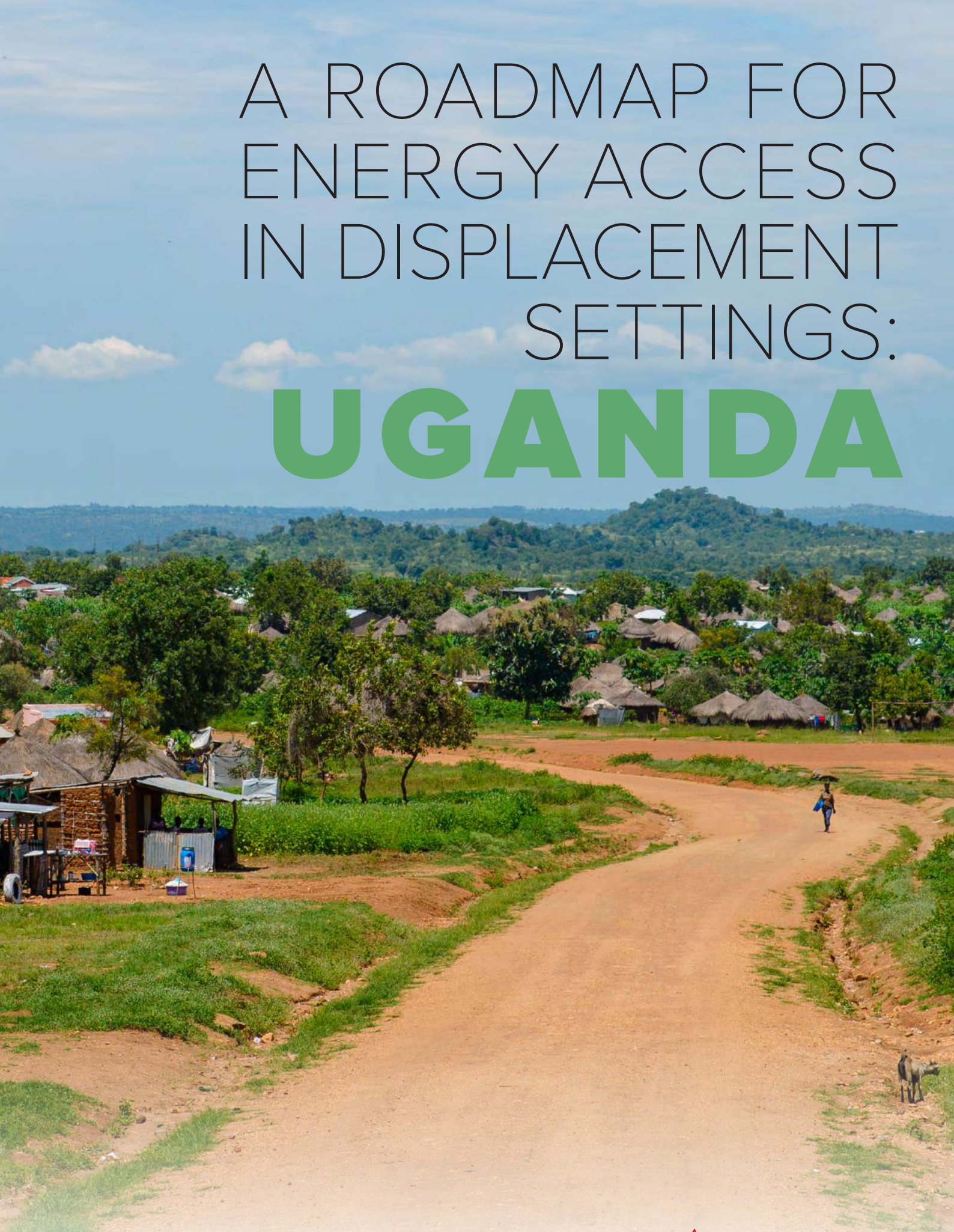
A ROADMAP FOR ENERGY ACCESS IN DISPLACEMENT SETTINGS: UGANDA



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About the partners

The **Global Platform for Action on Sustainable Energy in Displacement Settings** (GPA) is the global initiative to promote actions that enable sustainable energy access and use in displacement settings. The GPA strives to remove barriers to energy access in humanitarian settings by providing a collaborative agenda for energy, development, and humanitarian partners to deliver concrete actions of Sustainable Development Goal 7 (SDG 7) for displacement contexts. It promotes and contributes to the humanitarian sector's transition to renewable energy, which will increase efficiency and reduce costs and carbon emissions. Hosted by the United Nations Institute for Training and Research (UNITAR), the GPA Coordination Unit galvanises collective action towards the GPA's realisation.

About the READS Programme

The **Roadmaps for Energy Access in Displacement Settings (READS) Programme,** funded by the IKEA Foundation and implemented by the GPA Coordination Unit at UNITAR, will produce a "roadmap report" for each of the ten countries in its scope. The roadmap reports take stock of the state of energy access in displacement settings in each country with a focus on identifying gaps and high-impact project opportunities to increase sustainable energy access for displacement-affected communities.

These reports consolidate existing data and are informed by workshops with in-country stakeholders to develop and refine the research, including representatives of communities which have been affected by displacement, energy companies, humanitarian and development organisations, and governmental authorities, among others. The roadmap reports present project concepts that have been prioritised by local partners as being the most impactful areas for sustainable energy interventions in displacement contexts. Each roadmap report is produced in partnership with an organisation working in displacement contexts in the focus country.

About the READS Partner

Mercy Corps is a global team of 6,000 humanitarians working together in 40+ countries, on the front lines of today's biggest crises to create a future of possibility, where everyone can prosper. Its mission is to alleviate suffering, poverty, and oppression by helping people build secure, productive, and just communities. Mercy Corps goes beyond emergency aid, partnering with local governments, forward-thinking corporations, social entrepreneurs, and people living in fragile communities to develop bold solutions that make lasting change possible. Committed to support dignified lives also in emergency situations, Mercy Corps powers displaced and host communities in their journey to resilience through clean, affordable, and sustainable energy solutions and decarbonise the humanitarian operations that support them. It does that by providing the enabling environment for reputable energy companies to deploy their services and products, including access to settlements, contextual knowledge, and linkages with the broader market.

About the IKEA Foundation

The **IKEA Foundation** is a strategic philanthropy that focuses its grant making efforts on tackling the two biggest threats to children's futures: poverty and climate change. It currently grants more than €200 million per year to help improve family incomes and quality of life while protecting the planet from climate change. Since 2009, the IKEA Foundation has granted more than €1.5 billion to create a better future for children and their families. In 2021 the Board of the IKEA Foundation decided to make an additional €1 billion available over the next five years to accelerate the reduction of greenhouse gas emissions.

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Abbreviations

AMPERE	*Accessing Markets through Private Sector Enterprises for Refugees Energy*
ASCA	*Accumulating Savings and Credit Association*
BMZ	*German Ministry for Economic Cooperation and Development*
CRRF	*Comprehensive Refugee Response Framework*
DLG	*District local government*
DRC	*Democratic Republic of the Congo*
EASP	*Electricity (or Energy) Access Scale-Up Project*
ECP	*Electricity Connections Policy*
ENDEV	*Energising Development*
ERA	*Electricity Regulatory Authority*
ESDS	*Energy Solutions in Displacement Settings*
EUDCL	*Uganda Electricity Distribution Company Limited*
FAO	*Food and Agriculture Organization of the United Nations*
GCR	*Global Compact on Refugees*
GIZ	*Deutsche Gesellschaft für Internationale Zusammenarbeit*
GOU	*Government of Uganda*
GPA	*Global Platform for Action on Sustainable Energy in Displacement Settings*
ICRC	*International Committee of the Red Cross*
ICS	*Improved cookstove*
ICT	*Information and communication technology*
ILF	*International Lifeline Fund*
IOM	*International Organization for Migration*
KVA	*Kilovolt-amp*
KW / KWP	*Kilowatt / kilowatt-peak*
KWH	*Kilowatt-hour*

Abbreviations

KYC	*Know-your-customer*
LC	*Local council*
LPG	*Liquefied petroleum gas*
LWF	*Lutheran World Foundation*
MEMD	*Ministry of Energy and Mineral Development*
MFI	*Microfinance institution*
MNO	*Mobile network operator*
MW	*Megawatt*
NDP	*National Development Plan*
NEMA	*National Environment Management Authority*
NGO	*Non-governmental organisation*
O&M	*Operations and maintenance*
OPM	*Office of the Prime Minister*
OTC	*Over-the-counter*
PAYC	*Pay-as-you-cook*
PAYGO	*Pay-as-you-go*
POC	*Persons of Concern*
PUE	*Productive uses of energy*
PVOC	*Pre-export verification of conformity*
RBF	*Results-based finance*
RE4R	*Renewable Energy for Refugees*
REA	*Rural Electricity Agency*
READS	*Roadmaps for Energy Access in Displacement Settings*
REP	*Rural Electrification Programme*
RISE	*Regulatory Indicators for Sustainable Energy*

Abbreviations

RWC	*Refugee Welfare Committee*
SACCO	*Savings and Credit Cooperative*
SDG 7	*Sustainable Development Goal 7*
SERP	*Sustainable Energy Response Plan*
SGBV	*Sexual and gender-based violence*
SHS	*Solar home system*
SME	*Small and medium enterprise*
STA	*Settlement Transformation Agenda*
UECCC	*Uganda Energy Credit Capitalisation Company*
UETCL	*Uganda Electricity Transmission Company Limited*
UGX	*Ugandan Shilling*
UN	*United Nations*
UNACC	*Uganda National Alliance for Clean Cooking*
UNBS	*Uganda National Bureau of Statistics*
UNHCR	*Office of the United Nations High Commissioner for Refugees*
UNICEF	*United Nations Children's Fund*
UNITAR	*United Nations Institute for Training and Research*
USD	*United States Dollar*
VAT	*Value-added tax*
VSLA	*Village Savings and Loans Association*
W / WP	*Watt / watt-peak*
WENRECO	*West Nile Rural Electrification Company*
WFP	*World Food Programme*
Y-SAT	*Youth Social Advocacy Team*

Overview of common energy terms in displacement settings

Energy technologies for electricity and cooking, and the terms used to describe them, can vary between countries, contexts, and organisations. The descriptions used in this report aim to conform with the most commonly-used definitions in displacement contexts but may differ from those used by other organisations.

TERM	DESCRIPTION
MULTI-TIER FRAMEWORK (MTF) FOR ACCESS TO ELECTRICITY	*Access to electricity is categorised across seven attributes: capacity, availability, reliability, quality, affordability, formality, and health and safety.* *Each attribute falls in a range from Tier 0 (no access) to Tier 5 (full access). The MTF was developed by the Energy Sector Management Assistance Program (ESMAP) at the World Bank to better categorise access beyond a simple binary comparison of "access or no access".*
SOLAR LANTERN	*Solar lanterns are an off-grid technology usually composed of a small solar panel, battery, and LED light integrated into a single unit.* *Solar lanterns can typically provide a few hours of light from a single charge and may have a USB connection for charging phones.* *Suitable for a single user or household, solar lanterns typically provide Tier 1 electricity access.*
SOLAR HOME SYSTEM (SHS)	*A solar home system (SHS) is an off-grid technology kit usually composed of a solar panel, battery, LED lights, switches and control systems, and often appliances.* *The size and services provided by a SHS can vary but typically offer several hours of electricity per day for lighting, phone charging, and appliances such as radios. SHS are used by both households and businesses, and sometimes by community facilities.* *SHS usually offer between Tier 1 and Tier 3 electricity access and can be acquired through upfront purchases or PayGo models.*
MINI-GRID	*Mini-grids are decentralised electricity networks which can operate independently of the national grid. They typically serve a community with tens to hundreds of connections.* *Mini-grids have a power source (usually solar or diesel), battery storage and a distribution network to supply electricity to customers, as well as power control systems.* *Mini-grids can be designed to provide any level of electricity access and usually provide Tier 1 to Tier 3. Customers could include households, businesses, community facilities, or other users. Customers typically pay fixed tariffs for electricity consumption, or daily rates.* *"Mini-grid" often refers to systems with capacities ranging from tens to hundreds of kilowatts, but generically could refer to smaller systems (also known as pico- or nano-grids) or larger ones, perhaps also with a connection to the national grid.*
STANDALONE SYSTEM	*A standalone system can provide electricity independent of the national grid, either fully off-grid or as a backup power source. Any type of electricity generation could supply a standalone system, but these are usually powered by diesel or solar with battery storage.* *Standalone systems typically refer to those which supply buildings, compounds, or operational purposes such as water pumps, but could include any off-grid system such as a mini-grid.*
NATIONAL GRID	*The national grid is the main electricity infrastructure of a country. It provides power through high-voltage transmission and distribution lines and is supplied by large-scale generation, such as power plants.* *The national grid can provide up to Tier 5 electricity access but, especially in remote areas and displacement contexts, its electricity supply may be unreliable or unavailable.*
OFF-GRID OR DECENTRALISED SYSTEM	*An off-grid or decentralised system can operate independently of the national grid network.* *The term "off-grid solar products" usually refers to consumer-focused systems, such as solar lanterns and SHS, whilst "decentralised systems" usually refers to larger systems such as mini-grids and standalone systems.*
PRODUCTIVE USES OF ENERGY (PUE)	*Productive uses of energy (PUE) include any applications of energy for businesses, income generation, or economic activity. This could include appliances or machinery to make work easier or more efficient, or to make new activities possible.* *PUE usually refers to electricity, but it also includes energy for cooking and other applications.*

Overview of common energy terms in displacement settings

TERM	DESCRIPTION
MULTI-TIER FRAMEWORK (MTF) FOR ACCESS TO COOKING	*Access to cooking is categorised across six attributes: exposure to harmful pollutants, energy efficiency, convenience of acquiring fuel and using the stove, safety, availability of fuel, and affordability.* *Each attribute falls in a range from Tier 0 (no access) to Tier 5 (full access). The MTF was developed by the ESMAP at the World Bank to better categorise access beyond a simple binary comparison of "access or no access".*
TRADITIONAL COOKING SYSTEMS	*Traditional forms of cooking include the use of simple stoves (such as open fires, three-stone fires, or mud stoves) and biomass fuels (such as firewood and charcoal). Traditional cooking systems are sometimes referred to as "basic" stoves and fuels.* *These cooking systems usually have high emissions and low efficiencies but are generally the cheapest and most accessible.*
CLEAN COOKING	*Clean cooking systems meet international standards for emissions at the point of use. These can include energy efficient or so-called modern forms of cooking including electric cooking, liquefied petroleum gas (LPG), and high-performing biomass stoves, such as some which use pellets.*
IMPROVED COOKSTOVES (ICS)	*ICS include a wide range of stoves which provide advantages over traditional stoves but generally do not reach higher tiers of access. ICS can use a variety of biomass fuels including firewood, charcoal, pellets, or briquettes.* *ICS can be produced locally or shipped from other locations and are generally lower-cost than other manufactured stoves.*
MODERN COOKING	*Modern cooking refers to stoves and fuels which meet Tier 4 standards across all attributes. These include LPG, biogas, electricity, and ethanol cooking systems.*
LPG STOVES	*Liquefied petroleum gas (LPG) stoves are clean cooking systems which use canisters of LPG as fuel. LPG stoves offer higher-tier cooking solutions but generally have high upfront costs and rely on LPG supply chains.* *LPG is a fossil fuel but is considered clean at the point of use.*
ELECTRIC COOKING	*Electric cooking includes several technologies. Energy-efficient electric pressure cookers (EPCs), slow cookers, and rice cookers are appliances which use electricity to heat a pot and are particularly well-suited to foods which require slower cooking, such as beans. These appliances can be powered by on- or off-grid systems but generally require a reliable supply of electricity.* *Electricity-assisted cooking stoves use electricity to improve the efficiency of cooking with biomass, for example using fans powered by solar panels to increase the airflow over the fuels. This can enable the stove to reach higher temperatures and efficiencies than traditional cooking systems, and it usually uses off-grid power.*
PRIMARY AND SECONDARY COOKING SYSTEMS	*Households may use more than one type of stove or fuel to meet their cooking needs. The primary stove and fuels are the most used ones, whilst the secondary stoves and fuels are used less frequently.*
STOVE STACKING	*Stove stacking describes a situation where a household has access to multiple forms of cooking systems. This is usually in reference to having an improved or clean cooking system but continuing to use a traditional cooking system. This could be due to various reasons, such as to cook different kinds of food, convenience, preferences, fuel shortages, or many other reasons.*

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Globally, over 100 million people have been forcibly displaced from their homes. Amongst those living in camps and settlements, more than 80% rely on cooking with firewood over open fires whilst over 90% lack access to electricity. Sustainable Development Goal 7 (SDG 7) calls for universal access to affordable, reliable, sustainable, and modern energy for all by 2030 – including communities affected by displacement. Rapid progress is required to achieve this ambitious goal.

The Roadmaps for Energy Access in Displacement Settings (READS) Programme aims to support the achievement of SDG 7 in ten countries, including in Uganda. The country hosts a total population of concern (PoC) of 1,561,634 refugees and asylum seekers, with the term 'refugees' used to include all People of Concern throughout this report for brevity. This report consolidates the status of energy access in displacement settings in Uganda, provides an overview of the stakeholders working towards SDG 7, and presents opportunities for high-impact projects to support increased access to sustainable energy for displaced people and host communities. ››

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Sustainable Development Goal 7 calls for universal access to sustainable energy for all people – including displaced communities – by 2030.

Executive Summary

Energy access in displacement settings in Uganda

Household cooking and electricity

Access to clean cooking in displacement settings in Uganda is currently low. Around 98% of households in refugee settlements in Uganda use biomass fuels such as firewood and charcoal to cook, with three-stone fires being the most common primary cooking system. Heavy reliance on biomass fuels for cooking has a significant impact on the local environment. According to recent estimates, firewood has to be collected from 4-10 km away, which represents a significant burden for households and exposes firewood collectors (typically women and girls) to the risk of assault. The increasing scarcity of fuels also can lead to tensions between host and refugee communities. Some small-scale biogas and solar-powered cooking projects offer opportunities for cleaner cooking but have limited reach compared to the high demand for solutions.

Increasing access to clean cooking faces many challenges including the ubiquitous reliance on firewood, user preferences for traditional forms of cooking, and the low availability of more efficient alternatives. This is further inhibited by the high costs for clean cooking suppliers to establish operations in the settlements and a lack of coordination between stakeholders working through free distribution and market-based models. These barriers could be addressed by de-risking supplier entry to the local markets through staged grants and results-based finance (RBF), end-user subsidies and instalment payments to reduce the costs of improved stoves, and investments in non-biomass-based cooking systems such as electric cooking.

Access to electricity among households in refugee settlements is also low. In the West Nile region, only a few settlements have a grid connection. Although most settlements in the Southwest region are grid-connected, the connections mostly extend to administrative buildings and trading centres, with very limited connections of households. The majority of residents depend on basic lighting technologies, including solar lanterns, disposable dry cell battery-powered torches, or candles, whilst phone charging services are available in shops at a typical cost of UGX 500 ($0.13) per charge. The quality of off-grid solar products varies: some organisations support companies in selling certified products but low-quality and counterfeit products are also common. With few options for their repair and maintenance, the lifetime of these technologies is usually short.

Obstacles to improving electricity access include the low ability to pay of most customers, the small number of suppliers offering quality products and repair services, and the short-term orientation of companies operating in displacement settings. To address these, de-risking companies through RBF to support them with establishing sales outlets and storage facilities in or near settlements could strengthen the availability of high quality products and increase customer choice. For customers, instalment payments and pay-as-you-go plans could reduce the financial barriers to access electricity technologies, and promoting higher-quality products with warranties could increase their long-term benefits to users. These should be supported by repair services and e-waste management systems. ››

The majority of households in refugee settlements in Uganda use three-stone fires and firewood to cook, typically collected from 4-10 km away.

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Businesses and productive uses of energy

There is a wide variety of small businesses in refugee settlements in Uganda, including hair salons, phone repair and charging services, restaurants, milling operations, cold beverage dispensing, secretarial services, baking, and entertainment venues. Increased access to electricity and more efficient cooking technologies would enhance the productivity of these businesses and allow them to operate for longer hours. However, current access to reliable electricity sources remains low, as off-grid solar products typically have high upfront costs and sometimes insufficient capacities to power PUE appliances, whilst higher-power sources such as the national grid and mini-grids are typically unavailable or can be prohibitively expensive. Other PUE applications such as solar irrigation, agro-processing, joinery, maize milling, carpentry, and welding would also benefit from a more reliable electricity source.

Subsidies to connect to the national grid, where available, or new mini-grid systems strategically located near trading centres could increase the uptake of PUE and may also require subsidised tariffs. Awareness raising campaigns, access to finance, and skills training for energy-efficient appliances and efficient cooking technologies could offer new opportunities to boost productivity and income generation.

Social institutions and public lighting

Social institutions and community facilities (such as clinics, schools, and community centres) face challenges in accessing a reliable energy supply to provide critical services to both refugee and host communities. UNHCR Uganda estimated that 30% of health centres do not have access to electricity, impacting the levels of care they can provide, whilst another 30% rely on diesel generators.

Social institutions could benefit from standalone solar systems or mini-grids but the high upfront costs and lack of funding combine to hinder implementation. If such systems were in place, ongoing costs for operations and maintenance would require constant income or funding streams which are not typically included in traditional grant-based models. Furthermore a lack of ownership could mean that even minor technical faults could result in the system going into disrepair if neglected.

Conducting baseline assessments to design appropriately sized systems, providing funding both for capital costs and several years of servicing, and establishing long-term maintenance plans with clear roles and responsibilities could increase access to electricity for social institutions and ensure its sustainable provision.

In addition, there is a heavy reliance on firewood of schools that provide meals to their students. While some work has been done to provide institutional improved cookstoves, it would need to be scaled significantly to meet present needs. ››

Around 30% of health centres do not have access to electricity. Standalone solar systems could provide a reliable electricity supply to social institutions, thereby significantly improving the quality of service provision.

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Humanitarian operations

Humanitarian operations generally have higher levels of access to reliable electricity compared to small businesses and community facilities. If available, humanitarian and development organisations generally use the national grid, or have diesel generators, while some have small standalone solar systems. Water pumping is mostly reliant on diesel generators but some boreholes have been solarised.

Replacing diesel generation through grid connections or solar systems, particularly for water pumping, and providing power to operations with low or no access at present should be prioritised. Designing solar systems requires technical expertise that humanitarian agencies often lack in-house and so involving organisations with such experience to conduct assessments will be crucial. Private sector involvement in displacement settings is currently very limited and so inviting companies to view the opportunities to supply or increase access to electricity could promote greater engagement.

Energy access for urban refugees

Access to energy in urban settings is significantly higher than for refugees living in settlements. Urban refugees generally have access to the national grid to meet their electricity needs and cook in similar ways to other urban residents, although the overwhelming majority are reliant on firewood or charcoal. Cooking with electricity and LPG is slowly gaining in popularity, although perceptions around high costs impede their widespread use. ››

BARRIER	OPPORTUNITY
High costs of clean cooking and electricity access technologies	Instalment payments, flexible repayment mechanisms, customer subsidies, savings groups, easier access to credit
Limited private sector engagement in remote, rural areas where refugee settlements are located	Provide funding through RBF schemes and grants to establish shops, outlets, and storage facilities
Mixture of free distribution and market-based approaches	Improve coordination between stakeholders, promote both supply-side and demand-side mechanisms that are gradually phased out
Variable quality of energy technologies and lack of quality repair services	Support training and capacity building which provide recognised qualifications, establish hubs with trained technicians for basic repair and maintenance services, promote high-quality and certified products
High upfront costs of solar systems for social institutions and limited long-term funding for maintenance	Structure financing to include funding for maintenance, develop maintenance plans in partnership with stakeholders, implement plans under long-term agreements with the private sector

Executive Summary

Stakeholders in Uganda

The refugee response in Uganda is jointly managed by the Office of the Prime Minister (OPM) and UNHCR which play a key role in planning and monitoring energy interventions in refugee settlements. District local governments and local partners support the smooth implementation of activities, as well as working with other stakeholders through coordination groups. Refugee and host representatives advocate for the needs of their community members and refugee-led organisations also work on energy access among other topics.

A wide variety of humanitarian and development organisations implement energy interventions. Local and international NGOs tend to focus on livelihoods, the environment, and agricultural production but also implement energy projects, particularly for clean cooking and the distribution of solar lanterns. Specific programmes to promote market-based approaches for energy access, such as GIZ's ESDS Project and the Accessing Markets through Private Sector Enterprises for Refugees Energy (AMPERE) programme by Mercy Corps, include support for private sector solar and cookstove companies to enter and operate in displacement settings and address a range of domestic, PUE, and institutional energy needs.

Opportunities to improve access to sustainable energy

Uganda offers great potential to improve access to sustainable energy in displacement settings. The country's progressive and welcoming environment towards refugees and its settlement-focused approach provide a solid foundation for sustainable energy projects, boosted by both the Sustainable Energy Response Plan (SERP) and increasingly supportive national policies. A wide range of organisations work in displacement settings on energy-focused projects, such as ESDS and AMPERE, using market-based approaches, and on themes intersecting with energy such as livelihoods, environment, and agriculture. Overall, both clean cooking and electricity access projects are relatively small and locally-focused but show promise for replication in other areas and wider scale-up across the country.

The READS Programme, in partnership with Mercy Corps, hosted a workshop in Arua, Uganda in March 2023 which brought together stakeholders working on energy in displacement settings in the West Nile region. During a co-design session, participants identified the foundations for high-impact project concepts to improve access to sustainable energy. These concepts were subsequently developed and refined, drawing upon previous work in Uganda and other displacement settings, to showcase the potential investment opportunities and serve as a starting point for future support. A summary of these project concepts is shown in Table 1. ››

Uganda's progressive and welcoming environment towards refugees and its settlement focused approach provide a solid foundation for sustainable energy projects, boosted by both the SERP and supportive national policies.

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TABLE 1

High-impact project concepts to increase sustainable energy access with estimates of their potential reach, duration, budget, and scalability.

