



UNITED NATIONS  
INDUSTRIAL DEVELOPMENT ORGANIZATION



# A LARGE-SCALE DELIVERY MODEL FOR CLEAN COOKING

---

EXPERIENCES FROM DAR ES SALAAM

# **A LARGE-SCALE DELIVERY MODEL FOR CLEAN COOKING**

---

EXPERIENCES FROM DAR ES SALAAM

© UNIDO 2023. All rights reserved.

This document has been produced without formal United Nations editing. The designations employed and the presentation of the material in this document do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations Industrial Development Organization (UNIDO) concerning the legal status of any country, territory, city, or area or of its authorities, or concerning the delimitation of its frontiers or boundaries, or its economic system or degree of development. Designations such as “developed”, “industrialized” or “developing” are intended for statistical convenience and do not necessarily express a judgement about the stage reached by a particular country or area in the development process. Mention of firm names or commercial products does not constitute an endorsement by UNIDO.

# MARKET-ENABLING FRAMEWORK – PRIVATE SECTOR-DRIVEN APPROACH

---

An analysis of clean cooking delivery strategies has highlighted deficiencies and the need for an alternative approach.

Recognizing that the fundamental need for cooking is already met through traditional fuels is essential. Hence, the need for an alternative, attractive, clean, and competitive replacement. Customers must choose to switch and target households must be encouraged and assisted in switching from cooking with charcoal or wood to clean burning ethanol fuel. When coupled with the deployment of industry and business for ethanol fuel, this act of switching fuel use will create the conditions for sustainability.

For most of the 20 high-impact countries, there is a need to build delivery capacity to accelerate massive adoption of clean cooking solutions. UNIDO intends to build capability and experience to support developing countries in scaling up these efforts through:

## **Large-scale, rapid roll-out through a market enabling framework:**

- Briefing and support of Governments on technical and program information
- Smart subsidy program design
- Program finance and fundraising

## **Advisory support on policies and standards:**

- The potential role of ethanol in the national energy mix and revision of policy documents
- Level playing field for fuels on VAT and other duties and taxes
- Standards with oversight are needed to introduce the fuel safely

## **Ethanol-based cooking solutions technical components:**

- Stove specifications and selection
- Stove assembly and production
- Ethanol manufacture and fuel quality management
- Fuel handling and distribution

