



Nigerian Energy Support Programme (NESP)

Umon Island Solar Mini Grid Project: Mission Report to Umon Island

Abuja, Nigeria, 11th April 2014

ToR: Support for the Development of Sustainable Operational Arrangements for Umon Island Mini Grid Project (56-2017-WP-4)

Topics: First Mission Report

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**Maps**

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Contents

| | |
|---|-----------|
| 1. Executive Summary | 5 |
| 1. Introduction..... | 6 |
| 2. Visit to State Electrification Agency and NESP | 6 |
| 3. Meeting Clan Head of Umon South | 8 |
| 4. Meeting with Community Leaders of Umon Island | 8 |
| 4.1 Inauguration of the Village Power Committee (VPC) | 9 |
| 4.2 Sensitization Workshop | 10 |
| 4.3 Security of the Solar Mini Grid Facility | 10 |
| 4.4. Memorandum of Understanding | 11 |
| 4.5. End-user Contract | 11 |
| 4.6 End-users' Load Assessment Study | 11 |
| Appendix 1: Proposed Operational Model for Umon Island Mini Grid Project.. | 12 |
| Appendix 2: Questionnaire Template for End-users' Load Assessment Study | 19 |

Acronyms

| | |
|-------|---|
| CR | Cross River State |
| SEA | State Electrification Agency |
| SMGF | Solar Mini Grid Facility |
| CREDC | Community Research and Development Centre |
| NESP | Nigeria Energy Support Programme |
| MOU | Memorandum of Understanding |
| GIZ | Deutsche Gesellschaft für Internationale Zusammenarbeit |
| RETs | Renewable Energy Technology |
| UIDN | Unique Identification Number |

1. Executive Summary

Umon Island is located in Biase Local Government Area of Cross River State, Southern Nigeria. The Community is surrounded by the waters of River Cross. Since the Community is surrounded by water, there is no access road connecting the other part the state to Umon Island; thus, the major means of transportation to Umon Island is by water. The Community is not connected to the national electricity grid and going by the economies of grid connected electricity, Umon Island may not be a viable location for grid generated electricity in the coming decades. The Nigeria Energy Support Programme (NESP) is implementing solar mini grid projects in Umon Island. Through a open bidding process, the Community Research and Development Center (CREDC) was selected by the NESP to serve as the mini grid operator in Umon Island. For the smooth operation of the mini grid facility in Umon Island, CREDC is expected to carry out some preliminary activities to prepare the inhabitants ahead of the inauguration of the Solar Mini Grid Facility.

In order to begin the implementation of the preliminary activities in Umon Island, a Team from the CREDC made the first visit to Umon Island from the 27th to 30th March 2017. The objective of this first visit are: to familiarize with the leadership of the Umon Island and discuss the implementation of the preliminary activities with the community leaders; set up the Village Power Committee (VPC) that will work with CREDC in the operation of the Mini Grid Facility; gather the information to carry out the end-users' load assessment study; and discuss the signing of the community-operator memorandum of understanding (MOU) and other operation activities with the community leadership

Before proceeding to the Community, the CREDC Team visited the officials of the Cross River State Electrification Agency, the NESP Officials and the Clan Head of Umon South in Calabar to inform them of the objectives of their mission and seek their inputs into the operational strategies developed for Umon Island SMGF. During this mission to Umon Island, the Village Power Committee was inaugurated comprising of three men and two women. Other operational issues were discussed and agreed by the Community. The first sensitization workshop will hold on the 2nd of May 2017 to educate the community on the efficient utilization of electricity, the productive use of electricity and safety tips in handling electricity. On the security of the mini grid facility, the community preferred that the CREDC engage security men from the community to watch over the facility. The community consented to the signing the MOU between the Community and the Operator; CREDC will send a draft copy of the MOU to the VPC Chairman for further action. During the mission, the CREDC Team collected data to carry out the End-Users' Load Assessment Study.

1. Introduction

Umon Island is located in Biase Local Government Area of Cross River State, Southern Nigeria. The Community is surrounded by the waters of River Cross. The coordinates of a central location in the Community is given as Latitude 5.32°N, Longitude 8.08°E. Since the Community is surrounded by water, there is no access road connecting the other part the state to Umon Island; thus, the major means of transportation to Umon Island is by water. To access Umon Island from Calabar, the capital of Cross River State requires a two-hour drive north of Calabar to Ikot-Okpota and then move 30 minutes on speed boat. The Community is not connected to the national electricity grid and going by the economies of grid connected electricity, Umon Island may not be a viable location for grid generated electricity in the coming decades.