PROJECT	NAME	REACH	DURATION	BUDGET	SCALABILITY
1	*Scaling market-based approaches for solar lanterns and SHS for households and small businesses*	*100,000 households*	*4 years*	*$2 million*	*Moderate*
2	*Solar mini-grids and stand-alone systems to grow the local agro-economy*	*1,000 businesses*	*3 years*	*$3.5 million*	*Moderate*
3	*Financing for productive use of energy appliances*	*1,000 businesses*	*3 years*	*$1 million*	*High*
4	*Electric cooking through grid- or mini-grid connections or standalone solutions*	*6,200 households*	*3 years*	*$3 million*	*High*
5	*Modular nano-grids through standalone solar units*	*1,000 connections*	*4 years*	*$1 million*	*High*
6	*Solarisation of health centres*	*50 health centres*	*3 years*	*$2.5 million*	*Moderate*

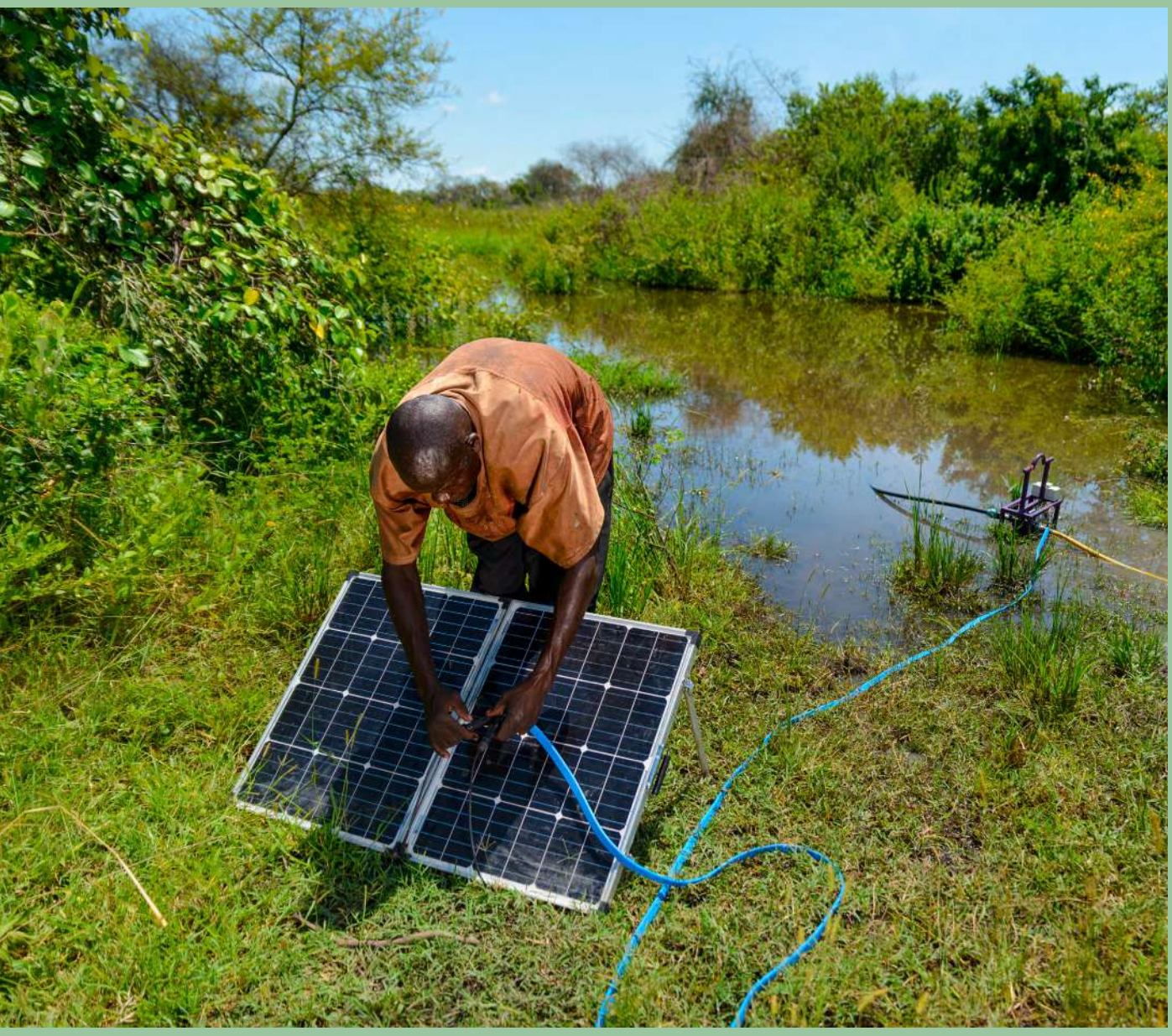
Improving access to sustainable energy will require a coordinated effort and a shared vision between all stakeholders working in displacement contexts. Based on the findings in this report, the READS Programme has outlined a roadmap for energy access in displacement settings in Uganda with short (2023-2024), medium (2025-2027) and long term (2028-2030+) goals. These include increasing electricity access through off-grid solar products, scaling up electric cooking, solarising social institutions, and promoting productive uses of energy for businesses.

The challenge is huge: achieving access to affordable, sustainable, reliable, and modern energy for refugees and host communities by 2030 will require more projects, activities, partners, coordination, and investment than ever before. Fortunately, the projects and stakeholders already working in Uganda offer a promising foundation to scale up sustainable energy access in displacement settings in pursuit of achieving SDG 7. ●

Improving access to sustainable energy in displacement contexts in Uganda will require a coordinated effort and shared vision between all stakeholders.

01

Setting the scene



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Setting the scene

Access to sustainable energy in Uganda's refugee-hosting districts is very limited, both for displaced and host communities. Most households rely on traditional low-tier cooking systems, such as three-stone fires, and the high demand for firewood has contributed to deforestation and to tensions between communities, exposing people to risks of assault. Furthermore, cooking over inefficient, polluting stoves can cause or worsen health issues, particularly impacting women and girls who typically bear the responsibility of cooking.

Electricity access is also low in and around refugee settlements. Off-grid solar products, such as solar lanterns and solar home systems (SHS), can provide basic access and electricity services. Their uptake is limited, however, as their cost and the prevalence of low-quality products affect both their longevity and customer perceptions. Larger standalone solar systems for health centres and other social institutions have begun to be implemented, but these are usually at small scales and with limited long-term funding for their operation and maintenance (O&M).

Stakeholders from across government, humanitarian and development organisations, the private sector, and local communities have initiated a wide range of projects aimed at improving energy access for cooking, lighting, businesses, and institutions. Whilst these are growing, both in number and impact, they require more investment and coordination to scale up to the challenge of providing sustainable access to energy for all displaced people and host communities.

Addressing the challenge of achieving universal access to sustainable energy in displacement settings requires coordination at all levels – from local to global [1]. International targets for energy access are met through implementation on the ground with each country, region and community needing its own consideration and planning to reach this shared goal. Although structures exist to help coordinate the humanitarian energy response, such as the Environment and Energy Working Group in Uganda, their geographical coverage is not exhaustive and does not include all relevant actors. Substantial funding gaps further affect the planning and implementation of effective energy programmes. Additionally, the amount of research and evidence to fully understand the energy needs and develop appropriate solutions does not match the scale of the challenge and is typically disparate and hard to find.

Acknowledging this, the READS Programme aims to provide a country-level overview of sustainable energy in displacement settings, and a focus on individual settlements and communities where possible. With the Programme working across ten countries, Uganda – alongside Rwanda and Kenya – is amongst the first to be featured in a READS Roadmap Report.

A goal of the READS Programme is to identify new opportunities for high-impact projects to increase sustainable energy access by consolidating the existing knowledge on sustainable energy in displacement settings. This includes published literature – such as government policies, programme output reports, datasets, academic papers, and press releases – but also the experiences and expertise of practitioners working on project implementation and, most importantly, of community members.

In support of this the READS Programme hosted a workshop in Arua, in Northwest Uganda, in March 2023 to engage with these stakeholders. Participants included representatives of communities which have been affected by displacement, the private sector, humanitarian organisations, and district level governmental authorities, among others. As the literature and workshop focus primarily on experience in the West Nile region, with limited representation from the Southwest region of ››

Setting the scene

Uganda and Kampala, the READS Programme undertook 19 key informant interviews in Nakivale refugee settlement and with urban refugees in Kampala to also represent these areas.

Using published literature, the knowledge and experiences shared during this workshop, and primary qualitative research, the READS Uganda Roadmap Report highlights the most pressing gaps, barriers, and opportunities for sustainable energy in displacement settings, as well as the roles of the stakeholders involved. It also provides a spotlight for potential high-impact projects, co-designed in the workshops by stakeholders from different types of organisations, which could significantly improve sustainable energy access if they received support and investment.

The energy needs of each community, household, business, or institution will vary, as will the most effective ways of addressing them. This report aims to be as broad as possible in covering different kinds of energy access, and as comprehensive as possible in each topic, but is inherently limited by the nascent nature of research on sustainable energy in displacement settings and the uniqueness of each context. The authors hope that further research – perhaps focusing on specific areas of energy access, settlements, or the impact of new projects – can build on this report by diving deeper into these areas and promote a greater uptake of sustainable energy in displacement contexts.

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At the READS workshop, stakeholders shared their experience through co-designing potential high-impact sustainable energy projects.

02

Forced displacement in Uganda

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National overview

The Republic of Uganda is a landlocked country in East Africa with more than 47 million inhabitants. Uganda is classified as a low-income and least-developed country [2] and, under its Vision 2040 initiative, aims to achieve middle-income status and reduce poverty to 5% of the population by 2040 [3]. The most recent elections held in January 2021 saw the National Resistance Movement party maintain its majority in parliament and its leader, Yoweri Museveni, re-elected as president; both have been in power since 1986. The security situation and economy in Uganda are relatively stable but there are ongoing conflicts in neighbouring South Sudan to the north and the Democratic Republic of the Congo (DRC) to the west. Uganda is also bordered by Rwanda, Kenya and Tanzania which are each relatively stable from a security and economic perspective [4].

TABLE 1

The population of Uganda [9], the populations of concern and their countries of origin [5].

		PEOPLE	%
POPULATION	RURAL	35,082,057	74
	URBAN	12,041,480	26
	TOTAL	***47,123,537***	***100***
DISPLACED PEOPLE BY COUNTRY OF ORIGIN	SOUTH SUDAN	882,765	57
	DRC	494,874	32
	SOMALIA	69,535	4
	BURUNDI	41,863	3
	ERITREA	34,631	2
	RWANDA	23,584	2
	OTHERS	14,382	1
	TOTAL	***1,561,634***	***100***

Uganda offers a welcoming environment for displaced people. With a population of 1,561,634 refugees and asylum seekers in 13 refugee settlements across 12 districts and Kampala [5], the majority of displaced people are from South Sudan (57%) and DRC (32%)[1] with smaller numbers from Somalia (4%), Burundi (3%), Eritrea (2%) and Rwanda (2%) (see Table 1). The majority of the Persons of Concern (PoC) live in settlements in the north of the country, with the majority of those people originating from South Sudan, with around one third, mostly people from DRC, living in settlements in the west and southwest of Uganda [7]. Around 2.5 million host community members live in or near the refugee settlements [8] and around 8% of refugees live in the capital, Kampala.

People living in the refugee settlements make up a significant proportion of people living in those districts (see Table 2 and Figure 1) [5, 7]. In the north of Uganda, in Obongi District, displaced people in the Palorinya settlement make up 71% of the district population; in neighbouring Adjumani District almost half of residents are displaced people; and in Lamwo District and Madi Okello & Terego District around one in three residents are displaced people. Two of the largest settlements, Bidibidi (Yumbe District) and Rhino (Madi Okello & Terego District), form a sizable minority of their overall districts' population whilst the largest settlement in the south of Uganda, Nakivale in Isingiro District, is home to around one-fifth of the district population. Around one in every fifteen residents of Kampala is a displaced person. ››

1 Asylum seekers from South Sudan and DRC are granted refugee status by default upon arrival [6].

National overview

Most refugees who arrived since 2016 are from South Sudan and DRC [8] and it is anticipated that refugees will continue to enter Uganda [10]. The ongoing political, interethnic, and communal conflicts in South Sudan, exacerbated by floods, the impact of the COVID-19 pandemic and localised violence, mean that humanitarian needs in the country continue to rise. Meanwhile food insecurity, human rights violations and militia activities in DRC will likely continue to force people to cross into Uganda; in November 2021, for example, 11,000 people fled to Uganda from DRC in a single day [10].

There are significant differences between refugee settlements across the country, including differing income and poverty levels, as well as different cultures and languages, socio-economic opportunities, infrastructure and access to basic services. To support the targeting of assistance by humanitarian and development actors, refugee settlements have been classified into three groups based on their poverty and vulnerability levels. These mirror the poverty levels in refugee-hosting districts, with settlements in the North and West Nile regions having higher poverty levels than those in the west and southwest of Uganda.

TABLE 2

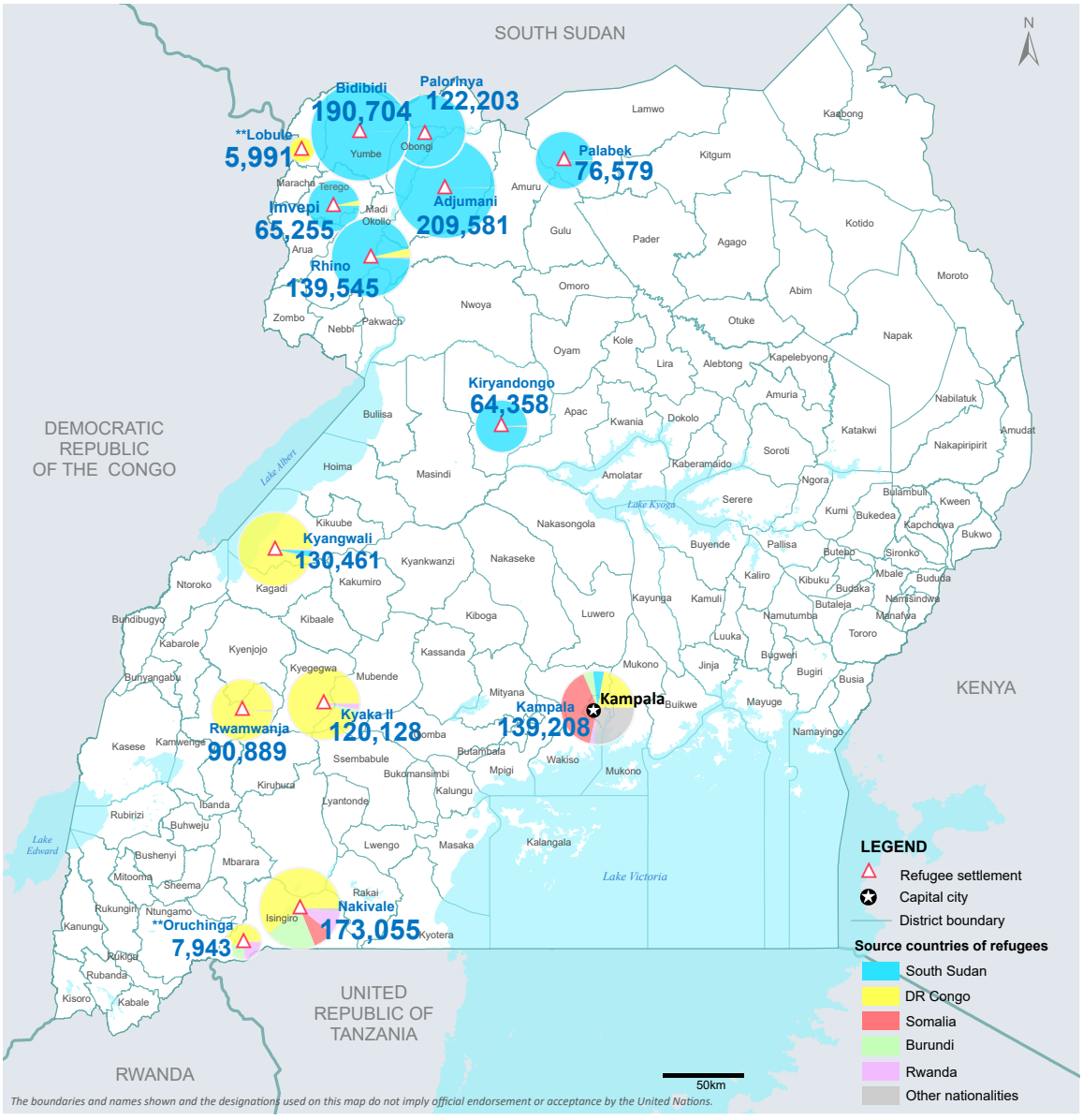
The number of displaced people and host community population by district [5].

DISTRICT	DISPLACED PEOPLE	HOST COMMUNITY	% POC
MADI OKELLO & TEREGO	*211,657*	*454,200*	*32*
ADJUMANI	*210,741*	*238,800*	*47*
YUMBE	*191,309*	*736,400*	*21*
ISINGIRO	*184,704*	*616,700*	*23*
KAMPALA	*144,802*	*1,738,600*	*8*
KIKUUBE	*131,139*	*376,600*	*26*
OBONGI	*124,632*	*51,300*	*71*
KYEGEGWA	*120,785*	*475,600*	*20*
KAMWENGE	*91,855*	*475,600*	*16*
LAMWO	*79,036*	*146,800*	*35*
KIRYANDONGO	*64,981*	*322,300*	*17*
KOBOKO	*5,993*	*277,500*	*2*

National overview

FIGURE 1

Map of Uganda with the locations of refugee settlements and a breakdown of the number of displaced people as of 30 June 2023 [7].



Policy frameworks for displaced populations

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Uganda's refugee policy regime has long been heralded as one of the most progressive and generous worldwide. The same rights to basic and social services for refugees as those for Uganda nationals are established in the Refugee Act of 2006 and the 2010 Uganda Refugee Regulations. These include the right to work, the right to establish a business, and the right to freedom of movement [11].

The Refugee Act also laid the foundation for Uganda's settlement approach, in which refugees are allocated a plot of land for farming upon arrival and live in open settlements alongside the host communities [12]. Taking into account the protracted nature of displacement settings and the impact on host communities, the Government of Uganda (GoU) introduced the Settlement Transformation Agenda (STA) in 2015. Its goal is to achieve self-reliance and local settlement for refugees by encouraging social development in refugee-hosting areas while protecting local and national interests, laying out a clear vision for settlements and recognising the potential for refugees to contribute to local economies [13]. The STA was subsequently incorporated into Uganda's National Development Plan II (NDP II). This made way for the New York Declaration for Refugees and Migrants and subsequently the Comprehensive Refugee Response Framework (CRRF), with Uganda being one of the first countries to adopt it in March 2017.

The CRRF Secretariat endorsed Uganda's National Plan on the implementation of the Global Compact on Refugees (GCR) in 2021 to guide GCR and CRRF implementation. These policy developments signal led a paradigm shift from traditional humanitarian responses to pursuing development approaches that support the self-reliance of refugee communities. The Ministry of Gender, Labour and Social Development issued a Jobs and Livelihoods Integration Response Plan for Refugees and Host Communities in April 2021 to respond to certain limitations to the self-reliance policy regime [14]. In 2022, the Ministry of Energy and Mineral Development (MEMD) launched the Sustainable Energy Response Plan (SERP) to provide a framework for improving access to sustainable energy in displacement settings (see feature box). ●

The Sustainable Energy Response Plan for Refugees and Host Communities (SERP)

Uganda's Ministry of Energy and Mineral Development (MEMD) developed the Sustainable Energy Response Plan for Refugees and Host Communities (SERP) which provides a framework at the national level to enhance energy access in displacement contexts around Uganda [11]. The SERP sets out the government's vision for energy access in refugee hosting areas, aims to improve coordination and resource mobilisation, and acts as an entry point for partners to support these efforts [8].

Other response plans had previously been developed by line ministries in Uganda. These include an Education Response Plan for Refugees, a Jobs and Livelihoods Integrated Response Plan for Refugees and Host Communities, and Water and Environmental Refugee Response Plans. With a focus on sustainable energy, MEMD partnered with the Office of the Prime Minister (OPM), UNHCR, the CRRF Secretariat, the Rural Electrification Agency, the World Bank and Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) to develop its own response plan with funding from the German Ministry for Economic Cooperation and Development (BMZ).

The SERP was developed in four phases [15]:

1. Its inception involved a comprehensive situational analysis, reviewing existing plans and achieving a common understanding among key stakeholders on the vision and objectives of the SERP.
2. Consultations were held across the 12 refugee-hosting districts and Kampala, taking place from November 2020 to March 2021. These gathered the input from stakeholders including refugee and host community representatives, district local governments (DLGs), town councils, OPM, humanitarian agencies and partners, electricity service providers, traders, local vendors, and suppliers.
3. Following this, the SERP was drafted and reviewed through an iterative process to develop its text.
4. The SERP was finalised, published, and disseminated.

The SERP was launched on 25 August 2022 in an event supported by the GIZ Energy Solutions for Displacement Settings (ESDS) programme. It follows the objectives of National Development Plan III (NDP III) towards integrating refugees into national energy planning, emphasising the importance of energy access for an effective humanitarian response and achieving development goals. A key objective of the SERP is to strengthen efforts to address the energy needs of the whole population in Uganda, aiming to avoid creating parallel structures to serve refugee and host communities individually as their energy needs mirror each other [15]. At the time of writing, there were plans for the establishment of a SERP Secretariat and a steering group which are expected to play a leading role in coordinating the implementation of the SERP.

Refugee and host communities attain universal access to affordable, reliable and clean energy for socio-economic transformation in an environmentally sustainable manner.

– SERP Vision

Policy frameworks for displaced populations

Despite these frameworks, in practice refugees still experience limitations on their rights and freedoms. One of these pertains to freedom of movement, which is included in the Uganda Refugee Act of 2006 but subject to various restrictions [14]. Refugees are free to move in and out of settlements but there are limits set on where refugees may establish themselves: those who wish to establish themselves elsewhere must apply for a permit and, even though the permits themselves are free, refugees cannot always afford the transport fees to obtain them. Furthermore, refugees are eligible for aid only if they are based in the official refugee settlement that they were assigned to and are required to obtain permission to move settlement. Although refugees are allowed to settle elsewhere, this presents a significant barrier and dissuades people from relocating due to limited financial means.

The time of arrival of refugees, particularly for those from South Sudan, has been critical to their experience as it determines the location of their designated settlement, their food rations (which have been reduced due to funding shortages), and the size of the land they are allocated [16]. This has been a source of tension between different groups of refugees as the size of land allocations plots has been reduced in response to the growing refugee population, now reaching a point that the plots do not enable subsistence farming, let alone income generation. It has also been reported that the soil is infertile in some settlements and water shortages further hamper productivity [17]. Moreover, while refugees have the right to use the assigned land, they do not have the right to purchase, sell, or use it as collateral. In practice, some refugees have been working around these rules by negotiating leasing agreements with neighbours or obtaining uncleared land from landowners. Finally, a great limitation of the land allocation policy is that not all refugees are farmers. Many refugees have no agricultural expertise and do not know how to, or do not wish to, cultivate the land, and so struggle with insufficient non-agricultural opportunities in the settlements. Refugees and hosts with a higher level of education (secondary and some tertiary) have been found to have the highest unemployment rates [14].

Other points within the legal frameworks lead to uncertainty and prevent refugees from accessing all of their rights. One example relates to the need for refugees to have a work permit, as the Refugee Act of 2006 does not specifically state that refugees are exempt from obtaining a permit [14]. Moreover, formal employment opportunities in refugee-hosting areas remain rare for both refugees and host community members, often limited to short-term jobs for humanitarian and development agencies [16]. In addition, qualifications of refugees obtained in their country of origin are not always recognised by new employers. Skill training programmes are not always offered in languages spoken by displaced people, presenting a further barrier.

Uganda's national legislation for establishing a new business has been ranked as one of the poorest in the world, involving a variety of administrative hurdles. For that reason, many refugees opt to register as a sole proprietor or as a refugee-led organisation rather than a business [14]. A study by BFA Global found that many displaced people experience a shift in employment type after entering Uganda: 32% of refugees were self-employed in their country of origin, compared to 52% who supported themselves through small independent and often informal businesses after fleeing to Uganda [18]. The existence of social networks plays a large role in supporting entrepreneurship by providing useful business linkages and sources of capital through remittances. Refugees from Somalia and Ethiopia were found to have more supportive networks compared to both refugees from other origins and host community members. Refugees that have been in Uganda for longer also tend to have access to more resources through their networks and a higher ability to raise capital [14]. ●

Income levels in displacement settings

Poverty is high across refugee and host communities: 91% of refugees are considered highly economically vulnerable, with communities in the West Nile region more at risk than those living in the Southwest region. The employment rate for refugees is 51% in the Southwest region and 22% in the West Nile region, compared to 80% in the Southwest and 60% in West Nile for host communities. Host communities tend to have better access to land for agriculture, higher levels of education, and stronger networks for sourcing opportunities [19].

According to a study by BFA Global, the average monthly earnings of refugees was approximately UGX 160,000 ($43[2]). There were significant variations between regions across the country, with urban refugees in Kampala earning approximately 200,000 UGX ($53.50) compared to refugees in Palorinya who earned UGX 90,000 ($24) per month. The hosts across all of Uganda who were surveyed as part of this study earned UGX 100,000 ($27) in comparison. These differences in income can be explained in part by the amount of cash transfers and remittances that refugees receive compared to hosts, with refugees in Kampala reporting particularly high remittances [18].

Refugees rely on a variety of sources of income including self-employment, agriculture, cash and food transfers from WFP [18]. Remittances from relatives also contribute significantly to the household incomes of both refugees and hosts [19]. Common small enterprises include duukas (small shops), hair salons, phone repair and charging, restaurants, milling, secretarial services, baking and entertainment halls [14]. Many households engage in subsistence farming, and to a lesser extent in trade and agri-processing [8], with some medium-sized businesses using welders, cutters, milling machines and other appliances for manufacturing or agricultural purposes [19]. On average, businesses in the Southwest generate more revenue ($407) than those in West Nile ($253) [19]. ●

2 The exchange rate between the Ugandan Shilling (UGX) and the United States Dollar (USD, $) has typically been around UGX 3,700 per $1 since 2018 but has fluctuated between around UGX 3,500 (August 2021) to around 3,900 UGX (August 2022). Where possible, both UGX and USD values are taken from the original sources; if not, a conversion rate of UGX 3,700 per $1 is used.

91% of refugees are considered highly economically vulnerable, with communities in the West Nile region more at risk than those living in the Southwest region. They rely on a variety of sources of income including self-employment, agriculture, cash and food transfers.

Access to financial services

Low and seasonal purchasing power is one of the key barriers for households to increase their energy access levels. Access to financial services therefore plays a great role in supporting refugees and host communities in purchasing energy products and services, and making investments to improve their quality of life and livelihoods.

The main source of income for many households is humanitarian aid, which is increasingly shifting from in-kind distributions to a variety of cash and voucher assistance modalities. These include mobile money, direct or over-the-counter (OTC) cash, prepaid or smart cards, and bank transfers, with the first two being the preferred methods according to a study by U-Learn [20]. Savings groups are an important form of savings and credit among both refugee and host communities.

Mobile money

A study by U-Learn found that MTN Uganda was the most popular mobile money provider amongst the refugee and host community members it surveyed, followed by Airtel Uganda [21]. Mobile money was used by 64% of refugees and 75% of host community members and the study identified a gender gap for both communities, with women being on average 20% less likely to own a mobile phone compared to men across both communities.

The same study also identified several persistent barriers to mobile money. These include a lack of agents in proximity to remote communities; a lack of IDs to meet Know-Your-Customer (KYC) requirements; difficulties with mobile network coverage and internet provision; misperceptions on needing to have a certain amount of income to open a mobile money account; and a lack of trust in mobile wallets due to varying levels of fees and taxes. In addition, women were generally less likely to be literate and to own an internet-enabled phone, which further restricted their access to and use of digital financial services.

Refugees must either have a refugee ID or OPM-issued attestation documents (which is different to UNHCR's attestation card) to open a mobile money account [9] and mobile network operators (MNOs) are not able to issue SIM cards without the correct form of ID. The lack of the required form of ID has meant that borrowing IDs has become common practice, but this entails a variety of security concerns and makes resolving issues related to mobile money accounts much more difficult [20].

Direct or OTC cash

More than half of the surveyed refugees reported receiving direct cash (given directly through aid agency) or OTC cash (via a financial service provider) from humanitarian or development agencies, with Post Bank, WFP and Equity Bank being the most common providers [20]. By contrast, only 6% of surveyed host community members report receiving cash as the humanitarian response mostly targets refugees. In general this form of assistance seems to work well, but there are barriers such as security concerns resultant from the public distribution of cash on commonly-known days. The inherent risk of carrying physical cash is a key advantage of mobile money over cash distribution. Other commonly-cited barriers were the long distances to travel to collect cash and limited timeframes to collect it, which can be very inconvenient and force recipients to choose between competing priorities. ››

Access to financial services

Bank transfers and prepaid or smart cards

Only about 17% of refugee and 15% of host community respondents of the U-Learn study reported having access to a bank account, which were perceived as expensive to open [20]. In addition, agents are not easy to reach and bank registration processes frequently require letters from authorities and passport photos, which the surveyed groups often did not have. Usage of prepaid or smart cards was also relatively low, with 27% of refugees having used them, with similar perceived barriers as for banking.

Savings groups

Informal savings groups are an important source of finance for refugee and host community members. A study by BFA Global found that 35% of surveyed refugees and 85% of host community members use an Accumulating Savings and Credit Association (ASCA) which allow members to borrow money. There are over 6,000 Village Savings and Loans Associations (VSLAs), a form of ASCA, in refugee settlements across Uganda. Cumulatively these hold savings of about $3 million and loans of about $2 million, of which an increasing number offer digital financial services. Other informal credit mechanisms have been quick to spring up within the refugee community, such as receiving credit at local stores and lending among family and friends [18].

Several banks, microfinance institutions (MFIs) and Savings and Credit Cooperatives (SACCOs) also operate in the refugee settlements with a growing number of customers. Remaining barriers include long distances to reach agents with associated insecurity and costs; an insufficient amount of agents; limited financial literacy and lack of understanding of financial products and terms; a perception of complicated processes to access financial services; and poor network connectivity to use digital financial services [20]. ●

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03

National energy context of Uganda

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National policy overview

Under the GoU's wider development objectives, its Vision 2040 plan states that "Ugandans aspire to have access to clean, affordable and reliable energy sources to facilitate industrialisation" [22]. This vision is echoed in the recent Energy Policy (2023) which aims to ensure energy can provide environmentally sustainable development as well as to meet the country's energy needs for social and economic transformation [23]. Amongst its goals for 2040, the Energy Policy aims to achieve universal access to electricity, of which 65% is to be through grid connections (currently 24%), and 50% of the population using clean cooking fuels and technologies. The Energy Policy aligns and builds on the goals and targets of Uganda's Third National Development Plan (NDP III) [24].