# Global Impact Programme – Market-enabling Framework



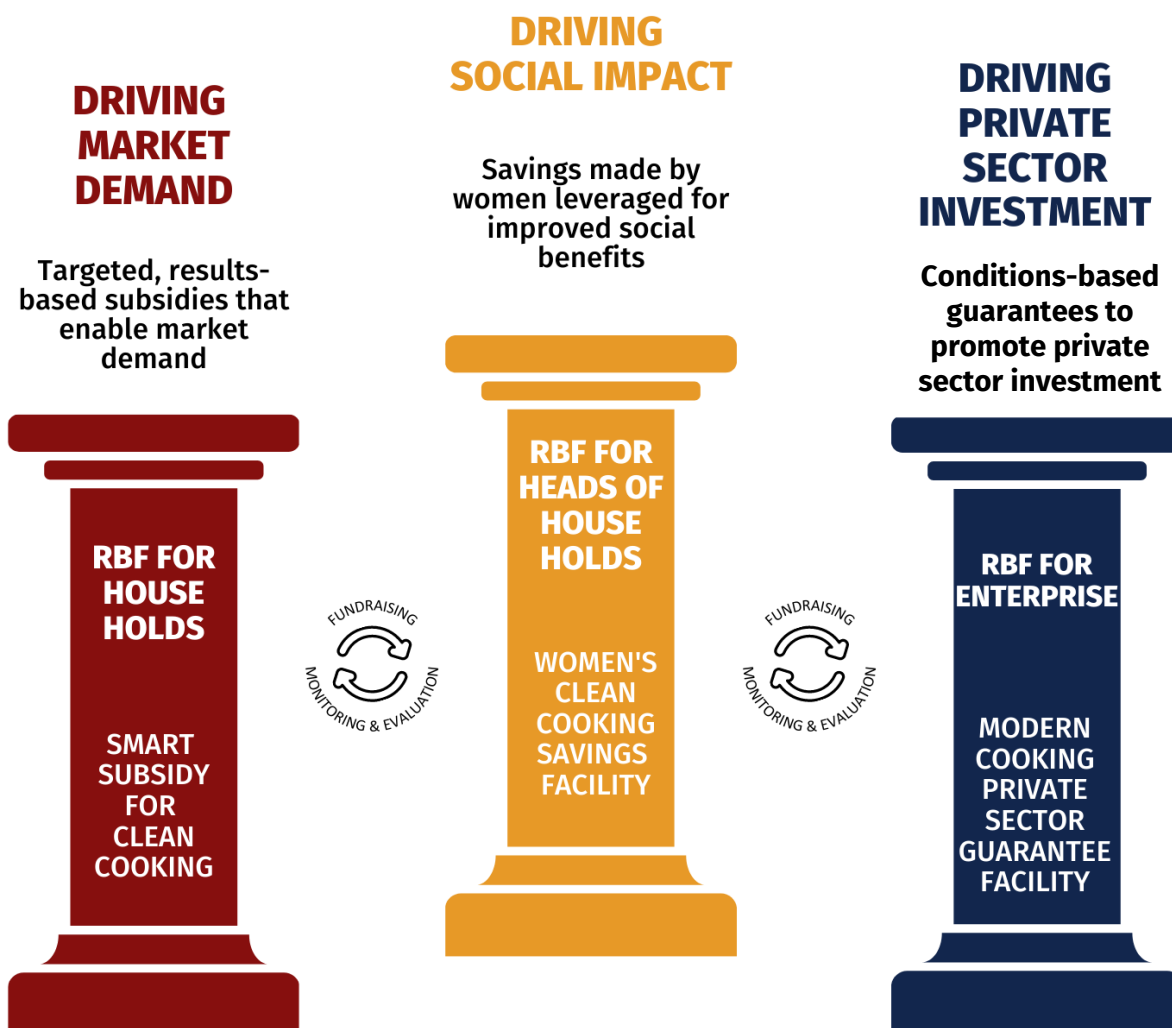
**The Market-enabling Framework (MEF) is an innovative approach to raise demand, productivity, and competitiveness and establish an efficient value chain at scale.**

# INTEGRATED RESULT-BASED FINANCING PACKAGE

A partnership delivery model: the results-based finance package for market, technology, financial and social innovation.

At the heart of clean cooking, delivery is the need to raise funding for a range of needs smart subsidy on the cookstoves and the development of a distribution infrastructure from production to last mile. Household savings obtained by the switch to ethanol cooking can be leveraged for other societal benefits.

## UNIDO three-pillar RBF package approach





Launch of the bioethanol programme in Dar es Salaam, Tanzania

## DAR ES SALAAM'S CLEAN COOKING PROJECT – A SUCCESS STORY

In Tanzania, over 85% of the population depends on biomass energy for cooking needs.

An estimated 372,000 hectares of forest is lost annually. The Government identifies this as a severe environmental challenge. In urban areas, more than 70% of households use charcoal as their primary cooking fuel, accounting for most of the charcoal consumed in the country. Dar es Salaam City alone accounts for almost 50% of charcoal consumption.

UNIDO's first project under its Global Impact Programme for Clean Cooking (GIP-CC) has introduced ethanol cooking in Dar es Salaam. It is implemented in partnership with the Government of Tanzania by Vice President Office-Division of environment (VPO-DoE), Ministry of Energy (MoE),

**Tanzania Development Bank (TIB), University of Agriculture (SUA) and University of Dar es Salaam and funded by the Global Environment Facility (GEF) and European Union (EU) through the EU Clean Cook Fund.**

Its ambitious goal is to market subsidised ethanol cookstoves and establish a sustainable ethanol fuel production and distribution industry to service 160,000 households over five years. The private industry will undertake delivery completely as it develops an entirely new distribution chain from production to final sellers.

## The programme's four main components



## Tanzania is in the process of developing its sugar industry to ensure self-sufficiency which will create the secondary production of 52 million litres molasses-based ethanol per year.

