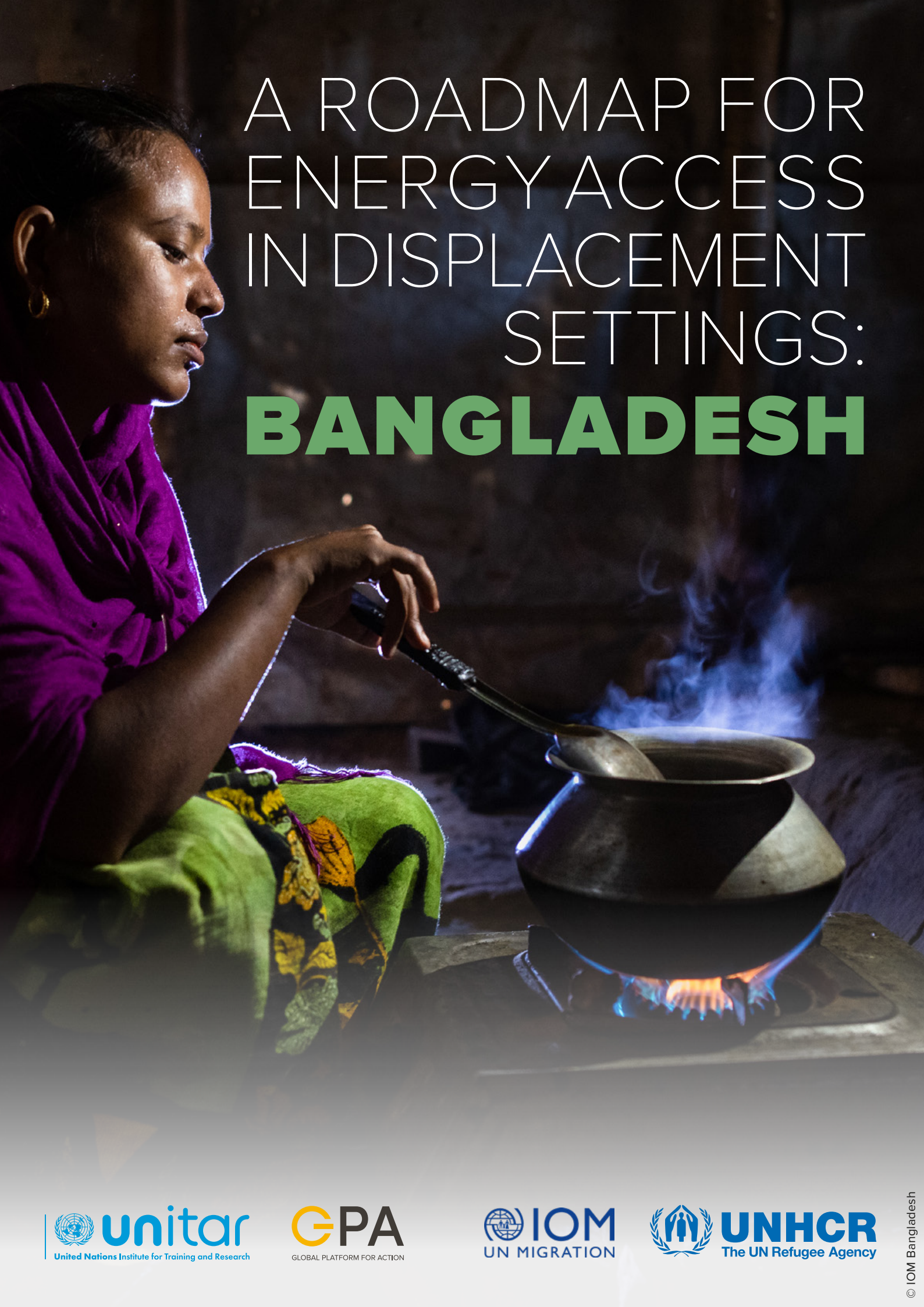

A ROADMAP FOR ENERGY ACCESS IN DISPLACEMENT SETTINGS: BANGLADESH

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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. ››

Acknowledgements

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.

About the READS Partner

UNHCR, the UN Refugee Agency, is a global organization dedicated to saving lives, protecting rights and building a better future for people forced to flee their homes because of conflict and persecution. We lead international action to protect refugees, forcibly displaced communities and stateless people. We deliver life-saving assistance, help safeguard fundamental human rights, and develop solutions that ensure people have a safe place called home where they can build a better future. We also work to ensure that stateless people are granted a nationality. Our teams bring expertise, compassion, and unwavering dedication to protect and care for millions worldwide.

The International Organization for Migration (IOM) is the UN's leading agency on the field of migration, working closely with its key stakeholders – migrants and Member States – to promote safe, orderly and regular migration. It does so by providing services and advice to governments, migrants and other stakeholders in order to maximize the benefits and opportunities of migration and reduce its challenges. Established in 1951, IOM now has 175 Member States, offices in over 580 field locations and over 20,000 staff – 90 percent of which are deployed in the field. The Organization's work at all levels is guided by IOM's Strategic Plan, which is built around three key objectives: saving lives and protecting people on the move, driving solutions to displacement, and facilitating pathways for regular migration. IOM leads environmental sustainability innovation for impact and scale in the humanitarian and migration management sector. Through innovative technology and finance solutions, IOM promotes the use of renewable energy in the communities that it serves, addressing immediate needs while implementing long-lasting solutions that benefit both communities and the environment. IOM collaborates with private sector and other key partners who can help accelerate scalable results by advancing high-potential initiatives.

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 avail- able over the next five years to accelerate the reduction of greenhouse gas emissions.

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Abbreviations

ADB	*Asian Development Bank*
AoR	*Area of responsibility*
BDT	*Bangladeshi Taka*
BPDB	*Bangladesh Power Development Board*
CCCM	*Camp Coordination and Camp Management*
CiC	*Camp-in-Charge*
CO2	*Carbon dioxide*
CRH	*Compressed rice husk*
EEN	*Energy & Environment Network*
EPC	*Electric pressure cooker*
FAO	*Food and Agriculture Organization of the United Nations*
FCDO	*Foreign and Commonwealth Development Office*
FDMN	*Forcibly Displaced Myanmar Nationals*
GHG	*Greenhouse gas*
GPA	*Global Platform for Action on Sustainable Energy in Displacement Settings*
GW	*Gigawatt*
ICS	*Improved cookstove*
IDCOL	*Infrastructure Development Company Limited*
IDP	*Internally displaced person*
IEPMP	*Integrated Energy and Power Master Plan*
IOM	*International Organization for Migration*
ISCG	*Inter-Sector Coordination Group*
IUCN	*International Union for the Conservation of Nature*
JICA	*Japan International Cooperation Agency*
JRP	*Joint Response Plan*
KRC	*Kutupalong Registered Camp*
kV	*Kilovolt*
kWh	*Kilowatt-hour*
kWp	*Kilowatt-peak*
LNG	*Liquefied natural gas*
LPG	*Liquefied petroleum gas*
MECS	*Modern Energy Cooking Services*

Abbreviations

MoDMR	*Ministry of Disaster Management*
MOFA	*Ministry of Foreign Affairs*
MPEMR	*Ministry of Power, Energy and Mineral Resources*
MTF	*Multi-Tier Framework*
MW	*Megawatt*
NAPCC	*National Action Plan for Clean Cooking*
NDC	*Nationally Determined Contributions*
NEP	*National Energy Policy*
NFI	*Non-food item*
NGO	*Non-governmental organisation*
NRC	*Nayapara Registered Camp*
NTF	*National Task Force*
O&M	*Operation and maintenance*
PV	*Photovoltaic*
READS	*Roadmaps for Energy Access in Displacement Settings*
RISE	*Regulatory Indicators for Sustainable Energy*
RRRC	*Refugee Relief and Repatriation Commissioner*
SDG 7	*Sustainable Development Goal 7*
SEG	*Strategic Executive Group*
SHS	*Solar home system*
SREDA	*Sustainable and Renewable Energy Development Authority*
SSL	*Solar streetlight*
THEA	*Transforming Humanitarian Energy Access*
UN	*United Nations*
UNHCR	*Office of the United Nations High Commissioner for Refugees*
UNICEF	*United Nations Children's Fund*
UNITAR	*United Nations Institute for Training and Research*
USAID	*United States Agency for International Development*
USD	*United States Dollar*
WASH	*Water, sanitation and hygiene*
WFP	*World Food Programme*
WHO	*World Health Organization*

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.*

Executive Summary

Globally, over 100 million people have been forcibly displaced from their homes. Amongst those living in camps and settlements, more than 80% rely on firewood and 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 Bangladesh, which hosts more than 1.1 million displaced people from Myanmar. This report consolidates the status of energy access in displacement settings in Bangladesh, provides an overview of the stakeholders working towards SDG 7, and presents opportunities for high-impact projects to support increased access to sustainable energy.

Energy access in displacement settings in Bangladesh

Household cooking

The use of liquefied petroleum gas (LPG) for cooking is almost universal across the refugee camps and its distribution is coordinated by UNHCR and IOM. This has significantly reduced the environmental impact of using firewood for cooking, which was previously the most common source of cooking fuel, although some households continue to use it if their LPG supply runs out. Humanitarian agencies have also distributed pressure cookers to reduce LPG usage and, more recently, pilot projects have explored the potential for electric cooking.

Despite this progress, many challenges remain including the significant cost of providing LPG to all camp residents. Fuel stacking remains common, and some households sell part of their LPG allocation to meet other basic needs, whilst access to maintenance services for LPG stoves can be limited. Improving coordination between humanitarian agencies to manage LPG supply could improve efficiencies whilst scaling up alternative and cleaner sources – such as pressure cookers and electric cooking – could reduce overall cooking costs.

Household electricity

Domestic electricity access is limited and fragmented, with most households reliant on small solar off-grid systems that provide basic services such as lighting and phone charging. These are often purchased in local markets and face quality and maintenance issues. Small-scale mesh-grids have been piloted and solar lighting guidelines have been developed to support greater scaleup, but overall electricity access remains low.

Although policy barriers remain in place, strengthening the enabling environment and supporting the private sector to lead on the delivery of high-quality solar products could help improve electricity access. Increasing local capacity within the camps for repair and maintenance could extend the lifetime of domestic solar systems and reduce the volume of electronic waste from disused and discarded products. ››

Executive Summary

Community facilities and humanitarian operations

Key services such as education, healthcare, distribution centres, and water pumping rely on consistent access to electricity. Solar power has been widely adopted for water pumping but many systems rely on diesel generators as a backup power source or when solar systems are not operational. IOM and UNHCR have solarised health centres and distribution centres across the camps but only a small number of educational facilities have access to solar power. Many organisations have implemented solar street lighting, complemented by training refugee technicians in repair and maintenance, but coverage is uneven and many systems are partially functional or non-operational.

Most electrification efforts for community facilities have been led by individual organisations and so coordination and standardisation across stakeholders could help to improve camp-wide delivery. Persistent maintenance challenges could be addressed through long-term service contracts and improved training, whilst uneven coverage of public lighting could be improved through closer with local communities. Prioritising hybrid electricity systems could provide reliable electricity whilst reducing operating costs, and exploring new clean cooking technologies (such as electric cooking) could support institutional-scale cooking needs.

BARRIER	OPPORTUNITY
High costs of LPG and solar products	Support alternative cooking technologies, market development, private sector entry, and carbon finance opportunities
Limited availability of local repair and maintenance for energy products	Promote high-quality products, train refugees to provide maintenance, and incentivise local repair and recycling
Many standalone projects with limited long-term funding	Use existing coordination mechanisms to plan camp-wide delivery

Stakeholders in Bangladesh

Energy access under the Rohingya humanitarian response in Bangladesh is underpinned by a robust coordination structure that operates across multiple administrative levels. The Government of Bangladesh, through the National Task Force chaired by the Ministry of Foreign Affairs, provides strategic direction at the national level. The Ministry of Disaster Management and Relief and the Refugee Relief and Repatriation Commissioner, meanwhile, lead sub-national coordination in Cox's Bazar and Bhasan Char.

On the humanitarian side, the Strategic Executive Group in Dhaka (co-chaired by the UN Resident Coordinator, UNHCR, and IOM) provides high-level leadership. In the field, the Inter-Sector Coordination Group facilitates coordination among UN agencies, NGOs, and donors, while UNHCR leads multi-sector coordination on Bhasan Char. Sector-specific responsibilities are shared amongst UN agencies and NGO partners. ››

The use of LPG for cooking is almost universal, but domestic electricity access remains limited and fragmented.

Executive Summary

Opportunities to scale up sustainable energy

There is great potential to scale up sustainable energy access in refugee camps in Bangladesh. Whilst access to clean cooking is already high as a result of existing LPG programmes, alternative technologies such as pressure cookers and electric cooking could help to reduce costs. Electricity access could be supported through local mini-grids for households and businesses, e-cooking in health centres, and improved system maintenance of systems serving community facilities.

The READS Programme hosted an engagement workshop in Cox's Bazar in February 2025 that brought together stakeholders working on energy in displacement settings in Bangladesh. 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 to showcase potential investment opportunities and serve as a starting point for future support. A summary of these project concepts is shown in Table 1.

Improving access to sustainable energy in displacement contexts requires coordinated effort and a shared vision among all stakeholders. Based on the findings of this report, the READS Programme has outlined a roadmap for energy access in displacement settings in Bangladesh with short- (2026-2027), medium- (2028-2029), and long-term (2030+) goals. These include continued support for LPG alongside complementary clean cooking technologies, assessing opportunities to solarise community facilities, and piloting approaches to increase electricity access for households and small businesses.

The challenge is significant: achieving access to affordable, sustainable, reliable and modern energy for displaced people will require more projects, activities, partners, coordination, and investment than ever before. The collaborations, learning, and progress already made in providing clean cooking to households and solar power to community facilities can help lay the foundations for greater access to sustainable energy across camps to improve the wellbeing and quality of life for displaced people living in Bangladesh.

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	*Continued support to LPG and strengthened local maintenance processes*	*230,000 households and 800 technicians*	*2 years*	*$1.5 million*	*High*
2	*E-cooking and electrification for refugee households*	*6,000 households and 30 businesses*	*2 years*	*$7 million*	*Moderate*
3	*Feasibility assessment of the solarisation and O&M models for communal facilities*	*200 facilities*	*1 year*	*$400,000*	*Moderate*
4	*Solar e-cooking for health facilities in Rohingya refugee camps*	*10 facilities*	*2 years*	*$350,000*	*Moderate*
5	*Solar electrification for households and small enterprises*	*500 households and 150 businesses*	*2 years*	*$1.5 million*	*High*

01

Setting the scene

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Setting the scene

Bangladesh hosts more than 1.1 million Rohingya people who have been displaced from Myanmar and are now resident in camps in Cox's Bazar and Bhasan Char. Liquefied petroleum gas (LPG) is distributed by humanitarian agencies and used almost exclusively for cooking, but access to electricity is less common and often limited to basic solar lighting technologies, if anything at all. Key public services, such as water pumping and health centres, and humanitarian operations often have access to the national grid network or solar power and public lighting has been widely implemented in the camps, but a lack of maintenance means that many are non-functional.

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 different sectors have initiated projects aimed at improving energy access but these will require more investment and coordination to scale up. Furthermore, the amount of research and evidence needed to fully understand the energy needs and priorities of camp residents could be further increased in order to develop appropriate solutions to provide sustainable energy in refugee camps in Bangladesh.

Acknowledging this, the READS Programme aims to provide an overview of sustainable energy in displacement settings. With the Programme working across ten countries, Bangladesh is the tenth to be featured in a READS Roadmap Report alongside Kenya, Uganda, Rwanda, Lebanon, Ethiopia, Jordan, Nigeria, Mauritania, and Mozambique.

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 Cox's Bazar in February 2025 to engage with these stakeholders. Informed by published literature and the and experiences shared during this workshop, the READS ››

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

Setting the scene

Bangladesh Roadmap Report highlights the most pressing gaps, barriers, and opportunities for sustainable energy, as well as the roles of the stakeholders involved. It also provides a spotlight for potential high-impact projects, co-designed in the workshop by stakeholders from different types of organisations, which could improve sustainable energy access if they received support and investment.

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

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02

Forced displacement in Bangladesh

National overview

The People's Republic of Bangladesh is home to approximately 171.5 million people, making it the eighth-most populous country globally and one of the world's most densely populated nations [2]. Situated in South Asia, Bangladesh borders India to the west, north, and east, Myanmar to the southeast, and the Bay of Bengal to the south (see Figure 1). Bangladesh achieved independence in 1971 and is a founding member of the South Asian Association for Regional Cooperation (SAARC). The country transitioned from low-income to lower-middle-income status in 2015 and had a GDP growth rate of 5.8% in 2023, and has the goal of achieving upper-middle-income status by 2031 [2].

Bangladesh has a significant population affected by forced displacement, with a large number of internally displaced persons (IDPs) and refugees. The total number of forcibly displaced people is reported to be 1.16 million as of 2025 [4], although the total is estimated to be higher (around 1.7 million) as a result of disaster-related displacements.

As one of the most climate-vulnerable countries in the world, Bangladesh experiences severe and recurrent natural disasters and around 700,000 people are displaced every year due to natural disasters like floods and cyclones [5]. Disasters are exacerbated by climate change, resulting in significant economic losses and ››

FIGURE 1

The locations of Cox's Bazar (Bangladesh) and Rakhine state (Myanmar) [3].

National overview

widespread disruption to livelihoods and infrastructure. For instance, the 2023 monsoon floods triggered 1.3 million displacements in Bangladesh, mostly in Chattogram division's Cox's Bazar district, and many of these IDPs experience long-term or protracted displacement [5].

As of 2024, around 500,000 IDPs are displaced due to conflict and violence, notably within the Chittagong Hill Tracts, the majority of whom have been displaced for decades [5]. These IDPs fall under the purview of the national government, with responsibility shared among the Ministry of Chittagong Hill Tracts Affairs, the Task Force on Rehabilitation of IDPs and returnee refugees, and local administrative bodies established under the 1997 Chittagong Hill Tracts Peace Accord [6, 7]. These entities oversee identification, verification, and rehabilitation of IDPs, although challenges persist in implementation. As this government-led process continues, the READS report primarily focuses on the refugee population in Bangladesh, specifically the Rohingya communities hosted in Cox's Bazar and Bhasan Char.

The mass and protracted displacement of the Rohingya population has defined Bangladesh's displacement landscape over the past decade. As per the joint registration exercise by the government and UNHCR, in October 2025 there were 1,168,398 Rohingya refugees in Bangladesh (also known as Forcibly Displaced Myanmar Nationals, FDMN), of which 1,132,562 reside in the Cox's Bazar Rohingya refugee camps and 35,836 in Bhasan Char (see Table 2) [4, 8].

The Rohingya are a predominantly Muslim ethnic minority from Myanmar's Rakhine (formerly Arakan) state. They have faced severe marginalisation since the introduction of Myanmar's 1982 Citizenship Law, which rendered them stateless, stripping them of basic rights and protection and exposing them to systematic persecution and violence [9]. The Rohingya have faced multiple waves of displacement into Bangladesh [10]:

- **1977-1978:** Military operations forced approximately 200,000 Rohingya people into Bangladesh, most of whom were subsequently repatriated.
- **1991-1992:** Another wave of around 250,000 Rohingya people fled to Bangladesh; official camps were established but many people remained unregistered and dispersed informally.
- **2012:** Renewed violence in Rakhine displaced around 140,000 Rohingya people, exacerbating displacement pressures.
- **2017**: A major military crackdown forced approximately 740,000 Rohingya people into Bangladesh within a few months, significantly expanding the refugee population and prompting an urgent humanitarian response.

Bangladesh formally established two registered refugee camps, the Kutupalong Registered Camp (KRC) and the Nayapara Registered Camp (NRC), in the early 1990s. Initially, these camps hosted a combined population of ››

Bangladesh is one of the most climate-vulnerable countries in the world.

National overview

33,000 officially recognised refugees; however, an estimated 200,000 other Rohingya people resided in informal settlements outside the camps in Cox's Bazar and in neighbouring districts, as well as in makeshift sites adjacent to the official camps before 2017 [11].

Following the 2017 influx, larger organised settlements were established and managed by the Government of Bangladesh through the Refugee Relief and Repatriation Commissioner (RRRC), with coordination from UNHCR and IOM, alongside numerous UN agencies, NGOs and humanitarian actors. These include Kutupalong Mega Camp, the world's largest refugee camp, and the Nayapara Camps. Located in the space-constrained, densely populated, and climate-vulnerable *upazilas* (sub-districts) of Ukhiya and Teknaf respectively, within Cox's Bazar District, these constitute 33 formally designated camps and occupy an area of 23.6 square kilometres. In addition, since 2020, the Government of Bangladesh has relocated 35,836 refugees to the Bhasan Char Island in Noakhali District as part of its efforts to decongest Cox's Bazar camps and plans to relocate up to 100,000 refugees. While protection services and humanitarian assistance on the island have improved since November 2021, significant gaps remain in service delivery, access to energy and reliable transportation. These challenges not only affect the long-term sustainability of the island but also impact both refugees and humanitarian partners [12]. ●

TABLE 2

The population of Bangladesh, the populations of concern and their countries of origin, and the number of internally displaced people [2, 5, 12].

		PEOPLE	%
POPULATION OF BANGLADESH	***Total***	***175,686,899***	***100***
	Rural	*100,849,190*	*57.4*
	Urban	*74,837,709*	*42.6*
FORCIBLY DISPLACED POPULATION	***Total** (Rohingya refugees)*	***1,168,398***	***100***
	Cox's Bazar	*1,132562*	*96.93*
	Bhasan Char	*35,836*	*3.07*
INTERNALLY DISPLACED PEOPLE	*Conflict and violence*	*585,000*	-
	Disaster	*172,000*	-

Policy frameworks for displaced populations

Bangladesh does not have a comprehensive legal or policy framework dedicated to refugees' status, rights, or long-term solutions. The country is not a signatory to the 1951 Refugee Convention or its 1967 Protocol, nor does it have a national asylum or refugee law. Refugee protection and governance instead rely on a patchwork of administrative directives and bilateral or multilateral agreements [13, 14]. The 1946 Foreigners Act remains the principal legal instrument governing non-citizens in Bangladesh, granting the government broad discretion over the treatment of foreign nationals. In the absence of refugee-specific legislation, this Act supersedes other protections, meaning Rohingya refugees have no legally enforceable rights or status under Bangladeshi law [11].

Bangladesh's response to the Rohingya influxes, both before and after 2017, has evolved through ad hoc and legal-bureaucratic measures [15]. An early precedent was set in the late 1970s and 1980s under President Ziaur Rahman, when a bilateral agreement with Myanmar led to the repatriation of approximately 200,000 Rohingya refugees from the first major influx within sixteen months. During the second major influx in the early 1990s, the government similarly prioritised "quick and safe return", repatriating about 230,000 of 250,000 newly arrived Rohingya people by 1997. The remaining refugees, mainly those residing in official camps, were granted formal refugee status under a 1993 memorandum of understanding with UNHCR [15].

This early pattern established repatriation as the preferred solution. Since then, successive Bangladeshi government administrations have consistently refused to grant refugee status to new arrivals, believing that denying formal recognition would deter further influxes [15-17]. Rohingya people who arrived after the 1990s are officially labelled "Forcibly Displaced Myanmar Nationals" (FDMN), "unregistered refugees", or "temporarily sheltered", and are treated as irregular migrants living in makeshift camps or with host communities, rather than as refugees [18]. This nomenclature provides access to basic humanitarian assistance but not legal rights, underlining the government's stance that their presence is temporary.

In the absence of a dedicated refugee law, Bangladesh has gradually developed institutional mechanisms to manage each successive influx of the Rohingya refugees. A key step was the establishment of the RRRC under the Ministry of Disaster Management and Relief (MoDMR) in 1992, following the second major Rohingya influx. Since then, RRRC officials have served as Camp-in-Charge (CiC), overseeing camp administration and coordinating assistance on the ground [19].

In 2013, the Ministry of Foreign Affairs (MoFA) introduced the National Strategy on Myanmar Refugees and Undocumented Myanmar Nationals, commonly referred to as the Rohingya Refugee Strategy, in response to continued refugee arrivals. This strategy, which remains the main policy reference, outlines five key priorities: registration and data management, provision of basic services, strengthening border management, diplomatic engagement with Myanmar, and institutional coordination through an inter-ministerial task force [15]. The strategy established a National Task Force (NTF) in Dhaka to oversee Rohingya issues, chaired by the Ministry of Foreign Affairs and comprising various ministries and security agencies, signalling an effort to coordinate policy at the national level. ››

Cox's Bazar district hosts 33 formally designated camps.

Policy frameworks for displaced populations

The 2017 influx prompted major changes in Bangladesh's response structure. The government activated and bolstered the NTF as a high-level coordination platform, and in partnership with the UN, helped set up a complementary field-level mechanism called the Inter-Sector Coordination Group (ISCG) to organise the large-scale humanitarian operation. The RRRC's capacity has also significantly increased over time [15].

Under this framework, the government of Bangladesh leads the emergency response with the support of UN agencies (such as UNHCR, IOM, WFP, UNICEF, and WHO), international NGOs, and donor governments. Coordination occurs at multiple levels: the NTF provides strategic oversight and policy guidance in Dhaka, while on the ground in Cox's Bazar the RRRC and CiCs work alongside the ISCG's sector working groups to handle day-to-day service delivery. These arrangements have substantially improved camp management and helped deliver life-saving assistance to nearly one million Rohingya refugees since 2017, under the government's overall leadership [15, 20]. Notably, in the early phase of the crisis, Bangladeshi authorities – including the army – were deployed to maintain order and distribute relief supplies as the refugee population surged, before international actors scaled up their operations. This combination of national leadership and international partnership has been credited with averting famine and containing disease in the densely populated camps [20].

