TERMS OF REFERENCE FOR INDIVIDUAL CONSULTANTS AND CONTRACTORS

Title	Funding Code	Type of engagement	Duty Station:
Renewable energy (Solar) market assessment for UNICEF's key sectors (health and education with related WASH support to education and health services) in Sierra Leone	GS200005 (HQ Climate Change Funds)	☒ Consultant ☐ Individual Contractor Part-Time ☐ Individual Contractor Full-Time	Home based remote work with mission travel(s) (to Sierra Leone and local travels for site assessments)

Purpose of Activity/Assignment:

Background

UNICEF has integrated sustainable and disaster-resilient systems for responding to natural risks, climate change and disasters into its key programmatic sectors such as health, education and Water Sanitation and Hygiene (WASH) with environmentally sound, low-carbon, and climate-smart technologies. In contribution to the UNICEF Strategic Plan 2022-2025, UNICEF Sierra Leone Country Office is committed to scaling up sustainable energy integration in priority programme areas (e.g., Health, Education and related WASH interventions) with the goal of promoting positive social benefits for children and young people.

Access to energy for lighting, cooking, heating, digital services and powering appliances at the level of households as well as key public institutions, such as health facilities and schools, are central to the socio-economic development and human capital of a country. Although significant progress has been made towards ensuring access to modern energy worldwide, Sub-Saharan Africa has the highest population without electricity and relies on polluting solid fuels, especially in rural areas. Even if communities are connected to the national grid, in the rural areas it is often unreliable with frequent power outages. These conditions, in particular lack of electricity or frequent outages affect health facilities, schools and related WASH services.

Positive correlations between electricity access and health outcomes have been demonstrated during routine maternal, newborn and child health services and emergencies. The interruption in availability of electricity is a bottleneck in using life-saving equipment especially for newborns and children which has resulted in many preventable deaths. Similarly, during the COVID-19 pandemic, electricity in health facilities is critical to treat patients and operate vital, lifesaving medical devices to manage cases. Health facilities with un-interrupted, stable and suitable electricity supply are expected to have a higher performance in delivering health services. Besides enabling a proper cold chain and improving diagnostic and curative services, the availability of reliable electricity leads to a better administration of the health facilities and supports the access to better communication channels and data management.

Similarly, remote learning and technology-based solutions that support continuous learning also rely on access to electricity, especially in rural areas. The COVID-19 pandemic necessitated distance and remote learning as many schools were closed for approximately six months. Access to sustainable energy also supports conventional education, especially in rural areas, by enabling access to lighting, proper WASH facilities, and internet connectivity.

Access to reliable electricity in health facilities and schools is therefore an important enabler of quality health, education and related WASH services and is necessary to meet the Sustainable Development Goals (SDGs) in energy, health, education, and WASH.

Despite its importance, access to reliable and affordable electricity is often overlooked as a building block of quality health, education and related WASH services. Some of the solutions to increase energy access in health and education facilities include extending the grid network or connecting to decentralized solutions such as mini-grids or stand-alone solar Photovoltaics (PV) systems. Decentralized solar energy solutions are promising options that can also simultaneously transform the sectors to a low carbon and climate resilient development pathway. This is a powerful benefit to children and young people in the face of a changing climate and degrading environment.

There are limitations, however, in the form of limited data and market information on a granular (national and sub-national) level to understand the access gap, the demand for solar energy based on type and size of health and education facilities, the cost of providing electricity, willingness to pay, the most appropriate delivery models and best sustainability measures including long-term operations and maintenance (O&M) which is a major challenge. These include recent energy technologies and service delivery innovations, and financing services to ensure sustainability.

Situation in the Health and Education Sectors in Sierra Leone

Health Sector

The Health system in Sierra Leone consists of primary, secondary, and tertiary level health service delivery. Primary health care facilities are referred to as Peripheral Health Units (PHUs). There are three levels of PHUs which are recognized and standardized: Maternal and Child Health Post (MCHP), Community Health Post (CHP), and Community Health Centre (CHC). Secondary care is delivered in district hospitals. District hospitals receive referrals from primary care facilities and accept walk-in patients directly. Regional hospitals provide further specialized care and accept referrals of complicated cases that cannot be managed at the district hospital. A total of 1,210 health facilities are in Sierra Leone, including 26 government hospitals, 233 CHCs, 319 CHPs, and 632 MCHPs.[1]

Sierra Leone has a limited number of Tertiary hospitals (all located in the capital, Freetown). These tertiary facilities are Connaught Hospital, Ola During Children's Hospital, Princess Christian Maternity Hospital, Lakka, Kissy Mental Hospital, and Jui.

