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Qulliq Energy Corporation  
Société d'énergie Qulliq  
Qulliq Airuyaktuqtunik Ikumatjutiit

## REQUEST FOR PROPOSAL

Qulliq Energy Corporation (QEC)

Construction of New Diesel Power Plant at Kugluktuk, Nunavut

### Chapter 05

#### **Photo Voltaic (PV) Solar and Battery Energy Storage System (BESS) Requirements**

|     |                                |   |
|-----|--------------------------------|---|
| 1   | SCOPE OF THE DOCUMENT          | 2 |
| 2   | OBJECTIVE                      | 2 |
| 3   | SCOPE OF WORK                  | 2 |
| 4   | DELIVERABLES                   | 3 |
| 5   | DESIGN GUIDELINE               | 4 |
| 6   | ENERGY MANAGEMENT AND CONTROLS | 5 |
| 7   | PERFORMANCE                    | 5 |
| 7.1 | CRITERIA                       | 5 |
| 7.2 | GUARANTEE                      | 5 |
| 8   | COMMISSIONING                  | 6 |

## 1. SCOPE OF THE DOCUMENT:

This document establishes the general guidelines for conceptual design and detail design, procurement, installation, commissioning and integration of 500KW (AC) Photovoltaic Solar System (solar panel) and BESS to diesel generation. It is the responsibility of the contractor to follow all applicable codes, Standards, underwriters laboratories certifications and regulations during the project design, execution, integration and commissioning.

## 2. OBJECTIVE:

- a) Contractor shall provide a conceptual design to connect 500kW Photo Voltaic System (solar panel) and Battery Energy Storage System(BESS) with the 2.6MW diesel plant
- b) The provided solutions shall contain the philosophy, technology/material to be used, protection and interconnection scheme, with supporting data(assessment, analysis, rationale)
- c) Contractor shall provide PV energy model, BESS life cycle and specification, system life cycle VS. cost & performance analysis.
- d) The intent of BESS is to provide support during the transition period i.e. the period when the solar system is getting OFF and diesel generator is getting ON.
- e) The contractor shall also execute the project after going through the phases of conceptual and detail design.

## 3. SCOPE OF WORK:

The contractor shall perform all professional services as necessary to provide QEC with a total “Turnkey” project including all necessary equipment, material, conceptual and detail design, manufacturing, installation, testing, commissioning and training services for the installation of ground mount 500kW utility-interactive photovoltaic system, BESS, and interconnection with diesel plant. The contractor shall install the project such that it is operational and compliant with all applicable standards, building codes, certifications and UTILITY interconnection requirements. The contractor shall include specifications, calculations and drawings in the design package, as required and turn it over to QEC for review.

The contractor shall first prepare and provide conceptual design, based on 25 years’ life cycle of the project. After review and comment by QEC, detail design package shall be prepared. Supply, install, testing and commissioning of the system start, once QEC agreed with the final design.

- a) Examine the plots/available area and suggest optimum layout for all components of this hybrid plant, which includes diesel / solar PV panel and storage, and all other accessories of the Hybrid plant (see attached site map for reference)
- b) Contractor shall be responsible for civil work include Design, fabricate, supply and install module mounting structures; civil footings /foundations of appropriate and anchoring of fixed tilt module mounting structure.
- c) Contractor shall be responsible for work required for site development activities inclusive but not limited to area grading, excavation, cutting, filling and disposal of soil from site, levelling of land; cable trenches & storm weather drainage system, construction of room for inverter with electrical fixtures and proper air circulation (if required).

- #### 4. DELIVERABLES:

- 3 | Page

- ## 5. DESIGN GUIDELINE:

- a) Mounting system shall be directly anchored into the ground (driven piers, etc.). Mounting system design needs to meet applicable local building code requirements with respect to snow, wind/gust, and earthquake factors.
- b) High efficiency panels, inverters (central or string), transformer and allied material (Balance of material BOS) shall be used.
- c) DC to AC ratio may be 1.2 or other optimal number
- d) Panels' orientation or azimuth shall be of due south.
- e) Optimal tilt shall be determined after site assessment based on site latitude and wind conditions to capture maximum amount of energy (PVsyst or similar software report required).
- f) Ground cover and vegetation management shall be included in the proposal (if applicable).
- g) Storm water management and erosion control management plan shall be included in the proposal.
- h) All lines interconnecting PV arrays to point of interconnection shall be underground, secured in PVC conduits.
- i) Contractor shall review and implement the report recommendations (see section XXXX) as this is required for Project reporting

The Contractor shall be responsible for performing all engineering, fabrication, supply, install and commission of the components of the BESS, enclosure and pertinent assemblies and accessories. The BESS shall include necessary plumbing, lighting, fire protection and electrical outlets as well as facilities for ambient temperature, humidity and dust control, as required. All the required AC and DC disconnects shall be UL listed and in rated NEMA enclosure.

- a) Interface with inverter controller
- b) Battery management systems
- c) Control battery charging, discharging and state of charge
- d) Provide alarming for out of specification conditions and malfunctions
- e) Communication interface with QEC system.
- f) Communication to the transformer high side circuit breaker protection scheme to protect the BESS and PV system from system abnormalities such as faults, under frequency, over frequency, etc.
- g) HMI's are to be located in the battery enclosure or in QEC control room.
- h) Energy management software communication protocols shall be Modbus RTU, Modbus TCP, or DNP3

a. CRITERIA:

- b. GRANTEE:

- I. The power output in terms of efficiency of panels, inverters and BESS over the period of 10yr, 20 and 25years.
- II. If output drops below the capacity, the contractor shall replace the particular unit.

The vendor shall develop and submit a commissioning program and after review from QEC shall perform commissioning that will include but not be limited to

- Procedures for design verification,
- Operational acceptance testing,
- Start-up procedures,
- Operator training and provide operational training manuals
- Functional acceptance testing and safety testing.