Despite these efforts, Bangladesh has not enacted any new law or permanent policy specific to refugees. The government's approach remains focused on short-term humanitarian management and an eventual return of refugees to Myanmar, rather than local integration. Policies and guidelines are often issued via administrative orders or circulars, reflecting an adaptive stance rather than a fixed long-term strategy [17]. Underpinning this approach is the government's firm political position that Rohingya repatriation is the only viable long-term solution for the crisis. In line with that position, Bangladesh has pursued diplomatic agreements to facilitate future returns, including a bilateral arrangement with Myanmar in November 2017 and a memorandum of understanding with UNHCR in April 2018 establishing a framework for voluntary, safe, and dignified repatriation [21]. To date, however, no large-scale returns have occurred under these agreements, as conditions in Rakhine State remain unsafe. Bangladesh continues to emphasise in international forums that the Rohingya's stay is temporary and to call on Myanmar (with UN support) to create conditions conducive to early repatriation.

Within Bangladesh, the government has prioritised immediate humanitarian relief for the Rohingya although without measures that would signal permanent integration. Refugees are not granted the right to work or move freely beyond camp boundaries. Any support for education, skills development and select livelihood initiatives are designed to align with opportunities in Myanmar and prepare refugees for repatriation and reintegration [12]. For example, the curriculum in camp learning centres is based on Myanmar's education system and language, and vocational trainings focus on skills that would be useful upon return. Officials have frequently cited the limited economic opportunities in Cox's Bazar, one of Bangladesh's poorest and most resource-constrained districts, and competition for jobs as reason for restricting refugees' access to the labour market [13]. Moreover, any informal income-generation activities (often labelled as "volunteer" work with humanitarian organisations) are irregular, low-paid, and insufficient to support sustainable livelihoods [19].

As a result, both camp-based and non-camp Rohingya communities remain confined to precarious living conditions characterised by limited access to essential services, heightened exposure to violence, severe restrictions on mobility and persistent tensions with local communities [22]. Critical to this are the added security risks and the perceived risk that expanded rights may hinder eventual repatriation to Myanmar [16, 17].

Since 2017, Bangladesh has undertaken several initiatives to improve camp management and ››

Policy frameworks for displaced populations

service delivery, often with international partners. A major step was the joint Government–UNHCR registration exercise launched in 2018, through which more than 800,000 refugees received biometric identity cards by late 2019, strengthening protection and planning [23]. This system underpins coordination of assistance in the camps and has become a core element of the government's approach to camp administration. Camp governance has also become more formalised: in 2020 the government established a Law and Order Coordination Committee, chaired by the Ministry of Home Affairs, to address security and repatriation matters [13]. That same year, responsibility for camp security shifted from the military to new Armed Police Battalions, aiming to curb criminality and maintain civil order [20]. Together, these measures reflect the government's efforts to address evolving challenges in a protracted crisis and to institutionalise camp governance.

Several policy decisions were also taken to provide structured services while maintaining the principle of non-integration. In early 2020 the government approved a pilot to introduce the Myanmar curriculum in the camps [24]. In 2022, the Government endorsed a Skills Development Framework for camp-based vocational initiatives and issued guidelines for engaging Rohingya volunteers in specific roles, allowing limited skills-building and incentives while upholding restrictions on formal employment [25].

Bangladesh has undertaken a government-led initiative to relocate Rohingya refugees from the crowded camps of Cox's Bazar, as part of a strategy to decongest the mainland settlements to the remote island of Bhasan Char, a newly formed silt island approximately 60 kilometres from the mainland known locally as "the floating island" due to its recent emergence from the Bay of Bengal over the past two decades [13, 16]. Since 2021, approximately 35,000 refugees have been moved to Bhasan Char under this plan [4], which envisions eventually housing up to 100,000 people on the island; officials have stated that all relocations are voluntary, and the government has invested around $350 million from its own funds to develop Bhasan Char's infrastructure [26]. In October 2021, Bangladesh and the United Nations signed a memorandum of understanding establishing a common humanitarian framework for Bhasan Char which has enabled UN agencies to support services on the island while the government retains lead responsibility for administration and security [27, 28]. The scheme is officially portrayed as a temporary arrangement until the refugees can safely return to Myanmar [27]. ●

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Humanitarian support

Prior to the establishment of the Joint Response Plan (JRP) in 2018, the humanitarian response to the Rohingya refugee situation in Bangladesh was fragmented, limited in scale, and largely reactive. Assistance was focused mainly on the small number of refugees residing in the two registered camps at Kutupalong and Nayapara, managed under a 1993 memorandum of understanding between the Government of Bangladesh and UNHCR, which prioritised voluntary repatriation over integration or protection [11]. The broader Rohingya population living in informal settlements, often termed "Undocumented Myanmar Nationals" under the 2013 National Strategy on Myanmar Refugees and Undocumented Myanmar Nationals, received minimal structured support and were largely outside of formal humanitarian programming [15, 17]. Coordination mechanisms remained weak, with humanitarian assistance delivered through isolated sectoral interventions by individual agencies, lacking a unified operational framework [18].

In the early stages of the 2017 influx, the Government of Bangladesh, assisted by UN agencies, local NGOs, and the Bangladesh Armed Forces, mounted an emergency response that prioritised immediate needs such as shelter construction, food distribution, and basic health services [15, 16]. However, the absence of a comprehensive coordination system soon became apparent as the crisis rapidly escalated, prompting the formation of new operational structures. Notably, the RRRC expanded its presence in Cox's Bazar, while UN agencies began coordinating informally through sector-specific working groups (see Table 3) [17]. This operational gap, alongside mounting donor pressure for a harmonised and efficient response, led to the formal launch of the first Joint Response Plan in early 2018 under the leadership of the Inter-Sector Coordination Group (ISCG). The JRP marked a significant turning point, providing a strategic framework for multi-agency coordination, common objectives, joint needs assessments, and funding appeals for both refugees and affected host communities [29].

The 2025–26 JRP targets 1.09 million Rohingya and 392,000 vulnerable members of host communities in Cox's Bazar and Bhasan Char [25]. According to the JRP, humanitarian assistance continues to be the primary lifeline for refugees, covering food, shelter, health, protection, energy access and education services. These programmes are implemented by a consortium of 113 partners, including UN agencies and NGOs, with coordination facilitated by the ISCG.

Despite ongoing efforts, challenges persist due to funding shortfalls including significant reductions in support from USAID and other key donors in 2023–24 [25]. Food aid is predominantly distributed by the World Food Programme (WFP) through an e-voucher system in Cox's Bazar camps, while refugees on Bhasan Char receive in-kind food rations. Food rations for refugees in Cox's Bazar were increased in early 2024 to $10 per person per month (from the earlier cuts in 2023 down to $8 per month), and later raised to $11 by June 2024 with the hopes to reach the full ration target of $12.50 per month by August [30]. However, funding shortfalls in early 2025 prompted a reduction from $12.50 to $11, with additional cuts remaining a possibility under ongoing funding uncertainties [31]. Furthermore, recent funding cuts for education have resulted in the closure of numerous learning facilities, putting the education of 300,000 camp children at risk [32].

Humanitarian support

TABLE 3

An overview of humanitarian support programmes in Bangladesh [29].

ACTIVITY GROUP	BRIEF DESCRIPTION
FOOD SECURITY AND NUTRITION	*WFP provides food assistance through e-vouchers in Cox's Bazar and in-kind rations on Bhasan Char. At the beginning of 2025, UNICEF estimated that 14,200 children in the Rohingya refugee camps would suffer from severe acute malnutrition. This represents a 27% increase compared to the same period in the previous year, highlighting the worsening nutritional status among children [33]*
HEALTH SERVICES	*Healthcare is delivered via a network of clinics and mobile units, offering primary care, maternal and child health services, and disease prevention programs. Efforts are made to ensure equitable access to health services across all camps. In January 2024, approximately 407,000 outpatient consultations were recorded across the camps.*
WATER, SANITATION, AND HYGIENE (WASH)	*Over 5,700 tube wells were installed between August and December 2017 to provide clean water. However, by early 2018, approximately 21% of these wells were no longer functional, highlighting maintenance challenges. By 2019, humanitarian organisations had set up 55 solar-powered water systems across the refugee camps. IOM and JICA implemented one of the world's largest humanitarian solar water systems in Camp-12, providing safe water to approximately 30,000 refugees.*
SANITATION FACILITIES	*Several organisations (including Oxfam, CARE Bangladesh, the Bangladesh Red Crescent Society, and the Danish Red Cross) have introduced WASH facilities designed to meet the needs of women and girls. These facilities provide separate toilets, bathing areas, and laundry spaces to improve hygiene and privacy. Various types of latrines have also been constructed, such as direct pit latrines, twin pit latrines, and biogas latrines, to improve sanitation in the camps.*
SHELTER AND CAMP MANAGEMENT	*Shelter assistance includes the provision of materials for constructing and maintaining shelters. The Shelter Camp Coordination and Camp Management (SCCCM), established in 2023, ensures organised service delivery and infrastructure maintenance within the camps. SCCCM, together with partners, is currently working to improve cooking safety and air quality within the shelters [34]. IOM is also currently piloting lime-stabilised soil shelters to improve fire resistance and weather resilience [35].*
PROTECTION SERVICES	*Between April and June 2024, 510 serious protection incidents affecting 604 individuals were recorded across camps in Ukhiya and Teknaf. These included abductions or kidnappings (183 cases), serious physical assaults (112 cases), and other forms of violence and exploitation. Protection programmes address issues such as child protection, prevention of gender-based violence, and legal assistance. These services aim to safeguard the rights and well-being of Rohingya refugees, with particular attention to vulnerable groups [36].*
EDUCATION	*Approximately 3,400 learning centres operate across the camps, with UNICEF supporting around 2,800 of them. Efforts are underway to introduce the Myanmar curriculum in the camps to facilitate future reintegration and recognition of education [37]*
LIVELIHOODS AND SKILLS DEVELOPMENT	*About 35% of working-age refugees are employed, primarily through humanitarian programmes [38]. Various initiatives offer vocational training in areas such as tailoring, handicrafts, solar and cookstove repair, and small-scale agriculture to enhance self-reliance. Particular efforts are underway at Bhasan Char to provide opportunities comparable to those in Rakhine State, Myanmar.*
ENERGY ACCESS	*Almost all camp households in Cox's Bazar use liquefied petroleum gas as their primary cooking fuel, following large-scale distributions by UNHCR and IOM [39]. Hundreds of solar streetlights and solar home systems have been installed across many camps to provide basic lighting, improve safety at night, and facilitate access to WASH and other services after dark [40].*
CROSS-CUTTING INITIATIVES	*The JRP includes cross-cutting themes such as emergency preparedness, environmental sustainability, and accountability to affected populations, ensuring a holistic approach to humanitarian assistance.*

Access to finance and income generation

Access to formal financial services remains highly restricted. Rohingya refugees and FDMNs are unable to hold bank accounts, receive remittances legally, or access microfinance. They are also excluded from formal services like Western Union [41] and thus are exposed to financial insecurity, exploitation, and legal risks. As a result, refugees in Bangladesh use informal channels for financial transactions. These include bKash (a mobile financial service), Hundi (an agreement to pay a stated amount), and Hawala (a trust-based money transfer system). Although remittances from the Rohingya diaspora (particularly in Malaysia and the Gulf States) play a crucial role for some households, the lack of regulated financial channels leads to inefficiencies and economic vulnerabilities [41].

The Centre for Peace and Justice has highlighted the pressing need to allow refugees safe and regulated access to financial services, noting that formalising remittance flows could enhance financial stability for refugees, reduce illegal activities, and generate additional revenue for Bangladesh's strained economy. However, fears around security risks, social integration, and permanent settlement continue to inform the government's restrictive stance [41]. Moreover, the broader impact of the humanitarian response extends to host communities. Recent research shows that areas closer to refugee camps in Cox's Bazar have seen modest economic benefits such as higher job formality and better food security, primarily driven by humanitarian aid flows [42]. However, these gains are balanced against heightened safety concerns, environmental degradation, and tensions between refugees and local residents.

Income-generating opportunities for Rohingya refugees remain extremely limited. Formal access to the labour market is prohibited, and movement outside the camps is restricted. Instead, two key programmes (cash-for-work and refugee volunteer initiatives) provide modest stipends. These schemes are regulated by the Government and ISCG, offering unskilled and semi-skilled roles for maintaining camp services [43].

According to a 2022 UNHCR-Yale University study [43], the cash-for-work programme typically engages refugees in unskilled labour, such as construction, repair, and maintenance tasks. Workers earn BDT 50 per hour or BDT 350 per day (around USD $0.60 and $4 respectively), but their engagement is capped at 16 consecutive days or 32 days within a quarter. The refugee volunteer programme involves both unskilled and semi-skilled roles (such as health outreach workers, teachers, paralegals, and community mobilisers) with no strict time caps. Stipends range between BDT 7,200–12,600 (around $84-147) per month, depending on skill level and sector [43]. Despite these initiatives, around 87% of refugee households rely solely on humanitarian agency work for income. A small proportion of refugees are involved in self-employment (3%), working for Bangladeshi-owned businesses (5%), or refugee-owned businesses (5%) [43]. These figures likely understate overall economic engagement, as key informants report that many refugees also work informally as lower-paid agricultural labourers outside the camp periphery during the cropping season and participate in joint-venture cropping on host-community land, activities that are illegal and therefore not captured in official statistics.

The UNHCR-Yale University study in 2022 found that these volunteer programmes are often the sole source of income for participating households [43]. Refugee households engaged in these initiatives reported an average monthly income of BDT 8,057 (approximately $93) while cash-for-work participants earned about BDT 6,694 ($78), both significantly below the minimum expenditure basket estimated at BDT 8,681 ($102) per month for a family of five. Notably, 88% of households surveyed in the ››

Access to finance and income generation

study had at least one member engaged in some form of cash-for-work or volunteering within the three months prior to the survey. Despite this, household income levels remain insufficient to meet basic needs.

Beyond cash-for-work and volunteer stipends, the study noted that some refugees reported alternative income sources, such as remittances from family members abroad or assistance from friends and neighbours, accounting for around 5% of household incomes, or informal financial services, particularly through platforms like bKash [43].

Despite aid, the UNHCR-Yale study found that 63% of households reported unmet basic needs, with food (58%), clothing (52%) and healthcare (50%) forming the most cited gaps, while 12% of households identified cooking fuel as an unmet need. Due to the inadequacy of direct income, 25% of refugees reported selling or bartering humanitarian aid to meet their household needs. Food aid was the most commonly monetised item, especially essentials like vegetable oil (60% of households), rice (31%), and lentils (16%). Non-food items frequently sold included bath soaps, blankets, buckets, and jerry cans. The prices obtained for monetised aid were typically 12-33% lower than retail market prices, reflecting both surplus supply and exploitation vulnerabilities in the informal markets [43], including coercive camp-based syndicates that force refugees to sell at depressed prices. In addition, 88% reported spending all their income on essential family needs without the ability to save. Only around 10% of households managed to save, and donations (mainly religious offerings) accounted for around 4% of the average monthly income [43].

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03

National energy context of Bangladesh

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National policy overview

Bangladesh has made significant strides in its energy sector over the past decades and, by 2022, it had achieved almost 100% electrification. This progress is attributed to concerted efforts in grid expansion and off-grid solutions, including the widespread deployment of solar home systems, facilitated by both government support and private entities. Despite high access rates, the quality and reliability of electricity supply remain pressing concerns. Frequent power outages, voltage fluctuations, and load shedding are common, particularly during peak demand periods and in rural and peri-urban areas. These issues are exacerbated by an overreliance on natural gas for power generation and challenges in grid infrastructure.

Bangladesh's energy mix remains heavily reliant on fossil fuels. As of 2024, the Bangladesh Power Development Board had a total installed power generation capacity of 27,515 MW. Natural gas, encompassing both domestic production and imported liquefied natural gas (LNG), remains the dominant source at 44%, followed by coal (24%) and heavy fuel oil (23%). Other sources include hydro (0.84%), imported electricity (4.22%), and renewable energy such as solar (1.94%) and wind (0.22%) [44].

Although Bangladesh contributes only 0.56% of global greenhouse gas emissions, it ranks as the seventh most vulnerable nation to the impacts of climate change. Coal's contribution to the energy mix nearly tripled in 2023, attributed to the commissioning of new coal-fired power plants and increased coal imports aimed at mitigating power shortages, and has contributed to heightened carbon emissions, with the power sector emitting nearly 60 million tons of CO_2 in 2023 [45]. Whilst the country's reliance on oil-based fuels has ››

TABLE 4

Selected SDG7 indicators for Bangladesh and the regional and global averages [47].

SDG7 INDICATOR		BANGLADESH	CENTRAL ASIA & SOUTHERN ASIA	GLOBAL
ACCESS TO ELECTRICITY (%)	***Total***	***99.5***	***98.7***	***92***
	Rural	*99.6*	*98.1*	*83*
	Urban	*99.5*	*98.7*	*97*
ACCESS TO CLEAN COOKING	***Total***	***28***	***69.5***	***74.1***
	Rural	*10.8*	*56*	*55.2*
	Urban	*63.2*	*90.6*	*88.5*
RENEWABLE ENERGY (% FINAL CONSUMPTION)	-	*24*	*25.6*	*18*

National policy overview

declined, aligning with the government's strategy, renewable energy sources remain underutilised and contribute only around 2% of total electricity generation.

Whilst access to electricity has significantly expanded in recent years (see Table 4), the quality of that access remains a concern. According to the World Bank's Multi-Tier Framework (MTF) survey undertaken in 2017 [46], the majority of households experienced frequent outages and voltage fluctuations and, despite being connected to the grid, many households fall into Tier 2 or 3. The MTF survey concluded that 47% of households in Bangladesh had Tier 3 access (electricity is available at least eight hours a day and three hours in the evening, and households can use medium- to high-load appliances). Wide urban-rural disparities remain: 25% of rural households are in Tier 1-2 compared to 3% in urban areas, with Tier 4-5 access rates of 1% 23% in rural and urban areas respectively. Overall, only 2.6% of Bangladesh's population was assessed to have Tier 5 access. The survey also noted that 71% of rural and 78% of urban grid-connected households did not receiving four hours of electricity between 6–10 pm, and that 80% of rural and 45% of urban households experienced more than 14 outages per week. Furthermore, 12% of grid-connected households faced voltage fluctuations sufficient to damage appliances. ››

TABLE 5

*Primary cooking fuel distribution in urban and rural settings, and nationwide, 2023 [49]. *Paurashava and Upazila Headquarters refer to urban areas outside the big City Corporations, as part of non-metropolitan urban Bangladesh, and so City Corporations and PSAs together account for urban areas.*

FUEL TYPE	TOTAL (%)	RURAL (%)	CITY CORP (%)	PSA/OTHER URBAN*
UNCLEAN FUELS (TOTAL)	***69.66***	***81.55***	***8.67***	***44.63***
STRAW/LEAVES/CHAFF/HUSK	*21.9*	*27.12*	*0.82*	*8.13*
WOOD/PLANK/TIMBER	*50.23*	*57.26*	*7.82*	*38.55*
CHARCOAL/DRY DUNG	*5.54*	*6.71*	*0.33*	*2.67*
KEROSENE/PARAFFIN	*0.05*	*0.00*	*0.60*	*0.01*
PETROL/DIESEL	*0.02*	*0.02*	*0.03*	*0.00*
CLEAN FUELS (TOTAL)	***30.34***	***18.45***	***91.33***	***55.37***
ELECTRICITY	*0.48*	*0.22*	*1.23*	*1.34*
SUPPLY GAS	*12.96*	*3.10*	*71.48*	*29.82*
LPG	*8.66*	*5.39*	*17.59*	*19.36*
BIOGAS	*0.08*	*0.10*	*0.04*	*0.03*
OTHERS	*0.07*	*0.08*	*0.05*	*0.08*

National policy overview

The 2017 MTF survey [46] found that 57% of all households were in Tier 1 for clean cooking, indicating the use of traditional biomass stoves and high exposure to emissions. In rural areas, 75% of households were in Tier 1, whereas 30% of urban households were in Tier 4 and 32% in Tier 5. Cooking in Bangladesh remains heavily dominated by biomass (with a breakdown shown in Table 5) and firewood is used by 46% of households overall. Clean fuels (defined as liquefied petroleum gas (LPG), natural gas, biogas and electricity) account for 73% of cooking energy use in urban areas but just 14% in rural households.

Common cooking technologies include improved cookstoves (ICS), gas stoves, LPG stoves, electric rice cookers, and induction cookers, and cooking technology varies with household socio-economic status [48]. In 2018 around 4.1 million households were connected to piped natural gas but the government stopped new connections in 2016-17 due to declining reserves, which increased the demand for alternatives like LPG. In addition, 102,808 biogas digesters had been installed in Bangladesh by 2018 but the high initial investment costs, amongst other issues, have resulted in slow uptake.

Fuel availability was reported as always reliable for 69% of households nationwide, although urban areas increasingly faced gas supply issues due to declining reserves. The exposure to harmful cooking emissions is a critical issue, especially for rural women who are predominantly responsible for cooking, with 54% of rural households in Tier 1 for the cooking exposure attribute [46]. Fuel stacking, where households use more than one cooking technology is also common and most households use firewood with other biomass fuels (63% in urban areas, 78% in rural areas) [50].

The World Bank's RISE 2024 Index ranks Bangladesh among the top five countries with the most rapid advancement in clean cooking initiatives, with progressive change in the energy mix for household cooking (see Table 6). The commercial import of LPG from 2011-12 resulted in a significant shift in cooking fuel use and supportive government policies have positioned Bangladesh as one of the fastest-growing LPG markets globally, with a current demand approximately 1.3 million tonnes per year which is projected to grow to 3 million tonnes by 2030 [51]. Cooking with electricity is currently not prioritised at policy level [50].

TABLE 6

RISE Pillars for Bangladesh and the regional and global averages.

RISE PILLAR	BANGLADESH	SOUTH ASIA	GLOBAL
OVERALL	*53*	*46*	*56*
ELECTRICITY ACCESS (%)	*79*	*77*	*62*
CLEAN COOKING ACCESS (%)	*49*	*34*	*30*
RENEWABLE ENERGY (%)	*27*	*30*	*41*
ENERGY EFFICIENCY (%)	*57*	*45*	*46*

Government agencies in the country's energy sector

The power sector in Bangladesh operates under a multifaceted institutional framework (see Figure 2) designed to manage electricity generation, transmission, distribution, and regulation. This structure encompasses various government ministries, regulatory bodies, and state-owned enterprises, each with distinct responsibilities.

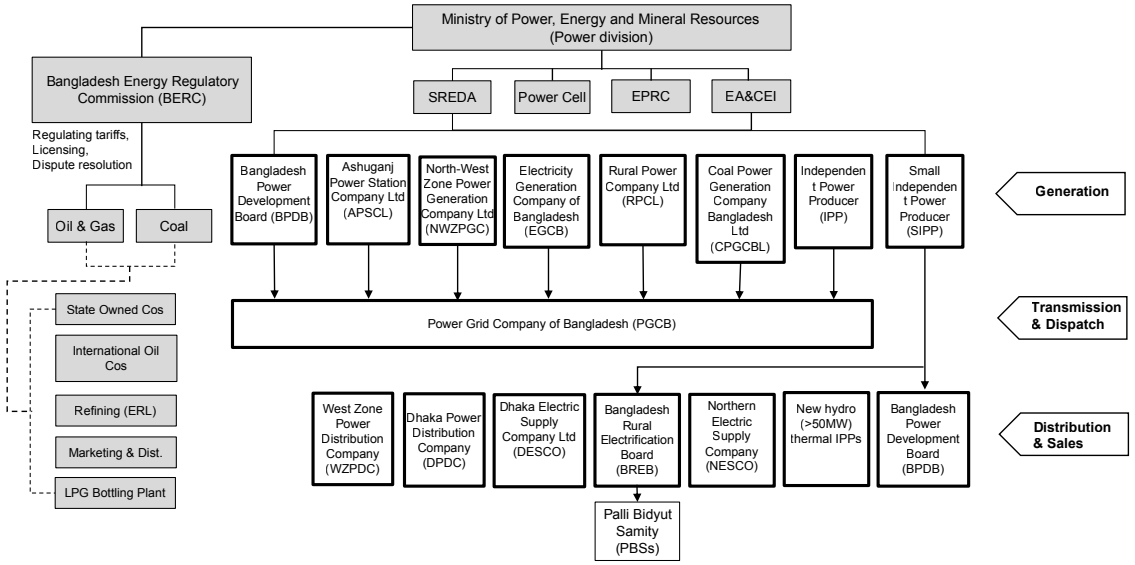
At the helm is the Ministry of Power, Energy and Mineral Resources (MPEMR), which formulates policies and oversees the energy sector. MPEMR is divided into two primary divisions for power (responsible for electricity generation, transmission, and distribution) energy and mineral resources (which manages oil, gas, and mineral resources). Separate bodies under the Power Division include the Energy and Power Research Council, the Sustainable and Renewable Energy Development Authority (SREDA), the Power Cell, and the Electrical Advisor and Chief Electrical Inspector. SREDA was established in 2012 to advance renewable energy and energy efficiency, serve as the coordinating body for renewable energy policy, provide capacity building and advisory services to strengthen the sector, and monitor organisations involved in promoting and financing energy initiatives and facilitates public-private partnerships [52]. The Power Cell, meanwhile, implements power sector reforms and supports policy and planning by focusing on performance improvements, consumer satisfaction analysis, and utility viability [52].

