Dev-Eng 2025

Oka-Freeze

1 April 2025

The Last Mile, Field Observations from Mozambique

- Villages hard to access
- Lack of electricity

Global Burden due to Lack of Cold Chain

- More than 1.5 million people globally lose their lives due to vaccine-preventable diseases each year (The Children's Hospital of Philadelphia 2014)
- Estimates suggest that 25% of vaccines reach their destination with degraded efficacy mainly due to failures within the cold-chains (Barrowclough 2020)
- 600 million people fall ill due to foodborne diseases, with around 420,000 of them dying annually, due in part to the lack of a food cold-chain that would ensure safety and quality of food consumed from farm to plate (Afshin et al. 2019; WHO 2022).
- Each day 25,000 people die from hunger, while the lack of effective refrigeration directly results in the loss of 526 million tons of food production annually (or 12% of the total food produced), which could feed an estimated 1 billion people (Holmes 2009, 25; IIF/IIR 2021).

Launch of Oka-Freeze

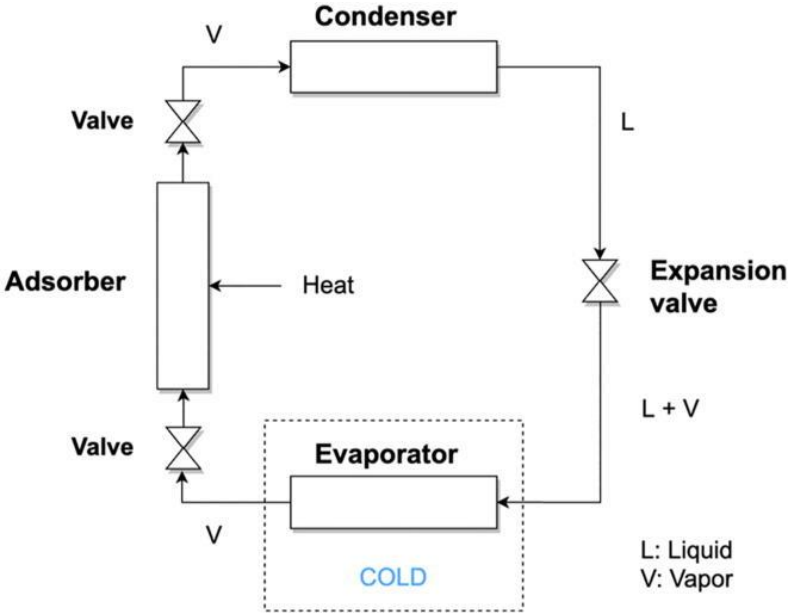
Resulted in

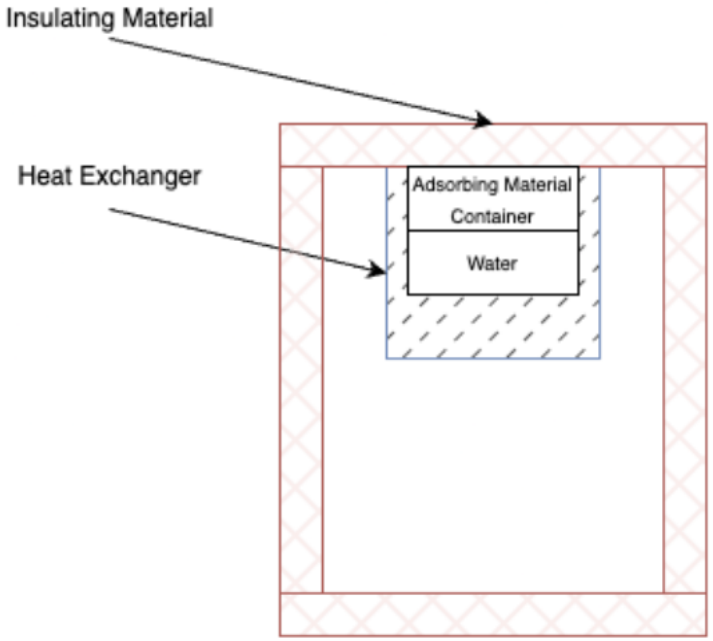
- Business success
- Identification of technological limitations
  - → Photovoltaic panels and battery-powered fridges

