**Supplier Terms of Reference**

**Equipping of a borehole with solar water pumping system**

**Oxfam in Lebanon program**

**Oxfam** is a global movement of people, working together to end the injustice of poverty. Oxfam has been working in Lebanon since 1993. We provide humanitarian assistance to vulnerable people affected by conflict, and we promote economic justice and good governance, and women’s rights. Oxfam also works with local partners to contribute to the protection and empowerment of marginalized women and men.

**Oxfam is seeking a company to carry out installation of a solar power system** **for a borehole that provides water to 110 households in Tripoli, Darawish street in Tebenneh area** (Coordinates: 34.445042, 35.854382)**. The borehole is equipped with two pumps of 2 hp each.**

**Project Objective:**

**Equipping a borehole with a solar power system on a building to ensure safe access to water for the most vulnerable families living in the, Darawish street in Tebenneh area.**

***A)*  Installation of a solar power system*:***

* *Hybrid inverter with a nominal power of 8000 watts (W) minimum, as per technical Appendix I.*
* *24 solar panels with nominal power of 545 Wp each or higher, mono-crystalline silicon modules, efficiency higher than 20%, Tier 1 Manufacturers, as per technical Appendix I.*
* *G90 Galvanized steel support structures, with all needed accessories for a complete and safe installation, as per technical Appendix I.*
* *Lithium battery with a capacity of 15 kWh, as per technical Appendix I.*
* ***AC Accessories:***
* *Panel Board 9-Module\*1*
* *AC Circuit Breaker 4-Pole 40 A \*2*
* *Volt- Ampere Meter With OVP \*2*
* *Modular Contactor \*1*
* *Modular Sign Lamp \*1*
* *AC Power Cables S=4\*10mm2 \*20 Lm*
* *Additional Accessories \*LS*

* ***DC Accessories***
* *Panel Board 12-Module \*1*
* *DC Circuit Breaker 63 A - for PVM's \*3*
* *DC MCCB 200 A - for Battery Bank \*1*
* *DC Fuse Holder 1000V \*6*
* *DC Fuse 24A \*6*
* *DC Power Cable S=6mm2 \*300 Lm*
* *Power Cable S=25mm2 \*8 Lm*
* *MC4 Connector \*6*
* *Additional Accessories \*LS*
* *Supply and install Storage water Tanks: Capacity: 2000 liters (approximately 528 gallons)*
* *Spare Parts:*
* *Panels \*4*
* *DC MCCB 200 A \*1*
* *DC Fuse Holder 1000V \*2*
* *DC Fuse 24A \*2*
* *Earthing system (electrical resistance less than 5 ohms)*
* *Chlorination system dosing machine Liquid*
* *Chlorination dosing system consisting of 2 dosing pumps (duty/standby basis), 2 FRP tanks 100 Liters, mixer and all required accessories for dosing chlorine in the inlet and monitor the outlet water to be 2-3 ppm.*

**Content of Works:**

* The period of execution the works is up to 15 days
* The contractor will be responsible to provide transportation for himself and his team.
* The contractor must visit the work site before submitting his technical offer and he must match the technical offer with the actual status for the execution.
* The Site Engineer may amend what he deems "technically" suitable for the project and after taking the approval of Oxfam, and the Contractor must abide completely with what was required by the supervising committee.
* The Contractor’s relationship will directly be with Oxfam staff.
* Oxfam will inform the contractor on the date of execution before one week.
* Oxfam staff will be onsite during the execution.
* The contractor shall execute all work required in the presence of the Oxfam site considering that the supervision committee has the right to require re-implementation in case of violation of specifications agreed in the technical Book of Conditions or the instructions of the supervising committee or which have been executed in the absence of Oxfam supervisors without informing the Supervisor of the time of executing the works.
* Oxfam Team will monitor and confirm the work.
* All execution should be as the ToR and BoQ.
* Contractor must ensure safety and security/prevention to avoid any accident while working.
* Oxfam has the right to increase or decrease quantities at the same unit cost.
* The contractor should send specification/data sheet for the item before installing them on the site.
* The contractor should send the system’s single line diagram, PV layout, steel structure details, and other relevant documents before installation.

