



United Nations Development Programme

Terms of Reference for the appointment of a Technical Expert in Utility-Scale Battery Energy Storage Systems of Lithium-ion technology under Component 2 of the GCF project

TITLE	International Consultant (IC) / Reimbursable Loan Agreement (RLA) – Technical Expert/Engineer in Utility Scale Battery Energy Storage Systems of Lithium Ion technology for the design, installation, testing and commissioning of a Battery Energy Storage System in Republic of Mauritius
COUNTRY	Republic of Mauritius
REGION	Africa
DUTY STATION	Central Electricity Board (CEB) Corporate Office, Ebene.
REPORTING TO	GCF Project Coordinator
CONTRACT TYPE	International Consultant (IC) / Reimbursable Loan Agreement (RLA)
DURATION	72 person days (47 days total for field missions and 25 days total home-based)
STARTING DATE	31 July 2020
END DATE	15 December 2020

A. Project Description

The Government of Mauritius goal to reduce fossil fuel use is reflected in the Long-Term Energy Strategy 2009-2025. Under this Strategy, the Government has announced two key targets: (1) a renewable energy (RE) target of at least 35% of electricity production by 2025; and (2) the establishment of a dedicated Mauritius Renewable Energy Agency (MARENA) to coordinate the rapid uptake of renewable energy. The national electric grid is operated by the Central Electricity Board (CEB) which is the sole public electricity supplier in Republic of Mauritius.

The Green Climate Fund (GCF), through the United Nations Development Programme (UNDP), is providing financial support and expertise to assist the Government of Mauritius in achieving the targets set out in the Long-Term Energy Strategy. In this context, the project – Accelerating the transformational shift to a low-carbon economy in the Republic of Mauritius - is being implemented since July 2017 at national level and is financed under the GCF. One of the key tasks under the project is to improve grid absorption capacity (from 60MW to 185MW) of the national electricity network.

In this respect, the project intends to co-finance a total of 18MW of utility-scale (connected) battery energy storage system (BESS) for the CEB in order to increase the grid absorption capacity. Out of the total of 18MW, 4MW of BESS have already been installed and commissioned in 2018. This assignment concerns the installation of the remaining 14MW BESS by the CEB.

The BESS will be used mainly for frequency regulation (although provision has been made in the design and specifications for both peak shaving and black start). Other functionalities such as peak shaving and black start had also been requested as per the requirement of the scope of works of the Contractor.

In order to ensure the smooth and technically sound implementation of the 14MW BESS, the UNDP intends to recruit a Technical Expert to provide assistance to the CEB for the design, installation, testing and commissioning of the 14MW BESS.

B. Scope of Work, Project Timeline & Duties and Responsibilities

B.1 Scope

The implementation of the 14 MW Battery Energy Storage System will concern 4 specific sub-stations of the CEB ('site(s)') as per Table 1 below:

Table 1: Substations at which BESS will be installed

Sub-station	Size of BESS	GPS Coordinates	
La Tour Koenig Substation	2 MW	20°10'56.43"S	57°27'4.76"E
Anahita Substation	4 MW	20°16'21.07"S	57°46'24.16"E
Jin Fei Substation	4 MW	20°6'57.05"S	57°31'43.93"E
Wooton Substation	4 MW	20°18'13.40"S	57°32'3.39"E

The implementation of the BESS will involve the following major stages/milestones:

1. Factory Acceptance Test (FAT) (Spain)
2. Installation
3. Testing & Commissioning

B.2 Project timeline

A 12-month implementation period is expected for the 14MW BESS as from the date of signature of the contract with the supplier (November 2019).

Note: As per the latest Programme of Works submitted by the main contractor back in March 2020, the project completion date is maintained for end of November 2020. As such, all timelines in this TOR are based solely on this latest schedule. Based on future developments with the respect to the Covid19 situation, the employer (UNDP) reserves the right to amend the schedule of the milestones accordingly and as and when required. The consultant is expected to demonstrate a flexible Client oriented approach in undertaking the assignment.

