



Higher tier cookstoves for humanitarian energy access:

Innovations and technology transfer

About SNV

SNV is a global development partner, deeply rooted in the countries where we operate. We are driven by a vision of a better world: A world where across every society all people live with dignity and have equitable opportunities to thrive sustainably. To make this vision a reality, we need transformations in vital agri-food, energy, and water systems. SNV contributes by strengthening capacities and catalysing partnerships in these sectors. We help strengthen institutions and effective governance, reduce gender inequalities and barriers to social inclusion, and enable adaptation and mitigation to the climate and biodiversity crises.

Building on 60 years of experience we support our partners with our technical and process expertise and methodological rigour. We do this in more than 20 countries in Africa and Asia with a team of approximately 1,600 colleagues. By being adaptable and tailoring our approaches to these different contexts, we can contribute to impact at scale, resulting in more equitable lives for all.

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About the humanitarian market-based energy access project

Kakuma Refugee Camp and the Kalobeyei Integrated Settlement in Turkana County are home to one of the largest and most protracted displacement contexts in the world. Hundreds of thousands of refugees and asylum seekers live alongside Turkana host communities, all facing long-standing challenges in accessing clean, reliable and affordable energy.

For years, households, institutions and small businesses have depended heavily on firewood and charcoal for cooking, and on low-quality or donated products for lighting and productive uses. This reliance has contributed to widespread deforestation, indoor air pollution, high operating costs for institutions, safety risks, and limited economic opportunities particularly for women and youth.

Since 2017, SNV has been at the forefront of transforming humanitarian energy access in Kakuma and Kalobeyei. Moving beyond one-off product distributions, SNV has developed a comprehensive, market-based energy portfolio that strengthens local supply chains, builds private-sector participation, and expands access to modern cooking, lighting and productive-use technologies.

This integrated approach cuts across:

- Local stove production and clean cooking solutions
- Market-based access to solar lighting and home systems
- Household and institutional electric cooking (eCooking)
- Productive use of electricity for livelihoods (PUE)
- E-waste management and circularity
- Behaviour change and social marketing
- Access-to-finance and end-user affordability mechanisms

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Introduction

As the Government of Kenya aims to achieve universal access to clean cooking by 2028, there is an urgent need to accelerate the transition to cleaner cooking solutions to mitigate the negative impacts associated with the use of traditional fuels and stoves. The Ministry of Energy and Petroleum launched the Kenya National Cooking Transition Strategy (KNCTS) 2024–2028, that seeks to transform the cooking sector into a sustainable and profitable industry in line with this national ambition. The KNCTS defines clean cooking as cooking with fuels and stove combinations that meet the standards set by the World Health Organization (WHO) guidelines for indoor air quality.

To be deemed a clean cooking solution in Kenya, a stove must meet International Organisation Standard (ISO) performance targets of at least Tier 4 for particle emissions and Tier 5 for carbon monoxide emissions. This tier system, which ranges from inefficient Tier 0 stoves (e.g., three-stone fires) to high-performing Tier 5 stoves (e.g., electric or ethanol), standardizes efficiency, emissions, and safety. The KNCTS aims to transition all households to these higher-tier stoves by 2028, delivering significant health, environmental, and economic benefits including reduced indoor air pollution, lower emissions, cost savings from fuel efficiency, and less time spent collecting fuel.

Kenya's High Tier Cookstoves (HTC) market already demonstrates a wide range of technologies, from efficient biomass stoves such as BURN Manufacturing's Jikokoa, to gasifier stoves like ACE and ECS, fuel-based models such as KOKO Networks' ethanol stoves and Circle Gas' PAYGo LPG systems, as well as biogas digesters and electric cooking appliances from brands like Ramtons, LG, Samsung, Tefal, Burn and Sunking. These options show what is possible, but for many low-income and humanitarian households, affordability and accessibility remain major barriers.

Yet, while progress has been visible at national level, the need is most acute in humanitarian settings.

In Turkana County, the Kakuma refugee camp and Kalobeyei settlement host more than 270,000 refugees and asylum seekers, alongside thousands of members of the local host community. Here, reliance on firewood and basic improved cookstoves drives deforestation in a fragile ecosystem, exposes families to harmful smoke, and forces women and girls to spend long hours searching for fuel. The humanitarian context underscores the urgency where without targeted interventions, the clean cooking transition risks leaving behind the very communities who need it most.

For Jacob Opete, serving as a Trainer of Trainers has been a turning point in his clean energy journey.