In Sierra Leone, hospitals and periphery health facilities do not have continuous 24-hour electricity. Findings from UNICEF Sierra Leone's comprehensive needs assessment[2] for the maternal, new-born and child health services provided in the 16 Tertiary, Regional and district hospitals in the process of establishing Special Care Baby Units (SCBU) shows that 44% of 16 hospitals have EDSA access (national electrical grid) but no continuous and regular supply. Only 10 sites have solar system, but capacity is limited only for light bulbs, and is not sufficient. Although all 16 hospitals have generators of various capacities, there is no continuous power due to a lack of fuel for generators. After the findings of the needs assessment were disseminated, all 16 SCBUs were provided a 10 kVA generator to ensure 24-hour electricity for the life-saving machines (e.g. incubators, oxygen concentrators, warmers, resuscitation table with warmers, infusion and syringe pumps, phototherapy machines etc.). Nevertheless, due to insufficient funding for fuel, it has been difficult to maintain 24 hours of electricity for the SCBUs and other critical areas of the hospital.

[1] Basic Package of Essential Health Services, 2015.

[2] Assessing the availability of 24 hours electricity and proper WASH facilities in the hospitals was one of the major components of the assessment.

The availability of reliable access to electricity is pivotal for hospitals which serve as referral sites and have many departments that require electrical equipment. As noted, most of the health facilities- community health centers and outreach services- have few electrical equipment except the Expanded Programme for Immunisation (EPI) freezers which use a solar system. As per the National Basic Package of Essential Health Services, the PHUs are required to provide essential maternal, new-born and child health which would include delivery, lab tests and immunizations which require electricity to run the needed equipment.

Education Sector

Sierra Leone is ranked 182 out of 189 on the 2020 Human Development Index, with 60% of the population living in poverty, and only one in three children born in Sierra Leone expected to realize his/her full economic and personal potential.[3] With over half the population in Sierra Leone of school age, there is intense pressure on the education sector to deliver quality education to over four million children.[4]

The Government of Sierra Leone has prioritised education as the key to development with the launch of the Free Quality School Education (FQSE) programme in August 2018, committing 21% of the national budget to education. Since this launch, there has been significant progress made in access with an estimated 30% increase in enrolment across all grade levels. Nevertheless, there remain many challenges in the education sector in terms of both quality and access. Approximately 20% of school aged children are out of school[5], at risk of dropping out or not benefiting from schooling. Many of these children live in remote rural communities where there are no schools or schools are yet to be approved by the government to qualify for the FQSE programme and related school subsidies. Furthermore, due to high and persistent levels of poverty, parents are unable to pay the direct and indirect costs of education even with the FQSE programmes which provides school subsidies (waiving school fees), core textbooks and cover national examination costs.

Although there is gender parity throughout up to junior secondary level, there are disparities amongst girls and boys as they move from junior to senior secondary education and to the workforce. Retention, completion, and transition rates are persistently lower for girls especially those from the poorest households.[6] Additionally more than 40% of primary school teachers are untrained and/or unqualified[7] which impacts the quality of education.

The question of education quality and education system management, particularly in terms of data, is also an important issue, partly in connection with the low qualification of teachers, and insufficient teaching and learning materials and a lack of amenities (WASH facilities[8], access to electricity, and internet, etc.), which enable children and young people to acquire basic skills such as reading, writing and maths.

A total of 11,034 schools are in Sierra Leone, including 1,756 pre-primary schools, 7,020 primary schools, 1,600 junior secondary schools (JSS), and 658 senior secondary schools (SSS). The electrification of these schools remains very low with the majority of schools not having access to electricity (63% of pre-primary, 86% of primary, 64% of JSS and 45% of SSS do not have electricity).[9] For the schools that have access to electricity,

