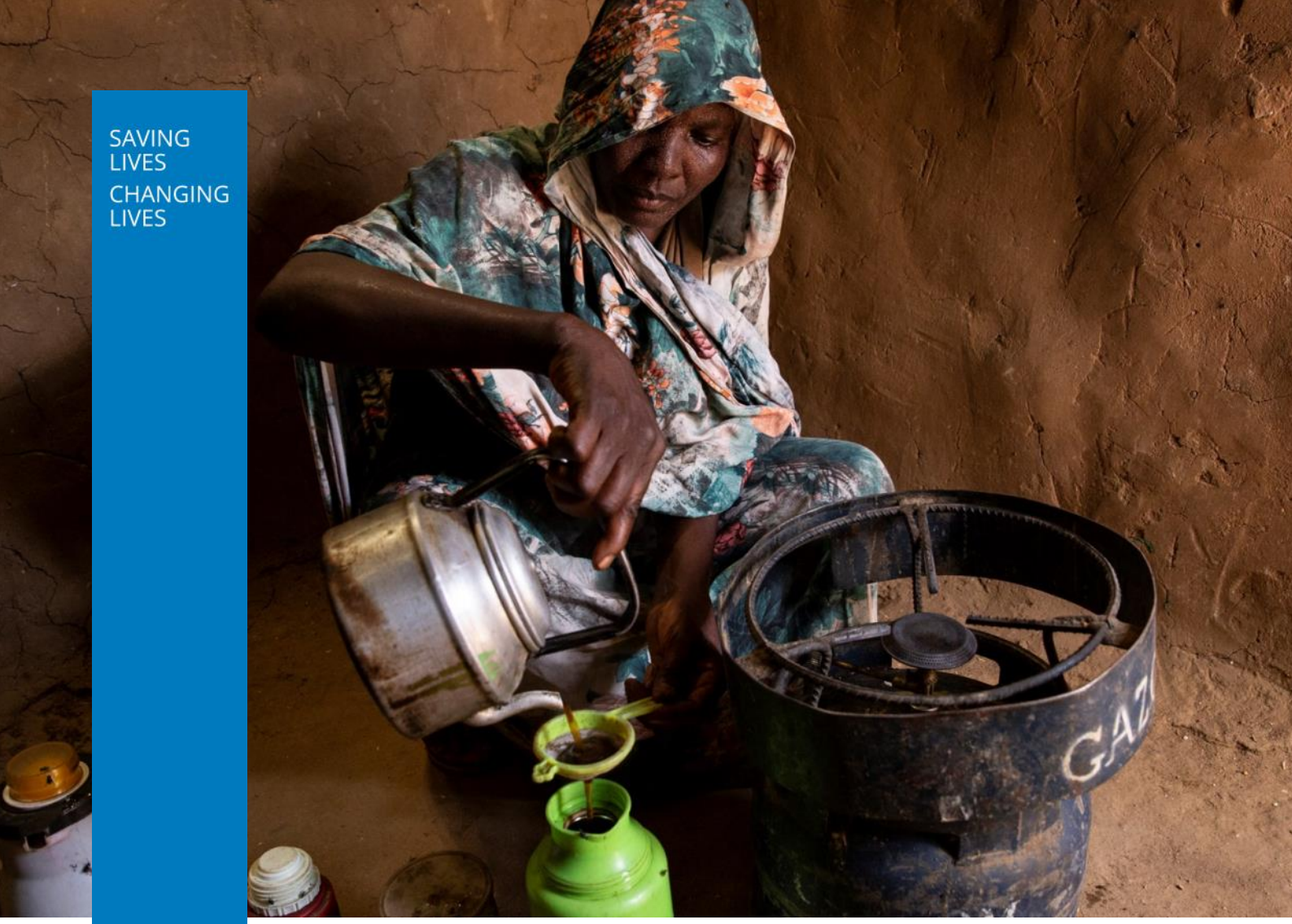
SAVING LIVES
CHANGING LIVES



Assessing cooking needs in Chad

Methodology and findings

Access to clean cooking remains a neglected aspect of humanitarian response in displacement settings, largely due to limited capacity of agencies responding to crises, lack of dedicated funding and the focus on short term needs. Rather than being linked to food assistance programmes, cooking interventions often come as an afterthought and with insufficient scope. This can lead to negative environmental, health, security and socio-economic impacts. The "**Modern Cooking Solutions in Chad and Beyond**" project (funded by SIDA and implemented by WFP and UNHCR) aimed to address cooking needs in six refugee camps in eastern Chad. Cooking solutions are highly context-dependent and are intimately linked to people's culture, preferences, habits and convenience as well as to the local availability and affordability of fuels and appliances. To gain a thorough understanding of opportunities for clean cooking in Chad, the project gathered information through a desk review mapping of ongoing and past activities as well as government policies and strategies. This was complemented by an energy need assessment and market scoping to identify end users' needs and wants, potential solutions and suppliers already available in the country. Chad is situated in a highly vulnerable area that suffers from overlapping ongoing conflicts. The displaced refugee population is the 10th largest in the world, mostly hosted in camps. The region is vulnerable to climate change which has led to a shift in rain patterns, increased frequency of droughts and desertification. These phenomena have significant impacts on agricultural practices that support local livelihoods. Scarcity of resources and poverty result in tensions between communities, exacerbated by the arrival of refugees.