Project role in advancing higher tier cookstoves

The Humanitarian Market-Based Energy Access (MBEA) Project, implemented by SNV with funding from EnDev, has since 2017 served as a catalyst for modern energy solutions in refugee-hosting areas. The project applies a market-based approach, working through private sector actors to establish sustainable enterprises, expand distribution channels, and stimulate demand for clean energy. In its early years, MBEA supported the distribution of improved cookstoves, giving households an affordable alternative to the traditional three-stone fire. To make these stoves more accessible, the project introduced Stove Production Units (SPUs) for local manufacturing. Producing stoves closer to the market helped reduce transport costs, create jobs, and lower prices, making improved cookstoves more affordable for both refugee and host households. This model proved vital in bridging the affordability gap and ensuring cleaner cooking solutions were available where they were most needed.

From the outset, MBEA's long-term ambition was to enable households to transition to higher tier stoves that provide far greater health, environmental, and economic benefits.

The project initially collaborated with suppliers to promote higher-tier cookstoves (HTCs) that were not produced locally in Kakuma. While these stoves offered strong performance in terms of efficiency and user experience, affordability and reliability of supply remained key challenges. Transporting the products from urban-based suppliers to Kakuma added to the costs and limited consistent supply.

To address these barriers, MBEA built on the successful local production model used for improved cookstoves by introducing local HTC manufacturing through the SPU model. This approach aimed to reduce costs, strengthen supply chains, and enhance availability. It was through this effort that the Jambo HTC stove was identified as a suitable option combining durability, efficiency, and affordability and introduced for local production and distribution in Kakuma and Kalobeyei.

Linking innovation to access

The Jambo HTC stove, developed by Jambo Capital Initiative in Thika, is a durable, energy-efficient model designed for charcoal and briquettes, with modifications underway to also accommodate bioethanol. Constructed from heavy-gauge metal with a ceramic liner and fibre insulation, it delivers higher efficiency (35% thermal efficiency) than traditional stoves (Three-stone – 13%, KCJ - 23) and has already achieved Tier 3 certification by the Kenya Industrial Research and Development Institute (KIRDI). Although the stove showed promise, it was largely inaccessible to households in Kakuma due to high transport costs and distribution challenges.

To address this, SNV facilitated a technology transfer agreement between Jambo Capital Initiative and Sunken Limited, a local producer in Kakuma. Through this partnership, Sunken acquired the rights to manufacture the Jambo HTC stove locally, reducing costs, embedding production in the humanitarian economy, and ensuring availability at scale for both refugees and host communities.

Stage 1: Building local skills and capacity

To ensure sustainable HTC production in Kakuma, SNV prioritised capacity building. A Trainer of Trainers (ToT) approach was introduced, beginning with an SNV technician who travelled to Jambo Capital's workshop in Thika to acquire hands-on knowledge of the stove's production process.

Following this, 22 artisans (16 men and 6 women) were trained at Sunken's production unit in Kakuma, supported by Jambo Capital Initiative and the ToT (Jacob). Over four days, participants gained skills in cladding, ceramic liner production, curing and firing, assembly, and finishing. This investment not only enabled local HTC production but also created new livelihood opportunities for refugee and host youth.

Testimonial : Training the trainers, spreading the skills

For Jacob Opete, serving as a Trainer of Trainers has been a turning point in his clean energy journey. With support from SNV, he trained in Thika on every step of Jambo HTC stove production, cladding, ceramic liner preparation, curing, firing, and final assembly.

I was trained on the HTC, specifically the Jambo stove, and the skills I gained now enable me to train both refugees and host community members on all aspects of Jambo stove production- Jacob Opete

Jacob's experience highlights the multiplier effect of training: one individual's learning empowers an entire community, ensuring that HTC production can grow sustainably in Kakuma and Kalobeyei.

Testimonial : Breaking barriers in stove making

For Jane, working as a metal fabricator with Sunken began with producing improved cookstoves. Although stove making was long considered a man's domain, she quickly mastered the craft and proved her skills in cladding and metalwork. When the opportunity came through SNV and Sunken to train on HTC production, Jane was among the 22 artisans selected.

"When I started, it was tough, but now it feels easy, and I am confident I can train anyone interested - Jane Aryemo

The income Jane earns now supports her children's school and medical expenses, proving that stove production is not just technical work but also a pathway to family wellbeing and women's economic empowerment in Kakuma.

Stage 2: From production to market

With trained artisans and production facilities now in place, Sunken Limited has begun production of the Jambo HTC stove in Kakuma. Between June and September 2025, more than 150 stoves were manufactured, demonstrating that advanced clean cooking technologies can be produced effectively within humanitarian settings.

To ensure the stoves reach households, Sunken has leveraged its robust network of over 130 vendors across Kakuma and Kalobeyei. This well-established distribution system enables last-mile uptake, embedding the Jambo stove within existing market channels and proving that private-sector approaches can thrive in humanitarian economies.