[3] World Bank 2018: The Human Capital Project in Education Sector analysis, Republic of Sierra Leone, IILP UNESCO Dakar 2020.
[4] 4.1 million children and youth representing 52% of the total population, Education Sector Analysis of the Republic of Sierra Leone, Assessing the enabling environment for gender equality, Republic of Sierra Leone, UNICEF, IIEP-UNESCO Dakar 2020.
[5] Around 22% of 6-18 years old children are out of school. Sierra Leone Integrated Household Survey (SLIHS), 2018.
[6] Education Sector analysis, Republic of Sierra Leone, IILP UNESCO Dakar 2020.
[7] https://borgenproject.org/education-sierra-leone/
[8] The Annual School Census (ASC) Report (2020) highlights the 33.7% of learners enrolled in schools that have no access to water facility.
[9] The Annual School Census (ASC) Report (2020), Ministry of Basic and Senior Secondary Education.

most reported that the main source of electricity is the national grid (compared to generator and solar). The highest percentage of schools that do not have access to electricity are in mostly rural areas.[10]

Energy Access

Only 15% of the total population and only about 2.5% of the rural population currently have access to electricity in Sierra Leone. The power sector is small, with less than 150 megawatts (MW) of energy capacity connecting less than 150,000 customers with the cost for electricity heavily subsidized. The entire country lacks a stable and reliable public power supply and domestic demand remains significantly unmet.[11] The access rate to electricity is below the Sub-Saharan average of 30% and this access is mostly confined to the capital city, Freetown.[12]

The gap in infrastructure is not only impacting people's welfare and ability to access services, but also severely impeding on competitiveness, job creation and poverty reduction. Limited access to electricity and an unreliable grid has led to the use of diesel generators for domestic, public, and commercial purposes especially in the towns outside the capital city. The Sierra Leone Opportunities for Business Action (SOBA) programme estimated an on- and off-grid addressable market of about 500,000 households; with typical willingness to pay of around $2 per month for electricity. It is estimated that 47% of these households currently use diesel generators. Solar products enjoy tax exemptions of up to 25% import duty and 15% sales tax.[13]

The Government of Sierra Leone aims to increase energy access from the 15% in 2020 to 80% by 2030. Sierra Leone, like many countries across sub-Saharan Africa, is also keen on increasing the share of sustainable energy, including solar, in the national energy mix. One of the ongoing programmes that the Government is undertaking with partners include the Rural Renewable Energy Project (RREP, from October 2016 to May 2022), has reached 104 schools and 54 Community Health Centers with off-grid renewable energy solutions as of June 2021.[14] According to the country's Energy Sector Roadmap (2018-2030), coordination between the Ministry of Energy, development partners and private sector is needed to achieve the Government's energy access target.[15] To reach this target, Sierra Leone seeks to increase installed capacity from the current 100 MW to 350MW by 2023 while aiming to fully utilize its potential to exploit the 1,240 MW capability for local consumption and export in the sub-region. The many rivers with numerous waterfalls and the abundant sunlight for solar energy create considerable capabilities for power generation. The exceptional expertise in energy generation and producers of high-quality power equipment are of priority in the region and in considerable demand.[16]

Objectives, Purpose & Expected Results

The purpose of this consultancy is to assess the demand for the provision of sustainable energy, especially solar energy, in UNICEF's key programme sectors (Education and Health services, WASH as a support

[10] Freetown City has the lowest percentage of schools for pre-primary and primary (27% and 40% respectively) and Makeni City has the lowest percentage for junior secondary and senior secondary (18% and 0% respectively). The Annual School Census (ASC) Report (2020), Ministry of Basic and Senior Secondary Education.

[11] Official US government website of the International Trade Administration, https://www.trade.gov/country-commercial-guides/sierra-leone-energy-infrastructure, September 14, 2021.

[12] Press Release, "More than 270,000 Sierra Leoneans to Get Better Access to Electricity". World Bank, January 28, 2021.

[13] Sierra Leone's Off-Grid Sector, Africa Clean Energy Factsheet, 2020.

[14] Fact sheet_RREP Updated, June 2021 (energy.gov.sl).

[15] Coordination in Africa's off-grid sector is accelerating progress towards universal energy access. Africa Clean Energy, 2020.

[16] Official US government website of the International Trade Administration, https://www.trade.gov/country-commercial-guides/sierra-leone-energy-infrastructure, September 14, 2021.

service) in Sierra Leone, to generate the evidence base to inform UNICEF's value add and assess opportunities to meet several SDGs.[17]

The **general objectives** of this consultancy are to contribute, through a specific analysis of the context, needs and opportunities for support to:

(i) Improve the quality of care offered in the health services, focusing mainly on the peripheral level (Health District)

(ii) Improve the learning conditions for students and working conditions for teachers

In particular:

(i) Identify feasible off-grid solar PV delivery models to health, education and WASH sectors.