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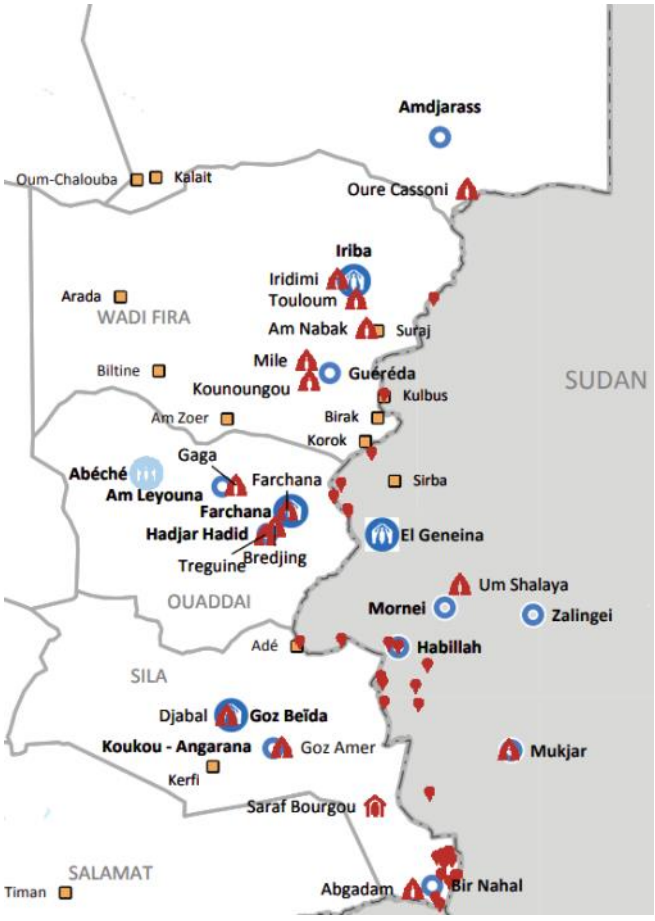
Chad is one of the poorest countries in the world, with high levels of malnutrition and low GDP (US$ 1,79 per capita). Access to energy in Chad remains low, with only 3% of the population using clean cooking technologies.

METHODOLOGY

Desk-based review. A desk-based study took place in September 2021 to establish the context of the project, gather data from past and existing initiatives, and, by means of an inception workshop, foster synergies for partnerships. The study reviewed energy use for cooking and other purposes in households, institutions and commercial dwellings. This was based on past donor funded energy access projects, government policies, strategies on clean cooking, energy development plans in Chad and the region, and previous vulnerability assessments. The focus was to examine energy technology solutions, delivery models and financing mechanisms. Issues encountered included weak inter-agency and organizational cooperation, weak institutional memory, and a reluctance to share data among organizations.

Field assessment. A field assessment was conducted to build additional evidence collecting primary data that was directly relevant and specific to the context of the project, as secondary information was scarce, difficult to access, or not publicly available. Data collection was carried out between September and November 2021 through surveys targeting 89 households, 12 restaurants and street food vendors, 28 fuel resellers and 6 stove manufacturers and sellers to investigate:

- Local cooking practices, cooking options, and suppliers able to provide cooking solutions
- Locally available fuel mix and existing supply chains
- Sustainable energy-efficient technologies and existing supply chains



The project interests the Wadi Fira and Ennedi East regions in six refugee camps: Iridimi, Touloum, Am Nabak, Milé, Kounoungou, and Ouré Cassoni.