B.3 Duties and Responsibilities

The **general** duties and responsibilities expected from the incumbent for this assignment are set out below:

- i. **Overall:** To provide the highest standard technical advice and guidance during the Factory Acceptance Testing (FAT), installation and testing and commissioning stages of the 14MW BESS in line with international best practice in the field and based on sound experience and knowledge of similar utility-scale, battery storage systems;

- ii. **Design, layouts and detailed drawings:** Review the approved designs (layouts and detailed drawings) during the FAT, installation and testing and commissioning stages, or any time during the duration of the works to ensure that the equipment and installation works are in line with the approved documentation, and suggest any technically sound and feasible improvements where applicable and whenever required whilst ensuring no adverse impact on the schedule, scope, cost and quality of the works;
- iii. **FAT:** Accompany CEB relevant staff, to attend the two FATs in Spain for the inverters and for the PCS containers with battery interface (integrated FAT);
- iv. **Installation:** Assist the CEB during the installation phase of the works to ensure that the BESS are installed and mounted as per the Employer (CEB) Specifications and approved drawings/methodology (to be provided to the Technical Expert after his/her appointment), and the individual site specificities, and that the integrity of all equipment is maintained throughout the installation process. The technical expert is also expected to assist the CEB in troubleshooting any major issues that may arise during the installation on the CEB side of the installation;
- v. **Testing and commissioning:** Assist and provide technical advice and guidance to the CEB, during the testing and commissioning phases, in order to ensure that all testing and commissioning steps are undertaken correctly and that the system is successfully tested and commissioned. The technical expert is also expected to assist the CEB in troubleshooting any major issues that may arise during the testing and commissioning phases. The test results from the testing and commissioning can be provided to the technical expert for review;
- vi. **Technical support:** Assist the CEB, in dealings with the Supplier/Main Contractor and Sub-contractors in strict relation to the scope of works during the performance of the related contracts for the installation, testing and commissioning of the battery storage systems. Such dealings may include physical meetings with the supplier/main contractor/sub-contractors, emails or telephone conversations;
- vii. **Risk management:** Review the risk assessment performed by the Main Contractor and ensure its completeness and robustness. Propose any improvements to the risk management measures preconised and ensure that the overall risk management measures are put in place by the Main Contractor during installation, testing and commissioning stages. Notify the CEB in case of new, unidentified risks so that CEB can take the appropriate action. The risk management review shall include aspects to be addressed as per the Environmental and Social Management Plan with GCF requirements.
- viii. **Technical expert will provide a level of certification for payments to be issued to the main contractor based on progress of works.**

The **detailed** duties and responsibilities under this consultancy are provided below:

1. **FAT (Modality: on-site in Spain)**

- a) Vet and improve where necessary the proposed test schedule of the EPC Contractor for the Factory Acceptance Tests (FAT) for for the inverters and PCS container with battery interface (integrated FAT);
- b) Review and improve, if required, the FAT schedules for simulation tests to be performed on other major components of the BESS:
- c) Attend, alongside CEB technical team, the FAT for the inverters and PCS containers with battery interface (integrated FAT) in Spain;

- d) Review and approve the FAT test procedures and advise on the acceptable results for each test;
- e) Validate the FAT test results as per international practices, standards and requirement of the tender specification.
- f) Sign off all test results certifying compliance with specifications provided

