COMPENDIUM

Protection-Sensitive Access to Lighting

DECEMBER 2022

Acknowledgments

Cover photo: UNHCR, the UN Refugee Agency, are powering up refugee communities and creating a better world for thousands of people who have been forced to flee home. © UNHCR/Samuel Otieno

Table of Contents

Acronyms and Symbols

BPRM	US Department of State, Bureau of Population, Refugees, and Migration
CBI	Cash-Based Interventions
CCCM	Camp Coordination and Camp Management
ESDS	Energy Solutions in Displacement Settings
EPR	Extended Producer Responsibility
ESMAP	Energy Sector Management Assistance Program
GBV	Gender-Based Violence
GCR	Global Compact on Refugees
GIZ	German Development Agency (Deutsche Gesellschaft fur Internationale Zusammenarbeit GmbH – German Corporation for International Cooperation)
HH	Household
IASC	Inter-Agency Standing Committee
IDP	Internally Displaced Person
IDPs	Internally Displaced People
IEC	International Electrotechnical Commission
LTA	Long-term Agreement
MEB	Minimum Expenditure Basket
NFI	Non-Food Items
O&M	Operation and Maintenance
OMC	Operational Management Cycle
PAYG	Pay-as-you-go
PoC	Persons of Concern
PPA	project Partnership Agreements
PV	Photovoltaic
SDG	Sustainable Development Goal
SHS	Solar Home System
SL	Solar Lamps
SMS	Supply Management Service
SSL	Solar Street Light
UNHCR	UN High Commissioner for Refugees
W	Watt
WASH	Water, Sanitation and hygiene
WHO	World Health Organization

Terminology[1]

Lighting: device in a room, premises, communal facilities (including shared toilets) or streets for producing light with the scope of illuminating physical spaces.

Energy: refers primarily to the source that powers the lighting devices.

Energy access for lighting: the ability of the end user to utilize an energy source with a device that provides light (e.g., fire with candles, kerosene with oil lamp, electricity with light bulbs, etc.). Energy access for lighting may also be referred to as lighting access.

Electricity: a form of energy resulting from the existence of charged particles (such as electrons or protons) that occurs naturally (as in lightning) or is produced (as in a generator) and that is expressed in terms of the movement and interaction of electrons. The word "electricity" is sometimes used to mean electrical energy.

Renewable energy: refers to energy options that are naturally replenished over time (e.g., solar, hydro, wind, tidal, geothermal and biomass energy).

Appliances (also called end-use devices): Equipment, powered by electricity or other energy sources, that accomplish some function or task to deliver a lighting service (e.g., light bulb, lantern, streetlight, etc.)

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1   Terminology based on the UNHCR Global Strategy for Sustainable Energy (2019-2025) and ESMAP handbook "BEYOND CONNECTIONS Energy Access Redefined" (2015).

Introduction

LIMITED ACCESS TO ENERGY FOR LIGHTING HAS AN IMPACT ON PROTECTION OF REFUGEES, IDP AND HOST COMMUNITIES

Limited or no access to energy for basic needs, such as lighting, can have significant repercussions on refugees, internally displaced people (IDPs) and other people we serve and host communities. It puts them at risk of GBV, limited education opportunities and potential health-related concerns, such as exposure to smoke and indoor pollution, ultimately jeopardizing broad protection outcomes at the communal, households or individual level.

ACCESS TO LIGHTING IS A BASIC NEED, A SUSTAINABLE DEVELOPMENT GOAL AND ONE OF THE OUTCOMES OF THE UNHCR GLOBAL STRATEGY TO SUSTAINABLE ENERGY

Access to lighting is a key sustainable development goal. The 2030 Agenda for UN Sustainable Development Goals (SDG) adopted by all United Nations Member States in 2015, provides a shared blueprint for peace and prosperity for people and the planet, now and into the future, reflected in the seventh goal "Ensure access to affordable, reliable, sustainable and modern energy for all" (SDG 7 / target 7.1).

Access to sufficient lighting is a goal of the UNHCR Global Strategy for Sustainable Energy 2019-2025. The Strategy aims to enable refugees, IDPs, and other people whom UNHCR serves to meet their energy needs in a safe and sustainable manner and to ensure that UNHCR's response is also environmentally sustainable.

Furthermore, the Global Compact on Refugees (GCR) offers a framework for more predictable and equitable responsibility-sharing, recognizing that a sustainable solution to refugee situations cannot be achieved without international cooperation. Specifically, on energy and lighting: "…*Environmental impact assessments, national sustainable development projects and business models for the delivery of clean energy that cater more effectively to refugee and host community needs will be actively supported… to improve the quality of human settlements*".

AIM OF THE COMPENDIUM

The aim of this compendium is to support the development of safe lighting access programmes with a focus on protection outcomes. It provides a step-by-step approach and a list of options to address lighting needs.

NOTE FOR THE USER

The use of this compendium is intended for UNHCR personnel and partners to support programme development in compliance with UNHCR policies and guidance. The steps followed are aligned with the Operations Management Cycle (OMC) as outlined in the UNHCR Programme Manual.

> "Light and Protection have an intricate relationship. Access to light and the reduction of GBV risks are commonly linked. One reason is that electricity increases women's access to information. The more information that girls and women have access to, the greater understanding they will have of their rights and the less accepting they may be of stereotyped roles and violence. The humanitarian sector links the reduction of protection risks as a prioritized rationale for the introduction of light. Household and community lights are important because they help expose dangerous animals and can reduce vandalism and theft. Access to electricity is also a powerful engine to economic empowerment. Furthermore, community level lighting makes possible life outside the shelter after daylight hours. Women are also more likely to become wage earning workers outside the home when they have access to electricity." (UNHCR 2015)

The compendium is based on the experiences in refugee situations but can be adapted to situations of internal displacement as well. The decision on the levels of assistance for lighting to IDPs is decided at country level based on the coordination between the actors on the ground.

GUIDING PRINCIPLES AND APPROACHES

Interventions to improve lighting access should be designed from a rights-based approach complemented by a set of principles to safeguard refugees and IDPs from protection risks such as GBV, and health and safety hazards caused by lack of illumination inside the household or in public places. Access to lighting in humanitarian settings can enable safe and dignified living conditions, access to connectivity, increased education opportunities and livelihoods outcomes, thereby promoting self-reliance. All lighting programmes shall adhere to the following protection principles:

▶ **'Do no harm'** that actively avoids exposing refugees and IDPs to further harm resulting from one's actions.

▶ **UNHCR's community-based approach** shifts the focus of programme design from individual assistance towards building on the existing knowledge, skills, and capacities of refugees, IDPs and their hosting communities.

▶ **The rights-based approach** promotes the respect for rights at both individual and community levels as well as the change needed to fulfil these rights.

▶ **Age, gender, and diversity policy:** ensures that all segments of a population have equitable and non-discriminatory access to assistance and protection.

▶ **Data protection policy:** seeks to protect the rights of individuals whose information it holds, and to ensure that the processing of personal data conforms to key data protection principles.

Lighting programmes shall consider the following programmatic approaches of being evidence-based as well as environmentally and socio-economically sustainable: lighting solutions should be selected based on the availability of the supply (especially in term of spare parts), do not jeopardize local market situations and livelihoods opportunities (distribution vs. market approaches), and have minimum environmental impact in terms of waste and safe disposal at the end of their lifespan.

Lighting needs and solutions

The most appropriate lighting solution is selected considering the lighting needs, the habits of persons, the available device options, livelihood opportunities, and sustainability factors. The short, medium, and long-term advantages and disadvantages of different interventions in terms of protection and environmental impact must be considered.

Any technology, especially if still in a pilot phase, shall value its users' acceptance, behavioural changes that may be required and how long it will take for people to adjust to those.

User behaviors, preferences, and needs

To select lighting interventions, it is essential to know the lighting needs of the user at both household and the community level, particularly where and when refugees or IDP are exposed to protection risks, if and how provide additional benefits in term of better life quality and the the required level of response interventions.