Heavy reliance on fuelwood is unsustainable in the long-term. Access to modern energy cooking solutions such as Liquid Petroleum Gas (LPG) and electric cooking is critical to advancing universal energy access, improved health and well-being, gender equality, climate action, peace and justice, and livelihoods.

FINDINGS

A large proportion of Chad's local and refugee populations use firewood as a primary source of cooking fuel. The increase of energy demand in the area leads to several issues:

- Wood collection contributes to **deforestation, desertification and environmental degradation**, which in turn impacts ecosystems services and livelihoods.
- Fuel collection in remote areas increases **protection risks** due to competition between refugees and hosting population on limited resources.
- **Time spent** on fuel collection, preparing and tending fires and cleaning pots from soot has strong gender repercussions. Time is taken from education, income generation and other activities, as well as participation in community life.
- **Exposure to harmful emissions** from burning biomass leads to premature deaths due to respiratory diseases.
- The Chadian Government has **banned the usage of charcoal and green wood** for domestic use. However, lack of alternatives makes the ban ineffective.
- **Commercial wood can be purchased in selected refugee camps** but it is typically very expensive for the most vulnerable. Although Chad is working to develop a framework to fully integrate refugees into the national system, they do not currently have the legal right to work or earn an income and largely resort to collecting wood.

LOCAL COOKING PRACTICES

The survey found that the majority of households (76.4%) prepare two meals per day, while 19.1% prepare three or more meals per day. Most households cook on a *Banco* stove (raised bundt shaped mud constructions) or three stone fires. The remaining households cook with improved biomass stoves, solar cookers, direct solar technologies made of cardboard and aluminum, and very few with Liquified Petroleum Gas (LPG). Some households use a combination of appliances, which is referred to as stacking (see Table 1). The restaurants interviewed cook with LPG gas stoves, *Banco* ovens, and occasionally electric kettles and microwaves. Household meals consist of **bread** prepared from **sorghum flour** or **maize porridge** accompanied by **sauce** (e.g. gumbo). Typically, **breakfast** consists of **tea** and **maize porridge** while **bread** is eaten in **the evening as part of a larger meal**. All these foods can be prepared with improved biomass, LPG or electric stoves, while solar cookers could be used to boil water for tea or preparing sauces.

TABLE 1	Appliances
LPG stove	3%
Biomass improved stove	18%
Three stone fire	24%
Banco stove	77%
Solar cooker	9%

TABLE 2	Fuels
Gas	3%
Firewood	98%
Charcoal	12%

The use of fuels aligns with the technologies that were indicated, **with firewood at 98%** followed by charcoal and butane gas (see Table 2). **Firewood is primarily collected** (61%) but as much as **43% of respondents purchase it from retailers at the market within camps or villages**, with some households both collecting and buying fuel. 89.9% of respondents indicated that they faced difficulties procuring fuel wood, including harassment and competition with host communities.

61%

people collecting firewood

43%

people purchasing fuel

Once the indirect costs of fuel collection were factored in, particularly time loss, it was inferred that despite the very low purchasing power of households in the area and limited technical knowhow, **nearly all respondents were willing to pay a small amount to access an improved cooking technology.**

There were however strong preferences on technologies, with solar electric cookstoves emerging as highly desirable although the technology is not widely known. The reason indicated was the ability to eliminate the use of fuel and associated costs. Respondents that were not willing to pay, still wished to acquire improved cooking technology but stated that they could not afford it.

EVALUTION OF COOKING OPTIONS

A range of cooking solutions were explored under this project and evaluated against criteria designed to ensure successful uptake: LPG; solar electric cookstoves, e.g. electric pressure cooker (EPCs) either powered by direct current diode solar or by a national grid or mini grid; ECOCA[1]; solar cookers; improved biomass cookstoves; and biogas/biofuel stoves. The most basic requirements for a suitable solution were defined as:

- **Acceptable**: either familiar to the end user or very convenient to use also in terms of fuel.
- **Usable**: reasonable learning curve, fits with local cooking needs.
- **Available**: already offered on the market or ready to be introduced to the market. This also considers the availability of materials to manufacture solutions and the ability to procure fuel.
- **Affordable**: sold at the right price level - a combination of willingness to pay and good cost-benefit ratio.