Overall Uganda offers a relatively supportive environment towards sustainable energy compared to other countries in Sub-Saharan Africa, particularly for access to electricity and clean cooking. The country's policies towards energy efficiency, however, are an area of relative weakness [25] (see Table 3).

Uganda has a series of policies which govern different areas of the energy landscape [11]:

- The Energy Policy (2023) which provides an overarching policy direction and objectives for sustainable energy in Uganda,
- The Electricity Act (1999) which established the Electricity Regulatory Authority and regulates the generation, transmission, distribution, and sale of electricity,
- The Electricity Amendment Act (2022) which streamlined the existing policies and standardised feed-in tariffs for renewable energy systems of up to 50 MW[3],

TABLE 3

RISE Pillars[4] for Uganda and the regional and global averages [25]. Scores indicate the relative maturity of the regulatory environment ranging from mature (67 to 100), developing or improving (33 to 66) and early-stage (0 to 33).

RISE PILLAR	UGANDA	SUB-SAHARAN AFRICA	GLOBAL
OVERALL	55	38	61
ELECTRICITY ACCESS	74	51	53
CLEAN COOKING	72	35	37
RENEWABLE ENERGY	54	43	51
ENERGY EFFICIENCY	19	24	48

- The Rural Electrification Strategy and Plan (2013) which focuses on electrification in rural areas of Uganda for the period 2013-22, and
- The Electricity Connections Policy (2018) which aims to increase access to electricity across the country.

These also contribute to Uganda's overall development policies, such as the Green Growth Development Strategy and the NDP III for 2020/21-2024/25, and sustainability commitments under its Nationally Determined Contribution.

Access to electricity has increased steadily in Uganda from 12% in 2010 to 19% in 2015 and 42% in 2020, according to World Bank Estimates [9]. Rates in rural areas still lag well behind ››

3 This Act also addressed a range of other issues, from assigning the responsibility of developing energy plans and policies to the Minister of Energy and Mineral Development to mandating that one-third of members of the Ministry should be women [26].

4 Regulatory Indicators for Sustainable Energy (RISE) is a set of indicators, aggregated across four pillars, which assess a country's policies and regulatory support (0-100) towards sustainable energy.

National policy overview

urban centres, however, despite recent increases (see Table 4). A more recent survey by the Uganda Bureau of Statistics found that solar kits were the most commonly used form of lighting (27% of households) followed by grid electricity (19%), batteries (16%), wick lamps (14%) and solar home systems (11%). The remaining households relied on phone torches, paraffin lanterns, firewood, or candles [27].

Access to clean fuels for cooking is very low in both urban and rural areas, and well below the average for Sub-Saharan Africa, with 85% of the population relying on firewood and 13% on charcoal [24].

Uganda has a very high penetration of renewable energy as a proportion of final energy consumption[5], driven by the use of biomass by households, and also has a high share of renewable electricity capacity [28]. Hydropower constitutes 84% of Uganda's renewable electricity generation with the remainder composed of solar and biomass (8% each). As a result, the emissions intensity of grid electricity in Uganda is one of the cleanest in the world [29]. ●

5 Total energy demand includes all energy use across different sectors of society including households (76% of final energy use), industry (13%), and transport (negligible) and other uses (11%).

TABLE 4

Selected SDG 7 indicators for Uganda and the regional and global averages.

SDG 7 INDICATOR		UGANDA	SUB-SAHARAN AFRICA	GLOBAL
ACCESS TO ELECTRICITY (%)	***Total***	***42***	***48***	***91***
	Rural	*33*	*29*	*83*
	Urban	*70*	*78*	*97*
ACCESS TO CLEAN COOKING (%)	***Total***	***1***	***18***	***70***
	Rural	*0.2*	*6*	*49*
	Urban	*1*	*35*	*87*
RENEWABLE ENERGY (% FINAL CONSUMPTION)	-	***90***	***68***	***18***

Ugandans aspire to have access to clean, affordable and reliable energy sources to facilitate industrialisation.

– Uganda Vision 2040

Government agencies

MEMD has overall responsibility for the sustainable utilisation and exploitation of Uganda's energy and mineral resources, as well as meeting the energy needs of the Ugandan people for social and economic development [30]. MEMD provides guidance on energy policymaking, provides technical data and resources, monitors and regulates private companies working in the energy sector, and aims to create a supportive enabling environment for investment in energy projects. It also oversees rural electrification programmes, energy efficiency campaigns, and investment in renewable sources. This includes in displacement settings, with MEMD leading the development of the SERP.

Uganda's electricity supply industry is divided into three separate segments[6] [31]:

- Generation is composed of government-owned power plants, independent producers, and public-private partnerships.
- Transmission of electricity is managed by the Uganda Electricity Transmission Company Limited (UETCL), responsible for bulk quantities of power and grid assets above 33 kW, which also executes power purchase agreements from independent producers, and
- Distribution of power is shared between private players[7] and the GoU-owned Uganda Electricity Distribution Company Ltd (UEDCL) which operates grid assets below 33 kV.

The Electricity Regulatory Authority (ERA), meanwhile, has the authority to issue licenses for the generation, transmission, distribution and sale of electricity, as well as to establish tariff structures, and also offers standardised power purchase agreements templates to support the private sector [32, 33].

The Rural Electrification Agency (REA) was established in 2001 with the overall target of achieving universal access to electricity by 2040 [34]. REA aimed to promote equitable rural electrification, maintain a comprehensive database of the rural electrification subsector for more informed decision making, and enhance the amount of financing available to relevant projects. REA was supported by major international development partners and organisations such as the World Bank and Africa Development Bank. In July 2022 REA was integrated into MEMD, maintaining its same functions, and renamed the Rural Electrification Programme (REP).

Owned by the GoU under MEMD, the Uganda Energy Credit Capitalisation Company (UECCC) is responsible for coordinating funding from the government, international development organisations and the private sector to invest in renewable infrastructure [35]. It also provides financing and technical support for renewable energy projects to increase private sector involvement. UECCC has programmes in place to provide households and businesses with loans for solar systems, grid connections, and domestic biogas systems for cooking and lighting, as well as larger-scale generation projects. ●

6 Previously, the Uganda Electricity Board had a monopoly over these three areas but the body was unbundled under the liberalisation of the electricity sector and the Electricity Act (1999) [31].

7 As of late 2020, nine electricity distribution companies were in operation and predominantly served rural communities [31].

Electrification policies and the national grid

The Electricity Connections Policy (ECP) was developed in 2018 with the goal of 60% of households having an electricity connection by 2027 [36], a target now increased to 65% by 2040 under the Energy Policy (2023). Its first objective is to increase the rate of connections from 70,000 to 300,000 per year, delivered by providing free single-phase[8] electricity connections to households and businesses within 90 metres of an existing low-voltage distribution poles[9]. The second objective is to increase national electricity demand of the grid by 500 MW, as generation capacity currently far exceeds demand, and so provides credit facilities for three-phase connections and promotes productive uses of electricity for rural businesses, agriculture, and manufacturing. NDP III aims to increase generation by around 50% as well as extend grid transmission and distribution networks [24].

The Ugandan national grid uses a tariff system based on the type of consumer. Domestic users with single-phase connections are billed monthly depending on usage with prices ranging from 250 UGX/kWh for the first 15 kWh units to over 820 UGX/kWh for higher consumption[10] [37]. Commercial and industrial consumers are billed according to time of use, with lower tariffs for users which consume higher volumes of power, with prices as high as 784.6 UGX/kWh in peak hours and as low as 193.2 UGX/kWh in off-peak times [37].

Uganda's rural electrification strategy has focused predominantly on grid extension with a secondary focus on decentralised solutions. The Rural Electrification Strategy and Plan (RESP), which covers the period 2013-2022, emphasises the importance of end-user engagement and managing electrification schemes via local co-operatives [11]. Under the RESP, 1.28 million new on-grid connections were expected but only 140,000 via off-grid solutions [38]: the financing requirements reflected this disparity, estimating $866.5 million and $55.4 million respectively[11]. Despite the precedence of the national grid, the RESP acknowledges that rural electrification should be implemented as part of a multi-technology approach [38].

The nationwide Electricity Access Scale-Up Project (EASP) explicitly identifies refugee settlements and host communities as targets for support. It seeks to increase electricity access nationwide amongst households, businesses, industrial users, and public institutions via on- and off-grid solutions [39]. Implemented by the GoU with funding from the World Bank, the EASP will provide last-mile connections through support for on- and off-grid systems, and supply public institutions[12] with standalone solar systems under long-term, private-sector-led energy service contracts to reduce the capital requirements [40]. The EASP has been extended to support clean cooking – broadening its "E" to "Energy" – as well as having components on technical assistance and results-based finance (RBF) schemes for off-grid solar and productive uses of electricity.

Whilst Uganda has government targets for energy efficiency, these are mostly focused on reducing industrial energy usage and few consumer products are subject to energy labelling systems, aside from refrigerators and lighting [25]. Strengthening the energy efficiency policy environment and certifications could yield sizable cost and emissions savings, but these would require significant investment and promotion by the GoU [41]. ●

8 Single-phase connections are typically suitable for households and small businesses such as shops where power demand is relatively modest. More expensive three-phase connections can provide more power and are less susceptible to voltage fluctuations, making them more appropriate for higher-power applications such as machinery for productive uses and agro-processing.

9 Previously a connection would cost at least UGX 650,000 ($175), or more if an additional pole were required. Under the ECP a fee of UGX 20,000 ($5.40) is charged to inspect the property but, if it passes, the connection itself is free [36].

10 Units between 16-80 kWh are charged at 747.5 UGX/kWh, units between 81-150 kWh are charged at just 412 UGX/kWh, then any units above 150 kWh are charged at 747.5 UGX/kWh [37]. The middle tariff was introduced to incentivise clean cooking, described later.

11 A further $29.7 million of financing was identified for other aspect of the RESP such as customer financing, technical assistance and training.

12 Around 50% of public health centres did not have electricity in 2019, the majority of which were small primary care facilities; around 80% of public schools in 2019 did not have access to electricity, the majority being primary schools [40].

Mini-grids and standalone systems

Decentralised solutions, such as mini-grids and standalone systems which operate independently of the main national grid network, can provide reliable power for communities, business centres, and individual or groups of institutions. These are supported via multiple initiatives, for example NDP III has a goal of constructing 200 mini-grids by 2025 [24]. Support also comes from international organisations: the EUR 9.8 million Pro Mini Grids initiative, funded by the German Federal Ministry of Economic Cooperation and Development and the EU, and led by MEMD in cooperation with GIZ, has been running since 2016 with a goal of establishing 40 solar mini-grids [42]. Lamwo District was the location for the first 25 mini-grids and is also where Palabek Refugee Settlement is located, with the settlement hosting two of the mini-grid systems. The programme also trained 300 solar technicians and estimates that 20,000 people, and 300 SMEs, received electricity access.

Previously mini-grid policies were less well-developed than those for the national grid, resulting in bottlenecks caused by inadequate or unclear regulations [43], but this has been greatly improved by the recent Electricity (Isolated Grid Systems) Regulations (2020) [44]. Off-grid mini-grids with capacities below 2 MW – as would be the case for almost any system in displacement contexts – are eligible for a license exemption, with the application process taking 60 working days. A mini-grid developer must undertake a feasibility study, submitted to ERA, during which time it receives an exclusivity period [44]. It must also submit an environmental and social impact assessment to the National Environment Management Authority (NEMA) but, for systems with capacities below 500 kW, only a short project brief is required. Developers are permitted to propose tariffs higher than those of the grid but the ERA reserves the right to amend these to match those of the central network.

All mini-grid systems are held to technical, service quality, and safety standards, and are expected to use energy meters and provide training to their operational staff [44]. If the main grid arrives to the mini-grid location, then a mini-grid developer with a license exemption can apply for a license to continue to sell power to the mini-grid consumers, generate and sell electricity to the main grid, or receive compensation from MEMD [44]. ●

NDP III has the goal of constructing

200

MINI-GRIDS

by 2025

Solar lanterns and solar home systems

Off-grid solar products are supported under the national electrification strategy with both supply- and demand-side financing available to promote them [45]. This financing is designed to support the private sector, for example in 2020 Fenix International received a $12.5 million loan to support the deployment of 240,000 SHS. There are also technical support packages for developing renewable energy loan products, and large sectoral support programmes for off-grid lighting products are supported by international development agencies and the UN Capital Development Fund.

Uganda has a favourable tax environment for solar lighting products [45]. SHS are exempt from both import duties and value added taxes (VAT, also referred to as sales tax or goods and services tax)[13]. Some solar appliances, such as solar refrigerators and solar cookers, are exempt from VAT only and others, such as grain millers and solar water pumps, are charged no import duties [46].

The Uganda National Bureau of Standards (UNBS) has the facilities to test both solar panels and batteries, having been given laboratory equipment to do so under a DFID-funded project in 2019 [47]. In April 2021 the GoU adopted quality standards for the testing and performance of off-grid electricity systems up to 350 W[14] [46]. Focusing on domestic solar systems, these regulations aim to provide consumer protection against sub-standard products and ensure the quality, durability, and truth in advertising of off-grid solar products.

To uphold these standards, Uganda has pre-export verification of conformity (PVoC) requirements to ensure the quality of goods entering the national marketplace [48]. Goods under PVoC requirements, including solar products, must be certified before leaving their country of export. Overall, an estimated 97% of solar lighting products sold in Uganda in the first half of 2021 were quality-verified[15] [45]. ●

13 Most appliances sold with solar home systems, however, are charged 25% import duties and 18% VAT [46].

14 These are aligned to international standards for the testing (IEC 62257-9-5) and performance (IEC 62257-9-8) of off-grid energy systems [46].

15 According to GOGLA and VeraSol standards to IEC TS 62257-9-8 [45].

Uganda has a favourable tax environment for solar lighting products and has pre-export verification of conformity requirements to ensure the quality of goods entering the national marketplace.

Clean cooking

The NDP III acknowledges both the high reliance on traditional biomass in Uganda and the damage it causes to the environment [24]. Biomass makes up 88% of the country's energy consumption and results in a reduction of 120,000 hectares of forest cover per year, of which 60% is due to firewood and charcoal. Estimates for 2019 stated that demand for charcoal was 2.1 million tonnes and the cumulative biodegradation loss was $2.3 billion, but also that the charcoal sector provided 200,000 jobs in production, transport, and trade. In displacement settings, meanwhile, a study in 2020 found that 62% of refugee households relied on firewood for cooking and 36% relied on charcoal [49].

To address this, NDP III provides high-level suggestions to promote the uptake of alternative and efficient cooking technologies and liquefied petroleum gas (LPG) [24]. It provides two overarching targets for clean cooking: to increase the share of clean energy for cooking from 15% to 50% (echoed in the Energy Policy) and to reduce the share of biomass energy used for cooking from 85% to 50%[16]. The Uganda National Alliance for Clean Cooking (UNACC) aims to support these targets by providing a single collaborative framework for public and private stakeholders to coordinate and attract finance [50], whilst the Uganda National Biogas Alliance plays a similar role for its subsector.

As woody biomass and charcoal are the predominant cooking fuels in the country, in 2013 the GoU released its National Biomass Energy Strategy to assess the supply and use of biomass resources and the transition to more sustainable management [51]. Its objectives include enhancing regulatory capacities, promoting awareness and training programmes, and increasing the uptake of improved stoves and cleaner fuels. It also highlights the key aspects of biomass and charcoal demand of households and gives a detailed breakdown of biomass usage for specific industrial applications.

16 Both targets use FY2017/18 as a baseline and FY2024/25 as the target year, with annual intermediary targets in between.

The use of electricity for cooking is formally supported through a reduced grid tariff designed to increase its uptake [52]. From 1 January 2022 the "Fumba" tariff of 412 UGX/kWh was introduced for domestic customers for units 81-150 of their monthly consumption, lower than the tariff for the preceding units 16-80[17]. A review by ERA found that this tariff would provide an economic incentive to use electricity to cook, rather than firewood or charcoal, for those customers that have the means to adopt it and overcome customer perceptions of high electricity tariffs.

Uganda has adopted quality standards for the technical, performance, and safety requirements of biomass stoves (US 761:2019) [53]. These standards also cover manufacturing, durability and packaging requirements, as well as the methodology for testing thermal performance and emissions [54]. Whilst quality standards and labelling of cookstove products are useful steps to inform consumers, little information is available as to whether these standards are widely adopted by suppliers[18]. ●

17 The tariff structure reverts to the higher price for consumption above 150 kWh/month to avoid exploitation.
18 The cookstove standards were introduced in January 2019 with the intention of making them voluntary for two years, before becoming mandatory, to allow a smoother transition for manufacturers [55].

Clean cooking should increase from

15 TO 50%

by 2024/2025

04

Energy needs in displacement settings

Clean cooking for households

Most of the available literature, along with the READS workshop, is focused on data and experience in the West Nile region. To supplement and complement these sources and others, the READS Programme also conducted primary qualitative research interviews to gain first-hand insights into the energy needs and priorities of displaced people. These involved 19 key informant interviews in Nakivale refugee settlement, in the Southwest region of Uganda, and with urban refugees in Kampala to also represent these areas. As the circumstances for refugees living in urban areas are typically quite different from those living in settlements and rural areas, energy access in urban settings is given its own spotlight.

Clean cooking for households

Only 1% of the Ugandan population have access to clean cooking [6]. Across rural areas of the country 84% of households rely on firewood for cooking and 15% rely on charcoal [56], a trend mirrored in refugee-hosting districts and the settlements themselves. National clean cooking targets are far from being achieved, both country-wide and in Uganda's 12 refugee-hosting districts. The immense challenges related to clean cooking are further exacerbated by population growth.

According to a study from 2020, across Uganda's refugee-hosting districts and Kampala, 62% of households relied on firewood and 36% on charcoal [49]. A separate, recent assessment by Mercy Corps found that in Bidibidi, Adjumani, Palabek, and Palorinya refugee settlements in West Nile, between 76-91% of surveyed households relied on firewood as their main cooking fuel. Between 88-98% used three-stone fires as their primary stove across three of the settlements, with the exception in Bidibidi where 54% of households reported using improved cookstoves[19] [8]. Firewood is typically collected from between 4-10 km away from individuals' homes [6], causing significant impact to the environment. Reliance on firewood also affects people's health, especially women and children who are primarily responsible for collection from the local surroundings, and who risk exposure to sexual and gender-based violence (SGBV) when doing so. Charcoal, along with cooking oil, represents a very costly expense of many refugee households at an average of UGX 40,000 and UGX 11,000 ($10.81 and $3) respectively, out of a total average monthly expenditure of UGX 65,500 per household ($17.50) [18]. This high cost of fuel has a ripple effect on other areas of household expenditure, making it harder for families to afford other essential needs like education, healthcare, and decent housing.

Biogas cooking, LPG, and solar powered cooking are some other potential clean energy options available on the market. For example, a local biogas system innovation currently meets the energy cooking needs of 45 households in Nakivale Refugee Settlement. However, for refugee households, cooking with both biogas and LPG remains very rare in refugee settlements and is mostly prevalent in Kampala (13% for biogas and 3% for LPG for urban refugee households) [49]. Projects to support the rollout of solar powered cookstoves – that cook faster, more efficiently and save on fuel costs – have also been implemented but suffer from numerous issues. These small-scale projects typically have limited reach, a lack of awareness amongst customers of their benefits, and misconceptions about using electricity or waste for cooking.

Holistic, coordinated, and longer-term programming is needed to address the challenges of clean cooking and to protect both people and the environment. Any solutions aiming to do so should address the three main barriers of availability, affordability and acceptability. ››

19 No information was provided on the efficiency or effectiveness of the improved cookstoves.

Clean cooking for households

A study by EnDev from 2017 estimated that the consumption of biomass is approximately 2 kg per person per day [57]. Heavy reliance on biomass fuels significantly outstrips the amount which can be harvested sustainably: according to the GoU's Water and Environment Sector Refugee Response Plan, at least 15 five-year-old trees are needed to meet the average person's annual cooking needs [58]. Using growth rates from FAO [59], the average refugee family would need to cultivate and care for almost 300 trees to sustainably meet their cooking needs. Existing land limitations in refugee hosting districts notwithstanding, even if the growth of such trees was possible, it would take five years for the biomass to be ready to use [11]. Urgent measures are needed to address this need for biomass fuels, such as the promotion of improved cookstove (ICS) technologies. With an efficiency rate of approximately 40%, these could save up to 757,800 tonnes of biomass per year.

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Heavy reliance on biomass fuels significantly outstrips the amount which can be harvested sustainably. Efforts are needed to scale up small-scale projects that promote the rollout of non-biomass cooking technologies, which show promising results but suffer from a lack of reach and lack of awareness about the benefits of these technologies.

Barriers to clean cooking

AVAILABILITY BARRIERS

Fuel is not included in food distribution or in cash assistance and so most refugees resort to collecting firewood from the local surroundings. Host community members also rely on the same sources for firewood, and often own the land from which refugees collect firewood, which can lead to conflicts and damages social cohesion between the communities. The increasing scarcity of firewood and resulting deforestation results in high pressure on both communities, particularly on women and girls who are forced to walk further distances, increasing the health and SGBV risks associated with it.

Several organisations support ICS companies to set up operations in refugee settlements through RBF schemes. However, the number of companies selling these more fuel-efficient stoves is still limited, as is the variety of available products. Other organisations have conducted trainings on constructing ICS using local materials, but these stoves do not always perform well from an efficiency perspective. There is limited willingness to purchase them, as well as a lack of evidence on their continued usage. The products would need to be improved before attempting to scale up production, which is constrained by a lack of raw materials and machinery necessary to manufacture stoves at a larger scale. Many of these programmes have relied heavily on grant funding and ceased operations once the initial funding ran out.

Household briquette making has also been promoted in the settlements. However, these initiatives have had limited success to date: the process of making briquettes is highly labour intensive but has low earning potential. There are insufficient raw materials, and the briquettes often perform worse than firewood or charcoal leading to low market demand. Solid biomass fuels, like briquettes and pellets produced semi-industrially with higher efficiency levels, are not widely used in Uganda's cooking fuel market [15]. A study was conducted in 2022 to determine the viability of manufacturing these fuels in refugee-hosting regions in Uganda, Ethiopia, and Kenya, which concluded that it was not economically viable to produce high quality briquettes and pellets (although technically feasible) [60].

Other alternative fuels, such as LPG and electricity, are not currently widespread, but some initiatives have started and LPG sales have begun in Nakivale, although high upfront costs of the stove and cylinder remain a barrier. Standalone e-cooking appliances, which use fans powered by solar panels and batteries, already exist and could be promoted as an efficient technology which is able to meet cooking needs at a lower cost than charcoal and without needing connection to the national grid. However, adoption of these is limited owing to unavailability and high upfront costs, and so would need further subsidisation or innovative payment modalities to enhance affordability. Biogas is unlikely to have high potential within settlements due to low levels of land and livestock ownership amongst refugees, although it may be of greater relevance to host communities. Ethanol is used as a cooking fuel in Kampala, however it would require significant investment to scale fuel supply chains and is therefore unlikely to meet a significant portion of demand [11].

OPPORTUNITIES

In the short-term, biomass fuels such as firewood and charcoal are likely to remain the dominant fuels in refugee settlements. The promotion of alternative fuels will take time and so it is essential that biomass resources are managed more effectively. DLGs have bylaws and ordinances banning the production of charcoal, however these have proven very difficult to monitor and enforce. Restrictions on making and using charcoal could be adapted to promote more efficient and sustainable charcoal production, along with the provision of support to households to access affordable alternative fuels, to manage the transition from unsustainable biomass usage [11].

While dedicated woodlots and agroforestry interventions are needed in all settlements at a large scale, the energy needs are likely to surpass the supply created through these measures. The SERP recommends that firewood distribution programmes sourced from sustainable forestry sources be expanded to meet energy needs in the short term, with the amount being reduced with time as other technologies and fuels be- ››

Barriers to clean cooking

come more widespread, to decrease deforestation rates. This could be done through voucher or cash assistance schemes, fuel-for-work interventions to promote tree growing, and inclusion in the minimum expenditure basket[20] [11].

Coordination will be crucial among the implementers of improved biomass stove projects as distributing cooking products for free would undermine market development activities for the same products. In addition, alternative, non-biomass cooking systems such as e-cooking and LPG stoves should be promoted. Private companies selling these cooking technologies should be de-risked to support their market entry into displacement settings. Clean cooking products must be tested both at a lab as well as at a field level, and independent evaluations should be carried out to assess the continued usage of the stoves. The viability of solid biomass fuel production and the use of alternative fuel sources, such as agro-waste, could be further explored.

In addition, repair and maintenance services are not always easily accessible. Companies should be required to provide after-sales services and to train local staff in the provision of repair and maintenance services. The creation of other independent repair and maintenance hubs could also be supported.

AFFORDABILITY BARRIERS

Many households report that they sell or exchange food rations to buy firewood from collectors. While charcoal is sold in all of the settlements, many households claim they cannot afford to buy it. The uptake of ICS and e-cooking solutions, meanwhile, is hindered by their high upfront costs; although a study on alternative cooking fuels showed that e-cooking with high efficiency appliances and improved biomass stoves were the most cost-effective systems when compared over five years, the upfront costs make these long-term savings unattainable [11]. In addition, there is limited willingness to pay for ICS as some organisations have distributed stoves for free, hampering efforts to build markets for these products.

OPPORTUNITIES

End-user subsidies, instalment payments, and flexible repayment mechanisms could be used to support households with buying more fuel-efficient biomass stoves as well as e-cooking and LPG. Examples of these approaches include supporting existing stove sales through RBF and demand-side subsidy schemes by GIZ ESDS and EnDev, as well as an upcoming EnDev programme which plans to sell approximately 200,000 ICS through a demand-side subsidy scheme. Initial findings from implementing the first demand-side subsidy schemes show that they play a significant role in increasing sales numbers. Mercy Corps is also planning a demand-side subsidy scheme, as are MEMD and UECCC through funding from the EASP programme. Another larger pilot is planned by UNHCR and KfW under the Refugee Environment Programme which intends to promote ICS and tree growing through a carbon credit scheme. Some companies, like FRES Uganda, are exploring financing rental models for products with high upfront costs.

Non-inclusion of fuel in food and cash assistance implies that people are expected to collect firewood from their surroundings: if people require assistance to access food, it also follows that they need energy to cook [11]. As detailed above, firewood distribution programmes from sustainable forestry sources could support households in meeting their energy needs and prevent them from needing to sell their food rations.

ACCEPTABILITY BARRIERS

Cooking practices and systems are deeply entrenched in cultures. There are many different preferences, which clean cooking solutions do not always cater for, and this can lead to low adoption rates, as people are unlikely to adopt new technologies if the food does not taste or feel right. Most households prefer three-stone fire stoves because they are easy and fast to make and use, free, rain resistant, suitable for all ››

20 The minimum expenditure basket is an operational tool which identifies and quantifies the average minimum cost of the regular, essential needs of a median household which can be covered through the local market. It is used to inform the design of cash and voucher assistance [61].

Barriers to clean cooking

pot sizes and both firewood and charcoal, and do not require much space [11]. There is limited awareness of how to use clean cooking technologies, of their benefits, and of the cost-value-price comparisons with current cooking methods. Indeed, research in West Nile revealed similar trends with 83% of the households in refugee settlements not having used ICS and indicating a lack of knowledge on the benefits and usefulness of improved cooking [57]. Even though there are many briquette manufacturers throughout the settlements, uptake remains very limited because the briquettes are often low quality, with charcoal being both cheaper and higher quality.

OPPORTUNITIES

The government has an important role to play in promoting clean cooking solutions. Organisations are working with media houses to conduct awareness raising campaigns, which should be scaled up to reach more people and conducted over longer periods of time. Engaging cultural leaders, such as tribal kings and queens, and other prominent social and political figures as product ambassadors can play an important role in influencing behaviour. These campaigns should be conducted both before and during the implementation of a clean cooking intervention. Improved cookstove and e-cooking companies, supported by humanitarian agencies and community-led organisations, should invest in community mobilisation and demonstration activities which highlight the various pros and cons of different cooking solutions and include cost comparisons, and allow people to try the technologies for themselves. This should include cooking demonstrations and classes at schools, which give both boys and girls the opportunity to learn how to cook with new, efficient technologies.