**The contractor must visit the work site before submitting his technical offer and he must match the technical offer with the actual status for the execution.**

**The site visit is scheduled on Wednesday November 15, 2023, at 9:30 am.**

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| --- | --- | --- | --- | --- | --- |
| # | Description | UNIT | QUANTITY | UNIT PRICE | TOTAL PRICE |
|  |  |  |  |  |  |
| 1 | *Supply and install a hybrid inverter with a minimum nominal power of 8000 watts (W) with all accessories needed, as per technical Appendix I.* | Item | 1 |  |  |
| 2 | *Supply and install 24 solar panels with nominal power of 545 Wp each or higher with all accessories needed and following the instruction of engineer, as per technical Appendix I.* | Item | 24 |  |  |
| 3 | *Supply, install, test and commission of G90 Galvanized steel support structures, with all needed accessories for a complete and safe installation, as per technical Appendix I.* | Item | 24 |  |  |
| 4 | *Supply and install lithium battery with a capacity of 15 kWh, with all accessories needed, as per technical Appendix I.* | Item | 1 |  |  |
| 5 | ***AC Accessories:***   * *Panel Board 9-Module\*1* * *AC Circuit Breaker 4-Pole 40 A \*2* * *Volt- Ampere Meter With OVP \*2* * *Modular Contactor \*1* * *Modular Sign Lamp \*1* * *AC Power Cables S=4\*10mm2 \*20 Lm* * *Additional Accessories \*LS* | Item | 1 |  |  |
| 6 | ***DC Accessories***   * *Panel Board 12-Module \*1* * *DC Circuit Breaker 63 A - for PVM's \*3* * *DC MCCB 200 A - for Battery Bank \*1* * *DC Fuse Holder 1000V \*6* * *DC Fuse 24A \*6* * *DC Power Cable S=6mm2 \*300 Lm* * *Power Cable S=25mm2 \*8 Lm* * *MC4 Connector \*6* * *Additional Accessories \*LS* | Item | 1 |  |  |
| 7 | *Supply and install Storage water Tanks: Capacity: 2000 liters (approximately 528 gallons)* | Item | 4 |  |  |
| 8 | *Spare Parts:*   * *Panels \*4* * *DC MCCB 200 A \*1* * *DC Fuse Holder 1000V \*2* * *DC Fuse 24A \*2* | Item | 1 |  |  |
| 9 | Supply, install and commission an earthing system (electrical resistance less than 5 ohms) | Item | 1 |  |  |
|  | Chlorination system dosing machine Liquid  Supply, install and commission a chlorination dosing system consisting of 2 dosing pumps (duty/standby basis), 2 FRP tank 100 Liters, mixer and all required accessories for dosing chlorine in the inlet and monitor the outlet water to be 2-3 ppm. | Item | 1 |  |  |
| 11 | Supply and install of fire extinguisher 6 kg, type ABC dry powder | Item | 1 |  |  |
| 12 | Supply and install of fire extinguisher 5 kg, type CO2 | Item | 1 |  |  |
| 13 | Supply a first aid kit. | Item | 1 |  |  |
|  |  |  |  |  |  |

**Contractor must**

Ensure that the supplied items are brand new **not renewed**, and that applies to all the supplied items. Preference is given to the items that have proven technical quality and efficiency during the operation.

**Qualifications**

* More than 2 years of experience (Contractor to submit list of projects, date, reference, power of the system).
* Technical capacity to implement the project (Contractor to submit CVs for main key staff; example PM, Solar/electrical engineer…)
* Quality of the items; Data sheet of the materials (contractor to submit to specification data sheet of the main items: panel, invertor, cables, battery).
* Capacity to complete the project on time, contractor to submit workplan.

**Selection criteria for administrative compliance**

* Company Profile.
* Size of customer database - along with a list of your main customers including any Non-Governmental Organizations (NGOs) and U.N. agencies
* Copies of Institution registration certificate and VAT registration certificate (if available) apply for companies only not individuals.
* Other relevant documents according to the above criteria.
* Bank details

**Start date**

The tentative start date is 20 November.

**Coordination and Supervision**

The activity will be supervised by Oxfam’s PHE team. Oxfam may assign additional staff during the implementation of activity.

**Questions / Request for clarification**

Any requests for clarification may be submitted by email to Rita Diab [rdiab@oxfam.org.uk](mailto:rdiab@oxfam.org.uk) ccing [SHeneskehian@oxfam.org.uk](mailto:SHeneskehian@oxfam.org.uk)

**Timeframe and Payment**

100% payment after completing the activity of the requested quantity and submitting the financial documents. Oxfam will pay based on the executed work in comparison with the BoQ.

**Appendix I: Technical Specifications**

**I.1. Solar photovoltaic (PV) Modules:**

The contractor shall supply, deliver, and install the PV modules according to the following criteria:

• PV-modules must have a product warranty of at least 10 years and a linear power warranty of at least 97% after 1 year, 90% after 10 years and 80% after 25 years. All PV-modules must be plus-sorted and thus deliver more power than their designation indicates. This must be clearly stated in the manufacturer's data sheet.