To ensure adequate lighting solutions, there are three different levels:

1. **Individual lighting:** the lighting source is normally needed to move around, see steps while walking, and to avoid obstacles or potential hazards (e.g., dangerous animals like scorpions, snakes, etc.). It is also needed to perform individual tasks that required high eye focus like reading, sewing, cutting food, etc.

2. **Household lighting:** the light is used to illuminate the entire room/shelter and it helps to move comfortably in the space and perform tasks that need less eye focus such as eating, get dressed, etc. The light in the household also gives a sense of safety and protection.

3. **Public space lighting:** the light is used to illuminate areas and building for security reasons and to guide people along safe paths between locations.

INDIVIDUAL and HOUSEHOLD LIGHTING

The main factors affecting the lighting needs at individual and household level are:

▶ Size of the household

▶ Specific individual needs by age and gender

▶ Social and cultural factors

▶ Activities after sunset

▶ Availability of household-level WASH facilities (toilets and showers)

Consulting different population groups will be important to understand people's needs for individual lighting and eventually to broaden electricity access, including mobile phone chargers and other plug loads (e.g., radios, TVs, and electronic devices). It will also support the early identification of potential usage issues (due to intra household dynamics) and help to generate solutions to overcome those. Consulting with people with specific needs is key to ensure that lighting solutions meet those. Age and Gender play an important role in determining individual and household access and use of resources, with women and girls often having less access to lighting. Women and girls are more likely to carry the burden of energy poverty and experience the adverse effects of lack of safe, reliable, affordable and clean energy.

PUBLIC SPACES LIGHTING

The main factors affecting the lighting needs in public spaces are:

▶ Climatic and terrain conditions

▶ Social and cultural factors

▶ Perception around safety and security

▶ Activities after sunset

▶ Presence of shared/communal WASH facilities

A community-based approach through the whole process will respond to the exact needs of the people, to build community ownership, and to reduce risks of theft and vandalism of public spaces and the lighting installations. The consultation and involvement of a representative of the population will further help to identify future needs for maintenance in the longer run and clarify who will be responsible and accountable for it. It will also be essential to understand which lighting options are relevant to each context, as well as the specifications for each option.

Lighting devices

Providing a sustainable lighting solution depends not only on selecting an efficient light source, but also on making sure that the light emitted by the device is enough for performing each specific task (i.e., reading, walking during dark hours, etc.).

▶ At the **household level,** it is important to strike the correct balance between illumination (level of light) and the task being performed: high levels of illumination result in unwanted physiological eye responses such as squinting, while low light levels make it difficult to distinguish objects when performing tasks requiring high visual acuity and tend to cause eye fatigue and headaches. Refer to annex 1 for a connection between illumination and the task being performed.

▶ **Public lighting** should aim to provide appropriate sufficient lighting at community level, thereby contributing to improve safety and security, reduce protection issues and improve night-time activities.

There is a wide variety of lighting devices on the market. However, the process of selection becomes easier once the lighting needs have been identified. In the table below a list of lighting devices and systems is presented together with the most typical lighting options in UNHCR operations.

Table 1: Typical lighting solutions adopted in UNHCR

Light needs	Devices/system	Typical lighting solutions in UNHCR operations
Individuals	Portable lamp Phones	Solar lanterns
Households	Solar Home system Minigr ids Connection to national grid	▶ Solar lanterns ▶ Stand-alone solar home system (SHS)
Public spaces	Streetlight	Solar Streetlights (SSL)

SOLAR LANTERNS and SOLAR HOME SYSTEMS for Individual and households

Solar lanterns (SLs) and solar home systems (SHSs) are small-scale, stand-alone solar-powered systems. Some SLs provide just enough electricity for a single light and perhaps to recharge a mobile phone. SHS can power small appliances such as radios, fans, and televisions. The exact distinction between an SL and SHS has become blurred with the increase of these devices in the market. However, a useful distinction is that solar lanterns are most of the time portable devices while for the SHSs the photovoltaic (PV) panel is roof-mounted, and the lights are designed to be hung or wall mounted. Both technologies require a battery to properly function.

SHSs are more expensive than SLs, due to the size of the system and the devices that can power. SLs can be purchased from US$10 to about US$40. They are often available everywhere, including in rural areas. SHSs tends to be more expensive, depending on the capacity and appliances included.

> **PRODUCTS & SPECIFICATIONS GUIDANCE for SOLAR LANTERNS and SOLAR HOME SYSTEMS**
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> The 'Certified Solar Product database' developed by VeraSol, is the largest online repository of quality-verified solar lighting energy kits and independently tested solar powered appliances such as fans, refrigerators, and televisions. This database is used to confirm whether a solar energy kit meets the Lighting Global Quality Standards or the quality standards in IEC TS 62257-9-8. The catalogue can guide practitioners and assist them in applying specifications of the most appropriate lighting technology for the context in which they are working.

The contribution of SLs and SHSs to improve access to electricity beyond lighting purposes should also be carefully considered, especially for recharging mobile phones. Mobile phones are common assets and can be easily recharged with small devices such as SLs.

Although the electricity access provided is modest, SLs and SHSs can be considered as a reasonable solution in emergency settings. On the longer run, higher-tier mini-grid or national grid access should be considered, although not very widespread in many displacement settings. Often, as situation gets protracted, informal market and other arrangements such as phone recharging shops and/or private generators are installed by the householders itself.

Another marked distinction is that SLs are part of the Core Relief Items (CRI) and are distributed to the displaced individuals as part of the emergency response, with the essential scope to provide protection. Due to its higher costs, SHSs are generally considered for long-term solutions that combine the protection aspect with the possibility to increase the self-reliance of the refugees and linking this technology with income generating activities.

CASE STUDY: SOLAR LANTERNS – WORLDWIDE

The distribution of solar lanterns is part of UNHCR's sustainable procurement initiative, launched in 2012. Not only are solar lanterns better for the environment, as they do not require any firewood or kerosene, but they have proven to reduce protection risks, particularly gender-based violence. Violence and theft are common at night in dark communities, and solar lanterns can make a real difference. UNHCR is deploying solar lanterns as a standard part of its relief packages. "*The provision of solar lanterns demonstrates UNHCR's commitment to the protection of refugee women and children, who need to be able to walk around safely at night. It also helps children study. It is important to procure more environmentally friendly relief items on behalf of the communities we serve.*" Quote by Terry Morel, Director of the Division of Emergency, Security and Supply (UNHCR Global Report 2013).

UNHCR warehouse containing tents, blankets, solar lanterns, hygiene kits, and other non-food items in preparation of new arrivals coming from Ukraine. © UNHCR/Andrew McConnell

CASE STUDY: SOLAR HOME SYSTEM – RWANDA

In 2021, two national solar companies in Rwanda implemented a household-level renewable energy program for refugees and their hosting communities. The Renewable Energy for Refugees (RE4R) programme, in partnership with Practical Action and supported by the IKEA Foundation, enabled UNHCR to facilitate refugees and their host communities to access 4,279 SHS. The local market was upgraded with two different SHS sizes to give the customers the choice to access the best option based on their needs and ability to pay. The first SHS model had a capacity of 50W, adequate to power a phone charger, a radio and three lightbulbs. The second model had a capacity of 20W, enough to power a phone charger and three lightbulbs. A loan scheme from one to three years was proposed to refugees and host community members, to allow flexibility in purchasing the system they preferred. During the annual monitoring survey, 93 % of respondents were satisfied with the solar home system and 98% reporting feeling safer in their homes after dark.

Solar power system provides Kigeme refugees in Rwanda with a good alternative for home lighting and has enabled some of the refugees to expand their small businesses © UNHCR/Eric Didier Karinganire

SOLAR STREETLIGHT for public spaces

Solar streetlights are lighting infrastructure that provide lighting to designated area, usually targeting those with heavy foot traffic including around WASH facilities, allowing for greater access during night hours. Streetlighting can either have one dedicated panel and battery per post, or could be connected to one unified solar system that powers various posts. Solar streetlights provide reliable lighting outdoors which is critical especially in locations that do not have access to electricity.