As shown in Table 3, other parameters were considered to determine the most suitable technological solution for the unique context of humanitarian settings in Chad: **heating speed** (how quickly the stove heats up), **durability** (stove lifespan)**, reliability** (whether it can be consistently and dependably used regularly for cooking), **quality** (variations in heat rate that might affect the ease of cooking), **legality** (alignment with Chad's national strategies and laws), **convenience** (cooking time, difficulty to use, and if fuel is difficult to procure), **health** (reduces exposure to indoor pollution) **safety** (reduces exposure to physical harm), **resale value** (likeliness for

beneficiaries to retain the solution to use for themselves or to sell for a profit), and **reusability** of materials (ability of different components to be recycled).

Solutions were compared on each criteria and colour coded with rating going from low (red), medium (beige), or high (green). **Overall, the most promising solutions were found to be LPG and solar or grid powered EPC**. Despite offering time savings in terms of fuel collection, providing charging services, and offering a healthy and safe cooking environment, the **ECOCA** was eliminated for its high upfront cost (US$499 per stove) and lack of local resale and repair infrastructure. **Solar thermal cookers** avoid the use of biomass, they align well with Chad's national strategy to promote solar energy, are cheap, available, easily reparable and safe. However, they were rather unpopular among the target population as they take a long time to cook and increase cooks' exposure to the sun and heat. They are only suitable for a subset of dishes, are not durable and are fully dependent on sunlight which is not consistently reliable (particularly

TABLE 3	LPG	ECOCA	Solar EPC	Solar thermal	Improved biomass	Biogas
Heating speed						
Durability						
Reliability						
Quality						
Affordability						
Convenience						
Health and safety						
Availability						
Reselling value						
Reusability of materials						

1. ECOCA is a solar PV powered appliance manufactured by Pesitho https://pesitho.com/the-ecoca-new/

As each cooking solution analyzed presents limitations when applied to the context of Chad, it is likely that several technologies will be used concurrently. End users should ideally be offered a range of options to choose from.

during the rainy season). **Improved biomass stoves** were unpopular among interviewees and the use of biomass is also discouraged in Chad's national strategy. **EPCs** are commercially available in most countries at a cost that enables a reasonable payback period and would be ideal if the national grid reached the area or a photo-voltaic solar mini-grid was to be built. Lastly, **biogas stoves** were not seen as a viable solution due to lack of local manufacturers or resellers, low availability of animal manure and water and the cultural and social acceptability of using excrement to cook food.

RECOMMENDATIONS

While no single **cooking solution analyzed** is ideal for the context of Chad, most of them **could be part of a fuel stacking mix** which may still involve the use of firewood. Based on the chosen criteria, for both households and institutions, **the two most viable solutions were found to be LPG and solar EPC powered by standalone direct current diode solar panels.**

