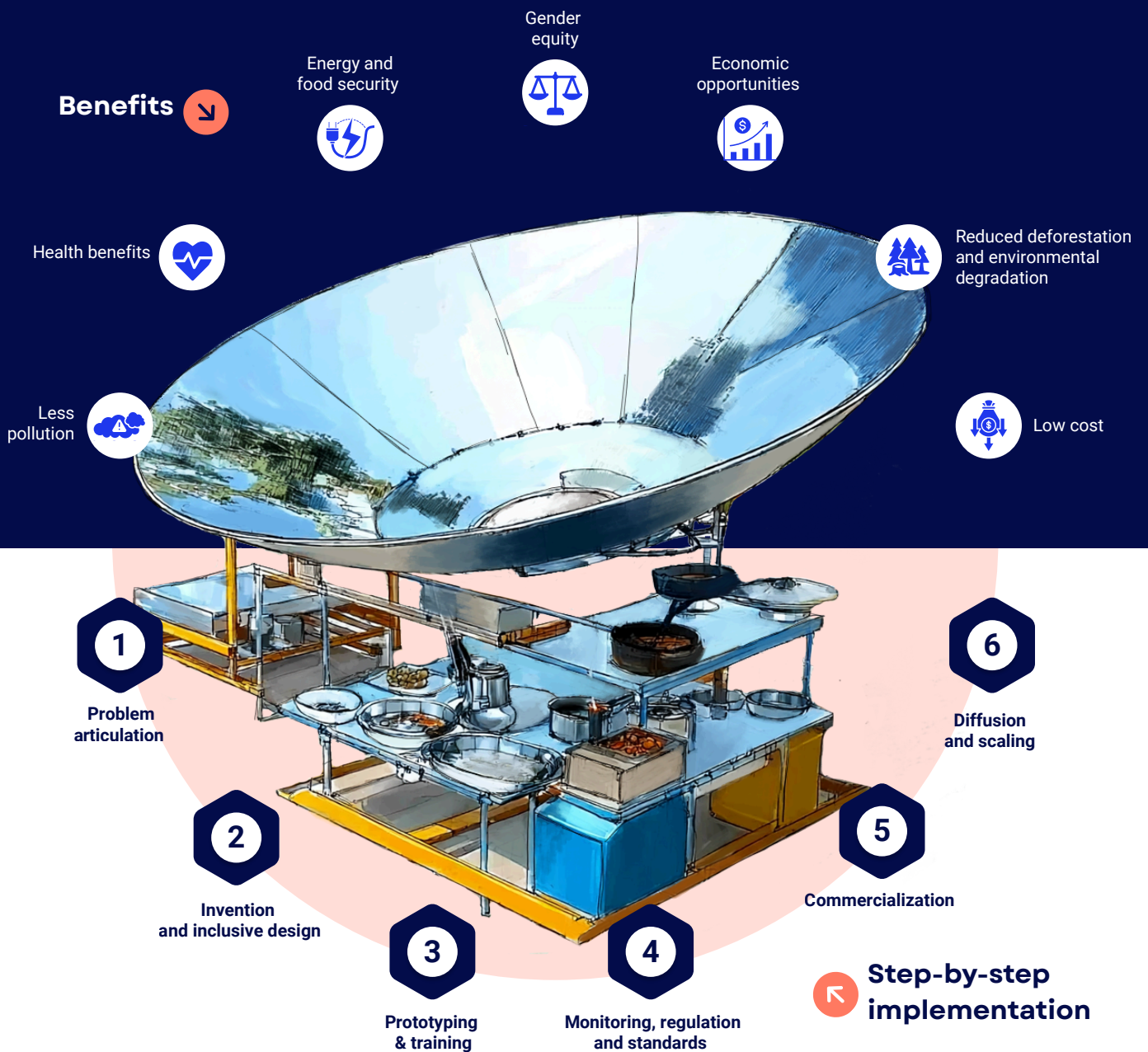


SOLAR COOKING

Harnessing sunlight for clean, affordable and climate-smart cooking

Objective: Climate adaptation and mitigation

Approach: Community based | Disaster risk reduction | Ecosystems and biodiversity | Gender



“When we co-create with the community and merge scientific and indigenous knowledge, we come out with very sustainable and welcome kinds of innovations.”