Electricity generation in Bangladesh involves both public and private entities. The Bangladesh Power Development Board (BPDB) is the principal public sector organisation, overseeing a significant portion of electricity generation. It also acts as the sole buyer of electricity from independent power producers supplement the national grid. The Power Grid Company of Bangladesh is solely responsible for electricity transmission, operating and maintaining the national grid infrastructure. Electricity distribution is managed by several regional entities in urban areas, whilst the Bangladesh Rural Electrification Board oversees rural electrification through cooperatives known as Palli Bidyut Samities.

Finally, the Bangladesh Energy Regulatory Commission serves as an autonomous body for regulating tariffs, licensing, and dispute resolution across electricity, gas, and petroleum sectors. It provides transparency and protects consumer rights in the energy market [52]. ●

FIGURE 2

Institutional setup of the energy sector in Bangladesh (adapted from [52, 53]).



Energy policies

Electrification policies and the national grid

Over the past three decades, the Government of Bangladesh has developed a range of coordination and planning instruments to guide the energy sector's expansion, diversification, and reform. The process began with the National Energy Policy (NEP) in 1996, later revised in 2004, which aimed to ensure reliable and affordable energy through efficient resource utilisation and greater private sector participation [54]. In 2008, the government introduced the Renewable Energy Policy [55], setting a target (which remains unmet) to generate 10% of electricity from renewable sources by 2020.

Building on these, the Power Sector Master Plan 2016, developed with support from the Japan International Cooperation Agency (JICA), provided a more structured roadmap for long-term power generation and diversification, with an emphasis on natural gas, LNG, and imported coal [56]. More recently, the government has undertaken the preparation of an Integrated Energy and Power Master Plan (IEPMP), also with JICA support, to harmonise energy planning to 2050 across sectors and integrate economic, environmental, and social considerations [57]. In parallel, Bangladesh's Nationally Determined Contributions (NDCs) under the Paris Agreement commit to reducing GHG emissions from the power, transport, and cooking sectors (see Table 7) [58].

The installed generation capacity of Bangladesh is at 27.5 GW, of which over 86% is from fossil fuels and less than 3% is from renewables [59]. As of 2023, Bangladesh's renewable energy capacity stands at approximately 1,183 MW with solar photovoltaics (PV) accounting for about 80% of this total [60]. Despite these developments, the growth rate of renewable energy installations remains modest compared to non-renewable sources.

The IEPMP aims to raise this to 130 GW by 2050 with a more diversified mix [57]. The national grid has 14,000 km of transmission lines (mostly 132 kV to 400 kV) and has seen significant investments in regional interconnections and upgrades to reduce system losses and improve voltage stability [57]. To meet future demand, the IEPMP aims to expand the national transmission network by 55,000 km by 2050, reduce transmission losses from around 12% in 2020 to below 8% by 2041, and enhance connectivity between south (Barisal and Chattogram) and north (Dhaka) zones to balance regional loads and renewable variability.

In early 2025, the Power Division published a Renewable Energy Policy with the aim to reposition renewable energy at the centre of national energy planning amid growing concerns about fuel import dependency, energy security, and climate resilience. The policy articulates ambitious but tiered targets for renewable energy development: 6,149 MW (20%) by 2030, and 17,470 MW (30%) by 2041, conditional on enabling support. It proposes several incentivising mechanisms including import duty and tax exemptions on renewable energy components, the introduction of carbon trading systems, and promotion of battery storage systems to integrate more renewable energy into the grid and address intermittency issues. ››

Bangladesh's Renewable Energy Policy targets 20% renewable power by 2030.

Energy policies

TABLE 7

Key energy policy instruments and milestones in Bangladesh.

NATIONAL ENERGY POLICY (1996, REVISED 2004)	*The foundational policy aimed at ensuring reliable and affordable energy through increased private sector participation, efficiency improvements, and energy diversification.*
RENEWABLE ENERGY POLICY (2008)	*Bangladesh's first dedicated policy to promote renewable sources, setting an initial target of 5% electricity from renewables by 2015 and 10% by 2020. The policy is now being revised.*
POWER SECTOR MASTER PLAN (2016)	*Developed with JICA, this plan outlined long-term energy supply strategies with a focus on LNG, imported coal, and natural gas. It introduced the Power Perspective Plan 2041 with a target of 60 GW installed capacity by 2041 and with 40% of electricity to come from clean energy sources*
ENERGY EFFICIENCY AND CONSERVATION MASTER PLAN (2016)	*This plan set a target to reduce primary energy consumption per unit of GDP by 20% by 2030 and prioritised the improvement of distribution and end-use efficiency.*
NATIONALLY DETERMINED CONTRIBUTIONS (2015, 2021, 2025)	*Bangladesh's first NDC (2015) committed to reducing emissions by 5% (unconditionally) and up to 15% (conditionally) by 2030 in the power, transport, and industry sectors. NDC 2.0 (2021) expanded sectoral coverage to include cooking, agriculture, waste, and afforestation, and raised the ambition to a 6.73% unconditional reduction and 21.85% conditional reduction in emissions by 2030 compared to business-as-usual. Bangladesh's third NDC, submitted in 2025, extends the mitigation horizon to 2035, targeting a 6.39% unconditional and 13.92% conditional reduction (a total cut of 20.31%, or 84.97 $MtCO_{2eq}$) below the 2035 business-as-usual projection, with economy-wide coverage [61].*
INTEGRATED ENERGY AND POWER MASTER PLAN (2023)	*The IEPMP is the most recent and comprehensive strategy, developed with JICA support, and proposes an integrated energy roadmap to 2050 to reduce reliance on fossil fuels, enhance cross-border electricity trade, and improve grid reliability and reserve capacity.*
RENEWABLE ENERGY POLICY (2025)	*It sets a target to meet 20% of electricity from renewable sources by 2030 and 30% by 2041. It emphasises utility-scale solar, wind, biomass and waste-to-energy, and explicitly recognises the role of battery energy storage systems and grid integration measures. It also introduces new instruments such as Renewable Purchase Obligations and Renewable Energy Certificates, a Sustainable Energy Development Fund, and various fiscal and financial incentives to mobilise private investment, although observers note that practical implementation and alignment with the IEPMP will be critical to achieving the stated target [62].*

Energy policies

Mini-grids, standalone and solar home systems

Bangladesh is recognised as a global leader in the off-grid energy sector, especially to address the needs of off-grid communities. Solar home systems (SHS) in Bangladesh have been instrumental in improving living conditions by providing clean, sustainable energy for lighting, powering small appliances, and enabling socio-economic activities in regions previously deprived of electricity [58]. As of 2023, the country had installed over 6 million SHS, with a combined capacity of 264 MW, which reached approximately 20 million people (around 11% of the population) [63]. SHS in Bangladesh have been instrumental in improving living conditions by providing clean, sustainable energy for lighting, powering small appliances, and enabling socio-economic activities in regions previously deprived of electricity [58]. This growth was spearheaded by the Infrastructure Development Company Limited (IDCOL) and supported with development finance from the World Bank, the Asian Development Bank (ADB), and JICA, amongst others.

In addition to SHS, Bangladesh has implemented rooftop solar PV systems on government and private buildings with a capacity of around 66 MW. More than 2,200 solar irrigation systems have also been installed to support agricultural activities and reduce dependency on conventional fuel-powered irrigation systems [58]. ››

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Energy policies

Mini-grids have emerged as a viable solution for providing electricity to remote communities. These localised systems are designed to operate independently or in conjunction with the national grid network. According to SREDA there are 28 operational mini-grid systems with a combined capacity of 5.8 MWp, serving around 16,000 families and with tariffs averaging $0.38/kWh [63]. Although the penetration of mini-grids in Bangladesh has been modest, they have been piloted effectively in several regions and IDCOL aims to finance up to 200 solar mini-grid projects by 2025 [63].

Standalone renewable energy systems, including solar parks and rooftop solar system installations, contribute significantly to the country's renewable energy generation with SREDA estimating that 76 solar parks representing almost 5,000 MW of installed capacity. These systems are particularly suitable for households and small enterprises in geographical locations where mini-grids or grid connectivity are impractical due to terrain or low population density. Rooftop solar installations are also gaining traction, particularly in urban and industrial areas, supported by net metering policies that allow consumers to feed excess electricity back into the grid. More than 2,800 solar irrigation systems have been installed (with a total capacity of 52 MW, of which IDCOL implemented 45 MW) with a goal is to finance 50,000 solar pumps by 2025. In addition, there are almost 300,000 solar streetlights installed nationwide with a capacity of 17 MW [63].

Despite significant achievements, Bangladesh faces several challenges in scaling mini-grids and standalone systems. Primarily, high upfront costs and limited access to affordable financing mechanisms hinder widespread adoption. Furthermore, ensuring reliability and efficiency often requires advanced technologies which may not be accessible or economically viable. Long-term operations and maintenance also remain a concern, as many projects lack sustainable revenue models, clear O&M responsibilities, and access to spare parts and technical support at the local level [64]. Improved coordination among key stakeholders (including SREDA, the Power Division, and private developers) is essential to streamline activities and prevent duplication of efforts and resources. Meanwhile the deployment of battery energy storage systems will be crucial for addressing the intermittency of renewable energy and ensuring grid stability, however the high costs and technical expertise required for their integration pose further constraints to scalability and long-term sustainability [66, 67].

To address these challenges, the National Solar Energy Roadmap 2021-2041 outlines a long-term vision for scaling up solar energy initiatives, including standalone systems and mini-grids [58]. It provides a framework for capacity expansion through targeted measures and implementation scenarios. The government has also introduced a refinancing scheme to support small-scale solar and micro-grid projects, focusing on improving energy access in off-grid areas. This initiative aims to encourage private sector participation and leverage investments to expand energy coverage, thereby helping to address the needs of marginalised communities [58]. ››

Bangladesh is a global leader in off-grid electricity, but challenges remain.

Energy policies

Clean cooking access

Government efforts since the 1970s have led to the deployment of over 4.5 million ICS and 102,000 biogas digesters through public-private partnerships in recent years (see Table 8) [58]. However, access to clean cooking remains a pressing development challenge and is deeply intertwined with issues of health, gender equity, and environmental sustainability. As of 2022 only 28% of the population had access to clean cooking fuels and technologies, despite the country almost reaching universal electrification [2]. Traditional cooking with solid biomass (including firewood, cow dung, and crop residues) remains prevalent, particularly in rural and peri-urban areas, exposing millions to harmful indoor air pollution and posing environmental risks. Bangladesh is among the 20 countries that collectively account for 80% of the global clean cooking access deficit [67].

An estimated 67% of households in Bangladesh experience some form of clean fuel poverty, with rural areas and low-income, less-educated, and female-headed households disproportionately affected [68]. More than 60% of multidimensionally poor households lacked physical access to clean fuels, while 52% were unable to afford them, with clean fuel poverty not merely an issue of income but also stemming from infrastructure gaps, limited awareness, and sociocultural preferences. Overcoming this would require a multidimensional policy response that includes targeted subsidies, behaviour change campaigns, improved infrastructure, and gender-sensitive strategies.

The Government of Bangladesh introduced the Country Action Plan for Clean Cookstoves in 2013, followed by the more comprehensive National Action Plan for Clean Cooking (NAPCC) 2020-2030. The NAPCC outlines a phased roadmap to achieve universal clean cooking access by 2030 with an estimated investment requirement of $2.9 billion, of which $2 billion is from consumer financing and the remainder from ››

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Energy policies

public and private sector investment [48]. The plan promotes a fuel- and technology-neutral approach and encourages the uptake of LPG, electric cooking, biogas, improved biomass stoves, and other emerging technologies. It acknowledges the reality of stove stacking and supports accommodating, rather than eliminating, this behaviour. The strategy includes targets for expanding LPG coverage to 55-65% of households, improved cookstoves to 40%, electric cooking to 7.5-10% and sharply reducing reliance on biomass to under 30%. Implementation is guided by nine thematic pillars, ranging from regulatory reform and market development to gender integration and technology innovation.

The NAPCC also proposes a robust monitoring framework and assigns responsibilities across ministries, with SREDA acting as the central coordinating agency. However, a major lesson from the review of the 2013 policy is that coordination and accountability remain weak links. Many of the proposed actions (such as establishing a national testing lab, developing cookstove standards, or scaling consumer financing) remain aspirational in the absence of institutional incentives and financial commitment. However, policy momentum is building, with fiscal incentives including LPG tax waivers, reduced import duties, and subsidised pricing mechanisms.

TABLE 8

Key Bangladesh clean cooking policy instruments and milestones.

YEAR	CLEAN COOKING DEVELOPMENTS IN BANGLADESH
1976 – 1987	• *Bangladesh Council of Scientific and Industrial Research begins working on ICS* • *Clean cooking initiatives started by the Government of Bangladesh by introducing ICS* • *Village Education Resource Center and EnDev launch ICS programmes*
2004-2006	• *Grameen Shakti and Bangladesh Bondhu Chula Foundation start ICS programmes*
2010-2012	• *Introduction of concrete-made ICS by GIZ/EnDev* • *Inauguration of IDCOL Improved Cookstoves Program* • *Clean Cooking Alliance begins its work in Bangladesh* • *Country Action Plan for Clean Cookstoves is launched* • *LPG sector liberalised, leading to several LPG companies bottling and marketing LPG cylinders*
2017	• *One million ICS disseminated by IDCOL*
2019-2020	• *Launch of National Action Plan for Clean Cooking 2020-2030* • *Electricity coverage throughout the country is nearly complete (95%)*
2021-2030	• *IDCOL meets a target of 4 million ICS installed since 2017* • *Vision for Bangladesh Government to achieve 100% clean cooking by 2030*

04

Energy in displacement settings

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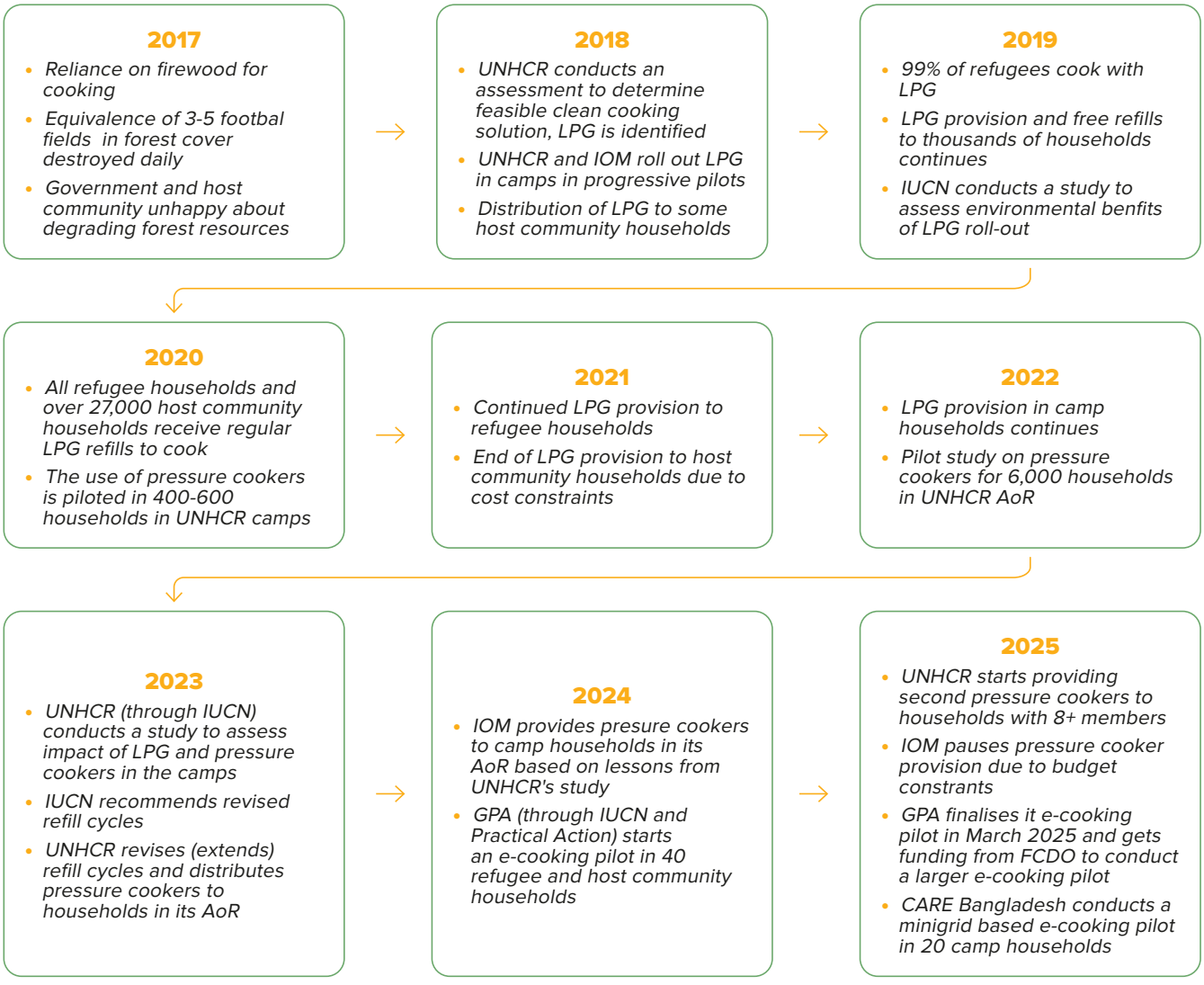
Clean cooking access for households

Clean cooking in the Rohingya refugee camps has evolved significantly since the mass influx of over 700,000 Rohingyas into Cox's Bazar in 2017 (see Figure 3). UNHCR and IOM established refugee camps in Ukhia and Teknaf upazilas in the southern part of Cox's Bazar district which bordered sensitive forest reserves and had approximately 60% and 40% forested land respectively, underscoring the environmental stakes involved in hosting a large population in this ecologically vulnerable area [69].

The relocation of a large number of Rohingya refugees within a short period posed several challenges, one of the most severe being access to clean cooking. The widespread use of firewood as the primary cooking fuel led to alarming deforestation rates, growing tensions with host communities, and heightened health and protection risks, especially for women and children. These challenges forced the government, IOM, UNHCR and partners to explore cleaner and more sustainable cooking solutions. ››

FIGURE 3

A summary of the evolution of energy access for cooking and clean cooking programmes in the Rohingya refugee camps.



Clean cooking access for households

The use of firewood as primary cooking fuel (before late 2018)

Following the mass influx of Rohingya refugees in August 2017, over 837,000 refugees, many settling in the Kutupalong-Balukhali mega-camp, faced limited access to safe, sustainable cooking fuel options. Firewood became the primary fuel, sourced at increasingly higher costs in local markets or collected from the nearby forests. The price of firewood rose to approximately 12 BDT ($0.14) per kilogram, placing it beyond the reach of many households [70].

FAO estimated that the daily firewood consumption of the refugee population exceeded 730 tonnes, equivalent to the loss of 3-5 football fields of forest per day and contributed to severe deforestation [70]. This environmental degradation heightened landslide risks, reduced biodiversity, strained local community resources, and caused tension between the host communities and the refugees.

Meanwhile, health and protection risks were widespread as refugees relied on rudimentary mud stoves that emitted high levels of indoor air pollution. Though air quality data were limited, field reports indicated elevated rates of respiratory illness, particularly among women and children, and inter-partner violence. In addition, the use of firewood contributed to climate change through the emission of CO_2, methane, and black carbon, while accelerating the loss of natural carbon sinks. The Government of Bangladesh raised repeated concerns about deforestation and environmental degradation in the area.

This large-scale use of firewood for cooking led to fuel scarcity, affecting both refugee and host community households. Surveys by WFP and UNHCR indicated that over 50% of refugee households lacked sufficient cooking fuel. Many adopted harmful coping strategies, including selling food rations, reducing meal frequency, or burning unsafe materials as fuel. Alternative solutions such as compressed rice husks, improved cookstoves, and biomass briquettes were piloted by IOM, UNHCR and FAO between 2017 and early 2018, but none achieved meaningful scale or impact. ››

The influx of over 700,000 refugees in 2017 required the implementation of cleaner and more sustainable cooking solutions.

Clean cooking access for households

Biogas

In Teknaf, Action Contre la Faim (ACF) piloted a biogas project through communal kitchens, but it was poorly received as households preferred the privacy of cooking individually and were culturally uncomfortable Figure 3 with the use of biogas given its source materials. While this pilot predates the 2017 major refugee influx in Teknaf, uptake has remained limited. Likewise, in Bhasan Char, where more permanent brick structures were originally designed with biogas cooking in mind, it is used but relatively little. There, communal kitchens are connected to housing blocks and households rely on biogas when LPG supplies run out.

A 2022 study by Chowdhury et al. assessed the potential of biogas as a complementary clean cooking solution in the Rohingya refugee camps [71]. The study estimated that biogas could replace nearly 500,000 LPG cylinders annually (about 20-25% of current demand) and cut greenhouse gas emissions by 85%. Supplying biodigesters for all households would cost between $70-327 million, depending on the technology. However, a combination of factors – including severe space constraints, high initial capital investment, ongoing maintenance demands, and limited user acceptance – renders biogas systems in the Rohingya refugee camps operationally and programmatically less viable based on previous implementation experience.

Compressed rice husk

Compressed rice husk (CRH) was trialled in 2017 by UNHCR as a transitional cooking fuel in the Rohingya camps. In 2017, UNHCR procured CRH for this purpose, but large-scale procurement quickly absorbed most of the available local supply and raised concerns about market availability. Storage has also been a significant constraint; given the scale of over 230,000 households, CRH requires vast storage facilities and must be used relatively quickly, especially during the rainy season when it deteriorates faster.

CRH continues to be used in the camps as temporary solutions, especially for new Rohingya arrivals before they get registered by UNHCR and IOM and integrated into the LPG distribution system. In late 2024, UNHCR donated CRH to IOM for temporary distribution to 6,000 households to bridge immediate cooking energy gaps, though part of this stock remained unused due to the limited supply, which was insufficient to meet the needs of all targeted households and could have created tensions among refugee households. FAO has also proposed CRH as a potential complement to LPG during supply shortages, and UNHCR continues to plan limited distributions for new arrivals. However, current stock levels are insufficient to meet the needs of all refugees, making CRH an interim rather than a sustainable fuel solution in the camps.

The combination of constrained and inconsistent market supply, extensive storage and handling requirements, accelerated degradation during the monsoon season, and insufficient stock volumes prevents CRH from reliably meeting the continuous cooking-energy needs of more than 230,000 households. Although CRH offers value as a short-term contingency fuel for new arrivals or emergency gaps, its deployment at scale is not operationally or programmatically viable within the Rohingya response. ››

Clean cooking access for households

Provision and use of LPG for cooking

Household surveys revealed strong demand for cleaner solutions, citing factors such as smoke reduction, time savings, and ease of use. The situation underscored the urgent need for a scalable transition to clean cooking. In 2017 a study and cost benefit analysis conducted by UNHCR which assessed a range of clean cooking fuel options (excluding e-cooking) recommended LPG as the most feasible option due to cost, environmental, and availability factors [70].

Following the UNHCR-led study in 2017, the LPG transition programme was launched in August 2018 to reduce firewood dependency, curb environmental degradation, and improve indoor air quality, safety, and cooking efficiency in Rohingya refugee shelters. The rollout involved the distribution of single-burner LPG stoves, pots, and 12 kg cylinders to refugee households, and was done in a phased approach [69]. This initiative aligned with a broader national shift in energy policy that prioritised LPG over natural gas to conserve domestic reserves, making Bangladesh the world's fastest-growing LPG market at the time. The World LPG Association played an advisory role, supporting safe implementation in the camps in line with good industry practices and the Cooking For Life initiative. Since then, LPG supply chains have been established in the camps and neighbouring host communities, enabling free LPG distribution and regular refills to nearly all refugee households.

LPG distributions in the Rohingya refugee camps are coordinated by UNHCR and IOM, in their respective areas of responsibility (AoR), and implemented through both direct and partner-led approaches. Both organisations manage LPG distribution through their respective long-term agreements with locally contracted suppliers. While each agency follows its own procurement and supply arrangements, these parallel systems operate independently of one another, resulting in separate contracting, logistics, and delivery structures, which, if better aligned or coordinated, could offer opportunities for greater economic efficiency across the overall LPG supply chain in the camps [39]. ››

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Clean cooking access for households

By 2025, coverage had reached 99%, with scheduled refill cycles tailored to household size. Each household receives a single-burner LPG stove, connection accessories, cooking pots, regular refills, safety training, and follow-up monitoring visits. To ensure sustained access, stove repair desks have been installed at all LPG distribution points in the camps, complemented by informal repair services in local markets [72-74].

Reports found that in 2024, 99% of Rohingya households received LPG refills on time, although approximately 23% still use firewood as a complement when LPG runs out before they are eligible for a new refill [75]. An energy access assessment of 400 camp households, conducted in 2024-2025 by IUCN, Practical Action, and GPA-UNITAR under the MECS-funded e-cooking feasibility study, revealed that over 96% of refugee households run out of LPG before the scheduled refill dates, with 49% reporting running out 12 times in the past year [76]. In such cases, more than 66% resort to using firewood for cooking while the rest buy or borrow LPG from their friends and relatives.

The huge benefits of the LPG distribution programme have been documented by multiple studies. A 2019 assessment by UNHCR, IUCN, and East West University found that the introduction of LPG in the camps led to an 80% reduction in firewood use, bringing deforestation to sustainable levels. Other studies report the reduction in firewood consumption decreased by more than 90%, from about 462,000 tonnes per year to 37,000 tonnes per year.