Community members can play a central role in creating new cooking solutions. There are initiatives, such as the innovation centres managed by Kulika and Y-SAT, ongoing in the settlements which focus on the co-design of cooking technologies which allow community members to develop cooking solutions that meet their needs and specific preferences, like an oven or groundnut roaster. Adoption and regular usage of these solutions is far more likely when end-users are involved in the design of the products. Beyond these innovation activities which involve creating technologies from scratch, professional stove manufacturers should involve end-users in the design of their products and make efforts to adapt their products to consumer needs and preferences, instead of only relying on behavioural change measures. ●

FIGURE 2

Energy kiosk funded by GIZ in Rhino Camp

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Innovation centres for energy technologies: Kulika Uganda, YSAT, and MIT D-Lab

Energy products that are available in Uganda's refugee settlements are often unaffordable and do not always meet people's needs and preferences. In a collaboration between local NGO Kulika Uganda, refugee-led organisation Y-SAT, and MIT D-Lab, with funding from GIZ ESDS, the Design Lab pilot project was implemented to strengthen local innovation systems and foster the creation of energy solutions for household use and to start small enterprises.

Building on work funded by Malteser International, the project supported the establishment of two innovation centres in Rhino Camp and Imvepi where refugee and host community members work on designing, prototyping and refining technologies, using the tools provided by the innovation centre and locally available materials. Community members complete MIT D-Lab's Creative Capacity Building curriculum at the centre, in which they learn about the design cycle and work in teams to design technology prototypes that address specific energy needs. Once participants develop a prototype, they spend another week at the centre refining it with the support of centre staff. The centres have expanded to offer other trainings to further support the participants, such as basic business skills and group formation activities.

In the first year of the project, there was a strong focus on developing energy-saving technologies for food processing such as cassava graters (shown in the image below), juice makers, drinks coolers, groundnut roasters and improved ovens. People make use of these technologies to save energy, run a business, and/or generate income. More recently, the Design Lab pilot has had a focus on exploring the factors in adopting energy-saving cooking technologies, such as insulated cooker boxes and charcoal briquettes made from agricultural waste.

Solutions that are made from locally available materials and harnessing local knowledge have the potential to complement other improved cooking solutions and bridge the gap to more widespread adoption of energy-saving cooking technologies. Fostering the innovative potential of people living in the settlements enables the design of solutions that are tailored to specific needs and match preferences, as well as building confidence of the innovators and promoting entrepreneurship.

Barriers to clean cooking

BARRIER	OPPORTUNITY
High cost of products and improved fuels compared to free collection of firewood	End-user subsidies and instalment payments
Unavailability of affordable, accessible non-biomass fuels	Invest in scale-up of pilots of standalone solar powered e-cooking
	Innovative financing to enable PAYC/rental models for e-cooking
	Grants or RBF to increase reach of LPG
Lack of coordination among actors doing free distribution and market-based approaches	Clear policy guidance on the promotion of clean cooking systems and strict enforcement of regulations
High upfront costs of operations in settlements for suppliers and difficulties with transportation of products	De-risking for suppliers through staged grants which encourage longer-term outlook and localisation of production sites
	Support with warehousing and distribution channels
Immense demand and heavy reliance on firewood	Firewood distribution from managed sources or inclusion of fuel in minimum expenditure basket
	Dedicate land for fast-growing trees and agroforestry, creating jobs or running fuel for-work schemes for refugees growing food and tending trees
Preference for three-stone fires over improved cooking products which do not always match cultural preferences	Promotion of local innovation and involvement of users in design of products
	Promotion of local construction and sale of improved cookstoves
	Field level testing of stoves
	Demonstrations of fuel savings in which community members cook with the products and can see the results for themselves
	Engage cultural leaders to support awareness campaigns and influence user behaviour towards cleaner fuels and energy efficient technologies
Women and girls are usually responsible for cooking but are not always the primary decision-makers	Conduct clean cooking and ICS demonstrations targeting men, women, boys and girls
	Hold cooking classes using efficient technologies at schools where boys and girls can learn how to cook with new technologies

Electricity access for households

Just 42% of households in Uganda have access to electricity, falling to only 33% in rural areas [9]. Access levels in refugee settlements are even lower, with access to the national grid generally being limited to refugee settlements in the South-west region of Uganda. Only Pagirinya and Bidibidi refugee settlements in the North are connected to the grid [11] and, whilst medium voltage transmission lines have been installed in Bidibidi, there are no last mile connections. Even where the grid is available it is connected to very few households, primarily serving trading centres and humanitarian operations. Although some places in Nakivale, Oruchinga, Kyaka II, Rwamwanja and Kiryandongo have connected end-users, further extension of the network and an increase in the numbers of connections are needed to expand the coverage within the settlements. Nakivale Refugee Settlement, for example, is divided into three administrative units – Base Camp, Juru and Rubondo – with only Base Camp connected to the grid. The majority of consumers are humanitarian organisations, government workers and a few refugees that live in the greater Base Camp trading centre area.

Electricity from the grid is often unreliable and power outages occur frequently. While some issues are easier to resolve, like undersized or inadequate numbers of transformers, others are more challenging as they relate to lack of generation capacity and transmission difficulties [11]. Mini-grid development is currently being explored in some refugee settlements, however a KfW study showed that, due to the relatively low use of grid power by households and businesses, very high tariffs would be necessary to make the projects financially viable. Even grid-connected households restrict their electricity use to lighting and the charging of electronic devices because of high costs of electricity per unit, as explained in key informant interviews. Off-grid solar systems might instead present a more cost effective source of electricity in many places [62].

Without a connection to the national grid or a mini-grid, most people in refugee settlements use kerosene lamps, solar lamps or disposable dry cell battery-powered torches for lighting. Firewood and candles are also frequently used, posing both a fire and health hazard [6]. In the case of Rhino Camp and Imvepi refugee settlements, households primarily use solar lamps and disposable dry cell battery torches, spending between UGX 1000-1500 ($0.27-0.40) per week [63]. Phone charging is available in shops, costing UGX 500 ($0.13) per charge.

The quality of solar lamps in the settlements is varied: some organisations work to support private companies selling certified, high-quality products, but lower-quality and counterfeit products are also in circulation. The short lifespan of disposable lighting sources, including low-quality solar products, has the potential to generate large amounts of e-waste if not adequately managed. Although e-waste regulations are in place in Uganda, they are not always enforced and there is a lack of awareness of e-waste hazards. This is exacerbated by a lack of repair and maintenance services in the settlements. Some organisations are addressing this by providing training programmes on maintenance and service.

People living in displacement settings are already spending on lighting: the fact that they are paying for low-quality sources implies that there would also be willingness to pay for reasonably priced higher-quality alternatives, showing the potential for organisations to use market-based approaches to promote higher quality lighting products. Refugee and host community representatives indicated in the key informant interviews that there is a market readiness in both communities to pay for electricity access if the following barriers of availability, affordability, and acceptability can be addressed. ››

Barriers to household electricity

AVAILABILITY BARRIERS

Uganda has a vibrant off-grid solar sector and is the third largest market in East Africa by volume of products sold [11]. Although high-quality solar products exist and are available throughout the country including in the West Nile region, most companies focus on urban and peri-urban areas [8]. Refugee settlements are still perceived as a risky market by many companies, who also cite security concerns, distribution challenges, and short-term market demand as reasons that they do not work in humanitarian settings [11].

Certified solar lanterns and SHS are now being sold in the settlements following market-based interventions by organisations. However, the number of service providers operating in the settlements and the range of products they offer are limited. While some companies which were supported through RBF schemes have successfully established themselves in the settlements, continuing to operate there once the financial support ended, others have not managed to do so and ceased to operate in the settlements. COVID-19 presented an additional challenge to companies which had just begun to work in displacement settings.

A study by Mercy Corps found that there is a mismatch between what energy products are on offer from suppliers and what refugee and host community members need and are able to afford [64]. The report highlighted that people in refugee-hosting districts regularly spent money on low-quality lighting products, with low consumer awareness of the cost-quality-value comparison with higher-quality alternatives. Low-cost disposable torches and dry cell batteries are also commonly used for lighting, which have very limited lifespans and generate e-waste.

OPPORTUNITIES

The enabling environment must be strengthened to facilitate the introduction of solar companies into the settlements, allowing them to sell high-quality products and support longer-term operations. Due to the high upfront costs of establishing operations in the settlements and the low ability-to-pay of customers, it will be necessary to de-risk and incentivise private companies who enter the refugee market. This needs to be done in a way that allows companies to set up longer-term structures by encouraging the development of localised facilities like warehouses which can be shared by companies so that they eventually cease to be reliant on external funding once the market is catalysed. Supporting companies to gain access to high quality data will help them better tailor their business models and product offerings. Companies should invest in setting up accessible repair and maintenance structures along with programmes to train and certify technicians from the local community, and also establish comprehensive e-waste management systems. In addition to services provided by individual companies, independent repair and maintenance service hubs could be created which also employ certified local technicians.

AFFORDABILITY BARRIERS

Availability of reliable sources of electricity does not translate into higher access rates unless a combination of affordability and accessibility is provided [65]. The high upfront cost of off-grid solar products was cited as the greatest obstacle to accessing electricity in the READS workshop, as low-income levels and low access to finance impede households from investing in a solar product. Interviews in Nakivale also confirmed that affordability was the key barrier to accessing off-grid solar products or connection to the national grid.

OPPORTUNITIES

Financial products tailored to customers' needs, such as instalment payments and flexible repayment mechanisms, are key to supporting more widespread access to solar products in refugee settlements. These could include consumer subsidies, RBF and default guarantees, which are already being implemented by projects like ESDS and Accessing Markets through Private Sector Enterprises for Refugees Energy (AMPERE), and are being planned at a larger scale through the EASP project. Leasing opportunities could be piloted and would allow customers to become acquainted with the benefits of solar products with minimum capital requirements [11]. Awareness raising activities should demonstrate the benefits of off-grid solar systems, especially using cost-quality-value comparisons, and should include explanations of the different payment options. ››

Barriers to household electricity

ACCEPTABILITY BARRIERS

Social and cultural factors play a role in maintaining the status quo and hinder the uptake of renewable electricity. Even in settlements where solar products are available, people often prefer batteries due to familiarity and the perception that solar products are less reliable. Counterfeit products circulate in the market and organisations have distributed lower-quality solar lanterns for free, which ended up breaking quickly, reducing consumer trust. Some new companies have not ended up delivering the quality that they promised, disappointing customers and making them wary of new products. In Nakivale refugee settlement, where a biogas system provides electricity to 45 households, the developers have faced challenges with uptake due to cultural beliefs that waste cannot be used to produce electricity, let alone be used to cook food for human consumption.

Another social issue relating to acceptability is that it is usually men who make household decisions, although women typically spend more time in the domestic sphere and are responsible for a greater variety of tasks at the household level. There may be differences in willingness to purchase solar products as well as in usage patterns among household members.

OPPORTUNITIES

Awareness raising activities are necessary to demonstrate the benefits of renewable sources of energy over non-renewable sources, as well as how to correctly use and maintain them, to help overcome negative perceptions [11]. Quality standards for off-grid solar products must be upheld by organisations and governments in order to avoid market spoilage [11]. Activities should target women, men, girls, and boys, highlighting different uses of electricity for different household members and the benefits of joint decision-making. Customer surveys should gather sex-disaggregated data to understand gendered use patterns better and target women's needs more explicitly, and explore the role that improved lighting can play in increasing perceptions of safety from household accidents, scorpions, and SGBV.

BARRIER	OPPORTUNITY
Low quality products with short lifespans decrease trust in products and generate e-waste	Sell high quality products with warranties and after-sales services which meet international standards
	Fund the establishment of a comprehensive e-waste management system
Low customer ability to pay	Introduce instalment payments, flexible repayment mechanisms over longer durations, and tailored financial products, and roll-out PayGo systems as mobile money becomes more widespread
	Collaborate with VSLAs to support with end-user financing
Short-term orientation of private sector companies	Establish local shops and outlets for long-term investment
Limited number of providers, products, and repair services available in the settlements	De-risk private sector market entry through financial support and provide high quality data to support planning
	Establish repair and maintenance hubs and train technicians in providing repair services
Decision-makers do not always take needs of all household members into account	Awareness raising campaigns targeting women, men, girls and boys, highlighting the value of joint decision making

Energy access for urban refugees

Energy access for urban refugees is significantly higher than for refugees living in settlements. Urban refugees have access to the national grid which generally gives them access to sufficient energy for lighting, charging, education, healthcare, and other productive uses in line with the host communities in the same areas.

Urban refugees cook in similar ways to members of the host communities; for the latter group, a national survey of households in urban areas in 2016 found that either firewood (69% of respondents) or charcoal (31%) were used by the overwhelming majority of people [56]. A 2023 survey by IMPACT and UNHCR also found that refugees experience unmet energy needs, particularly in terms of accessing cooking fuels, including traditional and modern options [66].

Even with access to the national grid, many urban refugees reported that they cannot use electricity to cook due to high tariffs. Electricity from the grid is therefore limited to a few non-intensive uses. High electricity costs were also highlighted as a hindrance for livelihoods for urban refugees [65], with some respondents in the key informant interviews voicing frustrations about their inability to establish energy-intensive businesses, such as bakeries.

However, perceptions of the high costs of electric cooking are not always founded on any experience or longer-term cost comparisons. Some urban refugees have adopted e-cooking, and did not experience a significant price difference in using elecricity for cooking compared to charcoal as explained in the quote below.

Awareness campaigns and demonstrations that show how to use appliances efficiently to reduce costs could help support a greater uptake of e-cooking, if people were able to try it for themselves and experience its potential benefits.

Some urban refugees have access to LPG and prefer it over charcoal, although others prefer the latter. However, findings from other key informant interviews indicated that people who still depend on charcoal and firewood perceive cooking with LPG as more expensive, due to its high upfront costs, and as a fuel that is only for rich or middle class people. Some respondents cited safety concerns of using LPG, for example from the risk of burns or fire hazards, as the reason for their preference for using charcoal as their primary cooking method.

Raising Gabdho Foundation, an NGO, works primarily with urban refugees and has promoted LPG cooking, as well as distributed ICS and energy-saving baskets. The energy-saving baskets consist of an insulated basket in which food or pots can be placed to either keep warm or continue cooking using its residual heat. These appliances have potential to save energy, however they are not always suited to cooking practic- ››

> I used to spend approximately UGX 100,000 ($26) on charcoal [per month] for cooking. I am now using electricity to cook and I use the same amount of money. – Urban refugee in Kampala

Energy access for urban refugees

es and small cooking spaces. Only a few households have them and they are not readily available on the market, limiting their impact so far.

Although urban refugees typically have higher access to energy than those who live in settlements in rural areas, they still face limitations on their use of electricity both for domestic and professional purposes. Heavy reliance on biomass fuels remains a challenge in urban settings although more alternatives are available and are gaining more traction. Some urban refugees use LPG or e-cooking with promising results that indicate the potential for scale-up. However, there is need for much more work to validate energy efficiency claims, sensitise people to new and alternative ways of cooking, and to design targeted interventions for improved energy access for urban refugees and host communities in Uganda.

Energy-saving baskets promoted by Raising Gabdho Foundation

Cooking using gas (LPG) is cheaper when compared to charcoal. For example, I used to buy two sacks of charcoal for UGX 120,000 ($32) per month, but now I use 6 kg of gas per month which costs UGX 60,000 ($16). In addition, LPG cooks faster, it is convenient, and is clean.

– Urban refugee in Kampala

Energy access for livelihoods and productive uses

Productive uses of energy (PUE) can support income-generating activities, for example for agriculture, small-scale manufacturing, and businesses, and can include using energy for agro-processing, water pumping, irrigation, refrigeration, and lighting, among others [67]. Improved access to energy can play an important role in catalysing rural economic development and warrants greater attention as a pathway to development [68].

In refugee settlements in Uganda, some members of refugee and host communities sustain their livelihoods through small-scale enterprises that rely on solar power, national grid electricity, diesel gensets, firewood, charcoal, and briquettes. A study on enterprises in West Nile found that many types of small businesses were prevalent in Rhino Camp and Imvepi settlements: these included hair salons, phone repair and charging services, restaurants, milling operations, cold beverage dispensing, secretarial services, cookstove production, baking, briquette manufacturing, and entertainment venues, including hotels [14]. Other applications of PUE include solar irrigation and small-scale industries like joinery, tobacco processing, wine-making, breadmaking, maize milling, carpentry, and welding.

Several sectors and value chains in the settlements, in host community villages, and trading centres could use energy to enhance productivity. The hospitality and service sector requires energy access for refrigeration (both for cold storage and for serving food and beverages), barber equipment, televisions, and the production of locally brewed beer. In Rhino and Imvepi settlements approximately 21% of households were found to employ PUE associated with these value chains [14]. Livelihoods in the ICT sector can also be supported by PUE, including secretarial services such as printing and photocopying, the sale of rechargeable batteries, and computer training [69]. Small businesses and shops benefit from solar lighting connection to remain open for longer periods of time, enhancing their profitability [14]. PUE opportunities within the agriculture sector have supported farming and crop processing; in the West Nile region these included goat husbandry, sesame, soybean, tomato, and okra, cassava, and groundnuts [69]. In refugee settlements in Southwest and West Uganda, agricultural opportunities for PUE include applications for cattle farming, maize, beans, cassava, and potatoes. There are also livelihood opportunities for PUE to support the provision of energy itself. These include stove and briquette manufacturing, tree planting and management, sale of electronic goods along with repair and maintenance services, phone charging businesses, and technician jobs to maintain larger or more complex solar off-grid systems.

While there is potential to boost productivity across many different value chains, access to PUE remains limited. Enhancing energy-related livelihoods within value chains in refugee-hosting districts in Uganda requires capacity building, facilitation of market linkages to the private sector, and engagement with local government and financing institutions to improve access to financial services and to clean energy solutions. ››

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Barriers to energy access for livelihoods and productive uses

AVAILABILITY BARRIERS

Access to reliable and sustainable sources of electricity is limited for businesses in displacement settings. There is a heavy reliance on diesel generators, as grid connections are not available or are considered too expensive. Even for businesses which are grid-connected in the Southwest region of Uganda, diesel generators remain in use as a backup power source during power outages. Owing to this reliance, rising fuel prices have significantly impacted the profitability of diesel-powered businesses.

While there are plans to develop solar mini-grids in some settlements, they have not yet been installed. Smaller off-grid solar systems are fairly widespread among businesses but some enterprises cannot access them, citing concerns that the upfront costs are too high. Many small businesses which use solar report that their systems (ranging from 20-240 Wp) do not have the capacity to power them for long durations, and that they would like to upgrade their systems to be able to work for longer hours and power more appliances [14].

According to workshop participants, the GoU's perceived monopoly on the provision of electricity through the national grid hinders the ability of the private sector to provide power through mini-grids. This perception might be outdated or misconstrued, however, as both off-grid solutions and working with the private sector to deliver energy solutions (albeit with GoU permission for mini-grid installations and operation) are features of the government strategy. Setting up mini-grids in displacement settings, which could significantly improve access to PUE, is considered riskier in areas where the grid is nearby and could result in competition for customers against the Government-backed grid. Bureaucracy on the part of the local government, including the many processes and forms, were cited as further barriers to mini-grid implementation. The poor quality of some roads and geography of the West Nile region introduces more challenges to setting up mini-grids and adds to the regional imbalance between different settlements.

OPPORTUNITIES

While smaller off-grid solutions may be the fastest and most cost-effective way to increase access to PUE in the short-term, connection to a reliable grid or mini-grid will be necessary in the long-term to provide livelihood activities with higher levels of power that they require [11]. Grid expansion to reach all the settlements should thus be a priority, particularly in the West Nile region. Efforts should be made to widen the reach of the grid to businesses and households living near a trading centre to increase the number of connections.

For settlements (or zones within them) which are not going to be connected in the foreseeable future, solar mini-grids should be explored, like the installation of two mini-grids which is planned in Palabek refugee settlement through the GIZ ESDS project. A private developer operates systems in 25 villages in the same district and a licence is already in place; this provides an opportunity to install new systems in Palabek refugee settlement and to charge the same tariffs as in the other villages. Other solarisation projects have previously mostly targeted humanitarian operations. These could potentially be expanded to include nearby businesses.

AFFORDABILITY BARRIERS

While the grid has recently been expanded to some settlements in the West Nile region, the ››

Barriers to energy access for livelihoods and productive uses

cost of a household or business connecting to it remains very high. Previously the region did not benefit from the national lifeline tariff regime, a heavily subsidised rate of 250 UGX/kWh for customers for their first 15 kWh per month which greatly benefits low-consumption users. West Nile Rural Electrification Company (WENRECo) customers instead paid the full tariff for grid power, a rate comparable to typical mini-grid tariffs [11]. Whilst this has now been amended, such that in 2022 WENRECo customers paid the lifeline tariff for their first 8 kWh, the higher price of around 715 UGX/kWh for the next 8 kWh is paid at lower levels of consumption than elsewhere in the country [70]. Meanwhile interviewees in Nakivale refugee settlement in the Southwest, which is grid connected, reported that the main reason for non-connection was the prohibitively high tariffs.

Despite awareness of the opportunities they offer, high costs of connections and electric appliances remains a key barrier to increasing PUE. The owner of a sports bar in Nakivale, who previously relied on a diesel generator for power but now has a grid connection, found the costs of accessing an off-grid solar system prohibitive: "When solar came I found I would need an upfront cost of UGX 2,500,000 ($668) which I could not afford. Alternatively, the cost of a generator was only UGX 900,000 ($240), which I could afford. Hence, I acquired a generator which I still use when I have no access to national grid electricity. But if I had capacity, I would buy a solar system."

A businesswoman, who operates a large-scale porridge selling business in Nakivale, faces the same situation. She explains the following challenges regarding her use of firewood on p. 57.

Regarding the use of solar-powered appliances, a study in West Nile found that there are several initiatives promoting the use of solar irrigation [14]. These can have many benefits if tailored to the agricultural needs of each farm. However, solar pumps have very high upfront costs (ranging between $1,000-3,000 per acre) and profitability can be very unpredictable as it relies heavily on the season and the value of the crops. Similar challenges related to high upfront costs pertain to small-scale solar mills, which at present do not meet customer demand. The study recommended that local financial initiatives, like SACCOs and VSLAs, could contribute to increasing financial literacy and fostering a saving culture among members. This could enable them to borrow money from financial institutions to buy sustainable energy equipment for cooking and other livelihood needs. ››

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My major problem is firewood which affects my business profitability. I use all the money I can on firewood. For the past five years I used to buy firewood for UGX 200,000 ($54) per month, but now I use around UGX 400,000 ($108) on firewood per month…
I was told that I can use an institutional solar cookstove to cook porridge, but I have not explored that, and I can only invest in it if the solar cookstove costs around UGX 500,000 ($134) because I hear that it is expensive.

Barriers to energy access for livelihoods and productive uses

OPPORTUNITIES

Organisations should work with financial institutions to provide tailored microloans to buy PUE appliances that can be used to boost incomes. Other financial services, such as cash transfers and financial literacy programmes, would also support increased productivity. Some trading centres in refugee settlements have access to electricity and PUE which has increased earnings and added commercial value to agricultural products through processing, which can be used as examples [11].

ACCEPTABILITY BARRIERS

Many businesses are not familiar with PUE or energy efficient appliances and rely on common but labour-intensive traditional production methods. Entrepreneurs do not always trust appliances that are marketed as energy efficient as there have been cases of appliances being altered before sale, for example using stickers that indicate false information regarding their electricity consumption. Business operators also may be more familiar and comfortable with using diesel generators, in comparison to off-grid solar systems, owing to perceptions that solar electricity is not reliable or powerful enough for their applications.

OPPORTUNITIES

Awareness campaigns can play an important role in demonstrating the benefits and potential uses of PUE appliances. These public awareness initiatives could explain how electricity can be beneficial to their businesses by showing how off-grid solar systems can power many different appliances and machines. NGOs and financial institutions could facilitate business mentorship schemes that also provide entrepreneurs with microloans or other financial services to gain access to energy efficient appliances. Examples of such an intervention in other displacement contexts include the PUE component of the Renewable Energy for Refugees (RE4R) Project in Rwanda. Financial literacy trainings and other business development support will be key to boosting productivity, longevity and the potential for growth in the long run.

BARRIER	OPPORTUNITY
Unavailability of grid connection due to location, high connection cost and high tariffs	Financial support for businesses to connect in areas where the grid is available
Unavailability of mini-grids, bureaucracy, and high connection fees	Strategic selection of mini-grid sites in alignment with national electrification plans and government agencies, with subsidised end-user tariffs to support PUE for customers
Limited business training and financial literacy	Skills training for both PUE appliances as well as financial skills and business development
Low capacity of off-grid solar systems	Use of energy-efficient appliances for low-power systems
Unfamiliarity with energy-efficient appliances	Awareness raising campaigns and market development activities

Energy access for community facilities

Access to energy supports the provision of essential services such as for healthcare, education, and recreation. However, many community facilities have inadequate access to electricity. The quality of healthcare services, for example, is severely impacted as health centres rely heavily on electricity to power energy-intensive equipment like refrigerators, diagnostic machines, and lighting. According to UNHCR Uganda, approximately 30% of health centres do not have a source of electricity, while another 30% rely on diesel generators [6]. As a result of this lack of energy, medical staff are under increased pressure as they cannot power the machines they need and do not have sufficient lighting when performing operations and other crucial services. This results in higher error rates and higher staff turnover due to the poor working conditions, leaving many facilities overstretched. A lack of refrigeration leads to the spoilage of many essential medicines and vaccines, increasing wastage and decreasing their supply to local populations.

The provision of education also faces energy challenges. Most pre-school and primary schools in refugee settlements in Uganda operate on a day school basis and do not run feeding programmes. Secondary schools, private boarding primary schools, and vocational institutes, however, need to feed very large numbers of students and mostly rely on firewood as a fuel. Despite the availability of cleaner cooking alternatives, many schools continue to face challenges with regards to an enormous use of firewood. For example, Nakivale Secondary School relies extensively on firewood to meet its cooking needs for over 1400 students, as explained in an interview: "Our school relies on ››

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Energy access for community facilities

firewood for cooking. In a three-month term, the school uses seven trips of a 12-tonne truck of firewood to meet our cooking needs."

An institutional solar-powered cookstove project was piloted at the school and considerably reduced the amount of firewood needed. However, the project failed because of alleged corruption issues. According to the school administrator: "After the installation of an institutional solar-powered cookstove, the school's monthly firewood consumption to meet cooking needs was just half of a 12-tonne truck. But since reverting to an ordinary cookstove, the school now uses the same amount as before [when using the old stove]."

Nakivale Secondary School also uses electricity from a solar system for charging, lighting, printing, and powering electronic devices, but this is not the case for many schools in refugee settlements. A reliable electricity connection can have a transformational effect on the quality of education through access to ICT equipment and adequate lighting: an example of this is the COBURWAS Primary School in Kyangwali Refugee Settlement. This school, which gained an electricity connection, is consistently ranked amongst the best schools in the district and refugee settings in Uganda with its success attributed to running programmes like night preps, transport facilities, feeding, computer literacy, and printing of quality learning materials, all facilitated by access to electricity.

Community centres and religious centres, meanwhile, mainly operate during the day and rely on diesel generators for their energy needs. For example, most churches run generators for two to three hours on Sundays to amplify musical instruments, bible reading and preaching.

Street lighting can provide improved lighting in communal areas and offer an increased perception of safety to residents of refugee settlements, and has been implemented successfully in some displacement contexts, for example in Rwanda through the RE4R project. However, in consultations for the SERP development, most respondents instead prioritised household lighting. Calculation suggested that solar lanterns for households would be more cost effective, with one street light – at a cost of $1500 – benefitting 10 households, whereas the same funds could provide small solar lights to around 300 households [11].

Access to energy in community and institutional settings remains a work in progress in Uganda, with numerous challenges that must be addressed. The use of fuel-efficient institutional cookstoves could significantly reduce firewood consumption, one of the most pressing needs in the settlements. There is great potential for solar systems to enhance the quality of services for different community facilities, with UNHCR estimates suggesting that solar mini-grids can reduce costs by around one third whilst providing a more reliable electricity supply than the national grid in the same areas [6]. Some work has been done to address this issue, for example by GIZ which has solarised six health centres and schools in Rhino Camp and Imvepi settlements. However, all solar installations inherently entail substantial financial and maintenance requirements which are beyond most facilities in the short term at least, unless additional support can be provided. ››

Barriers to energy access for community facilities

AVAILABILITY

Many social institutions remain without a reliable electricity source or rely on diesel generators for power. Although some have been equipped with an off-grid solar installation, they still face challenges with reliably accessing electricity: this is because many of the systems were not sized adequately and can only power a small number of appliances for a few hours a day. There are also insufficient O&M schemes in place to ensure the longevity and effective performance of the installations [71].