- Rosemary Atieno, Director, Community Mobilization for Positive Empowerment

Solar cooking technology

Solar cooking technologies provide a zero-emission, low-cost, and sustainable alternative to biomass cooking methods that address both energy insecurity and climate change. These technologies can reduce the usage of biomass fuels, especially in regions with high solar irradiance, improving household energy security, enhancing community resilience, and contributing to national climate targets.

Solar cooking is particularly suitable for sun-rich countries, including those in Africa, South Asia, and Latin America.

Where integrated strategically into climate technology frameworks, solar cookers can help achieve targets related to clean energy access, emission reductions, gender equity and rural development, as part of their Nationally Determined Contributions (NDCs) and National Adaptation Plans (NAPs). This is a particular priority for Sub-Saharan Africa, which is expected to make up the largest proportion of people without clean cooking solutions by 2030.¹

A solar cooker is a device that uses the energy of direct sunlight to cook, heat or dehydrate food and pasteurize water.

Solar cookers come in various forms, such as:

- **Box cookers** – insulated containers with transparent covers that trap solar energy and transform it to heat.
- **Parabolic cookers** – curved reflectors that concentrate sunlight to a central focal area for high-temperature cooking.
- **Reflective-panel cookers** – lightweight and foldable models using reflective panels to direct sunlight to a cooking pot placed within a transparent heat trap (greenhouse).

The selection of an appropriate solar cooker model depends on multiple factors, including expected lifespan, available materials, cooking temperature requirements, and production and maintenance costs. The simplicity or complexity of construction should align with local manufacturing capabilities and intended use. A range of open-source designs are available, and international ISO standards (ISO/TC 285) provide guidance on performance, efficiency, emissions and safety to support quality assurance and consumer confidence.

In alignment with the World Bank's Multi-Tier Framework (MTF) for cooking, solar cookers provide reliable, high tier clean cooking technology to meet a portion of a household's cooking needs. The MTF assesses the suitability of cooking devices according to six attributes: exposure, efficiency, convenience, availability, safety, and affordability.²

Solar cookers are considered clean cooking technologies that meet the definition of Tier 4 or above on each relevant attribute (excluding efficiency, which refers to thermal efficiency from combustible fuels and does not apply to solar cookers since sunlight is the fuel source), scoring the highest Tier 5 for exposure, convenience, safety, and affordability, and Tier 4 for availability of fuel in regions with strong solar irradiance. When solar cooking is integrated with other clean cooking solutions to address potential gaps in access to sunlight (seasonality, nighttime cooking), households that adopt solar cooking are more likely to meet the MTF definition of access to modern energy cooking services.



Solar cooking demonstration, Mali

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Central African Republic

Solar cooking in practice

-  **Location**
Bangui
-  **Duration**
September 2024 – November 2025 (15 months)
-  **Implementing partner**
Solar Cookers International
-  **National designated entity**
Ministry of Environment, Ecology and Sustainable Development
-  **Project proponent**
University of Bangui
-  **Funder**
European Union, through UN CTCN
-  **Other key stakeholders**
Community representatives (in technical and youth committees), Association Ici c'est Chez Nous, Youth for the Protection of the Environment in Central Africa

The Central African Republic (CAR) prioritizes addressing deforestation, forest degradation, and the health impacts of biomass cooking, as reflected in national plans like the NDC and NAP, which advocate for improved cookstoves.

However, deforestation has persisted, with forest cover declining from 36.8% to 35.8% between 2000 and 2020.³ Improved cookstoves could help curb this trend by reducing wood fuel demand and lowering the risk of cooking-related forest fires. The country's updated 2021 NDC sets a target for 10% of households to be equipped with solar cookstoves by 2030.⁴ Despite growing governmental focus, progress has been limited due to the scarcity of improved stoves, which are mostly imported from neighbouring countries.

The Central African Republic, with the technical support of UN CTCN and partners, implemented a pilot project to evaluate, promote, and scale up the use of solar cooking technologies.

The initiative aimed to reduce deforestation, improve community health, empower women and contribute to climate resilience. Over 300 community stakeholders across four targeted project sites, including traditional chiefs and community leaders, took part in awareness activities with demonstrations of solar cookers.

A total of 180 households were selected to receive solar cookers (reflective panel, box oven, and parabolic reflector models) that were locally manufactured by the University of Bangui using open-source design plans.