Fast Stats about Oka Freeze

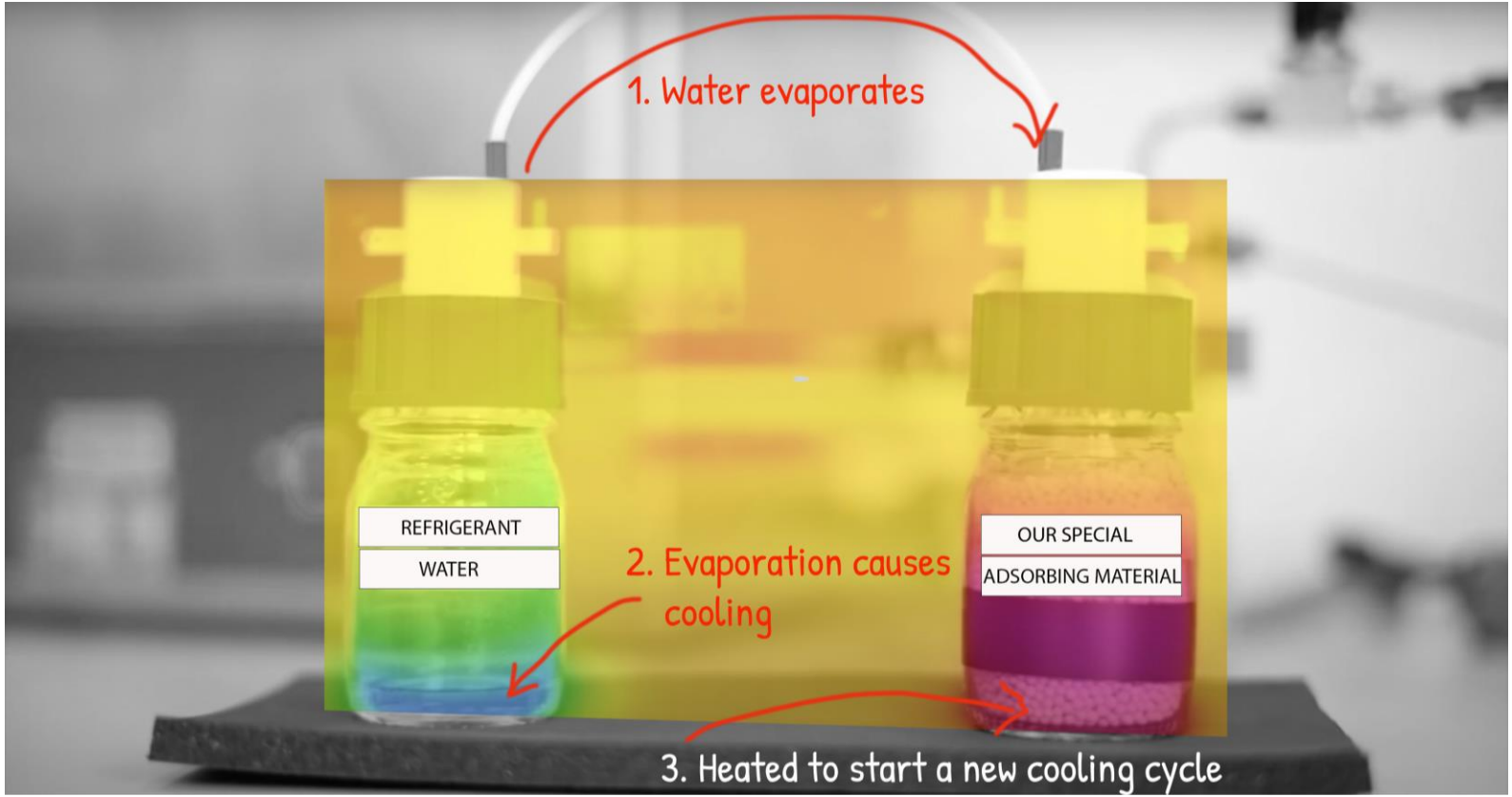
- Implemented in 11 villages in Northern Mozambique
- Running since 2019
- Renting each solar powered fridge (Solar panels, lead acid batteries) for 35 USD per month to rural shopkeepers
- Shopkeepers break even in 8 days
- Using rental money for maintenance
- ROI in 14 months
- 10’000+ people impacted to date

Adsorption cooling and the coldbox project





Adsorption Cooling



Advantages and Challenges of Adsorption Cooling

Advantage

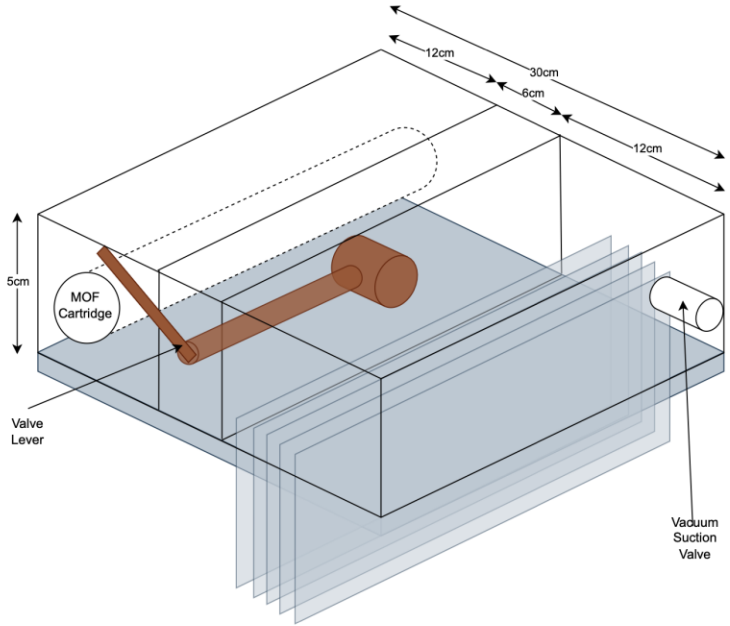
- Does not require electricity
- No moving parts
- Resistant to vibration
- Could be low cost

Challenges

- Vacuum
- Desorption at low temperature
- Current solutions desorb at 400°C.

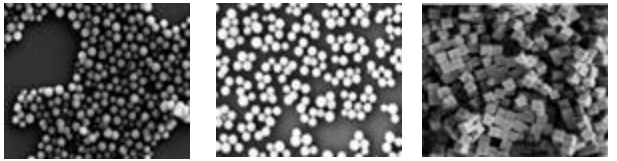
The Cold Box

Goal: Development of a cold box that is…



- Robust and low-cost
- Electricity-free, using low grade heat to refrigerate
- Resistant to vibration during transport
- Cold holdover for several weeks

→ Based on adsorption technology



Case Study

- We are about to start a company called Oka-Freeze, in Tanzania.
- Think of a deployment strategy of the cold box.