The LPG transition programme was accompanied by reforestation efforts in collaboration with the Bangladesh Forest Department, which had a visible environmental impact [73]. As part of broader environmental restoration efforts, reforestation activities were undertaken across 62 hectares of degraded land in 16 camps in 2019. Refugees were engaged in protecting saplings under an agroforestry model, receiving training on environmentally friendly agricultural practices. A total of 160 households participated in these efforts, contributing to the sustainable management of land and resources [77]. The regular provision of LPG has also helped to reduce protection risks, particularly for women and girls who previously collected firewood in unsafe areas, while also playing a vital role in the re-greening of camp areas.

A 2022 evaluation by Stanford University and ICDDR Bangladesh, which found over 80% of refugee households exclusively using LPG, also identified significant environmental and health benefits. It estimated that 330,000 tonnes of firewood and 407,000 tonnes of CO_2 emissions were avoided annually, preserving approximately 6,000 hectares of forest. This eased tensions with host communities which also rely on forest resources. The study also estimated that the reduction in indoor air pollution, and resulting respiratory illnesses, prevented over 2,300 adult deaths, 385 child deaths, and 85,000 disability-adjusted life years from diseases linked to biomass cooking. Women reported improved mental health, reduced stress, and increased quality of life, with a 10% reduction in depression among female caregivers. In addition, households were found to save an average of $7.19 per month previously spent on firewood, which was redirected toward food, increasing monthly expenditure by $8.55. This improvement ››

Widespread LPG usage has reduced deforestation and tensions with local host communities.

Clean cooking access for households

in food security was reflected in a Food Diversity Index increase, from 0.24 to 0.34 among Rohingya households, and from 0.34 to 0.48 among host community households.

The same study by Kwong et al. also found that LPG provision helped eliminate the dangerous practice of burning plastic waste for cooking, which was common before the LPG intervention. The reported use of plastic for fuel dropped to 0%, compared to 40% of households previously using plastic to cook regularly. Additionally, the LPG programme contributed to dignity and protection by removing the need for refugees, particularly women and girls, to leave their shelters to collect firewood, reducing their exposure to risks such as harassment and assault. Importantly, the programme achieved these outcomes at a relatively low cost of $0.34–$0.47 per household per day, with annual costs estimated at $99 per household for stoves and refills, and an additional $25–$73 for distribution logistics.

Between 2018 and 31 May 2021, both IOM and UNHCR extended LPG provision to some host community households in Cox's Bazar. IOM distributed 257,913 LPG refills and supported 27,875 households, including the provision of porter support to 5,403 individuals. This included the distribution of new LPG packages alongside refills and played a significant role in addressing cooking energy needs in the host communities until its conclusion due to financial constraints.

The shift from biomass to LPG in the Rohingya camps has brought transformative benefits across environmental, health, socio-economic, and protection dimensions. However, maintaining a free LPG supply for more than 230,000 refugee households remains financially demanding and is estimated to cost approximately $29 million annually, equivalent to around 3.1% of the total JRP 2025 budget of $934.5 million [25]. To enhance efficiency and reduce programme costs, IOM and UNHCR have been exploring optimisation measures, including the optimisation of supply chains and the distribution of pressure cookers to refugee households. ››

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Clean cooking access for households

Improved cookstoves and briquettes

Amid ongoing funding challenges and periodic LPG shortages, refugee households face a growing risk of reverting to pre-2018 levels of firewood dependence for cooking. To address this, both IOM and UNHCR have been exploring the introduction of improved cookstoves and briquettes to enhance the efficiency of biomass use.

In parallel, the agencies have engaged technical experts to identify more cost-effective and sustainable approaches for maintaining clean cooking access, including through green and carbon finance mechanisms to support long-term energy solutions in the camps.

Pressure cookers

To enhance fuel efficiency and reduce the operational cost of LPG provision, UNHCR introduced pressure cookers as a complementary measure to optimise existing LPG cooking systems. The initiative was guided by findings from the Nepal refugee response which indicated that using pressure cookers with LPG could reduce fuel consumption by up to 30%.

UNHCR worked with IUCN in 2020 to conduct a pre-pilot in Camps 2W and 8E, distributing pressure cookers to 400–600 households to assess their impact on LPG consumption. High adoption and usage rates were observed, supported by close monitoring and small cash incentives linked to usage. A larger pilot in 2022 distributed pressure cookers to 6,000 households in Camps 4 Extension and 27. Pot sizes were tailored to household size: 5-litre pots for households with 1-3 members, 5.5-litre for 4-5 members, 6-litre for 6-7 members, and 7-litre for households with 8 or more members. Recipients, mainly women, attended mandatory cooking demonstrations to ensure safe and effective use of the pressure cookers.

In September 2023, UNHCR revised its LPG refill policy and introduced a full-scale rollout of pressure cookers to all refugee households in its AoR. Over 90,000 households received pressure cookers by the end of 2023, supported by targeted awareness efforts including continuous training videos at distribution points and community-level outreach.

In 2023, IUCN conducted another study, through funding from UNHCR and FCDO, to compare LPG usage across households with and without pressure cookers in four Rohingya camps [73]. The study involved a total of 1,276 households (622 households with pressure cookers in Camps 4 Extension and 27, and 654 without pressure cookers in Camps 4 and 26). LPG consumption was monitored over a 14-day period. Of the 520 households provided with pressure cookers, 77.3% used them, with higher uptake among larger families. Findings indicated an average LPG saving of 0.03 kg per household per day, suggesting potential reductions of 7.7-14.6% with wider adoption. Drawing on these results, UNHCR introduced a revised refill schedule in 2024, ranging from 49 days for smaller households to 23 days for those with 11 or more members.

In 2025, IOM began distributing pressure cookers across camps within its AoR, drawing on lessons from UNHCR-led studies. That same year, UNHCR also started providing second pressure cookers to households with more than eight members. However, both agencies temporarily halted distributions later in the year due to funding constraints. By September 2025, all households in UNHCR-managed camps had received pressure cookers (excluding new arrivals), while approximately 8% of households in IOM's AoR were yet to be covered.

In addition to promoting pressure cooker use, partners have been exploring complementary ››

Clean cooking access for households

strategies to improve the efficiency and sustainability of LPG provision. These include engaging LPG experts to conduct system modelling and provide technical recommendations, as well as undertaking baseline studies on carbon finance opportunities to support long-term LPG supply through carbon finance. More recently, partners have also begun testing the feasibility of introducing e-cooking as a complementary solution to LPG through a series of small pilot initiatives.

E-cooking

Since 2024, e-cooking has been piloted by organisations like GPA-UNITAR and Care Bangladesh. Between late 2024 and early 2025, the GPA Coordination Unit, in collaboration with IUCN and Practical Action, conducted a feasibility study on solar PV-powered e-cooking in the Rohingya refugee camps and host communities in Cox's Bazar. The study included a baseline survey of 1,000 households, 54 market surveys of local cooking fuel and appliance prices, and a small-scale e-cooking pilot demonstration with 40 households (20 from each of the refugee and host communities). Each household received a 3 kWp solar PV system with battery backup and three appliances – an electric pressure cooker (EPC), an induction stove, and an infrared stove – for a seven-day monitoring period.

The findings showed strong willingness to adopt e-cooking, with households citing cost savings, time efficiency, and health benefits as driving factors. During the pilot, LPG use in refugee households dropped by over 75%, and users reported high satisfaction with the appliances. After the study, the 10 solar PV e-cooking systems were donated to institutions in both camps and host communities to support ongoing cooking needs. The study concluded that while solar PV-based e-cooking is technically viable and socially accepted, scaling will require smaller, more affordable systems, community-centred approaches, and integration of financing and maintenance models to ensure sustainability.

Building on these lessons, the next phase will be implemented through the FCDO-funded Transforming Humanitarian Energy Access (THEA) project between October 2025 and September 2026, led by Mercy Corps and the GPA Coordination Unit. With support from the UK Government through the Transforming Energy Access Platform, this phase will pilot solar-powered e-cooking systems with around 100 refugee households, costing approximately $1,000 per complete PV-powered e-cooking system, and about 200 appliance-only systems in host community households. A more comprehensive system-modelling exercise will also be undertaken, alongside the testing of market-based financing mechanisms for host community households to enhance affordability, and the establishment of appliance repair hubs with training for local volunteers and technicians to support sustainable maintenance. In parallel, CARE Bangladesh is conducting a complementary clean cooking pilot deploying a mini-grid-based solar PV e-cooking units alongside infrared LPG stoves in 20 refugee households. The initiative will run from January to December 2025. ››

99%

LPG stove coverage in 2025

Barriers to clean cooking

Despite significant progress in expanding access to clean cooking fuels, multiple barriers continue to constrain equitable, safe, and sustained clean cooking access. These barriers are environmental, economic, cultural, institutional, and infrastructural in nature and are both demand and supply-side driven.

On the demand side, fuel stacking remain commonplace. Although the LPG programmes now reach 99% of households, many, particularly large families, still use multiple fuels (such as bamboo, twigs, firewood) to meet their cooking needs. Around 29% of households continue to stack fuels, reflecting limitations in the sufficiency of LPG and cultural cooking preferences [74]. A 2024-2025 study by the GPA Coordination Unit and local partners found that over 96% of the 400 interviewed households experienced at least one LPG shortage before scheduled refill date in the past year, while 49% experienced shortages 12 times in the past year (albeit potentially only for short periods of a few days, as suggested by previous studies). During such shortages, around two-thirds of households tend to use firewood for cooking. The supply of LPG has sometimes been rationed due to funding constraints.

Socio-economic vulnerability remains an issue and has limited the uptake of clean cooking solutions. A large share of refugee households lacks regular income, due to government-imposed work restrictions, which has led to refugees selling some of their cooking fuel to obtain money to purchase other basic needs. Evidence shows that 11% of households have sold or gifted their pressure cookers, often to meet urgent needs such as healthcare or food, even after receiving food vouchers from WFP [74]. Aid cuts have worsened these conditions, forcing trade-offs between food and fuel [78].

Furthermore, the combustible nature of LPG poses a constant safety risk, particularly in the densely populated and congested camp environment where shelters are built close together and composed of flammable materials such as bamboo and tarpaulin. Although fire squads are present in the camps, a few LPG-related fire incidents have already been reported, highlighting the ongoing vulnerability. To mitigate these risks, households are provided with regular safety trainings on the proper handling and use of LPG systems, alongside strict safety protocols and rapid response measures. As fires are relatively common in the camps (including caused by cooking incidents, electrical devices, discarded matches, and other reasons) there are also a well-established fire response programmes to respond to these dangers.

Structural and spatial constraints also present barriers. Alternative cooking solutions, such as biogas and e-cooking, remain largely constrained due to high capital costs, dense living conditions, and cultural and operational challenges. Supplying biodigesters for all households could cost up to $327.5 million, depending on technology used, and were concluded to be less feasible [71]. Additionally, limited grid electricity access and the high cost of solar PV powered e-cooking, combined with refugees' restriction to work, further constrains the feasibility of electric cooking or hybrid clean energy solutions.

Although LPG stoves in the camps are supplied with a five-year warranty and repairs are led by the supplier, maintenance remains a challenge. In the humid coastal climate of Cox's Bazar, the steel burners are prone to rust and require frequent cleaning to remain functional. Stove performance declines without regular upkeep, shortening their effective lifespan and adding to the operational costs of sustaining LPG provision. To address this, each LPG refill point is equipped with repair centres where households can bring their devices for servicing and minor repairs.

The cost of sustaining LPG provision in the camps is estimated to cost humanitarian ››

Barriers to clean cooking

partners around $29 million annually. Although Bangladesh already had an established LPG supply chain, the long-term financial burden of procurement and distribution is difficult to sustain. The problem is worsened by the fact that refugees are not permitted to work and cannot contribute financially, leaving the entire cost to external donors. Initially seen as a temporary measure, LPG provision has become heavily reliant on continued donor funding; whilst there is not yet a clear pathway to self-sustaining or locally financed supply, other funding options (such as carbon finance) have been suggested as options to reduce the burden on humanitarian budgets.

Finally, while LPG is cleaner than traditional biomass, its widespread use in the camps raises both environmental and health concerns. As an imported fossil fuel, LPG contributes to greenhouse gas emissions and increases dependency on external supply chains, making it less sustainable in the long term. Although LPG reduces exposure to smoke compared to firewood, risks remain from leaks, poor ventilation, and accidental fires. These concerns add to the complexity of maintaining LPG as the primary cooking solution in the camps.

OPPORTUNITIES

Building on lessons from recent interventions and emerging innovations, a mix of short-, medium-, and long-term strategies could strengthen the sustainability, efficiency, and inclusivity of cooking energy provision in the camps.

Optimising the provision of LPG could help to support ongoing access to clean cooking. ››

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Barriers to clean cooking

Improving coordination among implementing agencies (UNHCR, IOM, private suppliers, and others) and deploying digital monitoring systems could optimise stock management and reduce refill delays prevent duplication. Introducing bulk procurement and joint logistics planning could also yield cost efficiencies through economies of scale. Establishing smaller distribution points within communities could address the issues of long distances to LPG distribution points and long queues, or making provisions to transport the canisters to households located far from distribution points.

Although LPG stoves are supplied with warranties and local repair points exist at distribution sites, maintenance gaps persist. Improving repair and maintenance systems by establishing additional decentralised maintenance hubs, managed by trained refugee volunteers, could help maintain stove performance, extend equipment lifespan, and create new livelihood opportunities within camps.

Scaling up the usage of pressure cookers and efficient appliances could decrease the burden on LPG. Evidence from the UNHCR-led pressure cooker implementation between 2020 and 2025 found that using pressure cookers can reduce LPG use by around 10%, depending on household size and consistency of use. Expanding coverage to all households and maintaining refresher training on safe use could yield substantial savings and reduce the frequency of refill cycles. Additionally, providing extra pressure cookers (as requested by most households) could significantly increase the use of pressure cookers and, as a result, reduce the amount of LPG used in the camps.

Furthermore, combining LPG with emerging renewable energy options such as solar-powered e-cooking could reduce dependency on imported fossil fuels while also enhancing reliability. The ongoing e-cooking pilots by the GPA Coordination Unit and CARE Bangladesh will offer valuable insights into the technical, financial and behavioural feasibility of such systems.

This could be scaled to combine e-cooking into multi-functional energy systems. Future interventions could adopt integrated designs that provide both cooking and basic electricity services (such as lighting, phone charging, fans, and power for small businesses). These systems, demonstrated in earlier pilots, could improve livelihoods, reduce reverting to using firewood, and address multiple energy needs simultaneously.

Leveraging carbon finance and sustainable funding models could help to provide funding for clean cooking solutions. Carbon credit generation could be a potential revenue stream as both LPG and solar e-cooking interventions have strong potential for registration under voluntary carbon standards, such as Gold Standard or Verra. Carbon revenues can help offset part of the annual operational costs, estimated at $29 million for LPG distribution alone in the refugee camps.

Additionally, linking clean cooking interventions with Bangladesh's national energy and climate frameworks could unlock additional funding from development banks, climate facilities, and private investors through green and blended finance. Results-based or performance-linked mechanisms can further incentivise efficiency and accountability. Integrating clean cooking access within broader development and climate programmes (such as solar electrification, WASH, and livelihood initiatives) could also attract multi-sectoral co-financing and enhance long-term sustainability.

Facilitating refugee livelihoods could help to share costs. Enabling refugees to earn income legally through formal or community-based work schemes could significantly improve cost-sharing potential for clean cooking. Allowing controlled livelihood opportunities could not only ››

Barriers to clean cooking

enhance household dignity and self-reliance, but also ease the financial burden on humanitarian partners.

Strengthening governance, participation, and capacity could help to support the longevity of clean cooking programmes. Establishing camp-level energy committees, including women's representatives, can help to strengthen community ownership and accountability in energy planning. Participatory approaches could also enhance technology acceptance and safe usage practices. This can be further supported by structured training on LPG safety, appliance repair, and solar system operation can develop local technical capacity. Skilled refugees can be engaged in maintenance, monitoring, and awareness campaigns, reducing external dependency and promoting social inclusion. Furthermore, closer collaboration among humanitarian agencies, the RRRC, and national energy authorities can streamline technology approvals, harmonise safety standards, and ensure complementarity between camp-based and national clean cooking initiatives.

Finally, promoting the environmental, health, and social co-benefits of clean cooking could help to motivate further implementation and long-term sustainability. Clean cooking could help to maintain the 90% reduction in firewood use achieved since 2018, reducing deforestation and enabling continued reforestation efforts across Cox's Bazar. Expanding awareness on proper LPG and e-cooking practices can reduce respiratory illness, burns, and fire risks, and the transition to cleaner fuels has already led to measurable declines in indoor air pollution and associated disease burden. Reduced fuel collection has improved women's safety and freed time for education and livelihoods, supporting gender and protection outcomes and reducing inter-partner violence. Future initiatives can deepen this impact by integrating women into appliance maintenance, distribution logistics, and community awareness campaigns.

The long-term sustainability of clean cooking in the Rohingya refugee camps will depend on a diversified, multi-technology approach which combines efficiency improvements in LPG use, gradual integration of renewable energy systems, and strong community participation. By leveraging carbon finance, building local capacity, and aligning with national and donor strategies, humanitarian actors can transition from emergency fuel provision toward a resilient, low-emission energy system that meets the cooking and basic energy needs of both refugees and host communities.

BARRIER	OPPORTUNITY
High cost of LPG provision	Scale up pressure cooker implementation and e-cooking to reduce LPG usage, and explore opportunities for sustainable funding models through carbon finance
Fuel stacking can occur if households run out of LPG	Optimise the provision of LPG through inter-agency coordination, bulk procurement, and establishing local distribution points
Humid coastal climate causes damage to stoves which require repairs	Establish distributed maintenance centres, managed by refugee technicians

Electricity access for households

Electricity access in the Rohingya refugee camps remains limited and fragmented. Most households rely on decentralised small solar home systems (SHS) and lanterns to meet basic lighting and phone-charging needs, with only a few able to power small appliances such as fans. While grid-based electricity is available for government offices in the camps, this supply is not extended to refugee households or to NGO offices and communal facilities.

During the emergency response phase (2017–2020), several humanitarian agencies distributed solar lanterns and small SHS to households, providing Tier 1 lighting and phone-charging capabilities. IOM, for instance, provided solar lanterns to all households within its AoR. However, as funding declined and government policy evolved, lanterns were reclassified as non-essential items and large-scale distributions were halted [72].

Several studies have since assessed electricity access in the camps and surrounding host communities. One study found that about 58% of camp households reported having a reliable source of electricity for lighting, while 30% experienced intermittent supply and 11% described their lighting as generally unreliable [75]. Another estimated that roughly 50% of Rohingya households rely on small SHS or lanterns – often purchased from local markets and assembled from low-quality components – which require frequent maintenance or replacement. Despite these limitations, such systems remain vital for meeting basic energy needs such as lighting, mobile charging, and small fan use [79].

A baseline assessment of 400 camp households was conducted in 2024-2025 by the GPA Coordination Unit, in collaboration with IUCN and Practical Action, under the MECS-funded e-cooking feasibility. It found that over 96% of surveyed host-community households had access to electricity from the grid, but only about 10% of refugee households used electricity from mini-grids, and the remaining 90% lacked any access.

To address these gaps, several pilot projects have been implemented. SolShare deployed two mesh-grid pilots in Nayapara Registered Camp, using funding from FCDO, to connect SHS into local networks via its “SolBox” technology. Although mobile wallet integration was not feasible due to refugees’ lack of formal banking access, the pilots demonstrated that community-owned and operated systems could enhance both reliability and local ownership.

With grid access restricted within the camps and solar energy serving as the primary source of electricity, the Energy & Environment Network (EEN) developed the Solar Lighting Guidelines to promote safe and reliable access to electricity for households, public spaces, and communal facilities. These guidelines provide detailed technical specifications, installation standards, maintenance protocols, and practical recommendations for the design, operation, and maintenance of solar systems. The guidelines outline four main categories of solar energy projects currently implemented in the camps: solar streetlights (SSLs), solar mini-grids, solar nano-grids, and household-level solar lamps. As a living document, the guidelines are regularly updated to reflect field experience and evolving technologies, supporting the full life cycle of solar interventions.

In summary, electricity access in the Rohingya camps remains largely decentralised and donor-driven, relying on small-scale solar systems that often lack long-term durability. The persistent and systemic gaps in household-level electricity access have direct implications for safety, education, and daily living. Studies have shown that there is significant unmet demand and suggest a willingness among refugees to invest in basic energy services despite limited income opportunities, highlighting both urgent needs and potential pathways to improve living standards through affordable, reliable electricity solutions. Furthermore, the structured framework provided by the EEN Solar Lighting Guidelines, combined with emerging local repair capacity and decentralised maintenance systems, offers a foundation for building a more inclusive, coordinated, and resilient energy strategy in the camps. ››

Barriers to electricity access for households

Electricity access in the Rohingya refugee camps of Cox's Bazar remains severely constrained by structural, financial, and policy barriers. Chronic underfunding across the humanitarian response has prevented large-scale investment in resilient and durable electricity access infrastructure. Energy projects remain short-term and project-specific, with limited scope for scaling successful pilots. Many existing systems are nearing the end of their lifespan but replacements or upgrades have stalled due to budget cuts. Furthermore the energy response is fragmented across multiple agencies and projects, resulting in duplication and uneven service coverage. Data on solar installations, performance, and functionality are inconsistently reported. While the Solar Lighting Dashboard managed by NPM, EEN, and Shelter-CCCM tracks public lighting systems, its reporting remains incomplete which limits accountability and system optimisation.

Socio-economic vulnerability is a major barrier, with 54% of households earning less than 5,000 BDT (around $42) per month and 79% relying on unstable casual labour [75]. Most refugees therefore lack the financial capacity to buy or maintain stable electricity supply. Legal restrictions on employment further limit their ability to generate income, reinforcing dependence on aid. In some cases, families resort to selling relief items or borrowing to replace broken systems, which undermines their long-term resilience.

As a result around half of Rohingya households rely on low-cost, unregulated solar home systems or lanterns sold in local markets [79]. These systems often combine mismatched components, have no warranties, and degrade quickly due to humidity, heat, and poor-quality batteries. Frequent breakdowns leave households without lighting for days or weeks, while the limited nature of recycling facilities within the camps worsens e-waste accumulation in the camps.

The Government of Bangladesh's policy prohibits grid connections within the camps and is intended to preserve their temporary nature and avoid signaling permanence. This confines humanitarian actors to off-grid, solar-based solutions and prevents the camps' integration with nearby grid infrastructure. For the systems that are in place, weak maintenance and a lack of technical support limits their longevity as most household solar systems lack structured operation and maintenance (O&M) arrangements. Once donor-funded projects end, there is little technical backstopping to ensure continued performance, and batteries and controllers often fail prematurely due to heat and overuse. Although some livelihood programmes have trained residents in basic solar repair, these efforts remain small-scale and unevenly distributed across camps.

Energy inequities and procedural injustices also contribute to limited electricity access. Refugees, especially women and persons with disabilities, have limited participation in energy planning and governance processes. Decisions on technology type, distribution, and maintenance are often made through top-down approaches, which overlook diverse household needs and cooking practices. This has led to unequal access, underutilisation of some technologies, and missed opportunities for community ownership and sustainability [72].

OPPORTUNITIES

Alongside these persistent challenges, several promising interventions and enabling conditions are emerging. Decentralised solar solutions could help to overcome policy restrictions on grid connectivity and the reclassification of solar lanterns as non-essential items. Strengthening the enabling environment for the private sector could help it to lead on the delivery of off-grid solar systems (such as household solar kits, nano-grids, and mini-grids). Meanwhile using the EEN Solar Lighting Guidelines could help to standardise design, installation, and safety practices. This could be supported by working with government ››

Barriers to electricity access for households

authorities to gradually expand hybrid (solar and grid) models, and integrated e-cooking and basic electricity access systems, for essential services as confidence in off-grid systems grow.

Chronic underfunding limits replacement and maintenance of existing systems and delays the scale-up of new ones. Establishing preventive maintenance schedules and spare-parts supply chains could reduce system downtime and ensure consistent lighting in households and public areas. Integrating energy access with livelihoods and skills development, including by expanding solar repair and maintenance training under existing programmes, could also help to support the long-term maintenance of systems. Linking these to cash-for-work or community contracting models may reduce the dependence on external technicians and strengthen local ownership. In addition, it may be necessary to advocate for policy adjustments to allow limited refugee work rights and enable income generation for energy-related activities which might also help to overcome some of the socio-economic challenges.

Many SHS and lanterns bought from local markets are low quality and fail quickly, and there is a lack of technical regulation or quality assurance solar kits. Supporting end users to access solar products which meet quality standards through value chain development and expanding community-led repair hubs (such as the Green Innovation Hub and IOM repair desks) could provide affordable maintenance and prolong equipment lifespan. Improving supply chain management amongst humanitarian organisations for verified solar technologies could also help to ensure system reliability.

Low-quality solar products result in e-waste and so scaling up local repair, take-back, and recycling initiatives can help to overcome this, and could leverage successful models from the Green Innovation Hub and the partnership between UNHCR, NGO Forum, and Schneider Electric. Introducing structured waste collection incentives and formal recycling channels with certified recyclers in Dhaka, in conjunction with wider regional initiatives, could help to promote circular economy practices.