OPPORTUNITIES

Grid expansion and mini-grid development should specifically target the connection of social institutions. In addition, assessments should be conducted to determine which social institutions have access to which kind of electricity source, if any. For those institutions with access to an off-grid solar system, the functioning and the sizing should be assessed, as well as if there is an adequate O&M system in place. Resources should be dedicated to maintaining and upgrading these existing systems to ensure their performance remains high and they meet the energy needs of the institution. In addition, more off-grid solar systems should be rolled out in settlements where grid expansion, or the installation of mini-grids, is not foreseen.

AFFORDABILITY

Solarising social institutions, while bringing immense benefits to the quality of the services, comes with high upfront costs. Many institutions and communities in Uganda face financial constraints that hinder their ability to invest in clean energy infrastructure. In the long-run, however, it has been estimated that they could reduce costs of electricity by around one third compared to diesel-based electricity and have low operational costs compared to the investment amount [6]. The primary source of funding is donor grants, along with some specifically dedicated funds and RBF schemes. However, the cost requirements of the energy interventions often exceed the amount of financing available [71].

In addition to the costs of installing the systems, ongoing financing for O&M is also required. Institutions do not always have adequate O&M plans in place and lack the funds and technical capacity to maintain the systems.

OPPORTUNITIES

Grant financing should be dedicated to investing in the energy infrastructure for social institutions, along with funding to increase technical capacity for DLGs and staffing. Organisations should join forces to lobby for more funding for clean energy technologies. Effective coordination among implementing partners is critical to better resource allocation and management, and for reaching more facilities more effectively.

O&M plans must be created for every off-grid solar installation, with clear roles and responsibilities for each stakeholder. As O&M costs will be ongoing, this must be budgeted for in the grant financing; this could come in the initial allocation or periodic allocations if agreed in advance. Social institutions could also make efforts to gain a revenue stream by running a small side enterprise: the health centres that were solarised by GIZ, for example, are trialling running canteens that serve beverages and food and use the income to pay for O&M costs. Start-up capital, for example through microloans, should be invested in these income-generating activities. ››

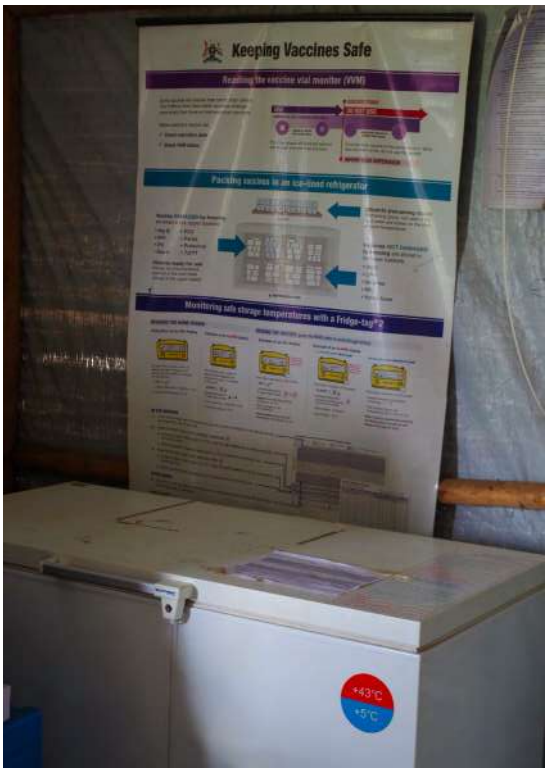
Barriers to energy access for community facilities

ACCEPTABILITY

A baseline assessment for solarising health centres found that those with access to an off-grid solar system had a limited sense of ownership of it [71]. In case of any technical issues, the implementing partner or district authority would get called in, as there was no capacity in-house to repair the system. The installations would often get neglected and staff would resort to using other strategies to provide services without power. Theft of components is also commonly reported, which an increased sense of ownership could help prevent.

OPPORTUNITIES

Specific staff of a given social institution should receive training in O&M skills to provide basic and routine maintenance for the systems. An O&M plan should be developed from the outset with clear roles and responsibilities. This could help create a sense of ownership of the system, which is key to ensuring its performance and longevity, and allow any technical issues to be addressed faster. ●



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BARRIER	OPPORTUNITY
Unavailability of grid connection due to location, high connection cost and high tariffs	Grant financing support for connection for social institutions
Incorrect sizing of off-grid solar systems	Assessment and upgrading of existing systems to ensure correct sizing
Lack of ownership for solar off-grid systems and lack of O&M	Establishment of O&M plan with clear roles and responsibilities, and capacity building of staff and training in O&M
Lack of funding for systems and ongoing O&M costs	Improved coordination and lobbying for funding, and use improved electricity access to power income-generating activities to finance O&M costs

Energy access for operational purposes

Powering the humanitarian response to provide essential services to displaced people is typically energy- and carbon-intensive. In general, if available humanitarian and development organisations use a connection to the national grid and if not, or during outage periods, diesel generators provide backup power if one is on site. Some organisations also have access to small standalone solar systems but these are also typically used for backup power rather than as the main source of electricity.

This is the case in Bidibidi: most refugee villages are not connected to the grid and most organisations run on generators and grid electricity, where available. The host community trading centres however, located near to the main roads, generally have connections to the national grid. In Palabek, meanwhile, most humanitarian offices are located at the edge of the grid network. Offices further away in the settlements rely on diesel generators and those with solar can use them for lighting only. Health facilities with solar systems are also limited to using them for lighting.

The provision of water in displacement settings in Uganda is particularly intensive. In Palabek for example, where underground water is relatively plentiful, all boreholes and pumping stations are powered by diesel generators but typically accommodate around 12 litres of water consumption per capita per day, lower than international standards. In Bidibidi, too, water pumping is highly reliant on non-renewable sources of power. To address this, some humanitarian and development organisations have transitioned to solar pumps to provide clean water for both refugees and host communities: in West Nile, Oxfam provided three refugee camps with solar pumps following the influx of refugees from South Sudan [13], whilst UNICEF installed solar pump stations in Rhino Camp [72]. These projects demonstrate the high potential for solar water pumping but much more can be done to solarise the humanitarian water response.

The ESDS Project, implemented by GIZ, is supporting the solarisation of UNHCR offices. The project undertook assessments of six sites: Lamwo, Adjumani and Yumbe sub-offices, and base camps in Palorinya, Imvepi and Rhino which also included facilities run by other organisations such as OPM, ICRC and Save the Children. Following a decision by UNHCR to focus on the sub-offices, as these sites fall under the administration budget rather than base camps which are classified under operations, preliminary sizing for solar systems was completed for Yumbe and Adjumani[21]. The systems are expected to be commissioned in 2023 and they will operate under a private sector service model for ten years. A second round of assessments, focusing on solarising three more UNHCR sites in the north of Uganda and four in the south, is currently underway.

21 The Lamwo site was not included as most UNHCR operations had moved to Palabek; the site is now used mostly for accommodation and the electricity demand is low during the day, making a solar system less advantageous.

Barriers to operational electricity use

Some operational users of electricity have reliable access to high levels of power through the national grid and diesel generators. This can form a barrier to implementing renewable energy systems as, if the quality of electricity service is already high, there would be little incentive to change to an alternative source, especially one which is unfamiliar. Facilities with little or no access to power, meanwhile, require greater levels of access but operate in more remote areas which are harder to reach – providing logistical issues to companies who might be able to provide solutions, if they are aware of them at all.

Barriers remain for organisations with the will and opportunity to access solar energy systems. Few humanitarian or development organisations have the capacity internally to appropriately assess ››

Barriers to operational electricity use

the demand of their own sites, design an appropriate renewable energy solution, and translate this into an appropriate tender. The skills to install and maintain these systems are also not common in these organisations, whilst the remoteness of many of the sites would make visits by trained maintenance professionals a rare and expensive occurance.

OPPORTUNITIES

Solar power can provide sustainable energy even to users with reliable sources of electricity. For water stations in particular, which remain highly reliant on expensive and polluting diesel generation, solar can offset or eliminate the need for diesel by pumping water during the daytime to last for the entire day. For facilities relying on the grid, too, standalone solar systems can provide back-up power during grid outages which are more common in remote areas at the end of the network. Larger solar systems can provide grid-quality power, sufficient for uninterrupted operations, rather than the small solar backup systems which are more common.

In more remote areas and for facilities with smaller systems, or none at all, the private sector could be invited into settlements to become aware of the potential market opportunities. This lack of awareness, and a potential assumption that displacement settings are riskier to operate in, could be overcome through managed visits and introductions. If several facilities are located near to each other they could potentially benefit from one larger system which could be of greater interest to the private sector.

Outside expertise and the private sector would likely be critical in both delivering and maintaining solar systems, owing to the lack of organisational or local expertise. Third parties could provide expertise in energy assessments, system design and implementation support – as was the case with GIZ supporting UNHCR – without compromising a private sector company's ability to bid in a competitive tender process, as might be the case if the company undertook these activities itself. Once selected, the company could provide technical training and capacity building to community members to both install the system and maintain it in the long term, promoting the longevity of the system as well as providing skilled jobs.

BARRIER	OPPORTUNITY
Some humanitarian facilities have access to the grid or diesel generators	Use solar power to offset electricity usage during the day
Facilities using small solar systems which provide only basic services operate in more remote areas	Invite private sector to upgrade or replace systems to provide higher levels of power and availability
Water pumping relies on diesel generators	Solarise boreholes and water pumping stations
Solar systems require technical expertise to correctly size and design	Promote assessments of potential sites to support humanitarian organsations with little expertise
Solar systems requires technical skills for installation and maintenance which may not be present in the settlements or within organisations	Partner with private sector under long-term agreements, and train local staff to install and maintain systems

05

Stakeholders and energy projects in displacement settings

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Overview of stakeholders in Uganda

Sustainable energy in displacement settings in Uganda is delivered through a complex network of stakeholders, each with their own mandates, projects, and objectives. Some organisations operate across the country or internationally, whilst others focus on issues in specific displacement settings.

The stakeholders working in Uganda can be classified into broad categories:

- **Government agencies** with mandates and responsibilities defined by the Government of Uganda.
- **Humanitarian and development organisations** which typically address specific issues including UN agencies operating across the world, international NGOs with projects in Uganda, and local NGOs working across the country or in certain areas.
- **Community-led organisations** which are directed and managed by members of the displaced or host communities, as well as appointed community representatives.
- **Private sector companies** which offer energy products or services on a commercial basis.
- **Financial institutions** which offer access to banking and other financial services to community members.
- **Other organisations** with a focus on issues that are related to energy in displacement settings.

This section provides a short summary of the most relevant organisations working in displacement settings in Uganda, their work, and relevant partnerships. It also provides deep dives into some of the projects and organisations aiming to improve access to sustainable energy in Uganda. The refugee response, and the organisations working within it, spans the entire country but most of the existing literature and projects focus on work in the West Nile region. Similarly, the READS workshop was hosted in this area and so, aside from those operating nationally, this section predominantly focuses on stakeholders operating in West Nile. Those working elsewhere are included where possible. The directory of stakeholders included in this section intends to be extensive but not exhaustive.

The refugee response in Uganda is jointly managed by the Office of the Prime Minister (OPM) and UNHCR, who play a key role in planning and monitoring energy interventions in refugee settlements. District local governments (DLGs) work with local partners in each of the refugee settlements and support the smooth implementation of these activities as well as coordination with other actors through the environment and energy working groups. Refugee and host community representatives play a key role in advocating for and providing critical insights into the energy needs of their community members, and refugee-led organisations also specifically work on the topic of energy access.

A wide variety of humanitarian and development actors also implement energy interventions as part of the humanitarian response. These include international and local NGOs, which tend to have a strong focus on livelihoods and agricultural production, but also work on energy access. Many of these target household energy access, particularly clean cooking and the distribution of solar lanterns.

There are also programmes that seek to promote market-based approaches for energy access in displacement settings, such as ESDS run by GIZ and AMPERE run by Mercy Corps. These include RBF schemes to support private solar and cookstove companies entering and operating in refugee settlements, as well as PUE interventions, the solarisation of social institutions, and institutional cookstoves. ●

Overview of stakeholders in Uganda

OFFICE OF THE PRIME MINISTER (OPM)
Government
NATIONWIDE

DISTRICT LOCAL GOVERNMENTS (DLGS)
Government
NATIONWIDE

MINISTRY OF ENERGY AND MINERAL DEVELOPMENT (MEMD)
Government
NATIONWIDE

OTHER GOVERNMENT STAKEHOLDERS
Government
NATIONWIDE

UNHCR
UN agency
NATIONWIDE

WFP
UN agency
NATIONWIDE

WORLD BANK
Development Bank
NATIONWIDE

MERCY CORPS
NGO
NATIONWIDE

GIZ
Development agency
NATIONWIDE

SAVE THE CHILDREN INTERNATIONAL
NGO
WEST NILE

INTERNATIONAL LIFELINE FUND (ILF)
NGO
NATIONWIDE

LUTHERAN WORLD FEDERATION (LWF)
Faith-based organisation
WEST NILE

KULIKA UGANDA
NGO
WEST NILE

PALM CORPS
Humanitarian organisation
WEST NILE

CARITAS
NGO
WEST NILE

IOM
UN agency
WEST NILE

WORLD VISION
NGO
WEST NILE

CARE INTERNATIONAL
NGO
SOUTHWEST

OTHER HUMANITARIAN & DEVELOPMENT ORGANISATIONS
Humanitarian and development
NATIONWIDE

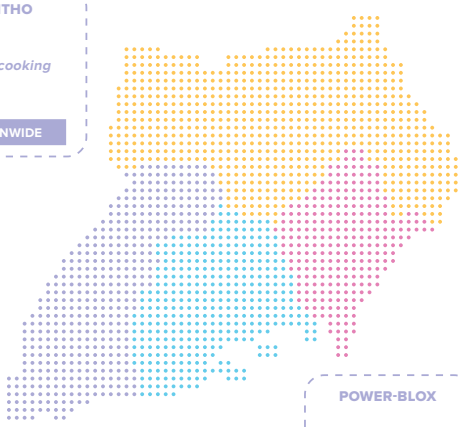
YOUTH SOCIAL ADVOCACY TEAM (YSAT)
Refugee-led organisation
WEST NILE

I CAN SOUTH SUDAN
Refugee-led organisation
WEST NILE

AVSI FOUNDATION
NGO
NATIONWIDE

SOLAR NOW
Solar
NATIONWIDE

PESITHO
Clean cooking
NATIONWIDE



REFUGEE WELFARE COMMITTEES (RWCS)
Refugee community representation
NATIONWIDE

LOCAL COUNCILS
Host community representation
NATIONWIDE

FENA SOLAR
Solar and clean cooking
NATIONWIDE

RAISING GABDHO FOUNDATION
Clean cooking
NATIONWIDE

VISION GROUP
Multimedia company
NATIONWIDE

CENTER FOR RESEARCH IN ENERGY & ENERGY CONSERVATION (CREEC)
Research institution
NATIONWIDE

VILLAGE POWER
Solar
NATIONWIDE

MANDULIS ENERGY
Biomass gasification
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POWER-BLOX
Solar units
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SOLVOZ FOUNDATION
Research institution
NATIONWIDE

UGANDA BIODIVERSITY TRUST FUND (UBF)
Non-profit organisation
NATIONWIDE

BM ENERGY SAVINGS AND EQUIPMENT (BM)
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D.LIGHT
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TULIMA SOLAR
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FRES UGANDA
Solar home systems
SOUTHWEST

OTHER PRIVATE COMPANIES
Private sector
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UGANDA NATIONAL ALLIANCE FOR CLEAN COOKING (UNACC)
Multimedia company
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UGANDA SOLAR ENERGY ASSOCIATION
Association
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I4SD
Solar mini-grids
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ENGIE ENERGY ACCESS
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NYABYEYA FORESTRY COLLEGE
Academic institution
NATIONWIDE

THE ENVIRONMENTAL CONSERVATION TRUST
Non-profit organisation
NATIONWIDE

NAKAWA VOCATIONAL INSTITUTE (KAMPALA)
TVET
KAMPALA

INNOVATION VILLAGE (KAMPALA)
Start-up platform
KAMPALA

OTHER RESEARCH INSTITUTIONS
Research
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SOLARAID
Solar lights
NATIONWIDE

CLEAN ENVIRONMENT FOR AFRICA
Clean cooking
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VISIONFUND UGANDA
Financial institution
NATIONWIDE

BRAC
Financial institution
NATIONWIDE

VSLAS AND SACCOS
Financial institution
NATIONWIDE

EQUITY BANK
Financial institution
NATIONWIDE

OTHER FINANCIAL INSTITUTIONS
Financial institution
NATIONWIDE

Stakeholder directory

GOVERNMENT

OFFICE OF THE PRIME MINISTER (OPM)

Government

NATIONWIDE

The **Office of the Prime Minister (OPM)** provides the overarching policy and coordination framework of the refugee response in Uganda, co-leading with **UNHCR**. **OPM** and the response is supported by line ministries, district local governments, UN agencies, RLOs, and international and national NGOs. **OPM** plays a key role in approving, monitoring, and evaluating activities in refugee settlements, as well as for advocating for the inclusion of refugees into national systems and programming.

DISTRICT LOCAL GOVERNMENTS (DLGS)

Government

NATIONWIDE

The coordination of energy issues at district and settlement level is managed by **District Local Governments (DLGs)**. They play a key role in implementing district and national programme and strategies. Strengthening staff capacity and resources for coordination work have been identified as a priority in the NDP III and the SERP.

MINISTRY OF ENERGY AND MINERAL DEVELOPMENT (MEMD)

Government

NATIONWIDE

The **Ministry of Energy and Mineral Development (MEMD)** is responsible for managing the use of Uganda's energy and mineral resources to enhance socio-economic development. In 2022, **MEMD** launched the Sustainable Energy Response Plan for Refugees and Host Communities (SERP). The plan sets a precedent by integrating refugees into national energy planning and seeks to strengthen efforts to address the energy needs of the whole population of Uganda while avoiding the duplication of structures for each community. **MEMD** is responsible for the coordination, promotion and governance of the SERP, as well as the effective engagement of all stakeholders.

OTHER GOVERNMENT STAKEHOLDERS

Government

NATIONWIDE

Other government stakeholders include: **the CRRF Secretariat, the Uganda National Bureau of Statistics, the West Nile Rural Electrification Company (WENRECO), Umeme Limited, Ministry of Finance Planning and Economic Development, Ministry of Water and Environment, Uganda Energy Credit Capitalisation Company (UECCC).**

Stakeholder directory

HUMANITARIAN & DEVELOPMENT

UNHCR

UN agency

UNHCR co-manages the refugee settlements in Uganda together with **OPM**. They provide protection and assistance for displaced people throughout Uganda, including the delivery of critical services such as for water, sanitation, health, shelter, and nutrition. They support coordination among different partners at the settlement level for the planning and implementation of energy programmes that target refugees and host communities.

NATIONWIDE

WFP

UN agency

WFP is a key actor in the humanitarian sector due to its crucial role in providing food assistance in-kind or in cash. The agency is exploring how to support clean cooking programming, for example by including end-user subsidies and voucher schemes, and is part of the School Feeding Coalition in Uganda.

NATIONWIDE

WORLD BANK

Development Bank

The **World Bank** has plans to implement the Electricity Access Scale-Up Project (EASP), a $608 million intervention focusing on energy on rural areas in Uganda including refugee hosting districts covering a variety of interventions. Continuous dialogue with **MEMD** will be important to understand how to collaborate and coordinate as their work progresses.

NATIONWIDE

MERCY CORPS

NGO

Bidibidi

Mercy Corps is an international NGO that works on humanitarian responses worldwide. Through the **AMPERE** programme, **Mercy Corps** has been working to support the introduction of private energy companies to Bidibidi refugee settlement. The programme also collected market data on the viability of pay-as-you-go systems and carried out a community mapping exercise to build evidence for quality market-driven energy solutions as part of the humanitarian response. **Mercy Corps** also collaborated with **Pesitho** to pilot e-cooking. Recently, the NGO completed the Enter Energy assessment in Uganda among other countries to scope further opportunities for market-based energy interventions.

NATIONWIDE

Stakeholder directory

HUMANITARIAN & DEVELOPMENT

GIZ

Development agency

Rhino Camp, Imvepi, Bidibidi, Palorinya, Palabek, Lobule, Kiryandongo, Nakivale

NATIONWIDE

The German international cooperation agency **GIZ** works in refugee settlements in West Nile and Southwest regions of Uganda through their **Energy Solutions for Displacement Settings (ESDS)** Project, implemented in partnership with UNHCR, and their **Energising Development (EnDev)** Project with its refugee component. The projects promote market system development and affordable access to clean cooking energy and electricity through RBF schemes and demand-side subsidies. The two projects have also established energy kiosks and have solarised social institutions in West Nile region. **ESDS** is collaborating with the GoU and a private sector company to install and operate two mini-grids in Palabek Refugee Settlement, and is supporting **UNHCR** to solarise their sub-offices. On a national policy level, **ESDS** has worked on enhancing the policy framework for energy access in displacement settings. This was achieved by developing the SERP in collaboration with a task force led by **MEMD** and comprising key stakeholders such as **UNHCR**, the **OPM**, the **CRRF Secretariat**, the former Rural Electrification Agency, and the **World Bank**.

SAVE THE CHILDREN INTERNATIONAL

NGO

Adjumani, Bidibidi, Rhino Camp, Imvepi, Kiryandongo

WEST NILE

Save the Children International is an international development and humanitarian NGO. Its Response to Environmental Degradation (RED) and Promotion of Alternative Energy Efficient Technologies project promotes energy efficient technologies (e.g. rocket Lorena stoves, fire-shielded stoves, heat retaining baskets) as well as sustainable income-generating activities. The project also works on promoting the construction of institutional cook stoves and facilitates the environmental youth innovation technology challenge. **Save the Children** also works on strengthening policies, gender mainstreaming, and coordination with different partners.

INTERNATIONAL LIFELINE FUND (ILF)

NGO

Kiryandongo, Rwamwanja, Rhino Camp, Imvepi, Bidibidi, Nakivale, Kyangwali, Lobule

NATIONWIDE

The **International Lifeline Fund (ILF)** is an NGO with a focus on promoting access to clean energy and water. It has developed a low-cost, fuel-saving charcoal cookstove which caters to local practices and was designed through a human-centered approach. Since 2008 **ILF** has produced 300,000 stoves at its factory in Lira. Through the SAFE initiative, working in Nakivale, Kyangwali and Lobule, **ILF** distributed fuel saving stoves to vulnerable households, and sold ICS in Rhino Camp, Imvepi, Bidibidi and Kiryandongo under **GIZ's** RBF schemes. It also installed institutional cookstoves in schools and reception centres. In addition, **ILF** established energy kiosks which sell improved cookstoves in refugee settlements and supply their products to the energy kiosks that were established by **GIZ**. **ILF** also has deployed **Power Blox**, solar-powered energy cubes, to small businesses. Individual units, each with a 200 W capacity, can be combined to create larger modular nano- or mini-grids, allowing enterprises to power appliances and grow their energy capacities.

Stakeholder directory

HUMANITARIAN & DEVELOPMENT

LUTHERAN WORLD FEDERATION (LWF)

Faith-based organisation

Palorinya, Adjumani

WEST NILE

The **LWF** is a member of Act Alliance and works to fight poverty and to promote human rights. In West Nile region, **LWF** works on promoting access to energy saving stoves and distributable portables stoves. They have run trainings on the construction of Lorena stoves along with basic marketing skills. **LWF** also provides institutional stoves for social institutions and works on briquette production. The organisation has worked to establish woodlots, as well as household tree growing and institutional tree planting interventions. They have also distributed solar lanterns to people of concern.

KULIKA UGANDA

NGO

Rhino Camp, Imvepi

WEST NILE

Kulika Uganda is an NGO which runs livelihood programmes in Terego and Madi Okollo districts. In cooperation with **MIT D-Lab** and **Y-SAT**, and with funding from Malteser International and **GIZ**, **Kulika** established innovation centres in Rhino Camp and Imvepi settlements. Creative capacity building trainings are held in these centres in which participants create and refine their own technologies that they can use to improve their livelihoods. The Design Lab pilot project, funded by **GIZ**, has a focus on energy technologies and particularly cooking energy. Examples of these technologies include a mini press to make briquettes from charcoal dust or agricultural waste and “heating boxes” to cook rice or beans.

PALM CORPS

Humanitarian organisation

Rhino Camp, Imvepi, Bidibidi, Palorinya

WEST NILE

Palm Corps is a local NGO which is funded by Strome Foundation and by the Austrian government. The organisation provides trainings to refugee and host community members on how to construct briquettes from agricultural waste material and energy saving stoves. **Palm Corps** has also run interventions to promote solar irrigation.

Stakeholder directory

HUMANITARIAN & DEVELOPMENT

CARE INTERNATIONAL

NGO

Kyangwali

SOUTHWEST

The international NGO **CARE** runs three solar-powered community kitchens which aim to reduce the consumption of firewood and protect women from the hazards of fuel collection. **CARE** has also launched a plastic recycling plant.

IOM

UN agency

Bidibidi

WEST NILE

The **International Organization for Migration (IOM)**, a UN agency, runs an e-waste project in Bidibidi refugee settlement. The project promotes a circular economy approach and works on solar lantern repairs and battery repurposing. It also conducts awareness raising activities on the risks of unsustainable e-waste management for both health and the environment.

AVSI FOUNDATION

International NGO

NATIONWIDE

Founded in 1972, the **AVSI Foundation** is an international NGO which supports a range of humanitarian and development objectives worldwide. Amongst its work in Sub-Saharan Africa, **AVSI** supports improving access to clean energy through projects in Kenya, Uganda, DRC, Rwanda, and other countries. These include the promotion of renewable energy technologies like off-grid mini-grids and solar home systems for rural communities, as well as biodigesters for farmers and households. **AVSI** also facilitates the development of the renewable energy value chains through market studies, access to finance, and access to electric appliances. It also uses a market-based approach for clean cooking involving awareness raising, behavioural change campaigns conception and implementation, market studies and assessment, and advocacy. **AVSI** also promotes PUE and energy efficient lighting and appliances. The **AVSI Foundation** works with households, schools and communities, with a particular focus on rural areas.

Stakeholder directory

HUMANITARIAN & DEVELOPMENT

CARITAS

NGO

Bidibidi

WEST NILE

Caritas aims to facilitate a wide range of social and development solutions in Uganda including for sustainable agriculture, microfinance, water and sanitation, and agro-forestry. **Caritas** Denmark and Uganda partnered with **Pesitho** to develop a cooperative for assembling ECOCA stoves in Yumbe.

WORLD VISION

NGO

Imvepi, Bidibidi, Adjumani, Palabek

WEST NILE

World Vision is a faith-based international NGO. In West Nile region, **World Vision** works on promoting energy saving stoves as well as on farmer managed natural regeneration (FMNR) training which aims to increase the number of trees, improve soil fertility, and other environmental restoration measures.

OTHER HUMANITARIAN AND DEVELOPMENT ORGANISATIONS

Humanitarian and development

NATIONWIDE

Other humanitarian and development organisations working on issues aligned with energy and the environment include: **ZOA, Alight, Ugandan Red Cross, DanChurchAid, Danish Refugee Council, SNV, Oxfam, FAO, RICE-West Nile, Community Integrated Development Initiatives (CIDI), Joint Energy and Environment Projects (JEEP), Enabel (Belgian Development Agency), Refugee Law Project**, other community-based organisations and faith-based organisations.

Stakeholder directory

COMMUNITY-LED ORGANISATIONS

YOUTH SOCIAL ADVOCACY TEAM (YSAT)

Refugee-led organisation

Rhino Camp, Imvepi

WEST NILE

YSAT is a refugee-led organisation which implemented the Design Lab project in partnership with **Kulika**. The project conducted creative capacity building trainings and in which participants create their own energy technologies. **YSAT** also runs a pilot project in which Samsung electronics are upcycled.