2. Installation phase (Modality: on-site in Mauritius)

- a) Review all documents, information, manuals including installation manuals, procedures, technical approach and process, drawings, equipment documentation and operating procedures and other technical documentation necessary in order to ensure that the installation is compliant with the tender specification
- b) Provide technical advice to the CEB during the installation and ensure that all engineering works including electrical, mechanical and structural are being carried out in accordance with tender specifications and all applicable standards;
- c) Supervise, inspect and quality control the installation works performed for the first two sub-stations (as per the Programme of Works), review the progress of installation works with the CEB and, if required, Main and Sub Contractors. The quality control shall include (but is not limited to) cabling, routing, connections, protection, fixations, positioning, equipment and component installation, amongst others, ensuring integrity and soundness of the installation. During the supervision, inspection and quality control stages, the Technical Expert is required to train CEB staff on supervision, inspection and quality control of installation works as performed by the main or subcontractors.
- d) Where applicable, ensure any amendments made to the layouts by the CEB or other are duly reflected on site and perform a final quality check on same;
- e) Attend site meetings with CEB and CEB's contractors/subcontractors to review works status, advise on the best course of action and assist the CEB in resolving technical issues;
- f) In case of deviations on the Programme of Works (schedule), assist the CEB in analyzing the relevancy of the justification by the Contractor and propose corrective actions to minimize the delays, where technically feasible and applicable;
- g) Review, inspect and verify that the actual functionalities and philosophies of the BESS are as per the agreed design;
- h) Review, inspect and verify that the actual implemented settings and thresholds in the BESS are as per the agreed design;
- i) Review, inspect and verify that the various other relevant parameters and settings are implemented to ensure optimum performance of the BESS based on the requirements of the CEB and as per the agreed design parameters;
- j) Assist the CEB project team in the overall project management of the installation namely in terms of aligning and adjusting CEB resource allocation, reviewing deliverables, facilitating communication in the project and assessing and managing the risks during this phase.
- k) Issue a Certificate of Compliance to the CEB to effect payment for this milestone. The template for the Certificate of Compliance is to be submitted as part of the proposal.

3. Testing and Commissioning (Modality: on-site in Mauritius + on-line assistance)

- a) Review the testing and commissioning manuals and suggest improvement/amendments where required and ensure that the supplier/main contractor follows the appropriate testing and commissioning manual(s) during these stages;
- b) Assist the CEB during the testing and commissioning phases of the first two sub-stations (as per the schedule in the Programme of Works), on-site, and approve the testing and commissioning results of the first two BESS. Thereafter, review and approve the testing and commissioning results of the remaining two BESS (home-based review).
- c) Therefore, the technical expert will provide on-site assistance for the first two sites' testing & commissioning (as per the Main Contractor's schedule). He/she shall then be required provide on-line (home based) assistance for the remaining two sites' testing & commissioning;
- d) Provide technical advice in case of issues with the BESS and assist the CEB team in troubleshooting same;
- e) Respond to queries, in a timely fashion, which the CEB may have on the testing and commissioning aspects;
- f) Participate in on-site and off-site meetings with CEB and CEB's contractors/sub-contractors to review work status and resolve any issue during the testing and commission stages;
- g) Assist the CEB in meetings and dealings with contractors, sub-contractors and suppliers;
- h) Sign off on the testing and commissioning works, as and when required, on behalf of the CEB.
- i) Issue a Certificate of Compliance to the CEB to effect payment upon successful completion of the testing and commissioning for each sub-station.

4. Signing-off on the installations (on-site + online assistance)

- a) Prepare a snag list to be followed during the de-snagging part following testing & commissioning phases for all the installation sites;
- b) Sign-off on all installations, both post installation and post testing & commissioning phase;
- c) Provide a final compliance status (e.g. via compliance report or certificate of completion or compliance) on the works prior to taking over by the CEB;
- d) Review and approve the O&M manuals and any other manuals and documentation being requested by the CEB in the tender document;
- e) Review the proposed training manual and suggest, where applicable, any improvements to same or additional topics to be covered by the supplier, where applicable.
- f) Issue a final Certificate of Completion for the project and a Handing-over Certificate for each site to CEB;
- g) Certify the final claim certificate (from the main contractor) in collaboration with the CEB and after assessing any claim for extension with cost, penalties to be applied as per the contract document etc.