Tanzania is developing its sugar industry to ensure self-sufficiency, creating the secondary production of more than **52 million additional molasses-based ethanol per year**. Additionally, cashew apple waste holds a potential yield of 133 million annual litres of ethanol; and sisal bole is estimated to have a potential of 68 million litres of ethanol production.

Together these three waste streams will yield up to 250 million litres annually, able to supply two million households with cooking fuel. Moreover, small businesses can be supported by initiating local, microscale ethanol production (generally defined as 5,000 litres per day or less). In Dar es Salaam the first tender for the distribution of ethanol stoves and fuel were launched and resulted in eight applications.

Through a UNIDO procurement process, one applicant was appointed as distributor, Consumers Choice Limited (CCL), a wholesale company with experience in buying and selling bioethanol with the goal of distribute up to 110,000 ethanol stoves. They were chosen for the first phase of the rollout and given a target to distribute ethanol cookstoves to households in 20 selected wards in Dar es Salaam.

Clean Cook, a Swedish company with manufacturing facilities in Durban, South Africa was chosen as an ethanol stove supplier. The tenderer includes local assembly in the delivery terms to lower the delivery price and build local capacity. During phase two, up to three additional vendors will be chosen.





### Raw and finished ethanol products CCL Go-down

As part of its preparatory assistance, UNIDO provided a thorough introduction process including technology transfer, sourcing of ethanol and stoves, testing and standards, bottling and distribution, skills development, sales strategies, financial business planning, governance and monitoring, and consultation to support newly established operations. UNIDO supported with technical advice in the establishment of an ethanol blending and bottling plant with storage and mixing tanks with a batch capacity of 2,400,000 million litres per year. Five staff are employed in the bottling plant.

The vendor has also been supported in the establishment of a stove assembly unit at their facility with five staff employed in assembly. The CCL purchased 12, 000 ethanol clean cookstoves. In addition, the vendor has a dedicated sales and marketing team that is on the front line, selling ethanol stoves. As a December 2022 has been sold 10, 000 ethanol cookstoves. To date, the vendor has invested 1.1 million USD in the business and has expanded sales operations to cover five districts of Dar es Salaam including Tabata, Segerea, Sinza, Mtoni and Mbagala and others.

# Dar es Salaam's Clean Cooking Project

*Achievements: First phase of the project: As per December 17<sup>th</sup>, 2022*

	Maximum Ethanol Bottling Plant Capacity (litres/year)	GHG emission savings net (tons TCO <sub>2</sub> -eq/year)	Ethanol cookstoves sales	Staff / Bottling plant	The volume of ethanol sold/consumed (litres/year)	Capacity Development (trainees)	Women trainees	Workshops conducted	Private sector investment (Local, USD)	Stoves sales staff
Tanzania 2022	2.4 Mill.	1,434	10,000	5	124,000 lt	160	43	4	1.1 Mill.	25



Train transporting sugarcane to fields in Moshi, Tanzania

# Target of Dar es Salaam's Clean Cooking Project as 160,000 clean cook stoves

## Tanzania Impact Data



### CLEAN FUELS

30 million litres per year



### COMPANIES

~40



### JOB

800+

### JOB

2400



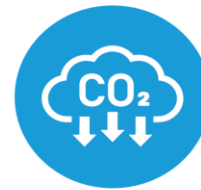
160.000

Households adopting ethanol cook stoves



150 Million USD

Private Sector investment



350k tons of CO2

Reduce per year



Twin burners cook stove in Tanzania. (Source: Project Gaia INC)



Ethanol bottles ready for distribution. (Source: Project Gaia INC)

# Partnerships

## Clean Cooking Conference 2022

Tanzania’s Ministry of Energy organised a Clean Cooking Conference on 1-2 November 2022, with the aim of developing a concrete roadmap towards achieving affordable clean and reliable cooking solutions in line with the National Energy Policy (NEP) of 2015. Sustainable Development Goal (SDG) 7 and Tanzania’s SEforALL Action Agenda (2015) with the participation of the guest of honor H.E. Ms. Samia Suluhu Hassan, the President of the United Republic of Tanzania.