I CAN SOUTH SUDAN

Refugee-led organisation

Bidibidi

WEST NILE

I CAN South Sudan is a refugee-led organisation which runs the Humanitarian, Development, and Peace Initiative for Crisis Affected Populations in Uganda project. This initiative includes tree planting and awareness raising measures for community members on environmental protection and the use of clean energy. **I CAN** also implements the Refine project, in which community members are connected with financial service providers to access loans and financial literacy training. As part of this project, funds were also raised to buy solar lanterns which were distributed to school pupils.

REFUGEE WELFARE COMMITTEES (RWCS)

Refugee community representation

NATIONWIDE

Every refugee settlement has a **refugee welfare committee (RWC)**, each headed by a chairperson. Committee members play crucial roles in representing and advocating for the needs of the community members in their remit, as well as conducting community mobilisation activities. In refugee settlements there are village level representatives (**RWC1**), parish level representatives (**RWC2**), and zone representatives (**RWC3**).

LOCAL COUNCILS

Host community representation

NATIONWIDE

Host community members are represented by their **local councils**. Each **local council** is structured in five levels: Local Council 1 (**LC1**) for village level representation, **LC2** for parish level representation, **LC3** for sub-county representation, **LC4** for county representation, and **LC5** district representation and chairpeople.

Stakeholder directory

PRIVATE SECTOR

PESITHO

Clean cooking

NATIONWIDE

Pesitho is a Danish company which provides off-grid power solutions. Their main product, the ECOCA is a compact, self-contained, multi-purpose cooking unit which is run by solar power. It consists of an electric base, which includes a battery pack, a solar panel array and a highly insulated cooking pot that can keep food warm for hours. The ECOCA also has two USB ports and two portable, rechargeable lamps. The company specifically targets refugees and host communities with a solution that is designed to be small and lightweight, therefore easy to install and move. This solution was piloted separately with **Mercy Corps** and **Caritas** in Bidibidi. With donor support, **Pesitho** has established an ECOCA assembly and sales point in Yumbe and sells stoves for a subsided price of UGX 700,000 ($185), reduced from around UGX 1,900,000 ($500).

D.LIGHT

Solar

NATIONWIDE

d.light is a SHS and solar lantern company which also sells TVs, radios and smartphones. **d.light** uses pay-as-you-go technologies to help low-income, off-grid households pay for their products. The company operates in refugee settlements in Uganda and participated in **GIZ's** RBF schemes.

ENGIE ENERGY ACCESS

Solar

NATIONWIDE

Engie Energy Access (formerly Fenix International) is a solar company focusing on Sub-Saharan Africa. They sell smaller SHS for households and larger systems for businesses using PayGo systems. The company also develops and installs solar mini-grids. Their SHS products are available in refugee settlements in Northern Uganda and the company participated in the RBF schemes through the **GIZ ESDS** and **Mercy Corps AMPERE** projects.

SOLAR NOW

Solar

NATIONWIDE

Solar Now is a company that provides customised solar PV solutions in off-grid areas in Uganda and Kenya, including in refugee settlements. It has worked on solarising social institutions.

Stakeholder directory

PRIVATE SECTOR

RAISING GABDHO FOUNDATION

Clean cooking

KAMPALA, WEST NILE

Raising Gabdho Foundation is a Ugandan social enterprise which works on the topics of renewable energy, livelihoods, urban sustainable agriculture, and WASH, among others. They sell a variety of improved cookstoves, briquettes, bio-waste fertilisers and fireless slow cooking baskets which are used by some urban refugees and in Bidibidi. It also trains people how to manufacture these energy-efficient products and conducts awareness raising campaigns about their benefits.

TULIMA SOLAR

PUE

NATIONWIDE

Tulima Solar is a Ugandan solar water pumping company and offers a range of solutions for irrigation, horticulture, domestic, school and dairy farming. Its products are available in some of the refugee settlements in West Nile region.

VILLAGE POWER

Solar

NATIONWIDE

Village Power sells a range of pico-solar products and SHS, with smaller systems powering lighting and charging devices, and larger systems being able to power solar TVs, computers, and printers. All products have a warranty and are installed by staff. **Village Power** offers a mobile money instalment payment option spread out over the course of a year. The company participated in the **AMPERE** and **ESDS/EnDev** RBF schemes.

MANDULIS ENERGY

Biomass gasification

NATIONWIDE

Mandulis Energy develops and operates renewable energy projects, including the deployment of on-grid and off-grid renewable energy infrastructure. Its projects include gasification of agricultural residues into a source of electricity for microgrids which power farming communities. It is working on constructing a grid-tied biomass gasification power plant in Gulu.

Stakeholder directory

PRIVATE SECTOR

BM ENERGY SAVINGS AND EQUIPMENT (BM)

Clean cooking

NATIONWIDE

BM sells energy saving improved firewood and charcoal stoves for households and institutions. The company participated in the first **ESDS/EnDev** RBF schemes and were also contracted by **GIZ** to build ICS in several schools and reception centres. Some energy kiosks sell their stoves.

FENA SOLAR

Solar and clean cooking

NATIONWIDE

Fena Solar is a women-led enterprise which aims to advance gender equality through sustainable energy access. The company recruits women as solar champions and as part of its female direct sales network to provide solar lighting products and clean cooking solutions to underserved communities in peri-urban and rural Uganda. **Fena Solar** was one of **GIZ's** RBF partners and also trains women on the benefits of clean energy through community engagement and education.

CLEAN ENVIRONMENT FOR AFRICA

Clean cooking

NATIONWIDE

Clean Environment for Africa (CEFA) is a clean cooking company that sells improved stoves in the West Nile region, as well as elsewhere in Uganda. **CEFA** is one of **GIZ**'s RBF partners and has also partnered with **AVSI Foundation** to support women selling **CEFA**'s stoves to their local communities.

SOLARAID

Solar lights

NATIONWIDE

SolarAid is a UK-based international organisation which has worked in Uganda since 2014, with the Uganda operations now managed as an independent Ugandan-run entity. The organisation has distributed over 80,000 solar lights and supported entrepreneurs across the country, and was a **GIZ** partner for its first round of RBF.

Stakeholder directory

PRIVATE SECTOR

FRES UGANDA

Solar home systems

SOUTHWEST

Since 2010 **FRES Uganda** has provided SHS in Southwest Uganda. With its international headquarters based in the Netherlands and Uganda operations based in Mbarara, as of 2021 the company operated five outlets and served around 6,000 customers, nearly half of which are professional customers such as small businesses, manufacturers and schools. In partnership with **Mercy Corps, FRES Uganda** developed a solar-powered shared space concept where refugees living in settlements can start new businesses.

I4SD

Solar mini-grids

Nakivale

SOUTHWEST

Infrastructure for Sustainable Development (i4SD) is a social enterprise which worked with **UNHCR** to replace a 24 kVA diesel generator with an 18 kWp solar mini-grid for Rubondo Base Camp in Nakivale. The mini-grid provides power to a health centre, nurses' accommodation, **OPM** offices and accommodation, **UNHCR** offices, and an ICT centre. The diesel generator serves as a backup on cloudy days and plans are underway to expand the capacity of the mini-grid.

POWER-BLOX

Modular nano-grids

Kiryandongo, Rwamwanja

NATIONWIDE

Power-Blox is a Swiss company that provides an innovative modular solar solution. Individual 200 W units can be purchased and combined to create larger systems to power individual entrepreneurs as well as clusters of businesses. **Power-Blox** collaborated with **International Lifeline Fund** to pilot their technology in Kiryandongo and Rwamwanja settlements.

OTHER PRIVATE COMPANIES

Private sector

NATIONWIDE

Other companies include **African Clean Energy (ACE), Assen Venture Limited, Brightlife, UpEnergy, Green bio energy, BURN, Wana Energy Solutions, M-Kopa, Davis and Shirtliff, Azuri, Solar Today, PowerGen, Equatorial Power, Pamoja, EleQtra, Power Trust, Aga Great Works, Green Heat, Energrow, SunKing.**

Stakeholder directory

FINANCIAL INSTITUTIONS

EQUITY BANK

Financial institution

NATIONWIDE

Equity Bank is a commercial bank providing financial services throughout Uganda, including in displacement settings. The bank has created products tailored to the specific needs of refugees, such as savings and credit, as well as allowing them to open bank accounts and receive payments. **Equity Bank** has 242 agent bankers in refugee settlements across Western Uganda.

VISIONFUND UGANDA

Financial institution

Palorinya

NATIONWIDE

VisionFund is a Christian microfinance institution affiliated to **VisionFund International** and **World Vision**. It provides microloans, microsavings, and microinsurance services as well as training and education to lift people out of poverty. **VisionFund** Uganda has been diversifying its loan products to reach more displacement-affected communities. In West Nile region, **VisionFund** Uganda is working with over 1,000 groups composed of both refugees and host community members. **EnDev** is supporting **VisionFund** Uganda with a grant to offer a new energy loan product for PUE for female entrepreneurs, both in groups or as individuals.

BRAC

Financial institution

NATIONWIDE

BRAC International is a non-profit organisation that runs many financial inclusion programmes and operates as a microfinance institution. **BRAC** Bank has the largest branch network of banking services in the country and specifically aims to provide inclusive financial services to low-income households, as well as microloans for women, small enterprises, and entrepreneurs seeking to expand their businesses.

VSLAS AND SACCOS

Financial institutions

NATIONWIDE

Village Savings and Loan Associations (VSLAs) and, to a lesser extent, **Savings and Credit Cooperatives (SACCOs)** play a key role in providing access to finance to community members who may not have access to a formal financial institution.

OTHER FINANCIAL INSTITUTIONS

Financial institutions

NATIONWIDE

Other banks operating in displacement settings include **Stanbic, Centenary, and Finca,** whilst microfinance organisations include **Nile Microfinance** and **RUFI**. The **EnDev** and **ESDS** energy kiosks act as agents for some of these entities.

Stakeholder directory

OTHER ORGANISATIONS

VISION GROUP
Multimedia company

Vision Group is a multimedia company which provides news and entertainment across print, radio, TV, and digital platforms. **Vision Group** has run awareness raising campaigns on the benefits of sustainable energy products.

NATIONWIDE

UGANDA NATIONAL ALLIANCE FOR CLEAN COOKING (UNACC)
Association

UNACC is the umbrella organisation for all actors in the clean cooking sector in Uganda. It plays a key role in raising awareness about clean cooking issues, takes the lead on advocacy issues, supports a joint coordination framework, provides data and trainings, and facilitates networking opportunities.

NATIONWIDE

UGANDA BIODIVERSITY TRUST FUND (UBF)
Non-profit organisation

The **Uganda Biodiversity Trust Fund (UBF)** is a non-profit organisation dedicated to channelling funding to organisations working on conservation solutions.

NATIONWIDE

UGANDA SOLAR ENERGY ASSOCIATION
Association

USEA is a non-profit association dedicated to promoting the growth and development of the solar PV industry in Uganda. It was formed by private sector companies with support from **MEMD**.

NATIONWIDE

SOLVOZ FOUNDATION
Research institution

The **Solvoz Foundation** conducts research and makes findings available on what approaches to deliver aid work best.

NATIONWIDE

Stakeholder directory

OTHER ORGANISATIONS

CENTER FOR RESEARCH IN ENERGY AND ENERGY CONSERVATION (CREEC)

Research institution

NATIONWIDE

Based at Makerere University, **CREEC** is a non-profit research organisation which provides research on approaches to renewable energy interventions and provides technical expertise.

NYABYEYA FORESTRY COLLEGE

Academic institution

NATIONWIDE

Nyabyeya Forestry College is located on the outskirts of Budongo Forest and offers degrees in biomass energy technologies, forestry, agroforestry, and beekeeping among others. It aims to contribute to the management and utilisation of Uganda's forest resources and environmental conservation.

THE ENVIRONMENTAL CONSERVATION TRUST

Non-profit organisation

NATIONWIDE

The **Environmental Conservation Trust (ECOTRUST)** is a non-profit conservation organisation established to conserve biodiversity and enhance social welfare by promoting sustainable and innovative environmental management. **ECOTRUST** delivers conservation finance to smallholders undertaking restoration as a business in rural communities and deploys conservation incentives.

NAKAWA VOCATIONAL TRAINING COLLEGE

TVET

KAMPALA

Nakawa Vocational Training College is a TVET institute based in Kampala with an emphasis on skills acquisition through use of tools, machinery, and equipment. It offers a variety of courses, including electrical engineering.

Stakeholder directory

OTHER ORGANISATIONS

INNOVATION VILLAGE

Start-up platform

KAMPALA

The **Innovation Village** is a platform for start-ups in Uganda which provides networking opportunities, business development resources, venture building, and alternative forms of capital.

OTHER RESEARCH INSTITUTIONS

Research

NATIONWIDE

Several research institutions have undertaken energy- and environment-related studies or projects in displacement settings, notably **Gulu University** and **Muni University**.

©GIZ

Market-based sustainable energy access projects in displacement settings

Several organisations have been piloting market-based approaches to enhance sustainable energy access in displacement settings. These projects aim to strengthen local markets for energy products and services, thereby increasing access to high quality, reliable and affordable options and increase choices. Key components of these projects include supply-side support of de-risking private companies to begin operating in displacement settings, as well as demand-side support such as end-user subsidies.

Accessing Markets through Private Sector Enterprises for Refugee's Energy (AMPERE) – Mercy Corps

Mercy Corps works to enable access to energy through market-based programming and, under the AMPERE programme, aims to support the introduction of private sector PayGo solar energy providers in Bidibidi refugee settlement. AMPERE is implemented in collaboration with SNV, Save the Children, and the Response Innovation Lab and funded by the Netherlands Enterprise Agency (RVO).

A market system analysis for off-grid solar products and PayGo systems was conducted and the results were published in Mercy Corps' Paying for Darkness report [64]. This publication detailed potential interventions, which were later piloted and assessed, and included the development of a customer segmentation scheme. The scheme laid out different preferences of clients and pricing schemes based on the seasonality of demand, and this information was then passed on to retailers to better target customers. The AMPERE programme also subsidised the sale of products, supported the establishment of local service centres, warehousing and retail points, and conducted market campaigns to raise awareness on quality products and consumer protection rights [64]. The programme also worked with the Humanitarian OpenStreetMap Team to create an interactive community map of energy retailers to better understand the availability of solutions and relevant market trends [73].

Mercy Corps has also partnered with the solar e-cooker producer Pesitho to pilot their ECOCA product to refugee and host community households in Bidibidi refugee settlement. Using an innovative "pay-as-you-cook" (PAYC) business model and a capital cost subsidy of the ECOCA cooking unit, customers can pay by usage for up to three years. This payment mechanism is enabled by two circuit boards in the base of the cooking units which are able to track usage. The ECOCA also contains two USB charging points and two rechargeable, portable lamps. The stoves are both assembled and retailed locally, and technicians were hired from the host and refugee community. Demand far exceeded the amount of units provided during the pilot and so the partnership is currently being scaled up from 25 to 100 cooking units [74].

Mercy Corps is planning to continue expand its market-based energy programming in refugee settlements in Uganda. As part of the Enter Energy partnership, Mercy Corps recently conducted an energy assessment which highlights potential new market-based interventions to roll out in displacement settings in the future. ››

Market-based sustainable energy access projects in displacement settings

Energy Solutions for Displacement Settings (ESDS) and Energising Development (EnDev) – GIZ

Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, the German international cooperation and sustainable development agency, has extensive experience in last-mile energy access interventions. Its work in displacement settings in Uganda began with the establishment of two energy kiosks in the West Nile region through the Energising Development (EnDev) programme, an international flagship programme for providing energy access. In 2019, the Energy Solutions for Displacement Settings (ESDS) Project was commissioned by the German Federal Ministry for Economic Cooperation and Development (BMZ) and has a specific focus on displacement settings in Uganda, Kenya, and Ethiopia. Implemented in partnership with UNHCR as project partner and MEMD as government partner, the ESDS Project is part of a wider BMZ-funded programme that aims to support the implementation of the GCR, strengthening self-reliance of displacement-affected communities and easing pressure on shared resources. In Uganda, ESDS works in refugee settlements in the West Nile region, in Kiryandongo and Palabek Refugee Settlements. It also works with the national government, including the Office of the Prime Minister (OPM) which plays a leading role in refugee management, to shape policies relating to energy access in displacement settings.

Both EnDev and ESDS aim to build markets for sustainable energy products and services. The projects have worked with four clean cooking and five off-grid solar companies through RBF schemes to support them in setting up operations in refugee settlements, thereby enhancing access to high quality, affordable clean energy products and increasing choices for end-users. Since 2022 these RBFs also offer temporary end-user subsidies to refugees and immediate host community members, providing lessons for EnDev's incoming demand-side subsidy scheme. ESDS has established four solar-powered energy kiosks in addition to the four kiosks that were all established through the EnDev programme which are linked to the RBF partners and sell ICS, solar lanterns and SHS. They also sell cold drinks, and provide phone charging and secretarial services, and most kiosks also run ICT trainings. The kiosks are managed as a business by a joint team of refugees and host community members, who were provided with business development and gender trainings as well as some start-up appliances. In addition, tricycles were provided to some kiosks under condition of meeting sales targets to support with reaching more remote customers. The kiosks were operationalised in May 2021 and December 2022. Under EnDev, there are plans to support companies with renting storage facilities in the settlements for their products to facilitate their distribution.

In addition to promoting private sector involvement, ESDS has also worked on promoting co-creation and innovation. Through a grant agreement, ESDS supported the establishment of innovation centres in Rhino Camp and Imvepi at which community members can design and refine new technologies which meet their energy needs. Kulika Uganda and Y-SAT South Sudan manage the centres and have been trained by MIT D-Lab to implement their Creative Capacity Building trainings on technology design, and have held a variety of trainings and co-creation events as part of the project. Innovators from both the host and refugee communities have since created a variety of ››

Market-based sustainable energy access projects in displacement settings

technologies which generate income and improve their lives. The project currently has a focus on designing cooking energy technologies.

In collaboration with VisionFund Uganda, EnDev is implementing a gender pilot project which provides PUE loans to individual women, women's savings groups or mixed groups with women in leadership positions. The loans provided are higher than their current maximum loan amounts which will allow the customers to invest in PUE appliances. It also has established four solarised demonstration sites including a carpentry workshop, a hair salon, a restaurant and a solar water irrigation system which is used by a women farmers group.

GIZ has supported the solarisation of six health centres and five schools in Rhino Camp and Imvepi: three health centres and four schools through the ESDS project, and three health centres and one school through the EnDev project. The sizing and design of each solar system was based on an analysis of all the current and future anticipated loads at each facility. The secondary schools were provided with ICT appliances, enabling the schools to lessen the digital divide. Meanwhile, in the two years since the systems were installed, the health centres have been able to offer improved medical services, and further expanded their services through additional medical equipment provided by other partners.

A pilot programme has been conducted in two health centres to establish an O&M scheme which is financed by income-generating activities, with explicit permission by the local government. Canteens (small kiosks/shops) were established, connected to the health centres' electricity supply, and provided with some electric appliances to generate revenue. The aim is to generate revenue which can cover regular O&M costs for the solar systems of the health centres and contribute to the replacement of batteries in the medium-term. In addition, GIZ is conducting a study to determine the viability of providing O&M for stand-alone systems for social institutions and for PUE applications through a service model. This study was kicked-off by a joint field assessment with MEMD.

After conducting studies on e-waste in displacement settings, ESDS plans to tackle the emerging challenges through the establishment of repair workshops with safe e-waste collection centres and training of already existing groups of electronic repair shop employees on safe e-waste management.

In addition to solarising social institutions, ESDS is currently supporting the development of two minigrid sites in Palabek that will connect offices, businesses, households, and a few social institutions. Through a grant agreement with AVSI, awareness raising activities on electricity use have been conducted. Specific businesses have been selected for further PUE support, including on how to choose the right appliances and effectively use them.

ESDS is supporting UNHCR with the solarisation of their sub-offices to support operational uses of electricity. An assessment of six sites was conducted in the West Nile region in 2021/22 and included a mix of sub-offices and base camps, of which two were selected to progress. Preliminary sizing for off-grid solar systems in Yumbe and Adjumani sub-offices has been completed and the systems are expected to be commissioned in 2023, and to operate under a private sector leasing model for ten years. Building on this work, assessments have now been completed for all UNHCR offices in Uganda.

ESDS works together closely with OPM and MEMD to help support policymaking and provided both technical and financial support to the development of the SERP. It has offered its support with the establishment of a SERP Secretariat which is due to play a key role in coordinating the implementation of the SERP.

06

Potential high-impact projects

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Project concept design

Effective long-term solutions cannot be implemented in isolation. Close coordination among stakeholders and fostering learning between different organisations is essential to use resources as efficiently as possible and to scale up existing work. Designing potential energy interventions together – bringing together the experience and expertise of many different stakeholders – can help to identify the most impactful areas of programming as well as the potential barriers and enablers that will affect its implementation.

In support of this, the READS workshop featured a session in which groups of diverse participants came together to learn about each other's work and co-design potential high-impact projects, building on the experience made with existing interventions. Each group focused on a different energy issue with the goal of outlining a viable project opportunity that would directly address some of the greatest challenges currently faced in displacement contexts in Uganda.

By involving a range of stakeholders in the collaborative co-design process, and crucially refugee and host community representatives who are integral to any project design, the project concepts aim to address the barriers and gaps that the participants identified as the most pressing. They draw on approaches that have already been piloted that show potential to be either replicated in different settlements or scaled up.

Following these initial designs, and incorporating ideas from previous work in displacement settings in Uganda and elsewhere, these ideas have been further developed into the project concepts presented in this section. These summaries provide an outline of the potential project including:

- The proposed location and scale,
- The project activities and potential implementation partners,
- Enablers and barriers which could affect its realisation, and
- How these projects link to previous work through replication and scaling.

The estimated costs of the projects are included as a guide and will vary significantly depending on their scale and complexity. The project concepts are designed to be a starting point to further develop interventions, scope out potential partnerships, attract investment, and ultimately increase access to sustainable energy.

The READS workshop featured a co-design session for stakeholders to develop viable, high-impact projects to increase access to sustainable energy for their specific area.

Important considerations for project design

There are not only huge differences between refugee settlements in West Nile and the Southwest region, but also within the same region, settlements, and refugee and host communities in terms of income, levels of education, literacy, and other factors. Variations in the amount of existing infrastructure, levels of economic activity, distances to towns, culture, and local needs and priorities will determine what kinds of interventions would have the greatest effect in increasing access to sustainable energy in each location. In all interventions, efforts must be made to address both the needs of host communities as well as refugees, as both communities live in the same settlements and face the same energy challenges, to not disadvantage one group and to promote social cohesion and peaceful coexistence.

A one-size-fits-all approach will not be able to account for these nuances. Before beginning any of these projects, further research and detailed assessments at the local level will be necessary to better understand the specific and unique situations on the ground. Such assessments should also be independent, objective, and afforded appropriate time and resources to best develop long-term implementation plans. These should be done with community members and other stakeholders that have a deep understanding of energy needs and are therefore best positioned to shape the proposed interventions.

Many of the project concepts aim to use market-based approaches to better integrate the private sector in the provision of sustainable energy in displacement contexts. For this to work in the long term, national or international companies should set up operations with supply chains to outlets in refugee settlements or host towns – and to be adequately supported in doing so, where required – to establish a permanent presence which endures after external funding ends. Local companies in the settlements, meanwhile, should be supported to conform with national and international product standards to ensure quality for customers. All companies and organisations which implement sustainable energy technologies should facilitate ongoing and independent evaluations to assess their benefits to the user in the field, not just under laboratory or ideal conditions, to monitor their continued usage and long-term benefits. ●

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Community involvement

Refugee and host communities should be involved from the outset when designing sustainable energy interventions as they best understand their own energy needs and priorities. Community members are particularly well-placed project partners owing to their networks and knowledge of the context, and so should have crucial roles in the design and implementation of interventions. Some potential opportunities to involve the community include:

- Working with community groups and a range of leading figures to gather input on design of intervention plans, and to advocate for sustainable solutions with other stakeholders and within their communities,
- Consulting with different community segments during the design phase of interventions and for delivery model development, such as through focus group discussions, co-design workshops and community mapping interventions, whilst coordinating with other organisations to minimise overlap and survey fatigue,
- Hire community members as sales agents, community mobilisers and product ambassadors,
- Equitably target both refugee and host community members for employment and sales targets,
- Providing training and capacity building for community members, such as on the installation or maintenance of energy technologies and customer services,
- Involving or creating cooperatives to oversee and manage community-wide or public projects and their locations, such as streetlights, and
- Direct collaboration between community members and humanitarian and development actors, the private sector, and other organisations for project planning, management, auditing and other key activities.

Inclusivity strategies

Achieving sustainable energy for all requires understanding and meeting the needs of every member of the community. In displacement contexts some people may have specific vulnerabilities or require different considerations to access sustainable energy, for example if they have a disability. Including these people in project design, and offering strategies for their inclusion during implementation, can mean that energy interventions meet their needs more effectively. Some inclusivity considerations could include:

- Holding focus groups with people with specific vulnerabilities to ensure an intervention will be accessible to them and meet their needs,
- Include people with disabilities in trainings and employment opportunities whilst accommodating any specific needs,
- Engaging with savings groups and microfinance institutions to develop services which make upfront costs more accessible to low-income customers, such as for connections to mini-grids,
- Use voucher systems for vulnerable customers to access technologies within a wider market-based approach, such as for solar products or improved cooking solutions, and
- Promote technologies, products and designs which accommodate users with specific vulnerabilities or disabilities.

Gender mainstreaming

Sustainable energy interventions could have different implications for women and men. This can be exacerbated when decision makers, typically men, are not the same gender as the primary users of energy technologies, for example typically women with regards to domestic responsibilities. Considering these differences and the effects they may have during both the design and implementation of energy projects can allow them to better meet the needs of all community members and promote gender equality. Gender mainstreaming will vary depending on individual contexts and communities but could be integrated into projects by:

- Using single-gender focus groups during initial scoping phases to identify gender-specific concerns, for example around the locations of public lighting,
- Targeting equal opportunities for training and employment for both women and men,
- Increasing opportunities for training and employment for women in roles that are traditionally seen as “men’s work”,
- Identifying employment opportunities for women which are compatible with family, childcare or household responsibilities, for example near to their homes,
- Schedule engagement events at convenient times of the day and/or provide stipends to avoid conflicting with childcare responsibilities and allowing mothers to participate,
- Using awareness-raising campaigns for energy solutions that target men and women to promote interest in new technologies,
- Offer cooking classes in schools to both boys and girls to raise awareness of clean cooking solutions and encourage both boys and girls to learn how to cook, and
- Highlight the needs of different household members during product sensitisation campaigns and encourage joint decision-making.

Project concepts

SCALING MARKET-BASED APPROACHES FOR SOLAR LANTERNS AND SHS FOR HOUSEHOLDS AND SMALL BUSINESSES

1/3

LOCATION

Adjumani, Palabek, Kiryandongo, Nakivale, Kyaka, Kyangwali, Rwamwanja, Oruchinga

Scaling up of activities in Bidibidi, Rhino Camp, Imvepi, Palorinya, Lobule

BACKGROUND

There is limited access to high quality, reliable solar products for households in refugee settlements. While humanitarian organisations have distributed products for free, these often were of low quality and without adequate provisions made for repair; this led to a large number of obsolete products, e-waste, and reduced trust in solar products. Private companies offer a variety of high-quality solar products, however their shops are often located far away from the refugee settlements and companies perceive displacement settings as risky markets. The ESDS project (GIZ) and AMPERE project (Mercy Corps) have piloted market-based approaches to introduce private companies into the settlements, thereby increasing access to high quality, sustainable electricity solutions and enabling customers to choose for themselves which products best suit their needs. These approaches could be rolled out in other settlements. There are currently plans for further projects implementing RBF schemes and demand side subsidies for household electricity access, and any further projects would need to coordinate closely with these initiatives. Supporting companies to set up storage facilities closer to the refugee settlements and in training sales and repair agents also plays a key role in enhancing access to quality lighting products.