C. Expected outputs/deliverables

The Technical Expert shall be remunerated in accordance with the payment schedule and deliverables in Table 2 below. The work plan and subsequent reports shall be submitted in draft (for comments) and then

in final version. Incorporation of comments supplied by the Client on the draft versions is expected to take 1 week at the most.

Table 2: Expected Outputs and Deliverables

Activity	Approx. timing	Means of verification
<p>i. Workplan (10%) <i>(Approx. 5 HB days)</i></p>	<p>July 2020</p>	<ul style="list-style-type: none"> • Submission of an approved workplan • Workplan to include technical approach, schedule of field missions, schedule and scope of home-based activities
<p>ii. FAT Inverters and PCS containers with battery interface (20%) <i>(Approx. 5 FM days in Spain)</i></p>	<p>July / August 2020*</p>	<ul style="list-style-type: none"> • Reviewed/commented/annotated checklist for inspection and list of parameters for simulations • Submission of an approved FAT report to report on success rate of FAT tests performed, conformity with design parameters and expected outcomes, issues if any, any finetuning required, parameter adjustments etc.
<p>iii. Installation (30%) <i>(Approx. 21 FM days + 2.5 HB days)</i></p>	<p>September 2020*</p>	<ul style="list-style-type: none"> • Completion of supervision of installation of the BESS for the first 2 sub-stations (based on the latest revised schedule in the main contractor's programme of works) + Submission of an approved end of field mission report. • During the mission, carry out training of CEB staff on installation review, technical supervision and inspection. This aspect to be reported on adequately in the end of field mission report for this stage.
<p>iv. Testing and commissioning (30%) <i>(Approx. 21 FM days + 12.5 HB days)</i></p>	<p>October 2020*</p>	<ul style="list-style-type: none"> • Completion of supervision of the testing & commissioning of the BESS at the first 2 sub-stations (based on the latest revised schedule in the main contractor's programme of works) + Submission of an approved end of field mission report • During the mission, carry out training of CEB staff on testing & commissioning review, technical supervision and inspection. This aspect to be reported on adequately in the end of field mission report for this stage.

		<ul style="list-style-type: none"> • Provision of on-line (via Skype/Zoom) technical assistance to CEB for the other two sub-stations.
v. Sign off (10%) (Approx. 5 HB days)	November / December 2020*	<ul style="list-style-type: none"> • Submission of snag list + reviewed training and O&M manuals and any other relevant operations-related documentation. • Submission of overall compliance report for the 4 sub-stations or certificates of compliance for each sub-station. • Submission of an approved end of consultancy report.

FM: Field Mission (on-site in Mauritius Island)

HB: Home-based (mainly for offline document review and drafting of reports etc.)

**These dates may change depending on the extent of impact of Covid19 on the various supply chains etc.*

The FAT may take place online (e-FAT – to be advised by Main Contractor) if there continues to be restrictions on flights etc.

Important Notes:

- Payments are directly linked to deliverables.
- All reports including Work Plan must be submitted in an editable draft version in Word, Excel or other as well as a PDF version (for comments) and then final version, following incorporation of all comments and suggestions by the reviewing team and the Component 2 Sub-Board. The reports have to be approved by the Component 2 Project Director before payment is effected.
- The technical expert may also be requested to present the full scope of findings and recommendations to the Component 2 Sub-Board committee and other stakeholders.
- Price proposed must be an all-inclusive fee, supported by a breakdown of costs (*ref. Section H for more details*).
- Contract price is fixed for the duration of the project.

D. Institutional Arrangement

All deliverables shall be submitted in **English** and in appropriate format, in editable MS Word and in PDF as per requirement of the UNDP & CEB to the following address:

Mr Shakil BEEDASSY

Project Coordinator - “Accelerating the Transformational Shift to a Low-Carbon Economy in the Republic of Mauritius” project

6th Floor, Anglo Mauritius Building

Intendance Street,

Port Louis

Email : shakil.beedassy@undp.org

Tel : +230 212 3726

Fax : +230 208 4871

Copied to:

1) Mr Sajjid MOONARUCK

Project Manager – *“Accelerating the Transformational Shift to a Low-Carbon Economy in the Republic of Mauritius”* project

c/o CEB Corporate Office,

Rue du Savoir,

Ebene Cybercity

Mauritius.