A key breakthrough has been affordability. Retailing at just Kshs 1,500, the Jambo HTC stove is priced significantly lower than other biomass HTC models that typically sell for Kshs 4,000–6,000. This dramatic price reduction achieved through localized production in SPUs has made higher-tier stoves far more accessible for refugee and host households who could not otherwise afford such technologies.

To further bridge the affordability gap, the project strengthened Village Savings and Loan Associations (VSLAs) as a financing mechanism. Through these groups, households can access the Jambo stove on credit and repay in manageable instalments, enabling even the most vulnerable families to acquire cleaner technologies without the burden of a one-off payment.

By combining local production, inclusive financing, affordable pricing, and last-mile distribution, the MBEA Project has demonstrated how higher-tier cookstoves can move from being a national policy ambition to a practical, market-based solution in humanitarian contexts. For refugee and host households in Kakuma and Kalobeyei, the Jambo stove is more than a product, it represents better health, reduced environmental pressure, and new livelihood opportunities. This experience underscores that even in fragile settings, market-based clean energy solutions can improve people's lives..

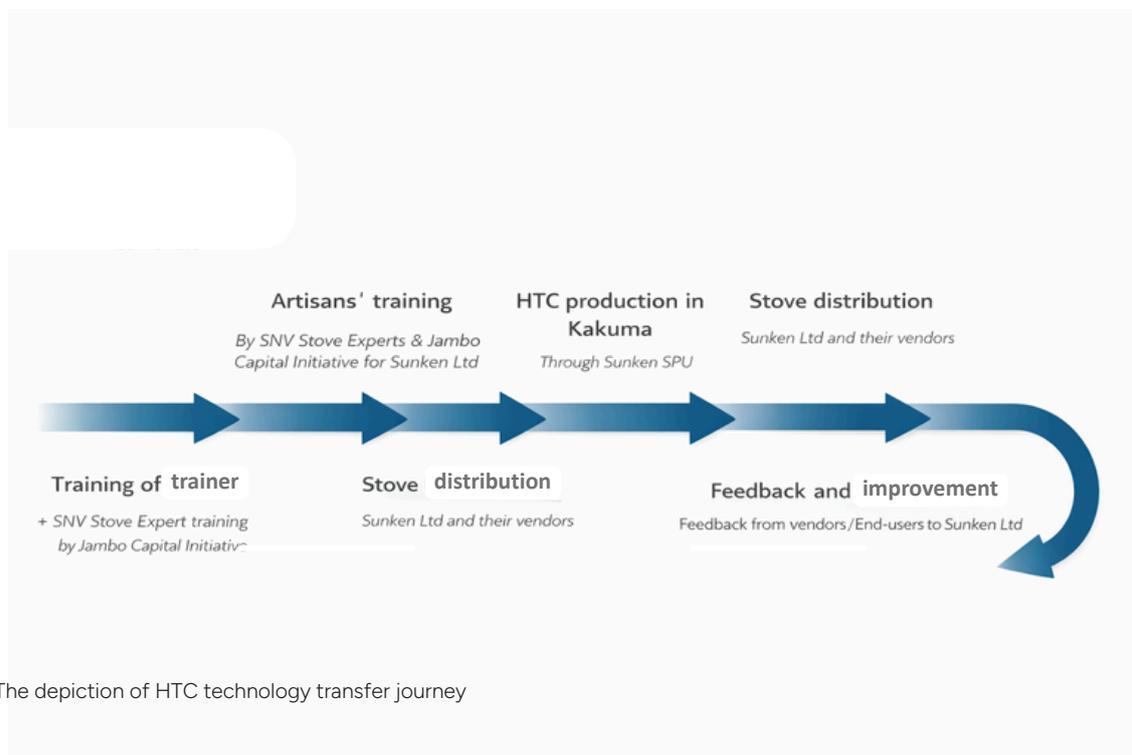


Figure 1: The depiction of HTC technology transfer journey

From biomass to modern energy cooking

As households and institutions in Kakuma began adopting locally made higher-tier stoves, the MBEA Project identified the next frontier in the clean cooking journey, that is the transition toward modern, electric cooking. To complement biomass interventions, SNV expanded its approach to include Electric Pressure Cookers (EPCs), marking a new phase of innovation and inclusivity in humanitarian energy access.

Building on the progress in higher-tier cookstoves, the MBEA Project, in collaboration with the Modern Energy Cooking Services (MECS) Programme and supported by EnDev and UK Aid, piloted EPCs among institutions in Kakuma and Kalobeyei.