The SSLs have the main purposes to enhance security for the refugee site residents but have also the potential to improve access to communal infrastructure and prolonged livelihood opportunities during night hours. They are cost effective and more sustainable solutions compared to lighting systems using diesel generators that run with fossil fuel.

> The ideal situation is for lighting to be provided in all communal areas of camps and accommodation including bathing units and toilets for both female and male users so that they can be used during the hours of darkness. (UNHCR WASH Manual). To ensure that the intervention does not create additional challenges instead of mitigating the overall risk, it is important to assess the entire activity area and not just focus on strategic points. For example, if only women's toilets are illuminated, people would tend to gather under the lights, including men, making women less willing to use the units. In this case, lighting both gender toilets and possibly the path to reach them will minimize the risk.

The capital cost of SLL is around USD 1,000-1,500 per unit through international procurement. The structure (pole) and/or foundations can be procured separately from the lights, battery, and solar panel. This allows for more local procurement and may reduce the cost. Availability of spare parts also needs to be carefully considered when selecting among the various SSLs models as this factor will influence maintaining the units in the long run.

The operation and maintenance need to be planned over multiple years: panels need to be cleaned especially in dry or sandy locations, and batteries and charge controllers may need replacement more often than the entire units (see Operation & Maintenance paragraph). It is recommended to have a long-term service agreement and/or warranties with vendors to ensure sustainability of the infrastructure and of the service provided to cover maintenance and replacement costs.

The batteries of the SSLs are often targeted by thieves as it is easy to be removed and be repurposed. Security mechanisms embedded on the units may be considered, such as engraving codes on the solar panel frame, locking the casing containing the panels and battery with a heavy-duty lock, construction of a security fence. However, the most common solution is to assign wardens or technically trained focal points from the community that are tasked with protecting the solar streetlights and report any damages, while also sensitizing the community on the importance of such appliances for their own safety, security, and well-being.

Training on monitoring and maintenance should be provided to the community, which is essential to extend the life span of the solar streetlights. Additionally, community involvement during unit installation provides additional hands-on training for technicians to understand troubleshooting better and be able to take care of the SSL after the handover.

CASE STUDY: SOLAR STREETLIGHTS – BANGLADESH

In 2018, in Cox's Bazar, Bangladesh UNHCR has installed more than 1,600 streetlights in both refugee settlements and host community areas, providing lighting in the locations identified through community consultations. Streetlighting increases security in refugee settlements, allowing the community to feel safer during night-time. Additionally, lighting enhances the dignity of life in the settlements, allowing individuals to visit neighbours, and build community life after sunset. Streetlighting has now expanded into many areas of the settlements. Further to the community consultations and a series of streetlight mapping exercises (see safety mapping exercise), a coordination tool has been produced which is shared with the Asian Development Bank, the World Bank, and other agencies. The tool is aimed to channel funds to ensure equal community lighting coverage between settlements, as well as for monitoring and evaluation purposes.

Refugees walk safely across the camp at night, thanks to the lights provided by solar panels, in Cox's Bazar camp, Bangladesh. © UNHCR/Vincent Tremeau

SUMMARY of CRITERIA FOR LIGHTING OPTIONS SELECTION:

▶ **Needs** – emergency context or long-term settings for individuals, households, or public spaces lighting needs.

▶ **Supply Availability** – local or international procurement of lighting devices, spare parts, service companies, and the system reliability requirements (Life-cycle analysis – including existence of dedicated sites and businesses for recycling / disposal, renewable energy solutions to be preferred over non-renewable and polluting technologies).

▶ **Affordability** – cost of the lighting device/source, spare parts, and fuel price if any. There are therefore two different costs to consider:

▷ **Capital Cost** – the initial cost to purchase, and if relevant install, the equipment. Costs vary considerably based on type of technology, size of the system, quality of the equipment and the local market. A comparative study across the possible options is essential.

▷ **Operating Cost** includes the cost for operations and maintenance, spare parts and fuel (where applicable). Operating costs will have greater variation than capital costs, due to differences in prices from country to country, use patterns (systems will experience different level of stress depending on the number of hours they operate, the amount of power they provide and the operation modalities of the users) and environmental conditions (e.g., in a very dusty area the cleaning schedule of the solar panels with be more frequent).

> Typically, the capital cost is covered by the organization, if the device is deployed as a CRI, or by the user, if purchased directly in the market. While the operating cost is mainly covered by the users. The weight of the operating cost on the overall household expenses will determine the sustainability of the device in the long run.

▷ **Durability** – the device lifetime, expressed either in years, operating hours (for bulbs), or cycles (for power storage for batteries), should be maximized and specification defined based on either high-quality standard of products available in the local market, or international standards.

▷ **Reliability** – the product quality, potential O&M service agreements with the supplier and operators, and training for end-users are key for a reliable operation.

Assessment of lighting interventions

This chapter illustrates how to carry out an assessment for lighting needs, understanding preferences and potential challenges, and identifying the potential solutions defined by protection principles, environmental risk assessments, and socio-economic sustainability criteria.

To gain a comprehensive understanding of the needs and context, personnel and partners need to ensure that refugee and IDP lighting needs are considered during the comprehensive needs assessment in collaboration, if possible, with other sectors (e.g., protection, health, WASH, shelter, education, livelihood, etc.). The needs for domestic and public lighting are studied simultaneously because the lack of one can intensify the need for the other (for example, common non-illuminated WASH facilities can result in the need for distribution of more portable lamps). On the other hand, during emergencies, the assessments are kept minimal, considering that the primary lighting needs are satisfied through the distribution of solar lanterns as part of CRI and the installation of lights for streets , WASH facilities and other common areas.

The UNHCR's Needs Assessment Handbook illustrates the common data collection tools and methodologies which should be observed throughout all operations. Combining two or more methods – research triangulation – is imperative when assessing cross-cutting issues like access to lighting options. For instance, consulting different population groups is important to understand people's various needs for domestic activities or for the well-being of the community. It will also support the early identification of potential usage issues (due to intra-household dynamics) and help to generate solutions on how to overcome those.

✔ **Each assessment shall be carried out with a participatory approach,** in line with the right of the people we serve to participate in decisions on matters that affect their lives.

✔ Lighting related aspect should be systematically incorporated in GBV safety audits.

✔ If time and resources are limited for a dedicated lighting assessment, **lighting-related questions could be included in multi-sectoral needs assessments,** Participatory Assessment, etc.

✔ **Lighting related expenditures** (including purchase of lighting devices and bills for utilities) shall be included in a multi-sector market assessment and the Minimum Expenditure Basket (MEB) calculation, to tailor Cash-Based Intervention (CBI) interventions.

Protection considerations

Before conducting any assessment, refer to the UNHCR ethical and safety guidelines and the Ethical Assessments Checklist to apply ethical and safety standards. Sometimes it can be useful conducting conduct conversations with women, girls and boys separately to assess their specific needs and risks. It is also important to be aware that participatory assessments with children must follow specific guidelines. For more details, refer to the World Health Organization (WHO) ethical and safety recommendations for researching, documenting, and monitoring sexual violence in emergencies. Assessments are not intended to collect information on GBV incidents. However, GBV disclosures may occur at any time during data collection.

Therefore, all staff conducting assessments should be trained on how to receive a disclosure safely using the survivor centered approach and to refer survivors in a timely manner.

Gender-based-violence survivors should not be sought out or targeted as a specific group during assessments. Assessments of lighting access may disclose reports of gender-based violence incidents hence they should be preferably conducted in collaboration with specialists and/or a partner or agency specialized in gender-based violence interventions. More information can be found in the IASC Gender-based Violence Guidelines 2015. Enumerators must be trained on how to safely handle a disclosure and make a referral following the disclosure of an incident.

The points below summarize the steps to follow to increase active participation of community members in lighting access activities.

1. **Engage existing/create forums** in which women, girls, older persons, persons with specific needs, marginalized groups and others may participate.

2. **Ensure that programme objectives reflect the needs,** concerns, and values of all segments of the community related to access to lighting at both household and community level.

3. **Establish systems** that enable the community to provide inputs and feedback to the programme/project.

