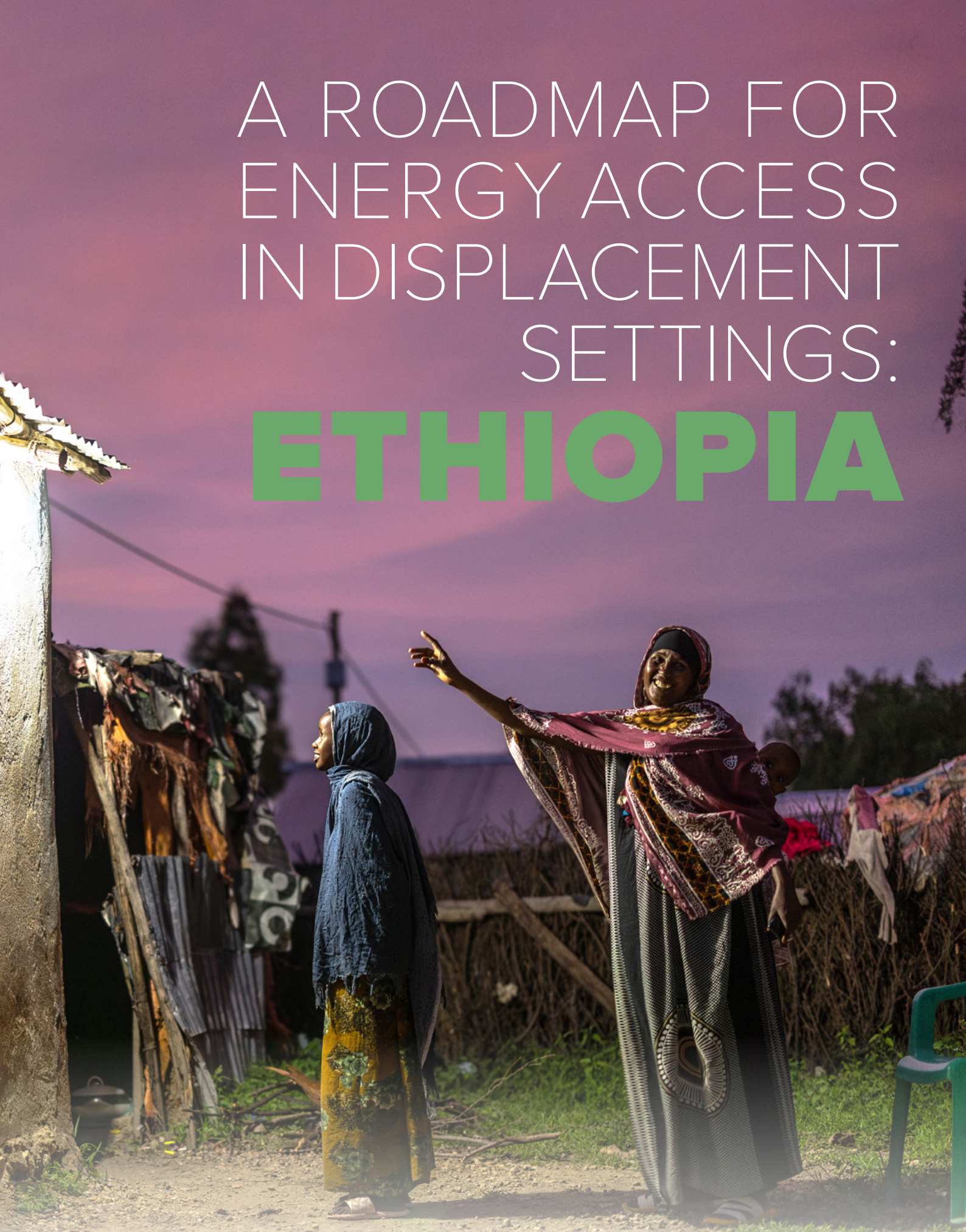
A ROADMAP FOR ENERGY ACCESS IN DISPLACEMENT SETTINGS: ETHIOPIA



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About the GPA

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

AECID	*Spanish Agency for International Development Cooperation*
CBE	*Commercial Bank of Ethiopia*
CRRF	*Comprehensive Refugee Response Framework*
DCA	*DanChurchAid*
EEP	*Ethiopia Electric Power*
EEU	*Ethiopia Electric Utility*
EEWG	*Energy and Environment Working Group*
EFD	*Ethiopian Forestry Development*
ENDEV	*Energising Development*
ESDS	*Energy Solutions in Displacement Settings*
ETB	*Ethiopian Birr*
EUR	*Euro*
FX	*Foreign Exchange*
GIZ	*Deutsche Gesellschaft für Internationale Zusammenarbeit*
GOE	*Government of Ethiopia*
GW / GWP	*Gigawatt / gigawatt-peak*
IDP	*Internally displaced person*
IRENA	*International Renewable Energy Agency*
KW / KWP	*Kilowatt / kilowatt-peak*
KWH	*Kilowatt-hour*
KYC	*Know-your-customer*
LED	*Light-emitting diode*
LPG	*Liquefied petroleum gas*
MFI	*Microfinance institution*
MOM	*Ministry of Mines and Petroleum*
MOWE	*Ministry of Water and Energy*
MTCO2EQ	*Megatonnes of CO2 equivalent*
MW / MWP	*Megawatt / megawatt-peak*
NBE	*National Bank of Ethiopia*
NDC	*Nationally Determined Contribution*
NEP	*National Electrification Program*

Abbreviations

NGO	*Non-governmental organisation*
NRC	*Norwegian Refugee Council*
O&M	*Operations and maintenance*
OCP	*Out of Camp Policy*
PEA	*Petroleum and Energy Authority*
PUE	*Productive uses of energy*
PV	*Photovoltaic*
RBF	*Results-based finance*
RDPP	*Regional Development and Protection Programme*
READS	*Roadmaps for Energy Access in Displacement Settings*
REB	*Regional Energy Bureau*
RISE	*Regulatory Indicators for Sustainable Energy*
RRP	*Ethiopia Country Refugee Response Plan*
RRS	*Refugee and Returnees Service*
SDG 7	*Sustainable Development Goal 7*
SEFFA	*Sustainable Energy for Smallholder Farmers in Ethiopia, Kenya and Uganda*
SGBV	*Sexual and gender-based violence*
SHS	*Solar home system*
SME	*Small- and medium-sized enterprises*
SNNP	*Southern Nations, Nationalities, and Peoples' Region*
TVET	*Technical and vocational education and training facilities*
UN	*United Nations*
UNDP	*United Nations Development Programme*
UNHCR	*Office of the United Nations High Commissioner for Refugees*
UNICEF	*United Nations Children's Fund*
UNOPS	*United Nations Office for Project Services*
USD	*United States Dollar*
W / WP	*Watt / watt-peak*
WASH	*Water, Sanitation and Hygiene*
WFP	*World Food Programme*

Overview of common energy terms

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

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 for cooking 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 – and 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 affected by forced displacement, including Ethiopia. The country hosts a displaced population of more than 1 million refugees, 4.3 million internally displaced people (IDPs), and 2.5 million IDP returnees. This report consolidates the status of energy access in displacement settings in Ethiopia, 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.

Energy access in displacement settings in Ethiopia

Household cooking and electricity

Biomass cooking remains the predominant form of cooking in Ethiopia and in its displacement settings. The Multi-actor Cooking Energy Strategy for Refugees and Host Communities in Ethiopia (2022-2030) found that over 90% of refugee households relied on firewood as their primary fuel, compared to only a small minority which used charcoal or briquettes, similar to households in their host communities. Heavy reliance on biomass for cooking has led to adverse health effects such as respiratory diseases and burns, severe environmental degradation, risks conflict between communities, and exposes those collecting it – usually women and girls – to assault and sexual and gender-based violence (SGBV). The use of ethanol for clean cooking in displacement settings has been supported but has stalled in recent years; meanwhile there are pilots to use electricity for cooking, including the use of communal kitchens for cooking and baking *injera*, but these face challenges around acceptability and affordability.

Promoting a range of clean cooking solutions will be necessary to meet the varying needs and preferences across Ethiopia's displacement settings. This could include the production of improved biomass stoves and fuels, as well as piloting electricity for cooking and leveraging the recent installation of solar mini-grids. Combining traditional grant-based programming with market development approaches will be crucial to facilitate a more sustainable enabling environment for clean cooking in Ethiopia's displacement settings. These should be supported by developing or reinforcing community management frameworks to enable displaced and host communities to more effectively manage access to resources.

For humanitarian and development organisations, transitioning to multi-year financing offers the opportunity to better support the longer-term nature of market-building programmes. For any intervention, user-led design approaches should be implemented and robust market research should be conducted to ensure that solutions are compatible with local cooking customs and preferences. ››

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Household electricity

Only 57% of households in Ethiopia have access to a source of electricity, with 33% connected to the grid and 24% relying on off-grid solutions. The National Electrification Program (NEP) is Ethiopia's central policy for increasing access to electricity and aims to provide a roadmap for 24.3 million households to gain improved electricity access by 2030, primarily through grid connections. In 2018 the NEP estimated that only 37% of refugees had access to electricity for lighting and basic services; at the time only two camps, Mai-Aini and Adi Harush in Tigray region, were connected to the grid, with a further two camps – Aysaita and Barahle in Afar region – being connected in 2021.

Domestic access to electricity remains limited across displacement settings with most households relying on expensive and unreliable sources of lighting such as cell phones, disposable battery torches, candles, and firewood, if anything at all. Households in some camps have access to solar mini-grids which are managed by cooperatives. In the first instance of a private company installing a solar mini-grid under the current legislation, Humanitarian Energy PLC recently implemented a 254 kWp system in Sheder camp, Somali region, which will bring power to more than 17,000 refugee households and businesses. There are also plans for a 2 MW system in Bokolmanyo woreda to serve the host community with the potential to connect the refugee camp at a later stage.

There is low engagement of private energy companies in displacement settings. Limited awareness of the potential opportunities, the lack of a supportive enabling environment, and restricted access to foreign currency has hindered the establishment of market-based models, perpetuating reliance on grant funding for electricity access projects. Piloting business opportunities, supported by the establishment of a more solid evidence base on the energy needs, will be crucial to catalysing greater investment.

The development of solar mini-grids offers the opportunity to significantly expand access to reliable electricity for displacement-affected communities. Government commitment and support for energy access initiatives, including the establishment of a clear regulatory framework and supportive enabling environment, are crucial to encourage further development of mini-grids and off-grid solar interventions. Streamlining licensing and permitting procedures would simplify the process for other companies to establish operations in displacement settings and could attract greater private sector investment.

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The solar mini-grid in Sheder camp will provide electricity to 17,000 refugee households and businesses.

PUE can play a crucial part in supporting livelihoods, while increased access to electricity for social institutions and improved public lighting are crucial to support communities.

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Businesses and productive uses of energy

Ethiopia offers a relatively welcoming policy environment for displaced people to have jobs, run businesses, and access other livelihoods opportunities, although limitations remain in practice. Productive uses of energy (PUE) can play a crucial part in supporting livelihoods by providing lighting for shops and marketplaces, supporting key services, powering equipment and machinery, and offering alternative technologies for cooking.

Interventions to support access to energy to facilitate productive livelihoods have a long history in Ethiopia but the uptake of PUE technologies in displacement settings is hampered by low awareness, high upfront costs, and low confidence in technical support. Some programmes have aimed to increase PUE through communal models, such as supporting the formation of cooperatives for income-generating activities. These have been used to support irrigation systems for agriculture, running community biogas systems, and solar water pumping systems.

The present lack of PUE offers many opportunities for sustainable energy to support businesses. Increasing the availability of PUE appliances, along with measures to support access to finance or pay-as-you-go models to acquire them, will be crucial to increasing the productivity of businesses in displacement settings. Conducting market research and engaging with community members will be critical to effectively understand the needs of businesses and the types of energy and PUE appliances that could support productive livelihoods.

Social institutions and community facilities

Access to sustainable energy for community facilities has been slowly increasing but improvements have generally been through projects focused on specific camps rather than widespread progress across the country. The Electrification Strategy for Refugees and Host Communities highlights that only a handful of social institutions in refugee camps had access to electricity as of May 2024.

To address this, the Ethiopia Country Refugee Response Plan explicitly includes increased access to sustainable energy as one of five strategic objectives. It acknowledges the need to improve access to public lighting in protection-sensitive areas and aims to scale this up to provide 40% coverage as well as highlighting the need for training refugees to maintain them. Several programmes have aimed to increase access to energy for community facilities including Alianza Shire which, amongst its broader energy access goals, supported community facilities through the extension of the national grid to serve community facilities in Shire and a micro-grid in Dollo Ado.

Communal cooking facilities have been implemented at small scales and support from the Multi-actor Cooking Energy Strategy could help to roll these out to reach the Strategy's bold projections. Extending the national grid, meanwhile, would need additional oversight of government bodies and would be dependent on the presence of local infrastructure. ››

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Humanitarian operations

Humanitarian organisations require energy to support their operations: these range from the provision of essential services, such as water pumping, to electricity in offices to support camp administration and communication.

Scaling up sustainable energy for operational purposes is a priority for many organisations, and an objective of the Ethiopia Country Refugee Response Plan, but many barriers remain. Humanitarian operations generally have access to reliable electricity through the grid or diesel generators but water pumping has emerged as an effective candidate for solar energy, both for drinking water boreholes and for crop irrigation. The high costs of the equipment required to provide power and limited organisational budgets have slowed their uptake. Connecting to the national grid, where available, or larger-scale solar mini-grids could help to provide more affordable and reliable power for these critical services. Once implemented, renewable energy systems require skilled maintenance which may not be available in organisations; this could instead be provided through long-term agreements with the private sector. ››

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Connecting to the national grid, where available, or larger-scale solar mini-grids could help to provide more affordable and reliable power for critical services.

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BARRIER	OPPORTUNITY
Limited private sector engagement in displacement settings	Provide funding through results-based financing schemes and grants Instalment payments, flexible repayment mechanisms, customer subsidies, savings groups, easier access to credit
Limited ability for companies to make investments to scale up their production and operations, especially because of limited access to foreign currencies	Explore opportunities resulting from the new foreign exchange regime and other reforms of the financial sector
Low availability, awareness of, and confidence in off-grid solar products, PUE appliances and unfamiliar cooking solutions	Product showcases and demonstrations, cost-value comparisons, awareness raising campaigns supported by influential figures, and end-user training Conduct market research and community engagement
Limited access to high-quality and reliable power	Expand the national grid where possible and invest in further solar mini-grid systems
High upfront costs of more efficient technologies	End-user subsidies, saving groups, pay-as-you-go systems, flexible repayment mechanisms
Small-scale energy interventions with limited budget, duration, and reach	Build relationships between organisations to support planning and advocate for long-term project funding
High initial and maintenance costs for large electricity systems	Combine grant-based models for capital costs with long-term financing for ongoing expenses
Reliance of community-based models on external organisations for support	Provide support and invest in training and capacity building

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Stakeholders in Ethiopia

The Government of Ethiopia's Refugee and Returnees Service (RRS) and UNHCR work in close partnership to coordinate the multi-sectoral humanitarian response across Ethiopia. Energy projects have been implemented through collaborations between government and UN agencies, NGOs, the private sector, and displacement-affected communities; the Energy and Environment Working Group, composed of humanitarian and development organisations, helps to coordinate sustainable energy activities.

There is limited private sector engagement in displacement settings in Ethiopia due to a combination of factors including a volatile security situation, limited infrastructure, and low access to foreign currencies. Interventions have sought to increase the involvement of companies in the provision of solar home systems and have supported a large-scale solar mini-grid but the vast majority of interventions rely heavily on funding from international donor organisations. A range of banks and microfinance institutions, meanwhile, provide financial services to refugee and IDP communities.

Opportunities to improve access to sustainable energy

There is great potential to improve access to sustainable energy for displacement-affected communities in Ethiopia. The country has committed to achieving 100% access to electricity and 50% access to clean cooking by 2030, as well as offering relatively strong sustainable energy policies. The comparatively welcoming environment for displaced people, meanwhile, offers a foundation for coordinated and cross-sectoral support for key services, economic integration, and livelihoods opportunities.

Supporting the availability of high quality off-grid solar and clean cooking products through a combination of grant-based models and pilots of market development approaches, implementing flexible financing schemes, extending connections to the national grid where possible, and increasing investment in solar mini-grids could help Ethiopia meet its sustainable energy goals in displacement settings. The new foreign exchange regime, meanwhile, offers opportunities to support market development and increase the growth of the private sector through enhanced access to foreign currencies.

The READS Programme hosted an engagement workshop in Addis Ababa in November 2023 which brought together stakeholders working on energy in displacement settings across Ethiopia. During a co-design session, participants established 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 Ethiopia 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. ››

The READS programme hosted an engagement workshop in Addis Ababa which brought together stakeholders working on energy in displacement settings across Ethiopia.

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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	*Solar mini-grid development*	*Five mini-grids for 30,000 households and businesses*	*3 years*	*$22.5 million*	*High*
2	*Supporting market development for solar off-grid companies*	*8,000 households and businesses*	*4 years*	*$2 million*	*High*
3	*Piloting electric cooking*	*1,600 households*	*2 years*	*$2 million*	*Moderate*
4	*Diaspora crowdfunding for energy in social institutions*	*Five locations*	*3 years*	*$500,000*	*Moderate*
5	*Solar water pumping for irrigation*	*Six locations*	*3 years*	*$3 million*	*High*

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 Ethiopia with short (2024-2025), medium (2026-2027) and long-term (2028-2030+) goals. These include developing new solar mini-grids, supporting solar off-grid companies to work in displacement settings, promoting electric cooking, crowdfunding for energy initiatives in social institutions, and advancing solar irrigation.

The challenge is huge: achieving access to affordable, sustainable, reliable and modern energy for displaced and host communities by 2030 will require more projects, activities, partners, coordination, and investment than ever before. Fortunately there are promising solutions that can be learned from and scaled up to implement new initiatives, make new collaborations, and improve access to energy in displacement settings throughout Ethiopia. ●

01

Setting the scene

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Setting the scene

Access to energy in Ethiopia's refugee and internally displaced person (IDP) camps, and in their surrounding host communities, is limited. Previous and ongoing work has resulted in a mixed picture: some camps have connections to the national grid network or solar photovoltaic (PV) mini-grids (supported by donors, led by the private sector, or often both), whilst many camps remain unconnected to the grid or a mini-grid; some have piloted novel approaches to modern forms of cooking, whilst others have received very little attention to support clean cooking. In all cases, access to sustainable electricity and clean cooking amongst both displaced and host populations remains low and far short of national and international targets.

Traditional cooking methods and the use of biomass for fuel are the predominant form of cooking across Ethiopia and in its displacement settings. Collecting fuel from the local area is ubiquitous but causes damage to the environment, adverse health effects such as respiratory diseases and burns, risks conflict between communities, and exposes those collecting it – usually women and girls – to sexual and gender-based violence (SGBV). The use of ethanol for clean cooking has been supported but has stalled in recent years; meanwhile, there are efforts to promote improved biomass stoves and fuels as well as communal kitchens which use electricity for cooking, especially for baking *injera*, but these efforts are typically small-scale and short-term.

Domestic access to electricity is limited across displacement settings with most households relying on the most basic forms of power, such as rechargeable torches, if any at all. Households in some camps have access to mini-grids: often these are informal and powered by diesel generators and have been set up by local entrepreneurs but solar PV-powered systems run by cooperatives have also been established by humanitarian and development organisations. More recently Humanitarian Energy PLC installed a 254 kWp solar mini-grid in Sheder refugee camp in Somali region, the first time such a system has been implemented by a private company and licensed under the current legislation. This has brought electricity to thousands of households and businesses and could provide a blueprint for greater replication, as well as providing opportunities to pilot electric cooking (e-cooking) solutions. These mini-grid systems can also provide electricity access for community facilities but demand across all displacement settings currently far outweighs the available supply of power.

Sustainable energy for community facilities is similarly mixed: some health centres, schools, and water pumping centres have access to electricity from either the national grid or mini-grids but many more either do not have power or their situation is not included in organisational reporting. National policies acknowledge the need for public lighting in protection-sensitive areas but coverage remains well below target levels. On the other hand, the operations of humanitarian and development organisations typically have more reliable access to electricity and several promising initiatives have successfully transitioned water pumping systems from diesel generation to solar power.

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. Stakeholders from across government, humanitarian and development organisations, the private sector, and local communities have initiated various energy initiatives but these are typically limited to specific locations and currently lack the investment and coordination to scale up to the challenge of providing sustainable access to energy for all displaced people and affected communities. Furthermore, whilst the amount of research and evidence to better understand the challenges and opportunities for ››

Setting the scene

sustainable energy is growing, information to help develop appropriate solutions 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 camps and communities where possible. With the Programme working across ten countries, Ethiopia is the fifth to be featured in a READS Roadmap Report alongside Kenya, Uganda, Rwanda, and Lebanon.

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 Addis Ababa in November 2023 to engage with these stakeholders. Participants included representatives of communities which have been affected by forced displacement, the private sector, humanitarian and development organisations, and governmental authorities, amongst others.

Using published literature, assessments and other resources from programme partners, and the knowledge and experiences shared during this workshop, the READS Ethiopia 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 rapidly and radically improve sustainable energy access if they received support and investment.

As the available existing literature and workshop focused primarily on the experience of refugees, with limited representation of the situations of IDPs, the READS report similarly focuses on refugees but includes information on IDPs where available. In addition, the READS Programme undertook primary fieldwork in Mekelle in Tigray region to highlight the context of IDPs in this area.

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, camps, or the impact of new projects, and particularly more in-depth research on the energy needs of IDPs – can build on this report by diving deeper into these areas and promote a greater uptake of sustainable energy in displacement contexts.

Further research is needed that focuses on specific areas of energy access, regions, and the energy needs of IDPs.

Ethiopia's reform of the foreign exchange system

On 29 July 2024 the National Bank of Ethiopia (NBE) announced a major and immediate revision of the country's foreign exchange (FX) regime [2]. Previously the value and exchange rates for the Ethiopian birr (ETB) were controlled by NBE, Ethiopia's central bank, with 1 USD ($) equating to around 56 ETB in the year to July 2024 and having risen steadily from around 27 ETB in 2018. This reform shifted FX to a market-based regime under which banks are now able to buy and sell foreign currencies at freely negotiated rates.

Amongst other changes, non-bank FX bureaus are now able to buy and sell foreign currencies, residents can open foreign currency bank accounts for remittances and other purposes, and interest rate ceilings that previously applied to companies when borrowing from abroad have been removed. These reforms were introduced as part of negotiations to secure a $10.7 billion loan from the International Monetary Fund and World Bank to help support the struggling Ethiopian economy and alleviate the longstanding issues caused by a lack of foreign currency.

Under the previous FX regime, the lack of foreign currency meant that Ethiopian importers struggled to pay for products from overseas suppliers, for example renewable energy equipment manufactured abroad. It also caused issues for companies to repay their creditors if they received loans in USD but payments from their customers in ETB. The lack of foreign currency and fixed official exchange rate led to what NBE described as an "unanchored parallel market exchange rate" – or black market – with favourable rates on FX transactions for those with foreign cash. NBE's reforms also aim to bring more FX transactions under its legal framework.

Immediately after the reform the value of ETB fell by around 30% (to around 80 ETB per 1 USD) and, at the time of writing in August 2024, had lost around half of its value (around 110 ETB per 1 USD). The Government of Ethiopia has pledged to introduce subsidies on essential items to combat inflation and market instability but concerns continue about the long-term effects of the devalued currency, especially for companies with loans in foreign currencies and those reliant on imports [3].

Financial values in this report are given in ETB and are accompanied by the USD or EUR equivalent stated in the original source (where available), the exchange rate at the time of the source's publication, or a pre-reform value of 56 ETB per 1 USD.

The revision of the foreign exchange regime aims to increase the availability of foreign currency but in the short-term led to a significant devaluation of the currency.

02

Forced displacement in Ethiopia

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National overview

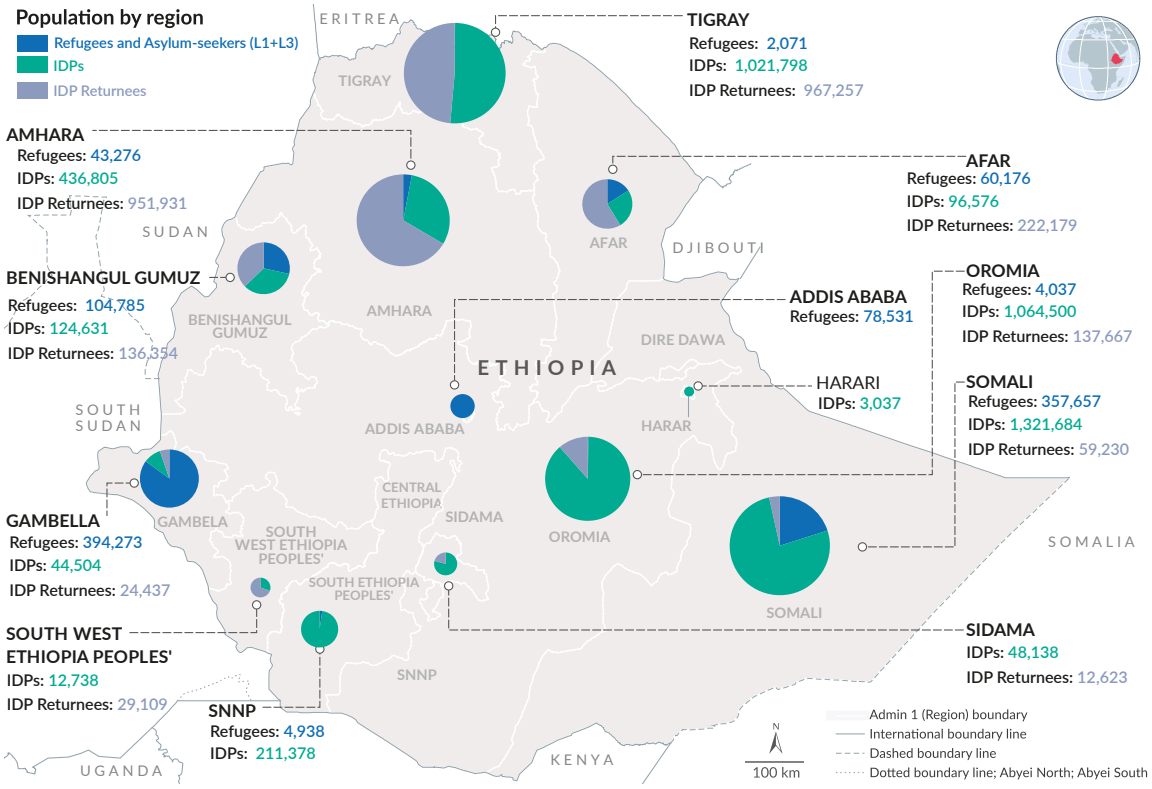
The Federal Democratic Republic of Ethiopia is home to more than 126 million people and is the second most populous country in Africa after Nigeria [4]. Situated in the Horn of Africa, it borders Eritrea to the north, Djibouti to the northeast, Somalia to the east and southeast, Kenya to the south, South Sudan to the west, and Sudan to the northwest. Ethiopia is Africa's oldest independent state and is a founding member in both the United Nations and the African Union. The country is one of the fastest growing economies in the region with a growth rate of 7.2% in 2022-23 and aims to reach lower-middle income status by 2025 [4].

Ethiopia is home to more than 80 distinct ethnic groups and has struggled as a country to establish a unified national identity. The incumbent prime minister Abiy Ahmed's election in 2018 sparked hope for peaceful reforms, however political instability persists along with widespread insecurity. At the time of writing, fragile peace arrangements in the Tigray region and active insurgencies in the Amhara and Oromia regions pose significant stability and security challenges. Despite these risks, increased GDP growth along with reforms are expected to enhance political stability.

Ethiopia is one of Africa's and the world's principal hosts for refugees and asylum seekers, accommodating more than 1.1 million people. Over 92% of these refugees reside in 24 camps and settlements across the country with the largest numbers of refugees originating from South Sudan (40%), Somalia (34%), and Eritrea (17%), with smaller displaced populations from Sudan (9%), Kenya, Yemen, the Democratic Republic of the Congo, and the Syrian Arab Republic (each less than 1%) (see Table 2 and Table 3). ››

FIGURE 1

The numbers and locations of refugees, IDPs, and IDP returnees in Ethiopia as of 30 June 2024 [5].



National overview

Most of the refugee camps are situated in remote, underdeveloped areas which presents significant challenges due to limited resources, infrastructure, and access to basic services. The main refugee camps and sites in each area include:

- Aysaita and Barahle in Afar;
- Sherkole, Tsore, Bambasi, and Ura in Benishangul-Gumuz;
- Nguenyiel (the country's largest camp with more than 112,000 people), Tierkidi, Jewi, Kule, Pinyudo 1 and 2, Okugu, and Akula in Gambella; and
- Melkadida, Kobe, Bokolmanyo, Hilaweyn, Buramino, Aw-barre, Mirqaan, Kebribeyah, and Sheder in Somali region.

In addition, refugees live in other sites, rural locations, and cities throughout the country and almost 80,000 refugees live in the capital Addis Ababa [5].