Email : sajjid.mooniaruck@undp.org

Tel : +230 404 2000

Fax: +230 454 7630/7632

2) Mr Chavan DABEEDIN

Project Director – *“Accelerating the Transformational Shift to a Low-Carbon Economy in the Republic of Mauritius”* project

CEB Corporate Office,

Rue du Savoir,

Ebene Cybercity

Mauritius.

Email: chavan.dabeedin@ceb.intnet.mu

Tel: +230 404 2000

Fax: +230 454 7630/7632

3) Mr Iqbal DREPAUL

Alt. Project Director – *“Accelerating the Transformational Shift to a Low-Carbon Economy in the Republic of Mauritius”* project

CEB Corporate Office,

Rue du Savoir,

Ebene Cybercity

Mauritius.

Email: iqbal.dreepaul@ceb.intnet.mu

Tel: +230 404 2000

Fax: +230 454 7630/7632

4) Mr. Brahmaddutt Sewpal

Senior Engineer (Project & Construction)

Central Electricity Board

Curepipe,

Mauritius

Email: uttesh.sewpal@ceb.intnet.mu

Tel: +230 601 9700 / 9707

The project manager will be responsible for further distribution, if required. The deliverables should be of high quality in form and substance and with appropriate professional presentation. For document-based submissions, they should be in Microsoft Word (or other similar) format and contain a document control cover page for ease of tracking. The Technical Expert should fully comply with the requirements of UNDP in terms of content and presentation and respect UNDP GCF visibility guidelines, since **unsatisfactory performance may result in termination of contract.**

E. Duration of the work

The Technical Expert shall be assigned for **72 person-days** (42 days field mission in Mauritius, 5 days field mission in Spain and 25 days home-based) between 01 July 2020 until 31 December 2020 for the successful completion of the assignment.

F. Duty Station

During the field-based part of the assignment in **Mauritius**, the Technical Expert will be based as relevant at the CEB Corporate Office, Ebene Cybercity.

G. Competencies and Qualifications

Corporate Competencies:

- Demonstrates commitment to UNDP's mission, vision and values;
- Displays cultural, gender, religion, race, nationality and age sensitivity and adaptability;
- Ability to work effectively with counterpart staff at all levels and with all groups involved in the project; and
- Highest standards of integrity, discretion and loyalty.

Functional Competencies:

- Shares knowledge and experience; and
- Actively works towards continuing personal learning, acts on learning plan and applies newly acquired skills.

Development and Operational Effectiveness

- Ability to report analytical outputs in a clear, concise manner to a non-technical audience;
- Ability to maintain appropriate records / uphold quality assurance integrity;
- Strong drafting, presentation and reporting skills, excellent written communication skills;
- IT competencies in Word, Excel, Power Point and internet.

Leadership and Self-Management

- Focuses on result for the client and responses positively to feedback; and
- A good personality with strong leadership skills.

Education:

- **Mandatory:** Bachelor degree in Electrical Engineering
- **Desirable:** Additional postgraduate in Automation or Power System or any other relevant fields including Project Management

Experience:

- Minimum 10 years of working experience
- Minimum of two BESS projects, of lithium ion batteries, of 2MW or higher capacity for frequency regulation as Engineer
- Working experience with both public and private sector is desirable. Experience in donor funded projects will be an advantage.

Language:

- Fluency in English (both written and verbal) is a must. Knowledge of French and Creole is an advantage.