BARRIER	OPPORTUNITY
Lack of policy support and funding for domestic electricity access	Support the private sector to deliver decentralised solar solutions
Weak maintenance and a lack of technical support means that existing systems fall into disrepair	Use EEN Solar Lighting guidelines, establish preventative maintenance schedules, supply chains for spare parts, and training for local technicians
Low-cost, unregulated solar products break easily and cause electronic waste	Promote high-quality solar products and incentivise local repair and recycling initiatives

E-waste management in the Rohingya refugee camps: The Green Innovation Hub

In response to the growing volume of broken electrical appliances in the Rohingya refugee camps, a few initiatives have emerged to strengthen local repair and maintenance capacity. The livelihoods sector has supported this effort through vocational training programmes, equipping hundreds of camp residents with basic electrician skills.

Dedicated repair centres have been established which complementing these efforts, including IOM's solar lantern repair desk in Camp 20, and a comprehensive e-waste management programme and Green Innovation Hub (GIH), a collaborative initiative by UNHCR Bangladesh, NGO Forum for Public Health, Schneider Electric, and Electriciens Sans Frontières in in Kutupalong and Nayapara camps [79]. The GIH serves as both a training facility and a functional repair workshop, focused on solar lanterns, torches, fans, lights, and other small appliances, providing a promising model for extending product lifespans and reducing e-waste.

Surveys across four camps revealed limited awareness of energy efficiency and that batteries, fans, phones, cables, and solar panels making up the bulk of e-waste [79]. Harmful disposal practices, such as burning wires and dumping battery water, posed severe environmental and health risks. In response, awareness campaigns, community sessions, and training of 40 "energy ambassadors" significantly improved community understanding of the issues, with over 80% of targeted populations now reporting awareness.

The GIH was established as a repair and training centre to build technical skills in repairing solar lanterns, solar home systems, and mini-grids. The Hub was equipped with tools and curricula from Schneider Electric and Electriciens Sans Frontières [79]. Other elements of the project included a take-back and recycling scheme which trained and deployed 20 incentivised refugee volunteers to collect e-waste door-to-door. Furthermore, a cash-for-work incentive scheme encouraged participation: community members received small cash payments based on the scrap market value of items; for example, 200 BDT ($1.65) for a smartphone or 40 BDT ($0.35) per kilogram of iron-rich e-waste.

Overall, the programme achieved active participation from 49% of households in the targeted group and a significant reduction in improper disposal and visible e-waste in public areas [79]. A detailed logbook system tracked over 9.4 tonnes of collected e-waste, which was categorised for repair or ethical recycling by a certified recycler, Azizu, in Dhaka. It also resulted in increased community-led repair activities and technical interest.

The programme faced challenges during implementation, such as legal constraints on refugee employment and cash payments with resulted in delays. Limited local or regional e-waste recycling processes meant that the e-waste needed to be transported for recycling and disposal in Dhaka, and the programme's sustainability hinges on flexible, multi-year funding and integration of informal repair shops [79].

The e-waste management programme has illustrated that, even in challenging environments settings, well-designed and community-centred approaches can support environmental goals while also creating local livelihood opportunities.

Electricity access for communal facilities

Reliable and sustainable energy access is essential for the effective functioning of communal and operational facilities in the Rohingya refugee camps including education centres, women and child-friendly spaces, NFI and food distribution depots, LPG hubs, health posts, and WASH systems. In practice, however, energy access for communal facilities remains uneven and fragmented. While critical public service centres such as health posts and water systems have increasingly been prioritised for solar electrification, many other facilities continue to rely on a patchwork of solutions. These range from diesel generators at high-throughput depots to small standalone solar systems or, in some cases, no electricity at all in community spaces. This inconsistency limits operational reliability and service quality, and also impacts the safety of vulnerable populations, particularly women and children who rely on these spaces for essential services and protection.

Recent research by Bahaj et al. (2025) underscores the vital role of sustainable electrification in maintaining essential services in refugee contexts, drawing lessons from Uganda and Bangladesh [80]. In the Rohingya camps alone, electricity is required to power a vast array of public infrastructure, providing lighting for more than 180,000 households, operating over 50,000 toilets, pumping 16 million litres of water daily, and supporting 5,000 classrooms, 43 primary health centres, 144 health posts, and 100 nutrition centres. Despite this scale of need, much of the existing infrastructure remains dependent on the electricity grid or diesel generators. The running costs both of these are relatively low which increases the payback periods of other sources, such as solar.

A modelling study by Chowdhury et al. in 2019 identified an optimal hybrid energy configuration for the Rohingya camps which combined solar PV, wind, diesel generators, batteries, and converters [81]. The optimum system would provide 87% of its energy from renewable sources, reduce emissions by more than 60% compared to conventional diesel systems, and have a lower cost of energy ($0.35/kWh) than standalone solar home or diesel-only setups. The study also highlighted long-term sustainability benefits including the reduced reliance on imported diesel and a potential contribution to mitigating deforestation. Even small-scale PV–battery systems were shown to deliver notable cost and emissions savings over both five- and 20-year time horizons. These findings align with ongoing field interventions: the ADB deployed fifty 5 kWp solar minigrids to power street lighting and limited household use, while IOM and UNHCR have installed solar systems in several health facilities to enable 24-hour medical services. These systems have faced issues caused by a lack of O&M, however.

Despite these advances, progress toward large-scale adoption remains constrained by short-term funding cycles, high upfront capital costs, and the absence of integrated, cross-sectoral energy planning. To ensure coordination and technical consistency, the installation of all community-level energy systems, such as solar streetlight, mini-grids, nanogrids, and lightning arrestors, is currently overseen by the Shelter-CCCM Sector, in collaboration with IOM, UNHCR, and respective site planning teams. Strengthening this coordination, alongside multi-year funding and policy support, is essential to move from fragmented, project-based electrification toward a more systematic, resilient, and sustainable energy infrastructure for communal facilities in the camps. ››

Electricity access for communal facilities

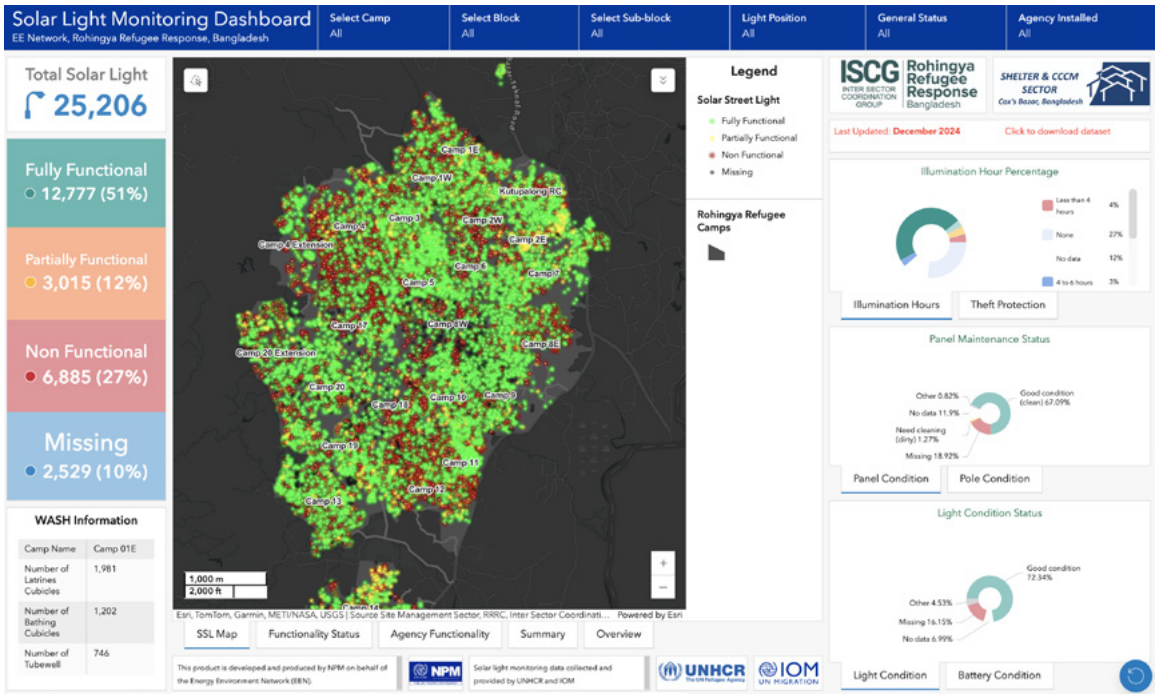
Public lighting

Access to safe and reliable public lighting remains a significant challenge in the Rohingya refugee camps. According to the 2024 Inter-Sector Needs Assessment, 57% of households reported inadequate lighting at night, which can limit mobility and heighten protection risks, particularly for women and girls. Around one third of women and girls stated that they did not feel safe using communal latrines, largely due to the limited functionality of solar lighting infrastructure. Given the Government of Bangladesh's restrictions on night-time activities, solar streetlights (SSLs) are crucial for safety and protection, particularly around communal WASH facilities used by women and girls after dark.

Standalone SSLs are complemented by solar nano-grids and mini-grids which provide lighting for roads and limited household use for between one and six hours per night. However, overall coverage remains inadequate, and the absence of sufficient lighting continues to pose serious safety and protection risks. Joint Protection Monitoring Reports have linked poorly lit areas to increased incidents of gender-based violence, theft, and physical injury [82, 83]. In some cases, vandalism and theft of lighting infrastructure have further exacerbated the problem, with criminal groups reportedly damaging SSLs to facilitate illicit activities. ››

FIGURE 4

The Solar Street Light Monitoring Dashboard [85].



Electricity access for communal facilities

Key contributors to SSL projects include UNHCR, IOM, ADB, Save the Children, Qatar Charity, the World Bank/LGED, CAFOD, and GUK. Although more than 24,000 SSLs have been installed across the camps by over 60 implementing partners since 2020 under the Shelter-CCCM Sector, functionality remains a persistent issue owing to a lack of regular O&M and repair planning. Only 46–51% of installed SSLs are currently operational, with the remainder partially functional, non-functional, or missing. Given the Government of Bangladesh's restrictions on night-time activities, SSLs are crucial for safety and protection, particularly around communal WASH facilities used by women and girls after dark. An estimated 37,700 SSLs are required for adequate coverage which leaves a shortfall of nearly 27,600 functional units [25, 84].

Maintenance represents a major challenge. The wide variety of SSL models used across the camps and the absence of a unified O&M framework have resulted in inconsistent performance and system downtime. To address this, the Livelihoods and Skills Development Sector has trained over 1,300 Rohingya refugees in solar repair since 2023, creating a skilled pool of local technicians capable of providing first-line maintenance support. A formal O&M system is also being developed to link these trained individuals with identified maintenance needs across different camp zones.

To enhance coordination and data-driven planning, the Solar Lighting Dashboard – jointly managed by NPM, the Shelter-CCCM Sector, and the EEN – tracks the distribution, status, and performance of SSLs and other grid-based systems (see Figure 4). However, reporting inconsistencies among implementing partners continue to limit comprehensive analysis and hinder timely decision-making.

Electricity use in the WASH sector

Energy is central to ensuring reliable water supply and hygiene services across the Rohingya camps. The WASH Sector, coordinated by the Government of Bangladesh, UN agencies, and NGOs, operates a mixed network of hand pumps and solarised boreholes which have become the standard for water provision in the camps. Since 2019, nearly 298 water networks have been constructed across the 33 camps, comprising 320 boreholes, 768 tank sites, and over 7,000 tap stands (see Table 9). These networks provide safe water to the refugee population and, in several cases, to host communities and institutional users such as NGO and government offices. In Camps 22, 26, and 27, for example, between 80-100% of the water infrastructure also serves surrounding host communities.

A significant percentage of solarised WASH infrastructure are functional, although some are non-functional. The main causes of non-functionality include theft of solar panels and batteries, damage to electromechanical components (such as pumps, inverters, and controllers), and operational issues such as non-functional boreholes and tap stands. In some cases, unclear roles and responsibilities during project handovers between implementing partners further delayed repairs.

Despite widespread solar adoption, energy access for water networks remains fragile. While solar power is promoted as the primary energy source, the sector still relies heavily on diesel generators, particularly in camps where solar infrastructure is absent or malfunctioning. An internal 2023 study by the Geneva Technical Hub found that many boreholes were operating at below-optimal capacity, some at less than half, largely due to technical failures and inadequate solar system sizing. ››

Electricity access for communal facilities

To mitigate these risks, 90% of water networks in 15 camps are equipped with backup diesel generators. However, eight camps (01E, 01W, 15, 16, 17, 20, Extension, 21, and 26) have no provision for backup energy at all which leaves systems vulnerable during monsoon and cyclone seasons. The 2025 Water Strategy for the Rohingya Response emphasises integrating solar power with reliable backup systems, recommending at least three days of fuel storage, alongside measures to standardise chlorination protocols, strengthen solar equipment maintenance, and improve water production monitoring. ››

TABLE 9

Organisations that have implemented solar-powered WASH projects in the camps.

ORGANISATION	INTERVENTION
CARE BANGLADESH (CAMP 16)	*CARE implemented a 12 kW solar PV system powering a 7.5 HP submersible pump drawing from a deep borehole (800 ft). It provides around 120,000 litres per day via 40 tap stands to more than 4,000 people. It has 95 m^3 of overhead storage, automatic chlorination, and a 15 kVA diesel generator for backup during low-sunlight periods [86].*
WORLD VISION (CAMP 15)	*World Vision installed two 250-metre-deep boreholes on one of the highest hills in the camp. It uses an 8 kW PV array (56 panels of 310 W each) and two 190 m^3 storage tanks, and supplies around 1,000 refugee families and 32 host community households across 30 tap stands [87].*
CPI / NGO FORUM	*NGO Forum has implemented several WASH projects including in Camps 6, 7, 4, 4ext; some are ongoing, and others are completed [88]. It deployed a 3 kW solar pump from a 150 m borehole into a 5 m^3 tank, serving around 800 people through four tap stands. It includes basic chlorination for around 10,000 litres per day [89].*
UNHCR	*Installed in 2019, UNHCR's safe water systems run entirely on electricity generated through solar panels. Motorised pumps draw water from newly installed 70,000 litre chlorinated tanks. The five water networks (jointly completed by UNHCR MSF, OXFAM and BRAC) provided safe water to over 40,000 refugees as of 2019 [90].*
UNICEF	*To improve access to safe water in the Rohingya refugee camps in Cox's Bazar, UNICEF and its partners constructed 47 piped water distribution systems across seven camps. These helped to increase safe water coverage from 10% in 2018 to 73% in 2022. Each system includes boreholes, reservoir tanks (95 m^3), solar-powered pumps, and tap stands located in community areas [91].*

Electricity access for communal facilities

Electricity use in the healthcare sector

Reliable access to electricity is indispensable for delivering quality healthcare services and enables the use of lighting, refrigeration, sterilisation, diagnostics, and emergency response. In the Rohingya refugee camps, several organisations have made notable progress in electrifying health facilities, prioritising solar power as a sustainable and resilient energy source (see Table 10).

IOM, in partnership with the World Bank, has led one of the largest healthcare electrification efforts to date, installing solar PV systems across 100 health facilities throughout the camps. Similarly, the UNHCR has solarised at least 10 health centres in its AoR, including Camps 1W, 2E, 3, 4, 5, and 6, often pairing solar systems with diesel generator backups to guarantee continuity of care during cloudy or emergency periods. Other actors, including the HOPE Foundation, Kopernik, and Solevolt, have implemented targeted interventions to strengthen maternal health services, disease outbreak response, and primary healthcare delivery through reliable solar-powered systems.

Health posts are some of the few communal facilities in the camps with institutional scale cooking, where LPG is the predominant fuel source. In contrast, cooking activities are less common in other communal spaces such as schools and it remains unclear whether cooking occurs in madrasas (religious schools), indicating an area for further investigation. An e-cooking pilot has been implemented at the Camp 12 health centre, supported by a donation from Schneider Electric, which features a 3.3 kWp solar array and two infrared stovetops [94]. The cooks at the health centre prepare approximately 40 meals daily using this setup. ››

TABLE 10

Organisations that have implemented solar systems for heathcare applications in the camps.

ORGANISATION	INTERVENTION
IOM	*In 2017, IOM introduced solar PV systems in remote health posts across the Kutupalong-Balukhali settlements to enable 24-hour healthcare services. These systems power lighting, medical services, water purification, and mobile charging. By late 2017, 13 fixed clinics were solarised which supported continuous emergency care, improved hygiene services, and enhanced patient support. These were implemented in collaboration with WHO, the Ministry of Health, Solevolt, Kopernik, and BPO Data Exchange [92].*
KOPERNIK	*Between November 2017 and March 2018, Kopernik deployed two Solevolt Enterprise solar units in IOM's diphtheria treatment clinics in Cox's Bazar. The systems provided 24-hour lighting, fans, ultrasound power, and phone-charging capacity during outbreak response. During this period, 5,278 patients were triaged and 648 admitted, with zero diphtheria fatalities. Clinics later continued to be in use for general healthcare between 8 am and 8 pm [93].*
HOPE FOUNDATION FOR WOMEN AND CHILDREN	*In 2018, the HOPE Foundation for Women and Children of Bangladesh opened the HOPE Field Hospital for Women in the Kutupalong mega-camp. This was the first hospital in the camps run by a Bangladeshi NGO and the only one dedicated specifically to women's healthcare. The facility receives a large portion of its power from solar energy using five custom-built SOLARKIOSK units, funded by the Abundant Future Foundation. Solar energy supports lighting in labour and delivery rooms, sterilisation equipment, vaccine refrigeration, and incubators. The system is also integrated across the hospital's wider power grid and provides indoor and perimeter lighting, ensuring safe and uninterrupted care during frequent monsoon-related and grid power outages.*

Solar e-cooking at the health facility in Camp 12, Cox's Bazar

In Camp 12 of Cox's Bazar, a 13-bed inpatient health facility uses solar PV electric cooking to prepare meals. The off-grid facility installed a 3.3 kWp solar PV system, with an inverter and a 6.24 kWh battery storage system, and uses two single-burner induction cooktops.

Led by NGO Forum for Public Health since 2024, this solar-powered e-cooking setup has dramatically reduced the facility's dependence on LPG, cutting fuel use by an estimated 83%. Staff report that meals are now quicker and easier to prepare, with less exposure to open flames and without indoor smoke. Cooking pots stay cleaner, kitchen temperatures are more manageable, and the risk of burns has greatly reduced. The cook added that she can use a fan during summer, which was not possible with LPG. Additionally, she requires less water for pot washing, as there is no residue under the pots.

Despite these successes, the transition has not been without challenges. Monsoon-season power fluctuations required the battery capacity to be doubled, and LPG remains as a backup for cloudy days. The upfront system cost, about $6,100, was a significant investment, and ensuring adequate kitchenware (such as induction-compatible pots) was essential. Staff training and user familiarity with induction cooking also played a key role in the success of the initiative.

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Solar-powered electric cooking can reduce LPG usage, prepare meals faster, and provide a more comfortable environment for staff.

Electricity access for communal facilities

Electricity access in education and protection facilities

Education and protection facilities play a critical role in the Rohingya refugee camps by providing learning opportunities, psychosocial support, and safe spaces for vulnerable groups, especially women and children. Teachers and instructors from both the Rohingya refugees and host communities are trained to deliver education under the Myanmar Curriculum. Despite this, access to education remains constrained by limited infrastructure, rapid population growth, and lack of classroom space. Most schools operate in two shifts, allowing learners only a few hours of instruction daily. This system disproportionately affects girls, who face cultural and economic pressures to stay at home or marry early and reduces their participation in formal education.

In 2019, over 1,600 centres operated across the camps with only a limited number equipped with solar PV systems which powered basic lighting and fans [95]. These systems allow minimal comfort during lessons and limited flexibility for evening or extended learning hours. The 2024 Inter-Sector Needs Assessment reported that there were 5,994 learning facilities across the camps, each serving about 80 learners daily, 40 in the morning and 40 in the afternoon. The majority (81%) are formal learning centres, while others include community-based learning facilities (14%), multi-purpose centres (4%), and mixed-use spaces (1%). Community-based learning facilities often cater to the most marginalised learners but lack adequate infrastructure, including lighting and ventilation.

Learning centres in the camps are typically modest structures that rely heavily on natural daylight, and electricity access remains inconsistent. Many learning spaces lack dedicated power systems altogether, and where solar systems exist, these often have capacity constraints which prevent the use of fans during the hottest periods, digital learning tools, or ICT-based teaching equipment.

The energy limitations of these centres are compounded by funding cuts and operational disruptions. As of mid-2025, nearly 300,000 Rohingya children were at risk of losing access to education due to the closure of learning centres amid funding shortfalls. These challenges threaten not only the continuity of learning but also the broader protection and resilience goals of the humanitarian response.

Parallel to learning centres, women- and child-friendly spaces play a vital role in providing protection, counselling, and skills development for Rohingya refugees, particularly survivors of gender-based violence and children needing psychosocial support. These facilities, supported by UNFPA, UNICEF, and NGO partners, are typically equipped with basic standalone solar lighting systems that have improved safety and extended operational hours, especially late-afternoon sessions and indoor activities. However, energy provision typically remains limited to only a few LED lights and fans, and would be insufficient for running sewing machines, charging devices, or supporting digital learning and vocational training. While these installations have enhanced the physical safety and dignity of women and girls, there remains a strong need to expand and standardise energy access across education and protection facilities. ››

Electricity access for communal facilities

Energy access in women spaces, depots, and distribution points

Numerous other facilities in the Rohingya refugee camps rely on reliable energy to maintain essential daily operations such as food distribution sites, NFI warehouses, LPG depots, and women's and community spaces managed by humanitarian agencies and NGO partners. Most of these facilities are powered primarily by the national electricity grid and diesel generators, which provide the high and continuous power needed for essential functions such as biometric registration, digital beneficiary verification, lighting, ventilation, and IT systems. Grid and diesel generation remain the dominant energy sources because of their reliability for powering equipment with substantial energy demands and for supporting operations that must run without interruption.

In some facilities, solar lighting systems have been installed to supplement diesel power, mainly to enhance safety, visibility, and operational continuity during evening hours. However, these solar systems are generally limited to basic illumination and do not offset the heavy energy requirements of core operations. Fuel shortages, generator breakdowns, and maintenance challenges periodically disrupt services, highlighting the need for more sustainable and resilient energy alternatives.

Energy access is becoming increasingly linked to livelihoods and productive uses. The Livelihoods and Skills Development Sector has provided basic Level 1 electrician training to camp residents, building a pool of individuals with entry-level technical skills to support installation and maintenance of small energy systems. Markets across the camps are vibrant, with many vendors relying on LPG for cooking-related enterprises and small solar systems to power lighting, phone charging, or other low-power livelihood activities. Although limited research exists on energy use in small businesses, field observations found that informal electrical repair shops are widespread and play a crucial role in keeping appliances and systems operational. This reflects both the latent demand for reliable energy and the entrepreneurial potential of energy-related services to support local economic activity. ››

Facilities rely on consistent access to electricity to provide key services in the camps.

Barriers to energy access in communal facilities

Despite important progress in electrifying communal infrastructure, it remains uneven, underfunded, and highly dependent on donor-led pilot initiatives.

Most electrification efforts in communal spaces, whether solarising health centres or deploying streetlights, have been led by individual humanitarian organisations or NGOs through fragmented standalone projects. While IOM's large-scale collaboration with the World Bank (covering 100 health facilities) and UNHCR's solarisation of at least 10 health centres mark significant progress, there is limited coordination, standardisation, or long-term planning between agencies. This results in gaps in service coverage, technology diversity, and inconsistencies in system quality and performance.

A lack of sustainable O&M models means that solar systems installed in health centres and public spaces often face maintenance challenges due to a lack of technical expertise among facility staff and an absence of structured arrangements. Once donor support ends, many systems are left without the technical backstopping needed for long-term operation. This is particularly concerning for life-saving infrastructure such as maternity wards, vaccine cold chains, and nighttime health services.

Cooking remains a major blind spot in energy planning for communal facilities. Most health centres rely on LPG for preparing patient meals, and electricity for cooking is rare, except for a small e-cooking pilot in Camp 12's health post powered by a 3.2 kWp solar PV system with ››

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Barriers to energy access in communal facilities

battery storage. Cooking is generally not supported in schools or madrasas, and the needs remain poorly documented. The high electricity demand of electric cooking poses challenges for solar PV systems unless paired with careful load management and sizing of components such as batteries and inverters.

Street lighting has been deployed throughout the camps but its coverage remains inconsistent between and within camps. Some areas have benefited from high-quality solar-powered LED systems, while others lack sufficient light points or suffer from broken or poorly maintained units (only around half of installed SSLs are fully functional). This limits safe mobility and contributes to heightened gender-based violence risks, particularly for women and girls using communal facilities such as toilets after sunset [25]. Many shelters remain dark at night, restricting movement and safety within households and public spaces. Vandalism and theft have also been reported, which reduce the longevity of installations.

Environmental conditions and grid limitations present further challenges. Monsoon-related flooding, humidity, and high temperatures frequently disrupt both solar system functionality and the grid. In grid-connected areas, power outages are common and can last for hours or days, particularly during the rainy season. Health facilities with hybrid systems (composed of solar power, diesel generators, and the grid) are more resilient to outages but those without adequate backup remain vulnerable to interruptions in care.

Finally, policy and coordination gaps mean that there is currently no comprehensive energy strategy for communal facilities in the camps. Energy interventions remain reactive, driven by emergency needs or ad hoc funding, rather than coordinated through a long-term energy planning framework. Institutional mandates for energy are often unclear across the humanitarian cluster system which further delays progress on scaling energy models that have demonstrated success in the camps.

OPPORTUNITIES

Fragmented project-based approaches and inadequate coordination and standardisation across agencies could be supported through the development of a camp-wide energy strategy for communal facilities. This could be coordinated through existing mechanisms, such as the EEN, or through the shelter and WASH sectors.