• All modules must be of a robust design. Only certified Mono-crystalline silicon modules will be accepted from Tier1 Manufacturers.

• Number of cells in a module: 144 cells.

• Rated power of the PV panel > or = 545Wp at STC.

• Module conversion efficiency: greater or equal to 20 %.

• Module DC voltage up to 1000 VDC.

• Cell protection: Cells should be protected by antireflective coated tempered glass.

• Module shall withstand load up to 5400 Pascal.

• I-V curve should be supplied.

• PV modules must be approved to IEC/EN 61215 ,61730-1/2, certified and listed. Certifications have to be issued by an internationally recognized laboratory.

• Measures against Potential Induced Degradation (PID)

• Including but not limited to:

* All fixing accessories on module framing.
* Earthing of the PV modules.
* Device preventing any risk of electrolytic couple.
* Report flash testing of the modules to be provided before installation.

• The PV Modules shall be clearly labelled and permanently marked with a data plate containing the following information: manufacturer’s name and physical address, type/model number, the watt-peak power rating at STC, open circuit voltage and short circuit current, voltage and current at maximum power point, tolerance and temperature coefficient, country of manufacture, certification, e.g: UL listing, IEC 61215,ISO certification, with fool-proof +ve/-ve connectors.

• Tilt and orientation of PV modules must be optimized for maximum yearly energy output.

• PV module wiring, and associated components should resist to UV, wind, water, and other environmental conditions. Wiring and components should be fit for this purpose and built in such a way as to minimize exposure to detrimental environmental effects. Particular attention is drawn to the need for prevention of water accumulation in cable/ module support systems.

• Provide manufacturer’s flash test report for each panel used in the project.

**I.2 Steel Structural Design Criteria**

The contractor shall provide his own proposal with the drawing guidelines and in conformity with the international and national standard codes.

The contractor shall supply, deliver and install G90 Galvanized support structures according to the following criteria:

• The contractor shall limit his structure installation to the allocated area.

• Particular attention should be given to wind loads on PV modules and structure so that they withstand up to 140 km/h gust speed.

• Wind load calculation study for PV array should be presented according to international structural codes software simulation.

• Safety procedure for Steel Structure should be planned to avoid any injury to site, equipment, and personnel. Fire extinguishers, water buckets, safety gloves, life rope, helmets, safety shoes, welding masks…. And other needed PPE, are mandatory during the welding process.

**I.3 Hybrid (On/Off) Inverter**

Contractor shall supply, deliver, and install hybrid (On/Off grid) inverter according to the following criteria:

• Rated power of the inverter should be 8 kW or higher, with built-in dual input MPPT solar charger. (Capable of charging Lithium battery (ies))

• The inverter must have a product warranty of at least 5 years and an efficiency of at least 97% according to international standards by the end of the warranty term.

• Should be connected in parallel with a back-up generator in addition to EDL public Grid.

• The inverter shall be of 230 V and 50 Hz output

• Insulation testing feature on DC side.

• AC type 1+2 surge arrestor shall be provided on the AC side.

• Acoustic noise less than 45 dB (A).

• Ground connection of the inverter to the equipotential bonding conductor and to the protective conductor on the AC Side.

• Suitable consideration of the inverter ventilation to avoid potential capacity de-rating.

• Inverter must meet following standards: EN 62109-1&2, EN 61000-2 & 3. Safety according to EN 60335-1, 60335-2-29. Emission and immunity according to EN 55014-1, EN 55014-2, EN 61000-3-3. Anti-islanding according to VDE AR-N 4105.

• Minimum manufacturer warranty of 2 years from commissioning.

**I.4** **Lithium Battery**

The battery bank provided for this project shall comply with the below specifications:

• Lithium Ion LIFePO4

• Maintenance free Battery bank

• Built in BMS integrated into battery

• Battery Capacity 15 kWh

• Maximum DoD > 95%

• Operating ambient Temperatures: Discharging: -30 to 50 °C Charging: 0 to 50 °C.

• Equipped with battery connectors

• Allows both indoor and outdoor installation

• IP55 rating or higher

• Battery Warranty: 10 years

**I.5 Monitoring and Control Equipment**

The contractor must check troubleshoot the existing monitoring system for PV system including the:

*Manual-Mode Operation:*

The system shall operate manually from solar PV system (DC Source) and in case the operator needs to shut down the pump inverter, and switch to the existing AC source, an MTS shall be installed switching between the pump inverter output and the starter output prior to the pump.