The evolving nature of many displacement situations has forced some refugees to relocate. In the Tigray region in October 2020 Eritrean refugees lived in four camps (Shimelba, Mai Aini, Adi-Harush, and Hitsats) with almost 8,000 people alongside host communities under Ethiopia's Out of Camp Policy (OCP). After the outbreak of the conflict in November 2020, most residents relocated to the neighbouring Amhara region [6]. Meanwhile the ongoing conflict in Sudan has meant that, between April 2023 and June 2024, 56,486 refugees had entered Ethiopia with around 10% being Ethiopian refugee returnees who had previously sought safety in Sudan [7]. ››

TABLE 2

The population of Ethiopia [8], the refugees and their countries of origin, and the number of internally displaced people and returnees as of 30 June 2024 [5].

		PEOPLE	%
POPULATION	**TOTAL**	***126,527,059***	***100***
	RURAL	*97,227,189*	*76.8*
	URBAN	*29,299,870*	*23.1*
REFUGEES	**TOTAL**	***1,064,587***	***100***
	SOUTH SUDAN	*423,163*	*39.7*
	SOMALIA	*358,768*	*33.7*
	ERITREA	*179,276*	*16.8*
	SUDAN	*94,093*	*8.8*
	YEMEN	*2,534*	*0.2*
	OTHERS	*6,753*	*0.6*
INTERNALLY DISPLACED PEOPLE		*4,385,789*	
IDP RETURNEES		*2,548,685*	

National overview

In addition to people displaced across borders, there are 4,385,789 IDPs and a further 2,548,685 IDP returnees in Ethiopia (Figure 1 and Table 3). People who are internally displaced often live alongside other local communities and share the same rights and freedoms but can suffer from similar issues to refugees such as intercommunity tensions and limited access to land. Almost two thirds of IDPs were displaced because of conflict (65%) whilst others left their homes as a result of drought (18%), social tension (9%), floods (7%) or other reasons [5].

TABLE 3

The numbers of refugees, IDPs, and IDP returnees in selected regions of Ethiopia as of 30 June 2024 [5]

REGION	REFUGEES	IDPS	IDP RETURNEES
TOTAL	***1,064,587***	***4,385,789***	***2,548,685***
ADDIS ABABA	*78,531*	-	-
AFAR	*60,176*	*96,576*	*222,179*
AMHARA	*43,276*	*436,805*	*951,931*
BENISHANGUL-GUMUZ	*104,785*	*124,631*	*136,354*
GAMBELLA	*394,273*	*44,504*	*24,437*
HARARI	-	*3,037*	-
OROMIA	*4,037*	*1,064,500*	*137,667*
SIDAMA	-	*48,138*	*12,623*
SNNP	*4,938*	*211,378*	-
SOMALI	*357,657*	*1,321,684*	*59,230*
SOUTH WEST ETHIOPIA PEOPLES'	-	*12,738*	*29,109*
TIGRAY	*2,071*	*1,021,798*	*967,257*
OTHER	*14,843*	-	*7,898*

Policy frameworks for displaced populations

Ethiopia has a long history of sheltering refugees and upholding an open-door ethos for those seeking sanctuary within its borders. In 2004, it implemented the comprehensive Refugee Proclamation which aligned with international and regional refugee agreements to which Ethiopia is a signatory. These include the 1951 Convention relating to the Status of Refugees, its 1967 Protocol, the 1969 Convention Governing the Specific Aspects of Refugee Problems in Africa, the Universal Declaration of Human Rights, and African Charter on Human and People's Rights. The Refugee Proclamation includes key provisions such as the principle of non-refoulement, prohibiting the return of refugees to places where their life or freedom is at risk, and underscores Ethiopia's dedication to granting humanitarian access and safeguarding those in search of asylum [9].

Since 2016 Ethiopia has embraced a series of forward-looking policy shifts and legal amendments regarding refugees which represent a notable evolution in its approach. These encompass several key reforms, notably the "Nine Pledges" introduced in 2016, the adoption of the Comprehensive Refugee Response Framework (CRRF) in 2017, and the enactment of the Refugee Proclamation in 2019 [10].

The Nine Pledges commit Ethiopia to enhancing refugees' access to socio-economic services, employment, and integration within local communities. They encompass initiatives including granting work permits to refugees, fostering job opportunities in new industrial zones, establishing a collaborative job compact with international contributors, expanding the OCP, providing a path to citizenship for refugees residing in the country for more than two decades, allocating land for agricultural purposes near refugee settlements, enhancing basic and social services, boosting educational enrolment, and facilitating improved access to identity and associated documentation [11]. One key promise was to broaden the OCP to encompass 83,000 refugees, 10% of the refugee population, which grants them access to work permits in sectors open to foreign employees. Notably the expansion of the OCP, initially exclusive to Eritreans, was extended to all nationalities with the goal of facilitating movement, fostering self-sufficiency, and augmenting livelihood opportunities. This initiative was also designed to bolster access to education, training, and services, as well as to advance overall independence and prospects for the future [12].

In 2019 the Government issued the Refugees Proclamation, an upgraded version of a previous policy, which significantly expanded refugees' access to fundamental rights including to work, move freely, and access education. In doing so it supports Ethiopia's regulatory landscape in ››

Ethiopia has embraced a series of forward-looking policy shifts and legal amendments regarding refugees, including the introduction of the "Nine Pledges" in 2016, the adoption of the CRRF in 2017, and the enactment of the Refugee Proclamation in 2019.

Policy frameworks for displaced populations

fostering a more conducive environment to refugees exercising their right to work (including wage-earning employment, self-employment, and collaborative project work) [12, 13]. The Refugee and Returnees Service (RRS) issued 7,796 work permits and 5,239 residence permits to refugees in 2022-23 and it is collaborating with the Ministry of Labour and Skills and the Ministry of Trade and Regional Integration to develop a directive on work permits and business licenses to facilitate the creation of economic opportunities for displaced communities. In addition, measures such as the inclusion of refugees into the national digital ID system aims to support the economic inclusion of refugees.

Despite the expansion of rights through the Proclamation and other more recent measures, limitations remain. Refugees continue to struggle with socio-economic hurdles including low incomes, high unemployment rates, low mental and physical health metrics, and diminished life satisfaction, especially in comparison to the neighbouring host communities [14]. Similarly, while the Government of Ethiopia (GoE) works towards commitments outlined at the 2019 Global Refugee Forum and the Nine Pledges, challenges persist. These include many employment-related issues such as restricted work permits, insufficient job prospects, insufficient access to irrigable land for agricultural activities, inadequate allocation of jobs within industrial parks for refugees, and limited entrepreneurial experience [15]. Obtaining work permits, in particular, poses a significant challenge for refugees seeking to rebuild their lives and involves navigating a variety of bureaucratic complexities. Furthermore job markets are strained in many areas of the country which leads to high competition for positions.

Access to education is another fundamental issue which shapes post-conflict prospects for refugees. Displacement often disrupts educational pathways and rebuilding educational infrastructure is crucial to ensure a brighter future for the younger generation among the affected population. Displaced communities in Ethiopia often have limited opportunities for enrolment in primary, secondary, and tertiary education due to funding shortages and budget cuts from international donors, among other reasons, which impacts their socio-economic development and long-term employment prospects.

The numerous challenges refugees face, particularly those from Eritrea, leads many people seek resettlement with a strong preference for Europe and the United States. Others embark on irregular migration routes through Sudan and Libya, ultimately aiming to cross the Mediterranean. Many of the incoming refugees also arrive with the aspiration to continue their journey towards Europe and these intentions might hinder their willingness to explore the potential opportunities of a future within Ethiopia. Consequently the confluence of limited legal employment options, economic challenges in host regions, and refugees' aspirations for migration hinder the establishment of a stable livelihood for many displaced people in the country [16]. The GoE is taking measures to create economic opportunities for displaced people, particularly in agricultural and livestock value chains, however more resources are needed to create jobs and improve the socio-economic prospects of refugees and host communities.

These issues lead to many refugees relying extensively on humanitarian aid distributed within camps. The broader humanitarian response therefore plays a pivotal role in addressing the challenges faced by refugees in Ethiopia: adequate resource allocation for rebuilding livelihoods, coupled with targeted support for refugees, is essential. International cooperation and support are crucial to addressing the multifaceted issues encountered by refugees, enabling them to rebuild their lives, access meaningful employment, and positively contribute to their communities as they recover from the impacts of conflict.

Access to finance

The 2019 Refugee Proclamation includes an article which states that refugees have the right to open a personal bank account. Before this legislation some refugees resorted to illegal means to obtain bank accounts and driver's licenses but the Proclamation allows them to deposit, transfer, or withdraw funds, as well as access various banking services, using identification documents provided by RRS. As a result the Commercial Bank of Ethiopia (CBE) announced that the first refugee to open an official bank account using legal procedures did so in September 2019 in Jijiga, Somali region [17].

Since then there has been a concerted effort, facilitated by UNHCR and RRS, to enable Somali refugees to access banking services. The CBE, known for its extensive branch network, has been instrumental in this initiative: for example it conducted a comprehensive briefing session for the refugees residing in Kebribeyah camp which outlined the prerequisites for opening a bank account. This proactive step supported Somali refugees in accessing formal banking services and serves as a model to expand to other groups and regions [17]. Meanwhile the Islamic Shebelle Bank operates in Melkadida and Sheder refugee camps in Somali region and plays a crucial role in providing access to inclusive financial services. Its compliance with Islamic banking regulations is another enabling factor towards greater financial inclusion for refugee communities.

Despite these advances, refugees often encounter significant obstacles in securing loans from financial institutions due to their lack of collateral as both microfinance institutions (MFIs) and commercial banks typically demand asset collateral for loan approval. Refugees also often lack IDs, which is a key know-your-customer (KYC) regulation for MFIs. Still, there have been efforts to increase access to microfinance services for refugees. In Dollo Ado, a pioneering project initiated by the IKEA Foundation established a 13.2 million ETB (363,000 EUR) rotating fund to implement a microfinance programme. Of this, 7.6 million ETB (209,000 EUR) was allocated for refugees and 5.6 million ETB (154,000 EUR) for host community members. These loans aim to facilitate the establishment of profitable business ventures for small- and medium-sized enterprises (SMEs) and are accessible to qualified individuals. The allocation of funds was conducted through Dedebit Microfinance-Ethiopia, a private MFI collaborating with the Relief Society of Tigray and the 21st Century Pastoralist Development Association as the implementing partners [11].

The Refugee Proclamation gave refugees and asylum-seekers the right to access telecommunication services by using identification documents issued by RRS. These measures significantly influenced market dynamics, including prompting organisations to establish branches in Dollo Ado and Bokolmanyo. This included financial institutions including CBE, Oromia International Bank, and Somali Microfinance Institution expanding their reach by launching new branches within refugee communities.

These institutions also introduced mobile money services which have become available in Ethiopia only relatively recently. The inaugural mobile money service in Ethiopia, M-BIRR, made its commercial debut in 2015 and, by the end of 2019, 18 financial institutions were offering 10 different mobile money services. These catered to approximately 10 million registered accounts across Ethiopia with M-Birr, Hello Cash, and E-Birr being among the prominent providers. The introduction of Telebirr, an Ethiopian telecom-owned mobile banking service, has significantly enhanced the country's financial sector by allowing SMS banking options which do not rely on an internet connection, departing from the reliance on a bank-led model to provide mobile money services to greater agency of telecom companies.

The rollout of mobile money services has been expanding rapidly in Ethiopia. The state-owned Telebirr experienced high growth rates of ››

Access to finance

200% in the year to September 2022, resulting in a total of 200,000 mobile money agents, compared to only around 13,000 agents in 2019 [18]. Even though the network of agents has expanded exponentially it is still much smaller than the leading mobile money market, Kenya, which has 300,000 active agents for a population of half the size of Ethiopia's [19]. Buoyed by the growth of the sector, however, Safaricom launched its mobile money service M-PESA in Ethiopia in August 2023 [19].

Research from GSMA found that distance to a banking point was the main reason that prevented people from opening a mobile money account [19]. This results in considerable regional differences in levels of access to digital financial services. In Somali and Afar regions, for example, refugees can access mobile money services at similar rates to members of the host community. In other regions however, limited telecommunications infrastructure in camps and a lack of ID documents to open accounts prevent more widespread access. This highlights the importance of further expanding the mobile money agent network.

200,000

mobile money agents in 2022 (compared to 13,000 in 2019)

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Income levels

Refugees in Ethiopia typically rely more heavily on humanitarian aid compared to the local host communities. While some refugees generate income through salaried jobs, farming, entrepreneurial endeavours, informal cross-border trading (particularly with Somalia), and receiving remittances, many still depend on humanitarian assistance for support [20]. A World Bank study published in 2021 [21], which used data from 2017, found that refugees were far less likely to be self-employed or work on family farms compared to host community members, particularly women refugees in Benishangul-Gumuz compared to other regions.

Refugees in Somali region (typically from Somalia) had better access to livelihoods opportunities compared to those in Benishangul-Gumuz and Gambella (typically from Sudan and South Sudan respectively) [21]. In Dollo Ado camps, 21% of refugees engage in income-generating activities compared to 29% of the host community [21, 22]. The study suggested that the shared language and cultural similarities between refugees and hosts in the Somali region enable deeper integration than in other displacement settings, and this inclusive environment contributes to improved socio-economic opportunities [21]. Somali refugees in Ethiopia experience more favourable employment prospects compared to other refugee communities. They predominantly rely on wage employment (24% of male-headed and 12% of female-headed households) and self-employment (15%) in sectors such as services, retail, and agriculture for their primary income. Additionally, some Somali refugees benefit from crop irrigation initiatives in Melkadida, aligning with the CRRF commitment to equally support refugees and hosts and enhance livelihood opportunities for both groups [21, 23].

In comparison, Eritrean refugees primarily draw income from wages, services, and remittances (13%), with a similar gender gap of 12% of men and 7% of women in wage employment, akin to their host community's 36% of men and 14% women. For Sudanese and South Sudanese refugees, livelihoods are more constrained. Just 11% of South Sudanese refugees rely on agriculture, self-employment, and wages, which leads to low participation (6%) in wage employment. After being displaced dependence on aid was found to have increased, especially among women (over 40%) compared to men (around 21%) who are inactive in the labour market. Sudanese refugees, who were typically previously reliant on agriculture (over 70%), were found to now heavily depend on aid with only 13% engaged in wage-based work (including just 6% for women). In the host communities, too, employment prospects are limited: only 19% of men and 7% of women were found to be engaged in wage-related employment, primarily relying on agriculture [21].

Research from the Refugee Studies Centre at University of Oxford identified the considerable gap in median monthly earnings between Somali and Eritrean refugee communities living in urban areas and their respective host populations [24]. Its findings revealed that the median monthly income for Somali refugees in urban settings averages around 1,400 ETB ($51.85), while Eritrean refugees in similar circumstances earn approximately 1,500 ETB ($55.55). In contrast, the host communities in these areas typically earn substantially more: median incomes were found to be 3,000 ETB ($111) for Somali-hosting communities and 4,000 ETB ($148) for Eritrean-hosting communities [24]. This significant disparity highlights the economic challenges faced by refugees living in urban settings and the study emphasised the need for support mechanisms to create pathways for economic empowerment among refugee populations striving to build sustainable livelihoods.

Higher numbers of dependent children and a lack of access to land limit opportunities for ››

Income levels

women from both the host and (more so) refugee communities [21]. Female refugees in particular are limited by their low levels of education and tend to live in larger families and experience higher poverty levels than female hosts. There is a notable gender gap in wage employment present in both communities: in Somali region, 27% of men and 9% of women refugees are engaged in wage employment compared to 33% and 7% in the host communities. The World Bank study recommended increasing access to education and skills training for women, increased access to sexual and reproductive health services and childcare facilities, joint host-refugee cooperatives, and investing in employment creation in sectors like agriculture and livestock. In all interventions, it is essential to pay attention to gender and take into account the legal and practical barriers women experience that hinder their economic opportunities.

IDPs also face challenges for their livelihoods including a loss of access to land and assets, limited start-up capital, continuing conflict, and recurring droughts. A study from 2021 which focused on IDPs in Somali region found that just 5.7% of IDP households had a source of income in the region, compared to 15.5% of IDP households nationally, and relied on pastoralism (64%), agro-pastoralism (25%), collecting firewood (5%), daily labour (4%), and farming (3%) [25]. The sale of firewood, amongst other items, was the main income-generation activity in Goljano *woreda* (district) and was assumed to be a key activity in other areas, alongside charcoal production. More recent studies in conflict-affected regions found that support continues to be limited. A report from 2023 found that IDPs in Enderta woreda and Mekelle City, Tigray, received no aid to support livelihoods – such as for seeds, fertilisers, water pumps, or fuel for generators – amongst many other shortcomings in basic assistance [26]. ●

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03

National energy context of Ethiopia

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National policy overview

Ethiopia has great potential for sustainable energy and high ambitions to achieve SDG 7. The country generates the majority of its electricity from hydropower and Grand Ethiopian Renaissance Dam – Africa's largest hydroelectric project which began producing power in 2022 – is expected to help provide power to millions of households that currently lack electricity [27]. In 2021 Ethiopia committed to achieving 100% access to electricity and 50% access to clean cooking by 2030 [30] and the country offers a relatively strong policy environment towards sustainable energy, shown in Table 4.

Ethiopia's Nationally Determined Contribution (NDC), updated in 2021, acknowledges that non-biomass energy usage accounts for just 5% of greenhouse gas emissions (under its business-as-usual projections to 2030) but aims to reduce these by more than 50% to 9.5 $MtCO_{2eq}$ through measures such as energy efficiency and the electrification of transport [30]. This is without considering the additional reductions associated with exporting low-carbon power to neighbouring countries. Incorporated under the country's land use-related NDC, policies to reduce biomass for cooking include transitioning to more efficient stoves and electric biofuels; whilst there are no quantitative targets attached to these policies stated in the NDC, its overall goal is to convert land use change and forestry from a net emitter of emissions to a carbon sink.

TABLE 4

RISE Pillars, which summarise the national policy environment for different sustainable energy components, for Ethiopia and the regional and global averages [29].

RISE PILLAR	ETHIOPIA	SUB-SAHARAN AFRICA	GLOBAL
OVERALL	52	38	***61***
ELECTRICITY ACCESS	73	51	***53***
CLEAN COOKING	57	35	***37***
RENEWABLE ENERGY	42	43	***51***
ENERGY EFFICIENCY	35	24	***48***

Data from the World Bank (Table 5) states that Ethiopia has slightly higher levels of electricity access to other countries in Sub-Saharan Africa: almost all urban households have an electricity connection but less than half of all households in rural areas have electricity [8]. The rates of access to clean cooking, however, are well below both the global and regional averages: around one in four urban households use clean cooking but almost no households in rural areas have access. Ethiopia has a higher uptake of renewable energy than countries in the region and far exceeds the global average, driven by the widespread use of biomass – defined as a renewable source, even if in practice it may not be replenished – for cooking. Considering electricity alone, Ethiopia generates 98% of its power from renewable sources and, of this, 94% is sourced from hydropower and 5% from wind, with small amounts from solar and bioenergy [31].

A Multi-Tier Framework household survey was conducted in 2017 and found that 57% of households had access to some form of electricity – 33% from the grid and 24% from off-grid solutions – and 44% of households had access to Tier 1 electricity or higher [32]. Of those with access to off-grid solutions, 54% used solar lanterns which limited their access to Tier 0. The survey found a clear regional divide: in Addis Ababa 99.9% of households had a grid connection, far higher than in Tigray (51%), Oromiya (27%) and Amhara (29%) regions and the national average ››

National policy overview

TABLE 5

Selected SDG 7 indicators for Ethiopia and the regional and global averages [8].

SDG 7 INDICATOR		ETHIOPIA	SUB-SAHARAN AFRICA	GLOBAL
ACCESS TO ELECTRICITY (%)	***Total***	***54***	***48***	***91***
	Rural	*43*	*29*	*83*
	Urban	*94*	*78*	*97*
ACCESS TO CLEAN COOKING (%)	***Total***	***8***	***18***	***70***
	Rural	*0.5*	*6*	*49*
	Urban	*27*	*35*	*87*
RENEWABLE ENERGY (% FINAL CONSUMPTION)	-	*90*	*68*	*18*

(33%). Across the country 58% of grid-connected households face 4 to 14 outages per week, and 3% face more than 14 outages, and 6% of households have an informal connection to the national grid. Amongst rural households, 32% have access to off-grid systems including solar lanterns (17%), solar lighting systems (8%) and solar home systems (7%).

For cooking, data from 2017 found that 80% of households in rural areas of Ethiopia rely on biomass as their primary fuel source – with most of the remainder using animal dung, crop residue, or charcoal – and fewer than 6% use improved cookstoves or modern energy for cooking such as liquefied petroleum gas (LPG) or electricity [33]. Most rural households rely on collected firewood and, of these, 70% spent more than one hour doing so per collection session and 40% spent more than two hours. Similarly to other contexts, the burden of fuel collection and the negative health impacts of cooking on basic stoves were found to predominantly affect women and girls.

Amongst rural households, 32% had access to a solar off-grid solution; 80% used biomass as their primary fuel source and 70% spent more than one hour per firewood collection session.

Government agencies

The GoE's Ministry of Water and Energy (MoWE) serves as the regulatory body for the planning, development, management, and implementation of guidelines and strategies for water and energy resources in the country [34]. This includes for electricity, water supply and sanitation, irrigation, dams and hydropower, and natural and manmade energy resources. MoWE also conducts research and development activities.

The supply of grid electricity in Ethiopia was restructured in 2013 to fall under the remit of two organisations:

- Ethiopian Electric Utility (EEU), a government-owned public enterprise, which is responsible for universal electrification programmes (including through the grid, mini-grids, and off-grid solar systems), the administration and expansion of medium-voltage transmission lines, and the distribution and sale of power [35]; and
- Ethiopian Electric Power (EEP), also owned by the government, which is responsible for operating and maintaining electricity generation, the administration and expansion of high-voltage transmission lines, selling and purchasing bulk electric power, and submitting tariff proposals for the power it sells [36].

EEP manages 22 power stations around the country, 16 of which are hydropower – including the Grand Ethiopian Renaissance Dam – with the remainder being wind and fossil fuel generation. Other government organisations with responsibilities related to the energy sector include:

- The Ministry of Mines and Petroleum (MoM), responsible for the provision of fuels such as LPG and biofuels, relevant to the cooking sector, as well as regulations related to the exploration and extraction of fossil fuels [37];
- Ethiopian Forestry Development (EFD), the federal institution responsible for environmental protection including the maintenance and usage of forestry resources [38];
- The Petroleum and Energy Authority (PEA), which serves as the national regulatory body for the energy sector and issues licences for electricity generation, transmission, and distribution [39]; and
- The Institute for Ethiopian Standards, which certifies electricity products that can benefit from duty waivers on imports [40]. ●

MoWE serves as the regulatory body for the planning, development, management, and implementation of guidelines and strategies for water and energy resources in Ethiopia.

Electrification policies and the national grid

The National Electrification Program (NEP) is Ethiopia's central policy for increasing access to electricity. Launched in 2017 and with its second version published in 2019, the NEP aims to provide a roadmap for 24.3 million households to gain improved electricity access in the period 2016-30 primarily through grid connections [32]. In addition the NEP commits to electricity access for primary and secondary schools, hospitals, and primary health centres by 2025, and aims to prioritise areas with high economic growth potential, especially in the agricultural sector.

Ethiopia plans to scale up its on-grid generation capacity from a baseline of 4.1 GW in 2021 to 14.4 GW in 2030, more than a threefold increase [41]. The country's future electricity mix is expected to remain mostly dependent on hydropower but an increase in power from other sources (predominantly wind, solar and geothermal) will see these sources account for around one quarter of total generation capacity in 2030 at a cost of around $40 billion. It also plans to reduce its transmission losses from 19.6% to 12.5% over the same timescale, increasing the amount of generated electricity that reaches the end users, and almost double the length of the transmission network.

Ethiopia aims to connect an additional 8 million households to the national grid by 2030 [28]. This is expected through a combination of intensifying the existing grid for households between 1-2.5 km from the network (covering around 65% the population) and by extending the grid for households up to 25 km from existing power lines (around 31%). This is projected to cost $3.2 billion (around $370 and $1000 per connection for each distance respectively) and an additional $380 million will be spent to regularise around 3.8 million customers without an official EEU account. Of the total investment of $3.2 billion required for its on-grid components, $1.1 billion is expected to come from customer contributions [32].

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Off-grid electrification

The GoE acknowledges the role that off-grid solutions can play in providing intermediary levels of energy access and an estimated 11% of the Ethiopian households were "pre-electrified" via off-grid solutions such as solar home systems (SHS) and mini-grids in 2019 [28]. The NEP outlines that by 2025 around 35% of the population is expected to have access to off-grid solutions as a form of medium-term pre-electrification on the pathway to them being grid connected later [28]. Off-grid systems continue to feature modestly in electrification targets to reach households far from the main grid network and, under its proposed universal electrification scenario, the number of households with off-grid connections will fall from 8.9 million in 2025 to 0.9 million in 2030 (4% of the total) as they transition to on-grid connections [32, 41].

Solar lanterns and SHS are included in the NEP [32] and have been used under previous programmes to provide electricity access. Under the Rural Electrification Fund, more than 45,000 SHS had been provided to unelectrified communities and solar systems were provided to more than 1,000 schools (300 Wp systems) and 1,500 health clinics (200 Wp, later increased to 600 Wp) to provide basic lighting services as of 2021. Before this the Development Bank of Ethiopia, working as a financial intermediary for the World Bank, provided a credit line for market development for MFIs and companies to provide and access loans. This was a successful initiative as it provided loans in foreign currencies for companies to buy stock but repay loans in Ethiopian birr, helping to overcome foreign exchange issues, and helped to finance more than 70,000 SHS and 1.1 million Lighting Global-certified solar lanterns between 2012 and 2018. Larger SHS with quality certificates are also supported through exemptions from customs duties.

Recognising their potential for electrification in rural areas, EEU operates 31 diesel-powered mini-grids, mostly in Somali region [28]. EEU has also established a mini-grids unit and now has a goal that all new systems must include renewable generation. Of the current sites, around 35% have a capacity of around 100 kW each and in total support around 8,000 connections [32].

The NEP outlined support for mini-grid developers including technical assistance studies and geospatial analysis to identify high-priority sites [32]. The GoE followed up on this through the Mini-Grid Directive, approved by EEA in 2020, which outlined standards and design criteria for mini-grids, improved the regulatory environment through simplifying license applications for mini-grids, provides a process for determining and approving financially viable tariffs, and accommodates their potential eventual integration into the main grid network, including compensation clauses for mini-grid developers [42].

These measures are designed to help support the private sector development of mini-grids and off-grid solutions more generally. The reliance on companies to provide off-grid electrification will also be supported by supply- and demand-side market systems interventions from the GoE [28]. The NEP included the intention for a minimum subsidy tender mechanism to be put in place for areas which will likely rely on off-grid solutions in the long term, designed to accommodate the additional costs associated with operating in remote areas and with priority given to social institutions not expected to receive a grid connection by 2025.

The GoE has identified that it will require external financial support from donors, especially for the off-grid components. The NEP estimates that around 40% of costs ($1 billion) will come from GoE contributions and the remaining $1.5 billion will be sourced from development organisations and the private sector [32]. The GoE has also been exploring opportunities for other sources of funding for its electrification plans, such as climate finance [28]. The NEP estimates that the value of the cumulative emissions reductions of its off-grid component will reach more than $50 million per year, based on a carbon price of $50 per tonne, in 2025. ●

Clean cooking

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The overall policy framework of Ethiopia prioritises improved biomass cookstoves with the goals of reducing deforestation and improving user health. In its 2021 SDG 7 Energy Compact, the GoE stated ambitious targets to distribute 31 million improved cookstoves in rural areas by 2030 to alleviate the heavy reliance on biomass fuels resulting from traditional low-efficiency cookstoves [28]. In doing so it aims to increase access to clean cooking in rural Ethiopia to 50% by 2030 and to improve the sustainability of biomass utilisation and support climate resiliency.

Improving clean cooking access is a component of Ethiopia's Climate Resilient Green Economy Strategy, first published in 2011 to set out the national goals for green growth, and again aims to reduce dependence on traditional forms of biomass [41]. It states the need to reduce both deforestation and greenhouse gas emissions via the dissemination of more efficient stoves or those which use alternative fuels like LPG [43]. It highlights local cooking practices – specifically the necessity for households to have one *mitad* stove for baking injera and another for cooking sauces and coffee – and suggests the potential for electric mitad stoves, including using solar PV-powered stoves in off-grid areas. It also stated the requirement to mobilise international climate funds to reach its target (at the time) of 9 million clean cookstoves by 2015.

Alternatives to improved biomass stoves are also supported by GoE policies. The National Biogas Program, for example, aims to disseminate 98,000 biogas digesters by 2030 [41], building on more than 25,000 installed by 2024 [44]. Ethanol for cooking was featured in the second Growth and Transformation Plan in 2015 and has received some uptake in urban areas and in refugee camps, but its growth was far below expectations owing to supply constraints, amongst other factors [33]. Electric cooking, meanwhile, has been previously promoted by the GoE since the 1970s, which attempted to promote electric stoves for injera to reduce the environmental impact of biomass [45]. It has seen high levels of adoption in Addis Ababa – where 65% of households use it – but it is not presently explicitly supported through GoE policies, although the Ethiopian Standards Authority has introduced standards for locally-produced mitad stoves [45]. ●

Displaced people in the National Electrification Program

Displaced people are explicitly referenced in Ethiopia's National Electrification Program [32]. It acknowledges that little information is available for IDP situations but lighting conditions are generally poor and, where data has been collected, 85% of IDPs live in sites where lighting is a safety concern and only 4% have adequate lighting around latrines. The NEP states the GoE's intention to collaborate with humanitarian and development partners to support IDPs on electricity issues, suggesting that off-grid solutions could be the most appropriate option given the transitory nature of displacement and would also improve services for host communities.