UNIDO was invited to participate in the panel discussion on “Jobs, Skills, and Employment Opportunities in transitioning to Clean Cooking. Specifically, the discussions focused on Mitigating impact on jobs and SMEs in moving away from biomass cooking energies.”



Marketing Manager from Consumer’s Choice Limited, the company appointed by UNIDO for ethanol cookstove distribution in Dar es Salaam, had a chance to demonstrate the clean ethanol cooking stove technology, to H.E President Samia Suluhu Hassan.

## Visit of SMIDA DG, Zanzibar to Consumer Choice Ltd

Director-General for the Small Industries Development Agency (SMIDA), accompanied by representatives from the Ministry of Trade and Industry, Zanzibar, and UNIDO paid a visit to the premises of the ethanol Cookstove and Fuel distributor in Dar es Salaam—Consumer Choice Ltd. The aim of the visit was to learn from the experience of CCL to see if there was possibility of replicating the project in Zanzibar. The visit began with discussions including the management of CCL (Executive Director Frida Mlingi and the Head of Operations, Mohammed Kadhi and UNIDO), followed by a visit to the ethanol blending and bottling plant and a tour of the stove assembly unit.



From R-L the Head of Operations , Mohammed Kadhi, Gerald Runyoro UNIDO Programme Officer, Frida Mlingi Executive Director, Representatives from the Ministry of Trade and Industry Zanzibar and SIMDA Director General from Zanzibar.

## *UNIDO collaboration with TBS on Standards Development for Ethanol Fuel and Ethanol Cookstoves*

UNIDO collaborated with the Tanzania Bureau of Standards (TBS) to develop national standards for ethanol cookstoves and ethanol fuels which also included capacity building support which involved a visit to Kenya Bureau of Standards, for the exchange of experiences with key institutions on establishment of standards for ethanol cookstoves and fuel. The Standards for Tanzania, were subsequently developed after the visit. TBS team visited Clean Cooking Association of Kenya (CCAK), Kenya Bureau of Standards (KEBS), Kenya Industrial Research and Development Institute (KIRDI) and KOKO stove (ethanol appliances Co.).

The main purpose of the visit was to gain insight on the KEBS experience in developing standards for ethanol cookstoves and ethanol fuel. Also, for gaining more knowledge on the performance and sustainability of the existing standards, as well as learning from manufacturers and consumers on product feedback (ethanol cookstoves and ethanol fuel) and identification of opportunities for harmonization of standards within the region.



Ethanol cook stove demonstration to the TBS colleagues from KIRDI.

## *Clean Cooking Alliance (CCA)*

In 2022, the Clean Cooking Alliance (CCA), working through the UN Foundation, embarked on a fact-finding mission to selected target countries to determine the readiness of Governments to adopt strategies to raise the profile of clean cooking in their countries. In Tanzania, CCA approached UNRCO, UNIDO and UNCDF to assist in organizing meetings with some of the key stakeholders in the clean cooking sector including the Ministry of Energy and the Vice President's Office-Division of Environment.

Discussions were held with various representatives from the Ministry of Energy, the Vice President's Office-Division of Environment on the possibility of establishing a Delivery Unit (DU) within the Government framework, for the purpose of furthering objectives for providing access to clean cooking and implementing national strategies for clean cooking.

# FROM RESULT-BASED FINANCING TO MEF APPLICATION AND CAPACITY DEVELOPMENT

The UNIDO Global Impact Programme for ethanol cooking and the rapid rollout via the Market-Enabling Framework (MEF) are cutting-edge approaches to solve the problem of clean cooking delivery and are being successfully applied in Dar es Salaam.

**UNIDO's Dar es Salaam Market-Enabling Framework is set out below:**

## Clear vision and targets

- The reduction of charcoal is directly linked to the goal of the Tanzanian Government.
- To switch 160,000 middle-income households in Dar es Salaam to ethanol is set as a clear target.