The Nigeria Energy Support Programme (NESP) of the GIZ and the European Union is implementing solar mini grid projects in several locations in Nigerian and one of the locations is Umon Island. Through a open bidding process, the Community Research and Development Center (CREDC) was selected by the NESP to serve as the mini grid operator in Umon Island. For the smooth operation of the mini grid facility in Umon Island, CREDC is expected to carry out some preliminary activities to prepare the inhabitants ahead of the inauguration of the Solar Mini Grid Facility (SMGF). CREDC had developed a document titled “Proposed Operational Model for Umon Island Solar Mini Grid Project” (Appendix 1).

In order to begin the implementation of the activities contained in the Operational Model, a Team from the CREDC made the first visit to Umon Island from the 27th to 30th March 2017. The objective of this first visit are:

1. To familiarize with the leadership of the Umon Island and discuss the implementation of the preliminary activities with the community leaders
2. Set up the Village Power Committee (VPC) that will work with CREDC in the operation of the Mini Grid Facility
3. Gather the information to carry out the end-users’ load assessment study
4. Discuss the signing of the community-operator memorandum of understanding (MOU) and other operational activities with the community leadership

2. Visit to State Electrification Agency and NESP

The Cross River State Electrification Agency (CR SEA) is the government focal agency for the Umon Island Solar Mini Grid Project. Before proceeding to the community, the Team visited the CR SEA and the NESP Officials in Calabar to inform them of the objectives of their mission and seek their inputs into the operational strategies developed for Umon Island SMGF. The official visit to the CR SEA also help to seek the needed information that will enhance the smooth implementation of the preliminary activities in Umon Island.

Table 1.1: Attendees of the meeting at CR SEA

| | Name | Organization | Designation | Email/Phone No. |
|---|---------------------|--------------|---------------------------------------|--|
| 1 | Mr. Philip I. Nkanu | CR SEA | Director, Electrical | pinankanu@gmail.com 0803 471 3897 |
| 2 | Ekpenyong Effiom | CR SEA | - | Paulipeal@yahoo.com 0803 675 2088 |
| 3 | Ekpok Erokoro | NESP | Energy Advisor, Rural Electrification | ekpok.erokoro@giz.de 09053909253 |
| 4 | Etiosa Uyigue | (CREDC) | Executive Director, CREDC | etiosa@credcentre.org 0802 897 8877 |
| 5 | Osazee Uyigue | CREDC | Head of Technical Unit, CREDC | osazee@credcentre.org |
| 6 | Osahon Iyalekhue | CREDC | Intern | iyalekhueosahon@gmail.com |
| 7 | Alex Kayode Olasusi | CREDC | Ad-hoc Staff, CREDC | |

After a brief introduction of everyone present at the meeting, the Executive Director of CREDC, Mr. Etiosa Uyigue stated the objectives the Mission and highlighted the preliminary activities that CREDC will embark upon in Umon Island as contained in the Operational Model developed by the CREDC. These activities include:

- signing of the memorandum of understanding (MOU) with the community

- conduct two sensitization workshops in the community to educate them on the efficient utilization of electricity, safety in handling electricity and productive use of electricity
- conduct end-users' load assessment study in the Community
- collect data to create end-users' database
- security measures put in place by CREDC to protect the facility

The following suggestions were made on the Operational Model developed by the CREDC:

- the end-users' load assessment study should be designed to project the growth in energy consumption for the next 10 years against the 5-year projection initially planned by the CREDC.
- The Operator should put in place plans to immediately increase the capacity of the generation plant
- It was suggested that the issue of security of the SMGF should be solely handled by the Operator

3. Meeting Clan Head of Umon South

Before proceeding to Umon Island, the CREDC Team then proceeded to meet with the traditional Clan Head of Umon South, His Royal Highness, Onun Akoh Mba Akoh in Calabar. Again, the Team informed the traditional head of Umon Kingdom of the objectives of their mission. In response, he pledged his support to ensure the success of the mission.