*Pump Runs/Stops If:*

The pump shall operate normally from the solar PV or Grid/ Generator side unless:

- Any fault detected from pump inverter, pump stops

- Any fault detected from existing starter, pump stops

The pump shall stop operating at any fault detection mentioned above and shall resume its operation after a manual reset and safety time frame has passed.

**I.6 Protection Circuits and Cables (based on the requirement):**

The contractor shall supply, deliver, and install the protection circuits and cables according to the following criteria and as per BoQ, and Oxfam staff recommendation:

• Circuit breakers should be provided for short-circuit conditions.

• All electronics components must take into consideration temperature compensation issues.

• Full protection against open circuit, accidental short circuit and reverse polarity should be provided.

• All circuit breakers, fuses, disconnects and cables used on DC side must be listed or recognized for use in DC circuits where applicable. Equipment only rated for use in AC circuits will not be permitted for use in DC circuits.

• All cables and items that are exposed to the sun should be UV resistant.

• All cables installed must follow the specifications listed in the BOQ and minor voltage drop (voltage drop less than 2% on DC side, and less than 4% on AC side)

• Solar cables (Photovoltaic cables) specifically manufactured for solar applications shall be used. They should be manufactured according to the international standard EN 50618- H1Z2Z2-K.

• Electrical junction boxes shall be UV resistant, IP65, weatherproof.

• Earthing systems of the installation shall be verified

• Provide at least one AC disconnector located adjacent to the inverter.

• Provide a lockable manual transfer switch between the Grid/Generator input and the pump inverter directly connected to the pump, in case of solar system emergency shutdown.

• Provide at least one DC disconnector adjacent to the inverter.

• Surge suppression on the DC and AC side of the inverter must be provided near the inverter and DC surge protection near the PV modules.

• Minimum warranty of 2 years from commissioning.

**I.7 Safety Signs**

The service provider shall supply and install the following safety signs which shall be treated against oxidation, and supplied with the descriptions below:

• Warning do not touch

The minimum dimensions of the safety signs must be 20 cm height and 20 cm length.

The service provider shall provide signage at all disconnecting means including switches and circuit breakers in accordance with NEC article 690.17.

**I.8 Fire-Fighting Equipment**

Electrical room shall be provided with portable dioxide (CO2) fire extinguishers, complete with a gauge and wall bracket:

* Supply and install of fire extinguisher 6 kg, type ABC dry powder.
* Supply and install of fire extinguisher 5 kg, type CO2.
* Supply and install of a first aid kit.

In addition to the above equipment, the site should be equipped with at least the following items:

Portable Power Emergency lights.

Electrical sockets for maintenance.

**I.9 Testing and commissioning**

Service provider shall execute the following PV tests:

* PV string test to assess each string performance.
* Inverter test to assess inverter performance.
* Cables insulation resistance test to assess cables integrity.
* Earthing test to assess earthing performance.

Methodology of the above tests shall be submitted for approval by the consultant prior to execution.

**I.10 Documentation**

After contract award all the here below documents shall be prepared by the contractor in line with the here above specifications and requirements and submitted for approval by the Oxfam staff prior to execution.

* Document submittal schedule (to be submitted 2 days after contract signature).
* Project execution schedule.
* All system’s components datasheets and certificates, highlighting the specific models and selections of parts that will be used in the project, with quantities if need be.
* PV modules layout indicating the configuration and the required space, with schematic drawings of the allocated area for PV array.
* Single line diagram.
* Any other relevant document.

**I.11 Warranty, Defects Liability, Service and Maintenance**

a. The preliminary completion date is the date at which the contractor completes all his works, commission the system and train the operator and get a provisional acceptance certificate from the Oxfam staff.

b. The final completion date is the date at which the warrantee period starts. The Oxfam staff shall issue a final acceptance certificate.

c. The contractor Warrantee Period shall be **one year** from final completion date.

d. The contractor warrantee shall cover all works, manpower, spare parts, replacements, resulting from failure of equipment, systems and accessories supplied by the Service provider, except when said failures are due to Client’s fault.

e. All components of the system mentioned above shall also be covered by the manufacturer’s guarantee.

f. Rectification of all defects developed in the solar system during Warranty period shall be done by the contractor promptly, at most within two (2) days from date of receipt of the complaint.

g. It is understood that any alteration made to the equipment or accessories without the prior approval of the contractor will automatically cancel the remaining warranty period on the affected part.

h. Prior to the final completion date, the contractor must be available to answer any request that comes from the operator. The reply delay should be within one week.