## Status quo

- Cooking needs are already met by current cooking fuels.
- Local meal varies from beverages to staple foods such as beans, maize, and rice meal.
- Customers will have to switch cooking habits.
- Charcoal – \$ 1/ day and rising.

## Competitive market environment

- Introduced stoves are “aspirational” modern cooking appliances comparable to LPG stoves. They represent a footstep change.
- Stove price ceiling set: \$14 per single plate stove.
- Fuel price: \$ 0,75-0,95 per litre (on par or just lower than charcoal).

## Scale-up

- 160,000 units a level to create the development of a significant industry, a demand of about 30 million litres / year.
- Stove orders of this scale will shift the production to efficient levels, reducing appliance costs.
- Project will be the catalyst of other markets.

## Commercial enterprise involvement

- A new ethanol distribution industry is needed to serve these customers.
- Existing and prospective fuel producers will respond to the emerging market demand.
- Private sector guarantee fund leverages investment and helps with capital requirements.

## Marketing enabling interventions

- The selected market intervention is primarily a stove subsidy, reducing the stove price and thus enabling households to purchase the stove and make the fuel switch.
- Anticipation of the new fuel demand by households purchasing the stove attracts businesses to engage.



Retail outlet, Dares Salaam

## **UNIDO and TIB are now engaged in developing the operational manuals and procedures to initiate operations and sustainable fund-raising efforts for the Bioenergy Incentive facility Fund (BIF) for Tanzania**

UNIDO GIP ethanol-based cooking and the rapid roll out via a market enabling framework are cutting edge approaches to solving the problem of clean cooking delivery and were successfully applied in Dar es Salaam. To specifically address the funding challenges of the bioenergy sector in Tanzania, UNIDO has identified, teamed up and assisted the Tanzanian development bank (TIB) in the scoping of a private sector credit guarantee scheme to support private sector investors access local lending products on market favourable terms.

Based upon a diagnostic study and recommendations (Pre-Feasibility Study), UNIDO and TIB are now engaged in developing the operational manuals and procedures to initiate operations and sustainable fund-raising efforts for the Bioenergy Guarantee Fund (BEGF) and Bioenergy incentive Fund for Tanzania. UNIDO is providing TIB with seed capital for assisting in mobilizing the envisioned 10 million USD from additional partners and donors to set up the BEGF designed to unlock over 100 million USD in local private sector investments in the value chain.

# CAPACITY DEVELOPMENT

As the first child project of the UNIDO Global Impact Programme for Clean Cooking, substantial capacity development has been achieved in Dar es Salaam with 160 people trained in bioethanol, starting with the set-up of the ethanol fuel market-enabling framework:

- **160 people** were educated and trained through workshops on the bioethanol cooking industry development, including ethanol production (micro-distilleries) and distribution and marketing approaches.
- **43 women** from different organizations (central and local Government, private sector, NGOs, sugar/ ethanol industry and academia / research institutions) participated in four workshops. Of these women, 25 are from policy-making institutions. The first selected vendor is a woman-led organisation.

## Technical capacity was established on local ethanol stove manufacturing use:

- Training for distributor sales and marketing staff on handling and operating stoves was provided; In addition, safety training on the stove and handling of the fuel was completed.
- Training for distributor staff on stove assembly line procedures, assembly line sequencing and operation and maintenance as well as cookstoves assembly training was given to the distributors staff.
- Training materials were prepared and supplied directly to distributor staff for their use at the stove assembly facility by the stove supplier.

Moreover, UNIDO has prepared a policy brief for Government and stakeholders on policy tools, such as VAT, import duties on ethanol fuel and cookstove appliances and other fiscal and regulatory actions. In addition, a micro-distillery guidebook and the strategy on using carbon finance to provide funds for the stove subsidy after the UNIDO RBF programme closes, have been developed.