Furthermore, at the organisational level, developing camp-wide operation and maintenance frameworks and linking trained refugee technicians with humanitarian agencies could further help to maintain systems. Strengthening coordination between agencies through a centralised energy monitoring and reporting mechanism, building on existing tools such as the Solar Lighting Dashboard, would also be beneficial. This would require regular functionality reporting and the integration of monitoring systems with protection and WASH sector data for joint planning.

Establishing long-term O&M contracts, with clearly defined roles and responsibilities, would help to overcome the present lack of maintenance for electricity systems. Training facility staff in how to use solar systems and perform basic troubleshooting could keep systems operational and result in fewer periods of downtime. This could also reduce the costs and delays related to external maintenance providers needing to visit the camps to perform reactive maintenance.

As clean cooking for institutions relies primarily on LPG, the use of other energy sources could also be explored. Scaling up e-cooking pilots, which use solar PV and battery storage or hybrid power sources, could offer an alternative to present LPG systems. These could be tailored to the specific needs of different types of community facilities, such as health centres or schools. ››

Barriers to energy access in communal facilities

Alongside improvements for household lighting, SSL coverage should be expanded in high-risk zones such as pathways, latrines, and bathing areas, prioritising areas identified through the Solar Lighting Dashboard. Conducting mapping and needs assessments based on inputs from community members (especially involving women, youth, and persons with disabilities) can also help to identify the areas most in need of improved lighting. Investing in tamperproof SSLs could reduce the threat of vandalism whilst establishing local community lighting committees can help to manage, monitor, and report lighting functionality and safety issues. These platforms can also improve technology acceptance, safe use, and community accountability.

Prioritising hybrid electricity systems – composed of multiple sources of energy with sufficient storage capacity – can help to ensure the resilience of power availability for critical humanitarian services. Combining the grid, where available, to provide baseload power alongside solar PV and batteries can help to support system reliability, whilst diesel generators could be used to provide backup power in case of emergency.

Finally, promoting sustainable energy within integrated long-term planning would help to scale up energy access for community facilities. Centralised policy frameworks within and across sectors could help to embed energy into core areas of programming and allow for more proactive planning for the energy needs of key humanitarian infrastructure.

BARRIER	OPPORTUNITY
Most activities involve standalone projects with limited long-term planning	Advocate for integrated planning across clusters and the inclusion of energy access in camp-level service delivery frameworks
Weak maintenance plans and limited technical capacity	Establish maintenance contracts and train facility staff in solar system use and basic troubleshooting
Institutional cooking relies heavily on LPG	Scale e-cooking pilots and explore hybrid cooking solutions tailored to institutional settings
Uneven streetlight coverage with maintenance and vandalism issues	Conduct mapping and needs assessments, and invest in tamper-proof, community-managed public lighting systems
Power cuts, flooding, and heat affect the reliability of electricity systems	Prioritise hybrid systems and climate-resilient infrastructure design

05

Stakeholders and energy projects

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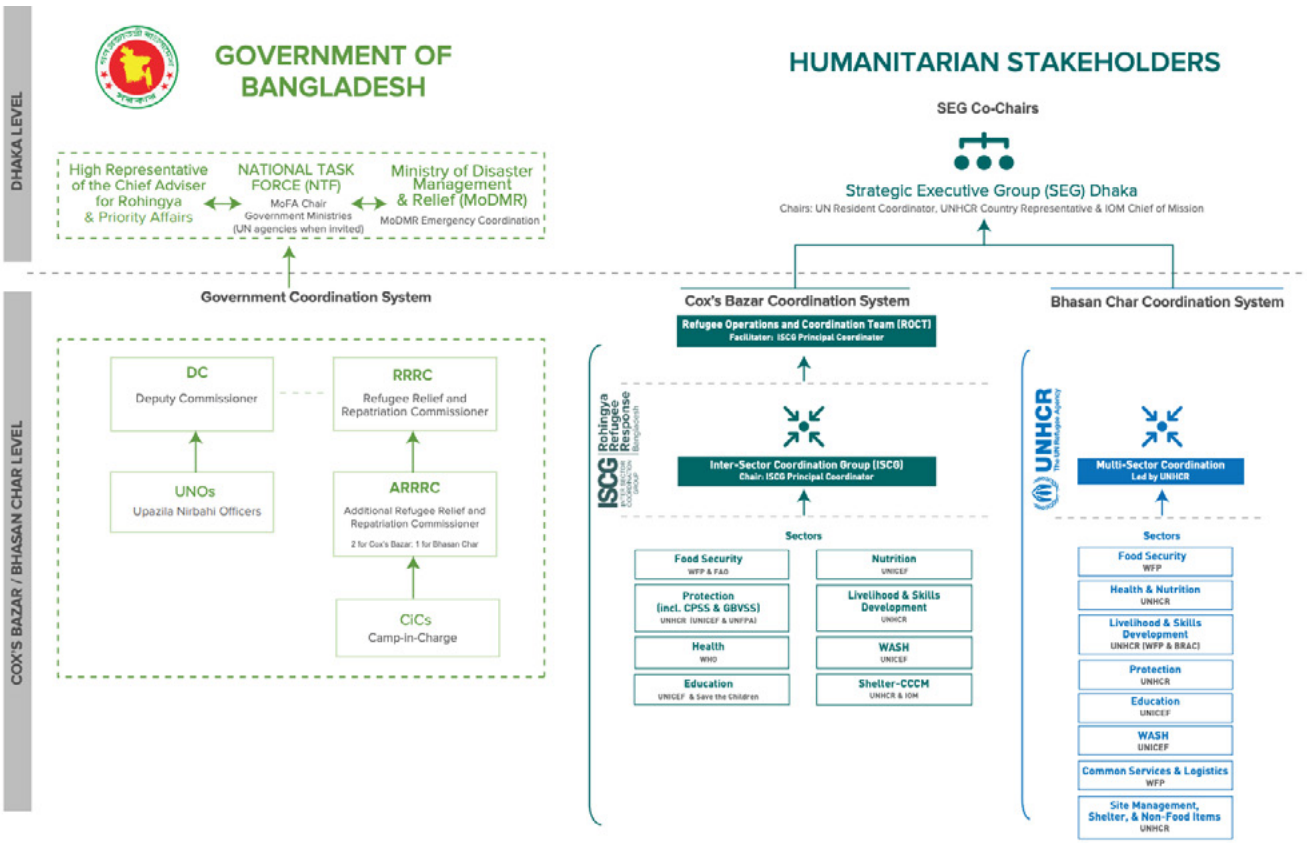
Overview of stakeholders in Bangladesh

Energy access for Rohingya humanitarian response in Bangladesh is underpinned by a robust coordination structure that operates across multiple administrative tiers. At the national level, the Government of Bangladesh, through the National Task Force chaired by the Ministry of Foreign Affairs, provides strategic direction. The Ministry of Disaster Management and Relief and the Refugee Relief and Repatriation Commissioner (RRRC) lead sub-national coordination in Cox's Bazar and Bhasan Char.

On the humanitarian side, the Strategic Executive Group (SEG) in Dhaka, co-chaired by the UN Resident Coordinator, UNHCR, and IOM, provides high-level leadership. In the field, the Inter-Sector Coordination Group (ISCG) facilitates coordination among UN agencies, NGOs, and donors, while UNHCR leads the multi-sector coordination on Bhasan Char. Sector-specific responsibilities are shared among various UN agencies and NGO partners, as illustrated in Figure 5. ››

FIGURE 5

Coordination mechanism for the Rohingya Humanitarian Response [25].



Overview of stakeholders in Bangladesh

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

- **Government agencies** with mandates and responsibilities defined by the Government of Bangladesh.
- **Humanitarian and development organisations** which typically address specific issues including UN agencies operating across the world, international NGOs with projects in Bangladesh, 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.
- **Finance institutions** which offer access to banking and other financial services to community members.
- **Other organisations** with a focus on issues that are related to energy in displacement settings.

This section provides a short summary of the main organisations working to support energy access in displacement settings in Bangladesh, 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 displaced communities in Bangladesh. The directory of stakeholders included in this section intends to be extensive but not exhaustive.

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Overview of stakeholders in Bangladesh

NATIONAL TASK FORCE (NTF)
Government
NATIONWIDE

UPAZILA NIRBAHI OFFICERS (UNOS)
Government
SUBNATIONAL

MINISTRY OF FOREIGN AFFAIRS (MoFA)
Government
NATIONWIDE

MINISTRY OF DISASTER MANAGEMENT AND RELIEF (MoDMR)
Government
NATIONWIDE

CAMP-IN-CHARGE (CIC)
Government
SUBNATIONAL

REFUGEE RELIEF AND REPATRIATION COMMISSIONER (RRRC)
Government
SUBNATIONAL

DEPUTY COMMISSIONER (DC)
Government
SUBNATIONAL

CARITAS BANGLADESH
INGO
NATIONWIDE

PRACTICAL ACTION
INGO
NATIONWIDE

WORLD VISION BANGLADESH
INGO
NATIONWIDE

UNITED NATIONS HIGH COMMISSIONER FOR REFUGEES (UNHCR)
UN agency
NATIONWIDE

ELECTRICIENS SANS FRONTIÈRES (ESF)
Technical NGO
INTERNATIONAL

BRAC
NGO
NATIONWIDE

HOPE FOUNDATION FOR WOMEN AND CHILDREN
NGO
NATIONWIDE

WORLD LPG ASSOCIATION (WLPGA)
Industry association
NATIONWIDE

MODERN ENERGY COOKING SERVICES (MECS)
Research institution
GLOBAL

EAST WEST UNIVERSITY (EWU)
Academic institution
NATIONWIDE

INTERNATIONAL ORGANIZATION FOR MIGRATION (IOM)
UN agency
NATIONWIDE

STRATEGIC EXECUTIVE GROUP (SEG)
UN agencies
NATIONWIDE

OXFAM
INGO
NATIONWIDE

SAVE THE CHILDREN
INGO
NATIONWIDE

UNIVERSITY OF SOUTHAMPTON (ENERGY AND CLIMATE GROUP)
Academic institution
NATIONWIDE

STANFORD UNIVERSITY & ICDDR,B
Academic institutions
NATIONWIDE/ GLOBAL

SOLSHARE
Solar company
NATIONWIDE

INTER-SECTOR COORDINATION GROUP (ISCG)
UN-led coordination mechanism
NATIONWIDE

REFUGEE OPERATIONS AND COORDINATION TEAM (ROCT)
UN-led coordination mechanism
NATIONWIDE

CARE BANGLADESH
INGO
NATIONWIDE

INTERNATIONAL UNION FOR CONSERVATION OF NATURE (IUCN)
INGO
NATIONWIDE

CAFOD (CATHOLIC AGENCY FOR OVERSEAS DEVELOPMENT)
INGO
NATIONWIDE

BEXIMCO LPG LTD
LPG company
NATIONWIDE

AZIZU RECYCLING & E-WASTE MANAGEMENT COMPANY
E-waste management
NATIONWIDE

BANGLADESH RED CRESCENT SOCIETY (BDRCS)
NGO
NATIONWIDE

ENERGY AND ENVIRONMENT NETWORK (EEN)
Coordination network
SUBNATIONAL

STRATEGIC EXECUTIVE GROUP (SEG)
Coordination mechanism
NATIONWIDE

NGO FORUM FOR PUBLIC HEALTH
NGO
NATIONWIDE

SOLEVOLT
Solar company
INTERNATIONAL

SCHNEIDER ELECTRIC
Multinational energy corporation
INTERNATIONAL

NF ENTERPRISE
LPG company
NATIONWIDE

PSEA NETWORK
Coordination mechanism
NATIONWIDE

UNITED NATIONS OFFICE FOR THE COORDINATION OF HUMANITARIAN AFFAIRS (OCHA)
UN agency
NATIONWIDE

WORLD FOOD PROGRAMME (WFP)
UN agency
NATIONWIDE

UNITED NATIONS CHILDREN'S FUND (UNICEF)
UN agency
NATIONWIDE

ASIAN DEVELOPMENT BANK (ADB)
Financial institution
MULTINATIONAL

OTHER FINANCE INSTITUTIONS
Financial institutions
NATIONWIDE

EUROPEAN CIVIL PROTECTION AND HUMANITARIAN AID OPERATIONS (ECHO)
Donor agency
MULTINATIONAL

Stakeholder directory

GOVERNMENT

NATIONAL TASK FORCE (NTF)

Government

The NTF is the Government of Bangladesh's highest-level coordination mechanism for the Rohingya refugee response. Chaired by the Ministry of Foreign Affairs (MoFA), it provides strategic oversight and policy guidance for all humanitarian operations. The NTF reviews and approves all UN–Government agreements and ensures interministerial alignment. Its decisions influence the authorisation of key infrastructure investments, including solar electrification, LPG distribution, and clean cooking programmes implemented in Cox's Bazar and Bhasan Char.

NATIONWIDE

MINISTRY OF FOREIGN AFFAIRS (MoFA)

Government

MoFA is the lead government ministry overseeing foreign relations and international cooperation. It chairs the NTF and ensures alignment between national policy and international humanitarian efforts. MoFA plays a pivotal role in negotiating donor frameworks, reviewing international energy and environment projects, and endorsing partnerships related to energy access, sustainability, and carbon-finance mechanisms in the camps.

NATIONWIDE

MINISTRY OF DISASTER MANAGEMENT AND RELIEF (MoDMR)

Government

MoDMR is Bangladesh's lead agency for disaster preparedness and emergency response. It coordinates humanitarian operations, oversees the Refugee Relief and Repatriation Commissioner (RRRC), and liaises with international partners on crisis management. In the Rohingya response, MoDMR provides policy oversight for all camp-level activities, including energy-related interventions. It authorises the installation of solar-powered WASH facilities, approves LPG distribution programmes led by UNHCR and IOM, and supports integration of renewable energy solutions in disaster-resilient infrastructure.

NATIONWIDE

REFUGEE RELIEF AND REPATRIATION COMMISSIONER (RRRC)

Government

The RRRC is the government's field-level coordination authority in Cox's Bazar and Bhasan Char. It leads the implementation of humanitarian operations and serves as the government's primary point of contact for energy interventions. The RRRC authorises the deployment of solar streetlights, solar water systems, and clean cooking programmes in the camps. It also facilitates coordination among agencies and enforces safety and compliance standards for LPG distribution and solar installations.

SUBNATIONAL

Stakeholder directory

GOVERNMENT

DEPUTY COMMISSIONER (DC)

Government

The DC's office manages coordination between refugee operations and host-community development. It oversees infrastructure shared between camps and surrounding villages, including solar-powered water systems and electrified health posts. The DC also supports energy planning within district disaster management frameworks and collaborates with partners such as IOM, UNDP, and the Local Government Engineering Department (LGED) to scale renewable energy use

SUBNATIONAL

UPAZILA NIRBAHI OFFICERS (UNOs)

Government

UNOs act as local administrators at the subdistrict (upazila) level and implement policies issued by the DC and RRRC. They facilitate permissions for energy installations (such as solar boreholes, streetlights, community electrification points) and ensure local participation and compliance with government safety standards.

SUBNATIONAL

CAMP-IN-CHARGE (CiC)

Government

CiCs are field-level administrators responsible for the daily management of each refugee camp. They supervise all operational activities, including the installation and maintenance of energy systems such as solar streetlights, e-cooking pilots, and LPG refill points. CiCs coordinate with humanitarian agencies to approve new infrastructure, manage safety protocols, and facilitate community awareness on energy use.

SUBNATIONAL

Stakeholder directory

HUMANITARIAN AND DEVELOPMENT

UNITED NATIONS HIGH COMMISSIONER FOR REFUGEES (UNHCR)

UN agency

NATIONWIDE

UNHCR is the UN's principal refugee protection agency, responsible for coordinating humanitarian assistance and promoting durable solutions for displaced populations. In Bangladesh, it co-leads the refugee response and manages 16 of the 33 camps in Cox's Bazar and Bhasan Char. As one of the SAFE +2 partners, alongside IOM, UNHCR spearheads the LPG distribution programme, covering nearly half of all camps through partnerships with the Bangladesh Red Crescent Society (BDRCS) and BEXIMCO. It introduced pressure cookers to improve LPG efficiency, supports solarisation of communal and health facilities, co-established the Green Innovation Hub (GIH) for solar and e-waste repair, and works with partners (IUCN, NGO Forum, and Practical Action) on clean cooking research, e-cooking demonstrations, and carbon-finance assessments to scale sustainable energy solutions.

INTERNATIONAL ORGANIZATION FOR MIGRATION (IOM)

UN agency

NATIONWIDE

IOM is the UN's migration agency, specialising in displacement management, infrastructure, and livelihoods. It co-leads the Rohingya response and manages 17 of the 33 of the camps in Cox's Bazar and Bhasan Char. IOM leads large-scale LPG distribution and runs system repair centres at distribution hubs. It has solarised about 100 health facilities in partnership with the World Bank, powers several WASH networks, and installs solar streetlights to improve camp safety. IOM also trains refugees in solar repair and supports research on hybrid energy systems for health and water infrastructure.

STRATEGIC EXECUTIVE GROUP (SEG)

Coordination mechanism

NATIONWIDE

The SEG is the top-level leadership body of the Rohingya response, co-chaired by the UN Resident Coordinator, the UNHCR Representative, and the IOM Chief of Mission. It provides overall strategic guidance and ensures that energy and environment priorities are integrated into the humanitarian response, supporting donor engagement and alignment with national policy frameworks.

INTER-SECTOR COORDINATION GROUP (ISCG)

UN-led coordination mechanism

NATIONWIDE

The ISCG manages cross-sector coordination between humanitarian agencies, donors, and government counterparts. It hosts the Energy and Environment Technical Working Group (EETWG) and the Energy and Environment Network (EEN) under its umbrella. The ISCG leads joint needs assessments, data management, and sector planning, ensuring that energy access is linked to WASH, Health, Protection, and Shelter-CCCM sectors.

Stakeholder directory

HUMANITARIAN AND DEVELOPMENT

REFUGEE OPERATIONS AND COORDINATION TEAM (ROCT)
UN-led coordination mechanism

The Refugee Operations and Coordination Team facilitates field-level coordination between UN agencies, NGOs, and government representatives.

NATIONWIDE

BANGLADESH RED CRESCENT SOCIETY (BDRCS)
NGO

BDRCS is the primary humanitarian partner of UNHCR for LPG distribution and emergency response. It manages distribution logistics, community engagement, and safety training for LPG handling.

NATIONWIDE

ENERGY AND ENVIRONMENT NETWORK (EEN)
Coordination network

The EEN is an open coordination platform for NGOs, technical experts, and private-sector partners implementing energy and environment projects in the camps. It is currently led by UNHCR.

SUBNATIONAL

WORLD FOOD PROGRAMME (WFP)
UN agency

WFP is the UN's lead agency on food security and nutrition. It operates food distribution centres and nutrition hubs across the camps, providing food vouchers to refugees. It is also part of the SAFE +2 coordination group, alongside UNHCR, IOM, and FAO.

NATIONWIDE

UNITED NATIONS CHILDREN'S FUND (UNICEF)
UN agency

UNICEF supports child rights and humanitarian services, including education, health, and WASH. In the Rohingya camps, it has constructed 47 piped water systems using solar-powered pumps and reservoir tanks, raising safe water coverage from 10% in 2018 to 73% in 2022. It also supports the solar electrification of learning centres and women-friendly spaces to improve safety and education outcomes.

NATIONWIDE

Stakeholder directory

HUMANITARIAN AND DEVELOPMENT

PSEA NETWORK

Coordination mechanism

The PSEA Network coordinates protection from sexual exploitation and abuse, and also ensures survivor support and accountability across agencies.

NATIONWIDE

UNITED NATIONS OFFICE FOR THE COORDINATION OF HUMANITARIAN AFFAIRS (OCHA)

UN agency

OCHA coordinates humanitarian assistance globally and ensures alignment between agencies. In Bangladesh, it facilitates coordination between the SEG, ISCG, and government partners (RRRC, MoDMR, MoFA). It provides cross-sector support on resilience, energy planning, and inter-agency prioritisation for funding and logistics.

NATIONWIDE

Stakeholder directory

NGO AND IMPLEMENTING PARTNERS

NGO FORUM FOR PUBLIC HEALTH

NGO

NATIONWIDE

NGO Forum is one of Bangladesh's largest NGOs and specialises in public health, WASH, and environmental management. It has been active in the Cox's Bazar refugee response since 2017. NGO Forum implements solar-powered water networks, manages solarised health posts, and co-leads the Camp 12 health facility e-cooking pilot (a 3.3 kWp PV system with induction and infrared stoves) that reduced LPG use by over 80%. It also co-established the Green Innovation Hub with UNHCR for solar repair, e-waste management, and training of refugee technicians.

INTERNATIONAL UNION FOR CONSERVATION OF NATURE (IUCN)

INGO

NATIONWIDE

IUCN is a global conservation and sustainable development organisation. It works on ecosystem restoration, resource management, and sustainable livelihoods. In the Rohingya response, IUCN leads the Energy and Environment pillar under the Joint Response Plan (JRP), focusing on reforestation, fuel management, and clean cooking. It co-led the 2024-2025 e-cooking feasibility study with the GPA Coordination Unit and Practical Action and piloted pressure cooker use for LPG efficiency. IUCN also supports environmental safeguards and carbon finance scoping for humanitarian energy projects.

CARE BANGLADESH

INGO

NATIONWIDE

CARE is a humanitarian organisation dedicated to fighting poverty and advancing gender equality. In Bangladesh, it operates in Cox's Bazar with a focus on protection, livelihoods, and infrastructure. CARE manages solar-powered WASH facilities, including a 12 kW PV water system in Camp 16, providing 50,000 litres of clean water daily. It also piloted solar minigrid-powered e-cooking systems in refugee households in 2025 and trains women on energy safety and appliance use.

PRACTICAL ACTION

INGO

NATIONWIDE

Practical Action applies technology and innovation to reduce poverty and build climate resilience. In Bangladesh, it focuses on clean cooking, renewable energy, and inclusive infrastructure. In the Rohingya camps, Practical Action co-implemented the MECS-funded e-cooking feasibility study (1,000 camp and refugee households, 54 market surveys) with the GPA Coordination Unit and IUCN, conducted technical assessments, and provided design inputs for e-cooking pilots. It also strengthens local partner capacity in data collection and energy planning.

Stakeholder directory

NGO AND IMPLEMENTING PARTNERS

ELECTRICIENS SANS FRONTIÈRES (ESF)
Technical NGO

ESF is a French humanitarian organisation specialising in electricity access for crisis-affected areas. In Bangladesh, ESF supports the Green Innovation Hub (GIH) by providing technical training on electrical safety, diagnostics, and repair of solar lanterns and streetlights. It also offers mentoring for local trainers and contributes to developing the camp's e-waste recycling chain, ensuring environmental safety and circular energy use.

INTERNATIONAL

WORLD VISION BANGLADESH
INGO

World Vision is a Christian humanitarian organisation working on child protection, education, and WASH. In Cox's Bazar, it installed an 8 kW solar system to power two boreholes (250 m deep) and two 190 m³ tanks in Camp 15, supplying clean water to more than 1,000 refugees and 30 host households. The project replaced diesel pumps with solar systems, improving reliability and cutting emissions.

NATIONWIDE

CAFOD (CATHOLIC AGENCY FOR OVERSEAS DEVELOPMENT)
INGO

CAFOD supports faith-based humanitarian and development projects worldwide. In Bangladesh, it works with partners on solar streetlight installation and community electrification in camps and host areas, contributing to protection and environmental sustainability.

NATIONWIDE

CARITAS BANGLADESH
INGO

Caritas provides humanitarian and development services, focusing on health, shelter, and WASH. In Cox's Bazar, it operates solar-powered water pumping systems in coordination with UNICEF and UNHCR and integrates clean cooking awareness into its protection work.

NATIONWIDE

SAVE THE CHILDREN
INGO

Save the Children focuses on child welfare, education, and emergency response. In the camps, it has installed solar lighting in learning centres and health posts, improving safety and continuity of services. The organisation advocates for sustainable energy integration into education and child protection facilities.

NATIONWIDE

Stakeholder directory

NGO AND IMPLEMENTING PARTNERS

OXFAM
INGO

Oxfam works on poverty reduction, humanitarian relief, and women's rights. In Cox's Bazar, Oxfam manages solar-powered water supply systems and supports clean cooking through gender-responsive energy education. It has installed solar streetlights in high-risk protection areas and supports the EEN with technical data on WASH energy use.

NATIONWIDE

BRAC
NGO

BRAC is one of the world's largest NGOs, with a long-standing presence in Bangladesh's humanitarian and development sectors. It operates schools, clinics, and community spaces across the camps. BRAC has installed solar home systems in child-friendly spaces and supports LPG training and awareness programmes in partnership with UNHCR and IOM. It also integrates renewable energy into its WASH and livelihoods programming.

NATIONWIDE

HOPE FOUNDATION FOR WOMEN AND CHILDREN
NGO

HOPE Foundation operates health facilities across Bangladesh, focusing on maternal and reproductive health. It runs the HOPE Field Hospital for Women in Kutupalong, one of the first fully solar-powered hospitals in the camps. The solar systems provide 24-hour electricity for lighting, sterilisation, maternity wards, and cold chain equipment.

NATIONWIDE

Stakeholder directory

PRIVATE SECTOR

SOLSHARE

Solar company

SolShare is a Bangladeshi technology company pioneering peer-to-peer solar electricity sharing through its "solar mesh-grid" model. The company links individual solar home systems to form community-level mini-grids that enable power trading between users. In the Rohingya camps, SolShare piloted two mesh-grid systems in Nayapara Registered Camp, funded by FCDO, to improve household lighting and appliance access. The pilot demonstrated how localised solar-sharing models could reduce energy inequality and optimise use of existing solar assets, despite restrictions on digital payment systems for refugees.