Meanwhile, the NEP presents the electricity situation for refugees as mixed: access to lighting is good in many places and several camps have streetlights, but rates of clean cooking are very low. It highlights that electricity access rates vary between regions, typically higher in Somali and Tigray regions and lower in Benishangul-Gumuz and Gambella, and rates are generally lower than in each host community. At the NEP's time of writing in 2019, two of the 26 camps were grid connected (Mai-Aini and Adi Harush in Tigray) while four more (Shimelba and Hitsats in Tigray, Barahle and Aysaita in Afar) were in the process of being connected, with the connection of the camps in Afar region having since been completed.

The NEP highlights that, for refugees, its implementation will entail collaboration with development partners in alignment with the GoE's commitments to the Nine Pledges, the Global Compact for Refugees, and the Comprehensive Refugee Response Framework. Overall the NEP acknowledges the importance of meeting the needs of displaced people in Ethiopia and some of the issues which would require tailored interventions, especially with regard to other GoE policies and partnership with other organisations, but lacks explicit goals or targets for increasing access to sustainable electricity for displaced people specifically. ●

Off-grid solutions are considered the most approropriate option to support IDPs with access to electricity, given the transitory nature of displacement.

04

Energy needs in displacement settings

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Strategies for energy in displacement settings

National strategies

Ethiopia's numerous and diverse displacement situations have highlighted the need for both greater coordination between key organisations and for overarching national strategies to support improved access to sustainable energy.

The Energy and Environment Working Group (EEWG) was established to coordinate activities and interventions related to energy in displacement settings [46]. Its core goal is to support refugees and vulnerable host communities in accessing modern energy through creating an enabling environment and its Steering Committee is composed of UNHCR, RRS, GIZ, UNDP, ZOA, and DCA. The EEWG has provided a platform to oversee strategies and other initiatives, especially for cooking energy. Despite providing an opportunity to coordinate among its stakeholders, inadequate coordination persists amongst humanitarian and development organisations and the current EEWG has no formal mandate [46].

Ethiopia has two overarching strategies for increasing access to cooking energy and electricity for its refugee populations and host communities. Used as key resources in this report, both were produced by GIZ's Energy Solutions in Displacement Settings (ESDS) Project and are endorsed by MOWE, UNHCR, RRS and GIZ. The Multi-actor Cooking Energy Strategy for Refugees and Host Communities in Ethiopia (2022-2030) was published in December 2022 and supported by RRS [46], while the Electrification Strategy for Refugees and Host Communities (2024-2030) was published in May 2024 and supported by UNHCR [47].

Both strategies share similar features:

- They have the same six goals to support SDG 7: ensuring access to energy services; improved policy, planning, coordination, and resource mobilisation; facilitating private sector and market development; building capacity; mainstreaming cross-cutting issues; and promoting learning and knowledge management.
- They each provide an analysis of the current situation, list strategic actions and key performance indicators for each of their goals, and present a risk management plan and monitoring strategy.
- They both outline an implementation strategy, including the establishment of coordination and technical working groups, as well as highlighting the need for management, ownership and monitoring by the EEWG.

Whilst the Cooking Strategy includes a summary of its funding needs, which total $116 million, the Electrification Strategy additionally outlines example electricity access projects – including for national grid expansion, SHS, and solar minigrids – with high-level estimates of funding requirements which total more than $95 million.

Whilst both Strategies commit their endorsers to greater coordination (including a permanent structure composed of UNHCR, MOWE, and RRS to support implementation) and provide valuable political support, they contain few concrete pledges, and the long-term impact of the policies remains to be seen. ››

Strategies for energy in displacement settings

The Melkadida Refugee Compact

Strategies for supporting sustainable energy have also begun to be included as part of regional policy frameworks. Developed by UNHCR, RRS, and Somali Regional State and focusing on Bokolmanyo and Dollo Ado woredas, the Melkadida Refugee Compact (2024-2027) has four pillars: renewable energy, sustainable water supply and sanitation, agriculture and environmental protection, and health and education [48]. Similar to the national strategies, the Compact presents the situation in the Melkadida operation, outcomes and actions from each pillar, and a commitment for UNHCR, RRS, and Somali Regional State to adopt a systemic approach to planning and coordination.

The Melkadida Refugee Compact provides an example of how previous energy-focused projects, such as those supported by the IKEA Foundation, and staff dedicated to energy and environmental issues can flourish into more coordinated planning. The Compact outlines cost estimations for energy access projects to support electricity access for households and businesses, individual and communal clean cooking, and social services such as education and health, totalling $220 million, including operations and maintenance (O&M) costs. The projected costs under the Melkadida Compact are higher than those of the Multi-actor Cooking Energy Strategy and the Electrification Strategy despite the Melkadida Compact's focus on a single region, albeit one which hosts a large number of refugees. The higher costs reflect local experience and the acknowledgement of substantial investments required to implement long-lasting sustainable energy programmes. ●

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Clean cooking

Biomass cooking remains the predominant form of cooking in Ethiopia, with just 6% of households using clean cooking solutions as their primary method of preparing food. Firewood is the most prevalent primary cooking fuel and was found to be used by 82% of the population in a market assessment by MECS and Energising Development (EnDev) in 2022 [45]. Approximately 70% of urban households use firewood and charcoal for their cooking needs whilst in rural areas 97% of households rely on biomass for cooking, mainly firewood (85%), but also other forms of biomass (12%) [49]. Using several types of fuels, known as fuel stacking, is common in response to fluctuating prices and the availability of cooking fuels.

Urban areas, in which 11% of the population resides, generally have better access to the national grid: 96.2% of urban residents have a connection to the grid compared to 12.2% in rural areas [45]. Over the past decade, this has supported a notable increase in the adoption of electric cooking and, as a result, a reduction in the reliance on firewood [46]. Despite this, only 21% of urban households in Ethiopia primarily use electricity for cooking and only 4.1% nationwide [45]. Addis Ababa stands as an exception where cooking with electricity is more prevalent, where 65% of households in the capital own electric cooking appliances and 63% use electricity as their primary cooking source.

Despite the low cost of grid electricity and government support for electric cooking initiatives, there remains considerable untapped potential for further adoption of electric cooking methods. An estimated 6-15% of the population have Tier 1 electricity connections, which cannot support electric cooking. Targeted efforts are therefore required to promote both access to higher-Tier electricity and electric cooking which could yield significant benefits by reducing reliance on polluting fuels and improving overall energy efficiency [45]. Electric cooking is not available in most displacement settings in Ethiopia; however, these are typically in remote areas that lack proper infrastructure and access to the national electricity grid or high-Tier off-grid solutions.

Refugees residing in formal camps and surrounding communities heavily rely on three-stone stoves and biomass for cooking and many people rely on collecting firewood from the local environment, including in areas owned by the host community or government. This reliance on firewood collection not only strains relations with host communities but also exposes those collecting it, typically women and children, to serious risks such as attacks and sexual violence. This practice has long-term detrimental effects on the environment, contributing to deforestation and soil degradation, and indoor air pollution resulting from inefficient biomass cooking methods also leads to chronic health issues. Promoting cleaner cooking alternatives is therefore critical for displacement-affected communities in Ethiopia.

Whilst the cooking energy landscape within refugee camps varies between regions, across the country there is a great prevalence of biomass cooking methods (see Table 6). The Multi-actor Cooking Energy Strategy for Refugees and Host Communities in Ethiopia (2022-2030) by UNHCR and GIZ found that, across settings, over 90% of refugee households relied on firewood as their primary fuel, with the exception of Afar where 80.2% used firewood [46]. Only a small minority used charcoal or briquettes as their primary fuel. ››

Clean cooking

Electric cooking was not prevalent in most settings except in Afar region where 9.2% of refugee households used electricity as their primary source. In Shire, for example, there were communal kitchens for injera baking which were powered by electricity both through the grid and through diesel generators, but have since ceased to operate. In Jijiga, meanwhile, ethanol and kerosene had previously been supplied to refugee households but the distribution has since stopped due to a reduction in the supply of ethanol and its increasing price resulting from competition with the alcoholic spirits industry.

Three-stone fires were by far the most common primary stove, used by at least 90% of refugee households across settings, again with the exception of Afar [46]. Firewood has historically been the primary fuel for the overwhelming majority of households across all settings, with only a small fraction of households using charcoal. This may change with the increasing scarcity of firewood: for example, anecdotal evidence suggests that the use of charcoal has risen sharply in Jijiga as the fuel has reached price parity with firewood as a result of depletion of biomass stocks in the area. Traditional charcoal stoves were found to be used as a primary stove by fewer than 6% of households, while improved charcoal stoves were used by 7.3% in the Afar region and 5.9% in the Assosa region. In Afar, electric stoves were used by the same 9.2% of households who indicated they used electricity as their primary source for cooking.

The Multi-actor Cooking Fuel Strategy found that in most settings, the cooking patterns and practices of host community households were very similar to those of the refugee communities [46]: 63.3% of host community households used three-stone fires as their primary stove with 51.5% using it as their only stove. Only 4.1% used electricity for cooking, with the penetration of electric cooking being significantly higher in urban areas (15.3%) than in rural areas (0.6%).

The Strategy also found that 27.2% of host communities relied on fuel stacking and that 64.3% of the biomass stove users cooked indoors without an exhaust system and had two or fewer doors or windows in the cooking space. Only 18.2% of households used a manufactured stove, even though the willingness to pay for one was high. Manufactured stoves and clean cooking stoves were more prevalent among higher-earning households but were still very low across the surveyed households. Collecting or purchasing firewood was found to be a significant time burden and 53.3% of host community households re- ››

7 hours

typical collection time for firewood in Melkadida, several times per week

Clean cooking

ported spending more than seven hours per week on the task.

The heavy reliance on biomass for cooking has led to severe environmental degradation in many refugee-hosting areas [46]. The distances travelled by refugees for dead wood collection have increased over time; this has prompted some people to resort to harvesting live trees, with some endemic tree species threatened by over-exploitation for fuel. For refugees, gathering firewood and dried grass from bushlands and forested areas entails regular treks, typically two to four times each week. In Melkadida, for example, respondents shared that firewood collection typically involved a seven-hour roundtrip of 10-15 km, while respondents in Assosa said their collection required a four-hour roundtrip. Deforestation is also causing major environmental degradation, with flash floods occurring in the rainy seasons that heavily impact humanitarian operations in some regions.

In addition to the time burden, gathering fuel exposes collectors to serious hazards such as animal attacks, gender-based violence, and conflicts with host communities. Purchasing fuel is an expensive alternative: the cost of purchasing cooking fuels ranges between 200-400 ETB ($3.57-$7.14) per month and some refugee households resort to selling their WFP food rations to acquire cooking fuels. In Jijiga, for example, refugee households reported that they sometimes had to use almost their entire cash-based transfer (200 ETB, $3.57) for fuel. ››

TABLE 6

The breakdown of primary fuels and stoves used by refugee households in selected regions and woredas [46]

AREA		GAMBELLA	JIJIGA	DOLLO ADO	ASSOSA	AFAR
FUEL TYPE (%)	FIREWOOD	93.4	96.7	99.1	90.2	80.2
	CHARCOAL	5.5	3.3	0.6	3.7	3.3
	BRIQUETTES	-	-	0.3	5.6	7.3
	ELECTRICITY	-	-	-	0.5	9.2
STOVE TYPE (%)	THREE-STONE FIRE	94.5	96.7	99.1	89.9	80.2
	TRADITIONAL CHARCOAL STOVE	5.5	3.3	0.4	3.7	3.3
	IMPROVED CHARCOAL STOVE	-	-	0.5	5.9	7.3
	ELECTRIC STOVE	-	-	-	0.5	9.2

Baking injera

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Injera, a sour fermented pancake-like flatbread, is a staple food in many regions of Ethiopia and Eritrea and renowned for its rich cultural significance. It is typically made from teff flour mixed with water but can also be made from wheat, barley, maize, sorghum, or a blend of these grains. The preparation of injera traditionally requires a specialised ceramic plate known as a *mogogo*, crafted from selected clay and scoria. The mogogo is placed atop a firewood, electric, or biomass stove to bake the injera.

The reliance on traditional cooking methods like three-stone fires and large amounts of firewood and time required to bake injera, raises concerns of deforestation, the risk of SGBV, and indoor air pollution. To address this, the Ethiopian Rural Energy Development and Promotion Centre developed improved firewood-based stoves, including the "Mirt stove" (Amharic for "best stove"), made from scoria and pumice, and introduced in the 1980s. In 2005, GIZ introduced a modified version of the Mirt stove; it featured enhanced efficiency and versatility which allowed simultaneous cooking while baking of injera [50].

Despite the advancements in stove technology, research into alternative energy sources for injera baking has been limited. Traditional clay stoves used for injera baking have low efficiency, estimated at around 5%, while the Tigray traditional injera stove and the Mirt stove offer efficiencies of 25% and 35% respectively. In urban areas where electricity is readily available, modern electric stoves can offer a cleaner alternative for cooking. However, in many refugee camps across Ethiopia, access to reliable electricity is limited, forcing refugee communities to continue relying on firewood for baking injera. With injera baking accounting for over 50% of primary energy consumption and over 75% of household energy use, the lack of efficient stoves poses a significant barrier to reducing biomass consumption [51].

Injera is a staple food in many regions of Ethiopia but traditional methods of baking require large quantities of firewood.

Clean cooking

AVAILABILITY BARRIERS

Near-universal use of biomass and three-stone fires as the primary form of cooking, coupled with the depletion of local biomass resources, means that firewood is becoming less available in displacement settings. This has devastating consequences, both in terms of environmental degradation and the hardship endured by firewood collectors who must travel increasingly long distances and risk being attacked. The ongoing lack of access to electricity means that e-cooking is not available for most displacement-affected communities, whilst other more efficient cooking methods are also nearly non-existent in these settings.

Most cooking energy interventions are small-scale and predominantly focused on distributing improved cookstoves [46]. These projects are often short-term, sporadic, and fragmented, relying on annual budgets that rarely support sustainable and enduring investments. There is a pressing need for more diverse and viable cooking energy options to be implemented at a larger scale, which would also necessitate longer-term programming.

Furthermore, there is no designated lead agency accountable for addressing energy needs in the humanitarian response, which causes further challenges in programming. Despite initiatives such as the EEWG, inadequate coordination among UN agencies, humanitarian organisations, and implementing partners exacerbates the issues and leads to duplicated efforts, inefficient use of resources, and conflicting objectives.

Although they have a great need for more sustainable cooking solutions, displaced communities remain excluded from national initiatives such as the National Programme for Improved Household Cook Stoves Development and Promotion and the National Biogas Dissemination Scale-Up Programme. Despite the cross-cutting nature of cooking energy – impacting sectors such as protection, livelihoods, environment, health, food security, and shelter – it remains inadequately integrated into both national energy planning and humanitarian programming, missing opportunities for cross-sectoral integration and increased resource mobilisation.

While there have been some attempts at implementing market systems approaches to deliver energy products and services through a more sustainable model, the remote locations of refugee camps and limited infrastructure, such as roads and internet connectivity, makes the provision of clean cooking solutions more difficult. As a result, there is limited private sector engagement and investment in refugee settings: the few enterprises that offer alternative fuels and fuel-efficient stoves operate on a small scale and struggle to turn profits [46]. The free distribution of products has led to an overdependence on handouts which hinders market development; in some cases people have come to expect and rely on free products and services and are unwilling to purchase products, whilst in others people resell the products they receive. These undermine efforts to develop functional market systems. Furthermore, many organisations procure goods from abroad as local value chains are very limited and shifting from artisanal to semi-industrial production would require significant investments in equipment. These would also likely rely on large amounts of foreign currency which can impair investments in local markets.

OPPORTUNITIES

Supporting the availability of sustainable biomass solutions is crucial. The existence of informal markets for traditional biomass fuels in refugee and host community settlements, alongside the significant portion of income spent on fuels, demonstrates the pressing need for these solutions. This could include supporting the creation of local fuel and stove production sites, as well as strengthening supply chains, warehousing and distribution mechanisms for these products.

It is also critical to manage current biomass harvesting practices more sustainably, for example by implementing a licensing system for suppliers that requires sustainable sourcing methods. Developing or reinforcing community manage- ››

Clean cooking

ment frameworks could also offer opportunities to enable communities to more effectively regulate access to resources such as firewood. This could involve sustainable harvesting methods and designating specific days and locations for fuel collection, supporting more equitable resource distribution and reducing environmental degradation. Such structured frameworks could help alleviate resource scarcity and foster community cooperation and resilience.

Promoting electricity for cooking would provide a more environmentally friendly alternative to biomass, as well as reducing household air pollution and associated health risks. Efforts to expand access to the national grid or mini-grids should consider the potential for e-cooking in the design of such systems to avail this opportunity. In instances of inconsistent electricity supply or power outages, households that have switched to electric cookstoves may revert to using charcoal or firewood as a backup source for cooking.

AFFORDABILITY BARRIERS

Displaced households are often in precarious financial situations with little or no disposable income. This results in low ability and willingness to pay, and correspondingly low demand for clean energy solutions. In turn, this makes it difficult to achieve economies of scale and to develop sustainable business models for private suppliers of improved and clean cooking products [46]. The challenge is especially pronounced in regions where firewood is available at no direct cost to households.

Limited employment opportunities and restrictions on accessing local firewood imposed by host communities or governments lead many refugees to selling essential food rations and non-food items to procure firewood and charcoal. Ongoing fuel purchases and having to engage in risky, time-consuming fuelwood collection practices perpetuate the financial strain on displaced populations, hindering their access to essential resources and perpetuating reliance on unsustainable coping mechanisms.

Clean cooking stoves typically have higher upfront costs and potentially lengthy payback periods compared to traditional methods, which deters their adoption. However, savings on fuel purchases compared to electricity tariffs can make these clean cooking solutions more cost-effective in the long run. E-cooking, for example, could be a cost-effective alternative and has been implemented in refugee camps but the initial expense of acquiring an electric stove poses a substantial challenge for displaced households. Similarly, biogas cooking requires a large initial investment to construct a biodigester, but once the system is operational and with organised organic matter feeding, biogas production incurs minimal ongoing expenses.

Clean cooking companies, meanwhile, struggle to acquire sufficient collateral to secure loans given that they are typically small-scale and lack the ability to semi-industrialise their manufacturing processes without access to foreign currencies. The available funds for cooking solutions falls far short of investment required and is often restricted to short-term funding cycles that are ill-suited for financing long-term solutions. The national macroeconomic environment adds another layer of instability for energy companies, with double-digit inflation and foreign exchange shortages increasing investment risk and uncertainties, especially for international companies.

There are significant gender disparities regarding purchasing power, decision-making, and entrepreneurial opportunities. Women typically lack the financial autonomy to procure cooking fuels and modern technologies, despite bearing the brunt of cooking responsibilities. While they may recognise the advantages of clean cooking solutions, they often depend on their husbands for purchases who may resist investing in new appliances. Research indicates that adoption rates of improved cookstoves are nearly twice as high in female-headed households compared to male-headed ones. For example, households led by men in southern Ethiopia demonstrate a lower likelihood of adoption compared to those led by women [52]. ››

Clean cooking

OPPORTUNITIES

Donor funding for clean cooking interventions, such as results-based finance (RBF) schemes, has been increasing and highlights opportunities for further support. These include GIZ's ESDS project in Gambella and the work supported by the IKEA Foundation in Dollo Ado. UNHCR's adaptation to multi-year programme funding offers the opportunity to better support the longer-term nature of market-building interventions [46]. The Development Bank of Ethiopia, with support from the World Bank, has also established a revolving fund for clean cooking and off-grid renewable energy projects through which financing is disbursed to private companies and MFIs to provide loans to increase affordability.

Additional blended finance support for energy-efficient technologies could increase their uptake. These could be applied to both domestic purposes, such as improved cookstoves or e-cooking for households, and for livelihoods opportunities such as in restaurants. Additionally, livelihood interventions could help families increase their incomes, but might require the revision or better application of Ethiopia's refugee laws that promise to increase access to finance and business opportunities. Climate financing and carbon credits could also support electric or improved cookstoves if their environmental benefits can be assessed and monitored.

Exploring bulk purchases of stoves presents an opportunity for significant cost reductions. Through this approach, local distributors could negotiate advantageous deals with stove manufacturers or suppliers to capitalise on the scale of bulk purchasing to secure discounted rates per unit. This could potentially be achieved through credit schemes to motivate distributors and facilitate larger stock purchases: these could decrease the upfront investment required and allow them to pass on lower costs to end-users. Favourable credit terms or financial incentives could motivate distributors to purchase larger quantities of stoves, supporting longer-term investments, which would increase the number of households that benefit and support investment in last-mile logistics to reach remote or underserved communities. This would also likely be reliant on overcoming the challenges of accessing foreign currency and unfavourable exchange rates.

ACCEPTABILITY BARRIERS

Traditional cooking practices are deeply ingrained in cultural norms, often impeding the adoption of modern cooking solutions. Households often lack comprehensive information regarding the economic, health, social, and environmental benefits of clean cooking. As a result, insufficient engagement of users, especially women, can lead to ineffective interventions [46]. The acceptance of new cooking technologies and methods depends on their ease of use, compatibility with local food, and resemblance to traditional stoves, which underscores the importance of user-friendliness and familiarity in increasing adoption rates.

Solar cookers, for example, have had limited uptake in part due to their incompatibility with injera baking and reduced capacity in the rainy season [51]. Biogas faces challenges, including misconceptions about being difficult to manage or having low gas production, which may lead to resistance from communities. Its water requirements for processing organic matter present an additional barrier, particularly for displacement settings in arid and semi-arid regions. Furthermore, biogas systems cannot be easily relocated and involve significant upfront costs. However, once initial doubts are addressed, users have generally appreciated biogas cooking for its smoke-free operation, the cleanliness of pots, immediate ignition, and safety [53].

Locally-developed solutions, such as manufacturing pellets from coffee husks, could provide the basis for successful clean cooking programmes but they face barriers to their support. Challenges include limited local technological research and innovation capabilities, inadequate cooperation with research and development institutions such as technical and vocational education and training facilities (TVETs), and a shortage of workshop facilities and training opportunities. ››

Clean cooking

Finally, the absence of standardised quality certifications limits the uptake of improved cooking solutions. Low-quality products compromise the reputation, and as a result the uptake, of improved solutions. The prevalence of counterfeit and substandard products can distort the market, undermine consumer confidence, and influence their willingness to invest in high-quality alternatives.

OPPORTUNITIES

Raising awareness of the opportunities offered by clean cooking solutions, as well as cost-value comparisons over the long term, are crucial to increasing their uptake. These awareness campaigns should be conducted throughout the entire duration of a clean cooking intervention. Clean cooking product demonstrations should aim to address men, women, boys and girls; this can use the opportunity of a new technology to engage men and to encourage their involvement in cooking. Kitchens in communal facilities could be used to provide cooking classes involving efficient technologies to teach boys how to cook alongside girls to sensitise young people to the benefits of clean cooking.

User-friendly, design-oriented research should be conducted on cooking preferences to ensure that solutions are compatible with local customs and preferences. Users could take part in design workshops to create new solutions or adapt existing ones to better meet their needs. These products could then be produced by local artisanal cooperatives and eventually scaled up. Authorities should certify products and enforce regulations more strictly to ensure only products that meet quality standards are available to customers. Meanwhile information on these quality standards should be made available to customers to support them making informed decisions and increase their trust in improved cooking solutions.

BARRIER	OPPORTUNITY
Preference and access to three-stone-fire stoves and firewood or charcoal, unfamiliarity with clean cooking solutions	Awareness raising campaigns and cooking demonstrations in local languages using community leaders and other influential figures, clear evidence that other cooking solutions save time and fuel
High upfront costs of more efficient biomass cooking methods such as LPG, ethanol and e-cooking	End-user subsidies, saving groups, pay-as-you-cook systems, flexible repayment mechanisms
Limited availability of fuel in refugee camps	Support for supply chains of sustainably sourced firewood, sustainable fuel resource management
Limited potential e-cooking due to limited electricity access and high upfront costs of e-cooking appliances	Increasing electricity access through national grid expansion and mini-grids, RBF schemes for e-cooking appliances
Limited private sector engagement in displacement settings	RBF schemes, easier access to credit, and other incentives to start and expand operations
Limited supply of raw materials for local cookstove production	Strengthening supply chains for raw materials, assessment of viability of cookstoves which use other fuels
Limited access to foreign currencies and ability to take out loans without collateral	New foreign exchange regime and reformed regulations for financial institutions

Electricity access for households

Electricity access levels remain low in displacement settings across Ethiopia. The National Electrification Program (NEP) has a target of achieving universal electricity access through grid extension (65%) and off-grid solutions (35%) by 2025 but many areas remain without connections, especially in areas which host displaced people [47].

In 2018 the NEP estimated that only 37% of refugees had access to electricity for lighting and basic services and only two camps, Mai-Aini and Adi Harush in Tigray region, were connected to the grid. Access rates have been found to be significantly lower in camps which have received dedicated assessments, however: a study by IRENA in 2019, which focused on two settlements in Assosa region, found that only 7% of refugee households had access to electricity for an average of four hours a day through a generator. Meanwhile, a survey conducted by Alianza Shire in 2023 in Hilaweyn refugee camp in Somali region found that only 2.4% of households had access to electricity [54]. This is far lower than the national averages for electricity access for rural and for urban settings in 2021 (43% and 91% respectively) [55].

The situation began to improve in 2021 when a further two sites in Afar region, Aysaita and Barhale, were connected to the grid and UNHCR began working on developing six micro-grids for the Melkadida camp cluster with support from the IKEA Foundation. More recently, in May 2024, a larger 254 kWp solar PV-based mini-grid was commissioned by Humanitarian Energy PLC and Mercy Corps in Sheder camp. In Bokolmanyo woreda, meanwhile, the federal government is constructing a 2 MW solar mini-grid for the host community and there are ongoing discussions with EEU to connect the refugee camp to this mini-grid.

Despite these initiatives, many households and most other camps remain unconnected. Where the national grid or mini-grids are not available, some organisations, such as Alianza Shire, have worked to promote the uptake of SHS and or distributed solar lanterns. Informal markets for solar off-grid systems with local retailers and installers exist in some refugee camps, however these are usually small-scale. Some private companies have considered expanding their operations into displacement settings but to date this has been very limited.

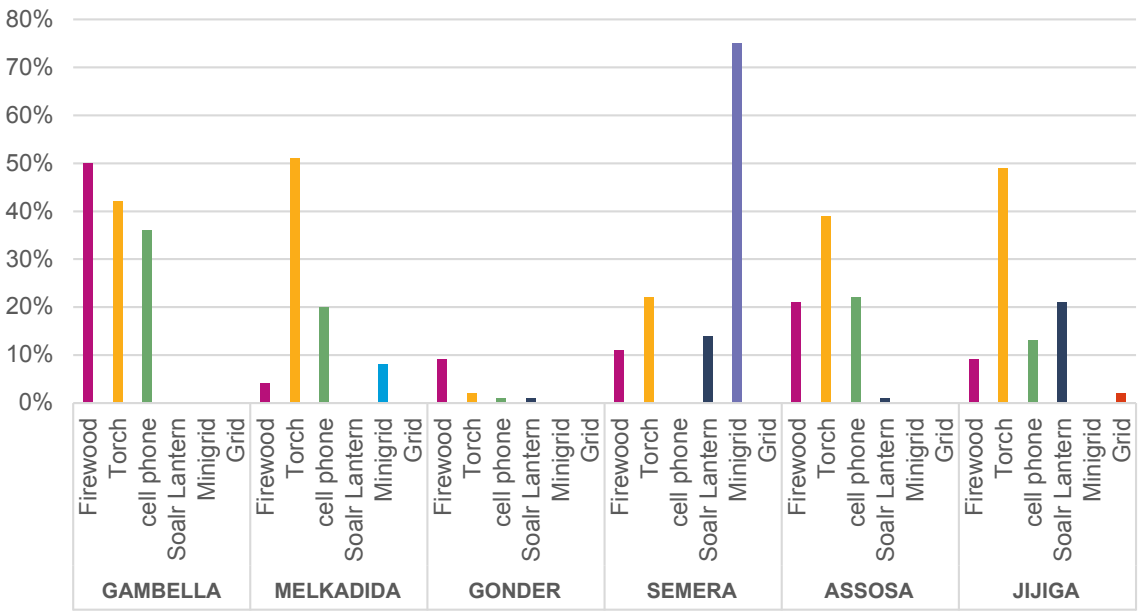
In the absence of a grid, mini-grid connection or possession of a SHS, households rely on a range of expensive and unreliable sources of lighting such as cell phones, disposable battery torches, candles, and firewood (see Figure 2) [47]. This results in low levels of electricity access overall, estimated to primarily fall under Tier 0 of the Multi-Tier Framework with few households in a small number of camps having access to Tier 1 or Tier 2 electricity (see Table 7). This varies across regions and camps: the study by IRENA found that in Sherkole refugee settlement, for example, disposable battery torches were by far the most common source of lighting at night for refugee households (72%), followed by generators (13%), solar (10%), firewood (10%), and candles (1%) [56]. In some areas off-grid solar solutions are more prevalent: in Hilaweyn camp, 50% of households were found to have access to a solar lantern, 17% to a SHS, with a further 33% relying on a diesel generator [54]. In Semera region, the majority of refugees have access to a mini-grid connection and solar lanterns are also more prevalent than in other regions [47].