The **long-term goals** are to:

(i) Support the definition of UNICEF's role in scaling up solar energy as an enabler to achieve SDGs on health, education and WASH for children and young people

(ii) Generate evidence on the interlinkages between energy and UNICEF programme sectors including solar energy demand/market assessment to identify opportunities and entry points for UNICEF to scale up sustainable energy access in social sectors for children and their communities

(iii) Strengthen UNICEF's ability to coordinate with national counterparts and development partners to build up data and evidence and provide analysis to support UNICEF's advocacy work on climate resilient low carbon development from a child-centered lens

(iv) Contribute to the Government's Sustainable Energy Policy, including 1) the possible (envisaged) partnership between the Government, UNICEF and development partners[18] on the same in the three areas targeted, 2) move forward with their reforms/standard norms for the off-grid electrification of health and school facilities in Sierra Leone, and 3) updated and budgeted quantification of the energy needs (with a focus on sustainable energy and specifically solar energy) of health and school facilities in all 16 districts in Sierra Leone, while formulating recommendations on long-term sustainability and operations and maintenance of the systems

Specifically, the study will assess the energy demand for energy-poor health and school facilities. The study will define and quantify the decentralized energy service market for health and school facilities in Sierra Leone. It will consider the product/market analysis framework, affordability, willingness to pay, availability, product suitability, product quality, market competition, distribution channels and prospective funding opportunities.

In terms of education sector, this study will complement the efforts undertaken by the Government of Sierra Leone, including within the framework of the Giga initiative which aims to connect every school to the Internet, and every young person to information, opportunity, and choice. Giga is supporting the immediate response to the COVID-19 pandemic, as well as looking at how connectivity can create stronger infrastructures and opportunity in the "time after COVID-19". Sustainable energy, especially solar energy will continue accelerating school connectivity and explore innovations to empower communities including the Giga initiative in Sierra Leone.

[17] SDG 7 which aims to, 'ensure access to affordable, reliable, sustainable and modern energy for all' In addition, access through solar energy contributes to the achievement of seven other SDGs. Without access to energy, the seven other SDGs will be difficult to meet.

[18] There are many actors including donors (e.g. World Bank, FCDO) and UN and other development agencies working/about to start work on solar in Sierra Leone. Hence a well-coordinated approach will assist the Government in advancing with this agenda.

The outcome of this consultancy will also help to strengthen partnerships among UNICEF, the Government (Ministry of Energy, Ministries of Education, Ministry of Health and Sanitation, etc.), other UN agencies, private sectors and various stakeholders (investors, CSOs, etc.) to step up efforts towards universal access to electricity in Sierra Leone. It will support key ministries (Health, Education and Energy) to develop an investment plan for the electrification of health and education facilities.

Scope of Work:

Description of the Assignment

UNICEF Sierra Leone seeks to engage an independent consultant to conduct a solar energy market assessment specifically for health and education sectors (with WASH as it pertains to health and education facilities). The objective is to facilitate a comprehensive understanding of the sustainable energy needs with the focus on solar energy and opportunities for improving access through the deployment and scale up of sustainable energy for services related to health and education provisions (including WASH in connection with health and education facilities) in Sierra Leone. The report will also outline how UNICEF's mandate can accelerate the transition or uptake of reliable, affordable and sustainable energy technologies for underserved, rural facilities in these sectors. The consultancy is expected to generate data (through facility level demand assessments), build upon existing market data, assessments, and projections to package the information to further inform UNICEF's mandate and delivery modalities for future off-grid sustainable energy interventions. These interventions can include energy access as well as energy efficiency.

In particular, it will consider the needs and market to cover

- All 16 districts in Sierra Leone to be assessed through desk and secondary literature review. The consultant will support in the identification of priority health facilities and schools for site specific facility-level demand assessment upon consultation with the Government, development partners and other stakeholders. A representative sample of the priority facilities may be considered in consultation with UNICEF and partners for the site assessments. The consultant is expected to propose an appropriate methodology to address needs in all facilities, with a granular representative assessment in some, and an extrapolation of assessment data at national level, as indicated. Additional surveys to assess needs in all facilities could be envisaged.
- The demand assessment will also cover cooling energy needs for COVID-19 vaccine cold chain.
- Define the typology of public institutions (health facilities and schools) and host communities to be covered (e.g. community centers, productive uses for children and young people, community WASH and public lighting facilities, etc.).
- For the site demand assessments, the consultant is expected to visit about 60 facilities (health and educational) in different districts of Sierra Leone to be able to capture the demand and other data from all the different types of facilities existing in Sierra Leone.