4. Meeting with Community Leaders of Umon Island

After fulfilling all the protocols of meeting with officials of the Cross-River State government, the NESP Team in Calabar and the paramount ruler of Umon Clan, the stage was not set for the Team to meet with the leaders of Umon Island. On arrival at Umon Island, the Team was given a warm reception by the Community leaders – comprising of the Paramount Ruler of Umon South, representatives of the elders, youth leaders, women group and representative of the Bagani, the nearby community benefiting from the SMGF. The community was immediately briefed of the objectives of the mission and the proposed activities that will be carried out by the CREDC to prepare the community for the SMGF.



Plate 1: Meeting with leaders of Umon Community

4.1 Inauguration of the Village Power Committee (VPC)

In his presentation, the Team leader stressed the need to set up a committee that will work with the CREDC, the Operator for the Umon Island Solar Mini Grid Facility. One of the roles of the Committee is to serve as intermediary between the Operator and the Community. According to him, the Committee should be made up of 5 persons (3 men, 2 women). The Community leaders, immediately nominated 5 persons to serve in the VPC. Their names and contact details are given in the Table 2 below:

Table 2: Members of Village Power Committee

| | Name | Phone Number | Position |
|---|----------------------------|--------------|-----------|
| 1 | Mr. Ndem Inyang Aniom | 07031206101 | Chairman |
| 2 | Mr. Isamoh Isamoh Uruen | 07069408041 | Secretary |
| 3 | Mr. Ekpo Agan Ekpo | 08028000960 | Member |
| 4 | Mrs. Eboeye Okon Effiong | - | Member |
| 5 | Mrs. Philomina Bassey Ojoi | 07034353987 | Member |

4.2 Sensitization Workshop

The proposal to carry out sensitization of community member and the objectives of the workshops was presented before the leaders of the Community. After a long deliberation, it was agreed that the first sensitization workshop will hold on the 2nd of May 2017 in the Community. The main content of the workshop will be to educate the community on the efficient utilization of electricity, the productive use of electricity and safety tips in handling electricity.

4.3 Security of the Solar Mini Grid Facility

The CREDC Team presented their proposal for the security of the facility when installed which involve the CREDC engaging two security men from the Community to protect the facility- one to watch over the facility during the day and the other during the night hours. The second option, where the community will be responsible for securing the facility was also presented. After deliberating on the mater, the Community leadership rejected the second option and requested the first option be upheld – CREDC to engage security men to watch over the facility. According to the Community leaders, it is better to have a system where some individuals can be held accountable for the safety of the facility.



Plate 2: Group photograph with community leaders

4.4. Memorandum of Understanding

Although there is a general MOU signed by the 5 parties involved in the Project – the State Government, Local Government, the Community, CREDC and the NESP/GIZ, the Team informed the Community that another MOU will be signed between the Community and the Operator. This was agreed upon by the Community. CEDC is expected to send a draft copy of the MOU to the Community.

4.5. End-user Contract

The Team also informed the Community leaders that CREDC will create a data base for all end-users to coordinate electricity bill collection and ensure accountability. In addition, the community was also informed that the Operator will sign end-user agreement with all end users.



Plate 3: Some members of the Team being conducted round the Community

4.6 End-users' Load Assessment Study

The Team immediately commenced data collection for the End-users' Load Assessment Study. This was done by conducting interview with key informants in the community and randomly administered questionnaires across the Community and the neighboring community that will benefit from the SMGF. Members of the Team moved round the two communities to capture on-the-site data.

Appendix 1: Proposed Operational Model for Umon Island Mini Grid Project

Preamble

Energy is vital for the socio-economic development of any society; it has been described as the bedrock of economic develop. Grid generated electricity is insufficient compared to the Nigerian population; electricity from the national grid is hardly up to 5000 MW for a population that is estimated to be about 170 million people. Thus, only about 50% of the Nigerian population is connected to the national electricity and majority of those not connected to the grid leave in the rural areas. Considering the huge cost of extending the grid, it may take several years or even decades for the electricity distribution companies to extend the national grid to these communities. For these category of communities, the use of mini grid facility using renewable energy technologies (RETs) become one of the only option for them to have access to electricity.