Paying for lighting sources can represent a significant household expense in relation to income in many refugee camps in Ethiopia. Households in Hilaweyn, for example, paid an average of almost $12 per month for battery charging, 17% of their total monthly spend [54]. A respondent in a study in 2021 [57] in Hitsats camp expressed their ››

Electricity access for households

FIGURE 2

Sources of household lighting in selected regions [47].



frustration: “I rent light from persons that have generators in this area and pay 150 ETB ($2.50) monthly. I am tired of this question; we are talking many times about this problem; there are no changes in the case of electricity compared to the last three years. It is the same as before. We collect petitions and send it to the concerned body, but nothing is changed so far except the promises they gave us. It is the number one problem of refugees in this area”.

Host communities also face challenges in accessing electricity. Only 57% of households have access to a source of electricity, with 33% connected to the grid and 24% relying on off-grid solutions [47]. Blackouts are frequent, with 58% of grid-connected households facing 4-14 disruptions each week; only one fifth of electrified households reported having electricity for 23 hours a day, and 50% said they had electricity for 8 hours per day. Households reported spending relatively little – less than 5% of their total expenditure – on electricity from the grid. The average grid-connected household consumes 120 kWh per month and has been connected to the grid for 11 years.

By contrast, most households which use solar products had purchased them within the last three years. Only 30% of grid-connected households had purchased medium- or high-load appliances, such as refrigerators and washing machines, and 16% reported voltage issues which had damaged their appliances. Almost all (97%) households reported being willing to pay for a grid connection and 80% to pay for a SHS which could power a television (TV). Despite a willingness to connect to the grid, 38% of unelectrified households reported administrative barriers, delays or refusal in obtaining a connection as the reason they are not yet connected. ››

Electricity access for households

TABLE 7

Percentage of households in selected regions and refugee camps with access to each Tier of electricity access under the Multi-Tier Framework (%). No camps reported households with access to Tier 3 or above [47].

OFFICE	REFUGEE CAMP	TIER 0	TIER 1	TIER 2
ASSOSA	BAMBASSI	100	-	-
	SHERKOLE	93	7	-
	TSORE	100	-	-
CO	ADDIS ABABA	-	5	95
	BORENA	100	-	-
	SOUTH OMO	100	-	-
GONDAR	ALEMWACH	100	-	-
	METEMA	100	-	-
	JEWI	99.4	0.6	-
GAMBELLA	KULE	99.4	0.6	-
	NGUENYIEL	98.8	1.2	-
	OKUNGO	98.5	1.5	-
	PINYUDO	95.4	4.6	-
	PINYUDO 2	87.2	12.8	-
	TIERKIDI	99.4	4.6	-
JIJIGA	AW-BARRE	98	2	-
	KEBRIBEYAH	99	1	-
	SHEDER	98.5	1.5	-
MELKADIDA	BOKOLMANYO	90	10	-
	BURAMINO	93.3	6.7	-
	DOLLO ADO	No data		
	HILAWEYN	93.7	6.3	-
	KOBE	91.7	8.3	-
	MELKADIDA	92.6	7.4	-
SEMERA	AYSAITA	-	-	100
	BARAHLE	-	-	100
	SERDO	No data		
TIGRAY	ADI-HARUSH	No data		
	ENDABAGUNA RC	No data		
	MAI-AINI	No data		
	TIGRAY-OCP	No data		

Barriers to electricity access

AVAILABILITY BARRIERS

Most refugee camps in Ethiopia remain unconnected to the national grid, despite expansion efforts, and the establishment of mini-grids has been limited to a small number of camps. Diesel generators, disposable battery-powered torches, kerosene lamps, and candles fill the gap as less sustainable and reliable sources of electricity and lighting. Increasingly, solar off-grid solutions are becoming more widespread. There are challenges associated with these as many of the products available in refugee settings are often low quality and were distributed for free, which can cause market distortions. Due to a lack of repair and maintenance services, these products often break and are disposed of improperly.

There is very limited engagement of private sector energy companies in refugee camps. Even though Ethiopia is considered the second largest market for off-grid solar products, and there are a variety of high-quality products available elsewhere in the country, these companies typically do not operate in displacement settings. Limited awareness among private companies of the potential opportunities and the lack of a supportive enabling environment hinder the establishment of market-based models. This perpetuates reliance on grant funding and sporadic foreign currency availability for electricity access projects.

These issues are compounded by unclear or lengthy authorisation processes. Experience from the Sheder mini-grid, for example, highlighted that one of the greatest challenges during its establishment was navigating the complex regulatory environment to acquire a license. Limited access to refugee camps and stringent requirements around approvals and permits to work in them slow down the operations of private companies, as well as discouraging the entry of new players.

OPPORTUNITIES

The development of mini-grids offers the opportunity to significantly expand access to reliable electricity for displacement-affected communities. There have been several examples in recent years in Somali region, such as the work by Alianza Shire to support access to SHS in Dollo Ado which has also been instrumental to improving access to electricity. Mini-grid systems can make electricity available to large numbers of households, or even entire communities, depending on their size and range of their distribution networks.

These systems can also be designed to provide different levels of availability and support different kinds of services, from basic access to lighting and phone charging (improving on the present low-Tier access) to higher-power applications which could provide a viable alternative to the national grid in areas designated for off-grid access under the NEP. Complementing the expansion of mini-grid systems, measures to support off-grid solar companies to establish operations in displacement settings could increase the availability of these products for households which do not have access to a mini-grid or grid connection.

Showcasing the business opportunities for the private sector to address the lack of electricity access in refugee camps, supported by the establishment of a more solid evidence base on the energy needs, is crucial to catalysing greater investment in displacement settings. Investing in energy-related enterprises (both for large companies and local businesses) can build markets for energy products and services, create jobs, and provide new income-generating opportunities in displacement settings.

Government commitment and support for energy access initiatives, including the establishment of a clear regulatory framework and supportive enabling environment, are crucial to encourage further development of mini-grids and SHS interventions. Streamlining licensing and permitting procedures, along with providing clear guidance frameworks, would simplify the process for other companies to establish operations in displacement settings. This would attract increased private-sector investment and expedite project implementation. Future interventions and resource mobilisation should be anchored in national development plans to enable synergies and ensure their alignment with broader strategies. ››

Barriers to electricity access

Building the capacity of local technicians, engineers and entrepreneurs can support the planning, implementation, and maintenance of interventions that make electricity access more widely available. This can, in turn, create further employment opportunities. Certified trainings and the opportunity to obtain qualifications should be promoted alongside the establishment of hubs for trained technicians to provide basic repair and maintenance services. After-sales support and warranties for products are fundamental to increasing the sustainability of products and companies should be required to provide such guarantees. In addition, development organisations and companies themselves can play an important role in ensuring a regular supply of off-grid solar products and their spare parts.

AFFORDABILITY BARRIERS

People living in displacement settings often have limited purchasing power so the costs of electricity access can be prohibitive. Whilst data on this expenditure is scarce, it varies between technologies and locations: grid-connected host community households have been found to spend less than 5% of their monthly outgoings on electricity, for example, compared to 17% for households in Hilaweyn camp on battery charging alone. These high and recurring payments can make electricity access unaffordable to displaced people, especially considering that lower-Tier sources of lighting provide lower-quality services at relatively high costs.

Ethiopia's national grid tariffs are amongst the lowest in the world and provide power at affordable rates, but it is usually not available in displacement settings. Mini-grids, on the other hand, charge cost-reflective rates that align with global benchmarks and also can entail high initial connection costs. In areas where it is not possible to obtain a connection, meanwhile, solar off-grid products can present a cost-effective solution but their own high upfront costs often prevent their uptake. A lack of access to financial support means that many displaced and host community households cannot afford to invest in higher quality electricity solutions, even if they would allow them to save money in the long-run.

OPPORTUNITIES

All electricity access interventions should ensure that their solutions are designed to be affordable for households. As a core component of this, organisations should proactively support community members in meeting the KYC, ID and residency requirements to gain access to financial services, as well as advocating for simplified processes for refugees to access finance to meet the initial costs and ongoing expenses of electricity services.

For mini-grid projects, it is crucial to design tariff structures that are affordable and inclusive of displaced communities. This should be done in consultation with the local authorities and community representatives and could be implemented through a cooperative model, as has been done in some settings. The tariff structures should also include provisions for households with specific vulnerabilities.

Paying in instalments and flexible repayment mechanisms for SHS or solar lanterns, meanwhile, can also play a role in making these products more affordable. Additionally, exploring supply-side financing mechanisms such as subsidies, RBF schemes, concessional financing, and crowdfunding can reduce costs for companies and thereby make energy services more affordable for their customers. Finally, promoting innovative technologies such as energy-efficient appliances could help to support lower-cost electricity access for similar or greater levels of service.

ACCEPTABILITY BARRIERS

Anecdotal evidence suggests that the prevalence of poor quality solar off-grid products erodes consumer trust and hinders efforts to promote higher-quality products. Furthermore, these lower-quality solar products and other energy services have, in many instances, been distributed for free by humanitarian organisations which can perpetuate expectations and decrease the willingness to pay for similar or higher-quality products in the future. A lack of adequate after-sales services exacerbates this issue, leading to many products being discarded once they break and generating e-waste. In addition, people living in displacement settings may not be familiar with the benefits, cost-effectiveness, and proper ››

Barriers to electricity access

usage of off-grid solar products, and therefore may be unwilling to invest in them.

OPPORTUNITIES

To increase confidence and avoid market spoilage, minimum standards for solar off-grid products such as those outlined by VeraSol must be enforced and system components such as lights, solar panels, and batteries should be labeled and include technical specifications [47]. Products should be sold with warranties and companies should be required to provide after-sales assistance and supported to meet this additional cost. This could require setting up servicing and repair locations in displacement settings that are endorsed by energy companies to provide local and easily accessible maintenance or replacement products.

At the national level, Ethiopia applies 15% value-added tax and 3% withholding tax on solar PV products [47]. Simplifying the process and revising taxation and import duties could help to support the dissemination of high-quality solar lanterns and SHS, and their spare parts, which could both increase affordability and address the spread of low-quality products.

Awareness raising campaigns for the benefits of off-grid solar products compared to other forms of lighting, along with cost-value comparisons, could further support the uptake of such products. Media companies could support with advertising for the products and community leaders could be engaged as product ambassadors.

BARRIER	OPPORTUNITY
Only a small number of camps are connected to the national grid or to a mini-grid	Expand the grid in planned areas and invest in new mini-grid systems
Off-grid solar products have high upfront costs which are too expensive for many households	Instalment payments, flexible repayment mechanisms and PayGo systems
	RBF schemes for companies and end-user subsidies
Poor quality of some solar lanterns and low levels of consumer trust	Strict enforcement of standards and inclusion of warranties
	Expansion of repair and maintenance services
High fuel costs and safety concerns due to poor connections of unregulated private electricity providers	Grant funding and technical support to access higher quality generators and improve wiring, introduction of metering devices
	Promote development of solar-diesel mini-grids meeting minimum standards, provide operator training, use phased grants to ensure the quality of electricity provision
Lack of qualified local technicians and spare parts	Training of a pool of technicians and establishment of repair centres
	Supply chain development support for spare parts and tools
Limited engagement of private sector in displacement settings	RBF schemes, easier access to credit, and other incentives to start and expand operations
Lack of access to foreign currencies for private companies to invest in new operations	New foreign exchange regime and reformed regulations for financial institutions

Energy access for livelihoods and productive uses

Ethiopia offers a relatively welcoming environment for displaced people to have jobs, run businesses, and access other livelihoods opportunities. Electricity can play a part in this by providing lighting for shops and marketplaces, supporting key services such as phone charging and refrigeration, and powering equipment and machinery to offer new opportunities for businesses. Energy for cooking, meanwhile, can support food service businesses such as restaurants to grow or to transition to cleaner, more efficient stoves and fuels to increase revenues and decrease the harmful effects of traditional cooking methods.

There are, however, significant variations in the types of livelihoods that members of displaced and host communities have and these vary between different regions and communities. A report published by GIZ in 2022 explored PUE opportunities in displacement settings in Gambella region and found that energy-related livelihoods included private electricity distribution, phone charging stations, cutting and selling fuelwood, and using refrigerators for cold drinks [58]. It also estimated the monthly expenditures on energy of different business types which received power from diesel generators or solar power, summarised in Table 8.

The same study reported that, amongst South Sudanese refugees in Gambella in 2018, working-age men were more likely to be employed than women (27% compared to 19%) [12]. Women and girls were involved in small-scale trade, selling firewood, brewing local alcohol, and selling items from food rations; leaving the camp to collect firewood was highlighted as putting them at a greater risk of experiencing SGBV. It also stated that energy-related livelihoods with the highest potential in the region include briquette and stove production and sales, solar-powered phone charging, hair cutting services, and refrigeration for selling cold drinks.

Interventions to support access to energy to facilitate productive livelihoods have a long history in Ethiopia. The EnDev Partnership Pro- ››

TABLE 8

The electricity sources, services offered, and estimated monthly expenditure of energy-related businesses in refugee camps in Gambella in 2022 [58].

POWER SOURCE	SERVICE OFFERED	MONTHLY EXPENDITURE	
		ETB	EUR
GENERATOR	LIGHTING	250	4.50
	REFRIGERATION	2,400-2,500	44-46
	ENTERTAINMENT	1,800	33
	SEWING	1,300	24
	HAIR CUTTING	1,800	33
	PHONE CHARGING	1,800-2,400	33-44
SMALL-SCALE SOLAR PV	PHONE CHARGING (PER CHARGE)	10	0.2
	SOLDERING (ELECTRONICS MAINTENANCE)	Depends on service	
GENERATOR FOR AGRO-PROCESSING	GRAIN MILLING (PER KG)	1	0.02

Energy access for livelihoods and productive uses

gramme, for example, with GIZ as its lead implementer, has operated in the country since 2006. The programme has supported more than 800 small-scale producers to make energy-efficient cookstoves [59]. Operating in 330 districts in seven regions across the country, these producers are estimated to have supplied almost 1.2 million stoves which cumulatively save 370,000 tonnes of fuelwood per year.

More recently, the EnDev Programme implemented the IKEA Foundation-funded Sustainable Energy for Smallholder Farmers in Ethiopia, Kenya and Uganda (SEFFA) project which aimed to increase access to PUE [60]. Focusing on the Amhara, SNNP, Oromia and Sidama regions in Ethiopia, and not in displacement settings specifically, its baseline market assessment in 2021 found that solar-powered irrigation was the most common form of PUE in use at the time. It also found that solar irrigation features a diverse range of products but the main customer base was composed of donors and NGOs, which purchase systems and distribute them to farmers under heavy subsidies, rather than the end-users themselves. Crop processing and cold storage, meanwhile, are rare. The SEFFA project found that increasing the uptake of PUE technologies is hampered by low awareness, high upfront costs, and low confidence in technical support. Its market assessment recommended commercial pilots for solar irrigation for horticulture as well as cooling for dairies through a cooperative model.

Focusing on displacement settings, some programmes have aimed to increase access to energy for livelihoods through communal models. From 2018 the Alianza Shire project scaled up in its second phase to reach four camps in Shire, aiming to benefit 40,000 people across the refugee and host communities, including a focus on extending the national grid to businesses and community facilities [37]. Businesses were also supported through a market-based model to distribute and maintain 1,700 SHS. During this second phase, however, the COVID-19 pandemic and the conflict in Tigray forced the suspension of project activities and their transfer to Dollo Ado.

Other programmes have supported community members in forming cooperatives to run income-generating activities. The Brighter Lives for Refugees campaign, which ran in Dollo Ado from 2014-17 and was funded by the IKEA Foundation, established five cooperatives for electricity provision with 12-21 members each [37]. The cooperatives were able to rely on several income streams including maintaining the project's solar mini-grids, streetlights, and SHS. Using power from solar mini-grids, the cooperatives sold electricity based on the appliances used by the customer – 50 ETB ($1) per month for a lightbulb and 2,000 ETB ($37) per month for a refrigerator, for example – with lower tariffs for vulnerable users [53]. UNHCR provided upfront capital to procure the SHS for the cooperatives with after-sales maintenance paid for by households, and a community fund was set up for streetlights with each household contributing 2 ETB ($0.04) per month. An assessment in 2020 [11] found that two mini-grid cooperatives (in Bokolmanyo and Buramino) had transitioned to self-reliance, whilst the others (in Melkadida, Kobe, and Hilaweyn) were not yet able to bring in sufficient income to sustain themselves.

The campaign also supported five cooperatives to source firewood for cooking from the invasive *Prosopis juliflora* tree; these originally had 70-80 members, though some left over time [37]. The cooperatives sold wood and converted it into charcoal briquettes for household use but had varying levels of success: they suffered from issues such as a limited supply of *Prosopis*, poor quality machinery, and low demand for their product. Four of the *Prosopis* cooperatives had their own diesel generators to run equipment, whilst the other shared one with the nearby UNHCR office.

Cooperative models have also been used to support irrigation systems for agriculture. In 2022, UNHCR was supported by the IKEA Foundation to establish a 56 kW solar water pumping system in Melkadida [53]. Two pumps supply an irrigation system for 90 individual farming plots and the system is run by an agricultural cooperative ››

Energy access for livelihoods and productive uses

composed of 45 refugees and 45 host community members. Through this system, farmers were able to increase the quality of their produce and lower their operating costs compared to the previous diesel-powered system. The cooperative, meanwhile, collects a monthly fee from members to cover O&M costs and the salaries of two technicians, one each from the refugee and host communities. The irrigation system operates for four hours every second day and pumps 3,600 litres per hour from the nearby river to serve 45 hectares of farmland.

The private sector solar mini-grid in Sheder, implemented by Humanitarian Energy PLC, also supports PUE activities. In partnership with Mercy Corps, a PUE hub was established in the camp to support local businesses: following a public call for interest, 14 businesses were selected to receive technical assistance and expand their operations through access to electricity from the mini-grid system.

As well as using energy to support income-generating activities, some displaced people operate small diesel generators and sell power to their local communities as a business in itself. A report by IRENA in 2019 found that refugees in Tsore, Benishangul-Gumuz, sold power from private generator networks to households and businesses for a fixed amount and that 14% of respondents to its household survey received power from these connections [56]. The supply was sufficient to power lighting and charge mobile phones, radios, and torches, with the average cost of electricity being 145 ETB (around $5) per month.

Finally, whilst most income-generating activities which use energy have typically relied on electricity from diesel generators or, more recently, solar, some have begun to use other technologies. In 2021 in Melkadida the IKEA Foundation supported UNHCR to establish a biogas digester to convert waste from a slaughterhouse and school toilet block into biogas for cooking [53]. A cooperative composed of 12 refugee and host community members manages the system and uses the biogas to cook prepared meals sold in the local marketplace. The system provides an income of around $290 per month, enough to maintain the system and allow it to save for future investments. ››

> This electricity has really improved life. We now have light at night, which helps my children to be able to study and do homework, and we can use it to charge our cell phones and fans. I've also been able to help my neighbours when they need electricity.
>
> – Female mini-grid customer, Buramino camp [61]

Barriers to energy for livelihoods and productive uses

AVAILABILITY BARRIERS

The lack of availability of energy for livelihoods is one of the biggest barriers to PUE. Whilst information on this topic is scarce, across displacement settings in Ethiopia there are several successful examples of the use of sustainable energy for income generation. Some programmes have been successful in establishing community-based models to provide energy for businesses, such as the cooperatives established under the Brighter Lives for Refugees campaign, but these have relied heavily on external support from organisations rather than locally-driven market-based models. Other projects, such as the SHS distribution in Dollo Ado by Alianza Shire, also relied on grant funding to increase the availability of basic energy technologies. Meanwhile PUE appliances, such as machinery and refrigerators, have been found to be uncommon in markets in displacement settings and likely would also require the support of external organisations.

There are some examples of electricity businesses which sell power within their communities but these are not widely reported and their reach appears limited. Some rely on diesel generators to supply power, such as those in Tsore, whilst others provide electricity from solar, such as in Gambella; under either modality, the availability of electricity for businesses remains limited by the reach of these locally-operated networks.

OPPORTUNITIES

The present lack of energy for livelihoods offers many opportunities to scale up sustainable energy to support businesses. Engaging with present electricity distributors, many of which rely on diesel generators, could support them in transitioning to sustainable power through the use of solar panels and batteries to reduce their costs and greenhouse gas emissions whilst retaining their business knowledge and experience in running local electricity networks. Additional funding could be used to expand their distribution networks to reach a wider geographical area and increase their customer base.

A separate model could be used to support SHS for individual businesses, as was implemented by the Alianza Shire programme in Dollo Ado. These small-scale solar systems could provide lighting, phone charging, entertainment, and other services for small businesses to increase their revenue, allow operations in the evening, or offer new amenities to their customers. This could rapidly scale up access to modest levels of electricity for PUE and also provide opportunities for local distributors, technicians, and sales staff to support the distribution of the SHS. This would likely need to be supported through the development and strengthening of supply chains, for example through market development activities and bulk warehousing, especially for less common products such as PUE appliances.

Whilst the cooperative models have had mixed fortunes, especially those selling cooking fuels, this community-based approach could be further utilised to scale up the availability of energy for income generation. Community cooperatives can provide a centralised coordination body for external organisations, such as NGOs, to implement larger-scale projects to support PUE for more complex or expensive pieces of equipment, such as briquette-making machines. Further development of the cooperative model would likely be necessary for each displacement context to accommodate the specific needs and concerns of the communities. ››

Barriers to energy for livelihoods and productive uses

AFFORDABILITY BARRIERS

High costs can be a prohibitive factor for entrepreneurs accessing energy for productive uses: this can limit profitability for existing businesses and inhibit the establishment of new ones. The prices of diesel and solar energy used for services in Gambella, shown in Table 8, are much higher than they would be for the national grid which can stifle businesses from growing and offering new services.

Purchasing renewable energy technologies, PUE appliances, or equipment such as briquetting machines can also represent an insurmountable expense for entrepreneurs and cooperatives without external support. This is compounded by a lack of access to financing, particularly for refugees who may face challenges to formally establish businesses, and the limited ability to make larger purchases on credit and repay the costs over time. Companies which supply this equipment face similar challenges which prevent them from buying stock, whilst any equipment that must be imported is also subject to challenges related to accessing foreign currency. These expenses are exacerbated by the costs of shipping to remote areas and intermediaries between manufacturers or importers and the final customer.

OPPORTUNITIES

Sustainable energy presents an opportunity to reduce electricity prices. Transitioning from diesel generators to solar power can avoid ongoing fuel costs and these savings could be passed on to business customers as lower tariffs. Scaling up the number of electricity companies, or providing alternative sources of power such as SHS, could also increase competition amongst electricity providers which could drive down prices for consumers.

This is dependent, however, on businesses or cooperatives' ability to afford the high upfront costs of renewable energy technologies (especially for electricity businesses) and PUE appliances. Subsidies could be used to lower the costs of energy technologies and appliances and could be implemented through supply-side RBF schemes. Long-term demand-side financing options through MFIs, NGOs, community savings groups, or offered by suppliers themselves could allow customers to make smaller recurring payments more compatible with their income streams. These could include instalment payments or flexible financing through which customers could repay more or less at different times to accommodate unpredictable income streams or varying remittances. This would, however, require an organisation to cover the initial costs – and take on the associated risk – to support businesses in accessing this equipment.

ACCEPTABILITY BARRIERS

Most PUE applications in displacement settings are not affected by the source of electricity – for example diesel or solar – as long as the power is reliable and affordable.

Research under the SEFFA project found that solar irrigation technologies are relatively well known but other PUE appliances suffer from low awareness and low confidence in the ability to receive technical support. This could inhibit market-based approaches if customers are unwilling to take a risk on new and expensive PUE appliances which they do not yet trust.

Models using different types of energy sources have been implemented around the country, including biogas digesters which use waste ››

Barriers to energy for livelihoods and productive uses

to generate cooking gas to sell prepared meals in Melkadida; whilst this was accepted by the community in this case, consultations may be required for other communities to accommodate potential cultural aversions to the use of such technologies.

OPPORTUNITIES

Conducting market research and engaging with communities is a necessary step towards understanding the needs of businesses and the type of energy and PUE appliances that could provide benefits. This should be paired with awareness-raising campaigns, to highlight the advantages of sustainable energy and PUE appliances, as well as appliance training and business mentorship schemes to ensure that users know how to use their new equipment most effectively and entrepreneurs receive wider support for their operations. Investing in local consultations and codesigning interventions, especially those that involve cooperative models, are critical to ensure that programmes provide the greatest benefits to businesses and will continue to support livelihoods opportunities in the long term.

BARRIER	OPPORTUNITY
PUE appliances are uncommon in markets in displacement settings	Support market entry for appliance companies and use community cooperatives to support larger pieces of equipment
Low awareness of, and confidence in, PUE appliances	Conduct market research alongside awareness raising and training activities
Businesses far from distribution networks cannot access power	Fund expansions in distribution networks of grid and mini-grid systems alongside transitions from diesel to solar power
High costs of electricity and expensive equipment	Transition from diesel to solar power, increase options for electricity provision, and offer long-term financing schemes
Community-based models have been reliant on support from external organisations	Leverage community-based models by providing support and investing in training
	Support distributed electricity such as through SHS

Energy Access in Displacement Settings in Tigray Regional State

The Tigray Region is home to 6.5 million people, predominantly reliant on agriculture, who were in the peak harvesting season when conflict erupted in November 2020. For the next two years the conflict – which ranked among the deadliest in recent history [62] – gained global prominence due to widespread accusations of war crimes, human rights violations, sexual violence, and ethnic cleansing in Tigray. It resulted in the displacement of thousands of people across the Sudanese border and internally displacing an additional 2.5 million people within Ethiopia in 2021.

Before the outbreak of the conflict in Tigray, 96,223 Eritrean refugees resided in four refugee camps: Mai Aini, Adi Harush, Shimelba, and Hitsats. When the war began approximately 24,000 Eritrean refugees in the region experienced a surge in violence, intimidation, and harassment. Aid was rendered inaccessible and refugees' access to essential resources such as food, water, shelter, and medical care was compromised. To address this, RRS and UNHCR relocated thousands of Eritrean refugees from Tigray to the Amhara region to ensure their safety.

The formal conclusion of the war in November 2022 left a significant portion of Tigray's population remaining internally displaced. Millions sought refuge in temporary IDP camps and communal facilities such as shelters, schools, clinics, health centres, administrative buildings, and other structures.

In Mekelle, the capital city of the Tigray region, and Enderta, the woreda which surrounds the city, data from Mekelle Office of Labor and Social Affairs found that 54,423 households (around 234,400 people) resettled in 11 IDP sites, while 2,086 households (6,340 people) live within the host communities [26]. Among these households, 45% are headed by females and 2% are led by children. Most IDPs in Mekelle are from other areas of the region including the Western (35% of people), Central (31%) and Southern and Eastern (19%), and Northwestern (14%) zones of Tigray, as well as those from other areas of the country.

The displaced populations in these areas face urgent humanitarian needs, particularly in terms of access to food and energy resources. Many IDPs resort to adverse coping mechanisms including skipping meals and selling household assets such as wedding rings. Other negative coping mechanisms include subjecting children to labour, meaning that they are unable to attend school, and adults engaging in commercial sex work.

This case study examines energy consumption patterns, challenges, and safety considerations in Mekelle. The READS Programme conducted 29 semi-structured interviews with IDPs living in Seba Kare IDP camp, in the outskirts of Mekelle around five kilometres to the west, as well as in Mai-Weini and Adi-Haki communal building IDP sites in Mekelle. Additional interviews were conducted with camp managers, NGO staff members, and IDP representatives.

The levels and types of energy access vary depending on the living situations of IDPs. Those residing in communal buildings such as schools, health centres, government shelters, and other similar premises generally have access to the national grid that was already in place before their arrival. On the other hand, IDPs living in camps typically lack access to the grid network and rely on solar power for lighting, as well as firewood and charcoal for cooking. This study aims to shed light on these situations, as well as the perspectives of the people involved, to better understand the underreported issues facing IDPs in Tigray. ››

Energy Access in Displacement Settings in Tigray Regional State

Energy for lighting in households

Humanitarian efforts in the Tigray Region often overlook the energy needs of refugees and displaced individuals: providing essentials like food, water, and shelter are prioritised, meaning that basic energy needs go unmet.

One respondent shared:

> "It's unbelievable that the entire IDP community in the camp lives in darkness, relying solely on solar energy for lighting. Despite the presence of numerous NGOs in the camp, none seem to be actively working to address this issue."

Another respondent echoed the sentiment:

> "We reside in an IDP camp on the outskirts of the regional capital city. Surprisingly, we live in darkness, relying solely on insufficient solar energy for lighting."

IDP residents of the communal school buildings have access to the national grid for lighting: these households generally experience a more stable supply of electricity, ensuring better lighting conditions compared to those reliant on solar power. Even though the electricity supply is fairly reliable, power outages still occur, leading IDPs to resort to solar lanterns and dry-cell torches as alternative energy sources during power outages to meet their lighting needs in shared rooms. There are also other safety hazards associated with malfunctioning wiring.