Local facilitators trained through the project offered support to and gathered feedback from households. Thirty youth “solar cooking advocates” recruited by University of Bangui and NGOs undertook training and formed a youth committee. The youth advocates were involved in undertaking surveys on the adoption and impact of solar cookers and supporting community awareness, distribution, monitoring and evaluation and local capacity building.

Looking ahead, the project will build on initial awareness and pilot efforts by expanding community training, led by newly trained local facilitators, to ensure all pilot households can use solar cookers effectively. Ongoing reinforcement visits will support adoption, address challenges, and promote long-term behavioural change for future scale-up in the Central African Republic.



Mali

Solar cooking in practice

-  **Location**
Koulikoro Region and Bamako District
-  **Duration**
December 2024 – November 2025 (12 months)
-  **Implementing partner**
Solar Cookers International and Togo Tilé
-  **National designated entity**
The National Meteorological Agency (Mali-METEO)
-  **Project proponent**
Commune of Banamba, Koulikoro Region, and Commune V, Bamako District
-  **Funder**
European Commission, through UN CTCN
-  **Other key stakeholders**
Community representatives (in technical and youth committees)

Limited electricity access (only 15% in rural areas) and high energy costs strain livelihoods.

Mali, a largely desert, landlocked country in the Sahel, faces severe environmental degradation from climate change and unsustainable resource use. **Over 80% of households rely on wood or charcoal for cooking and heating, driving deforestation, CO₂ emissions, and health risks, while rural women bear the heaviest burdens of wood collection amid growing insecurity.**⁵ Limited electricity access (only 15% in rural areas) and high energy costs further strain livelihoods. These challenges call for awareness, training, and the adoption of clean technologies such as solar cookers.

With the technical assistance of UN CTCN, a pilot project was implemented in two pilot communities: Commune of Banamba, Koulikoro Region, and Commune V, Bamako District. The objective was to strengthen the adaptive capacities of rural and urban populations, with an emphasis on the effective participation of women and their resilience to climate change. In particular, the project focused on reducing dependence on biomass for cooking by facilitating the development, production and transfer of energy-efficient cooking technologies.

In the pilot communities, various solar cooking devices (parabolic cookers, solar electric cookstoves, reflective panel cookers, and box ovens), as well as heat retention devices and improved biomass cookstoves as secondary devices were assigned to different households, based on their specific needs.

Across 12 rural and peri-urban locations, 448 community members (375 women and 73 men) took part in solar cooking awareness and community engagement events. These sessions covered climate change impacts, deforestation in Mali and the need for alternative cooking solutions, introducing solar technologies that reduce reliance on wood and charcoal for cooking. Participants observed and assessed various solar cooker designs.

Going forward, the results of the pilot project will help to guide partnerships between the public and private sectors and communities to boost supply and demand for zero-emission solar cookers, create local income opportunities, and position Mali as a leader in clean cooking solutions.



Solar cooker demonstration, Mali

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“Having data that points to specific outcomes is really important to make sure that’s part of the planning for how to deploy solar cooking technology”

– Keith Wingard, Strategic Partnerships Manager, Solar Cookers International

Key considerations and recommendations

Drawing from UN CTCN pilot projects, the following lessons can guide National Designated Entities and other stakeholders in the development and implementation of solar cooking technologies:

1 Promote inclusive design and co-creation → Promote inclusive design and co-creation with communities, especially women, in the design, testing, and demonstration of solar cookers tailored to local cooking practices.

Train women in business development and manufacturing and partner with women’s cooperatives to strengthen their role in the clean cooking value chain.

← **2 Advance gender integration**

3 Strengthen training, awareness, and behaviour change → Strengthen training, awareness, and behaviour change through local champions, culturally relevant materials, and community-based demonstrations.

Integrate solar cooking into vocational training, and enabling SMEs with access to tools, finance and mentorship.

← **4 Build technical capacity**

5 Develop inclusive financing models → Explore models such as blended finance, pay-as-you-cook, carbon credit schemes, lease-to-own, and innovation grants to expand affordability and market reach.

Integrate solar cooking into national policy and institutional frameworks including NDCs and NAPs, disaster preparedness strategies, and clean cooking standards and certification systems.

← **6 Align with policy**

7 Create demand → Stimulate demand creation through coordinated public awareness campaigns, climate education programs, and integration into gender and development initiatives.

Partner with international agencies, development banks, the private sector and climate finance mechanisms to mobilize investment and embed solar cooking into national energy access programmes.

← **8 Foster partnerships**

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