H. Scope of bid price and schedule of payments

The financial offer should be quoted as a **lump sum, all-inclusive (professional fee, insurance, all travel costs, per diem, etc.) amount, supported by a breakdown of costs as per template provided by UNDP.** Table 3 below provides an **indication** of the distinct travel costs and upon which the consultant should base him/herself when working out the lump-sum quote for this consultancy:

Table 3: Travel related expenses for the assignment

Costs	Additional details
Air Tickets	<ol style="list-style-type: none"> 1. 4 return tickets to Mauritius. 2. Return tickets to Spain are not to be quoted in the lump sum as they will be catered for separately under the GCF project.
Daily Subsistence Allowance (DSA)	<ol style="list-style-type: none"> 1. DSA for period of stay in Mauritius, as per UNDP rates. 2. DSA for period of stay in France and Spain are not to be quoted in the lump sum as they will be catered for separately under the GCF project.
Terminal Expenses (TE)	<ol style="list-style-type: none"> 1. TE as per UNDP rates. 2. TE France and Spain are not to be quoted in the lump sum as they will be catered for separately under the GCF project.

UNDP will **not** accept travel costs exceeding those of an economy class ticket. Should the consultant wish to travel on a higher class he/she should do so using his/her own resources.

The contract price is fixed regardless of changes in the cost components. In the case of unforeseeable travel (additional mission for example), payment of travel costs including tickets, accommodation and terminal expenses should be agreed upon prior to travel between UNDP and Individual Consultant and will be reimbursed.

Payments will be made based on deliverables as per **section C**.

I. Recommended Presentation of Offer

The following documents are requested:

- a) Duly completed **Letter of Confirmation of Interest and Availability** using the template provided by UNDP;
- b) **Personal CV**, indicating all past experience from similar projects, as well as the contact details (email and telephone number) of the Candidate and at least three (3) professional references related to work that was carried out on BESS projects;
- c) **Technical offer: Brief description** of why the individual considers him/herself as the most suitable for the assignment and a **methodology** on how they will approach and complete the assignment;
- d) **Financial Proposal** that indicates the all-inclusive fixed total contract price, supported by a breakdown of costs, as per template provided by UNDP.

J. Criteria for selection of best offer

Individual consultants will be evaluated based on the following methodology:

Cumulative analysis

The award of the contract will be made to the candidate whose offer has been evaluated using the “Combined Scoring Method” whereby the selection will be based on a Combined Scoring Method where the technical proposal will be 70 per cent and combined with the price offer which will be weighted 30 per cent.

When using this scoring method, the award of the contract should be made to the individual consultant whose offer has been evaluated and determined as:

- a) Responsive/compliant/acceptable technical proposal; and
- b) Having received the highest score out of a pre-determined set of weighted technical and financial criteria specific to the solicitation.

Table 4. Technical evaluation criteria:

	Criteria	Max. Point
1	Bachelor’s degree in electrical engineering	15
2	Additional Postgraduate (MSc. Or Ph.D.) in Power Systems / Energy Storage / Power Electronics / or equivalent	10
3	Minimum 10 years of working experience	10

4	A minimum of two utility-scale BESS projects, of lithium-ion technology, for frequency regulation with a minimum of 2MW BESS per project	20
5	Working experience with both public and private sector is desirable. Experience in donor funded projects will be an advantage.	10
6	Language (English mandatory/French is a plus)	5
7	Technical Proposal	30
	TOTAL max.	100

Candidates scoring a minimum of 70% of the maximum marks on the above criteria will be considered for the financial evaluation.

Final scoring

The financial offers will be evaluated giving the lowest price proposal 30 marks and marking the other more expensive proposals reverse proportionally to the cheapest offer.

The final scoring of short-listed candidates will take into account the technical score and the financial score:

Criteria	Weight	Max. Point
• Technical score	70%	70
• Financial score	30%	30

The candidate ranking highest shall be selected.

This TOR is approved by:

Satyajeet Ramchurn

Signature: _____

Designation: Head of Environment Unit

Date: 02-Jun-2020