An IDP resident living in the communal school building said:

> "My household is fortunate to have found refuge in a school, where we use the existing electricity supply and electric bulbs for our lighting needs. The existing wiring in our shared room is malfunctioning, so we've resorted to using suspended wires that are exposed and vulnerable, posing a significant risk to my children's safety. Additionally, most of the sockets are damaged, and I fear that my children might catch the exposed and damaged wiring. Urgent maintenance is required for the electrical wiring, and the sockets need to be replaced to reduce the potential risk. Currently, a volunteer who is internally displaced and skilled in electrical maintenance is helping us repair the wires. However, due to budget constraints, the maintenance is not satisfactory; it's merely a temporary solution."

Unlike their counterparts residing in communal buildings, those who live in tarpaulin shelters in IDP camps are not connected to the national grid. They rely entirely on solar lanterns which are often insufficient to meet their lighting needs.

A respondent shared the some of the challenges:

> "It is astonishing that we live in darkness, relying on insufficient solar energy for lighting and sometimes my household uses kerosene as an alternative lighting source. In my household, we own a mobile phone which needs an electric charge. We charge the mobile phone using a privately owned generator in the camp for 10 ETB ($0.18) per phone because it's our lifeline. I have a critical safety concern related to lighting using a kerosene lamp. We are living in an IDP camp shelter constructed of tarpaulin, and the kerosene lamp poses potential dangers of fire as well as health issues with our respiratory system. We are always cautious, placing the kerosene lamp away from direct contact with the tarpaulin to prevent severe fires. Moreover, we don't have streetlights, which makes our lives even more challenging. Accessing communal toilets during nighttime requires courage due to the potential for assault and gender-based violence. […] During nighttime, we usually move together in a group to access the communal toilets to minimise the potential for assault."

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Energy Access in Displacement Settings in Tigray Regional State

Although IDPs do not pay to access to the national grid, they still have high expenses for purchasing and maintaining lighting products. Higher-capacity solar lanterns are available in the market but their high costs render them unaffordable for many. In some cases, IDPs resort to using rechargeable portable LED lighting devices and rechargeable flashlights which require charging through privately owned generators at an additional cost. Some households use kerosene lamps as an alternative lighting source, especially in foggy conditions when solar devices may not have stored sufficient energy for nighttime usage. However, kerosene and candles are costly and pose potential fire hazards and health risks. ››

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It's unbelievable that the entire IDP community in the camp lives in darkness... Despite the presence of numerous NGOs in the camp, none seem to be actively working to address this issue. – Resident of an IDP camp

Energy Access in Displacement Settings in Tigray Regional State

Energy for cooking in households

Access to cooking energy differs greatly between IDPs living in communal buildings and those living in camps. IDPs residing in communal buildings predominantly use electric stoves for cooking but, during power outages, and as part of a daily ritual when brewing coffee, they use charcoal.

In a shared kitchen of an IDP site, a communal electric stove is used for baking injera. There is a schedule for each household to use it which is overseen by either the site manager or a designated representative. Each household takes turns and typically uses the kitchen twice a week to bake injera, a task predominantly undertaken by women.

The local market provides a diverse array of electric stoves offering different options, sizes, and capacities. Despite the upfront costs associated with both imported and locally-made electric stoves, people in the community generally prefer them due to their time-saving attributes, cost-effectiveness compared to charcoal, and user-friendly nature.

An IDP respondent shared,

> "For cooking, I primarily use locally-made electric stoves due to their affordability and durability. However, as a daily ritual and tradition, I rely on charcoal for making coffee. Additionally, during power outages, charcoal becomes the sole alternative for cooking meals. In the communal kitchen of the camp, I use communal electric stoves to bake injera according to the schedule provided by the camp manager. Unfortunately, these communal stoves often sustain damage from heavy usage, requiring repair. It takes time for the IDP community to gather contributions for maintenance, resulting in a shortage of communal stoves."

In the IDP camp where electricity is not available, the situation is very different. Households rely solely on firewood and charcoal for cooking which poses great challenges: cooking energy needs were found to be the second most pressing issue for the IDP community, after the need for food assistance.

The primary cooking method is using a three-stone fire, fuelled by twigs and animal dung, to prepare meals for the entire family. The preparation of injera, a staple food, involves the use of firewood in a traditional injera stove known as a *mogogo*. Crafted by the residents using stones and mud with a handmade circular griddle, this method of baking uses firewood and is time-consuming. Some households use a locally-made portable circular metal stove known as a *moqlo-hatsin*. They also use a locally crafted rectangular metal stove called *fernelo* specifically for charcoal-based cooking and preparing coffee, as the traditional morning coffee ritual requires the use of charcoal.

While the camp market offers a limited variety of firewood and charcoal, the affordability of these fuels remains a significant challenge. Residents often resort to acquiring charcoal from the remnants of firewood used during injera baking. The unavailability of these essential cooking resources in the camp market, coupled with their high costs, exacerbates the already challenging circumstances faced by those living in the IDP camp.

Since many households are unable to afford to purchase firewood from the market, they resort to the laborious task of collecting firewood from the surrounding bush. This not only exposes them to the risk of physical threats but also damages social cohesion. The land surrounding these camps is either owned by the host community or subject to stringent government regulations, making ››

Energy Access in Displacement Settings in Tigray Regional State

any attempt to collect firewood a potential act of trespass which risks imprisonment. The ensuing conflicts between camp residents and the host community over the collection of firewood have become a recurrent and escalating issue. Such disputes not only lead to arrests but also expose individuals, particularly women, to the risks of sexual violence and abuse. The repercussions extend to children, who have suffered violence, including head injuries caused by thrown stones, while attempting to gather firewood from the host community's property.

An interview respondent described the situation:

> "My nightmare is always finding firewood and charcoal, second only to seeking food aid. The burden rests on my shoulders, and the constant worry lies in the balance between sustaining our lives and sending my children to unsafe areas to collect firewood, exposing them to the associated risks of violence."

In great need of alternatives, camp residents occasionally ask the local community for access to animal dung which can serve as a substitute fuel source. This request is not always granted, however, and the absence of accessible options perpetuates their dependence on precarious means of securing firewood.

A respondent said:

> “Finding another alternative energy source for cooking, for me, is like searching for a needle lost in a haystack. My household relies solely on firewood and charcoal for cooking and baking injera.”

Electric stoves of varying sizes and capacities are readily available in the market but are often too expensive for households relying on humanitarian assistance, prompting them to sell other items to purchase a stove. The cost of a single-pan electric stove, whether imported or locally made, ranges from 600-900 ETB ($11-$16) while a two-pan stove costs 1200-3000 ETB ($21-$54) depending on its capacity. Many households opt for the more affordable one-pan electric stove due to its lower price but its lower capacity translates to longer cooking times. The upfront cost of purchasing an electric stove is often a worry for households connected to electricity, particularly those with limited financial resources, even though they do not pay for electricity consumption.

For IDP camp residents who lack access to electricity, the financial burden of firewood and charcoal is a significant component of their overall budget. Purchasing 100 kg of firewood, which lasts for around two weeks, typically costs around 800 ETB ($14.30). A medium-sized bag of charcoal, priced at approximately 900 ETB ($16), provides fuel for one month at most. Households also usually use charcoal for making coffee which costs 200 ETB ($3.57) per small bag. As no assistance is provided for acquiring firewood or charcoal, residents often resort to exchanging items, including food rations, with the host community at a reduced price. This bartering helps them cover their cooking fuel expenses as a crucial aspect of their survival strategy.

In addition there are significant challenges related to the safety of biomass cooking methods. The potentially flammable tarpaulin structures in which IDP camp residents live raise concerns about potential fire risks when cooking with firewood, twigs, animal dung, and charcoal. In contrast, people cooking with electricity are not exposed to the same fire hazards but they still face challenges related to safety due to the limited space within their dwellings. These households often share a small room with two to four other families, making it crucial to exercise caution in the kitchen to prevent accidents. While the risk of fire is minimised with electric stoves, there is the risk of accidents occuring when children touch hot stoves in the absence of dedicated cooking spaces. ››

My nightmare is always finding firewood and charcoal… The constant worry lies in the balance between sustaining our lives and sending my children to unsafe areas to collect firewood.

– IDP camp resident

Energy Access in Displacement Settings in Tigray Regional State

Business owners and operators

Businesses within the IDP camp, such as barbershops, tailors, mini-shops, restaurants, and cafés, sometimes have access to electricity from diesel generators. These enterprises would greatly benefit from increased electricity access, which could allow for expanded operating hours and enhanced services. Financial constraints present challenges, affecting and constraining fuel and generator maintenance expenditures, thereby limiting operational and working hours for businesses reliant on diesel power. Safety considerations, particularly concerning fire hazards, are also a factor in the choice of energy sources for businesses which prepare food, usually using firewood or charcoal.

In the Seba Kare IDP camp, the barbershop and four cafés are the only businesses that share a group-owned private generator, operating for approximately six hours daily. Each business contributes to the fuel, operating, and maintenance costs.

The barber explains:

> "At our camp electricity remains elusive, so my barbershop relies on a diesel generator owned by a group of business cooperatives. The heart of my trade lies in the electric barber machine, sculpting hair into my customers' desired styles. It's a lifeline for my business, given its reliance on electricity."

Businesses employ a variety of energy efficiency measures to reduce expenditure on energy. A hairdresser uses barber machines designed for low energy usage and uses alcohol to sterilise instead of energy-intensive steriliser machines. A café, meanwhile, aligns its generator usage with peak customer hours in the morning, lunchtime, and evening. The café also refrains from using tea and coffee machines, instead using firewood or charcoal and prioritising powering the television and charging customers' mobile phones.

Businesses must pay for their energy usage: the barber and the four cafés make daily cash payments for the generator to run from 7.00-13.00 which includes generator rental, diesel expenses, and maintenance costs. The constraints on business operations, stemming from the limited usage of the generator, have significantly impacted their entrepreneurial efforts.

According to the barber:

> "As the sole barber in this IDP camp, my clientele spans the entire community. However, due to the restricted operation of our generators – only six hours daily – I can only serve customers within that timeframe. The demand, however, exceeds our operational hours, leaving many customers unserved. An increase in electricity supply, preferably by extending the generator operation, is crucial for expanding my services." ››

An increase in electricity supply is crucial for expanding my services.

– Barber in Seba Kare IDP camp

Energy Access in Displacement Settings in Tigray Regional State

To overcome this constraint, a café owner in Seba Kare IDP camp personally invested in a generator after assessing the demand. Thanks to this, her business has flourished with an increased customer base.

She shared:

> "I prepare culinary delights over an open flame using firewood and charcoal, but I also use electricity from my generator. This power enhances the atmosphere, with speakers and a TV attracting customers. It serves as a magnet, drawing people who seek entertainment and a place to charge their phones. Electricity is crucial for my café's success amidst fierce competition, as it offers a unique blend of entertainment and convenience that sets us apart."

Across the IDP camp, people face energy challenges ranging from financial constraints, maintenance issues, safety concerns, and limited access to sustainable energy sources. Different groups have distinct needs but face similar hurdles, emphasising the need for holistic solutions addressing affordability, reliability, and safety in energy access within IDP camps. Collaborative efforts involving NGOs, community leaders, and governmental organisations are essential for implementing lasting solutions that improve energy access, safety, and overall quality of life in IDP camps.

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Energy access for community facilities

Access to reliable energy is critical in the provision of public services in displacement settings. Streetlights can offer an improved sense of safety and wellbeing after dark, hospitals require power to operate healthcare equipment and store medication, and electricity in schools can provide benefits such as lighting and connectivity to improve the learning environment for students.

Whilst access to sustainable energy for community facilities has been increasing in displacement settings, improvements have generally been through projects and programmes focused on specific refugee camps rather than widespread progress across the country. The Electrification Strategy for Refugees and Host Communities highlights only a handful of social institutions in refugee camps that had access to electricity as of May 2024 [47]:

- A health centre, staff residences, offices, and three communal kitchens in Sherkole camp, Assosa;
- A water pumping station in Tsore camp, Assosa;
- A health centre in Nguenyiel camp, Gambella;
- A school, health post, water supply schemes, a communal kitchen, and and a communal grinder in Aysaita camp, Semera;
- Water facilities in each of Aw-barre and Kebribeyah camps in Somali region;
- Water facilities and a high school in Sheder camp in Somali region; and
- A school, health post, and water supply schemes in Barahle camp, Semera.

To address the present lack of energy access in community facilities across the country, the Ethiopia Country Refugee Response Plan (RRP) 2024 explicitly includes increased access to sustainable energy as one of five strategic objectives [63]. It acknowledges the need to improve access to public lighting in protection-sensitive areas and it aims to scale this up to provide 40% coverage, whilst its 2022 edition highlighted the need for training refugees to maintain them [64].

Despite these overarching goals, the RRP cites only limited examples of progress made in this area. The 2022 RRP noted that the Regional Development and Protection Programme (RDPP) facilitated the connection to the national grid of Aysaita and Barahle camps in Afar region, which host refugees from Eritrea, and that extending the connection to the communal kitchens and street lighting in Barahle would be considered. It also stated that solar streetlights had been procured and would be installed in camps in Benishangul-Gumuz. While further details of planned interventions are limited, their monitoring framework includes an indicator of the percentage of community facilities (schools, health centres, and markets) which have access to sustainable energy. ››

The Ethiopia Country Refugee Response Plan explicitly includes increased access to sustainable energy as one of five strategic objectives.

Energy access for community facilities

Several other programmes have also aimed to increase access to energy for community facilities. This includes Alianza Shire which, amongst its broader energy access goals, in 2017 extended the national grid to serve a primary school, two markets, a female attention centre, and a training centre in Adi-Harush refugee camp in Shire [65]. It also installed 63 LED streetlights, providing 4 km of public lighting [66]. In 2023, Alianza Shire and UNHCR inaugurated a standalone system for two primary schools in Kobe refugee camp in Dollo Ado, Somali region, which is estimated to benefit 800 students. The system, composed of 20 kWp of solar and 9.6 kWh of battery storage, provides lighting, power outlets, overhead fans, and televisions to improve the learning environment [67].

Limited access to electricity for schools has offered opportunities for innovative solutions. The SolarSPELL initiative, implemented in several countries by Arizona State University in collaboration with local partners, provides solar-powered electronic devices (SolarSPELL "libraries") which are loaded with educational materials that users can download to their own phones or tablets using the library's local WiFi network [68]. Working with UNHCR in Ethiopia, in 2022 SolarSPELL trained 15 people to teach others how to use the devices and provided 60 libraries to schools in refugee camps in Gambella and Assosa.

Smaller-scale projects have also improved access to electricity for community services for different displaced populations. In 2022, GIZ supported the solarisation of two health centres in Nguenyiel camp, which hosts refugees from South Sudan, and Itang woreda in Gambella [69]. In the same year UNOPS partnered with the Government of Japan to improve basic services to more than 1,000 IDP returnees in East Wolega zone, Oromia region: in addition to constructing classrooms, administrative buildings, and latrines, the project also supplied solar power to support the school [70]. In 2023, UNHCR donated 75 solar streetlights to Mirqaan, a town in Somali region, with 65 installed in the refugee settlement and 10 in poorly-lit areas of the main town [71]. Whilst many of the energy requirements for community facilities are similar across regions and displaced populations, much more work is necessary to scale up the provision of sustainable energy to meet the large and growing needs.

Whilst many programmes have focused on increasing access to electricity for community facilities, several have also supported sustainable energy for clean cooking. Communal cooking facilities are uncommon in displacement settings worldwide but have shown potential in the country and are highlighted in the Multi-actor Cooking Energy Strategy for Refugees and Host Communities in Ethiopia, published in late 2022 [46]. It cites successful examples in Shire, Assosa (where 75 households use the facilities in Sherkole camp, 2.8% of the total), and Afar (300 households in each of Barahle and Aysaita, 10.4% and 8.3%) which use grid or diesel power to bake injera.

Despite representing less than 1% of the total cooking energy consumption across all settings, the Strategy projected that communal electric cooking will rise to 25% in 2027 and 40% in 2030 [46]. The same projections estimate that eventually more than 80,000 refugee and host community families will use communal electric cooking facilities and, at a cost of $50,000 per facility which meets the needs of 75 households, would require an investment of around $4.7 million. Separately, it also highlights a goal for resource mobilisation to adopt rules for modern cooking solutions in schools and health centres. ››

Barriers to energy for community facilities

AVAILABILITY BARRIERS

Whilst some programmes and organisations have been able to implement energy projects for community facilities, many barriers still exist. The availability of many energy technologies remains limited in the remote areas many displacement settings are located: in such regions core pieces of equipment such as solar panels and batteries would need to be imported and transported from major urban centres, as would people with the appropriate expertise to train local technicians. Whereas smaller-scale technologies such as SHS are commonly available across the country, community-focused equipment such as solar streetlights, for example, is not and would likely need to be purchased from international markets.

The implementation of more novel technologies, such as communal cooking facilities or educational devices such as the SolarSPELL libraries, would likely need to be guided and procured under specific programmes overseen by humanitarian or development actors rather than through market-based approaches. Extending the national grid, meanwhile, would need additional oversight of government bodies and would be dependent on the presence of local infrastructure. Alianza Shire, for example, determined that grid extension would be viable in its initial project location in Shire, but its later focus on the camps in Somali region found that grid extension would be unsuitable as the nearest infrastructure was hundreds of kilometres away.

OPPORTUNITIES

Several programmes have demonstrated that the availability of electricity within a camp or displacement setting can provide an opportunity to connect community facilities. For example, the RDPP connected Aysaita and Barahle camps to the national grid which facilitated the connection of the community facilities there. Organisations can also overcome availability barriers through the direct implementation of energy technologies: this could be through standalone systems for specific facilities (such as by GIZ for health centres in Nguenyiel camp) or through grid extension where possible (as the Alianza Shire programme did by extending the grid to Adi-Harush).

Furthermore, organisations can increase the availability of communal uses of sustainable energy which have been implemented in other displacement settings. The RRP has a target for public lighting to cover 40% of protection-sensitive areas, for example, which could provide political support to increase the availability of such technologies. Communal cooking facilities, meanwhile, have been implemented on a small scale and support from the Multi-actor Cooking Energy Strategy could help to roll these out to reach the Strategy's bold projections.

AFFORDABILITY BARRIERS

Large-scale sustainable energy systems, such as those required for community facilities, are inherently more expensive than for individual households. For organisations, these high capital costs form a barrier to accessing sustainable energy as most lack the resources or access to long-term financing to make large investments. Even if such initial costs could be overcome, the costs of O&M and replacement equipment would present a further barrier to implementation.

Most social institutions do not have dedicated budget lines for electricity: this can prevent them from connecting to private sector-operated systems, for example, which would require regular payments for power. As budgets are shrinking for humanitarian agencies, meanwhile, ensuring funds for electricity is increasingly challenging and could lead to services being cut. ››

Barriers to energy for community facilities

OPPORTUNITIES

Traditional donation-based models are likely the most viable pathway to overcome the affordability barriers for community facilities. These could provide the capital for, or direct donation of, renewable energy equipment such as solar standalone systems or solar streetlights as demonstrated by previous projects. Alongside funding for equipment and installation in the early stages of a project, it is essential to budget for staff training and O&M costs to cover ongoing operations, repairs, and spare parts to ensure the system remains operational in the long term. Community cooperative models, which have demonstrated viability, could provide a mechanism for long-term ownership and continued O&M of such systems. This would need to be addressed sensitively as many community members may not be able to contribute additional funds to support essential services, such as education or healthcare, which otherwise may be free of charge.

ACCEPTABILITY BARRIERS

Whilst the provision of sustainable electricity for community facilities generally does not have issues related to community acceptance, some other applications, particularly related to cooking energy, might not be as widely accepted. Communal cooking facilities can be perceived negatively compared to stoves for individual households as the former may restrict users to cooking at predefined times, using specific fuels or stoves, having less control over their cooking resources, or being wary of the potential for theft. Electric cooking, meanwhile, can be unfamiliar to users and its suitability and acceptance can depend strongly on the types of food being prepared.

Whilst the acceptability of electricity services themselves does not typically cause issues, the systems of paying for them can introduce problems. Maintaining regular payments, especially for funding-constrained social institutions, can be difficult and some could use their political or social leverage to delay or halt payments after being connected. This is exacerbated by a lack of tested management and service delivery models for community facilities for new projects to replicate. Some companies are hesitant to serve social institutions unless they can provide a clear willingness and ability to pay, either from their own resources or those of humanitarian partners, as disconnecting them can be challenging as it may result in social tensions or undermine the wider sustainability of their commercial operations.

OPPORTUNITIES

Despite these barriers, communal electric cooking has been implemented in Shire as well as Sherkole, Barahle and Aysaita camps. Whilst estimated to reach only up to around 10% of households in those camps, the projected rise in communal electric cooking could offer an opportu- ››

Alongside funding for equipment, it is essential to budget for staff training and O&M costs to cover ongoing operations, repairs, and replacement parts.

Barriers to energy for community facilities

nity for sustainable energy as, at present, these facilities are powered by diesel or the national grid. As electric cooking typically requires careful system design if powered by renewable energy, to overcome challenges such as the high power requirements and times of cooking demand in the evening compared to electricity generation in the daytime, more research and scoping would likely be required before greater implementation. Significant investment in community engagement and awareness raising would be critical to demonstrate the advantages of electric cooking, support users in transitioning to clean cooking, and ensuring the long-term effectiveness of such systems as an alternative to traditional cooking methods.

Developing and testing the acceptability of different payment systems and delivery models for social institutions can provide an opportunity to identify which types of facilities, and which organisations, can become long-term and financially sustainable customers for private sector electricity systems, especially solar mini-grids. This will require interorganisational coordination at both the field and headquarters levels to ensure that both the electricity usage and budgetary systems align with the service terms agreed with private sector electricity providers.

BARRIER	OPPORTUNITY
Lack of local suppliers of renewable energy equipment	Extend the national grid (where available) or organisations can support the installation of standalone systems
Individual facilities use their own generators which are often oversized	Build relationships between organisations to support long-term planning
Community facilities often lack budget lines for electricity which can be incompatible with private sector delivery models	Develop and test the acceptability of different payment systems and service agreements which work for both electricity users and suppliers
Large-scale electricity systems have very high initial costs and require funding for O&M	Combine donation-based models for capital costs with long-term financing for ongoing expenses, such as through cooperatives
Acceptance of communal or electric cooking might vary between communities	Engage with communities to understand their preferences and replicate successes from previous projects

Energy access for operational purposes

Humanitarian organisations require energy to support their operations in displacement settings. These range from the provision of essential services, such as water through pumping, to electricity in offices to support camp administration and communication. Acknowledging this, the Ethiopia Country Refugee Response Plan 2024 includes sustainable energy for humanitarian operations as part of its objectives [63]. It highlights that CRRP partners will aim to prioritise transitioning water pumping systems from diesel power to solar with the goal of reducing operational costs and greenhouse gas emissions.

A report by IRENA in 2019 assessed electricity usage in Sherkole and Tsore refugee camps, which host refugees from Sudan and South Sudan, in Benishangul-Gumuz [72]. At the time of its data collection period, the humanitarian offices, guesthouses, and some of the community facilities (such as the school, primary health clinic, and a community cooking facility) were connected to the national grid. Despite this, power was available for only three days of the ten-day data collection period. Tsore camp, meanwhile, was not connected to the grid. To compensate for the limited or lack of connection, most facilities used diesel generators to provide power and 73% of these were found to be greatly oversized.

The same study measured and analysed the electricity consumption of operational uses [56]. In Sherkole, an RRS-operated diesel mini-grid – which provided the health centre, offices, and community centres with 24-hour power – consumed the most electricity (29% of the total recorded), with significant consumption coming from a community kitchen (21%), UNHCR offices (20%), two boreholes (14% and 10%), and other organisations' offices (around 2% each). In Tsore, the borehole consumed the majority of the power (86%) with the RRS offices (8%) and those of other organisations (around 2% each) using relatively little. The difference in the electricity required to pump water was attributed to the difference in the heights of the water tables at the two settlements.

To reduce diesel consumption for water pumping at the two sites, two solar pumps were installed by the International Rescue Committee with a capacity of 22 kW in Sherkole and 18 kW in Tsore [56]. At that report's time of writing, however, neither were operational owing to tensions with the host community (which also demanded to be connected to the water pump) and challenges in agreeing on water distribution, respectively. Amongst other recommendations, the report suggested establishing a camp-wide mini-grid in Tsore. This could either be powered by large diesel generators rather than numerous smaller ones operating at low loads, which could increase overall efficiency by 50%, or implement a 60 kW solar plant with 150 kWh of battery storage which could reduce diesel consumption by around 60% (2,500 litres per month). Alternatively, it suggested that RRS and ELPA coordinate to extend the national grid network to the camp.

Solar water pumping systems have also been installed in refugee camps in Gambella. Since 2020 the SunWASH programme, funded by the Grundfos Foundation and implemented by Plan International and Water Mission, has installed four solar-powered automatic water systems alongside other interventions such as pipelines to deliver water to schools [73]. Oxfam manages a water pumping station in Pinyudo camp, also in Gambella; the system is managed by a refugee mother of six from South Sudan and uses solar power during the daytime and a diesel generator at night [74]. Despite having two sources of energy, the demand for water exceeds its capacity and decreasing funding has led to challenges in providing maintenance to the system.

In 2020 Norwegian Refugee Council (NRC) installed solar power to upgrade seven water supply systems: one each in Assosa (Benishangul-Gumuz), Bule Hora (Oromia), and Dollo ››

Energy access for operational purposes

Ado (Somali), and four in Jijiga (Somali) [75]. Previously powered by diesel, which had a higher-than-average price of around 800 ETB ($25) per 20 litre jerrycan because of the remoteness of the sites, the project also trained WASH committees to operate and maintain the systems. Interviews with community members revealed that the systems alleviated water scarcity and reduced the need to trek several kilometres in search of water. To protect the systems, one WASH committee erected a fence at a cost of 120,000 ETB ($3,750) which NRC highlighted as a positive example of community ownership.

UNICEF has also supported the transition to renewable energy for its water pumping systems. In March 2024 it reported that its rehabilitation and solarisation of water infrastructure schemes reached over 235,000 people in Oromia, with a further 34,200 IDPs benefitting from the solarisation of nine water schemes in South Ethiopia regional state [76]. The replacement of diesel generators is a key component of UNICEF's goal to provide sustainable water pumping and part of its wider aims to support community resilience.

The transition to sustainable power for water pumping has rightly been identified as a priority area for organisations to reduce their reliance on diesel generation and, in doing so, reduce costs and greenhouse gas emissions. Despite this, a review in 2019 found that just 25% of health facilities have access to reliable electricity and 27% of water schemes use solar energy for pumping [77]. Whilst progress has been made in the following five years and individual projects have shown the potential for this transition, much more support is necessary to reach the required scale and to expand it to other areas of humanitarian operations. ››

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Barriers to energy for operational purposes

BARRIERS

Scaling up sustainable energy for operational purposes is a priority for many organisations, and an objective of the RRP, but many barriers remain. The high upfront costs of renewable energy technologies, short-term funding cycles, and overstretched budgets of humanitarian organisations can make it impossible to invest in such systems without specific support from donor organisations or dedicated internal funding. This can be prohibitive for operational purposes which have high energy demands, such as water pumping, or require high levels of reliability, such as health centres. Even once systems are installed the demand for water, and hence energy, may exceed the capacity of the installed system and could require further capacity to meet the needs of the community.

Once implemented, renewable energy systems require skilled maintenance which may not be available in organisations. While some camps are connected to the national grid network, many are not and grid extension programmes would be viable only for those near to existing grid infrastructure. The rest would be required to rely on off-grid solutions such as solar power to offset or replace existing diesel generation.

OPPORTUNITIES

Several organisations in Ethiopia have identified water pumping as a viable opportunity to transition from diesel to solar power. NRC, Oxfam, UNICEF, and others have implemented solar-powered water systems which have reduced the costs and greenhouse gas emissions associated with this essential service, whilst support from the Grundfos Foundation has shown how donor funding can support this transition. Despite these positive examples, many more diesel-powered systems remain which provide a wide-reaching opportunity for scaling sustainable energy.

Whilst the offices of government agencies and humanitarian organisations might each represent smaller electricity demands than water pumping, they individually and cumulatively offer opportunities to transition to sustainable power. Diesel minigrids which provide electricity to organisations, such as the system in Sherkole, could be converted to a solar or solar-diesel hybrid system (with a single larger generator) to operate more efficiently and reduce the reliance on fuel. If a single system shared between organisations is not viable, individual facilities could implement smaller standalone solar systems tailored to their needs. This could be particularly effective for office and camp administration buildings which generally require electricity during the day when generation from solar power is the highest, potentially resulting in smaller and less costly systems.