Umon Island is among these communities. The community is located in Biase Local Government Area of Cross River State. The location of the community is in a terrain that is particularly difficult for grid extension; the main access route from the capital city require going from Calabar up north for about two hours and then through River Cross on speed boat for a period of about 30 minutes. The Nigerian Energy Support Programme has selected Umon Island as one of the pilot sites to implement Solar Mini Grid Project. Subsequently, through an open competitive process, the Community Research and Development Centre (CREDC) was selected to serve as the Official Mini Grid Operator in Umon Island. CREDC has a track record of developing off grid renewable energy projects in Nigeria

For sustainability, efficient and effective service delivery, CREDC is proposing this operational strategy for Umon Island Solar Mini Grid Project.

1. Memorandum of Understanding with Community

CREDC will sign memorandum of understanding (MOU) with the Community before commencement of operation. The MOU will clearly define the operational modalities of the Operator and the roles of both parties – the Community and the Operator. The MOU will clearly define but not limited to the following: the unit cost of electricity; power for the Operator to collect bill for electricity supplied; penalty in case of non-payment of electricity bill by any of the beneficiary; the right to operate in the community and; the initial connection fee.

2. End-users Load Assessment Study

Prior to the connection of end-user of electricity in the Community, CREDC will conduct a study to determine the energy needs of the different categories of end-users in the Community. This study will be done using simple interviewer questionnaires. The study will help illicit the following information but not limited to them:

- The different energy sources currently being used by members of the community for lighting, cooking, and other activities

- Economic activities in the Community
- Different types of appliances currently being used in the Community
- Household energy consumption in kWh
- Households spending on energy per month e.g. spending on kerosene for lighting and cooking, spending on private generators for electricity
- Number of commercial end-users
- Willingness to pay for electricity
- Average monthly income
- Identify productive users of electricity in the Community

2. Sensitization Workshops

CREDC will hold two sensitization workshops in the Community. Umon Island is a fishing and farming community and as result the workshops will be held on days that will be convenient and acceptable to the inhabitants. The preferred date for the sensitization workshops will be agreed upon during prior consultation meetings with the Community leadership. The two workshops will hold differently to achieve the following purposes but not limited to them:

- Develop and strengthen relationship between CREDC and the Community
- Set up the village power committee
- Educate the community on the operational modalities of the Operator - CREDC
- Create awareness on the potential of the solar mini grid facility to boost the development of the community
- Educate the community on energy efficiency and conservation and the ways to reduce energy wastages
- Basic scientific principles behind the solar PV system
- Safety tips on using electrical energy for domestic and commercial applications
- Productive use of electricity in rural setting
- Discuss the tariff of with the Community
- Set up the Village Power Committee (VPC)
- Provide training for local workers that will support in the running of the facility

3. Prepare Posters and Flyers

CREDC will design posters and flyers to server as communication tools to educate end-users on the benefits of connecting to the solar mini grid system. The posters and flyers will also inform the community members of the incentives available for those that will sign up early for the connection.

4. End-user's Data Base

The CREDC will create a data base of all beneficiaries in the Community. This will help to properly coordinate the energy bill collection and implement plans for effective operation in the community. This will be done prior to full commencement of the operations of the mini grid facility in the Community. All customer will be given a unique identification number (UIDN) and

their biometric information will be collected and link to the UIDN. All the houses in the community will be clearly marked with the UIDN. In addition to the electronic data base, files will be created for all beneficiaries using a data form (Appendix 1).

5. End-user Agreement

Before services are extended to any of the beneficiary, CREDC will sign contractual agreement with each of them. The contract will clearly state the roles of the Operator and the roles of the customer/beneficiary. It will clearly define the bases of the relationship between the Operator and the benefiting households or individual,

6. Operational Office in Calabar

CREDC will open an office in Calabar. The Umon Island Mini Grid Project is collaboration between the Cross-River State Government and the CREDC. The presence of CREDC in Cross River becomes very critical to deepen relationship with the Cross-River State Government and other stakeholders and for the ease of operation of the Mini Grid Project. The office will also position CREDC for replication of the Mini Grid Projects in other part of Cross River State and neighboring states. The cost of opening the office will be fully borne by the CREDC.