Please note, while WASH is a standalone sector for UNICEF, for the purpose of this assignment, WASH is envisioned as a support service for schools and health facilities and immediate communities around them.

The consultant will be expected to take photographs of all relevant components of existing infrastructure and share photographic evidence for all relevant data collected during assessments.

The aspects covered by the study are further detailed below:

1. **Public institution facility level data and analysis**[19]

a. Definition of national norms for primary health facilities and schools per type, if necessary, taking into account different conditions (urban/rural)

- Typology of health facilities/school, and list of **equipment** with minimum specifications per energy option.

The norms will indicate the **electricity quantity requirements per facility type** and will also suggest the corresponding equipment options; they will also include **orientations for maintenance**.

- Localization of the health facilities and public educational institutions to include in the study.

b. Site/Infrastructure Assessment:

1) Review the quality of data and information from existing health and school mapping exercise and as appropriate compliment with additional facility level mapping exercise.[20] This work should be coordinated with other ongoing and upcoming partner initiatives to avoid duplication.
2) Facility profile: verify the existence of the health facilities and schools at the provided location, basic information, GPS coordinates of the facility, etc.
3) Record the names and contact details of key facility personnel and local government officials with a stake in the healthy functioning of the facilities
4) Building layout (dimensioned plan), structural condition, physical infrastructure integrity and suitability for the installation of solar PV system to power the facility and community receptivity, electrical power distribution system, etc.
5) Determine the network connectivity situation and level of mobile phone service (voice/text only, GPRS, 3G, 4G, none) at each facility (to determine if remote monitoring technology can be deployed at the site)
6) Describe the operation activity of the facility, including the operating hours, etc.
7) Describe the current level of functionality of the facility (fully functional, partially functional, etc.) and highlight key constraints to functionality (medicine, vaccinations, water supply, electricity supply, etc.)
8) Record the number of rooms, list the potential / earmarked electrical equipment per room and the expected daily usage pattern of electricity
9) Record the average number of patients/day, no. of beds, services provided, etc. for health facilities and number of students and the fraction of these students that live in a boarding arrangement at the school – these can help estimate the size of the system and the needs in terms of equipment use, mobile phone/device charging
10) Grid power availability (facilities and community), quality (reliability), connectivity arrangements, plans for grid supply in the community
11) Describe if the facility currently receives material support from non-governmental institutions (e.g., UN organizations, GAVI, GPE, etc.)
12) What is the performance of paying the monthly bill for electricity (this is to track frequency of non-payments and a good metric of budget allocated to the facilities and likelihood of non-payments for solar PV contractor for O&M)?
13) Other additional assessment, as necessary.

[19] The assessment protocol including specifications of hardware and software tools required to conduct the assessment will be prepared by the IC and validated by UNICEF. IC will also submit a detailed guideline on the utilization of the protocol and will provide a comprehensive explanation of activities to be conducted.

[20] Including hard to reach underperforming facilities not included in the national electrification expansion plan.

c. Detailed load assessment of the facilities (or kW requirement) to meet the existing and future demand for improved service delivery, including but not limited to the following:

1) The current and potential future electricity needs of the facility. Most importantly, this part of the assessment should collect detailed information on the needs for which the facility does not yet have appliances, including but not limited to lighting (general and task), vaccine refrigeration, blood banks, oxygen concentrators, operation theatre, sterilization, suction, deliveries, maternal and new-born care, class rooms, canteens, administrative building, dormitories, etc, (we need a list of buildings that can be found in a primary or secondary school), labs, kitchen, space heating and cooling, staff quarters, water supply, thermal energy needs (hot water, cooking) communications, and other ancillary needs
2) Identify the types of services and associated electrical appliances that are deemed highest priority
3) Stock-take of existing energy consumption at facilities (including electricity via diesel generators, batteries, or other means, and the use of any liquid or solid fuels). This stock-taking should:
   I. List electrical appliances present at the site, their Wattage, and hours of usage in daytime and nighttime
   II. Describe the current source of lighting and electricity and how it is perceived in terms of reliability and service quality. Provide photographs of existing lighting sources (e.g., candle, kerosene lamp, battery-powered torch, etc.) and/or any existing electricity source (e.g., diesel generator or solar system). Record the age of the existing diesel generator (if any), cost of installing the energy system and the average energy expenditure (per month) on the different energy sources, and O&M costs
   III. The amount of downtime due to lack of fuel budget or generator being out of order
   IV. If one or more solar PV systems already exist, record information regarding their specifications (1) A picture of the solar panel specifications sticker on the back of the solar panels is helpful and a recording of what those values are on it. 2) Total number of panels, number of panels in series, and number of series in parallel. 3) Inclination and azimuth of solar panel array 4) calculated PV array peak output voltage, current, and power (wattage) (if available). 5) charge controller size and type. 6) battery size, type, age, and typical depth of discharge 7) battery inverter/variable frequency drive/3-phase inverter size and type (if used)) and typical usage profile
   V. If the facility has a water pump, determine the electrical consumption of the water pump. Determine the size of the water storage tank (in liters), how many hours it typically takes to fill, and how many days per week it is necessary to fill it. Determine 1) daily water demand for worst-case situations, 2) brand and model of pump, 3) maximum borehole yield during dry season, 4) safe water yield, 5) static water level, 6) dynamic water level, 7) pipe materials and diameters, 8) depth of pump, 9) elevation difference from borehole surface location to water tank surface location, 10) height of water tank inlet, 11) horizontal distance from borehole to treatment and treatment to water tank tower, 12) type and brand(s), model(s) of treatment, 13) brand and model of controllers, inverters, sine wave filters, and other equipment if present.
   VI. Record data on refrigeration used (model(s), size, and nameplate data). If the refrigerator is powered by a separate solar electric system, record solar panel peak Wattage (Wp)
   VII. For other equipment already powered by solar, length, terms, and conditions of the operation and maintenance contract, age of the system, battery life, etc.
   VIII. Identify loads not suited to being powered from a solar PV system
   IX. Forecast the load pattern and categorize them into various groupings depending on the present and future energy loads. The projected loads will have to be compared to the existing power supplies to determine if these supplies are adequate for the projected demand
   X. Identify other electrical loads in the proximity (WASH, education facilities, community, and productive uses, etc.)

XI. Identify mechanisms and costs for the final disposal of obsolete technology (e.g. panels, batteries, etc.).

d. System Sizing, costing and long-term sustainability/O&M recommendations: on the basis of the above assessment, provide a costing per type, per typology of the facility, per region/district, etc.
- Prepare an updated and budgeted quantification of the energy needs (with a focus on sustainable energy and specifically, solar energy) of health and school infrastructures in Sierra Leone, recommended system sizing and a list of equipment needed, and any recommendations on long term operations & maintenance, renewal, and lifetime of the technology

e. Beneficiary Survey: Develop a survey questionnaire for interviewing key beneficiaries on:

1) The perceived (potential) benefits of solar power solutions
2) Concerns about the impact and/or (mis)use of the solar systems
3) Any physical or other hazards that a solar installation at the site would be exposed to. Security of solar systems (vandalism and theft are some of the major concerns). Factors affecting the efficiency of solar power facilities. The effectiveness of solar installation will be affected by things like 1) dust accumulation/frequency of washing, 2) obstructions (such as trees, fences, buildings, water towers, etc.) casting shadows on the PV array. This information should be captured and evaluated. Keeping the panels fully exposed is one of the easiest and cheapest ways of increasing electrical generation. Indication on the appropriate installation options.[21]
4) Existing community participation/commitment/engagement, if any, in the Health facility and school management and operations
5) Existing technical skills in the facilities and community to provide preventive maintenance services
6) The survey questionnaire should be used to interview at least the following
    - Members of the Management team
    - Staff responsible for operations and maintenance
    - Local Government staff
    - Healthcare facilities staff
    - Parents and teachers' associations
    - Students (primary and secondary school)

2. <u>Host Community Demand Assessment</u>

Going beyond the energy demand of health facilities and schools, the following additional tasks will be covered for the energy demand assessment of the Host Community in the proximity to present an analysis of the current off grid solar market from the demand side perspective. The analysis should cover, but not limited to, the following aspects:

1) Define host community beneficiary segment: Map and identify potential beneficiary segment (e.g. community centres, productive uses focusing on children and young people, WASH, and public street lighting in the HCFs and schools, etc.). Define if they (a) have, or (b) would not have grid / off-grid access (present and in the next 5 years)
2) Determine the market size: Estimate the size of the potential community market for off-grid solar
3) Willingness to Pay (WTP): Assess user capacity to pay based on existing electricity (or energy) expenditure of community including any O&M costs (utility bills, expenditure on kerosene, candles, etc.). This can be considered as the minimum estimate of WTP. Analyse financial gains to

[21] For example, Water Mission, a non-profit engineering organization in the US, puts their solar arrays at 2 meters high off the ground to reduce theft and vandalism, but it increases the difficulty in washing somewhat. Other security measures include securing panels in the racks through welding methods rather than bolting them in place.

consumers from solar solutions. Product affordability, revenue/income, etc. should be taken into consideration

4) Conduct detailed site and load assessments of the identified host community facilities/services
5) Community engagement/commitment in the management and operations of the off-grid solar

3. **Stakeholder Mapping**
   Identify entities and actors (public, private, development partners, etc.) actively engaged in off-grid solar initiatives in health and education sectors in the country to aid effective coordination.

Methodology

The study will be based on 1) literature review of standards, evaluation reports, and health service operating reports as well as documents related to school mapping, and surveys carried out with various stakeholders, and 2) systematic collection of primary and secondary data and information in the health and education facilities to perform an inventory of the needs of each health facility/ school.

The consultant recruited to carry out the study will need to work in close collaboration with central/local governments related to Health Infrastructure and Equipment and School Infrastructures and Equipment. The overall work will be coordinated by UNICEF Sierra Leone, with technical support from the UNICEF WACRO and NYHQ.

Child Safeguarding

Is this project/assignment considered as "Elevated Risk Role" from a child safeguarding perspective?

☐ YES ☒ NO If YES, check all that apply:

Direct contact role ☐ YES ☒ NO

If yes, please indicate the number of hours/months of direct interpersonal contact with children, or work in their immediately physical proximity, with limited supervision by a more senior member of personnel:

Child data role ☐ YES ☒ NO

If yes, please indicate the number of hours/months of manipulating or transmitting personal-identifiable information of children (name, national ID, location data, photos):

More information is available in the Child Safeguarding SharePoint and Child Safeguarding FAQs and Updates

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Budget Year:	Requesting Section/Issuing Office:	Reasons why consultancy cannot be done by staff:
2022	*Education/UNICEF Sierra Leone*	*Highly specialized expertise required for a short timeframe on Solar Market Assessment that is not available in the section*

Included in Annual/Rolling Workplan*:* ☒ Yes ☐ No, please justify:

Consultant sourcing:	Request for:
☐ National ☒ International ☐ Both **Consultant selection method:** ☐ Competitive Selection (Roster) ☒ Competitive Selection (Advertisement/Desk Review/Interview)	☒ New SSA – Individual Contract ☐ Extension/ Amendment
If Extension, Justification for extension:	

Supervisor:	Start Date:	End Date:	Number of Days (working)
	21 February 2022	**20 August 2022**	**80 days**

Work Assignment Overview

Tasks/Milestone:	Deliverables/Outputs:	Timeline	Estimate Budget
Inception report	Inception report (including detailed time schedule, milestones, working methodology/approach to achieve the tasks, preliminary design and outline for case studies)	Week 2	15% of total amount
Progress report (1)	Progress report on initial findings from the facilities mapping and energy (solar) demand assessment	Month 2	20% of total amount
Progress report (2)	Progress report on sites assessment and detailed load assessment	Month 3-4	20% of total amount
Draft report and validation workshop	Draft report and one validation workshop (including PPT files for workshop)	Month 5	20% of total amount
Final report	Final report (including all necessary annexes) should not exceed 30 pages, excluding annexes	Month 6	25% of total amount

Reporting Requirements

The consultant will be required to provide and deliver the following:

- **An inception report** including methodology, timeline, preliminary design and outline for case studies, as well as proposed changes made to the scope of work in the kick-off meeting. If stakeholder interviews are required for gap assessments and market data collection, preliminary list of stakeholders is required. This information will be presented in an inception meeting with focal points from priority sectors
- **Progress reports and presentations** on regional data platform the in-depth case studies with the Excel sheets as well as narrative analyses with review by UNICEF
- **A data platform** that all data collected under this assignment will be formatted appropriately and delivered conjointly to the reports under the forms of regional and country-level data packages
- **One validation workshop**
- **A final report** for the whole solar market analysis, including the country case studies, a PPT summarizing the process, the findings and recommendations

All reports, together with the required reporting guidelines and deadlines for submission are listed above. All reports should be written in English, single spacing font size 11 Times New Roman and submitted as both word and pdf versions. UNICEF will provide template guidelines to ensure they meets the branding and publication requirements. Payments will only be made upon successful review and deliverable sign-off by UNICEF.