NATIONWIDE

BEXIMCO LPG LTD

LPG company

BEXIMCO is one of Bangladesh's leading LPG importers and distributors, supplying LPG cylinders to households, industries, and commercial users. In the refugee camps, BEXIMCO is contracted by UNHCR and the Bangladesh Red Crescent Society to manage LPG procurement, transport, and refilling. It ensures safe handling and maintenance of LPG cylinders for over 150,000 refugee households, conducts safety training for local distributors, and supports emergency response through fuel stockpiling and distribution monitoring.

NATIONWIDE

NF ENTERPRISE

LPG company

NF Enterprise is a local Bangladeshi LPG distributor responsible for LPG logistics under IOM's area of responsibility. It oversees cylinder distribution, refilling, and stove maintenance, and manages field-level depots. The company coordinates closely with IOM's WASH and Shelter teams to ensure consistent fuel supply and safety compliance in line with national standards.

NATIONWIDE

SCHNEIDER ELECTRIC

Multinational energy corporation

Schneider Electric is a global energy management and automation company. Through its CSR division, it supports access-to-energy programmes and vocational training in low-income communities. In Cox's Bazar, Schneider partnered with UNHCR and NGO Forum to establish and equip the Green Innovation Hub. It donated tools, repair kits, and appliances for the Camp 12 solar e-cooking system, and also developed technician training materials for refugees and host community youth.

INTERNATIONAL

Stakeholder directory

PRIVATE SECTOR

SOLEVOLT

Solar company

INTERNATIONAL

Solevolt designs modular solar systems for medical and emergency use. In 2017–2018, in partnership with Kopernik, Solevolt deployed solar energy systems in IOM's diphtheria treatment centres, powering lighting, ultrasound equipment, and vaccine refrigerators during the outbreak. The installations enabled 24-hour medical care in off-grid locations and demonstrated the critical role of reliable energy in emergency health operations.

AZIZU RECYCLING & E-WASTE MANAGEMENT COMPANY

E-waste management

NATIONWIDE

Azizu is Bangladesh's first authorised e-waste recycler. It operates collection and recycling facilities in Dhaka. Under the UNHCR–NGO Forum–Schneider partnership, Azizu receives and processes e-waste collected from the Green Innovation Hub. It dismantles, recycles, and repurposes components from non-functional solar lanterns and batteries, contributing to safe waste management and circular economy objectives within the camps.

Stakeholder directory

FINANCIAL INSTITUTIONS

ASIAN DEVELOPMENT BANK (ADB)

Financial institution

ADB promotes sustainable growth and renewable energy investment across Asia. In the Rohingya response, ADB financed the installation of fifty 5 kWp solar mini-grids across camps to power streetlights and communal facilities, improving safety and reducing diesel dependence. It continues to collaborate with humanitarian partners on expanding hybrid solar-diesel systems and building capacity for system O&M.

MULTINATIONAL

EUROPEAN CIVIL PROTECTION AND HUMANITARIAN AID OPERATIONS (ECHO)

Donor agency

The EU's humanitarian arm, ECHO, funds resilience-building, protection, and essential services in crisis contexts. In Bangladesh, ECHO has supported solar streetlighting, renewable energy for WASH and health infrastructure, and protection-focused energy access projects implemented by IOM, UNHCR, NGO Forum, and CARE. Its focus is on enhancing safety for women and children and reducing environmental degradation through clean energy.

MULTINATIONAL

Stakeholder directory

OTHER ORGANISATIONS

EAST WEST UNIVERSITY (EWU)

Academic institution

EWU is a private university in Dhaka with strong programmes in public health and environmental studies. It has conducted research with UNHCR and IUCN on the health and environmental impacts of the LPG transition, quantifying reductions in firewood use, emissions, and respiratory illnesses. EWU's research contributes empirical evidence supporting sustained donor investment in clean cooking.

NATIONWIDE

STANFORD UNIVERSITY & ICDDR,B

Academic institutions

In 2022 Stanford University, in collaboration with icddr,b (International Centre for Diarrhoeal Disease Research, Bangladesh), conducted an evaluation of the LPG programme in the Rohingya camps. The study found over 80% of refugee households used LPG exclusively, leading to a reduction of 330,000 tonnes of firewood and 407,000 tonnes of CO_2 emissions annually. It provided critical data on health outcomes, including reduced respiratory illnesses and lower depression rates among women. These findings have informed current optimisation and pressure-cooker integration strategies.

NATIONWIDE/ GLOBAL

WORLD LPG ASSOCIATION (WLPGA)

Industry association

WLPGA represents the global LPG sector and works to promote LPG as a clean and safe cooking fuel. In collaboration with UNHCR and the Bangladesh government, it supported the 2017 feasibility study that recommended LPG as the primary cooking fuel for the camps and continues to offer technical guidance on LPG safety and supply-chain management.

GLOBAL

UNIVERSITY OF SOUTHAMPTON (ENERGY AND CLIMATE GROUP)

Academic institution

The University of Southampton conducts research on sustainable energy and resilience in humanitarian settings. Its Energy and Climate Group, led by Professor AbuBakr Bahaj, has conducted comparative studies of energy access in Uganda and Bangladesh, including modelling optimal hybrid systems for the Rohingya camps. Their findings informed humanitarian solar design and the development of multi-sectoral energy strategies for communal facilities.

NATIONWIDE

MODERN ENERGY COOKING SERVICES (MECS)

Research institution

MECS is a UK Aid-funded programme led by Loughborough University and the World Bank's ESMAP, promoting a global transition to modern energy cooking. It partnered with the GPA Coordination Unit, IUCN, Practical Action, and Mercy Corps to fund and technically guide the e-cooking feasibility and pilot work in Cox's Bazar. MECS provides research frameworks, baseline tools, appliance testing protocols, and supports cross-country learning between Bangladesh, Kenya, and Uganda on electric cooking in displacement settings.

GLOBAL

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 is essential to use resources as efficiently as possible and to scale up existing work. Designing potential energy interventions together – bringing together the experience and expertise of many different stakeholders – can help to identify the most impactful areas of programming as well as the potential barriers and enablers that will affect its implementation.

In support of this, the READS workshops featured a session in which participants came together to co-design potential high-impact projects, building on the experience made with existing interventions. Each group focused on a different energy issue with the goal of outlining a viable project opportunity that would directly address some of the greatest issues currently faced in displacement contexts in Cox's Bazar, Bangladesh.

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 camps or scaled up.

Following these initial designs and augmented with elements of others that were identified as viable project opportunities in other work, 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 refugee settlements and 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 as well as refugees to not disadvantage one group and to promote social cohesion and peaceful coexistence.

A one-size-fits-all approach will not be able to account for these nuances. Before beginning any of these projects, further research and detailed assessments at the local level will be necessary to better understand the specific and unique situations on the ground. Such assessments should also be independent, objective, and afforded appropriate time and resources to best develop long-term implementation plans. These should be done with stakeholders which 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 the extent possible in the Cox's Bazar context, to better integrate the private sector in the provision of sustainable energy in displacement contexts. For this to work in the long term, national or international companies should set up operations with supply chains to outlets in refugee settlements and host communities – and be adequately supported in doing so, where required – to establish a presence which endures after external funding ends. Local companies, meanwhile, should be supported to conform with national and international product standards to ensure quality for customers. All companies and organisations which implement sustainable energy technologies should facilitate ongoing and independent evaluations to assess their benefits to the user in the field, not just under laboratory or ideal conditions, to monitor their continued usage and long-term benefits.

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Community involvement

Refugees and host communities should be involved from the outset when designing sustainable energy interventions as they understand best about their own energy needs and priorities. Community members are particularly well-placed project partners owing to their networks and knowledge of the context and so should have 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 design of intervention plans, and to advocate for sustainable solutions with other stakeholders and within their communities,
- Consulting with different community segments during the design phase of interventions and for delivery model development, such as through focus group discussions, co-design workshops and community mapping interventions, whilst coordinating with other organisations to minimise overlap and survey fatigue,
- Hire community members as sales agents, community mobilisers and product ambassadors,
- Equitably target both refugee and host community members for employment and sales targets,
- Providing training and capacity building for community members, such as on the installation or maintenance of energy technologies and customer services, and
- Involving or creating cooperatives to oversee and manage community-wide or public projects and their locations, such as streetlights, and
- 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 the same gender as the primary users of energy technologies, for example typically women with regards to domestic responsibilities. Considering these differences and the effects they may have during both the design and implementation of energy projects can allow them to better meet the needs of all community members and promote gender equality. Gender mainstreaming will vary depending on individual contexts and communities but could be integrated into projects by:

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

Inclusivity strategies

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

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

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Project concepts

CONTINUED SUPPORT TO LPG AND STRENGTHENED LOCAL MAINTENANCE PROCESSES

1/3

LOCATION

All refugee camps in Cox's Bazar

BACKGROUND

Since 2018, the large-scale provision of LPG has been the cornerstone of clean cooking access in the Rohingya refugee camps. LPG is currently the most economically viable and operationally feasible solution at the scale required and has delivered substantial benefits. Studies have documented significant reductions in firewood use and deforestation, improved indoor air quality, fewer respiratory illnesses, and reduced protection risks for women and girls who previously collected firewood in unsafe areas. However, sustaining free LPG provision for more than 230,000 households is financially demanding whilst global funding constraints on humanitarian budgets create significant risks for the continuity of the programme.

Agencies have introduced pressure cookers, which have demonstrated measurable reductions in fuel consumption and helped to extend refill cycles, but coverage is still incomplete and many larger households have requested additional units. UNHCR and partners are exploring carbon finance mechanisms to support the long-term sustainability of LPG provision and, for these to be effective, the LPG system needs to operate efficiently, safely, and reliably, with robust monitoring, data collection, and well-functioning local maintenance structures.

Given the central role of LPG in meeting basic cooking needs, continued support remains the highest priority for clean cooking in the Rohingya camps. Strengthening local maintenance systems, enhancing and consolidating LPG supply chains, improving efficiency through pressure cooker use, and diversifying the funding base beyond humanitarian budgets are therefore critical to safeguard and build on the gains achieved since 2018.

PROJECT REACH, TIMELINE AND BUDGET

230,000 households
and 800 technicians

Two years

$1.5 million

Project concepts

2/3

ACTIVITIES

Conduct a joint diagnostic assessment of LPG supply chains across UNHCR and IOM to identify gaps, inefficiencies, and opportunities for coordination, consolidation, and bulk procurement

Strengthen and harmonise LPG logistics and distribution processes, including improved delivery scheduling, and potential joint contracting mechanisms between IOM and UNHCR

Introduce or enhance digital monitoring tools to track cylinder movements, refill timeliness, breakdowns, maintenance needs, and household-level service gaps

Train 15–20 camp residents per camp (with gender balance) as community LPG technicians, covering safe repair of stoves, burners, regulators, hoses, cylinders, and leak detection

Establish decentralised LPG maintenance hubs in each camp to provide preventive maintenance, minor repairs, safety checks, and referrals to contracted suppliers where needed

Provide toolkits, spare parts, safety equipment, and standardised training manuals aligned with global standards and organisational safety protocols to all trained technicians

Expand pressure cooker provision to include all households, and a second cooker for larger or all households

Conduct regular demonstrations and refresher training on safe and efficient pressure cooker use, including fuel-saving cooking techniques and adoption monitoring

Deliver structured LPG safety awareness campaigns through community channels (majis, women's groups, youth networks, distribution points) focused on proper installation, leak detection, storage, and emergency response

Strengthen linkages between LPG programmes and existing fire safety systems to ensure coordinated risk management and clear reporting pathways

Align LPG monitoring and data collection systems with UNHCR's carbon finance methodology, including technician training on tracking usage, breakdowns, maintenance, and efficiency gains

Develop a sustainability roadmap outlining options for integrating humanitarian, climate, development, and carbon finance to stabilise the long-term funding base for LPG provision

Develop and maintain an M&E framework to track refill coverage, service reliability, household LPG use, pressure cooker uptake, safety incidents, and technician performance

ENABLERS

A well-established LPG distribution system already serves nearly all refugee households and can provide a strong operational foundation

Refugees widely accept and use LPG and pressure cookers

Multiple studies have demonstrated the significant environmental, health, and protection benefits of LPG and pressure cookers

Existing infrastructure such as LPG refill points, repair desks, community centres, and training hubs creates practical entry points for decentralised maintenance hubs, technician training, and awareness activities

UNHCR's ongoing work on carbon and climate finance offers a pathway to diversify the funding base and reduce long-term reliance on humanitarian budgets

Coordination platforms between UNHCR, IOM, CiCs, suppliers, and implementing partners are already established and can be leveraged to harmonise supply chains, safety protocols, and training standards

Strong community leadership structures (including majis, women's groups, youth groups, and religious leaders) can support participant selection, mobilisation, and sustained community engagement

BARRIERS

The high and recurring cost of sustaining LPG provision creates significant financial pressure, especially in the context of reduced global humanitarian funding

Refugees' restricted livelihood opportunities limit their ability to contribute financially

Dependence on external donors and making the system vulnerable to budget cuts

Parallel LPG procurement and logistics systems run by two different agencies can reduce efficiency and complicate efforts to streamline or harmonise supply chains

Humid coastal conditions accelerate the deterioration of stoves, while limited access to effective maintenance services increases the risk of equipment failure and reversion to firewood

Dense camp layouts and shelter construction materials heighten the risks associated with leaks, improper handling, and cooking fires

Government policies restrict refugee employment and service provision which limits the opportunities to formalise technician roles or introduce cost-sharing models.

Accessing carbon and climate finance requires robust data, verification systems, and long-term stability, all of which can be difficult to maintain in a highly dynamic humanitarian environment

Project concepts

FURTHER INFORMATION

The project would aim to benefit all refugee households in the camps through the improved reliability, safety, and efficiency of LPG supply and equipment, as well as additional pressure cookers where required. In addition, around 800 refugee volunteers and community-based technicians will be trained across all camps to provide LPG safety checks, maintenance, and basic repairs. The timeline would allow a phased rollout.

The budget would cover procurement and distribution of additional pressure cookers; training delivery; establishment and operation of decentralised maintenance hubs and equipment; community awareness and safety campaigns; and M&E and alignment with carbon finance initiatives. This reflects the scale of the intervention while remaining significantly lower than the annual cost of LPG provision itself (around $29 million). The investment could generate cost savings over time by reducing LPG consumption, extending equipment lifespans, improving safety, and supporting longer-term financing pathways.

The climate of Cox's Bazar means that stoves are prone to rust and require frequent upkeep. While repair desks exist at distribution points and stoves are provided with warranties, maintenance gaps remain and informal repair practices are common. Breakdowns and delays can push households back towards firewood use and fuel stacking remains frequent, especially if LPG runs out before scheduled refills.

Participant selection for the maintenance training should follow clear criteria based on previous successful initiatives. Priority can be given to candidates with basic literacy, an interest in technical work, and strong community ties. The selections should also ensure a gender balance and representation from different camp blocks. Technicians will require access to toolkits, spare parts, and ongoing supervision to maintain service quality.

REPLICATION & EXPANSION

The model can be extended to host communities facing similar safety, affordability, and maintenance challenges. Over time, maintenance hubs and training systems can incorporate complementary technologies such as e-cooking appliances, creating a pathway toward a more diversified clean cooking ecosystem

The enhanced monitoring and data systems support replication in other displacement settings pursuing carbon or climate finance, enabling wider adoption of safe, efficient, and sustainable cooking solutions

STAKEHOLDERS AND ROLES

UNHCR and IOM to provide strategic oversight, coordination, alignment with LPG contracts and carbon finance initiatives, and technical guidance and monitoring

Implementing partners (such as NGO Forum, IUCN, Practical Action, BRAC) to provide training delivery, community mobilisation, establishment and supervision of maintenance hubs, awareness campaigns, and data collection

LPG suppliers and private sector actors to provide LPG, spare parts, equipment, and technical input on safe maintenance and system optimisation

Camp-in-Charge (CiC) and Government of Bangladesh authorities to provide approvals, policy guidance, and facilitation of field activities

Refugee community structures (majis, women's groups, youth groups, religious leaders) to provide participant selection, mobilisation, feedback and accountability, and the promotion of safe practices

SCALABILITY

High: The project is highly scalable due to its reliance on existing LPG infrastructure, established community networks, and operational systems already functioning in the camps. Once the initial training modules, maintenance hubs, and supply chain improvements are established, the model can be expanded across all camps with relatively low additional investment. Its modular design also allows for gradual expansion to host communities and, over time, integration of other clean energy technologies such as e-cooking appliances. Strengthened monitoring systems, technician capacity, and alignment with carbon finance methodologies further enhance scalability by creating a robust foundation for longer-term and larger-scale adoption in other displacement settings.

CONTINUED SUPPORT TO LPG AND STRENGTHENED LOCAL MAINTENANCE PROCESSES

3/3

Project concepts

E-COOKING AND ELECTRIFICATION FOR REFUGEE HOUSEHOLDS

1/3

LOCATION

Six refugee camps in Cox's Bazar

BACKGROUND

Since 2018, LPG has served as the primary clean cooking solution for nearly all refugee households in Cox's Bazar and achieved major environmental, health, and protection gains. However, LPG often runs out before scheduled refill dates. When LPG is unavailable, most households revert to firewood which increases protection risks and deforestation that undermining the gains of the LPG programme.

Electricity access at household level remains low and most families rely on deteriorating solar lanterns or small home systems that provide limited lighting and almost no cooling, despite extreme heat in the camps. Only a few blocks benefit from mini-grids, and even these are often poorly maintained and insufficient to support basic household needs.

E-cooking has emerged as a potential complementary option for LPG an additional electrification pathway. However, significant sustainability and operational constraints include high upfront costs that make large-scale implementation challenging; the absence of a functioning market or cost-recovery model which limits long-term viability; refugee households cannot legally work, which prevents any fee-based or subscription models; operational risks from theft, resale of appliances, shading, dust, weather exposure, and space limitations; and the compatibility of e-cooking with the essential LPG system.

This project proposes a carefully scoped, complementary intervention that strengthens energy security without undermining the LPG programme. Additionally, PV-powered systems could also provide basic electricity services to households. It is linked to ongoing carbon finance work and is positioned as a pilot-to-scale opportunity that generates evidence, supports integrated clean cooking planning, and contributes to a diversified but coherent fuel mix.

Project concepts

2/3

PROJECT REACH, TIMELINE AND BUDGET

6,000 households
and 30 businesses

Two years

$7 million

ACTIVITIES

Ensure that all activities align with UNHCR/IOM energy coordination structures and ensure e-cooking deployment complements the LPG programme

Provide modular solar PV-powered e-cooking systems to participating households, enabling preparation of at least two daily meals and supplying basic household electricity

Distribute stronger or larger systems to 30 selected refugee-led businesses, particularly restaurants

Monitor LPG usage patterns to understand how households use LPG as a backup fuel

Conduct structured awareness campaigns on safe, efficient, and appropriate use of e-cooking systems, including cooking demonstrations and user training

Develop and deliver training modules for refugee technicians on repair and maintenance of PV modules, batteries, inverters, and e-cooking appliances

Strengthen existing appliance repair hubs and establish additional decentralised hubs equipped with toolkits, spare parts, safety equipment, and trained staff

Deliver entrepreneurship training for participating businesses to improve financial management, customer services, operational efficiency, and profitability

Engage private sector and carbon market stakeholders to explore opportunities under voluntary carbon markets to generate future revenue streams

ENABLERS

Strong existing partner networks (UNHCR, IOM, NGO Forum, IUCN, CARE, GPA, EEN) provide a solid foundation for coordination and delivery

Multiple pilots and feasibility studies have produced proven technical designs and high community acceptance

Established training centres and repair facilities (such as the Green Innovation Hub) can be leveraged for technician capacity building

The modular design of PV systems allows adaptation to different shelter structures and camp conditions

Compatibility with existing pressure cookers enhances user acceptance and cooking efficiency

LPG remains available as a reliable backup fuel, ensuring energy security even when solar systems underperform

BARRIERS

Some shelter structures may lack the stability needed for mounting PV panels, and tree cover reduces solar generating potential

PV systems may attract theft or damage, especially when installed externally

High dust accumulation and seasonal weather impacts (monsoon flooding, landslides) reduce performance and increase maintenance needs

Risk of asset resale to host community members

Limited user awareness may lead to misuse, safety risks, or reduced system lifespan without intensive training and support

Extremely high upfront costs restrict scalability and preclude development of any meaningful business model under current livelihood restrictions

E-cooking must remain clearly positioned as complementary to LPG, not a competing intervention, to avoid conflicting policy or operational messages

Project concepts

FURTHER INFORMATION

This intervention aims to support around 6,000 households across six camps to gain access to solar PV-powered e-cooking and basic household electricity as a complementary fuel to LPG. These will enable partial fuel substitution for selected meals and provide essential electricity services such as lighting, phone charging, and fans. In addition, around 30 refugee-run micro and small businesses (such as small food vendors and tea stalls) will be supported through shared or dedicated e-cooking systems to test productive-use applications under controlled conditions.

The project draws heavily on recent evidence showing high LPG shortage rates and widespread reliance on firewood as a fallback. Extensive feasibility work since 2024, including the MECS-funded study by GPA, Practical Action and IUCN, and small pilot by CARE Bangladesh, shows high social acceptability and willingness to adopt e-cooking when systems are reliable and properly sized. It also found that over 95% of households report at least one LPG shortage per year, and nearly half experience shortages monthly.

Only limited parts of the camps have access to small mini-grids, which are often unsafe and insufficient for meaningful household energy use. Introducing a complementary PV-based e-cooking and electrification system, while acknowledging sustainability constraints, can help to provide basic electricity services as well as to mitigate firewood use during LPG shortages and improve household wellbeing.

The project design considers varying shelter conditions, shading, dust levels, and maintenance challenges across the six targeted camps. Costs are derived from previous pilots in Cox's Bazar, adjusted for scale and system durability improvements.

REPLICATION & EXPANSION

The project builds directly on the MECS-funded feasibility study (2024–2025) and ongoing pilots by CARE and Mercy Corps/GPA

Appliance repair, maintenance, and entrepreneurship training modules already exist and can be replicated across camps

Strong partner existing partner networks offer a ready platform for coordination and expansion

Integration with carbon finance mechanisms could create new financing opportunities for future scale-up

Expansion to host communities could be possible with additional investment and careful coordination to avoid market distortion

STAKEHOLDERS AND ROLES

UNHCR and IOM to lead and coordinate the programme

Private sector companies, such as ATEC, to provide equipment, training, and M&E

Local implementation partners, such as IUCN, Practical Action, and NGO Forum, to support community engagement, stakeholder coordination, training delivery, technical supervision, and equipment provision

Camp-in-Charge (CIC) **and SMS Agencies** (BRAC, Practical Action) to support local coordination and community mobilisation

Community leaders, majhis, youth groups, women's spaces to provide outreach, awareness, and local support

SCALABILITY

Moderate: The model can be expanded with additional investment but high upfront costs, maintenance needs, and limited livelihood opportunities for refugees restrict long-term sustainability and constrain development of a viable business model. Expansion should remain closely coordinated with LPG programmes and be framed as a complementary (rather than alternative) fuel pathway. Integration with carbon finance may help offset some ongoing costs but not at a scale sufficient to replace donor funding.

E-COOKING AND ELECTRIFICATION FOR REFUGEE HOUSEHOLDS

3/3

Project concepts

FEASIBILITY ASSESSMENT OF THE SOLARISATION AND O&M MODELS FOR COMMUNAL FACILITIES

1/3

LOCATION

All refugee camps in Cox's Bazar

BACKGROUND

Since 2018, humanitarian agencies have installed hundreds of solar-powered systems across the camps in Cox's Bazar to reduce reliance on diesel and improve service delivery. These include solar PV systems for WASH facilities and water pumping stations, street lighting, health centres, women's centres, learning facilities, and other communal infrastructure. However, routine O&M is rarely budgeted, whilst data on system performance and component replacement is inconsistent or outdated. Where data exists, it is not updated systematically and does not capture functionality status or usage metrics in real time. This has led to widespread system degradation and frequent equipment failures, often within months of installation.

The project will fill these data and coordination gaps by undertaking a comprehensive, multi-stage assessment. This will combine data collection, technical evaluation, and system planning to inform sustainable solarisation and O&M models for communal facilities across all camps in Cox's Bazar. It will map of all communal facilities and their energy systems, conduct technical audit of existing solar installations (to assess performance, design quality, and maintenance status) and a fuel-use survey (to quantify energy consumption, costs, and emissions), and will design an O&M and data management framework. The project will also develop a centralised database and interactive dashboard, integrated with existing platforms, to provide partners with up-to-date information on system functionality, energy consumption, and maintenance needs.