With the lack of lighting in the camp, studying in the evening and feeding the family is a challenge. Also to leave the house after dark for fear of safety and protection © UNHCR/Hannah Maule-ffinch

Data collection methods

The most appropriate data collection method related to lighting access should be chosen, based on the specific local context:

▶ **Focus group discussion:** a qualitative approach to gain a general understanding of the indoor and outdoor lighting needs at individual and community level

▶ **Key informant interviews:** qualitative interviews with various group members or authorities who have extensive knowledge about the community and context

▶ **Direct observations:** inspection inside the households and in the public spaces that is used to gather additional information of the physical setting and the overall environment

▶ **Household surveys:** to collect quantitative data and analyze the lighting access in-depth. This method is normally more costly and time-consuming as it consists of a more detailed interview for each of the sample HH taken into consideration.

Sample questionnaires of focus group discussion key informant interviews and direct observations, that can be modified according to the specific context are in Annex 2. The UNHCR Tool for Participatory Assessment can be used as a guiding document for the proper preparation, facilitation, and permission to conduct interviews and surveys. For household surveys a methodology for data collection and interviews is found in the UNHCR Integrated Framework for Household Survey.

In the assessment process, especially for HH surveys, enumerators are vital to the success of the data collection exercises. They should be well prepared (i.e., introduction to the context, potential sensitive topics, and energy related issues) and trained before they conduct the interviews since their work can guarantee data quality (i.e., high respondent rate and accurate responses).

UNHCR SAFETY AUDIT TOOLKIT

Everyone has a responsibility to mitigate the risk of GBV in their respective area of work based on the needs of the community. The Safety Audit provides support to identify the needs of refugees and other forcibly displaced people around GBV risks without seeking evidence or proof of the occurrence of GBV incidents. Rather, the Safety Audit specifically aims to collect information on the perception of safety around GBV risks and to identify high-risk factors in the individual surroundings, as well as to hear their opinions on strategies to enhance safety and minimize GBV risks in their communities and on the provision of services. Safety audits can also help to foster collaboration with and within communities to address GBV risks, strengthen response, and improve recommendations. UNHCR safety audit toolkit provides a number of tools designed to support the safety audit process and data collection methods on safety around GBV risks. Tools & Templates (unhcr.org)

CASE STUDY: COMMUNITY LEVEL LIGHTING ACCESS ASSESSMENT IN UGANDA

In 2015, UNHCR installed solar streetlights in the northern Uganda's Rhino Camp refugee settlement hosting South Sudanese refugees, with funding from the Safe from the Start initiative. Refugee communities determined where to install lights both to prevent violence and facilitate productive community activities, based on self-identified needs and preferences. The mixed-method assessment took place in late 2016 through a population-based assessment of community lighting.

The study comprised **focus group discussions** among refugees, and **key informant interviews** with community leaders, refugees, teachers, and security guards. It also includes a **household survey** on refugee perceptions of unsafety in both lit and unlit locations. The study highlights the protective effect of community lighting in a refugee settlement. In addition, the assessment utilized various participatory research approaches with the focus on women's and youth empowerment contributing to the success of the overall project.

UNHCR staff conduct a focus group with young women from South Sudan living in Ayilo Refugee Settlement, to assess their needs and brainstorm ideas. Uganda. © UNHCR/Elena D'Urzo

Environmental considerations

Access to lighting has a direct impact on the environment and on the welfare and well-being of people. Assessing environmental risks and impacts at the earliest stage of the programme design is crucial to determine appropriate mitigation actions to avoid potential negative impacts. Cleaner light devices/sources and fuel-efficient solutions have a benefit on people' health and reduce air pollution.

The environmental risks and impacts mainly related to lighting solutions in refugee and IDP situations include, but is not limited to the following:

▶ **Pollution due to the generation of electrical waste (e-waste):** generated by unsafe management and disposal of products that have batteries or electric plugs such as electrical appliances, photovoltaic systems, portable electrical devices, etc. E-waste is a health and environmental hazard, containing toxic additives or hazardous substances such as mercury, which damages the human brain and kidneys and can pollute land and water sources. Lighting solutions do not only produce e-waste but also other types of solid wastes (plastics, iron/steel/copper made technologies) that have also negative impacts on soils, water sources, livestock, and people's lives in general.

▶ **Air pollution, both inside shelters and around settlements:** this is generated when the lighting need is addressed through a diesel generator, fireplaces, kerosene lamps and/or candles. Household air pollution is a critical environmental health problem contributing to lung diseases, increasing premature deaths risks and can cause non-communicable diseases such as lung cancer.

> To capture initial environmental consideration, practitioners should survey the environmental conditions of a particular location during a specific period, to identify any existing or potential problem with specific regards to the use of natural resources, but also considering broad social and economic impacts.

While considering specific context constraints, possible measures to reduce or eliminate negative environmental impacts are listed below:

1. **Tackle e-waste and other solid waste** focusing on collection and recycling solutions, while identifying responsibilities to cover the extra costs and how the Extended Producer Responsibility (EPR)[2] can be enforced.

2. **Encourage energy efficiency** by all users (domestic, businesses, institutional, and humanitarian agencies) by, among other things, introducing disincentives to high fuel consumption and identifying energy-saving techniques tailored to users' specific needs (e.g., low-consuming power devices, high quality appliances, well maintained devices, etc.).

3. **Promote the use of renewable energy** (such as solar) for lighting devices and for the conversion of diesel generators used for lighting purposes.

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2   The Extended Producer Responsibility (EPR) is the producer's responsibility for a product, extended to the post-consumer stage of a product's life-cycle, e.g. take-back of old / broken products by producer for recycling or safe disposal

Implementation

Recognizing the importance of integrating lighting needs within a humanitarian response helps to respond appropriately to the specific context of each displacement setting.

Three implementation modalities are available for lighting access programmes:

▶ **Through partners:** it includes selecting, negotiating, drafting, signing, monitoring, and closure of project partnership agreements (PPA)

▶ **Direct by UNHCR:** management of commercial contracts under UNHCR Direct Implementation

▶ **A combination of direct and partner implementation**

Given the multisectoral nature of lighting access related programming, UNHCR and partners should continue to collaborate across sectors to ensure successful implementation and complementarity while avoiding duplication.

The following paragraphers outlines some of the most typical delivery modalities for HH and public lighting interventions in UNHCR working contexts and their respective benefits, challenges, and considerations.

Individual and household lighting — Solar lamps and solar home systems

In emergency context, solar lamps are typically distributed to the affected people as part the Core Relief Items (CRI) kit to cover immediate basic needs. In protracted situations, the following delivery methods can be decided upon to increase the lighting access of displaced people.

Intervention	Benefits	Challenges	Considerations
In-kind provision	It can quickly and directly meet user lighting needs. It can provide lighting solutions that would be otherwise unaffordable for refugees (or a part of them) and their community	It is expensive and difficult to sustain in the long-term. Funds are often available for the procurement of lighting devices but not for their maintenance and replacement	Direct provision is essential in acute emergencies when preposition stocks exist and there is no time to use other modalities.
Cash Based Intervention (CBI)	Cash assistance may decrease response time and increase access to more options based on people' needs and preferences.	Limited or no market availability of the equipment and/or spare parts reduces the possibility of CBI.	Markets functionality is a pre-condition. The MEB should include a component for lighting and/or utilities to ensure that families can meet their needs (as for example in Egypt)
Access to affordable lighting items via market-based approach	Larger variety of products at affordable/subsidized price are injected in the market. It enhances onsite availability of technical expertise and after-sales service, availing support and spare parts which are covered by warranty period.	Displaced people, or part of them, may be unable to afford the lighting devices. Livelihood opportunities for refugees can be very limited in humanitarian contexts, reducing the purchasing power of the user.	Subsidy may be the only solution to ensure sustainable market, while CBI shall be considered for the most vulnerable.

CASE STUDY: ENERGY KIOSK SELLS LIGHTING ITEMS – UGANDA

In 2019 in Rhino Camp refugee settlement (Uganda) UNHCR in partnership with GIZ, through the program Energy Solutions in Displacement Settings (ESDS) constructed two energy kiosks, powered through solar energy, offering various services and selling a variety of energy items like solar lamps and SHS. Each of these kiosks is run by local refugee and host community associations counting 10 to 15 members, benefitting a community of approximately 35,000 individuals.