7. Develop Accounting System for Bill Collection

CREDC will develop book keeping and accounting system for effective and efficient bill collection. This will involve guidelines for accounting procedure, invoicing and bill collection that will allow for easy financial auditing annually. This procedure will be discussed with the VPC.

8. Recruitment of On-the-ground Staff

The staff of the Mini Grid facilities will comprise of the following:

- a. **Project Manager:** The Project Manager will be responsible for the day-to-day running of the facilities. The Project Manager will possess high level of competence have a good understanding of the operations of the different components of the generation equipment and distribution facilities. He will coordinate the activities of other staff of the facility. He/she will be based in the Community or in Calabar
- b. **Administrative Staff:** Will be recruited from the community and will be responsible for preparing billing vouchers, book keeping and other administrative activities.
- c. **Technical Office:** The Technical Officer will be based in the community. He/she will assist the Project Manager on technical issues. He will be adequately trained on the operations of the different component of the facility, both the generating equipment and distribution equipment.

- d. **Security Personnel:** Two security personnel will be recruited from the Community to man the facility for 24 hours. One will be watch over the facility during the day while the other will be available during the night.

Table 1: Propose staff of the Solar Mini Grid Facility

| | Staff | Proposed Monthly Allowance | Summary of Roles |
|---|----------------------|----------------------------|---|
| 1 | Project Manager | N100,000 | General coordination of activities and other staff |
| 2 | Administrative Staff | N50,000 | Billing, book keeping and other administrative activities |
| 3 | Technical Officer | N50,000 | Technical issues relating to connection, reconnection and maintenance |
| 4 | Security 1 | N30,000 | Watch the facility during the day |
| 5 | Security 2 | 30,000 | Watch the facility during the night |
| | Total | N260,000 | |

Other Operational Cost include: Administrative cost – N15,000/month

9. Propose Metering System

The Smart card based prepaid metering is being proposed for this project. To help CREDC with positive cash flow and to reduce the costs involved in billing, connection and disconnection cycle, prepaid metering system shall be adopted. The prepaid metering system consists of a smart meter, Contactless IC Card (owned by consumer), POS (Point-of-sale) device and billing software with remote management capability. A 10% discount shall apply for energy

consumption between 9.0 am to 4.0 pm. This is to encourage consumers to use electricity during the day when electricity is generated from the sun rays.

10. Proposed Monitoring and Evaluation Plan

There will be a 5-man Steering Committee jointly set up by the NESP/GIZ and the Cross River State Government and shall be called the Umon Island Solar Mini Grid Steering Committee (USMSC). The Steering Committee will comprise of the representatives of the Cross River State Government, Village Power Committee (VPC), CREDC, Biase Local Government Council and NESP/GIZ. The Steering Committee will be chaired by the Cross River State Government and Co-chaired by the NESP/GIZ. CREDC shall serve as the Secretary of the Committee. The Steering Committee will have the mandate to meet once annually except for cases of emergency. The roles of the USMSC will be to review annual progress of the Solar Mini-grid Facility (SMF). As the official Operator of the Solar Mini-grid Facility (SMF), CREDC will carry out the day-to-day running of the SMF and report directly to the NESP/GIZ and then to the USMSC. CREDC will prepare annual report of the progress of the project, which will be sent to the NESP/GIZ. This will also be presented annually to the Steering Committee. The VPC will represent the Community and serve as the mouth piece of the Community. All dealings of CREDC with the Community shall be through the VPC.

Implementation Plan

| | | | | | |
|-----------------------------------|---|---|---------------------------|--|------------------------------------|
| Overall Objective | The overall objectives of the assignment to set up local organizational and institutional structure to ensure proper operation of the solar mini grid system and to train local workers and managers that will oversee the operation of the mini grid facility. | | | | |
| Proposed Activities | Time Frame | Expected Outcome | Responsible Entity | Indicator | Means of Verification |
| Signing of MOU with the Community | 3 rd – 30 th March, 2017 | The relationship between CREDC and the Community is further strengthened and the authority to operate in the Community is established | CREDC, VPC | Number of people present at the MOU signing ceremony | Report of the MOU signing ceremony |
| End-user Load | 13 th March – | The categories of end-users in Umon Island is | CREDC | Number of respondents interviewed | Report of study |