BARRIER	OPPORTUNITY
Low availability of funding for energy equipment in organisational budgets and short-term budget cycles	Target the most cost-effective applications of sustainable energy first, such as water pumping
Requirements for high levels of electricity availability for critical services	Connect to the national grid where possible and maintain backup diesel generators in hybrid systems where necessary
Many organisations use individual diesel generators which leads to inefficiency	Share larger generation systems between several organisations and transition electricity generation to solar or hybrid systems

05

Stakeholders and energy projects

©Mercy Corps

Overview of stakeholders in Ethiopia

Sustainable energy in displacement settings in Ethiopia is delivered through a 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 Ethiopia can be classified into broad categories:

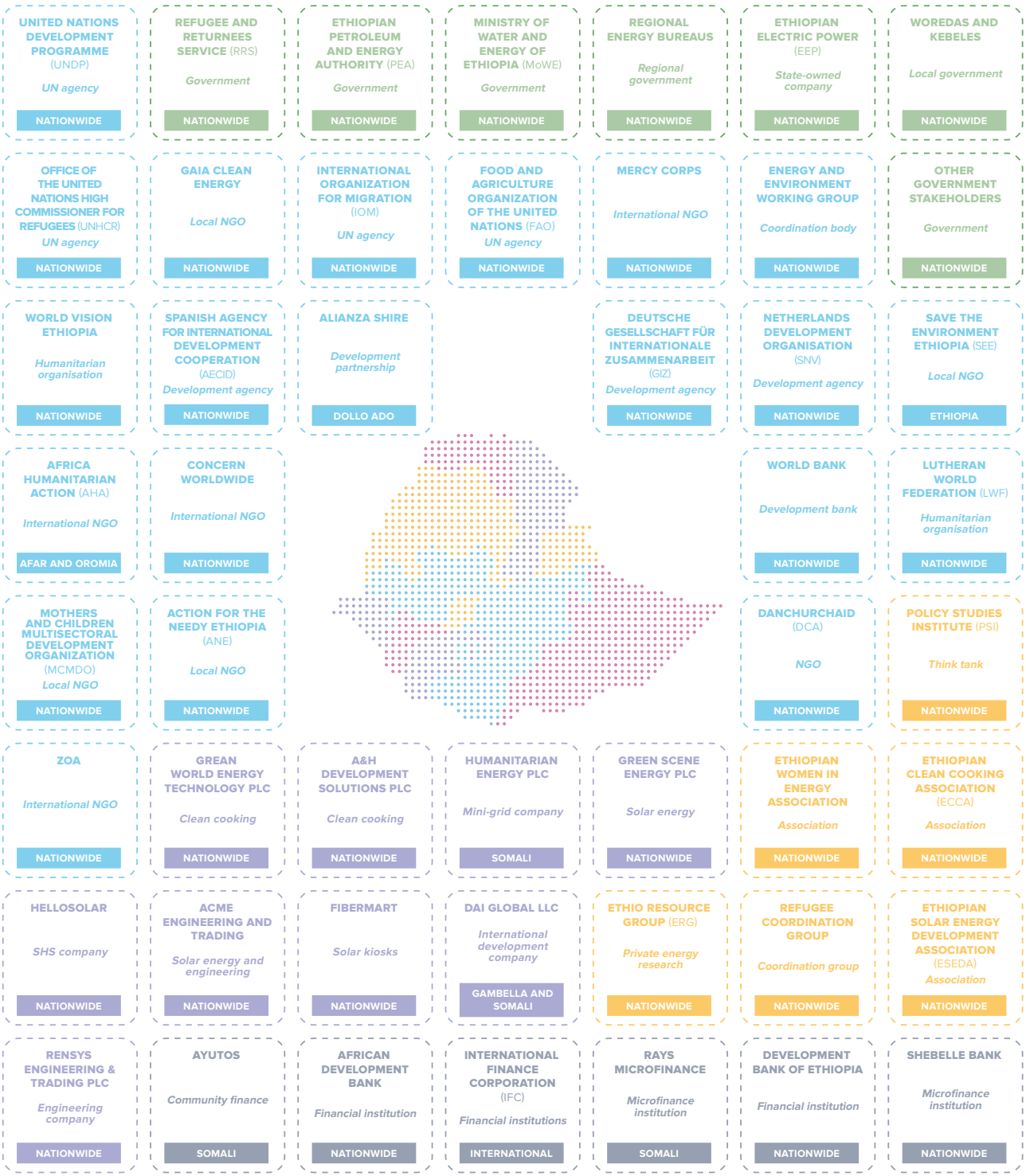
- **Government agencies** with mandates and responsibilities defined by the Government of Ethiopia.
- **Humanitarian and development organisations** which typically address specific issues including UN agencies operating across the world, international NGOs with projects in Ethiopia, and local NGOs working 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.

The Government of Ethiopia's Refugee and Returnees Service (RRS) and UNHCR work in close partnership to coordinate the multi-sectoral humanitarian response across Ethiopia. Ethiopia's wide range of energy projects have been implemented through collaborations between government and UN agencies, NGOs, the private sector, and displacement-affected communities with different models finding success across the country's diverse regions.

This section provides a short summary of the most relevant organisations working in displacement settings in Ethiopia, 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 Ethiopia. The refugee and IDP responses span the entire country but most of the existing literature and projects, and the work of participants of the READS workshop, focus on refugees. Organisations working in IDP settings are included where possible. The directory of stakeholders included in this section intends to be extensive but not exhaustive.

The Government of Ethiopia's Refugee and Returnee Service (RRS) and UNHCR work in close partnership to coordinate the multi-sectoral humanitarian response across Ethiopia.

Overview of stakeholders in Ethiopia



Stakeholder directory

GOVERNMENT

REFUGEE AND RETURNEES SERVICE (RRS)

Government

NATIONWIDE

The **Refugees and Returnees Service (RRS)** is a government entity funded by **UNHCR**. **RRS** also collaborates closely with other UN agencies, the Intergovernmental Authority for Development (IGAD), as well as national and international organisations. The primary responsibility of **RRS** is to safeguard the physical wellbeing and dignity of refugees until lasting solutions are identified to address their challenges. **RRS** assumes a leadership role in orchestrating and overseeing continuous refugee initiatives and facilitating the allocation of land for the establishment of camps.

ETHIOPIAN PETROLEUM AND ENERGY AUTHORITY (PEA)

Government

NATIONWIDE

The **Ethiopian Petroleum and Energy Authority (PEA)** serves as the federal regulatory body for the petroleum and energy sectors and is responsible for formulating a comprehensive legal framework to govern and regulate the activities within these sectors. Working under the Ministry of Petroleum and Mines since 2023, **PEA** is an energy regulator and issues licences for energy generation, transmission, and distribution; it also oversees maintenance works and provides competency certificates, amongst other duties. Its role includes increasing the uptake of energy efficiency and conservation measures while facilitating private-sector investments in the field. **PEA** works directly with the **Ministry of Water and Energy**, Ministry of Finance, Ethiopian Environmental Protection Authority, **Regional Energy Bureaus**, Ethiopian Electric Power, and Ethiopian Electric Utility.

MINISTRY OF WATER AND ENERGY OF ETHIOPIA (MOWE)

Government

NATIONWIDE

The **Ministry of Water and Energy (MoWE)** is a federal institution with responsibilities including the development, planning, and management of water and energy resources, formulation of policies, strategies, and programmes, enactment and enforcement of laws and regulations within the water and energy sectors, as well as engagement in related research. **MoWE** extends technical support to regional water and energy bureaus, participates in international agreements, and oversees their implementation. Aligned with the principles outlined in the new National Water, Sanitation, and Hygiene (WaSH) Implementation Framework, **MoWE** is actively promoting the scaling-up of the Community-Managed Project approach throughout the country.

Stakeholder directory

GOVERNMENT

REGIONAL ENERGY BUREAUS

Regional government

NATIONWIDE

Regional Energy Bureaus (REBs) are responsible for promoting off-grid energy products and services, especially in rural areas. **REBs** direct and align the implementation of national energy laws and policies to the needs and contexts of their geographical areas. **REBs** approve off-grid energy products which are distributed in their regions and so can have significant leverage over companies wishing to be authorised distributors.

ETHIOPIAN ELECTRIC POWER (EEP)

State-owned company

NATIONWIDE

Ethiopian Electric Power (EEP) is a state-owned electricity producer. It serves as the primary supplier of bulk electric power to the retail service provider Ethiopian Electric Utility (EEU) through the operation of generation and transmission facilities, as well as the development of new infrastructure. **EEP** oversees the operation and maintenance of 12 hydropower and three wind power facilities with a combined installed capacity of more that 4.2 GW. **EEP** is actively engaged in the construction of two significant hydropower projects, the Grand Ethiopian Renaissance Dam (expected to generate 6000 MW upon completion) and Genale Dawa 3 (254 MW), as well as the Gibe III plant (1870 MW, currently undergoing commissioning). **EEP** manages all high-voltage transmission lines in the country and oversees over 90 substations. Extensive plans are underway for significant expansions of the transmission network to cover the entirety of the country, including the implementation of cross-border power lines. **EEP** is also engaged in the Universal Electricity Access Program, focusing primarily on rural electrification efforts, which has electrified over 6,000 towns, villages, and rural communities across Ethiopia's remote areas.

WOREDAS AND KEBELES

Local government

NATIONWIDE

The highest level of administrative units in Ethiopia are the regional states and chartered cities; below this level are zones which are composed of groups of ***woredas*** (districts) which have their own local government. Each ***woreda*** is further divided into ***kebeles*** (wards), the smallest administrative unit, which have their own local associations. Each ***kebele*** elects representatives to the ***woreda*** council.

OTHER GOVERNMENT STAKEHOLDERS

Government

NATIONWIDE

Other government stakeholders include the Ethiopian Disaster Risk Management Commission (EDRMC), which supports individuals in Ethiopia during the initial stages of displacement; Ethiopian Forestry Development, which is responsible for the sustainable management of the country's forestry resources; the Ethiopia Environmental Protection Authority, which is responsible for conserving the environment and granting clearance for infrastructure implementation; and the Institute of Ethiopian Standards, which certifies products that can benefit from duty waivers.

Stakeholder directory

HUMANITARIAN AND DEVELOPMENT

UNHCR

UN agency

The **Office of the United Nations High Commissioner for Refugees (UNHCR)** in Ethiopia is dedicated to emergency response for IDP and refugee situations. It addresses the protection needs of refugees while fostering self-reliance, aligning with the principles outlined in the Global Compact on Refugees (GCR). **UNHCR** collaborates closely with **RRS** and together they coordinate with another 40 implementing partners to ensure comprehensive support and assistance across many sectors. **UNHCR** and other humanitarian partners are intensifying aid provisions to address humanitarian crises faced by drought-stricken populations across several regions of Ethiopia, including those who have been displaced.

NATIONWIDE

UNITED NATIONS DEVELOPMENT PROGRAMME (UNDP)

UN agency

The **United Nations Development Programme (UNDP)** is committed to the eradication of poverty, reduction of inequalities and exclusion, and the cultivation of resilience to ensure sustained progress across the world. In Ethiopia, **UNDP's** interventions work in both refugee camps and host communities with a focus on safeguarding, emergency employment, and ensuring access to essential services like energy and healthcare. These have included immediate response actions, such as deploying solar streetlights and mobile health clinics, and longer-term initiatives including significant infrastructure projects. Other **UNDP** programmes support peacebuilding, gender equality, and resilient green economies for SMEs.

NATIONWIDE

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS (FAO)

UN agency

The **Food and Agriculture Organization of the United Nations (FAO)** is engaged in sustainably addressing the energy needs of households affected by crises in and around refugee camps in Ethiopia. This involves conducting surveys and mapping woody biomass resources, assessing wood fuel consumption, and evaluating the energy efficiency of cooking systems in these areas. Amongst its wider work, **FAO** has implemented projects to enhance energy access and ecosystem restoration in four refugee camps (Kule, Tierkedi, Jewi, and Pugnido) and their surrounding areas, reaching more than 50,000 people. Its Building Resilience through Safe Access to Fuel and Energy approach combines energy-efficient technologies with multi-purpose tree plantations and meeting fuel and energy needs in protracted crises.

NATIONWIDE

LUTHERAN WORLD FEDERATION (LWF)

Humanitarian organisation

Lutheran World Federation (LWF) is a global network of Lutheran churches dedicated to humanitarian and development work, advocacy, shared witness, and dialogue. **LWF Ethiopia** began work in 1973 to address the consequences of a severe drought in Ethiopia and has longstanding partnerships with local government agencies such as **RRS**, international actors such as **UNHCR,** and marginalised and vulnerable communities across Ethiopia. **LWF's** recent energy work includes the provision of solar lamps to vulnerable families in Tigray.

NATIONWIDE

Stakeholder directory

HUMANITARIAN AND DEVELOPMENT

MERCY CORPS

International NGO

Mercy Corps is an international NGO dedicated to implementing sustainable solutions that can catalyse enduring transformation in more than 40 nations. In 2021 **Mercy Corps** merged with Energy 4 Impact to integrate the latter's energy knowledge into **Mercy Corps'** humanitarian and development initiatives. This collaboration supported **Mercy Corps** in expanding access to environmentally conscious and durable energy solutions in Ethiopia, further promoting climate resilience. Through its Enter Energy programme, **Mercy Corps** established **Humanitarian Energy PLC** in collaboration with the local company **Rensys Trading and Engineering PLC** to establish mini-grids in humanitarian settings. In partnership with **UNHCR** and **RRS**, a 254 kWp mini-grid – the first commercial mini-grid in Ethiopia – was launched in Sheder refugee camp in the Somali region in May 2024, with plans to scale in the Liben zone. It also is developing a PUE component and programmes for demand activation.

NATIONWIDE

ENERGY AND ENVIRONMENT WORKING GROUP

Coordination body

The **Energy and Environment Working Group (EEWG)** was established to act as a coordination body for activities and interventions related to energy in displacement settings. Its core goal is to support refugees and vulnerable host community members to access modern energy. It provides a platform to coordinate between organisations and its members include **UNHCR, RRS, GIZ, UNDP, ZOA,** and **DCA.**

NATIONWIDE

SPANISH AGENCY FOR INTERNATIONAL DEVELOPMENT COOPERATION (AECID)

Development agency

The **Spanish Agency for International Development Cooperation** (Agencia Española de Cooperación Internacional para el Desarrollo, **AECID**) is an autonomous agency responsible for the management of the Spanish Government's international development cooperation policy. It collaborates with Ethiopian organisations and other development agencies, including providing funding and support for the **Alianza Shire** partnership.

NATIONWIDE

ALIANZA SHIRE

Development partnership

Alianza Shire is a Spanish multi-sectoral and multi-stakeholder partnership for humanitarian action formed by three companies in the energy sector (Acciona.org, Iberdrola and Signify), **AECID**, and the Centre for Innovation in Technology for Human Development of the Technical University of Madrid (itdUPM). It has partnered with many organisations, including **UNHCR** and **RRS**, to implement a range of energy projects. Following conflict in the Tigray region, its original focus location, **Alianza Shire** has since implemented projects in Dollo Ado.

DOLLO ADO

Stakeholder directory

HUMANITARIAN AND DEVELOPMENT

DANCHURCHAID (DCA)

NGO

DanChurchAid (DCA) Ethiopia is an NGO which primarily supports vulnerable rural and peri-urban groups, as well as refugees and their host communities. Its activities address both natural and human-made disasters and include interventions for food security, income generation, resilience building, climate change adaptation, gender equality, and capacity building. **DCA** successfully integrated Aysaita camp (Afar region) into the national electricity grid under a project focusing on protection and development assistance for Eritrean refugees and their host communities. Financed by the European Union and executed through a consortium led by **DCA**, the project was designed to deliver sustainable solutions across multiple domains including water, energy, education, livelihood, protection, coordination, and capacity development. **DCA** has also worked in Gambella, Amhara, Oromia, and South Ethiopia, and its previous energy projects have included solar energy for lighting and irrigation.

NATIONWIDE

DEUTSCHE GESELLSCHAFT FÜR INTERNATIONALE ZUSAMMENARBEIT (GIZ)

Development agency

Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) represents the German Federal Ministry for Economic Cooperation and Development (BMZ) and collaborates with national and international partners in Ethiopia. Aligned with the goals of the Ethiopian Government, **GIZ** emphasises three key priority areas: fostering training and sustainable growth for decent jobs, contributing to a world without hunger, and promoting peaceful and inclusive societies. **GIZ** carries out several energy-related programmes in Ethiopia such as Green People's Energy, Energising Development (EnDev) Ethiopia, and the Energy Solutions for Displacement Settings (ESDS) project which aims to tackle the challenge of the inadequate sustainable energy supply in areas hosting displaced persons in Ethiopia. The ESDS project established energy kiosks to serve as hubs for refugees and host community entrepreneurs to provide services such as beverage sales, phone charging, and hairdressing services. ESDS also provides advisory services and implementing technical measures in displacement settings and, under this project, the Multi-actor Cooking Energy Strategy for Refugees and Host Communities in Ethiopia 2022-2030 will be implemented with the support of **GIZ, UNHCR, MoWE,** and **RRS.**

NATIONWIDE

NETHERLANDS DEVELOPMENT ORGANISATION (SNV)

Development agency

SNV has supported development projects in Ethiopia since 1974. The organisation aims to enhance affordable access to fundamental services, fostering safe and sustainable availability of clean energy and water. **SNV's** energy work is dedicated to supporting the creation of inclusive markets for sustainable energy, ultimately contributing to the establishment of more equitable livelihoods for all. The Refugee Integration and Self-Reliance in Ethiopia (RISE) project is aligned with the Jobs Compact, a framework designed to advance the Government's industrialisation goals while generating employment opportunities for both Ethiopian citizens and refugees. **SNV's** other projects include the National Biogas Programme-Ethiopia, Strengthening the Enabling Environment for the Clean Cooking Sector of Ethiopia, and Integrated Renewable Energy Services (IRES) – Ethiopia.

NATIONWIDE

Stakeholder directory

HUMANITARIAN AND DEVELOPMENT

CONCERN WORLDWIDE

International NGO

Concern Worldwide works to support energy solutions in the new camp in Bokh woreda, Somali region, established for refugees from Somaliland. **Concern Worldwide** plans to implement interventions including the provision of solar energy, fuel-efficient stoves, and solar mini-grid connections to all households and social services, solar cookers, and garbage collection and disposal projects for refugees and host communities.

NATIONWIDE

SAVE THE ENVIRONMENT ETHIOPIA (SEE)

Local NGO

Save the Environment Ethiopia (SEE) is an Ethiopian NGO dedicated to environmental initiatives. Established by Ethiopians in 2007, **SEE** operates in areas hosting refugees and internally displaced persons in Somali Region. The organisation envisions expanding its reach to cover all parts of Ethiopia and the Horn of Africa. **SEE's** programmes include environmental education, rehabilitation and protection alternatives, environment-friendly house construction, alternative energy promotion, and livelihood programmes. **SEE** has partnered with **UNHCR, RRS,** the IKEA Foundation, and **AECID** and its energy-related projects have included solar mini-grids in five camps, solar street lighting and irrigation, SHS for livelihoods, and the refugee-led production and distribution of energy-saving stoves.

NATIONWIDE

WORLD BANK

Development bank

The **World Bank Group** is engaged in development initiatives in Ethiopia which offer a range of financial products and technical assistance. This includes the second phase of the Development Response to Displacement Impacts Project in the Horn of Africa (DRDIP II) project, supported through $180 million in International Development Association financing, directed towards aiding Ethiopia in enhancing access to essential social and economic services, expanding livelihood opportunities, and improving environmental management for displaced persons and their host communities. The **World Bank** also funds the Climate-Smart Agriculture programme across several countries, including Ethiopia, with a market of 400,000 people (40% of whom are refugees). Other **World Bank** projects have supported renewable energy for business appliances, solar-powered mini-grids, and scaling private sector solutions in displacement settings.

NATIONWIDE

WORLD VISION ETHIOPIA

Humanitarian organisation

World Vision International is an ecumenical Christian humanitarian aid, development, and advocacy organisation committed to mitigating the impact of crisis situations and fostering support for vulnerable populations. **World Vision Ethiopia** collaborates with government bodies, UN agencies, and donors, to help address the needs of refugees across the country. **World Vision** works across 91 districts in ten regional states and has previously supported energy-efficient cooking solutions for households.

NATIONWIDE

Stakeholder directory

HUMANITARIAN AND DEVELOPMENT

INTERNATIONAL ORGANIZATION FOR MIGRATION (IOM)

UN agency

NATIONWIDE

The **International Organization for Migration (IOM)**, a UN agency, is dedicated to implementing operational assistance programmes for migrants, including internally displaced persons, refugees, and migrant workers. Operating in Ethiopia since 1995, **IOM** has played a vital role in supporting the Government in the management of migration through a diverse range of projects and programmes. One initiative involved the distribution of 5,800 energy-efficient cooking stoves by **IOM** to internally displaced households and host communities. This was part of **IOM's** broader humanitarian assistance in response to the Gedeo-Guji crisis, which aimed to improve living conditions and enhance sustainability for IDPs and affected populations in the region.

ACTION FOR THE NEEDY ETHIOPIA (ANE)

Local NGO

NATIONWIDE

Action for the Needy in Ethiopia (ANE) is a local humanitarian and civil-society NGO established in 2012. Since 2020, **ANE** has partnered with both **RRS** and **UNHCR** to implement sustainable energy solutions for refugees across Assosa, Afar, and Dabat/Debark operations. **ANE** ensures the quality and facilitates the timely monthly distributions of charcoal briquettes, solar lanterns, cooking stoves, legally procured firewood, and other energy sources for refugees originating from Eritrea, Sudan, South Sudan, and the Great Lakes region. **ANE** currently holds the role of the primary humanitarian organisation responsible for the construction, maintenance, and operation of communal kitchens, a crucial support element for refugee programmes in Afar, Assosa, and Dabat. In addition, **ANE** is actively engaged in the installation of solar street light systems in Assosa, Dabat, and Afar. Complementing the energy programme, **ANE** has also worked on the rehabilitation of environmental settings, tree plantation, nurturing seedlings, and conducting awareness programmes on environmental protection, among other activities.

MOTHERS AND CHILDREN MULTISECTORAL DEVELOPMENT ORGANIZATION (MCMDO)

Local NGO

NATIONWIDE

Mothers and Children Multisectoral Development Organization (MCMDO) is an Ethiopian non-profit humanitarian NGO founded in 1997. Since 2016, **MCMDO** has spearheaded the development of the Renewable Energies and Energy Efficiency for Sustainable Development in Ethiopia (REESDE) programme in collaboration with French organisations Blue Energy and the EDF Foundation. Under this initiative four solar drinking water pilot projects have been implemented in the Harari region, along with one solar irrigation project in the Somali region. Presently, **MCMDO**-REESDE is engaged in the creation of an energy-autonomous and climate-resilient rural community model which includes components such as a solar kiosk, community-managed biogas and collective biogas kitchen, solar cookers, and solar water heaters. Additionally, **MCMDO**-REESDE is in the process of implementing eight solar drinking water projects in the Harari region for more than 100,000 beneficiaries through collaboration with the Harari Water and Sanitation Bureau.

Stakeholder directory

HUMANITARIAN AND DEVELOPMENT

AFRICA HUMANITARIAN ACTION (AHA)

International NGO

Africa Humanitarian Action (AHA) is an international NGO dedicated to delivering impactful humanitarian relief, recovery, and advocacy services. Established in 1994, **AHA** has played a crucial role in assisting over 26 million individuals across 20 African nations in reclaiming their health, dignity, and overall wellbeing. In Ethiopia, **AHA** focuses its efforts in the Afar and Oromia regions and has executed humanitarian programmes for refugees, funded by **UNHCR**. These initiatives revolve around the provision of both new and rehabilitated transitional shelters in Serdo, Barahle, and Aysaita refugee camps. **AHA** Ethiopia has undertaken energy and environment projects, such as briquette production and distribution, and has been involved in preparing nursery sites and transplanting matured plants to benefit host communities and community-based institutions contributing to sustainable environmental practices.

AFAR AND OROMIA

GAIA CLEAN ENERGY

Local NGO

Gaia Clean Energy is a local NGO which is affiliated with the USA-based non-profit organisation Project Gaia. Originally called **Gaia Association**, it was established in 2005 as a non-profit entity, working as an affiliate and local flagship programme for Project Gaia to enhance household access to clean and efficient cooking technologies and fuels. In 2006, **Gaia Association** began working as a **UNHCR** implementing partner to administer programmes involving kerosene stoves, other improved cookstoves, and solar lanterns in Jijiga refugee camps. Beyond distribution efforts, **Gaia Association** collaborated with governmental bodies to advocate for the affordability and accessibility of ethanol as a cooking fuel. In 2017, **Gaia Association** was rebranded to **Gaia Clean Energy** before having to terminate its operations in refugee camps due to budget constraints of **UNHCR**.

NATIONWIDE

ZOA

International NGO

ZOA, an international humanitarian organisation headquartered in the Netherlands, has operated in Ethiopia since 1998, and provides sustainable solutions for areas including solar power, access to electricity, eco-friendly briquettes, and income generation. **ZOA** has a presence across the Amhara, Gambella, Oromia, and Somali regions, Tigray Regional State, as well as in the cities of Addis Ababa and Dire Dawa. **ZOA** implements relief and recovery assistance programmes with the goal of empowering Ethiopians and young refugees through offering skills development, employment training, and facilitating job placements. **ZOA** also engages in high-level dialogues with the Ethiopian government and **UNHCR** to help shape policies, including contributing to the Comprehensive Refugee Reference Framework in Ethiopia. **ZOA** was a key implementing partner in Phase II of the **Alianza Shire** project, collaborating closely with NRC and **RRS.**

NATIONWIDE

Stakeholder directory

PRIVATE SECTOR

A&H DEVELOPMENT SOLUTIONS PLC

Clean cooking

NATIONWIDE

A&H Development Solutions PLC is a renewable energy and clean cooking company that specialises in the manufacturing and distribution of electric household cookstoves, firewood stoves, charcoal stoves and bread ovens catering to both domestic and institutional needs. Under the REACT SSA initiative, **A&H** has expanded its product line to include ethanol and energy-efficient firewood cookstoves. In addition to clean cooking, its portfolio of projects ranges from studies for distribution and transmission stations to the upgrade of control systems for wind turbines and the development of control systems microgrids for commercial buildings. **A&H** has worked with **GAIA Clean Energy** and **UNHCR** to assess the dependency on biomass resources, and potential alternative cooking solutions, of refugee communities in five camps in Dollo Ado.

DAI GLOBAL LLC

International development company

GAMBELLA AND SOMALI

DAI Global is an international development company with activities in over 150 countries since its inception in 1970. In Ethiopia **DAI** implements the Strengthening Host and Refugee Populations (SHARPE) project, supported by the UK's Foreign, Commonwealth & Development Office. Operating from 2019 to 2025, this initiative focuses on bolstering economic resilience in vulnerable communities, particularly in regions such as Dollo Ado, Gambella, and Jijiga. Utilising an innovative market systems development approach known as "Markets for Resilience", the project seeks to promote refugee self-reliance, enhance financial services, develop regional markets for agriculture and livestock, create economic opportunities, and facilitate learning exchanges within the international and Ethiopian development spheres. SHARPE has enabled enterprise growth for over 100,000 refugees and host community members, attracted approximately £1.2 million in investments to refugee-hosting areas, and supported thousands of local businesses in becoming more innovative and sustainable.

HELLOSOLAR

SHS company

NATIONWIDE

HelloSolar is an Ethiopian off-grid solar energy company which aims to improve the quality of life for rural communities through its PayGo SHS. The company offers basic kits, composed of a small SHS with two bulbs and an independent solar lamp, and more systems which can power radios, televisions, or solar pumps. Products can be paid off in instalments and come with a two-year warranty, with **HelloSolar** providing technical support through call centres in different languages. Under the SHARPE programme, **HelloSolar** was supported in expanding into refugee and host community markets and sold 2,500 solar kits in Jijiga and Dollo Ado.

Stakeholder directory

PRIVATE SECTOR

ACME ENGINEERING AND TRADING

Solar energy and engineering

NATIONWIDE

ACME Engineering and Trading is an Ethiopian company that has provided energy, water supply, irrigation, agriculture, and engineering services since 2003. Under the SHARPE programme, **ACME** provides solar kits, barber packs and phone charging stations in Dollo Ado town and the five refugee camps under a PayGo model. **ACME** also recruits and trains local community members to work as technicians and sales agents.

FIBERMART

Solar kiosks

NATIONWIDE

Fibermart is an Ethiopian company which provides solar-powered kiosks for microbusinesses. It has deployed more than 50 of its Fiberkiosks for applications including mobile money vendors, phone charging businesses, barbershops, and small healthcare centres. Under the SHARPE programme Fibermart supplied kiosks to microbusinesses in Jewi, Kule, Nguenyiel, Awbarg, Buramino, and Melkadida camps.

HUMANITARIAN ENERGY PLC

Mini-grid company

SOMALI

Humanitarian Energy PLC is a private company and social enterprise that was established in 2022 as a special purpose vehicle by **Mercy Corps** and **Rensys Engineering and Trading PLC**. The company focuses on the deployment of hybrid solar PV mini grids in humanitarian settings, providing displaced communities with electricity for both domestic and business-related activities. **Humanitarian Energy PLC** worked with **Mercy Corps**, and in partnership with **UNHCR**, **RRS** and **PEA,** to install a solar mini-grid in Sheder refugee camp through the Enter Energy programme with funding from Shell PLC. After obtaining Ethiopia's first commercial mini-grid license, the system was launched in May 2024. The 254 kWp solar-hybrid mini-grid is expected to offer electricity services to almost 2,000 refugee and host community households and 50 businesses. **Humanitarian Energy PLC** is currently fundraising for a 2.15 MWp solar mini-grid which will serve three other refugee camps in the Liben zone area after having completed a technical and socio-economic feasibility study for the expansion.

