

COOLING INNOVATION CASE STUDY

KOOLBOKS

Overview

Koolboks provides solar-powered refrigeration systems designed for businesses and communities operating in off-grid and unreliable-grid environments. Koolboks operates across over 25 countries in Sub-Saharan Africa. Its solution combines solar panels, battery storage, and Powerfoot Pedestal technology to provide reliable and consistent refrigeration without depending on the conventional electricity grid. Through its innovative cooling solutions, Koolboks enables small businesses, retailers, farmers, and other refrigeration-dependent enterprises to preserve perishable goods, reduce post-harvest losses, and protect income. By reducing dependence on diesel generators and other fossil-fuel-powered alternatives, the solution also contributes to lower operating costs and reduced carbon emissions. [Learn more about the company here.](#)



Koolboks' Scrap4New Initiative further advances the company's commitment to the Circular Economy by collecting and refurbishing old refrigerators, reducing electronic waste and extending the useful life of refrigeration equipment. Together, these solutions address critical challenges around energy access, food preservation, climate resilience, and income generation, particularly for underserved communities with limited access to reliable electricity.

The Challenge

Refrigeration access gap: Only 17% of households in Sub-Saharan Africa have refrigerators (compared to almost 100% in developed countries) affecting 600 million people. This lack of refrigeration infrastructure poses significant challenges for food preservation, healthcare, and overall quality of life in the region. ([Source](#).)

High waste: 40% of food and 50% of vaccines are wasted annually due to lack of refrigeration. ([Source](#)).

Financial barriers: High upfront costs make refrigeration inaccessible to many low-income households.

The Solution

Koolboks's solar-powered refrigeration units improve access to reliable cold storage in rural and off-grid communities. Access to cold storage extends the shelf life of goods for households, farmers, and food vendors. On average, each Koolboks refrigerator saves 1.79 tons of food per year, collectively preventing over 51,700 tons of food waste from 2020 to 2025 and avoiding over 120,000 tons of CO₂ emissions.

“It has been very good and effective, since there is no electricity in my area. The freezer has been of great help for my frozen food business. I now sell more.” – Customer in Nigeria ([See more](#).)

Core technology: solar refrigeration paired with lithium-ion battery storage and a PayGo device, deployable off-grid or grid-connected - providing reliable, continuous cooling without dependence on diesel or unstable grid power.

Refrigerant transition: Koolboks achieved a >99% reduction in refrigerant-related Global Warming Potential (GWP) by transitioning all new units from R134a (GWP 1,430) to climate-friendly R600a (GWP 3). As of 2025, almost 90% of the active units use R600a, supporting Kigali Amendment compliance.

Cooling-as-a-Service / financing model via Koolbuy: direct payment, lease-to-own, and Cooling-as-a-Service options are layered on top of the hardware, enabled by IoT PayGo.

Koolboks Powerfoot: A retrofit device that converts existing fridges to solar power and captures carbon credit data, thus allowing Koolboks to collaborate with existing competitors by converting their units to solar-powered solutions. [Learn more.](#)



AI/predictive analytics roadmap: Predictive maintenance (anticipating equipment failures), weather prediction (to optimize energy consumption and food preservation), and credit prediction (for PayGo/financing risk).

Mini-assembly line: Produces PayGo fridges locally. The line plans for a full assembly factory targeting 72,000 units/year capacity.

Scrap4New circular-economy program: trade-in of old/diesel/non-functional units for discounted new Koolboks units. Once collected, units are assessed for refurbishment or component recovery. [Learn more.](#)

World Bank Group's Role

With the support of the UK Government's International Climate Finance (ICF) and the Ayrton Challenge, Koolboks participated in a number of pilots through the TechEmerge Sustainable Cooling Initiative in Africa. The catalytic grant provided by the WBG through the support of the UK Government allowed the company to develop a proof of concept for its technology and business model, particularly the Pay-Go cooling-as-a-service.

- [See company's TechEmerge profile.](#)
- [Learn more about UK IFC program.](#)

The company has since won many awards for its approach, including the SET Innovation Award, FoodTech 500 Finalist, and Bloomberg's "African Start Ups to Watch For" recognition.

More detailed information about the pilot engagements is available from the [TechEmerge Lessons Learned Report](#) (see p. 59).

Development Impact

Job creation: Koolboks advances an inclusive model of climate resilience through its PAYGO financing platform, Kool Kredit, which removes upfront affordability barriers for micro and small enterprises, particularly women-led businesses. Koolboks has created almost 20,000 direct jobs, including business owners and support staff, supporting more than 3,600 women-led businesses.

GHG emissions reduction: Between 2020 and 2025, Koolboks prevented 140,000 tonnes of CO2 emissions, or 30,000 homes electricity use for a whole year. [Learn more.](#)

Electrification: The units generated 10.96 GWh of renewable energy from 2020–2025, displacing diesel generators and grid electricity, easing pressure on local grids and improving energy stability in areas with intermittent supply.

Circular economy: The model aligns with Harmonized Circular Economy Finance Guidelines, specifically meeting the criteria for Circular Use & Value Recovery, by extending the life of the units. For those units that cannot

be salvaged, Koolboks recycles materials such as metals, compressor components, and refrigerants, aligning with Value Recovery by reducing landfill waste (almost 10.6 tons since 2023) through material recovery. [Access Circular Economy Finance guidelines.](#)

Mobilizing climate finance: Koolbuy's stated ambition is to mobilize financing toward selling \$5 billion worth of refrigerators/freezers across Africa, targeting the 600 million people in Sub-Saharan Africa without refrigeration.



About the WBG Sustainable Cooling and Heat Resilience Initiative

The World Bank Group's Sustainable Cooling and Heat Resilience Initiative is a “five by five” strategy, addressing cooling in the **five sectors where it's needed most**: 1) built environment, 2) manufacturing, 3) agribusiness and cold chains, 4) health and education, 5) transportation and infrastructure.

The Initiative accomplishes this through **five modes of engagement** designed to catalyze global action: 1) providing insights, 2) influencing decision-makers, 3) catalyzing innovation, 4) scaling up investment, and 5) creating impact through job creation and livelihoods for a livable planet. [Learn more here.](#)

The Initiative is comprised of several targeted programs across the WBG which address portions of the above “five by five” strategy. The Cooling Innovation Facility provides technical advice to investment clients looking to embed cooling into their operations, along with CapEx grants for piloting of innovative technology. The Facility is funded by the UK Government's Department for Energy Security & Net Zero.