Location and Duration

The assessment will be carried out via a combination of home-based desktop research, data mapping and analysis with mission travel for facility (approx. 60 facilities in total) level mapping, energy audit and stakeholders' consultations. The consultancy is expected to start on 21 February 2022 through 20 August 2022. UNICEF Sierra Leone together with UNICEF WCARO and NYHQ will review draft reports for quality assurance and provide feedback on the deliverables.

How to Apply

Requirements:

- Completed profile in UNICEF's e-Recruitment system. Uploaded Personal History Form (P11) and copy of academic credentials.

- A technical proposal on how you intend to carry out the mission (including details on number of working days proposed to be spent on sites and remote).
- A financial proposal (lump sum), which reflect the overall amount requested to achieve the deliverables/ and shall include amounts requested to cover:
    - Fees
    - Per diems (while in Sierra Leone)
    - Travel cost reflecting the proposed number of missions to Sierra Leone and any in country travel cost (except site visits). UNICEF Sierra Leone will support the consultant with local transport arrangements to make the site visits to conduct assessments
    - Any required visa/permit fees. UNICEF Sierra Leone helps in providing letter/documents proving that the consultant is going to visit the country
    - Miscellaneous (communication expenses or else as applicable, to be detailed)

  The financial proposal should be overall (lump sum) and broken down by above categories.

- Availability to carry out the work in the first half of 2022 (around late February through late August 2022).
- At the time the contract is awarded, the selected candidate must have in place current health insurance coverage.
- Payment of professional fees will be based on submission of agreed satisfactory deliverables. UNICEF reserves the right to withhold payment in case the deliverables submitted are not up to the required standard or in case of delays in submitting the deliverables on the part of the consultant.

Minimum Qualifications required:	**Knowledge/Expertise/Skills required:**
☐ Bachelors ☒ Masters ☐ PhD ☐ Other • Advanced university degree in relevant areas such as off-grid renewable energy, renewable energy finance/economics, climate change and environmental sciences/management/ economics/engineering.	The assignment requires an independent consultant with at least 5 years of consulting and off-grid renewable energy project experience in developing countries (and preferably in the Western and Central Africa region). The Consultant should demonstrate strong background in conducting energy demand assessment in social sectors preferably in UNICEF priority sectors and have experience in designing and managing off-grid renewable energy projects with expertise in social, economic, and environmental dimensions of sustainability. *1) Work experience* • A minimum of 5 years professional experience in off-grid renewable energy and finance (preferably in off-grid solar) at global and regional levels required. The 5 years of work experience can be substituted with a relevant master's degree in Renewable Energy or similar master's programme and a minimum of 3 years professional experience. • Prior experience in off-grid renewable energy access projects and demand assessments in UNICEF core priority sectors including Health, Education, WASH and Social Policy as well as in the Africa region is an asset • Specialized working experience in off-grid renewable energy projects design, cost benefit and socio-economic analysis, long term sustainability and O&M models, identifying innovative business models to leverage public and private sector engagements is preferred. Provide sample of previous work. • Experience with solar system design and energy modelling software like PVsyst, Homer, EnergyPlus, eQUEST or others. • Previous working experience with UNICEF, other UN agencies or international humanitarian organizations is an asset. *2) Competencies* • Ability to coordinate, convene stakeholders and report in a timely manner • Excellent organizational skill, service-minded, punctual, self-motivated, proactive, reliable, and demonstrated ability to work in harmony with government, private sector, and staff members of different national backgrounds • Respect for the principles of UNICEF • Excellent report writing skills and strong communication skills including presentation skills • Proven capability to meet deadlines and work under pressure • Excellent command of spoken and written English
Administrative details: Visa assistance required: ☒ Transportation arranged by the office: ☒	☒ Home Based ☐ Office Based: If office based, seating arrangement identified: ☐ IT and Communication equipment required: ☐ Internet access required: ☐