## Technology transfer was achieved for ethanol production through micro-distilleries:

- Workshops on micro-distilleries that included representatives from engineering services, companies, entrepreneurs, and SMEs as well as candidates from Tanzania were sponsored. Several workshops took place in Dar es Salaam in the University of Dar es Salaam and Sokoine University of Agriculture and one was convened at King Mongkut's University of Technology Thonburi (KMUTT) in Thailand, to which Tanzanian participants were invited.
- A detailed planning tool was prepared for both ethanol distributors and fuel producers to specifically help guide potential investors in micro distilleries through investment and financial calculations for project financial, and technical feasibility.
- In terms of policy standards, the Tanzania Bureau of Standards (TBS) and the private sector stakeholder such as Tanzanian Private Sector Foundation (TPSF) supported through information provision, fact finding missions and inputs to standards approval process for both ethanol cookstoves and fuel standards.





# STANDARDS DEVELOPMENT

---

The Tanzania Bureau of Standards (TBS) has been supported with technical inputs for the formulation of standards for cookstoves and fuel, including the facilitation of a tour to Kenya to exchange experiences with the Kenya Bureau of Standards on its bioethanol standards development and harmonisation.

## WAY FORWARD

---

The achievement of phase one sales targets has progressed slowly but steadily, having overcome obstacles such as the Covid19 pandemic. Additional distributors are soon to be brought on and will accelerate the achievement of stove sales targets. As a result, phase one was achieved at the end of 2022.

Thus, in Dar es Salaam, the first Global Impact Programme for Clean Cooking project (GIP-CC) is steaming ahead with the contracting of additional distributors to supply stoves in further areas through European Funding.

The project will grow until there are three to four successful distributors and the

target of 160,000 households using ethanol for cooking is achieved. Through the GEF component, the project will also continue to provide support for the establishment of a Bioenergy Centre at the Sokoine University of Agriculture.

UNIDO seeks to raise funds from additional donors to replicate the GIP-CC in other countries. For example, in Tanzania, the Government is seeking to introduce ethanol cooking to Dodoma, its new capital city, and to the island of Zanzibar, where most charcoal is imported from the mainland and where the mangroves must be protected. This will be part of Zanzibar's Smart City Programme.

## OUTLOOK

---

UNIDO has bold plans through its Global Impact Programme for Clean cooking to switch at least 500,000 households from traditional biomass fuels to ethanol for cooking in each country where the GIP-CC is run. This will be a total of 10 million households in 20 countries. This will create a market for 10 million ethanol cooking stoves and two billion litres of ethanol per year, which translates into an investment mobilisation of US \$2 bil. by the private sector.

In June 2021, UNIDO and the Clean Cooking Alliance (CCA), in partnership with the Africa Union Commission (AUC), the UN Economic and Social Commission for Asia and Pacific (UN-ESCAP), the Global Bioenergy Partnership (GBEP) and the Sustainable Energy for All (SEforALL) organized an Expert Group Meeting (EGM) on "Clean Cooking: Potential for Bioethanol Industries in High Impact Countries". The expert group adopted a call for action and requested UNIDO and other development partners to establish a multi-stakeholder platform to promote ethanol as a clean cooking fuel. Following up on the specific call for action by the Expert Group the Council on Ethanol-based Clean Cooking was launched at COP 27 and is open to countries with an interest in establishing a domestic ethanol industry. Thus, will build up a global knowledge and lessons sharing on technology, R&D, and financing in bioethanol developments.



Photo: Barbera Grover, Blue Flame Stoves

## FOR FURTHER INFORMATION PLEASE CONTACT:

### **Jossy Thomas**

**UNIDO Headquarter Vienna**  
Vienna International Centre  
P.O. Box 300, A-1400 Vienna  
Austria  
Email: [J.Thomas@unido.org](mailto:J.Thomas@unido.org)

### **Viktor Akim**

**UNIDO Field Office Tanzania**  
P.O. Box 9182  
182 Mzinga Way, Oysterbay  
Dar es Salaam, Tanzania  
Tel: +255-684-887 426  
Email: [v.akim@unido.org](mailto:v.akim@unido.org)



**Vienna International Centre**  
Wagramerstr. 5, P.O.Box 300,  
A-1400 Vienna, Austria



**+43 (1) 26026-0**



**[www.unido.org](http://www.unido.org)**



**[unido@unido.org](mailto:unido@unido.org)**



**UNITED NATIONS  
INDUSTRIAL DEVELOPMENT ORGANIZATION**