| Assessment Study | 30 th April, 2017 | fully understood | | during the assessment | |
|--|---|--|------------|---|---|
| 1 st Sensitization Workshop | 15 th – 30 th March, 2017 | Community members fully aware of the potentials of the SMF and economic opportunities available to the Community | CREDC, VPC | Number of participants at the workshop | Report of Workshop Media report of workshop in any of the national dailies |
| 2 nd Sensitization workshop | 15 th – 30 th April, 2017 | MOU signed between CREDC and Community and local staff of the SMF fully trained | CREDC, VPC | <ul style="list-style-type: none"> • Number of participants attending the workshop • Number local staff trained | Report of workshop |
| Prepare posters and flyers | 6 th – 30 th March, 2017 | End-users fully aware of the potentials of the SMF and incentives for those that will sign up on time | CREDC | Number of flyers and poster distributed | Printed copies of flyers and posters |
| End-users data base | 1 st – 15 th May, 2017 | Comprehensive data base of end-users is developed | CREDC | - | E-copy of end-user's data base made available to NESP |
| End-user Agreement | 16 th – 30 th June | End-user agreement signed with at least 50% of potential end-users | CREDC | Number of end-user's agreement signed | Physical copies of end-user's agreement |

| | | | | | |
|---|--|---|-------|---|--|
| Operational Office in Calabar | June 2017 | CREDC presence in Calabar established and relationship with the Cross River State government strengthened | CREDC | - | Physical address of the office established |
| Develop accounting and bill collection system | 1 st -30 th June, 2017 | Orderly bill collection and accounting system developed | CREDC | - | E-copy of ledger and printed document shared with stakeholders |

Appendix 2: Questionnaire Template for End-users' Load Assessment Study

Community Research and Development Centre

UMON ISLAND LOAD ASSESSMENT FORM

SERIAL NO.....

Occupation.....

1. Are you aware of solar electricity? Yes[☐] No[☐]
2. Are you willing to connect to solar electricity when available in your community? Yes[☐] No [☐]
3. Are you willing to pay for solar electricity in your community? Yes[☐] No[☐]
4. Type of households: Hut [☐] 1-Bedroom [☐] 2-Bedroom [☐] 3-Bedroom [☐] Others [☐]
5. Number of persons/households: Infant [☐] Children [☐] Adult [☐]
6. Number of male[☐] and female[☐]
7. Average monthly income(NGN): 0-10,000[☐] 10,000-20,000 [☐] 30,000-40,000[☐] 50,000 above
8. Age range 15 – 25 [☐] 25 – 35 [☐] 35 –45 [☐] 45 – 55 [☐] 55 – above [☐]
9. Do you have a phone: Yes [☐] No [☐]
10. If yes, how do you charge the phone.....
11. How much do you spend to charging your phone?.....
12. Source of electricity: Generator [☐] Battery [☐] Others
13. Generator rating in KVA
14. How long do you put on your generator per day? [☐] 0 – 3hrs[☐] 3 – 6hrs[☐] 6 – 10[☐] 10 – above[☐]
15. Fueling type for your generator: Gasoline [☐] Diesel [☐]
16. Fuel consumption per day (Litres/day)
17. Source of lighting: Hurricane lamp [☐] Wick Lamp [☐] Candle [☐]

Torch Light [] Others []

18 Source of cooking energy: Fuel wood [] Charcoal [] Kerosene [] Biomass residue []
Other []

19 Type of cooking stove: Charcoal Stove [] Kerosene Stove [] Traditional 3-Stone Stove []
Others []

20 Please specify the appliances you are using now in the table below

| Appliance | Qty | Rating (Watts) |
|--------------|-----|----------------|
| Lighting | | |
| Fan | | |
| TV | | |
| Radio | | |
| Refrigerator | | |
| Others | | |
| | | |
| | | |
| | | |
| | | |
| | | |

21 Which appliances will you like to have in future?

| Appliances | Remark |
|--------------|--------|
| TV | |
| Radio | |
| Refrigerator | |
| Fan | |

| | |
|-----------------|--|
| Decoder | |
| Press Iron | |
| Microwave | |
| LED Lamp | |
| Electric Cooker | |
| Other | |

22 Cost of Candle.....

23 Cost of Kerosene per litre.....

24 Cost of battery.....

Name of Interviewer

Date.....