LPG cylinders

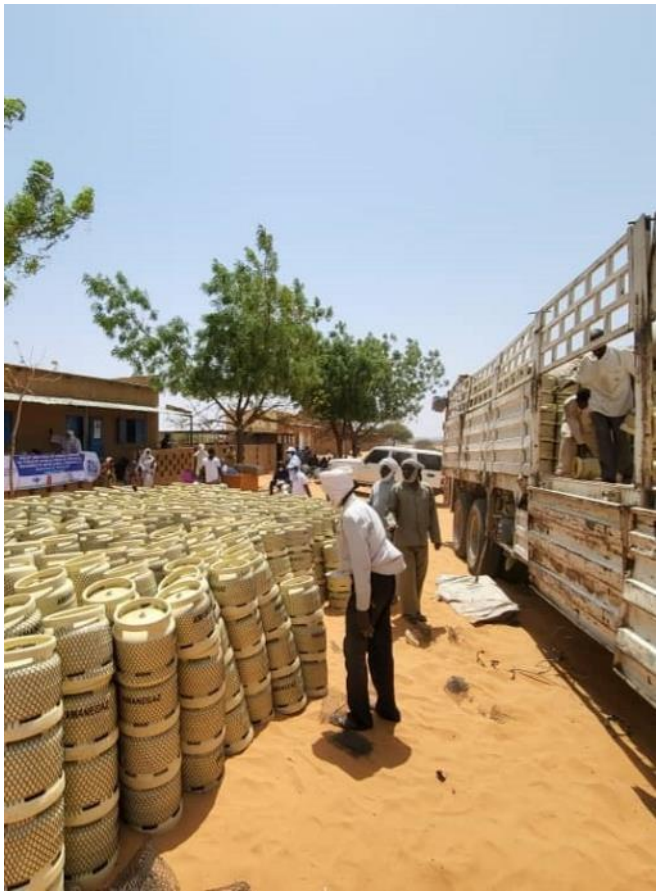
Solar electric pressure cookers

Both options align well with the national strategies to address environmental degradation, health impacts, gender inequality and conflicts over resources. Preferences from the household surveys highlighted that the most sought after characteristics of cooking solutions are the ability to cook quickly, consistently, at a low cost, and, in the case of EPCs, with little supervision. In the analysis, criteria such as reliability, affordability and convenience were therefore weighted over others. Durability and availability were also considered. This was particularly true for businesses that highly valued LPG and solar electric cookers as best suited to their needs and most helpful to reduce dependency on biomass as a fuel. Both solutions are aspirational for end users, but also present drawbacks. LPG cooking is bound to recurrent fuel expenditure after the initial investment for the cookstove and cylinder. LPG fuel, imported from abroad, is also subject to cost oscillations linked to global trends of gas prices. In addition, transportation to remote regions, such as those where the camps are located, is costly and subject to seasonal disruptions due to flooding of roads in the rainy season. Solar electric pressure cookers on the other hand, have a considerably higher upfront cost, but can then work without significant additional costs and the EPC and DDS technologies combined provide for a non-proprietary solution, hence lowering barriers to supply chain and market development. However, the lack of distribution networks, and gaps in local maintenance and repair capacity remain a challenge for their uptake.

DELIVERY MODELS

Traditionally, humanitarian agencies respond to the lack of access to energy by procuring technology such as cookstoves or solar lanterns and distributing them for free.

The **procure-distribute** delivery model however, **cannot address energy access at scale and over time**. The number of products distributed and the duration of services provided is dependent on the size of grant funding and its short disbursement timeframe. This modality is unsuited to address long-term needs in protracted crisis situations. Camps have existed in eastern Chad since 2005 and over time refugees have started to turn their housing into semi-permanent settlements. Even with restrictions over working rights, the communities in these camps face problems that are similar to those of the host communities and typical of development contexts rather than acute emergency responses.



It is, therefore, essential to **include displaced populations in local and regional economies and energy markets**, including camps and settlements in national clean cooking initiatives and empowering refugees as customers rather than beneficiaries. Factoring long-term financial sustainability into project design would be important to reduce dependency on subsidies and donations. By including commercial activities (restaurants and street food vendors) and retailers of cookstoves and fuel in the project design, the project can address barriers in the energy value chain.

Lessons from development interventions indicate that, whenever possible, **beneficiaries should contribute economically to the purchase of equipment, avoiding free distributions**. This proves the proposed items are indeed relevant to end users, strengthens the sense of ownership and value associated with the product, which in turn increases adoption rates. Donations can also distort or prevent the development of markets and consequently the opportunity for the intervention to become self-sustaining. Modern payment systems such as **pay-as-you-go**, **micro-finance** and **lease-to-own** are ways to address upfront cost barriers. They can be complemented by WFP vouchers or incentive schemes.

Raising awareness of the product's benefits and **training on appropriate usage** is also important to address skepticism and avoid misuse or damage. Including host communities in the project, who often face similar energy access challenges as displaced populations, is essential in limiting tensions. Designing interventions that can outlive the project's funding period and technology lifespan, often shortened by lack of maintenance, is crucial in curbing dependence on aid.

It is also important to ensure that **the objectives of the project align with public policies related to domestic cooking** to ensure cohesion in potential partnerships. Furthermore, in isolated rural areas such as refugee camps, cooking solutions must account for the local context. This means **considering sociocultural norms, infrastructure and the presence of market actors**. As conditions strongly depend on location, an assessment is always advisable. Modern cooking initiatives must employ a multidisciplinary approach to identify solutions that are adapted to the needs and expectations of end-users while being realistically viable in the targeted area, in order to create conditions for long-lasting impact.

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