PROJECT REACH, TIMELINE AND BUDGET

200 communal facilities
One year
$400,000

Project concepts

2/3

ACTIVITIES

Identify and map all communal and public facilities, including schools, health centres, women's centres, WASH points, learning spaces, and administrative offices

Compile and harmonise existing energy-related data from partners (such as IOM, UNHCR, NGO Forum, and UNICEF), including GPS coordinates, installation dates, and system types

Establish a centralised digital baseline inventory of all energy assets

Conduct technical audits of existing systems to assess design quality, installation standards, performance, battery health, and functionality

Evaluate wiring, load management, safety compliance, and user interface features (such as switches, cabling, and grounding)

Report system failures and degradation patterns to identify common causes and preventive maintenance needs

Collect quantitative data on the use of electricity, LPG, diesel, and firewood to determine consumption levels, operational costs, and the reliability of supply

Identify facilities with partial or no access to electricity and estimate potential demand for solarisation

Assess seasonal variations in energy use and their implications for system design

Engage with implementing partners to document existing O&M practices, roles, and funding mechanisms

Identify key challenges in system upkeep, spare parts availability, and accountability structures

Develop standardised O&M frameworks defining the roles, responsibilities, maintenance schedules, and cost-sharing models for sustainability

Conduct cost-benefit analysis and scenario modelling for solarisation of non-electrified facilities

Assess technical and economic feasibility of integrating battery storage, hybrid systems, and efficient appliances

Design and operationalise a centralised, regularly updated digital database hosted on a shared web-based platform (such as the JRC or EETWG portal).

Integrate data visualisation dashboards for real-time system monitoring, status updates, and maintenance tracking

Train local enumerators and partner staff on data collection, system diagnostics, and database management

Produce a comprehensive report to summarise the findings, lessons, and recommendations

Develop case studies highlighting best practices and challenges in solarisation and energy management across facilities

Present findings through EETWG and partner coordination platforms to inform future donor investments and humanitarian energy strategies

ENABLERS

Existing data and infrastructure from IOM, UNHCR, and THEA pilot projects

Availability of local implementing partners of energy projects, such as IUCN and NGO Forum for Public Health

The EEN could be used to map previous energy projects and products

Strong partner commitment to improving sustainability of energy systems

Availability of skilled local technicians and trained enumerators from recent e-cooking and energy surveys

Alignment with national solarisation priorities, EEN objectives, and global humanitarian energy priorities for data-driven planning and system sustainability

BARRIERS

Lack of centralised energy data management system

Access challenges and movement restrictions for enumerators in camps

Potential overlap of systems managed by different agencies with limited coordination

Limited funding for long-term O&M and data-driven maintenance, especially after project closure

Project concepts

FURTHER INFORMATION

Several assessments, including those under the THEA programme and by partners such as Practical Action and IUCN, have highlighted the need for integrated energy planning across all communal facilities. There is growing interest among partners to expand solarisation, develop sustainable O&M and cost-sharing models, and link data-driven decision-making to national and global humanitarian energy frameworks. The findings from this project will inform future work and can strengthen coordination under the Energy and Environment Technical Working Group. It could also support evidence-based investment planning, results-based finance mechanisms, and carbon finance readiness for communal energy systems.

The project will aim to reach all community facilities (including schools, health centres, women's centres, and WASH points) and solar streetlights in the camps. It will prioritise facilities with existing solar installations that face power interruptions, unsafe wiring, or reliance on backup diesel generators. In addition to a lack of information on system operation and performance, data on energy consumption and fuel use (such as LPG, diesel, and firewood) across communal and public facilities remains fragmented and outdated. This lack of comprehensive data limits the ability of agencies to plan energy transitions, optimise O&M practices, or allocate resources efficiently.

REPLICATION & EXPANSION

Builds on energy mapping and system inventories conducted in 2020–2021 by IOM and UNHCR

Potential to integrate with the JRC system, which has data on streetlights managed by IOM and UNHCR

STAKEHOLDERS AND ROLES

GPA Coordination Unit to lead the overall coordination and analysis

NGO Forum for Public Health, Practical Action, and IUCN to implement the project through data collection, technical audits, and community engagement

UNHCR, IOM, and EEN to provide facilitation for access and data harmonisation.

Local solar companies (such as Grameen Shakti, SolShare, Rahimafrooz) to provide technical support, system diagnostics, and performance testing

Donors (such as FCDO, the UNHCR Innovation Fund, and others) to provide funding

SCALABILITY

Moderate: The survey's methodology and data platform can be integrated into a camp-wide energy monitoring system and could be replicated in other displacement contexts.

FEASIBILITY ASSESSMENT OF THE SOLARISATION AND O&M MODELS FOR COMMUNAL FACILITIES

3/3

Project concepts

SOLAR E-COOKING FOR HEALTH FACILITIES IN ROHINGYA REFUGEE CAMPS

1/3

LOCATION

Ten refugee camps Cox's Bazar

BACKGROUND

Health facilities in the Rohingya refugee camps prepare meals daily for patients, attendants, and staff. Cooking remains heavily reliant on LPG which places significant strain on supply chains and increases operational costs for humanitarian agencies. Frequent LPG shortages create operational challenges and lead to occasional firewood use in some settings.

Small-scale institutional e-cooking has already shown promise. NGO Forum and UNHCR's solar e-cooking system in a health facility in Camp 12 demonstrated the potential to displace up to 80% of LPG use in a health post, while also improving kitchen comfort, safety, hygiene, and staff satisfaction. Similarly, a 2025 GPA pilot installed used e-cooking systems in five communal facilities. These early demonstrations offer valuable data on system performance, battery requirements, load management, and user training.

PROJECT REACH, TIMELINE AND BUDGET

10 health facilities

$350,000

Two years

Project concepts

2/3

ACTIVITIES

Conduct detailed technical assessments of the five e-cooking pilot sites and the Camp 12 health facility to evaluate performance, usage patterns, and maintenance needs

Identify and select 8-10 additional health facilities suitable for solar-powered e-cooking based on shading, structure, security, and staff capacity

Design and install solar PV systems with battery storage, inverters, and safe e-cooking appliances (such as EPCs, induction stoves, infrared stoves) tailored to institutional requirements

Oversize selected systems to support pilot battery swapping schemes for small refugee businesses (such as tea stalls, barber shops, and small eateries) to offer electricity for productive uses

Provide structured training for facility cooks, medical support staff, and cleaners on safe operation, hygiene, energy-efficient cooking practices, and emergency procedures

Develop pictorial user guides and training materials in Rohingya and Bangla to ensure accessibility and ease of use

Train 15-20 refugees and host community volunteers as maintenance technicians to support minor repairs, cleaning, troubleshooting, and battery management

Establish or strengthen decentralised repair hubs, linked to the Green Innovation Hub, with toolkits, spare parts, and safety equipment

Implement a monitoring framework for monthly data collection on system performance, cooking loads, LPG displacement, downtime, and O&M needs

Coordinate closely with LPG distribution teams and carbon finance experts to ensure alignment, complementarity, and integration into future carbon-credit methodologies

ENABLERS

Demonstrated technical feasibility and strong user satisfaction from the Camp 12 e-cooking system

Strong partner networks (GPA, NGO Forum, UNHCR, IOM, Mercy Corps) that support coordination, supervision, and training

Existing PV and appliance repair capacity (such as the Green Innovation Hub) to build local technical skills.

Alignment with humanitarian energy strategies and national clean-cooking targets

BARRIERS

Limited technical capacity for long-term maintenance unless strong training and supervision mechanisms are in place

Structural limitations of health facility buildings, weak roofing, shading, dust, and monsoon exposure can affect PV performance and installation

Staff turnover risks loss of operational knowledge without regular refresher training

Lack o sustainable business model due to refugee work restrictions and the system remains fully donor-dependent

Theft and damage risks for PV components, particularly batteries if used for swapping schemes

Potential operational challenges integrating e-cooking with existing LPG-based cooking workflows

Project concepts

FURTHER INFORMATION

The project will aim to reach 10 health facilities whilst serve up to an estimated 15,000 people through patient meals and staff catering. Its budget includes the costs of system design, equipment, appliances, training, monitoring, and long-term maintenance support.

This project focuses on institutional-scale cooking in health facilities, where communal meal preparation is already normalised and accepted. E-cooking can help to provide a complementary source of cooking in conjunction with LPG, as well as address broader energy access challenges in camps, where LPG shortages are common and household electrification is very limited.

Pilots in Camp 12 and the 2025 GPA e-cooking demonstration provide strong operational baselines for replication. Meanwhile technologies such as ATEC eCook have been tested in Bangladesh and internationally, offering reliable backup options.

REPLICATION & EXPANSION

Data from this phase could inform a larger second phase focused on integrating solar electrification (lighting, fans, refrigeration) into health centres and other facilities

Battery swapping pilots, if successful, can be replicated in camps with high demand for small-scale productive energy uses

Lessons could support integration of institutional e-cooking into carbon finance modelling under THEA

With additional funding, the model could expand to select host community health centres to strengthen social cohesion and extend clean cooking benefits

STAKEHOLDERS AND ROLES

GPA Coordination Unit to design the project, provide oversight, and coordinate with donors

Implementing partners (such as NGO Forum for Public Health, IOM, and UNHCR) to select facilities, install systems, and provide training and O&M oversight

Technical partners (such as ATEC Bangladesh, Pesitho ECOCA, and Grameen Shakti) to supply and test equipment, and support capacity building.

Community stakeholders (such as majhis, women's groups, and youth volunteers) to support training, repairs, and data collection

Donors (such as FCDO, MECS, and ECHO) to provide funding for pilot scale-up and learning

SCALABILITY

Moderate: The model can be expanded to additional health facilities with further investment, provided maintenance capacity is strengthened and donor support is sustained. Oversizing systems for battery swapping offers a promising innovation that, if effective, could support wider clean energy access and small-business development. Carbon finance mechanisms may partially offset future costs but will not fully replace donor funding.

SOLAR E-COOKING FOR HEALTH FACILITIES IN ROHINGYA REFUGEE CAMPS

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Project concepts

SOLAR ELECTRIFICATION FOR HOUSEHOLDS AND SMALL ENTERPRISES

1/3

LOCATION

Refugee camps in Cox's Bazar

BACKGROUND

Electricity access in the Rohingya camps remains limited, fragmented, and largely decentralised. Most households rely on small solar home systems (SHS) and lanterns distributed during the initial emergency response or purchased from local markets. Many of these systems are now failing or degraded due to poor quality components, harsh environmental conditions, and a lack of structured maintenance. Limited access to reliable electricity also constrains productivity and income for enterprises such as barbershops, tailoring stalls, mobile charging kiosks, and food vendors.

Humanitarian actors have deployed a mix of solar streetlights, mini-grids, nano-grids, and standalone lamps, informed in recent years by the EEN Solar Lighting Guidelines. However underfunding, short-term project cycles, and weak O&M arrangements have limited the durability and coverage of these systems. Only around half of installed solar streetlights are fully functional, leaving many paths, latrines, and communal areas in darkness and increasing protection risks, especially for women and girls.

This project will implement community-planned solar mini/nano-grids that serve both households and small enterprises. Designed as an exploratory intervention, it will align with the EEN Solar Lighting Guidelines; integrate with existing repair and e-waste initiatives; and prioritise safe, reliable lighting and productive uses of electricity.

FURTHER INFORMATION

Studies indicate that around half of households in the camps rely on SHS or lanterns, with frequent breakdowns and limited ability to power anything beyond basic lighting and phone charging. Grid electricity is not permitted for refugee households or most NGO facilities, and so off-grid solar systems remain the primary option for domestic electricity access in the camps.

Limited incomes mean that households can afford only low-quality products and which fail quickly and generate growing volumes of e-waste. Efforts such as the Green Innovation Hub and IOM's repair desks have shown that community-based repair, take-back, and recycling models can extend product lifespans, reduce e-waste, and create local livelihood opportunities.

The project is intended to test anchor-load-based, community-led models that can inform a more coordinated, long-term energy strategy for the camps, rather than provide universal electrification. It will also need to overcome constraints including those related to policy, funding, livelihood restrictions, and the lack of a full cost-recovery model.

Around 500 households will be reached with basic electricity services (such as lighting, phone charging, and fans), around 150 refugee-run micro and small enterprises for productive uses of energy (tailors, barbers, phone charging shops, and vendors of food and cold drinks), and selected communal spaces for public lighting (paths, latrines, markets). The project will include phases for planning phase (six months) and implementation and monitoring (18 months).

Potential areas for implementation include Camps 2W, 4, Kutupalong Registered Camp, and Teknaf blocks, where electricity access is extremely limited and small enterprise activity is concentrated. Previous pilots, including SolShare's mesh-grid projects in Nayapara Registered Camp, have demonstrated that community-owned nano-grid systems can improve reliability, strengthen local ownership, and reduce costs.

Project concepts

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ACTIVITIES

Undertake a community-led energy needs and risk assessment to identify priority blocks, markets, and pathways with high unmet electricity and lighting needs

Review existing survey data and the Solar Lighting Dashboard, and conform to EEN Solar Lighting Guidelines

Design modular solar mini/nano-grid clusters (around 5-15 kWp each) tailored to local conditions and capable of powering household lighting, fans, phone charging, and selected productive uses

Connect around 500 households with simple, safe internal wiring designed to minimise fire and shock risks

Equip 100-150 small enterprises with efficient productive appliances (such as sewing machines, hair clippers, fridges, coolers, charging kiosks, or other low-load devices) matched to the system capacity and load-management plans

Install targeted public lighting (solar streetlights or nano-grid-linked lights) in key pathways, latrine and bathing areas, and market perimeters and prioritise zones identified as high risk for protection incidents

Establish community energy committees (with strong representation from women, youth, and persons with disabilities) to co-design system layouts, agree basic rules for use, support conflict resolution, and provide feedback on performance

Build on existing vocational training programmes and the Green Innovation Hub model to train 30 or more refugee technicians (men and women) in safe wiring, basic PV troubleshooting, battery management, and small appliance repair

Develop and implement a simple O&M framework with preventive maintenance schedules, spare-parts plans, and clear responsibilities shared between implementing agencies and refugee technicians

Integrate e-waste management into the project design by linking with existing take-back and recycling schemes of the GIH, ensuring that damaged components are repaired where possible or responsibly recycled

Implement a monitoring and evaluation framework to track system performance, household and business energy usage, income changes, user satisfaction, and protection outcomes, and feed the results back to the EEN, Shelter-CCCM, and relevant sectors

ENABLERS

Existing experience with community-managed mini-grids (such as in KRC) and SolShare's mesh-grid pilots provides practical design and governance models

The Solar Lighting Guidelines offer a ready-made technical and safety framework for system design, installation, and O&M

The Solar Lighting Dashboard provides a starting point for mapping existing lighting infrastructure and identifying coverage gaps

Significant unmet demand for electricity among households and enterprises, and evidence that refugees are willing to invest in basic energy services when affordable and reliable options are available

Established initiatives such as the Green Innovation Hub and IOM repair desks demonstrate the feasibility of community-led repair, maintenance, and e-waste management

Strong existing coordination platforms, such as the EEN and Livelihoods and Skills Development Sector, support joint planning and training

BARRIERS

Underfunding across the humanitarian response reduces scope for large-scale, durable electrification investments and undermines long-term O&M commitments

High levels of socio-economic vulnerability and restrictions on refugee work rights mean that most households cannot pay for services and formal cost-recovery models are difficult to implement

Many previous solar systems have suffered from poor quality components, weak technical standards, and inadequate maintenance, leading to early failure and user distrust

Dense camp layouts, shading from trees and shelters, dust, high temperatures, and monsoon-related flooding and landslides pose technical and operational risks

Coordination and data gaps persist, and existing dashboards and reporting tools are underutilised or inconsistently updated, which limits the ability to plan and optimise systems.

Project concepts

PROJECT REACH, TIMELINE AND BUDGET

500 households and 150 businesses
Two years
$1.5 million

REPLICATION & EXPANSION

The modular, cluster-based design enables flexible replication in other camp blocks once anchor loads (markets, enterprises, and public lighting) have proven viable.

Lessons from the pilot can inform expansion of nano-grid or mesh-grid approaches, building on SolShare-type models to interconnect existing SHS where appropriate and safe

Data generated on usage, reliability, and livelihoods impacts can inform future integration of electricity access into carbon finance or blended finance mechanisms, although these will only partially cover costs

The approach can be adapted for selected host-community markets and settlements, promoting social cohesion and reducing tensions over unequal energy access

Insights from the project can feed into a broader camp-wide energy strategy for households and communal facilities

STAKEHOLDERS AND ROLES

RRRC and Camp-in-Charge (CiC) offices to provide permissions, ensure compliance with national policies, and facilitate site selection and coordination

GPA Coordination Unit or other partners to lead project design, technical quality assurance, alignment with EEN Solar Lighting Guidelines, M&E design, and donor coordination

UNHCR, IOM, and other core implementing partners (such as NGO Forum, Practical Action, and IUCN) to support community engagement, grid design and installation oversight, training delivery, and O&M framework development

Technical partners (such as SolShare, ATEC Bangladesh, Grameen Shakti, and others) to provide system design, equipment, training-of-trainers, and technical backstopping

Green Innovation Hub, IOM repair desks, and other repair initiatives to serve as central repair and training nodes, support e-waste take-back and recycling, and mentor refugee technicians

Community energy committees, majhis, women's and youth groups, and persons with disabilities' groups to co-design system layouts, support beneficiary selection, contribute to monitoring and feedback, and help manage protection-related concerns

Donors (such as FCDO, ADB, World Bank, IKEA Foundation, and others) to provide financial support for capital investment, O&M, and learning, and to engage in the joint review of pilot results and potential scale-up options

SCALABILITY

High: The model is technically and conceptually highly scalable, albeit under policy, funding, and livelihood restrictions. With sufficient investment, clear O&M arrangements, and continued government engagement, it can be replicated across additional camps and blocks. Scaling will require multi-year funding, stronger institutional mandates for energy within the humanitarian architecture, and continued efforts to embed energy within broader protection, WASH, education, and livelihoods strategies.

SOLAR ELECTRIFICATION FOR HOUSEHOLDS AND SMALL ENTERPRISES

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07

Conclusions

Key issues for energy access

Bangladesh hosts more than 1.1 million Rohingya people in camps in Cox's Bazar and Bhasan Char. The Government of Bangladesh, through the National Task Force, provides strategic direction at the national level whilst the Ministry of Disaster Management and Relief and the Refugee Relief and Repatriation Commissioner coordinate at the local level. On the humanitarian side, the Strategic Executive Group provides high-level leadership with field operations overseen by the Inter-Sector Coordination Group, including for issues related to sustainable energy.

Access to clean cooking is almost universal, as almost all households use LPG, but this is provided by UNHCR and IOM at significant cost to the organisations. Pressure cookers have been implemented to reduce this reliance on LPG and exploring options to complement these, such as e-cooking, could help to reduce the financial burden for humanitarian agencies and mitigate shortfalls in supply for households.

The uptake of electricity for households is limited by policy restrictions and a lack of quality solar products in the camps. Supporting market development for high-quality off-grid solar lighting products, and developing the local capacity to repair and maintain them, could help to improve electricity access in the camps and reduce electronic waste caused by discarded systems.

Electricity access for community facilities and humanitarian operations, however, is generally better: often facilities are connected to the national grid or have access to solar power. Furthermore, many areas of the camps have solar streetlights, but the coverage is uneven and lights have fallen into disrepair. Greater coordination between stakeholders and planning for maintenance could help to ensure the long-term sustainability of these systems.

There are significant opportunities to improve sustainable energy access. Continuing support for clean cooking through LPG and complementary technologies, such as pressure cookers and e-cooking, could help to reduce fuel costs. Providing solar equipment and mini-grid systems could provide both e-cooking and electricity access for households, as well as offer opportunities for productive uses of energy. Training camp residents to repair and maintain energy equipment could reduce breakdowns and support job opportunities, whilst exploring improved maintenance models for electricity systems in community facilities could improve their longevity. Finally, the new opportunities for institutional-scale e-cooking could be explored. ●

The progress already made in providing clean cooking to households and electricity to community facilities can help to lay the foundations for future work.

The road to sustainable energy in displacement settings

Improving access to sustainable energy will require strong linkages between partners, support for building market-based approaches, and a central role for displaced community members in the design and implementation of any intervention.

The READS workshops brought together 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 (2026-2027)
MEDIUM TERM (2028-2029)
LONG TERM (2030+)

CLEAN COOKING

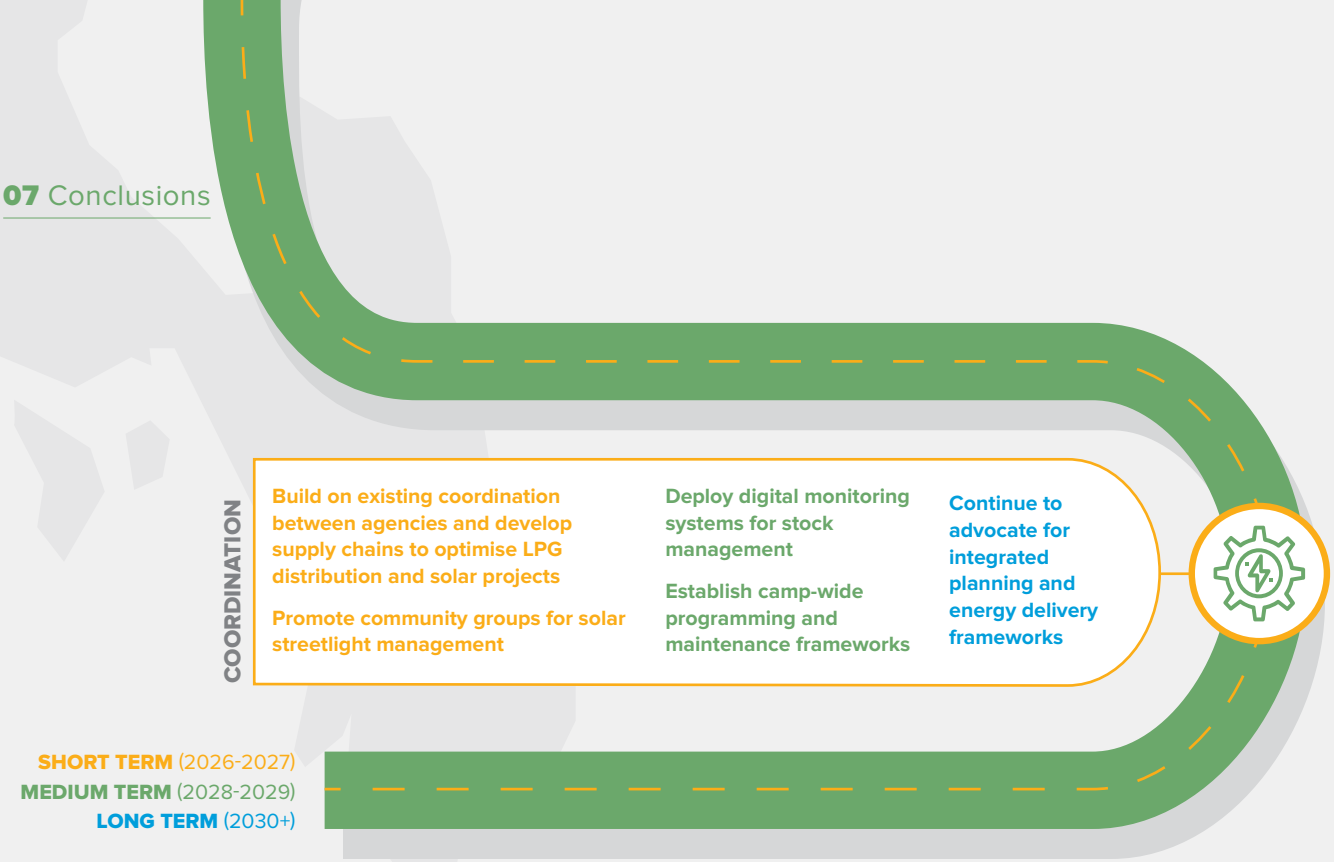
- **SHORT TERM:** Strengthen and optimise LPG supply chains to ensure continuity, safety, and cost efficiency
- **SHORT TERM:** Scale up pressure cooker implementation and e-cooking pilots
- **SHORT TERM:** Promote the environmental, health, and social benefits of clean cooking
- **SHORT TERM:** Explore opportunities for carbon finance
- **MEDIUM TERM:** Scale up e-cooking programmes in a coordinated manner alongside LPG provision
- **MEDIUM TERM:** Operationalise carbon finance mechanisms to partially offset LPG and e-cooking costs
- **MEDIUM TERM:** Link clean cooking programmes with national policies and climate targets
- **LONG TERM:** Maintain a diversified clean cooking ecosystem combining efficient LPG use, e-cooking, and renewables
- **LONG TERM:** Use carbon finance and private sector-led blended finance to stabilise long-term clean cooking funding

ELECTRICITY ACCESS

- **SHORT TERM:** Use the EEN Solar Lighting Guidelines to support project development
- **SHORT TERM:** Repair and rehabilitate existing solar streetlights, nano-grids, and mini-grids in priority areas.
- **SHORT TERM:** Scale up solar and hybrid systems for communal facilities and streetlight coverage in key areas
- **SHORT TERM:** Strengthen market systems to support private sector entry
- **MEDIUM TERM:** Support private sector delivery of high-quality solar products
- **MEDIUM TERM:** Develop repair facilities and recycling for electronic waste
- **LONG TERM:** Promote product longevity through preventative maintenance
- **LONG TERM:** Explore opportunities for higher-tier electricity services

CAPACITY BUILDING

- **SHORT TERM:** Support local participation and governance of energy projects
- **SHORT TERM:** Implement training and capacity building programmes for local repair and maintenance
- **MEDIUM TERM:** Establish pathways for potential employment for technicians
- **MEDIUM TERM:** Support long-term opportunities such as further skills training
- **LONG TERM:** Scale up the number of specialised technicians as clean energy access grows



The challenge is significant: achieving access to affordable, sustainable, reliable and modern energy for displaced people will require more projects, activities, partners, coordination, and investment than ever before. The collaborations, learning, and progress already made in providing clean cooking to households and solar power to community facilities can help lay the foundations for greater access to sustainable energy across the camps to improve the wellbeing and quality of life for displaced people living in Bangladesh.

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

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