Currently the Energy Kiosks have improved the community's market with a wide range of high-quality solar lanterns, plug-and-play home solar systems and improved cook stoves. Also, a set of on-the-job trainings in record keeping and marketing, after-sales services, basic repairs and maintaining devices has provided added skillsets within the refugee population. The energy kiosk team members are offering purchases through instalments for items with initially high investments, such as solar home systems and more fuel- efficient cook stoves.

From May 2021, the energy kiosks have sold 377 solar home systems and solar lanterns to refugees and host community members and provided 1,337 services to customers including after-sales services and training. The daily charging capacity for phone increased from 20, before the installation of energy kiosks, to 200 as the energy kiosk are powered by a solar system themselves.

ESDS project launched Energy kiosks in the Rhino Camp Refugee Settlement in Northern Uganda.
linking several economic activities linked with the aim is to empower them economically. © GIZ/Uganda

Public lighting – Solar streetlights

SSLs are typically procured and installed by the organization to alleviate safety and security risks because of the high cost of the units or the need for international procurement.

Intervention	Benefits	Challenges	Considerations
In-kind provision	Unsafe and dark areas in the community can be lit, increasing safety and security during dark-time activities (outdoor movements, working, use of WASH facilities, social life, etc.)	Funds are often available for the procurement and installation but not for their maintenance. Spare parts can be too expensive or difficult to procure for the community (e.g., if they are available only internationally)	Community involvement during the installation, monitoring and maintenance of the units is essential for the sustainability of solar streetlights.

CASE STUDY: SSLs WITH COMMUNITY OWNERSHIP – RWANDA

Since 2017, UNHCR has installed solar streetlights (SSLs) in refugee locations to improve the feeling of safety when moving around after dark. These complement the individual solar lamps and provide lighting of public spaces. The SSL and spare parts were imported from Europe. Together with the camp community through a participatory and Safety Map Exercise, the priority areas were identified, and the right size of lighting option was selected. The single light SSL costs EUR 1,159 and a larger double light system amounts to EUR 1,595.

To ensure the sustainability of the units after installation, the supplier trained 17 camp residents to keep them operational and allow for easy on-site troubleshooting. The local community reports the malfunctioning lights to the technicians, who then provide the maintenance and repair. Several spare parts were kept at a storage location in the country to allow for timely replacement. A Solar Streetlight Board is made up of six community members which organizes advertising at the lighting locations as a source of income into a community fund. The fund is operational and being tested as a mechanism to collect funds for the payment of the technicians, for the purchase of spare parts and for the potential replacement of the SSL beyond the project duration.

Installation of streetlights powered by solar energy has improved security at night and enabled businesses to operate for longer hours. © UNHCR/Eric Didier Karinganire

Community participation and stakeholders' commitment

It is important that the community participates actively and can build ownership even during the implementation phase. Women's engagement from the beginning and throughout the intervention must be encouraged as it will create a well-coordinated consultation among all stakeholders.

To increase active community participation during the implementation phase and build ownership:

▶ Ensure that women and men of all ages, persons with specific needs, minority, and marginalised groups, etc. receive information on the programme and are given opportunities to steer the programme

▶ Share assessment results with all relevant actors making sure that they are reflected in the design and objectives of the programme

▶ Maximise local skills and capacities and not to undermine people's own coping strategies if these do not have negative effects on their protection, wellbeing, and the environment

▶ Provide the community with workshops on securing and maintaining lighting equipment

▶ For SSL, consider the creation of community lighting infrastructure committees, establishing criteria for all committees on female participation (i.e., 50%) as well as the one of persons with specific needs

▶ If vandalism against SSL or SHS is an issue, establish community watch groups in night patrols to secure lights

▶ Consider user-friendly tools that can be easily utilised by all

▶ Target outreach to gather input from all groups, throughout the whole process

To achieve **maximum coordination** and delivery of effective protection, assistance, and solutions to the people under UNHCR's mandate, including in lighting programs:

▶ Carry out an open design process that engages a 'whole-of-society' pool of stakeholders. It is essential to review and analyze the roles, expectations, and commitment of the different stakeholders to maximize synergies. A Standard Operating Procedure (SOP) can be developed, to provide a guide for the implementation for different stakeholders involved in the distribution of solar lanterns and streetlights to refugees. See Ethiopia example of lighting solution SOP.

▶ Conduct a review on what the potential funding resources might be (i.e., regular internal resources, earmarked funding and donor-driven resources, partners with available funding and resources, other available funding sources).

▶ Consider in depth the context-specific risks and the possible mitigation actions for the identified interventions. An example table is below.

Initiative	Risk assessment	Likelihood	Risk mitigation
Solar lantern distribution **Disclaimer** This example is provided only for explicative purposes: the risk, likelihood, and mitigation vary from context to context	Low quality of the product	Low	Each product, locally or internationally procured, must be certified by an accredited body, and show compliances with minimum quality standards
	Low acceptance of the product	Medium	Carry out extensive assessments, participatory assessment and involve the community in the selection of the product
	Spare parts are not available, and solar lanterns are out of use after a short time	High	Carry out a market assessment and supply chain analysis before choosing a specific option. Consider the Extended Producer Responsibility (EPR)
	Free distribution interferes with and potentially damages the local energy businesses	Very High	Check for local opportunity to procure the solar lanterns and, when possible, encourage CBI
Solar Streetlights Installation **Disclaimer** This example is provided only for explicative purposes: the risk, likelihood, and mitigation vary from context to context	Low quality of the product	Low	Each product, locally or internationally procured, must be certified by an accredited body, and show compliances with international quality standards
	Spare parts are not available, and SSL are out of use after a short time	High	Carry out a market assessment and supply chain analysis before choosing a specific option.
	The community is not able to sustain the maintenance of the units	Very High	Provide training to local technician and include additional spare parts during the initial procurement.

Procurement

In the **procurement process,** ensure that all the materials, components and equipment are appropriate for the context and comply with all applicable standards and regulations depending on the type of technology, the task performed, and the country of implementation.

▶ For **solar lamps and SHSs** with power ratings less than or equal to 350 W, IEC TS 62257-9-8 provides baseline requirements for quality, durability, and performance[3].

▶ For **streetlights** and related equipment, the standard guideline EN13201 provides the basis for lighting quality including technical requirements, calculations, and methods of measuring lighting performance. Each component of the unit should be international standard IEC accredited laboratory for quality, safety, and performance (e.g., IEC 61215 for design, IEC 61730 for safety, and IEC 61701 for durability of PV panels).

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3 The 'Certified Solar Product database' developed by Verasol, confirm whether a solar energy kit meets the Lighting Global Quality Standards or the quality standards in IEC TS 62257-9-8.

When starting the procurement phase and launching the tendering process, it is important to describe what the purpose of the lighting intervention or system is, what the products will be used for, and where they will be located. It is necessary to specify the project's location so that potential suppliers may suggest suitable products for the site circumstances. Provide a clear, detailed, and quantitative description of what is being sought. The UNHCR Supply Management Manual provides more in-depth explanations.

It is advised to explore local, regional, or cross border markets on availability of lighting devices and after-sales service. Finding local solutions will ensure availability of technical expertise, including ease of availing service and parts which fall under warranty, and positive environmental outcomes by reduced transport-related carbon emissions. On the contrary, if a long-term agreement (LTA) covers the devices needed for the identified solution, the procurement process can be faster as the suppliers are already identified, and the products follow technical specification and are compliant with minimum standards. The UNHCR Supply Management Service (SMS) will be able to guide through existing LTAs and the procurement procedures.

Technical specifications of lighting devices should also follow international standards in terms of electrical health and safety. Transport, distribution, storage, and handling of lighting devices should follow environmental considerations to preserve the health of the beneficiaries and surrounding communities[4]. Training and capacity building of refugees and IDPs on lighting device use and maintenance shall be included in the request for proposal.

