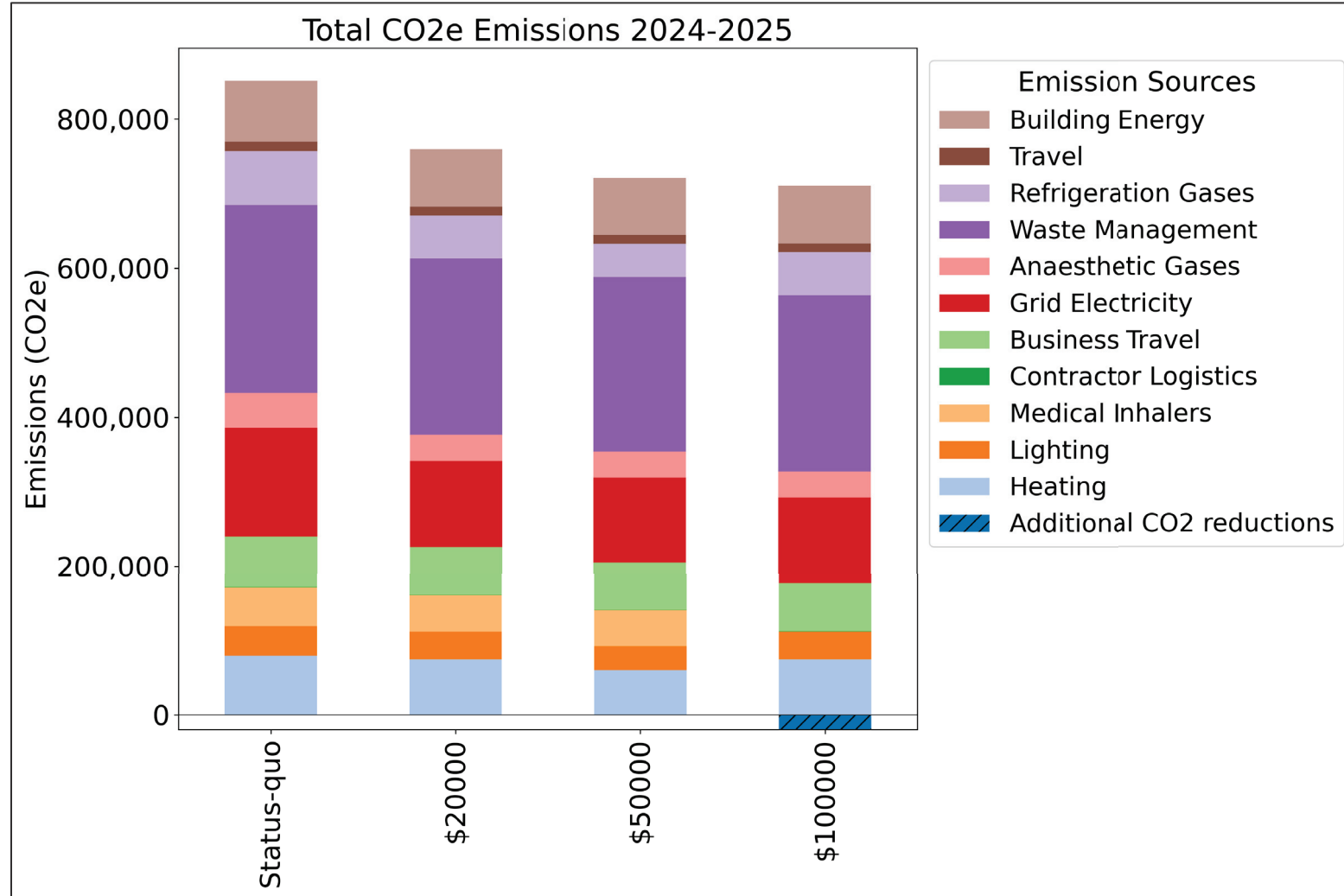
## Financial Resource Allocation Results

- ❖ Allocate resources for cost-effective carbon mitigation strategies within a constrained budget
- ❖ Select from **14** different carbon mitigation interventions, each with varying sizes and quantities
- ❖ The model selects interventions which maximize carbon reduction at minimal cost based on different budget scenarios
- ❖ \$10k it selects 100 LED lights, 10 refridgerants, 10 refrigerators;

# CARBOMICA Results: Mt Darwin

Intervention	Non-Financial Cobenefit
LED Lights	Improved lighting quality, better durability.
Solar System	Energy independence and environmental sustainability.
Low GWP Refrigerants	Lower greenhouse emissions and healthier indoor environment.
Energy-Efficient Fridges	Lowers power use, ensures stable temperature for medical supplies, and supports overall sustainability goals.
Sustainability Policy	Improved reputation and staff engagement.
Tree Planting	improves air quality, and offers natural cooling, reducing energy needs for air conditioning.
Training and Awareness	Empowered staff and increased patient trust.

# CARBOMICA Results: Aga Khan Hosp



## Financial Resource allocation & Carbon Reduction Analysis Results at Different Budget Scenarios.

- ❖ **\$20k** attains **11%** reduction through 10 refridgerators and training & awareness (inc waste segregation).
- ❖ **50k** reduces emissions by **15%** through 700 LED lights, 10 refrigerators, 10 AC units, 1000 tree planting trees and training and awareness & at
- ❖ **\$100k** reduces by **17%** through 4000 inhalers, 10 refrigerators & training and awareness  
Avoiding nitrous oxide in all budget scenarios



# Key Takeaways

- **Effective Resource Allocation**

The financial resource-allocation tool ensures **optimal distribution** of funds for carbon mitigation, prioritizing high-impact interventions by identifying cost-effective interventions, the tool enables **maximum utilization of limited funds**

- **Data-Driven Decision Making**

The model helps healthcare facilities make **informed, data-backed decisions**, aligning financial resources with carbon reduction goals.

- **Context-Specific Solutions**

The tool supports **tailored intervention selection** based on facility-specific needs, emissions hotspots, and financial constraints.



# Next Step

## Carbon Emission from Healthcare: **Measurement**

- Carbon emission measurement and modelling



## Mitigation Intervention in Health facility: **Design**

- Design and optimization modelling of mitigation interventions in healthcare facilities



## Mitigation Interventions in Healthcare facilities: **Implementation**

- Implementation of mitigation interventions in healthcare facilities



## Mitigation Interventions in healthcare facilities: **Evaluation, co-benefits and cost effectiveness**

- Effectiveness of mitigation interventions
- Cost effectiveness analysis of mitigation interventions



## Dissemination and Communication

- Design and implement communication and dissemination strategy**
- Conferences and publications

Health Systems Mitigation Strategies Collaborative Frameworks Innovative Financing Models Global Health Initiatives Research and Innovation



# Acknowledgements

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