REPLICATION & EXPANSION

Replicates existing work by GIZ and Mercy Corps

Builds on previous examples of awareness raising and marketing

STAKEHOLDERS AND ROLES

SHS and solar lantern companies to establish operations in settlements

Humanitarian and development organisations to support companies with de-risking, warehousing, and awareness raising

Government agencies to provide permits for companies to operate in settlements

Coordination among other organisations who are also supporting access to solar products to avoid free hand-outs and duplication or clashes with other interventions

Humanitarian organisations to support with inclusivity strategy for most vulnerable households

Development organisations to support companies with developing e-waste strategies

Project concepts

ACTIVITIES

Conduct needs assessment and develop business case (Y1)

Provide financial support to companies selling off-grid solar products (from small solar lanterns to larger component-based systems for PUE) to expand operations and establish sales outlets in or near refugee settlements supported partially or completely by RBF, with easier access to credit for working capital, technical and business training, and support for consumer awareness and education (Y2-4)

Provide initial consumer price subsidies for companies to offer products at a lower price for a specific time period to catalyse the market, followed by a subsidy phaseout; higher subsidies should be provided for entry level products to support lower-income groups to gain basic access (Y2-4)

Work with MFIs to support vendors and other distributors to access microloans to buy solar products from companies and sell them on to community members (Y2-4)

Coordinate closely with other actors already providing similar support and RBF programmes (e.g. GIZ/UECCC) (Y1-4)

Require companies to sell only those products that are approved by UNBS and Verasol, and which include warranties (Y1-4)

Train and employ technicians to provide repair and maintenance services (Y2-3)

Require companies to establish a shop or appoint sales agents in the settlement to ensure easy access for customers and build trust (Y2-3)

Encourage companies to use PayGo systems where available or instalment payments to improve affordability (Y2-4)

Encourage companies to partner with humanitarian agencies and local government to establish mechanisms to collect and process e-waste, including taking back similar amounts of old solar products from other providers as new products sold (Y2-4)

ENABLERS

High quality solar products are available in some refugee settlements in the West Nile region, increasing familiarity and trust in the products

Phone charging is a regular expense which makes domestic electricity access more attractive

The increasing digitisation of education, communication and entertainment makes access to electricity at home even more important, particularly for young people

Widespread use of mobile money, savings groups and increased activity of financial institutions enables affordability through PayGo systems, loans and payment by instalments

BARRIERS

Conflict with free distribution or potentially other business models

Mobility of refugees makes it hard for companies to establish a client base

Income disparities of customers might mean that lower-income households are not able to afford the products without additional financial support

Refugee settlements are often remotely located with poor infrastructure which makes access challenging, particularly in rainy seasons

Additional administration work is required for companies to operate in refugee settlements

SCALABILITY

Moderate: Could be replicated in refugee hosting districts all over Uganda, increasing sales numbers and choice for customers. However, the project would need to be well coordinated with existing schemes that provide de-risking support to companies and offer demand-side subsidies for off-grid solar products.

Project concepts

PROJECT REACH, TIMELINE & BUDGET

100,000 households

Year 1: Needs assessment and feasibility study, contracting of suppliers ($250,000)

Year 2: Establishment of operations, training of sales agents and technicians, begin sales, awareness raising campaigns ($1,000,000)

Year 3: Project rollout and scale-up across settings ($500,000)

Year 4: Project scale-up and subsidy phase-out ($250,000)

Large

$2 million for roll out across different regions

FURTHER INFORMATION

There is a strong need for increased coordination between different organisations pursuing different distribution models. Various demand side subsidies are planned including under the World Bank project under MEMD/UECCC, Mercy Corps, and EnDev, which will mean that any new projects must coordinate with these initiatives and match the demand-side subsidies.

The READS workshop also highlighted that market-based approaches to selling off-grid solar products were being hampered by the free distribution of similar products, making it impossible to build local markets. This is especially damaging to efforts to support market development when the free products are low quality and so diminish trust in solar products more broadly.

It is key for solar companies to establish a physical presence in the settlements to build trust and enable customers to easily access after-sales support. While supply- and demand-side subsidies are likely to be necessary in the short-term, they should be phased out gradually as the market develops and demand increases.

SCALING MARKET-BASED APPROACHES FOR SOLAR LANTERNS AND SHS FOR HOUSEHOLDS AND SMALL BUSINESSES

3/3

Project concepts

SOLAR MINI-GRIDS AND STAND-ALONE SYSTEMS TO GROW THE LOCAL AGRO-ECONOMY

LOCATION

Palabek and Palorinya (plans for mini-grid currently in place)

Other refugee settlements, or zones within them, where there are no current national grid extension plans and where there is a concentration of economic activity and a suitable topography

1/2 BACKGROUND

Decentralised electricity systems, such as mini-grids, can play a key role in stimulating the local economy by powering businesses and supporting commercial agriculture in places that do not have access to the national grid. Options should be explored to build mini-grid systems that can provide power to support agricultural value chains, such as milling machines and cold storage, in areas where grid extension is unlikely. Where mini-grids are not a viable option, individual standalone units could provide similar services to support local agro-processing.

ACTIVITIES

Undertake feasibility studies across selected settlements (inclusive of both refugee and host communities) to scope, size and design a solar mini-grid to support commercial agriculture and the development of complete value chains for agricultural products (Y1)

Undertake feasibility studies for standalone systems which could provide similar services at smaller scales (Y1)

Conduct market research into affordability and tariff structures to support both households and businesses (Y1)

Conduct environmental and social impact assessments aligned with NEMA requirements (Y1)

Apply for a license exemption from ERA and follow regulatory procedures (Y1-2)

Plant trees to improve the environment and help reduce degradation (Y1-3)

Provide power through installation of solar systems for applications, such as irrigation, milling, drying and other agro-processing machinery (Y2-3)

Promote appliances for post-harvest handling processes of agricultural products (Y2-3)

Engage MFIs to provide tailored loans to support agricultural businesses and the acquisition of appliances (Y2-3)

Provide financial facilitation and services, unsecured loans for specific groups, cash transfers, agents in locations, financial literacy and business development trainings (Y2-3)

Train and hire community members as builders, technicians and site agents to operate the system and to engage with the community (Y2-3)

ENABLERS

Very high solar resource in the area

Large areas of land near the settlements could be made available for agriculture and block farming

Economies of scale could allow savings on equipment and project costs

Leverages expertise and existing collaborations between several partners

BARRIERS

Very high up-front capital requirements for the system installation and expansion

Would likely require large amounts of initial grant funding

Private developers may face challenges in raising large amounts of capital

Permitting and regulatory requirements will require time before implementation

Multi-stage process (from initial design to operation) with long lead time to commissioning

Relies on coordination between multiple partners

Land acquisition for the solar installation can be complex

Project concepts

PROJECT REACH, TIMELINE & BUDGET

Large

$3.5 million

1,000 connections for businesses

Year 1: Feasibility study and project development for solar systems ($500,000)

Year 2: Construction of sites and connection of businesses, implementation of trainings and access to finance schemes ($2 million)

Year 3: Continuation of activities, evaluation ($1 million)

FURTHER INFORMATION

Irrigation and agro-processing machinery can both increase crop production and the value of goods which can be sold on. These can also provide solar mini-grids with viable "anchor loads": customers which reliably use relatively large amounts of electricity, especially during the daytime, that provide a steady income for the developer. Integrating agriculture and energy can be beneficial for both themes, whilst providing farming and processing jobs for local people to increase their incomes and grow the local economy.

REPLICATION & EXPANSION

Replicates successful mini-grid projects in non-displacement settings, which do not currently exist in refugee settlements

Expands agricultural livelihood trainings done by NGOs

STAKEHOLDERS AND ROLES

Mini-grid developers and operators to design, build and operate the system

Development agencies and humanitarian organisations to provide market research, awareness raising, feasibility studies, and technical capacity

Humanitarian organisations to mobilise communities and provide livelihood trainings

Government agencies to provide permissions, regulatory oversight, authorisation and financing

MFIs to provide financial services and training

Donors and financiers to provide grant financing for development of mini-grids and standalone systems

SCALABILITY

Moderate: Once the initial mini-grid is installed, it can be expanded to accommodate increasing demand depending on availability of financing.

SOLAR MINI-GRIDS AND STAND-ALONE SYSTEMS TO GROW THE LOCAL AGRO-ECONOMY

2/2

Project concepts

FINANCING FOR PRODUCTIVE USE OF ENERGY APPLIANCES

1/2

LOCATION

Nakivale, Kyaka, Kyangwali, Rwanwaja, Oruchinga

Bidibidi, Adjumani, Palorinya, Palabek

BACKGROUND

The use of electric appliances can greatly increase the productivity and revenues of agro-processing and manufacturing businesses, as well as small businesses and restaurants. These entrepreneurs would benefit from tailored financial support to gain access to appliances and from business mentorship. MFIs could work together with humanitarian organisations to provide a financing scheme to help businesses purchase the appliances to increase their productivity and incomes.

ACTIVITIES

Conduct needs assessment and project development (Y1)

Identify businesses which could benefit most from accessing PUE appliances to increase their productivity (Y1)

Work with MFIs to develop tailored financial products for entrepreneurs to buy appliances (potentially combining a subsidy and a loan) (Y1-3)

Work with NGOs to provide business mentorship and training, such as bookkeeping (Y2-3)

Run awareness raising and promotional campaigns for PUE appliances (Y2-3)

Conduct training programmes on the use of PUE appliances (Y2-3)

ENABLERS

Provides opportunities to boost productivity and stimulate local economies, in line with government and humanitarian objectives

High demand for electricity for businesses

BARRIERS

Limited access to electricity

Limited availability of electric appliances in the settlements

Relatively high cost of PUE appliances and limited capacity to take on large upfront expenses

Project concepts

PROJECT REACH, TIMELINE & BUDGET

1,000 entrepreneurs, targeting refugee and host communities

Year 1: Needs assessment, project planning and development of business case ($300,000)

Year 2: Roll-out of PUE appliance scheme and business mentorship ($500,000)

Year 3: Continuation of implementation ($200,000)

Medium

$1 million

FURTHER INFORMATION

Electricity can offer new opportunities for businesses, both the types that people might operate and the activities that they could do. PUE appliances can increase production and profits through reduced labour, whilst skills training can help entrepreneurs plan for the future and growth of their enterprises.

REPLICATION & EXPANSION

Builds on work done under the RE4R project in refugee camps in Rwanda

Builds on existing work by financial institutions offering services to refugees

STAKEHOLDERS AND ROLES

Development agencies and NGOs to provide business mentorship and develop appliance acquisition scheme

Companies to supply energy-efficient appliances close to refugee settlements

MFIs to provide microloans for businesses

SCALABILITY

High: Business mentorship and access to finance are relatively low-cost measures that can greatly increase the productivity of individual entrepreneurs.

FINANCING FOR PRODUCTIVE USE OF ENERGY APPLIANCES 2/2

Project concepts

ELECTRIC COOKING THROUGH GRID- OR MINI-GRID CONNECTIONS OR STANDALONE SOLUTIONS

1/3

LOCATION

Nakivale, Oruchinga, Kyaka, Kyangwali, Rwanwaja, Palabek

Scaling up of activities in Bidibidi

BACKGROUND

Access to clean cooking solutions is very low in displacement settings. The majority of households rely on biomass solutions and high demand for increasingly scarce firewood causes serious environmental degradation, putting pressure on communities. Solar energy is an abundant resource that could be harnessed through the installation of mini-grids that can connect communities. In addition, there are plans to extend the national grid to connect some refugee settlements. These connections could be used to roll out electric pressure cookers (EPCs), a clean cooking solution that carries little risk of burns and eliminates the need to procure fuels, or other types of electric cooking. A similar pilot project is currently being implemented by SNV in Kakuma refugee camp in Kenya. In settlements that are unlikely to gain a connection to the national grid or a mini-grid, Pesitho's ECOCA solution (a standalone electric cooking system which comes with a solar panel), which has been piloted in Bidibidi, could be used.

REPLICATION & EXPANSION

Scales up existing work done in Bidibidi through two projects with Pesitho, one with Mercy Corps and one with Caritas

Builds on work done by SNV with Solaria in Kakuma (Kenya)

Expands to different sources of electricity for cooking

STAKEHOLDERS AND ROLES

Development or humanitarian organisation to support market development and awareness raising

Private sector company to provide electric cooking solutions and associated technologies

Government agencies for regulatory oversight and coordination

Donors or carbon credit mechanisms to provide grant financing

Project concepts

ACTIVITIES

Conduct a mapping and assessment to better understand current cooking solutions, needs, and preferences (Y1)

Partner with electric cooking companies to introduce their product to displacement settings with market development support (Y1-2)

Refine and implement Pay-As-You-Cook (PAYC) schemes and other financing options to make products more affordable (Y1-3)

Provide RBF, technical support, business training, access to finance to promote private sector entry to the market and enable their operations to grow sustainably (Y2-3)

Use standalone systems for individual households in areas with no grid connection or mini-grid (Y2-3)

Partner with financial institutions to provide tailored financial services to community members, work with the local VSLAs & SACCOs (Y2-3)

Train community members in repair and maintenance, and set up repair centres which are easily accessible for customers for after-sales support (Y2-3)

Conduct market development and awareness raising activities (Y2-3)

Explore the use of carbon credits to co-finance solutions (Y3)

ENABLERS

Addresses the need for clean cooking, currently one of the most pressing energy challenges and a government priority

Expands grid connection and installation of mini-grids to provide power to cookers

Electric pressure cookers eliminate the need for cooking fuels and resulting recurring expenses, reducing the burden of households and reducing environmental degradation

BARRIERS

Currently only two of the settlements in West Nile are connected to the grid (but no households) and the installation of the mini-grids has not been completed

Electric cooking is a relatively unfamiliar technology and may not match cultural cooking preferences

Very limited historical usage of electric cooking in displacement contexts

Cultural preferences towards biomass cooking technologies and a potential lack of trust towards electricity for cooking

Customers may revert back to traditional stoves if the electricity supply is unreliable or unavailable at specific times

The technology has high upfront costs and may be harder to scale

Connectivity issues in the settlement may hinder digital PAYC systems and require a manual solution

Skilled repair technicians may not be available to provide the support required, new staff would need to be trained

SCALABILITY

High: Cooking using electricity harbours much potential if access to electricity were to increase in refugee settlements. As the national grid is extended and mini-grids are installed, electric cooking solutions will become more viable. At present they are relatively costly per unit and will need to be rolled out at a small scale, also because of the relative unfamiliarity of the product.

Project concepts

PROJECT REACH, TIMELINE & BUDGET

6,200 households
With grid connection: 5,000 households ($2 million)
With mini-grid connections: 200 households ($200,000)
With stand-alone systems: 1,000 households ($500,000)

Year 1: Needs assessment and feasibility study ($300,000)

Year 2: Roll-out of technologies with pay-as-you-cook model or instalment payments ($2,200,000)

Year 3: Continued implementation, monitoring and evaluation ($500,000)

Large

$3 million

FURTHER INFORMATION

While the energy challenges faced in Uganda's refugee settlements are multifaceted, deforestation caused by firewood collection was the most emphasised in the stakeholder engagement workshop. This puts immense pressure both on communities and the local environment. Biomass fuels remain the most prevalently used by far and this is unlikely to change soon, although promoting alternative cooking solutions could alleviate some of these pressures. Solar-powered e-cooking in principle eliminates the need to collect or buy fuels, cooks more efficiently and sustainably, and does not cause indoor air pollution and burns. It could slowly change attitudes and preferences towards more sustainable cooking solutions. Under the SOLCO pledge supported by the Last Mile Climate initiative and the government of Uganda, there is great potential to significantly scale access to e-cooking.

ELECTRIC COOKING THROUGH GRID- OR MINI-GRID CONNECTIONS OR STANDALONE SOLUTIONS

3/3

Project concepts

MODULAR NANO-GRIDS THROUGH STANDALONE SOLAR UNITS

1/2

LOCATION

Scale-up in Kiryandongo and Rwamwaja

Pilot in Bidibidi, Adjumani, Palorinya, Rhino Camp, Imvepi

BACKGROUND

Most refugee and host community businesses in refugee settlements in Uganda lack access to the national grid or to a mini-grid and therefore rely on off-grid solutions, like SHS. For some businesses these systems are too expensive, whereas for others SHS might not have sufficient capacity to power the required appliances. Standalone modular solar systems, such as those offered by Power-Blox, offer an innovative in-between solution. These solar-powered units can power appliances for businesses either as individual units or be combined to construct modular nano-grids. Businesses can purchase these units individually or form groups to invest in these systems and manage them.

ACTIVITIES

Conduct feasibility study to assess the viability of Power-Blox units and block-scale nano-grids, which could provide electricity services to individual entrepreneurs or clusters of 10-20 businesses in one area through combined solutions, and determine the business case (Y1)

Scope potential businesses in areas where such systems would be advantageous (far from planned grid expansion or mini-grids, low penetration of SHS) (Y1)

Work with community leaders to raise awareness and form groups of businesses to manage the block-scale nano-grids (Y1)

Pilot initial block-scale standalone solar nano-grids along with the sale of individual block units under a grant model to assess the opportunity (Y2-3)

Partner with microfinance institutions to support customers with acquiring the credit to pay for the technology (Y2-3)

Train local technicians to install and maintain the systems, and handle customer service (Y2-3)

Implement further systems under an RBF approach (Y4)

ENABLERS

High interest of businesses for electricity services

Flexibility of either purchasing individual units or creating larger systems by stacking units

Modular structure and portability of systems allows them to be scaled up and relocated easily if needed

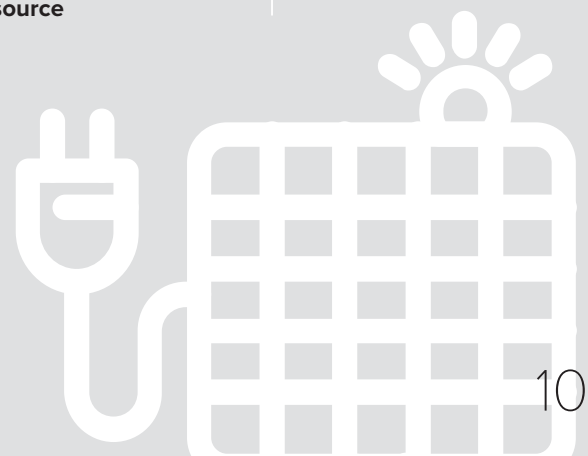
Very high solar resource

BARRIERS

Relatively small solution which would require many systems to achieve scale

Technology is not yet well known

Permitting and regulatory requirements could slow down implementation



Project concepts

PROJECT REACH, TIMELINE & BUDGET

1,000 connections

Year 1: Feasibility study and needs assessment ($250,000)

Year 2: Sales of standalone solar units through instalment payment scheme, awareness raising, entrepreneurship training and financial literacy ($500,000)

Year 3: Continued roll-out and monitoring of technology including repayment methods ($150,000)

Year 4: Monitoring and evaluation, review of scale-up potential ($100,000)

Medium

$1 million

FURTHER INFORMATION

Block-scale solar systems could fill a gap which is unmet by off-grid solar products and mini-grids in presently unserved areas of the camps. The possibility of initially purchasing one unit and then additional units to grow the systems if further capacity is required gives businesses the ability to scale in line with their needs and financial capacity. If necessary the modular, easily transportable equipment could be moved to a new area.
The Power-Blox pilot in Kiryandongo and Rwamwanja, which sold 33 200 W units, showed that customers generally liked the systems and were on time with their payments. The flexible repayment schedule was considered one of the most important features for the success of the pilot. Most customers chose to purchase their own individual unit rather than working with other businesses to combine blocks to create a larger system. The single units worked well for businesses like entertainment halls and secretarial services, and for providing lighting services for other kinds of businesses. However, they did not make financial sense for businesses that required more power-intensive appliances like refrigerators or equipment for hair salons as they would require several units.

REPLICATION & EXPANSION

Replicates pilot project by International Lifeline Fund in Kiryandongo and Rwamwanja refugee settlements

High potential for replication in other areas, if successful

STAKEHOLDERS AND ROLES

Private sector to design, install and maintain the solar systems

Humanitarian and development organisations to support with market development activities, awareness raising and provision of RBF schemes

Financial institutions to provide access to credit for businesses to purchase systems

Community leaders to coordinate formation of blocks and promote uptake

Government and regulatory bodies to provide processing of permits and applications

SCALABILITY

High: Once a successful business model has been trialled and the technology increases in familiarity, it could be rolled out in many other underserved areas in refugee settlements.

MODULAR NANO-GRIDS THROUGH STANDALONE SOLAR UNITS

2/2

Project concepts

SOLARISATION OF HEALTH CENTRES

1/2

LOCATION

Health centres in refugee settlements nationwide

BACKGROUND

Health centres in and around refugee settlements often lack reliable electricity access. This severely impacts the delivery of healthcare services as professionals must work without adequate sources of lighting, for example performing emergency operations at night using only a mobile phone torch. Vaccines and medications require refrigeration to be stored at the correct temperatures, and medical appliances which could improve patient outcomes require power to operate. By solarising health centres, the quality of services and the safety of staff and patients can be improved, as well as potentially reducing staff turnover by improving working conditions. By establishing canteens which sell cold drinks and serve meals, income could be generated to cover O&M costs for the solar system.

ACTIVITIES

Undertake site-specific assessments to scope, size and design solar rooftop systems for health centres (Y1)

Assess of sources of finance to pay for the electricity operational costs of the centres (Y1)

Develop detailed and costed O&M plan for long-term sustainability (Y1)

Coordinate closely with MEMD, Ministry of Health and DLGs on similar programmes (Y1-2)

Install solar PV systems which power all buildings and facilities of the health centres, providing lighting and powering appliances including cold storage for vaccines and medication (Y2)

Invest in improved medical equipment and appliances to fully utilise the advantages of electricity (Y2)

Employ construction workers for the installation of the systems (Y2)

Train and employ technicians to operate and maintain systems (Y2)

Arrange O&M service agreements with private companies (Y2-3)

Pilot running canteens which provide food, cold drinks and phone charging services and use income to cover O&M costs (Y2-3)

Programme monitoring and evaluation of system performance and improvement of patient outcomes (Y2-3)

Review potential for scale-up (Y3)

ENABLERS

Very high solar resource in the area

If multiple social institutions were to be solarised at the same time, economies of scale could allow savings on project costs

Replicates and scales-up existing projects in terms of technologies used and general implementation

Immense social impact in terms of health outcomes, safety, security, staff well-being and quality of services

BARRIERS

High upfront capital requirements for the system installation which will rely on grant financing

Limited opportunity for ongoing payments by the social institutions under a service model (e.g. regular bill payments)

Ongoing O&M costs and limited technical capacity at present

Medical equipment can be expensive and have high power needs and reliability requirements, increasing system costs

Relies on coordination between multiple partners and permitting

Project concepts

PROJECT REACH, TIMELINE & BUDGET

50 institutions

Year 1: Programme startup, needs assessment and project development ($300,000)

Year 2: Installation of sites and O&M trainings ($1.8 million)

Year 3: Operation and maintenance, monitoring, performance evaluation ($400,000)

Large

$2.5 million

FURTHER INFORMATION

Health centres in refugee settlements are often massively overstretched, serving greater numbers of patients than their capacity. There is often high staff turnover due to the challenging working conditions, including not having adequate lighting during procedures, which can seriously affect patient outcomes. While this intervention will rely on grant financing with limited prospects of becoming self-financing under power purchase agreement models, there is the potential for proceeds from the canteens to contribute to ongoing O&M costs.

REPLICATION & EXPANSION

The ESDS project (GIZ) has recently done work in Rhino Camp that could be replicated in other settlements

Aligns with plans for health centre solarisation under the SERP and EASP

Many off-grid solar systems for other institutions are already in place, installed by a variety of organisations

Existing collaborations between several potential partners

STAKEHOLDERS AND ROLES

Solar companies to assess, design, build and operate the solar system

Government health agencies to oversee infrastructure and staffing of clinics

Development and humanitarian organisations to support by providing technician training, training on new medical equipment, and support development of O&M plans

Donors to provide grant financing for solar systems

MFIs to provide microloans for initial start-up of canteens

SCALABILITY

Moderate: Could be scaled across health centres in and around the settlements.

SOLARISATION OF HEALTH CENTRES 2/2

07

Conclusions

Key issues for energy access

There is huge potential to scale up sustainable energy access in displacement settings in Uganda. The country offers a relatively welcoming environment for more than 1.5 million displaced people and has increasingly supportive policies towards implementing sustainable energy projects. Whilst these have some limitations in practice, the enabling environment provides a good basis for future projects.

Access to sustainable energy represents both a pressing need and enormous market potential. Improved energy access in Uganda is hindered by three main barriers – availability, affordability, and acceptability – but all could be overcome through increased investment, coordination amongst stakeholders, capacity building, and market-based programming.

The most pressing need for improved energy access in Uganda's displacement settings is for cooking: almost all refugee households, businesses, and social institutions rely on either firewood or charcoal which has caused deforestation and environmental damage, in addition to that caused by commercial agriculture. Locally designed and manufactured improved cookstoves, increased investment in sustainable forestry and biomass resource management, and scaling up electric cooking could support the transition to cleaner cooking.

Access to lighting and basic electricity services for households in displacement settings is limited, stymied by poor-quality solar products and the unavailability of the national grid. Demand for improved electricity access is high and could be realised through tailored and flexible financing mechanisms as well as end-user subsidies, whilst supply could be supported by de-risking companies' investments in the settlements, both for infrastructure and for training staff.

Energy for productive uses is available in some areas of the settlements, typically in trading centres that the grid has reached, but not all businesses can afford connections. Financing schemes for productive use appliances, supported by training programmes and funding to connect to the grid or a mini-grid (where available), could increase incomes and livelihood opportunities.

Some community facilities have access to electricity but this is typically suitable only for lighting needs. A lack of ownership affects the longevity of the solar systems present in displacement settings, and so improved O&M plans – implemented by local staff or technicians – as part of grant-funded or private-sector-led projects could help ensure that electricity is available in the long term.

Humanitarian operations, providing critical services for displaced people, typically have higher levels of energy access through grid connections or the national grid. This could be made more sustainable, both financially and environmentally, by transitioning operations reliant on diesel generation to solar power. Solarising water pumping stations in all settlements, before moving on to other key facilities, could offer great reductions in diesel usage. ●

Access to sustainable energy represents both a pressing need and an enormous market potential.

The road to sustainable energy in displacement settings

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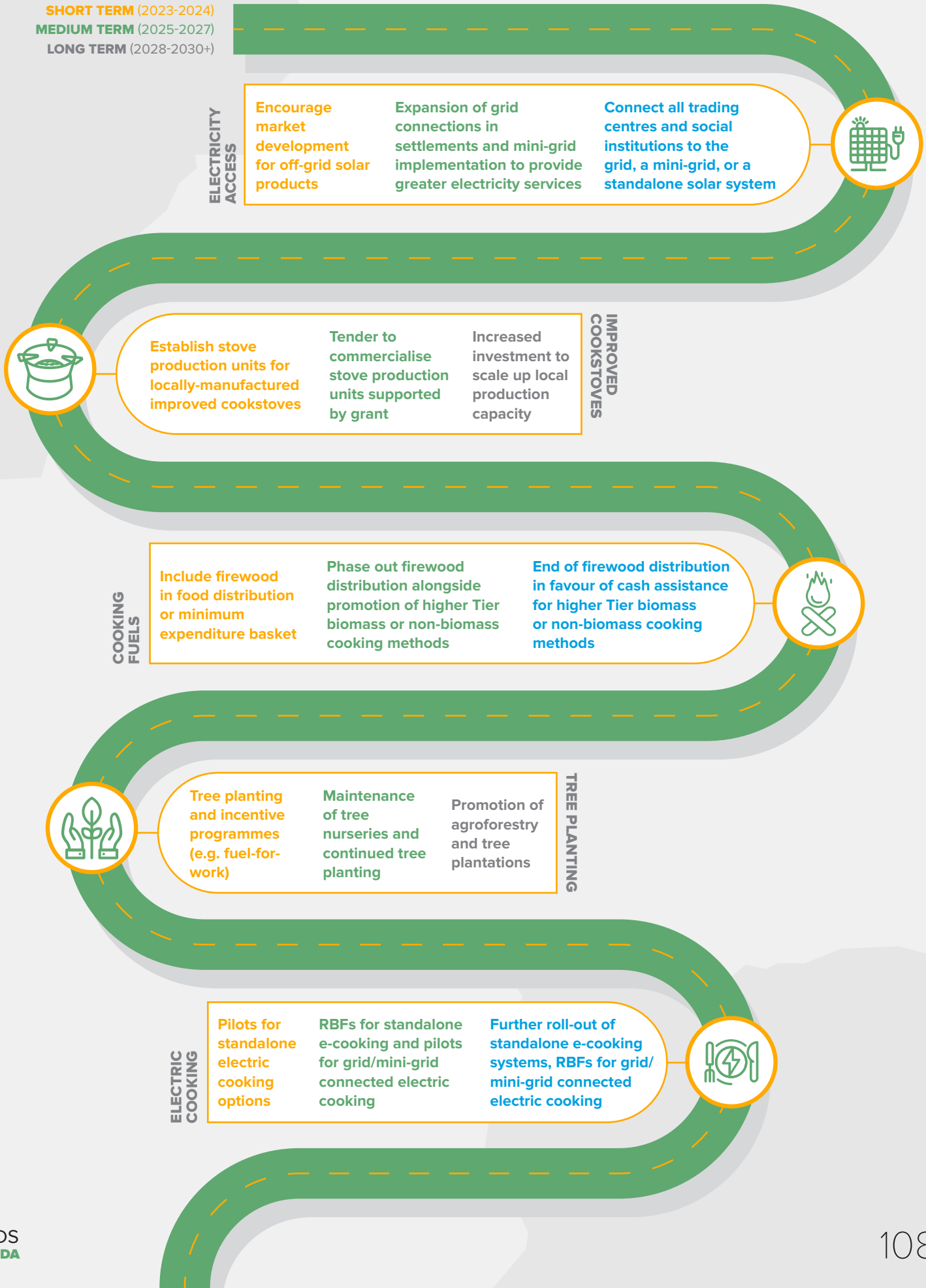
Improving access to sustainable energy will require a concerted effort from all stakeholders working in displacement contexts, with refugee and host community members having a central role in the design and implementation of any intervention.