All lighting solutions should include provision for testing and inspecting components, products, and services before, during, and after the delivery to ensure compliance with the specifications and designs. This should be taken into consideration during the contractual agreement preparation.

Operation & Maintenance

The supplier & installer/manufacturer shall provide operation and maintenance (O&M) programmes, manuals, and capacity building / training to ensure full sustainability of the lighting intervention. This part should be agreed upon and stated in the contract, as additional resources may be considered.

Basic notes on maintenance:

1. **Regular and timely maintenance** of all lighting equipment is essential to prolong the durability of the device.

2. **Routine maintenance,** as well as major overhauls and replacement, need to be planned and budgeted for in advance. Spare parts, market availability and supply chain will play a big part in the maintenance capacity

3. **Lack of maintenance ultimately will have a negative impact** and lead to under performance and substantial costs in the future

4. **Safety of lighting devices is intrinsically linked to regular O&M** hence this is a key element to consider, and train beneficiaries on. Unexpected design faults, user unfamiliarity, and significant modifications in the use of the device can potentially contribute to an increased risk of injury to the individual and the family. Therefore, it is fundamental for a quality lighting program to provide training to the users and to include a regular maintenance routine.

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4   Other positive environmental practices in procurement also include having suppliers with ISO 14001 environmental management certification (or equivalent standards on sustainability), to use more sustainable materials and have end of life solutions in place for the items they are procuring

Regular maintenance is worth the cost. Programmes should ensure there will be a commitment to service regularly the lighting devices or to develop an after-distribution (post-sale) service. Training of local personnel in the maintenance of the lighting devices is crucial to ensure sustainability of the lighting access project. The online Operation and Maintenance Plan for Solar PV Systems – Pico Solar Devices, Solar Home Systems and Solar streetlights – can help to plan and budget for it.

Safety considerations

Electrical hazard is a major concern as all electrical systems and appliances have the potential to cause harm from shock, burns, fire and even explosions.

Electrical Hazards

Shock: A response to electric current passing through the body.

Arc Flash/Blast: Emits heat and intense light that causes burns.

Fire: Occurs with faulty outlets, old wiring, cords, and switches.

Explosions: When electricity ignites explosive material in the air.

Some of the typical causes of electrical hazards:

▶ Overloading of electrical outlet or extension cables can cause them to overheat and short out and can become an electrical fire hazard.

▶ Heat, water, and oil nearby an electric wire can damage the insulation and cause a shock.

▶ Water and electricity shall never be mixed. To follow electrical safety rules, keep electrical equipment dry and away from water as this prevents damage to appliances and can protect against personal injury and electrocution (e.g., the electrical parts of the streetlights must be protected from atmospheric agents by placing them in a waterproof casing).

▶ Damaged power cords can cause both fires and electrocution. All power and extension cords should be checked regularly for signs of fraying and cracking, and they should then be repaired or replaced as needed.

▶ Batteries can explode when directly connected to the solar panel without charger controller or if exposed to high temperature (e.g., left under the direct exposure to sun light in hot climate).

▶ Vehicles passing over unprotected extension cords could damage them. Extension cords should be put in protective wireway, conduit, pipe or protected by placing planks alongside them.

To prevent, mitigate and reduce exposure to electrical risks, it is essential to respect minimum standards of settlement and shelter and follow best practices for the provision of safe and secure living conditions for

households. These goals cannot be achieved in isolation and require the engagement of a multi-functional team (from Shelter and Settlement, WASH, Energy and Environment, Protection, CCCM, Health, etc.), as well as consultation with local authorities. Some considerations are:

▶ All electrical installations should be undertaken by qualified personnel and regularly certified for safety.

▶ Fence off power generation systems and limit access to authorised personnel only. If solar photovoltaic systems are employed, ensure that fences do not shade the panels.

▶ Important considerations related to **fire hazard** are also linked to shelter[5]. Inside a shelter, greater safety and protection from the electrical wiring can be achieved, for example, by providing well insulated and proper wiring connection, keeping them away from water or fuel storages.

▶ Domestic and community preparedness should be in place from the start of the implementation such as awareness-raising activities, training, guidance, and fire-fighting equipment such as sand buckets and fire extinguishers, and evacuation plans.

End-User Training

Ensuring a correct use, including storing, cleaning, and maintenance, of the lighting technologies is important to maximize their benefits, longevity, and safe use. Often the need for end-user training is underestimated, with detrimental impacts on programs' effectiveness but also with potential risks for the safety of beneficiaries. Training programs which address key topics on operation, maintenance, and safety should always accompany the lighting technology. Training must be delivered in accordance with UNHCR's principle and practices of inclusion and community participation. Some core training topics related to lighting interventions are:

▶ **Safe use of lighting devices.** There are major risks associated with electricity (see paragraph on safety) with potential risk of electrocution and fire hazard. Extensive training on this matter should be given to households.

▶ **Safe storage** for batteries. The training materials and program should include practices for the safe handling and storage of batteries.

▶ **How to use the lighting technology** effectively (e.g., energy saving practices) **and what not to do** (e.g., alter or overload devices).

▶ **How to clean, maintain**, and, where possible, **repair** the lighting devices. In the case of streetlights, also a training on how to **install** the units can be considered.

▶ **Promote environmental conservation** by building awareness on the importance of ecosystem roles and the role on recycling- repair-reuse and proper disposal of e-waste, especially concerned to batteries containing toxic additives or hazardous substances

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5   https://reliefweb.int/report/world/shelter-and-sustainability

Monitoring

Monitoring of the lighting programme provides updates on the progress of the intervention and allows the identification of appropriate corrective actions where the performance deviates from the initial plan.

Programme monitoring shall be continuous and with the close involvement of both technical and protection experts. Other aspects that can be monitored beyond lighting and protection areas, are on environment, WASH, education, and livelihood impacts. However, they should also leave room to capture unintended consequences, both positive and negative, and other specific contextual and operational external factors.

The process should include people under UNHCR's mandate and other stakeholders directly or indirectly impacted by the programme. This is important to allow for different perspectives and building ownership and commitment for follow up actions and resolutions. Focus group discussions, key informant interviews, and household surveys can also be utilized during the monitoring process, following the process highlighted in the assessment phase.

Lighting programmes require relevant and context-specific indicators to measure specific results and potentially support further collaboration, advocacy, and fundraising. Each indicator requires clear measurement criteria and a monitoring/data collection plan, stating who will collect the data (e.g., UNHCR personnel, partners, or third-party monitoring), the periodicity of monitoring (e.g., quarterly, annually) and if appropriate the budget to perform data collection, analysis and report writing.

A. Use rigorous monitoring tools and indicators to collect comprehensive information on outcomes and exposure to protection risks

B. Determine if programme results are achieved effectively and efficiently

C. Determine the extent of programme sustainability and scale-up

D. Recommend changes and updates for improvement

E. Determine if the programme is still relevant for the current situation

Standardization of progress measurement of different lighting interventions will ensure the creation of a comparable set of data and determine the most effective delivery option adopted for a specific context. Whenever appropriate, the following indicators can be used, as included in the UNHCR Results-based Management System (COMPASS), to ensure consistent and comparable monitoring across our interventions.

Level of Results	Results Area	Indicator
Output	8. Well-Being and Basic Needs	▶ GOOD PRACTICE INDICATOR: # of POC receiving CRI (including solar lanterns) ▶ GOOD PRACTICE INDICATOR: # of POC receiving CBI (including lighting needs)
Outcome	9. Sustainable Housing and Settlements	▶ CORE INDICATORS: % of PoC that have energy to ensure lighting ▶ GOOD PRACTICE INDICATOR: % of area with street or public lights

A set of indicators related to lighting can also be found in the UNHCR Global Strategy for Sustainable Energy – Output 3 on Access to basic lighting and connectivity:

▶ # of active lighting and connectivity access projects

▶ # of livelihoods projects that are linked to lighting and connectivity access

More references related to lighting access indicators are in Annex 7.3.

> There is the tendency to collect more data than required. This is a waste of time and resources, and it can be a burden for the community. To reduce the risk of wasteful data collection fatigue, ensure that the purpose and intended use for each indicator is clear. Ensure alignment with other sectors' (e.g., CBI, WASH or NFI sector) data collection processes related to access to lighting.