Stakeholder directory

PRIVATE SECTOR

GREAN WORLD ENERGY TECHNOLOGY PLC

Clean cooking

NATIONWIDE

Grean World Energy Technology (GWET) is an Ethiopian company, established in 2016, dedicated to supporting the energy transition of rural and remote communities. Over the past five years, **Grean World** has distributed 156,000 clean cookstoves to rural areas that lack grid access and viable alternative energy sources. As a supplier of clean energy solutions to peri-urban and rural households, **GWET** also offers solar systems catering to needs ranging from basic lighting and charging to advanced solar home systems. **GWET** is initiating a project to establish energy hubs in rural villages to serve as charging stations for mobile devices and batteries, while also offering additional services such as beverage cooling, television access, internet services, retail product sales, and hairdressing. These hubs will double as promotional and training centres, providing education on solar products, repairs, and sales for spare parts. **GWET** markets the Mirt Stove, which offers significant fuel savings and reduces kitchen carbon monoxide concentrations compared to traditional three-stone open fires.

GREEN SCENE ENERGY PLC

Solar energy

NATIONWIDE

Green Scene Energy PLC is an Ethiopian company dedicated to providing solar solutions to off-grid communities. Its products aim to provide brighter, more cost-effective lighting, healthier indoor environments for work, reduced manual labour, and expanded income-generating opportunities. **GSE's** solar pumps have demonstrated the potential to increase farmers' income while cutting water usage. **GSE** participated in a GoE-backed roadshow to demonstrate its products to off-grid communities in the Somali (Kerbidihar, Degahabour), Oromia (Dodola, Adama), and Southern (Analemo, and Sodo) regions. **GSE** sells the BioLite Home 620 system, which garnered significant interest due to its provision of reliable and safe light and power to homes, facilitated by convenient pay-as-you-go payment options. However, its highest sales were recorded for Sun King solar lights, capable of charging phones and other devices. **GSE** is preparing to promote its solar energy solutions in additional regions, starting with Afar and Benishangul-Gumuz.

RENSYS ENGINEERING & TRADING PLC

Engineering company

NATIONWIDE

Rensys Engineering & Trading PLC, headquartered in Addis Ababa, is an Ethiopian company dedicated to addressing energy challenges by providing renewable energy solutions. The company has extended access to electricity through SHS, solar mini-grids, and solar lanterns. **Rensys** uses a business model in which households are required to make a down payment with the remaining balance payable over up to two years. This approach has zero interest rates, demands no collateral, and follows a transparent procedure. The products integrated into this initiative include 12 W SHS, 55 W solar TV systems, and small-scale solar irrigation pumps. **Rensys** uses PayGo-enabled products which support effective payment enforcement and post-sales service provision. In collaboration with **Mercy Corps**, **Rensys** established the company **Humanitarian Energy PLC** which seeks to implement solar off-grid solutions in humanitarian settings and launched the country's first commercial mini-grid in May 2024.

Stakeholder directory

FINANCIAL INSTITUTIONS

RAYS MICROFINANCE

Microfinance institution

SOMALI

Founded in 2014, **Rays Microfinance Institution** was established to alleviate vulnerability and poverty among low-income populations in Ethiopia, with a particular focus on the Somali region. Drawing from expertise in business and development initiatives and with a mission to enhance community livelihoods through accessible financial services, **Rays Microfinance** has partnered with AECF to provide solar systems for communities in the Somali region. Through this work it has reached 3,400 households and business customers, helping them to access clean energy and reduce their carbon dioxide emissions.

DEVELOPMENT BANK OF ETHIOPIA

Financial institution

NATIONWIDE

Since its inception in 1909, the **Development Bank of Ethiopia** has been tasked with promoting the country's development agenda. It specialises in providing development finance and offering technical support to viable projects aligned with government priorities such as commercial agriculture, agro-processing, mining, and manufacturing. This support is financed by both domestic and foreign sources.

SHEBELLE BANK

Microfinance institution

NATIONWIDE

Shebelle Bank is an Islamic bank that was established in 2011. The Bank operates a network of branches across Ethiopia and provides support to refugees in areas such as Melkadida and Sheder as a part of its commitment to inclusive financial services and involvement in local communities.

AFRICAN DEVELOPMENT BANK

Financial institution

NATIONWIDE

The **African Development Bank** is a multilateral institution dedicated to fostering sustainable economic development and social progress across African nations. In September 2023, the **African Development Bank** sanctioned a $104 million funding initiative to enhance energy infrastructure and increase the capacity of the power grid in eastern Ethiopia. It also seeks to integrate more industries and households into the electricity network, reducing the reliance on diesel generators, and facilitate the implementation of the government's regional agricultural irrigation programme which is designed to cover 462,174 hectares. The project's scope includes the construction of 157 km of transmission lines alongside the construction of substations in locations including Harar, Jijiga, and Fafem. Other funding initiatives include $10 million to support geothermal energy and $1 million to support the implementation of a procurement framework for independent power producers.

Stakeholder directory

FINANCIAL INSTITUTIONS

INTERNATIONAL FINANCE CORPORATION (IFC)

Financial institutions

INTERNATIONAL

The **International Finance Corporation (IFC)** aims to foster private sector growth in developing countries. The **IFC** approach involves bolstering economic development and improving livelihoods through the promotion of private sector expansion in developing regions. Amongst its work in Ethiopia, the **IFC** has signed an agreement with Ethiopia Electric Power to advise on developing up to 500 MW of solar power under its Scaling Solar initiative.

AYUTOS

Community finance

SOMALI

Melkadida Refugee Camp hosts numerous ***ayutos***, which are informal microfinance initiatives led by refugees. **Ayutos** operate through collective savings and micro-loans among members. Participants pool small sums of money into group savings, from which they can borrow and repay loans. This approach to financial management is particularly prevalent within the Somali community. **Ayutos** serve as a vital resource for addressing the financial needs of refugees in Melkadida, offering a locally accessible and community-driven solution for economic support and empowerment.

Stakeholder directory

OTHER ORGANISATIONS WORKING ON ENERGY OR REFUGEE AFFAIRS

POLICY STUDIES INSTITUTE (PSI)

Think tank

NATIONWIDE

The **Policy Studies Institute (PSI)** is a think-tank involved in economic, social, and governance research alongside policy analysis. **PSI** aims to serve as a bridge between research and policy implementation and is dedicated to capacity building, knowledge dissemination and exchange, and providing consultancy services. It has partnered with government departments and NGOs on topics including rural and urban energy choices for cooking, the impacts of improved cookstoves, and sustainable forest management.

ETHIOPIAN CLEAN COOKING ASSOCIATION (ECCA)

Association

NATIONWIDE

Established in 2019, the **Ethiopian Clean Cooking Alliance (ECCA)** is a civil society organisation dedicated to fostering an enabling environment for clean cooking. **ECCA's** approach involves advocating for policy changes and communicating the importance of clean cooking. Its activities have included facilitating training programmes, offering advisory services, promoting research and knowledge sharing, managing challenge funds**,** and promoting community participation. By doing so, **ECCA** aims to improve public health and support in mitigating adverse impacts of climate change. Collaborating with both national and international partners, **ECCA** works to establish an inclusive clean cooking sector that ensures accessibility to clean cooking solutions for Ethiopian households.

ETHIOPIAN SOLAR ENERGY DEVELOPMENT ASSOCIATION (ESEDA)

Association

NATIONWIDE

The **Ethiopian Solar Energy Development Association (ESEDA)** is an independent non-profit association that was established in 2009. Dedicated to facilitating the growth and development of solar energy businesses and solutions in Ethiopia, **ESEDA** unites a diverse range of experts, policymakers, and advocates to harness the potential of solar energy nationally. Through collaborative and innovative education initiatives, **ESEDA** empowers individuals and communities alike to embrace solar energy as an alternative to conventional power sources.

Stakeholder directory

OTHER ORGANISATIONS WORKING ON ENERGY OR REFUGEE AFFAIRS

ETHIOPIAN WOMEN IN ENERGY ASSOCIATION

Association

NATIONWIDE

Ethiopian Women in Energy Association (EWiEn) is an independent non-profit association dedicated to facilitating the growth and development of the solar energy sector in Ethiopia. The Association's activities include networking, advocacy, mentorship, and training for women in the energy field. **EWiEn** was founded in 2019 by a group of five Ethiopian women professionals in the energy sector, motivated by their shared passion for the country's energy evolution and the pivotal role of women within it. Since its inception, the country's focus on advancing women's participation in the energy field has grown significantly. The Association's membership now exceeds 300 professionals including engineers, financial experts, lawyers, technicians, and entrepreneurs.

ETHIO RESOURCE GROUP (ERG)

Private energy research

NATIONWIDE

Established in Addis Ababa in 2005, **Ethio Resource Group (ERG)** is a private company specialising in energy and environmental research and consultancy services. Over the past five years, **ERG** has implemented over fifty projects spanning Ethiopia, Malawi, Rwanda, and Madagascar. These have ranged from research initiatives on wood stove designs and solar lantern efficacy to more comprehensive undertakings including evaluating the impact of climate change on energy services and the design and installation of renewable energy systems.

REFUGEE COORDINATION GROUP

Coordination group

NATIONWIDE

The **Refugee Coordination Group**, jointly chaired by **RRS** and **UNHCR**, serves as the primary national coordination forum in Ethiopia for delivering humanitarian services to refugees. Comprising representatives from different sectors and various humanitarian partners, the Group plays a pivotal role in guiding inter-sector strategic matters and facilitating collaborative planning processes within national operations.

Sustainable energy projects in displacement settings

Mercy Corps' Enter Energy Ethiopia programme

In 2018, Shell and Mercy Corps launched the Enter Energy Ethiopia programme to address the issue of energy access in humanitarian settings by supporting the development of a sustainable, scalable, and market-based model for clean energy access. Following preliminary assessments in camps in Somali Regional State in 2018-2019, the Enter Energy inception phase took place in 2020-2021 and programme implementation formally began in April 2021.

The vision of Enter Energy Ethiopia was to test a replicable and scalable model for the long-term provision of energy access. To support this Mercy Corps Global and Rensys Engineering and Trading PLC, an Ethiopian company, invested the funds into a special purpose vehicle called Humanitarian Energy PLC to deliver on engineering, procurement, generation and commissioning mini-grids in humanitarian settings. The first project of this joint venture was to implement a 254 kWp solar-hybrid mini-grid in Sheder camp.

The mini-grid was inaugurated in May 2024 and has the capacity to provide access to clean, reliable, and sustainable energy for 17,600 refugees and host community members (14,600 and 3,000 people, respectively), small businesses, community institutions, and humanitarian organisations [77]. Its business model, developed with local partners, aims to create a sustainable model catering to domestic applications, productive activities, and humanitarian operations in displacement settings [78].

Humanitarian Energy PLC runs the solar-hybrid mini-grid as the service provider and is tasked with installation, operations, fee collection, and the training of local community members to provide connections [78]. Over 550 households paid the subscription fee to connect to the grid before its inauguration, as of July 2024 there were 979 paid subscribers and 922 connections, and up to 1,950 households and 50 businesses are expected to ultimately be connected. The total reach of the programme is expected to be around 17,600 people (directly and indirectly benefiting through services which are connected).

To connect to the mini-grid a customer must pay a connection fee of 1500 ETB, around $30, which can be paid for in one payment (which most households opted for) or in phases; after full payment the household is connected to the grid. ››

Ethiopia's first commercial mini-grid to be licensed under the new legislation was installed by Humanitarian Energy PLC in Sheder refugee camp, in collaboration with Mercy Corps.

Sustainable energy projects in displacement settings

The mini-grid uses a consumption-based payment structure, charging 19 ETB/kWh consumed in the daytime and 24 ETB/kWh at night (around $0.35/kWh and $0.42/kWh respectively), under tariffs that were established through negotiations with the community and which have been approved by the government.

The Community Electric Committee (CEC) acts as the bridge between Humanitarian Energy PLC and the local community. Members of the CEC are paid monthly to disseminate information from Humanitarian Energy PLC to the local community and to provide community feedback and insights back to the company. For electricity connections in host community, Humanitarian Energy PLC collaborates with local administration and the CEC. For refugee connections, Humanitarian Energy PLC works with the CEC and the Refugee Central Committee (RCC, whose members are elected by the community), along with UNHCR and RRS.

Mercy Corps leads on activities related to engagement, training, financial support, and supply chain improvements which aim to create a cycle of expanding energy access and increasing incomes. To enhance the financial sustainability of the mini-grid model, Mercy Corps is also implementing a livelihoods component that focuses on the productive use of energy to drive long-term demand for power. As the programme progresses in Sheder camp, Mercy Corps aims to gather valuable insights to help the programme expand within Ethiopia and potentially in other regions [77]. To support this it undertook a socio-economic feasibility study to assess the viability of replicating the project in three other camps, scoping the potential to install three mini-grids with a total capacity of 2.15 MW to serve over 150,000 host and refugee community members who do not have access to the national grid.

The Enter Energy Ethiopia programme's primary objectives, to establish a replicable and market-based model for sustainable and affordable energy services in crisis-affected regions and to enhance market mechanisms for refugees and host communities, proved to be challenging but ultimately achievable [77]. Establishing Ethiopia's first private-sector mini-grid, operated by Humanitarian Energy PLC, faced obstacles such as a complex regulatory framework but the system stands as proof that such a model can function. The implementing partners now have a strong understanding of what is needed for scale up, such as dedicating attention to the needs of host community members and finding equitable solutions for all displacement-affected communities. Although new issues will present themselves in future work, the process is expected to be far less challenging.

The success of the programme to date has been attributed to strong consultations with partners at all levels. Challenges to implementation were discussed at the local and federal levels as well as with community committee, and the wider refugee community, which helped to mitigate and remedy them. Through this initial project, Enter Energy Ethiopia has developed a successful private sector-led model which provides sustainable energy to refugees and host communities that could be scaled up in Ethiopia and beyond.

Sustainable energy projects in displacement settings

Energy interventions in UNHCR's Melkadida Operation

The largest component of the UNHCR Melkadida Operation's energy work focuses on electrification. Supported by a generous donation from IKEA Foundation, UNHCR has supported the implementation of six micro-grids, with capacities ranging from 25-30 kWp, which connect up to 1,300 customers and provide around 16 hours of electricity each day, depending on the weather conditions and battery capacities. The business model for the micro-grids was developed through a range of consultations with the refugee and host communities and kebele authorities.

In partnership with Save the Environment Ethiopia, a local NGO, UNHCR supported the establishment of cooperatives to manage the micro-grids. The cooperatives are certified under Ethiopian law, and each has around 12 members, who received certified training on solar and electrical wiring through a TVET institution and further on-the-job training before installing and maintaining the mini-grids. More recently, they have begun to install standalone systems for individual institutions and businesses.

The cooperatives manage the mini-grids financially, agreeing how much they charge customers through the RCC and host community representatives alongside UNHCR and local NGOs. Tariffs are set according to the appliance or device used (as opposed to by kWh consumed): this ranges from 50 ETB ($0.89) for one plug or light to 300 ETB ($5.36) for a television, and fees are collected monthly. The initial connection to the national grid, by comparison, costs around 3,000 ETB ($54).

Whilst the cooperative model has shown success, challenges remain. The high cost of batteries, which need to be replaced every three to four years, poses a threat to financial sustainability. The cooperatives are attempting to obtain loans from financial institutions but issues include finding the required guarantor, not being able to use livestock as collateral, and the high markup rates of the potential loans. UNHCR works with the cooperatives to provide interim support, and one group bought land from their savings, conducted civil works, and installed new equipment to grow their operations and increase their income.

To scale up access to electricity, UNHCR has promoted partnerships like the African Development Bank and the Government of Ethiopia to deliver a solar installation of 2 MW; this system is designed to serve the host community but with plans to extend it to the refugee community. Another 125 kWp mini-grid, funded by the Spanish Agency for International Development Cooperation (AECID), is proposed to serve up to 17 social institutions and will also be run by cooperatives. Three further mini-grids are in the engineering phase through Humanitarian Energy PLC.

In addition, UNHCR is in the process of solarising its compound by using a 650 kWp system to provide 24-hour power, as well as transitioning 11 water systems across the five camps in the Melkadida Operation to solar power. UNHCR has previously piloted the solarisation of a formerly diesel-powered irrigation scheme using a 57 kWp system; it supplies around 90 hectares of land and is operated and managed by an irrigation cooperative. UNHCR is also exploring the solarisation of drinking water systems through the support of the Grundfos Foundation and the Danish and German governments. ››

Sustainable energy projects in displacement settings

UNHCR also works on access to clean cooking and supports two stove production centres in different camps to make different kinds of cookstoves. These are tested by the Ministry of Energy, are compatible with firewood and briquettes, and reduce fuel consumption by up to 30%. UNHCR has also established two cooking fuel production sites which use dried *Prosopis juliflora*, an invasive species that the GoE is seeking to eradicate, to make 60,000 kg of firewood, charcoal, or carbonised charcoal briquettes annually. UNHCR is also piloting electric cooking and is in the process of procuring electric stoves for more than 20 families to test their compatibility with local cooking practices.

Under its lighting component, meanwhile, UNHCR supports domestic lighting by distributing solar lanterns and installing solar streetlights. The organisation has installed 1,100 solar streetlights since 2019 with support from the IKEA Foundation and has installed a further 160 lights through a donation from AECID and the European Union. The latter two partners also distributed 2,000 SHS to households in Hilaweyn camp.

The adoption of new energy technologies, such as micro-grids and clean cooking products, represent a significant achievement for UNHCR: this has resulted in increased donor interest to support initiatives such as solarising water pumping and a recognition that these initiatives can be scaled up. Expectation management of potential donors and acknowledgement that energy interventions are very expensive was also key to ensure adequate programme funding. Critical to the success of UNHCR's implementation was having committed staff on the ground to work with local stakeholders to drive initiatives forward.

A key reflection across UNHCR's energy work in Melkadida was that sustainability should be defined in a meaningful way for the local context and for the communities that these interventions aim to serve. In support of this the Melkadida Refugee Compact – coproduced by UNHCR, RRS, and Somali Regional State – provides an integrated plan for community-owned sustainable local development. The first of its four pillars focuses on sustainable energy and highlights how to build upon the promising results already seen in the region. The estimated investment required is significant, with $220 million estimated to be required to provide sustainable energy for households and businesses, clean cooking, water pumping, and social institutions, but demonstrates the scale of the challenge that UNHCR and its partners are aiming to overcome and the potential benefits for the displaced and host communities living in and around the Melkadida Operation. ●

The Melkadida Refugee Compact provides an integrated plan for community-owned sustainable local development.

Sustainable energy projects in displacement settings

The IKEA Foundation's Brighter Lives for Refugees campaign

In 2014, the IKEA Foundation launched the first phase of the Brighter Lives for Refugees campaign, raising €7.7 million on behalf of UNHCR from LED lightbulb and lamp purchases to support energy access in displacement settings in Africa, the Middle East and Asia. Among the communities supported by the campaign was the refugee population residing in the Dollo Ado woreda of Ethiopia's Somali region.

From 2014 to 2017 the campaign provided 40,000 solar lanterns and 240 streetlights in Dollo Ado. Building on the established relationship between the foundation and the woreda authorities facilitated the further allocation of funds towards energy and environmental projects and programming totalling $11.45 million by the end of 2018 [78]. This investment led to the installation of eight solar mini-grids, five serving public health centres and three providing a private electricity supply.

Beyond the mini-grid installation, the IKEA Foundation supported the installation of a further 1,409 solar streetlights across Dollo Ado's camps and local neighbourhoods and connected almost 5,000 households to the solar mini-grids. UNHCR reported that approximately 47% of refugees in the woreda had broader access to energy solutions following the campaign's activities.

The IKEA Foundation supported the establishment of energy cooperatives for both electricity access and clean cooking initiatives which helped to provide local energy independence. An assessment of the programme, however, revealed that only two of the five cooperatives – those focused on private electricity supply through mini-grids – had successfully transitioned toward self-reliance. The clean cooking cooperatives (dealing with prosopis, sourcing firewood, raw wood sales, and the production of charcoal briquettes for household use) faced significant challenges due to inadequate access to an affordable and reliable prosopis supply, reliance on outdated equipment, and low demand for the briquettes [11].

Although the campaign and its projects have had varying levels of success [11], these initiatives have had a significant impact on increasing local staff dedicated to energy access and programming. Two key takeaways from the campaign were the benefit of the medium-term presence, which involved and funded the work of local humanitarian actors, and the benefit in cooperating directly with local government and stakeholders throughout programme planning and execution [10].

In the past, other humanitarian actors have noted the challenging nature of obtaining the necessary permissions and approvals from local authoritative bodies in Dollo Ado. UNHCR, in contrast, dedicated the necessary time and resources via the Brighter Lives campaign into prioritising their partnership with district-level officials and the local host community. This emphasised how the energy-related activities would positively impact communities, such as through new agricultural programming and capacity-building initiatives, to generate long-term local support [37].

Sustainable energy projects in displacement settings

Alianza Shire: Expanding access to electricity for refugees and hosts

Alianza Shire is a Spanish multi-sectoral and multi-stakeholder partnership for humanitarian action and was formed by three companies in the energy sector (Acciona.org, Iberdrola and Signify), the Spanish Agency for International Development Cooperation (AECID), and the Centre for Innovation in Technology for Human Development of the Technical University of Madrid. In 2014 Alianza Shire, in collaboration with UNHCR, began working in Adi Harush, one of the four refugee camps in the Shire region of Tigray, Northern Ethiopia. Its initial work was aimed at demonstrating the potential of multi-stakeholder partnerships to address energy challenges and identifying the most viable ways to enhance electricity access for both the refugee and host populations [79].

The initial phase of the project, which ran from 2014 to 2017, focused on augmenting the distribution of electricity in Adi Harush. Efforts were directed toward enhancing and extending the national electricity grid to connect roughly twenty communal facilities including a school, two communal kitchens, and markets, as well as providing 5 km of street lighting and ultimately benefitting around 8,000 individuals. The grid was developed with particular attention to the lighting needs of the communities' most vulnerable members and so combined local community knowledge with technical knowledge on system design. The project involved capacity building with training sessions on system installation and maintenance provided to the refugee population. A team of technicians was established to conduct fundamental maintenance tasks for the electrical infrastructure [37]. The initial phase had an overall budget of 300,000 EUR.

At the local level, Alianza Shire initially interacted primarily with UNHCR and RRS for permissions and documentation to build infrastructure and also engaged with district- and municipality-level government officials. At the national level, Alianza Shire collaborated closely with UNHCR, RRS, and relevant ministries such as MoWE. The team liaised extensively with EEU for technical support and found the organisation was receptive to integrating refugee communities into the electrification process [79].

The project's scope expanded significantly during its second phase, co-funded by the European Union's Emergency Trust Fund for the Horn of Africa through AECID, with an initial timeline of 2018-2021. Activities were extended to three more camps in the region and aimed to reach 77,000 refugees and host community members with grid connection by expanding the local distribution network, connecting all communal services and an additional 450 private businesses to the grid, and installing 25 km of new streetlighting. Training was to be provided in four areas: managerial, for EEU's regional managers; technical, for EEU's field staff; training of trainers, for implementing partners; and with refugee and host community members, to facilitate their direct involvement in the local electric utility structure [80]. Apart from some previous pilots or individual businesses, this programme was set to be the first to legally connect a refugee-led business to the national grid.

Beyond improving grid connections, Alianza Shire also sought to provide off-grid solutions and enhance the local energy market, installing 2,000 SHS and supporting the creation of six refugee and host-community-owned microbusinesses to maintain them [79]. The off-grid component of the project demanded coordination between RRS, UNHCR, the RCC, local administrators, and host and refugee community leaders. The establishment of solar electrification committees at the ››

Sustainable energy projects in displacement settings

community level, user assistance centres, and a renewable energy service company formed the backbone of the market-based delivery model, ensuring the necessary coordination and management structures [79].

The project activities were suspended on two separate occasions. First, Alianza Shire had just initiated sensitisation with users in the Tigray region when the COVID-19 pandemic began. All technical designs of materials had been concluded, including the identification of the most feasible designs developed through participatory processes to address the needs of the camps' most vulnerable populations. Workshops with over 350 users had been held, entrepreneurs to support energy distribution had been preselected, and the SHS had been purchased just one month prior to the outbreak of the pandemic. Next, the conflict in Tigray made the continuation of activities in the region impossible and Alianza Shire needed to reconsider its activities and focus.

Participatory engagement with UNHCR and RRS led to the project transferring from the Shire region to Dollo Ado in 2021. The existing activities and presence of humanitarian and development actors working on energy related programming in Dollo Ado (such as the IKEA Foundation and ZOA, an AECID grantee), combined with prospective grant opportunities and the region's relative stability, influenced Alianza Shire's decision to relocate. The project shifted focus to solarising health facilities, humanitarian offices, and street lighting, maintaining the household electricity access component with SHS.

Alianza Shire needed to adapt its approach to suit the Dollo Ado region. Differences between the Shire and Dollo Ado were stark:

- Whilst the national grid had reached just 3 km away from the programme site in the Shire region, in Dollo Ado the grid was over 350 km away; ››

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Sustainable energy projects in displacement settings

- The demographic distribution was different as Shire's population consisted predominantly of men, but Dollo Ado housed mostly families; and

- Shire was relatively easy to reach with commercial flights and camp access and logistics were relatively straightforward, but accessing Dollo Ado was much more challenging owing to its remote location.

The distance from the national grid called for new, off-grid project planning with adjusted micro-grid sizing, supported by Iberdrola, and a shift from a "development" approach to a "humanitarian" approach.

Approximately 20 km of streetlighting was installed throughout the project's implementation. Signify, a Dutch multinational lighting corporation, was responsible for designing the most efficient and viable lighting solution and the streetlighting component of the programme was ultimately free thanks to a donation from the company.

In addition, 1,800 SHS were also installed throughout the project's duration with four locally-available varieties provided to community members across the region. The systems themselves were distributed but not sold to users: all SHS are owned by Safe Environment Ethiopia with users retaining the right to all maintenance needs. An advisory board was established for this branch of the project, composed of the Ethiopian Energy Cooperative, UNHCR, Acciona.org, AECID and Safe Environment Ethiopia. User assistance centres were established as the first point of contact for users, most often where payment for systems occurs, and are led by the local cooperative which is responsible for maintenance. A Photovoltaic Electrification Committee was created for users to share concerns, issues, or needs, usually related to system maintenance. The programme led to the implementation of a market-based model to increase household access to SHS, with co-design and implementation with local refugee and host community members helping to remedy the challenges previously faced when operating in Shire.

Building on this work, a 125 kW microgrid, designed to cover sixteen communal services, is expected to be active by July 2024. The technical design of the microgrid was publicly procured and contracted through the Spanish company Trama TecnoAmbiental (TTA). The interventions in Dollo Ado sought to learn from the experiences in Shire and focus more concretely on building local management systems and increasing local technical capacity. Alianza Shire is in the process of developing a management model, similar to an energy community, for the management and maintenance of the micro-grid. Cooperatives will be contracted to manage the micro-grids, however the system will remain the property of RRS. The primary users of the microgrid will be organisations, including local NGOs and INGOs, and all communal facilities will be connected to the microgrid. In addition, Alianza Shire intends to connect and test the use of sixteen electric pressure cookers (EPCs) in four schools in the region; due to their low consumption during the day, the EPCs are expected to help with microgrid efficiency whilst also providing school feeding.

The Alianza Shire initiative faced numerous challenges, including users' willingness to pay and delays in acquiring the necessary permits for project development. Future projects should account for these delays in their overall project timelines to keep their overall implementation on track and should proactively engage with local and national stakeholders to ensure the relevant parties are informed of the intended work. Its findings suggest that it is imperative to establish an entity to facilitate coordination between stakeholders, push for programme development on the ground, and support INGOs in forming impactful, joint programmes that maximise resource utilisation. Proper analysis and sensitisation of user willingness to pay is also critical, and in the future it will be important to proactively assess the community perception of service delivery models.

Sustainable energy projects in displacement settings

Ethanol cooking and Gaia Clean Energy

Project Gaia, a USA-based non-profit organisation, began working in Ethiopia in 2004. It began activities following an invitation from Finchaa Sugar Company to address issues of pollution caused by sugar production by-products which, for many years, saw sugar refineries dump molasses into the local environment which contaminated local rivers and water sources. Project Gaia recognised the potential for converting waste molasses into ethanol and, through its initiatives, set up locally-owned, community-run micro-distilleries amongst different communities in Ethiopia. The project partners collaborated with the Former Women Fuelwood Carriers Association, which had more than 4,000 members at the time, to provide employment opportunities and capacity building activities for women.

In 2005, Gaia Association was founded as a local non-profit organisation to promote and disseminate ethanol cookstoves in the country, working as an affiliate and local flagship programme for Project Gaia [81]. In collaboration with the Stockholm Environment Institute and the Ethiopian Government, the Gaia Association launched the Fuel from Waste programme which explored the feasibility of locally-produced ethanol for household cooking in Addis Ababa [82].

Gaia Association became an implementing partner to UNHCR in 2006, administering the organisation's Safe and Clean Household Energy Program and working in close partnership with RRS (then called ARRA) [83]. In addition to its ethanol cooking programme, Gaia Association provided a variety of energy solutions in 13 refugee camps, including distributing solar lanterns and installing solar streetlights. At the end of its programme, Gaia Association had distributed more than 7,000 stoves and over three million litres of ethanol.

In 2016, Gaia Association launched a new programme in Dollo Ado's Melkadida Camp in partnership with UNHCR and RSS to test and evaluate six different cookstove types (ethanol stoves, two types of firewood rocket stoves, two types of charcoal briquette stoves, and kerosene stoves) and to assess fuel supply and demand. Each stove was evaluated for factors including their health impact, user safety, environmental impact, user preference, and affordability. This measure was designed in response to supply challenges of ethanol cooking companies, such as sugar companies selling ethanol for blending with transport fuel rather than for cooking fuels.