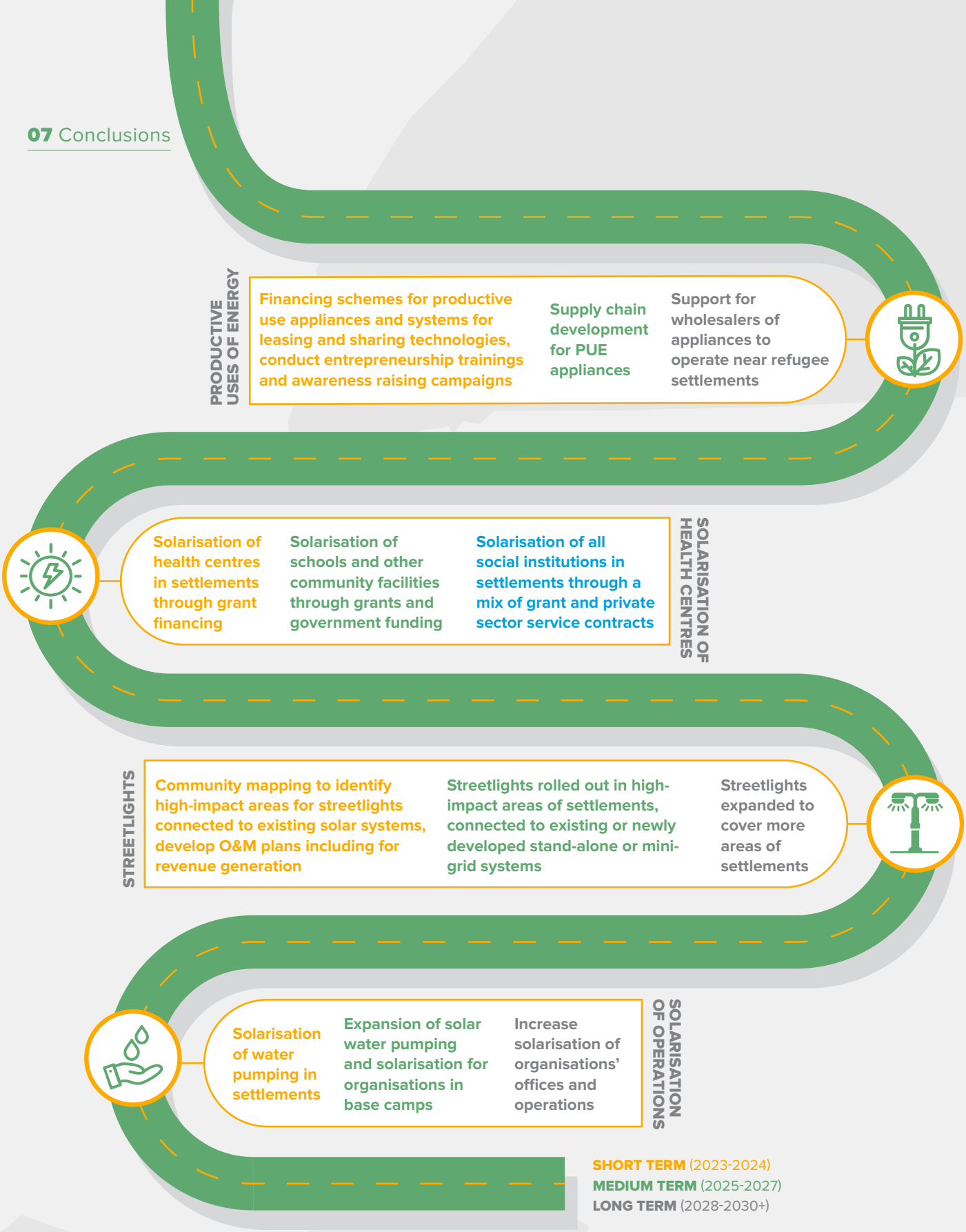
The READS workshop brought together a diverse range of stakeholders to co-design potential high-impact projects. Whilst these are presented as individual opportunities – and would each merit investment and implementation on their own – rolling out coordinated interventions addressing several energy themes together could have a truly catalytic effect on increasing sustainable energy access as a whole.

Acknowledging this, and the work of other initiatives, the roadmap below presents a vision of how access to sustainable energy in displacement settings could develop in the short, medium, and long term. Greater coordination will be central to achieving progress, which would be supported by the establishment of the SERP Secretariat and Steering Committee.

The challenge is huge: achieving access to affordable, sustainable, reliable and modern energy for refugees and host communities by 2030 will require more projects, activities, partners, coordination, and investment than ever before. Fortunately, the conditions are also more favourable than ever before to implement new initiatives, make new collaborations, and improve access to energy in displacement settings throughout Uganda. ●

All stakeholders will need to play a role, with refugee and host communities in the centre, to improve access to sustainable energy.


SHORT TERM (2023-2024)
MEDIUM TERM (2025-2027)
LONG TERM (2028-2030+)
ELECTRICITY ACCESS
Encourage market development for off-grid solar products
Expansion of grid connections in settlements and mini-grid implementation to provide greater electricity services
Connect all trading centres and social institutions to the grid, a mini-grid, or a standalone solar system
IMPROVED COOKSTOVES
Establish stove production units for locally-manufactured improved cookstoves
Tender to commercialise stove production units supported by grant
Increased investment to scale up local production capacity
COOKING FUELS
Include firewood in food distribution or minimum expenditure basket
Phase out firewood distribution alongside promotion of higher Tier biomass or non-biomass cooking methods
End of firewood distribution in favour of cash assistance for higher Tier biomass or non-biomass cooking methods
TREE PLANTING
Tree planting and incentive programmes (e.g. fuel-for-work)
Maintenance of tree nurseries and continued tree planting
Promotion of agroforestry and tree plantations
ELECTRIC COOKING
Pilots for standalone electric cooking options
RBFs for standalone e-cooking and pilots for grid/mini-grid connected electric cooking
Further roll-out of standalone e-cooking systems, RBFs for grid/mini-grid connected electric cooking


PRODUCTIVE USES OF ENERGY
Financing schemes for productive use appliances and systems for leasing and sharing technologies, conduct entrepreneurship trainings and awareness raising campaigns
Supply chain development for PUE appliances
Support for wholesalers of appliances to operate near refugee settlements
SOLARISATION OF HEALTH CENTRES
Solarisation of health centres in settlements through grant financing
Solarisation of schools and other community facilities through grants and government funding
Solarisation of all social institutions in settlements through a mix of grant and private sector service contracts
STREETLIGHTS
Community mapping to identify high-impact areas for streetlights connected to existing solar systems, develop O&M plans including for revenue generation
Streetlights rolled out in high-impact areas of settlements, connected to existing or newly developed stand-alone or mini-grid systems
Streetlights expanded to cover more areas of settlements
SOLARISATION OF OPERATIONS
Solarisation of water pumping in settlements
Expansion of solar water pumping and solarisation for organisations in base camps
Increase solarisation of organisations' offices and operations
SHORT TERM (2023-2024)
MEDIUM TERM (2025-2027)
LONG TERM (2028-2030+)

References

[1] Global Platform for Action on Sustainable Energy Solutions in Displacement Settings, 'State of the Humanitarian Energy Sector: Challenges, Progress and Issues in 2022'. UNITAR, 2022. Available: https://www.humanitarianenergy.org/assets/resources/SOHES.pdf

[2] OECD, 'DAC List of ODA Recipients'. OECD, 2022. Accessed: Nov. 02, 2022. Available: https://webfs.oecd.org/oda/DataCollection/DAC%20List/DAC-List-of-ODA-Recipients-for-reporting-2022-23-flows.pdf

[3] P. E. Rasmussen, 'Uganda: Structural Transformation and Achieving Middle-Income Status'. World Bank, Feb. 2022.

[4] Fund for Peace, 'Fragile States Index Annual Report 2022', Fund for Peace, Washington DC, 2022. Accessed: Nov. 02, 2022. Available: https://fragilestatesindex.org/wp-content/uploads/2022/07/22-FSI-Report-Final.pdf

[5] UNHCR, 'Operational Data Portal: Uganda', Sep. 30, 2022. https://data.unhcr.org/en/country/uga (accessed Nov. 04, 2022).

[6] UNHCR, 'Access to Clean Energy for Refugees Uganda Case Studies'. UNHCR, 2022. Available: https://www.unhcr.org/uk/6324814f4

[7] UNHCR, 'Refugees and Asylum-Seekers in Uganda'. Oct. 14, 2022.

[8] Mercy Corps, 'Enter Energy Assessments: Uganda Country Report', Jan. 2023.

[9] World Bank, 'World Bank Open Data'. World Bank, 2022. Accessed: Sep. 23, 2022. Available: https://data.worldbank.org/

[10] UNHCR and Government of Uganda, 'Inter-Agency Uganda Country Refugee Response Plan (UCRRP) 2022-2025', UNHCR, May 2022.

[11] Ministry of Energy and Mineral Development, 'Sustainable Energy Response Plan for Refugees and Host Communities (2022-2025)'. Ministry of Energy and Mineral Development, Aug. 2022.

[12] I. Idris, 'Integrated approaches to refugee management in Uganda', Institute of Development Studies, Brighton, UK, Jan. 2020.

[13] Office of the Prime Minister, 'Settlement Transformation Agenda II (2022-2027)'.

[14] M. N. Wanjiku, S. Alemu, P. Breul, and J. Sanchez, 'Access to energy for livelihoods in displacement settings'. GIZ in cooperation with Practical Action Consulting, 2022.

[15] GIZ, 'The Sustainable Energy Response Plan (SERP) for Refugees and Host Communities in Uganda', Energypedia, 2022. https://energypedia.info/wiki/The_Sustainable_Energy_Response_Plan_(SERP)_for_Refugees_and_Host_Communities_in_Uganda (accessed Apr. 30, 2023).

[16] H. Bohnet and C. Schmitz-Pranghe, 'Uganda: A role model for refugee integration?' BICC, 2019.

[17] Omata Naohiko, 'Rethinking self-reliance and economic inclusion for refugees through a distributive lens: A case study from Uganda', Available: https://www.rsc.ox.ac.uk/publications/rethinking-self-reliance-and-economic-inclusion-of-refugees-through-a-distributive-lens-a-case-study-from-uganda

References

[18] BFA Global, 'Grit, skills and luck: Examining the financial lives of refugees in Uganda', BFA Global, 2020.

[19] International Finance Corporation, 'Consumer and Market Study in Southwest and West Nile Refugee-Hosting Areas in Uganda', World Bank, Dec. 2021. doi: 10.1596/37876.

[20] U-Learn, UK Aid, and Cash Working Group Uganda, 'Financial services in Uganda refugee response: An assessment of user perspectives', U-Learn, Kampala, Uganda, 2022.

[21] U-Learn, UK Aid, and Cash Working Group Uganda, 'Financial services in Uganda refugee response: An assessment of user perspectives', U-Learn, Kampala, Uganda, 2022.

[22] National Planning Authority, 'Uganda Vision 2040'. National Planning Authority, Apr. 18, 2013. Accessed: Dec. 01, 2022. Available: http://www.npa.go.ug/wp-content/uploads/2021/02/VISION-2040.pdf

[23] Ministry of Energy and Mineral Development, 'Energy Policy for Uganda 2023'. Government of Uganda, Apr. 2023.

[24] National Planning Authority, 'Third National Development Plan (2020/21 - 2024/25)'. National Planning Authority, Jul. 2020. Accessed: Nov. 21, 2022. Available: http://www.npa.go.ug/wp-content/uploads/2020/08/NDPIII-Finale_Compressed.pdf

[25] Energy Sector Management Assistance Program (ESMAP), 'Regulatory Indicators for Sustainable Energy (RISE) Sustaining the Momentum', World Bank, Washington DC, 2020. Accessed: Sep. 22, 2022. Available: https://rise.esmap.org/data/files/reports/2020-full-report/RiseReport-010421.pdf

[26] I. Ehanmo, 'Uganda: New Developments in the Electricity Amendment Act, 2022'. ReEnergy Africa, Jun. 24, 2022. Accessed: Nov. 17, 2022. Available: https://www.reenergyafrica.com/wp-content/uploads/2022/06/UGANDA-ELECTRICITY-AMENDMENT-ACT-2022.pdf

[27] Uganda Bureau of Statistics (UBOS), 'Uganda Bureau of Statistics (UBOS), 2021. Uganda National Household Survey 2019/2020. Kampala, Uganda; UBOS', Aug. 2021. Available: https://www.ubos.org/wp-content/uploads/publications/09_2021Uganda-National-Survey-Report-2019-2020.pdf

[28] IRENA, 'Energy Profile: Uganda'. IRENA, Aug. 24, 2022. Available: https://www.irena.org/IRENA-Documents/Statistical_Profiles/Africa/Uganda_Africa_RE_SP.pdf

[29] S. El Abed, E. Gordon, and A. Rouget, 'Clean Energy Transitions in the Greater Horn of Africa'. IEA, Oct. 2022.

[30] Ministry of Energy and Mineral Development, 'About – Ministry of Energy and Mineral Development', 2022. https://energyandminerals.go.ug/about/ (accessed Nov. 18, 2022).

[31] Electricity Regulatory Authority, 'Uganda's Electricity Sector Overview', Nov. 11, 2020. https://www.era.go.ug/index.php/sector-overview/uganda-electricity-sector (accessed Nov. 18, 2022).

[32] Electricity Regulatory Authority, 'Standardised Power Purchase Agreement (PPA) for the GETFiT Program', Mar. 02, 2018. https://www.era.go.ug/index.php/resource-centre/regulatory-instruments/forms-templates/97-standardised-power-purchase-agreement-ppa-for-the-getfit-program (accessed Nov. 24, 2022).

References

[33] Electricity Regulatory Authority, 'Who We Are', 2018. https://www.era.go.ug/index.php/about-us/era/who-we-are (accessed Nov. 18, 2022).

[34] Rural Electrification Agency, 'About Us - Rural Electrification Agency', 2021. http://www.rea.or.ug/index.php/about-us/# (accessed Nov. 18, 2022).

[35] UECCC, 'Company Overview – Uganda Energy Credit Capitalisation Company', 2022. https://www.ueccc.or.ug/about-ueccc/company-overview/ (accessed Nov. 18, 2022).

[36] Rural Electrification Agency, 'Electricity Connections Policy'. Rural Electrification Agency, Jun. 14, 2018. Accessed: Nov. 18, 2022. Available: http://rea.or.ug/wp-content/uploads/2020/03/The-Electricity-Connections-Policy.pdf

[37] Umeme Ltd, 'Electricity retail tariffs for Quarter One 2022'. Umeme Ltd, Dec. 24, 2021. Accessed: Nov. 23, 2022. Available: https://www.umeme.co.ug/umeme_api/wp-content/uploads/2022/01/Tariffs-1.pdf

[38] Rural Electrification Agency, 'Rural Electrification Strategy and Plan (2013-2022)'. Rural Electrification Agency, Jul. 03, 2013. Accessed: Nov. 24, 2022. Available: https://rise.esmap.org/data/files/library/uganda/Renewable%20Energy/REA,%20Strategy%20and%20Plan%202013-2022.pdf

[39] C. Aguti, D. Achan, O. Xavier, and E. Mugisha, 'Electricity Access Scale-Up Project Stakeholder Engagement Framework', Ministry of Energy and Mineral Development, Aug. 2022. Accessed: Dec. 01, 2022. Available: https://energyandminerals.go.ug/wp-content/uploads/2020/07/EASP-Updated-Stakeholders-Engagement-Framework1-August-2022.pdf

[40] Ministry of Energy and Mineral Development, 'Uganda Energy Access Scale-Up Project (EASP) - P166685'. Ministry of Energy and Mineral Development, 2020. Accessed: Dec. 01, 2022. Available: https://energyandminerals.go.ug/wp-content/uploads/2020/07/tor_easp_electrification_of_public_institutions.pdf

[41] S. de la Rue du Can, D. Pudleiner, D. Jones, and A. Khan, 'Energy Efficiency Roadmap for Uganda: Making Energy Efficiency Count'. Lawrence Berkeley National Laboratory, May 2017. Accessed: Nov. 25, 2022. Available: https://www.usaid.gov/sites/default/files/documents/1860/Energy_Efficiency_Roadmap_for_Uganda_FINAL.pdf

[42] B. Banura, 'Promotion of Mini Grids for Rural Electrification (Pro Mini Grids)'. GIZ, Mar. 31, 2022. Accessed: Nov. 24, 2022. Available: https://www.giz.de/en/downloads/giz2022-en-mini-solar-grids.pdf

[43] SEforAll and Bloomberg New Energy Finance, 'State of the Global Mini-grids Market Report 2020'. SEforAll, 2020. Accessed: Nov. 24, 2022. Available: https://minigrids.org/wp-content/uploads/2020/06/Mini-grids_Market_Report-20.pdf

[44] Government of Uganda, 'The Electricity (Isolated Grid Systems) Regulations'. Dec. 02, 2020. Accessed: Dec. 01, 2022. Available: https://unreeea.org/wp-content/uploads/2021/11/Electricity-Isolated-Grid-System-Regulation-2020.pdf

[45] GOGLA, 'Uganda Country Brief'. GOGLA, 2021. Accessed: Nov. 29, 2022. Available: https://www.gogla.org/sites/default/files/resource_docs/uganda_country_brief_0.pdf

[46] T. Schumacher, E. Lai, F. Ndonga, and R. Macdonald, 'Off- and weak-grid solar appliance market: Uganda'. Efficiency for Access Coalition, Aug. 2021. Accessed: Nov. 23, 2022. Available: https://storage.googleapis.com/verasol-assets/Off-and-Weak-Grid-Solar-Appliance-Market-Uganda.pdf

References

[47] Uganda National Bureau of Standards, 'UNBS gets new solar battery and panel testing equipment', May 27, 2019. https://www.unbs.go.ug/news-highlights.php?news=99&read (accessed Nov. 23, 2022).

[48] Uganda Solar Energy Association, 'Uganda Solar Energy Association Handbook on Solar Taxation'. Uganda Solar Energy Association, Jun. 2019. Accessed: Nov. 23, 2022. Available: https://rise.esmap.org/data/files/library/uganda/Renewable%20Energy/Supporting%20Documentation/Uganda_Solar%20Taxation%20Handbook.pdf

[49] Ministry of Health, Uganda Bureau of Statistics (UBOS), Office of the Prime Minister, and UNHCR, 'Food Security and Nutrition Assessment in Refugee Settlements and Kampala'. Dec. 2020.

[50] S. Lietaer and E. Zaccai, 'Making clean cooking champions: perceptions on development of private actors in Uganda', KLIMOS, Brussels, Belgium, 14, Nov. 2017.

[51] Ministry of Energy and Mineral Development, 'Biomass Energy Strategy (BEST)'. Ministry of Energy and Mineral Development, 2013.

[52] The Energy Regulator, 'The cooking tariff: A gateway to convenient, clean and efficient cooking', May 17, 2022. https://theenergyregulator.com/the-cooking-tariff-a-gateway-to-convenient-clean-and-efficient-cooking/ (accessed Nov. 23, 2022).

[53] Uganda National Bureau of Standards, 'Household biomass stoves requirements', Dec. 10, 2019. https://webstore.unbs.go.ug/store.php?src=3638&preview (accessed Nov. 24, 2022).

[54] Uganda National Bureau of Standards, 'Biomass stoves - Requirements'. Uganda National Bureau of Standards, 2017. Accessed: Nov. 24, 2022. Available: http://www.puntofocal.gob.ar/notific_otros_miembros/uga686_t.pdf

[55] V. N. Wamala, 'Cook stove standards to improve the quality of cooking', UNBS Blog, Aug. 15, 2019. https://blog.unbs.go.ug/?p=10674 (accessed Nov. 24, 2022).

[56] Ministry of Energy and Mineral Development (MEMD), 'National Charcoal Survey for Uganda 2015, Final Report 2016'. Jun. 2016. Available: file:///C:/Users/hp/Desktop/National%20Charcoal%20Survey%20Final%20Report%202016.pdf

[57] GIZ Energising Development (EnDev) Uganda, 'A Rapid Assessment of Energy Needs and Practices in Refugee Settlements in West Nile', GIZ, Jun. 2017. Available: file:///C:/Users/hp/Desktop/LITERATURE%20REVIEW/GIZ%20Rapid%20Survey%20Report%20Refugee%20Energy%202017.pdf

[58] Ministry of Water and Environment, 'Water and Environment Sector Response Plan For Refugees and Host Communities in Uganda', Nov. 2019. Available: file:///C:/Users/hp/Downloads/Water%20and%20Environment%20Sector%20Refugee%20Response%20Plan_Signed_Final_Final-Report_November_2019_2.pdf

[59] FAO, 'Assessment of Forest Resource Degradation and Intervention Options in Refugee-Hosting Areas of Western and Southwestern Uganda', Feb. 2020. Available: https://www.fao.org/3/ca7832en/CA7832EN.pdf

[60] M. Owen, P. Quigley, E. Ntananga, and P. Behrens-Shah, 'Potentials of Biomass Cooking Fuel Production in Displacement Settings', 2022.

References

[61] UNHCR and WFP, 'Minimum Expenditure Baskets for Cash-Based Programming in Uganda - Updated Guidance for Uganda Cash Working Group in 2020 - 12 May 2020 - Uganda | ReliefWeb', May 15, 2020. https://reliefweb.int/report/uganda/minimum-expenditure-baskets-cash-based-programming-uganda-updated-guidance-uganda-cash (accessed Aug. 22, 2023).

[62] 'The Impact of Rural Electrification - Results of the 2013 - 2019 Impact Monitoring of the Investments in Rural Electrification in West Nile Sub-Region, Uganda'.

[63] Energising Development (EnDev) Uganda, 'Energy Access in Refugee Settlements: Creating Evidence for Market-Based Approaches'. Jan. 2018. Available: file:///C:/Users/hp/Desktop/LITERATURE%20REVIEW/Energy%20Access%20in%20Refugee%20Settlements%20in%20Uganda.pdf

[64] Mercy Corps, 'Paying for Darkness: Strengthening Solar Markets for Refugees in Uganda.pdf', Nov. 2019.

[65] B. M. Wabukala et al., 'Unbundling barriers to electricity security in Uganda: A review', Energy Strategy Rev., vol. 44, p. 100984, Nov. 2022, doi: 10.1016/j.esr.2022.100984.

[66] UNHCR and IMPACT, 'Participatory Assessment Report 2022', Apr. 2023. Available: file:///C:/Users/hp/Downloads/UNHCR_IMPACT-%20Participatory%20Assessment%20Report%202022_April%202023%20(002).pdf

[67] K. Kapadia, 'Productive uses of renewable energy: A Review of Four Bank-GEF Projects', 2004, Available: https://web.worldbank.org/archive/website00530/WEB/PDF/KAPADIAP.PDF

[68] J. Terrapon-Pfaff, M.-C. Gröne, C. Dienst, and W. Ortiz, 'Productive use of energy – Pathway to development? Reviewing the outcomes and impacts of small-scale energy projects in the global south', Renew. Sustain. Energy Rev., vol. 96, pp. 198–209, Nov. 2018, doi: 10.1016/j.rser.2018.07.016.

[69] UNHCR, 'Market Systems Development Assessment for Refugees and Host Communities in Arua and Yumbe Districts, Uganda', 2018. Available: file:///C:/Users/hp/Downloads/Market-Systems-Development-Assessment-Report-February-2018.pdf

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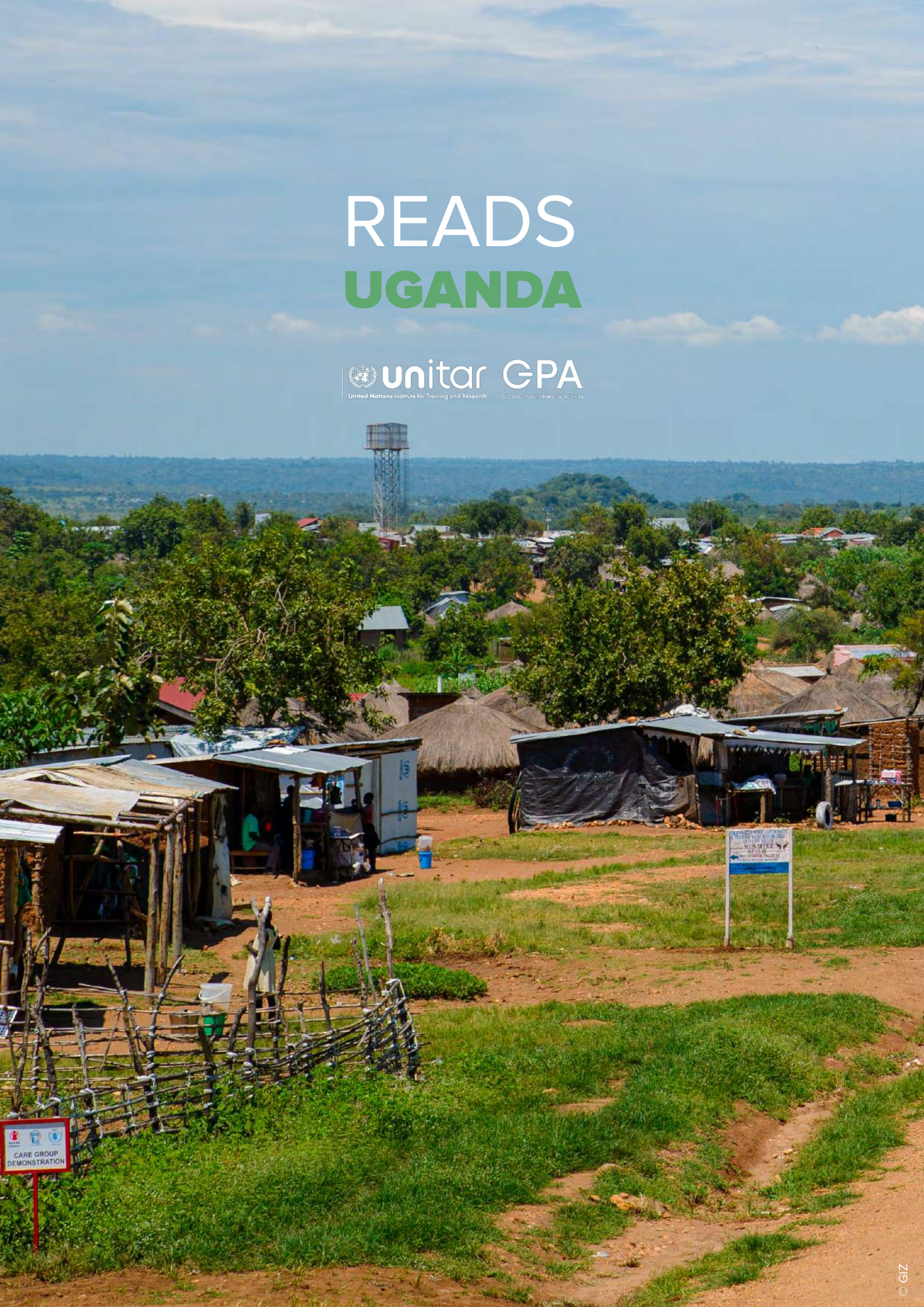

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