Annexes

7.1. Annex 1 – Connection between illumination and some common task

The lighting standard, *EN 12464 Light and Lighting – Lighting of workplaces – Indoor workplaces,* addresses the following definitions:

▶ **Illuminance** or light level is the total luminous flux incident on a surface per unit area. Illuminance is measured in lux[6].

▶ **The activity area** is where the most important tasks in the room or space are performed.

The amount of daylight varies throughout the day depending on local climatic conditions. In addition, inside a house/room with side windows the available daylight decreases rapidly with the distance from the window. Supplementary lighting may be needed to ensure the required illuminance levels are achieved and to balance the illuminance distribution within the room.

Lighting usage may be divided into three categories:

▶ **Ambient lighting** – provides security, safety, and general lighting for performing day-to-day activities.

▶ **Task lighting** – provides adequate illumination for accurate completion of tasks, like studying, cooking, sewing, etc…

▶ **Accent lighting** – illuminates walls to blend more closely with naturally bright areas like ceilings and windows.

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6   One lux is one lumen per square meter. While a lumen is a measure of the total quantity of visible light emitted by a source per unit of time.

In the table below some activity areas are reported. The illuminance is taken from the Light and Lighting Standards to be used as a reference.

Table 3: Recommended light levels – illuminance – for some types of working activities (EN 12464 Light and Lighting Standard)

Activity area	Illuminance (lx, lumen/m²)
Public areas with dark surroundings	20 – 50
Simple orientation in the shelter	50 – 100
Working areas where visual tasks are only occasionally performed	100 – 150
Washrooms, toilets	150
Control/guard points in communal facilities (e.g., health centres and schools)	150
Household dining/living rooms	200
Classrooms, reading room	300
General vehicle services, repair, and testing	400
Internet points, communal kitchens, hairdressing	500
Sewing station, mobile phone reparation	750 – 1,000
Electronic workshops	1,000 – 1,500

7.2. Annex 2 – Samples of lighting assessment questionnaires

This Annex provides a sample of questionnaires specifically related to energy issues, according to the UNHCR Tool for Participatory Assessment in Operations, specifically Part III, Step 5, "Facilitating discussions" for the proper preparation, facilitation, and permission to conduct an assessment. There may be individuals with specific needs (e.g., pregnant women, single parents, persons with disabilities/reduced mobility) that require assertive outreach to ensure their participation. It is recommended that participants be grouped by the same gender and/or age groups. For children, similar groupings are recommended based on age (and/or maturity) and/or gender, and should also take into account any special considerations (younger children, children with disabilities, and/or from socially excluded groups).

The following samples provides some guidance to discuss lighting access. The text and the following questions can be adapted to the context and specific situation where the discussion is conducted. External existing literature[7] can also be consulted.

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7   For some examples refer to Toolbox for Energy Assessments in Refugee Settlements and Host Communities (Uganda 2019) https://data2.unhcr.org/en/documents/download/69807 and Inclusive Energy Access Handbook https://www.womensrefugeecommission.org/wp-content/uploads/2020/10/Inclusive-Energy-Access-Handbook-2020.pdf.

Sample focus group discussion introductory text and questions

Welcome and thank you very much for your time. I am .... and I work with.................. I am here to gather information about your views and experiences regarding lighting and connectivity in your household or your community.

I would like to ask your permission to interview you about lighting issues including the type of source for lighting used by communities here, the challenges faced in obtaining and using this type of lighting device, and your ideas about how to improve safe access to it. I will use the information that you share with me to provide recommendations.

Thank you for your voluntary participation. Please feel free to answer only the questions you are comfortable with or leave at any time. Any information that we gather in this discussion will be confidential unless you expressly request or allow us to use your name or photograph. Please do not share any personal incidents of harm and if you wish to speak with someone or to receive support about such an incident afterwards, this can be facilitated. I expect our talk to last about [length of time]. Do you have any questions? Do I have your permission to begin?

A. Lighting access

▶ Do you have access to lighting inside the household?

▶ How do you light up your house during dark hours?

▶ If yes, how many hours per day do you have lighting? If not, what do you do to cope?

▶ Do you use a lighting device to walk outside during dark hours (solar lamps, mobile phones, candles, etc...?

▶ Does your community have streetlights?

▶ How many lighting devices/sources do you have?

▶ How many hours do you use this lighting device/source per day?

▶ Do you face any challenges in obtaining lighting access for your needs (e.g., cost, availability of the device/source, ...)?

▶ Do you use the same lighting device to power also other appliances (e.g., mobile phones)?

▶ Do you use the same mean of lighting also for cooking (e.g., firewood, electricity, ...)?

▶ What is the main source of lighting that the children usually use for studying?

▶ How do you pay for your lighting devices and/or your electricity bills? What payment system do you use?

▶ How much do you spend in average for lighting per month?

▶ How many mobile phones do an average household own in total? How do you charge it/them?

B. Protection

Perceptions of safety incidents should not be probed for details and participants should be reminded to maintain confidentiality and not disclose identifying information. Consult the protection/gender-based violence specialist prior to arranging the consultations and discretely refer to them anyone in need of support or services afterward.

- ▶ Which are the critical areas where lighting is missing?

- ▶ Do you have enough light to feel safe inside your home at night?

- ▶ Do you have enough light to feel safe outside your home at night?

- ▶ Are communal areas well lit?

  - ▷ toilets Y/N

  - ▷ showers/bathing facilities Y/N

  - ▷ water points Y/N

  - ▷ health posts Y/N

  - ▷ markets Y/N

  - ▷ other services

- ▶ Are there critical areas where you live (either inside the settlement or your home) where lighting is missing, that you'd like to see lit also during dark hours? Use Safety Mapping Exercise

- ▶ Are you aware of any risk women and girls in the community face due to lack of lighting? Or, by faulty lighting devices?

- ▶ If an incident connected to a lighting device occurs, do you know where to receive help and services?

C. Income generation

- ▶ Are you running any income-generating activity in the evening thanks to light?

- ▶ Are additional appliances connected to the lighting device used for income-generating activities (e.g., a TV for entertainment services)?

- ▶ How much money is earned by having access to lighting?

- ▶ Could women participate in safer, more productive activities if they had better access to lighting? If so, how?

D. Energy Market

- ▶ Are lighting devices for sale at the local market? If yes, which types and how much they cost?

- ▶ Can you afford any of them? If yes, which one?

- ▶ What does the community in your location do to obtain adequate supplies of lighting?

E. Other

- ▶ If you have a rechargeable and disposable batteries, where do you dispose it? And how about the solar lantern, mobile phone, etc.?

- ▶ If your lighting device is broken, can you repair it? How do you repair it, by yourself or via a shop, or any other alternative?

- ▶ In terms of lighting access, what would you need to improve your needs?