In 2017, Gaia Association was rebranded to Gaia Clean Energy. Its objectives include ensuring that 100% of households in refugee camps in Jijiga receive ethanol fuel for cooking on a regular basis, promoting mixed solutions to address cooking needs in Assosa, and providing lighting in refugee camps in Somali region. However, the NGO met challenges with this: changes and inconsistencies in ethanol supply led to households reverting to collecting biomass to meet their energy needs and it was observed that highly vulnerable populations, such as people with asthma, in Kebribeyah, Awbere, and Sheder camps were particularly impacted by a delay in the ethanol fuel supply [84].

In 2018, Gaia Clean Energy had to terminate its activities due to budget constraints of UNHCR. Despite the progress that the NGO and its partners had made in promoting ethanol as a source of clean cooking in displacement settings in Ethiopia, most households remain reliant on traditional cooking methods. Much more work needs to be done to scale up ethanol and other clean cooking approaches to reach displaced and host communities around the country.

06

Potential high-impact projects

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Overview of the design process

Effective long-term solutions cannot be implemented in isolation. Close coordination among stakeholders and fostering learning between different organisations are essential to use resources as efficiently as possible and to scale up existing work. Co-designing potential energy interventions – bringing together the experience and expertise of 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 workshops 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 gained from 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 issues currently faced in displacement contexts in Ethiopia.

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 displacement settings or scaled up.

Following these initial designs and augmented with elements of others that were identified as viable project opportunities from ongoing activities in displacement settings around Ethiopia, these ideas have been further developed into the project concepts presented in this section. These summaries provide an outline of the potential projects including:

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

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 workshops 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 considerable differences between displacement settings across the country and within similar areas, as well as between displaced and host communities. 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 and displaced people 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 given appropriate time and resources to best develop long-term implementation plans. These should be done with community members and other stakeholders who best understand their energy needs and are therefore best positioned to shape the proposed interventions.

Many of the project concepts aim to use market systems 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 displacement settings – and be adequately supported in doing so, where required – to establish a permanent presence which endures after external funding ends. Local companies in the camps, meanwhile, should be supported to conform with national and international product standards to ensure quality for customers. All companies and organisations that 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 in designing sustainable energy interventions as they understand best their own energy needs and priorities. Community members are particularly well-placed project partners owing to their networks and knowledge of the context, and therefore should have important roles to play 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 the 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,
- Hiring community members as sales agents, community mobilisers, and product ambassadors,
- Equitably targeting both displaced 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 service,
- Involving or creating cooperatives to oversee and manage community-wide or public projects and their locations, such as streetlights, and
- Enabling direct collaboration with humanitarian and development actors, the private sector, and other organisations for project planning, management, auditing and other key activities.

Gender mainstreaming

Sustainable energy interventions could have different implications for women and men. This can be exacerbated when decision makers, typically men, are not of the same gender as the primary users of energy technologies, who are often women with regards to domestic responsibilities. Considering these differences and their effects during both the design and implementation of energy projects can help 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 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 that are compatible with family, childcare or household responsibilities, such as positions near their homes,
- Scheduling engagement events at convenient times of the day and/or providing stipends to avoid conflicting with childcare responsibilities, allowing mothers to participate,
- Implementing awareness-raising campaigns for energy solutions that target both men and women to promote interest in new technologies,
- Offering cooking classes in schools to both boys and girls to raise awareness of clean cooking solutions and encourage them to learn how to cook, and
- Highlighting the needs of different household members during product sensitisation campaigns and encouraging joint decision-making.

Inclusivity strategies

Achieving sustainable energy for all requires understanding and meeting the needs of every member of the community. In displacement contexts, some individuals may have specific vulnerabilities or require different considerations to access sustainable energy, such as those with disabilities. Including these individuals in project design and offering strategies for their inclusion during implementation can ensure that energy interventions meet their needs more effectively. Some inclusivity considerations could include:

- ☑ Holding focus groups with individuals with specific vulnerabilities to ensure interventions are accessible and meet their needs,
- ☑ Including people with disabilities in trainings and employment opportunities whilst accommodating any specific needs,
- ☑ Engaging with microfinance companies to develop services that make upfront costs more accessible to low-income customers, such as for connections to mini-grids,
- ☑ Using voucher systems for vulnerable customers to access technologies within a wider market-based approach, such as for solar products or improved cooking solutions, and
- ☑ Promoting technologies, products and designs which accommodate users with specific vulnerabilities or disabilities.

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Project concepts

SOLAR MINI-GRID DEVELOPMENT

1/2

LOCATION

Camps in the Melkadida operation

BACKGROUND

Most refugee camps in Ethiopia remain unconnected to the national grid. Households therefore rely on torches, candles, kerosene, firewood, diesel generators and substandard solar off-grid products for lighting. Demand for a reliable source of electricity access is high. Solar-hybrid mini-grids have the potential to provide power to large numbers of households, businesses and community facilities, facilitating the expansion of reliable electricity in a more timely and cost-effective way than through the expansion of the national grid. The recent launch of the first private-sector mini-grid in Ethiopia, located in Sheder refugee camp, and other micro-grids implemented under cooperative models highlight the potential to install systems in camps that currently lack access to reliable electricity.

ACTIVITIES

Conduct a desk review, initial site assessment, community consultation, and feasibility study

Consult with local and federal government authorities

Develop a detailed system design and business plan, incorporating a cost-reflective tariff

Contract a mini-grid company and require an equity commitment of around 20-30%

Acquire land rights, license and permitting

Develop a long-term O&M plan

Construct and install the mini-grids

Conduct testing and commissioning

Train and hire community members as technicians and salespeople and establish a community electricity committee

Connect households, businesses and community facilities

Monitor usage and survey user satisfaction

Pilot e-cooking using mini-grid connections

Implement a reliable revenue collection system

ENABLERS

Humanitarian Energy PLC's experience in acquiring the first private sector mini-grid license will likely simplify the process in the future

Demand for electricity is very high and customers already pay high amounts for inefficient lighting products

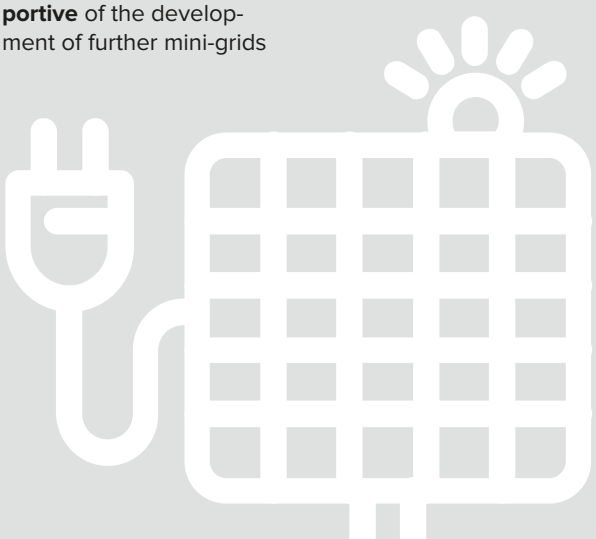
The government is supportive of the development of further mini-grids

BARRIERS

Complex regulatory environment and lengthy process to obtain a license

High upfront capital costs and operational expenditures with the need for substantial grant funding

Need for detailed assessments for each potential site



Project concepts

PROJECT REACH, TIMELINE AND BUDGET

Five mini-grids for 30,000 households and businesses in the refugee and host communities, with the option of connecting community facilities

Three years

$22.5 million

FURTHER INFORMATION

Ethiopia's first private mini-grid was launched in Sheder refugee camp in May 2024 and provides valuable experience for other companies and organisations to replicate its process. Humanitarian Energy PLC runs the solar-hybrid mini-grid as a service provider using a pre-paid consumption-based tariff structure. Demand for connections has been very high, including to connect more power-intensive appliances. Experience from the cooperative-managed mini-grids in Melkadida, meanwhile, provides insights into how to engage community members for long-term sustainability. Costs are estimated at around $750 per connection and the total budget could be a combination of grants, equity, loans, and climate financing.

REPLICATION & EXPANSION

Builds on experience made with the mini-grid in Sheder refugee camp implemented by Humanitarian Energy PLC

Micro-grids have been implemented by UNHCR in the Melkadida camp cluster which are managed by energy cooperatives

Potential to include e-cooking which is being piloted by Humanitarian Energy and Mercy Corps with support from MECS in Sheder. Additionally, Alianza Shire is implementing EPCs in schools in Kobe and in Melkadida

STAKEHOLDERS AND ROLES

Private company to design, install and maintain mini-grids, to collect fees, and to train community members

Technicians to install connections and maintain the system

NGOs and bilateral agencies to support commissioning, financing agreements, training and community engagement activities

Government authorities to provide licenses and permitting

Community electricity committees to mobilise the community and give feedback on issues to other stakeholders

Donors and financial institutions to provide blend of grant funding and financing

SCALABILITY

High: The need and demand are great for larger-scale solar off-grid solutions. Most camps do not have grid connections and experience with obtaining licenses and operating mini-grids will facilitate the expansion and installation of additional systems.

SOLAR MINI-GRID DEVELOPMENT 2/2

Project concepts

SUPPORTING MARKET DEVELOPMENT FOR SOLAR OFF-GRID COMPANIES

1/2

LOCATION

Refugee camps in Gambella and Benishangul-Gumiz regions

BACKGROUND

Ethiopia has a well-established market for solar off-grid products. Providing these products in displacement settings, which are typically in rural and remote areas, can be less attractive for companies owing to the increased logistics costs and complex regulatory environment, amongst other factors. This can inhibit solar off-grid companies from setting up operations in such locations and affects the profitability of those that attempt to enter these markets. De-risking solar off-grid companies by providing blended finance, such as results-based financing schemes, can help lower the risk of market entry and encourage new actors to serve these areas, catalysing further investment in the future. This should be supported by community awareness raising activities to engage customers, demonstrate the advantages of sustainable energy, and stimulate market growth.

ACTIVITIES

Conduct market assessments and community consultations to design the intervention

Engage with suitable solar off-grid companies

Issue a request for proposals for interested companies to bid for funding

Issue contracts and agree on deliverables for results-based financing schemes

Provide financing to companies to establish operations and begin selling their products, including setting up shops and training and hiring community members as technicians and salespeople

Support companies in developing financial schemes to enhance the affordability of products such as instalment payments, PayGo schemes, flexible repayment mechanisms

Work with MFIs to provide loans to customers to access products

Organise awareness raising campaigns involving community events to promote products

Assess potential for combined warehousing and logistics in remote areas for energy companies

Provide after-sales services and conduct customer surveys to assess usage and satisfaction rates

Identify market systems blockages and work with companies to overcome them

Develop tailored schemes for vulnerable households to access energy products and services

Monitor and evaluate the effects of market system support

Phase out results-based financing as operations become more established

ENABLERS

High demand for energy products and services

Many off-grid solar companies operating in Ethiopia

People are already paying for low-quality, inefficient lighting alternatives

Can work with a variety of companies to reduce risk and increase choice

BARRIERS

Low ability to pay of potential customers

Requires investment and a long-term approach to build markets

Could be affected by market distortion from the free distribution of similar products

Companies require pre-financing and the ability to access loans in hard currencies

Ethiopia's foreign exchange regime has recently changed which has led to signficant fluctuations of the value in the currency

Project concepts

PROJECT REACH, TIMELINE AND BUDGET

8,000 households and businesses in refugee and host communities

Four years

$2 million

FURTHER INFORMATION

Companies which sell energy products directly to consumers require reliable logistics and distribution networks which can take time and significant investment to establish. If some of these costs were de-risked through public-private co-investment, and additional guidance was provided by partners to reduce the risk and work with established MFIs, this could encourage increased private sector engagement and the creation of markets for higher-quality solar off-grid products, thereby supporting increased customer choice and access to electricity. Companies should be supported in providing high-quality products with warranties and maintenance support to ensure their longevity and avoid market distortion.

REPLICATION & EXPANSION

Similar to activities undertaken by SHARPE

Similar to work done by Mercy Corps and GIZ in West Nile, Uganda, by SNV in Kakuma, Kenya, and by Practical Action in Rwanda

STAKEHOLDERS AND ROLES

Humanitarian and development actors to provide and manage RBF schemes and support market development and community engagement

Energy companies to establish operations in displacement settings, sell products, train and hire community members, and provide after-sales services

Community members and leaders to engage with demonstration activities and to co-design schemes to support vulnerable households

Local government to support authorisations and permits

MFIs to provide loans to customers

SCALABILITY

High: Demand is high for high-quality, reliable lighting solutions. The more experience gained through initial sales, the more likely it is that demand will increase for solar off-grid products. Coordination to avoid free distribution and engaging in awareness raising campaigns is critical to support the uptake of additional systems.

SUPPORTING MARKET DEVELOPMENT FOR SOLAR OFF-GRID COMPANIES 2/2

Project concepts

PILOTING ELECTRIC COOKING

1/2

LOCATION

Locations with a mini-grid or grid connection, such as Alemwach (Amhara region) or Sheder (Somali region)

BACKGROUND

Using electricity for cooking can offer a cleaner alternative to traditional cooking practices. This can reduce indoor air pollution and its negative health impacts, as well as decrease the consumption of biomass, thereby avoiding environmental degradation and the need to collect fuel. The implementation of mini-grids offers new opportunities to trial cooking with electricity, for example using electric pressure cookers (EPCs) or induction stoves. In addition, electricity for baking injera is relatively well established in Ethiopia, and communal electric cooking facilities have been established in some camps.

ACTIVITIES

Identify suitable camps with mini-grid or grid connections

Engage with community members to identify potential barriers to electric cooking

Coordinate with government and electric utility providers

Contract companies to supply EPCs and induction stoves

Roll out EPCs and induction stoves along with close monitoring

Run information and training sessions on how to use electric cooking

Construct communal electric cooking facilities

Extend or upgrade national grid infrastructure to connect kitchens, if required

Establish community management groups

Support management groups to oversee the usage of the facilities and coordinate maintenance

ENABLERS

Mini-grids offer new opportunities to trial cooking with electricity

Communal electric cooking has been implemented in Sherkole, Barahle and Aysaita camps

Using electricity for baking injera is relatively well-established

The grid network can provide a relatively stable and high-quality supply of power and reduce or eliminate the need for firewood procurement

Ethiopia has been approved for renewable energy credits which could enable climate financing

Scarcity of woodfuel in some regions supports alternatives to biomass cooking

BARRIERS

Electric cooking is unlikely to meet all cooking needs, so traditional biomass sources will likely persist as the predominant form of cooking

Mini-grids need to be sized adequately to support electric cooking

If mini-grid tariffs are high, cooking with electricity may become unaffordable

Suitability could vary across different cooking practices

Communal cooking facilities require strong community oversight and people generally prefer the flexibility that comes with having their own cooking facilities

Few households have grid connections

Project concepts

PROJECT REACH, TIMELINE AND BUDGET

400 units for refugee households with mini-grid access
400 units for host community households with a grid connection
800 refugee households in electric communal kitchens

Two years

$2 million ($750,000 for individual households and $1.25 million for communal kitchens)

FURTHER INFORMATION

Transitioning to electricity for cooking compliments key objectives of many organisations, including reducing the reliance on biomass and the negative impacts of traditional stoves. The suitability of different types of electric cooking will vary depending on cultural preferences, with communal systems potentially more viable in northern Ethiopia and individual systems in Somali region. Refugee households with a mini-grid connection and grid-connected host communities could benefit from cost savings on fuel and reduced negative health impacts by adopting electric cooking if it is compatible with local cooking practices. For electric communal kitchens, camps with grid connections (or those that could receive them) would be the best candidates, as electric cooking can require large amounts of energy and has high power requirements at specific times of the day. The cost of providing communal electric cooking equipment alone has been previously estimated at $50,000 per kitchen for 75 households.

REPLICATION & EXPANSION

Replicates work done by SNV to pilot EPCs in Kalobeyei settlement in Kenya

Replicates communal electric cooking projects which have been implemented in Sherkole, Barahle and Aysaita camps

STAKEHOLDERS AND ROLES

Government and electrification authorities to provide permits and support with grid connection

NGOs to support and train management groups

Private sector to supply electric cooking equipment

Community leaders to encourage uptake of electric cooking and mobilise the community

SCALABILITY

Moderate: In the long-term, electric cooking may experience higher levels of uptake but this is reliant on extensive investments in increased access to electricity first. The potential to scale up electric cooking facilities is more limited due to their high upfront costs and the limited reach of households, as well as households' preference for having their own private cooking equipment.

PILOTING ELECTRIC COOKING 2/2

Project concepts

DIASPORA CROWDFUNDING FOR ENERGY IN SOCIAL INSTITUTIONS

1/2

LOCATION

Nationwide

BACKGROUND

Social institutions such as schools and health centres typically lack the upfront capital necessary to invest in renewable energy systems and rely mostly or entirely on government funds or grant funding. Donations from members of the diaspora could provide an additional source of funding. Developing a platform for the diaspora to donate to sustainable energy projects designed by community members could increase the amount of available funding and provide support to locally-developed initiatives. People working at these social institutions would be provided with an opportunity to crowdfund projects and support the realisation of their initiatives. The high social impact of supporting social institutions lends itself particularly well to individual private donors.

ACTIVITIES

Work with community members and leaders to identify pilot locations and facilities

Host engagement events with communities to support and develop renewable energy project ideas

Design and test a crowdfunding platform to showcase and promote projects specifically targeting the diaspora

Collaborate with a financial institution or tech company to disburse funds

Develop financial mechanisms to receive donations from the diaspora and allocate to specific projects

Ensure that the platform is suitably regulated and insured with responsible oversight

Promote the platform through social networks

Maintain and grow the platform to scale up to further locations

ENABLERS

Strong links between communities and the diaspora

Combining smaller donations can increase overall impact

Highly scalable to new locations

Flexible to individual community needs and priorities

BARRIERS

Requires strong oversight and management

Limited scale of projects

Necessary to align community expectations, technical system design, and available financial resources

Necessary to continuously promote and maintain platform

Project concepts

PROJECT REACH, TIMELINE AND BUDGET

Five locations

Three years

$500,000 to set up platform, engage with communities, and for seed funding

FURTHER INFORMATION

Managing a crowdfunding platform would require a clear understanding of financial regulations, necessitating close alignment and collaboration with a financial institution or dedicated private entity. If communities are not able to receive sufficient donations to cover the full costs of a project then a financial institution could be engaged to provide a loan, potentially at a concessional rate, to bridge the funding gap. Philanthropic entities or other funding sources could be engaged to match the crowd-funded donations and thereby increase the scale of the funding available.

REPLICATION & EXPANSION

Potential to learn from crowdfunding platforms like Kiva or GoFundMe

Crowd Power, a programme run by Energy 4 Impact with similar objectives, supported hundreds of energy access campaigns across Africa, Asia, and Central America

STAKEHOLDERS AND ROLES

Community members and leaders to identify local opportunities and engage diaspora

Humanitarian and development organisations to support local project development and platform development

Diaspora to provide funding for projects

Private sector or financial institution to set up a payment management and disbursal system

Bank to insure the payments and financial institution

Local authorities to provide oversight

Renewable energy companies to design and install systems

SCALABILITY

Moderate: The same platform could be used across locations but work would be required in each community to initiate projects.

DIASPORA CROWDFUNDING FOR ENERGY IN SOCIAL INSTITUTIONS 2/2

Project concepts

SOLAR WATER PUMPING FOR IRRIGATION

1/2

LOCATION

Nationwide

BACKGROUND

By providing a reliable source of water, irrigation systems can increase crop yields and mitigate some impacts of climate change. This can help to support agricultural livelihoods and strengthen local value chains for both displaced and host communities. Providing irrigation systems for the first time can unlock new farming opportunities, whilst transitioning diesel-powered pumps to solar energy can greatly reduce the costs and emissions associated with water pumping. Pumping systems can be run by cooperatives, composed of displaced and host community members, and provide jobs for technicians to operate the systems.

ACTIVITIES

Conduct needs assessments and community engagement

Assess appropriate fees and payment mechanisms for farmers

Work with existing cooperatives or support the establishment of new irrigation cooperatives

Contract a company to design, install and maintain systems

Provide training to cooperative members on how to manage the systems along with financial literacy courses

Community cooperatives operate and manage the systems

Recruit and train system operators

ENABLERS

High demand for irrigation

Can be implemented under a co-operative model

High solar irradiance

Supports organisational goals for livelihoods and resiliency

BARRIERS

High upfront costs

Requires community coordination and buy-in

Requires careful design for equitable access to water

Project concepts

PROJECT REACH, TIMELINE AND BUDGET

Six locations (100 hectares each)
Three years
$3 million ($500,000 per system)

FURTHER INFORMATION

Solar irrigation systems can provide reliable power at reduced costs compared to diesel generation. However, they still require maintenance and repair which should be budgeted for as part of the fees that cooperative members pay, including salaries for technicians. Engaging with communities is critical not only to form a well-functioning management cooperative but also to ensure equitable access to the benefits of the system for members of both displaced and host communities.

REPLICATION & EXPANSION

Replicates irrigation cooperative in Melkadida which uses a 57 kWp system for 90 hectares of land

STAKEHOLDERS AND ROLES

Displaced and host communities to form cooperative and operate and maintain systems

Irrigation technicians to operate and maintain the system

Company to design, install, and maintain the systems and train cooperatives

Humanitarian and development organisations to support equipment procurement and provide technical oversight

Government authorities to undertake water use assessments and approve systems

SCALABILITY

High: Systems are scalable depending on demand and available resources.

SOLAR WATER PUMPING FOR IRRIGATION 2/2

07

Conclusions

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Key issues for energy access

Ethiopia hosts one of the world's largest populations of displaced people, including more than 1 million refugees, 4.3 million IDPs, and 2.5 million IDP returnees. Most live in camps and communities located in rural areas around the country and, although Ethiopia has a relatively welcoming environment for displaced people, access to key financial services and livelihoods opportunities remains limited.

Access to sustainable energy in displacement settings presents a major challenge. Across the country, levels of access to both electricity and clean cooking are very low and the diversity of communities and displacement contexts in Ethiopia means that there will be no one-size-fits-all solution to improve the situation.

Almost all households in displacement settings in Ethiopia rely on traditional sources of cooking, such as three-stone fires with firewood or charcoal. This causes environmental degradation and health issues, risks conflict between communities, and exposes those collecting it – usually women and girls – to SGBV. Programmes to introduce a range of different solutions, including ethanol cooking, improved biomass stoves, briquette interventions, and communal electric kitchens have generally been sporadic and short-term, often forced to cease due to limited funding. Much more work is needed to scale up access and to strengthen supply chains for clean cooking.

Access to electricity for households and businesses is similarly limited: most rely on basic sources of power of lighting such as rechargeable torches, if anything at all, although diesel generators provide electricity services in some locations. Some organisations have distributed off-grid solar products in displacement settings but many of these products were low quality and have ceased to function without adequate repair and maintenance services to fix them. Supporting market development and activation activities, alongside flexible financing and RBF schemes, could help Ethiopia's off-grid solar companies to break into these challenging markets and increase access to higher-quality solar off-grid solutions.

Solar mini-grids, meanwhile, have begun to show promise, including under cooperative models in Melkadida and led by the private sector in Shedder refugee camp. These have brought reliable electricity to thousands of households and businesses but the demand across the country far outweighs the supply. Much greater investment will be required to replicate these systems across the country.

Whilst some community facilities have access to power from the grid or mini-grids, many more lack reliable power. Humanitarian operations, meanwhile, generally have access to reliable electricity through the grid or diesel generators. Water pumping has emerged as an effective candidate for solar energy, both for drinking water boreholes and for crop irrigation, but the high costs of the equipment required to provide power to community facilities has limited their uptake. Connecting to the national grid, where available, or larger-scale solar mini-grids could help to provide more affordable and reliable power for these critical services. ●

The road to sustainable energy in displacement settings

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

The READS workshops 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. ››

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The road to sustainable energy in displacement settings

SHORT TERM (2024-2025)
MEDIUM TERM (2026-2027)
LONG TERM (2028-2030+)

SOLAR MINI-GRIDS

SHORT TERM

- Replicate solar mini-grid implementation and community engagement models in different regions of Ethiopia
- Connect humanitarian operations and community facilities as anchor customers

MEDIUM TERM

- Support widespread scale-up of solar mini-grids through blended finance, led by private sector

LONG TERM

- Support solar mini-grids in hardest-to-reach areas through grants or concessional finance

OFF-GRID SOLAR PRODUCTS

SHORT TERM

- Support market activation and entry for companies in selected locations with subsidies and RBF schemes
- Train community members in repair and maintenance services

MEDIUM TERM

- Work with companies to establish supply chains and distribution centres in displacement settings
- Ensure quality standards and warranties are widely enforced

LONG TERM

- Phase out subsidies and RBF schemes where possible
- Continue market development and support for companies where required

IMPROVED COOKSTOVES

SHORT TERM

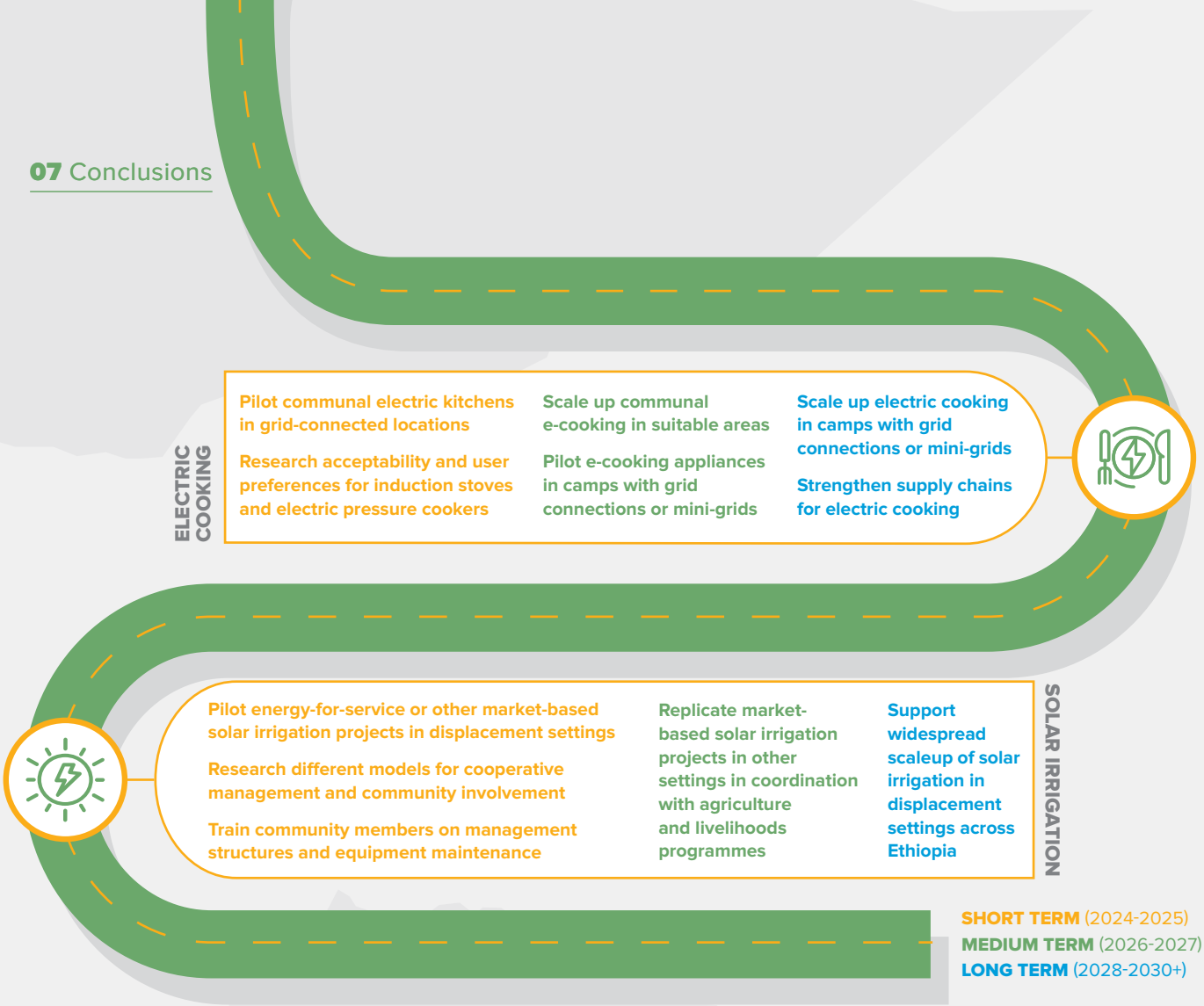
- Conduct research and pilot studies on the suitability of stove and fuel types in different regions
- Support introductions and community engagement activities for clean cooking companies

MEDIUM TERM

- Pilot RBF schemes for clean cooking companies in displacement settings
- Support development of supply chains for improved stoves and fuels as well as establishment of local production sites

LONG TERM

- Provide blended finance for clean cooking companies to establish larger-scale operations



The challenge is huge: achieving access to affordable, sustainable, reliable and modern energy for displaced and host communities by 2030 will require more projects, activities, partners, coordination, and investment than ever before. Fortunately there are promising solutions that can be learned from and scaled up to implement new initiatives, make new collaborations, and improve access to energy in displacement settings throughout Ethiopia.

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

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