The pilot introduced 40-litre and 20-litre EPCs, powered by solar energy, in four institutions including Kapooka Hospital. Traditionally reliant on firewood, these institutions faced high fuel costs and health risks. The EPCs reduced cooking time and energy costs by nearly 50%, improved kitchen air quality, and conserved water due to their sealed design which allows pressure to build up. To ensure these benefits were fully realised, cooks were trained to manage pressure settings and adapt their recipes accordingly. While some initially preferred the taste of firewood-cooked food, most embraced the speed, safety, and health benefits of EPCs.

To complement institutional pilots, the MBEA Project also extended modern energy cooking solutions to households, focusing on affordability, access, and user experience. This approach was implemented through local private sector actors, notably Nyalore Enterprises, which received support to retail and demonstrate Electric Pressure Cookers (EPCs) within Kakuma and Kalobeyei.

By linking households to local suppliers and to Village Savings and Loan Associations (VSLAs) for financing, SNV ensured that families could acquire EPCs without the burden of upfront payment. Cooking demonstrations, peer exchanges, and community champions helped build confidence among first-time users, especially women who manage daily cooking.

It is through this household approach that Mary Awuor, a shopkeeper in Kakuma town, became one of the early adopters of the technology.

Testimonial: Powering change in institutional kitchens

For the kitchen team at Kapooka Hospital, the shift to electric pressure cooking was more than a technical upgrade it was a daily relief. Previously, cooks would spend hours bent over smoky fires, stirring large pots of githeri or porridge while battling heat and eye irritation. Today, the hospital's meals are prepared faster, in cleaner, cooler kitchens.

“The success of the e-cooking pilot in Kakuma shows that clean energy solutions like EPCs can cut costs, improve health, and reduce firewood reliance paving the way for a more sustainable and equitable future.”
— SNV-MECS Pilot Report, 2024

Today, Mary cooks her family's meals in less than half the time, without smoke or heat filling the room. The energy savings allow her to put more money back into her business, while the extra time lets her focus on her children's schooling and community activities.

Her experience captures what modern energy access truly means not just cleaner cooking, but economic empowerment for women who juggle livelihoods and family care.

Scaling up modern energy cooking

The success of the MBEA–MECS pilot highlights the potential of integrating e-cooking into Kenya's clean energy transition. By aligning with the Kenya National Cooking Transition Strategy (2024–2028) and leveraging local enterprise models, SNV has demonstrated that electric cooking can thrive even in off-grid or hybrid contexts when paired with solar-powered systems, skills development, and inclusive financing.

Together, the Jambo Higher Tier Cookstove and Electric Pressure Cooker reflect the evolution of clean cooking in Kenya where innovation, entrepreneurship, and community ownership converge to deliver healthier, more sustainable, and inclusive energy solutions.

Lessons learned

Local production is critical to affordability and sustained access in humanitarian settings

Shifting to local SPUs significantly reduced costs and improved availability in Kakuma. By eliminating long-distance transport, the Jambo HTC stove retail price dropped to Kshs 1,500, demonstrating that technology transfer and local manufacturing can make advanced clean cooking solutions affordable in displacement contexts.



Photo credits: SNV.

Market-based approaches can function effectively in humanitarian economies

Using existing private-sector actors and vendor networks enabled efficient last-mile distribution of HTCs at scale. Sunken Limited's network of over 130 vendors showed that refugee and host communities can actively participate in functioning markets when interventions are built upon local systems.

Inclusive participation enhances social and economic outcomes

Deliberate inclusion of women and youth in stove production expanded livelihood opportunities and challenged gender norms within the clean cooking sector. Women artisans demonstrated that HTC production is both technically accessible and a pathway to economic empowerment and household stability.

Institutional cooking offers a strong entry point for modern energy solutions

EPC pilots in institutions delivered immediate benefits, including reduced cooking time, lower energy costs, and improved air quality. Institutional kitchens therefore serve as effective demonstration sites that accelerate acceptance of electric cooking while delivering measurable health and operational gains.

Financing mechanisms are essential for adoption

Even with lower prices, flexible financing remained critical for uptake among low-income households. Village Savings and Loan Associations enabled access to HTCs and EPCs without upfront payment barriers, reinforcing the importance of financial inclusion.

Conclusion

The MBEA Project in Kakuma and Kalobeyi shows that clean cooking solutions can work in humanitarian settings when they are locally produced and embedded in existing markets. Technology transfer and SPUs reduced the cost of higher-tier cookstoves while creating livelihoods for refugee and host communities. The locally produced Jambo stove improved access to cleaner cooking, reduced environmental pressure, and strengthened local supply chains. Building on this, Electric Pressure Cookers demonstrated the feasibility of modern cooking for both institutions and households. Vendor networks and community-based financing helped overcome affordability barriers and supported uptake. Together, these interventions show that clean cooking transitions in fragile contexts depend on aligning technology, skills, markets, and financing.

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