I want to thank you for your participation today. The information you provided is very valuable to this project and gives feedback to the organizations working here. Is there anything else you would like to tell me that I have not asked you related to access to lighting?
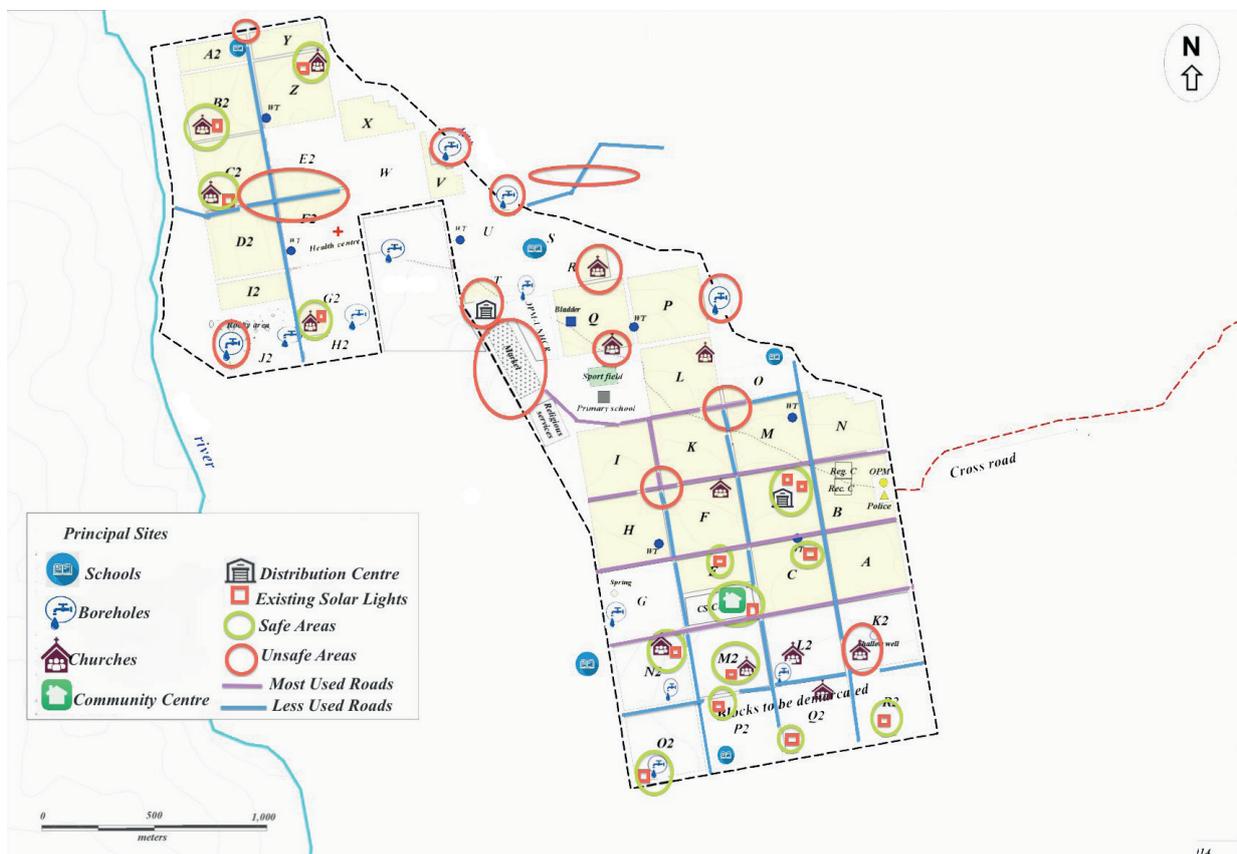
SAFETY MAPPING EXERCISE

The Safety Mapping Exercise is a participatory research method through which participants use creative thinking and a concrete approach to communicate information about their safety and security during dark-time activities (outdoor movements, studying, working, use of WASH facility like toilets, etc.).

During this exercise the participants use a map to visually pinpoint their communities, highlight safe and unsafe locations, describe what determines safety, and discuss how safety of different locations is perceived.

Trained UNHCR personnel and partners should employ this exercise to identify risks and unsafe areas with focus group participants and consider movements both inside and outside the camp to include typically visited locations.

It is also important to holistically assess the entire activity paths and not only focus on strategic spots, to ensure the intervention does not shift the problem to a different geographical location instead of mitigating the overall risk.

Mapping findings should be shared with camp management, shelter, protection personnel, and the authorities and policing structure where appropriate, so that programming can be adapted as needed.

Example of Safety mapping exercise, with highlighted safe and unsafe areas, most and less used roads and principal community facilities. © UNHCR

Sample of key informant interview guide

Some important information on lighting related needs could be found interviewing community leaders, partner staff, sectors members and government counterpart as illustrated below.

Sector	Cross-cutting topics related to lighting energy
Protection and gender-based violence	Information on protection and GBV risks related to lack of lighting access and on gender roles and responsibilities related to lighting, associated protection concerns and how they differ for women, girls, boys, and men
Environment	Information on availability of and access to lighting energy related environmental challenges and end-of-life arrangements (e.g., e-waste)
WASH	Information on safe access to toilets at night and other related facilities (e.g., bathing spaces, tap stands, washing points, etc.) and relevant programs and interventions
Shelter	Information of the safety and minimum requirements of the shelter to install lighting devices
Education	Information about school attendance and learning outcomes that can be related to lighting issues (e.g., no light to study at home).
Livelihoods	Information on buying/selling and availability of lighting devices, and possibility of income-generating activities connected to lighting devices

This KII guide is a sample and should be adapted based on the profile of the interviewee and context.

▶ Could you please give your title and your role within your community/organisation?

▶ Can you describe the challenges related to lighting access you know of?

▶ Are communities in and around your location able to safely access adequate lighting for their household needs? If not, why not?

▶ Which are the critical areas where lighting is missing?

▶ What does the community in your location do to obtain adequate supplies of lighting?

▶ Is there a market for selling/procuring lighting sources?

▶ How are the needs and challenges different for the refugees vis-a-vis the host community?

▶ Could women participate in safer, more productive activities if they had better access to lighting? If so, how?

▶ Does lighting affect children's ability to attend school – either travelling to and from school, or being present in school buildings? If so, how? Does it impact their ability to do homework? If so, how?

▶ What else is needed to ensure that communities in your location can safely and sustainably meet their lighting needs?

▶ Is there anything else that you would like to share with me?

Direct observation guide

Before starting, consider the safety and security of staff and the communities in locations where and time when direct observation is proposed (preferably after the sunset), since this may pose a challenge to perform direct observation. Through direct observation the following questions should be answered:

▶ Is there light available at night in public spaces? If yes, is it functioning and is it powered every night?

▶ Are communal areas well lit?

  ▷ toilets Y/N

  ▷ showers Y/N

  ▷ water points Y/N

  ▷ health posts Y/N

  ▷ markets Y/N

  ▷ other services

▶ What do people, especially women and girls, use as a source of lighting at night to walk outside their shelter? Flashlights, solar lights, phones, etc.

▶ How are people meeting their lighting needs inside the households?

▶ What types of lighting device/source are in and around households?

▶ Are three-stone fires also being used as a source of lighting?

▶ Where firewood is also source of lighting, are people collecting firewood? If yes, who and where? Are children collecting firewood?

▶ Are people selling/trading kerosene, solar lanterns and/or other lighting devices?

▶ Are there e-waste disposal areas (e.g., for batteries or solar lanterns) in the vicinity of the settlement?

▶ Do observations align with reports during interviews and focus group discussions? If not, what differences and discrepancies do you observe?

▶ Other comments: include any other observations, including those related to movements and the activities of women and girls

7.3. Annex 3 – Indicators related to lighting access

A list of the most commonly used indicators for lighting that can be used either in the assessment or monitoring phase:

Indicator	Assessment	Monitoring
Average HH expenditure on lighting per household per month	X	X
# of refugees and IDP employed in repair and maintenance of lighting devices and systems	X	X
# of refugees and IDP employed in activities connected to lighting access	X	X
# and size of solar PV systems at the HH level	X	X
% of outdoor areas with street or public lights	X	X
% of toilets that have adequate lighting	X	X
% of people who report a positive change in their perception of feeling safe at night through lighting assistance		X
# of distributed solar lanterns (annually)		X
# of Solar Home System (SHS) distributed (annually)		X
% of refugees and IDP receiving items for lighting		X
# of Solar Streetlights (SSL) installed (annually)		X
# of Solar Home System (SHS) sold on a monthly basis with the market-based modality		X
# of refugees and IDP receiving cash based assistance for lighting equipment		X
% of refugees and IDP participating in vocational training program related to lighting access		X
# of lighting devices repaired or recycled on a monthly basis		X
# refugees and IDP employed/generating income from activities related to access to lighting on annual basis		X

Where possible, indicators should be disaggregated by gender or age (e.g % of people disaggregated by age and gender who report a positive change in their perception of feeling safe at night through lighting assistance, % of refugees and IDP disaggregated by age and gender receiving items for lighting, % of refugees and IDP disaggregated by age and gender participating in vocational training program related to lighting access, #refugees and IDP disaggregated by age and gender employed/generating income from activities related to access to lighting on annual basis etc).

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