



Request for Quotation
For the purchase of material as per the following information.

A. Introduction

Pact is a US-based organization that has been engaged in a number of poverty alleviation and development program in Ethiopia since 1996. Pact's unique contribution as a development partner lies in the vitality, breadth and sectorial composition of its development programs.

B. Purpose

Pact would like to purchase the following Items for project use.

| S. No | Description of the Item | Quantity |
|-------|---|----------|
| 1 | Solar Panel power back up system with accessories | 18 |

C. Eligibility.

Accordingly Pact invites potential and reliable suppliers fulfilling the following criteria.

1. The Agency/Company detail profile (for both)
2. Business registration certificate from relevant authorities
3. Experience in supplying of similar items, document showing such experience should be attached. Has the ability/capacity to meet deadlines for delivering the items. (for both)
4. Has past experience of supplying such items to similar organizations by meeting deadlines. Letter recommendation from clients.
5. Has the representative in Ethiopia (for international suppliers)

D. Prices:

Prices should be fixed and it includes, installation and costs of delivery to Pact Ethiopia Office. Price should also specify whether it is before or after VAT.

E. Validity:

Quotes shall remain valid for three month from the due date of receipt of quotes. In exceptional circumstances, prior to expiry of the original offer validity period, Pact may request that the offeror extend the period of validity for a specified additional period.

F. Delivery Date: not later than 1 month after placing order (signing Purchase Order).

1. Pact shall not be responsible for any costs related to the preparation and submission of the quotation.
2. Late quotes shall not be considered.
3. Pact has the right to cancel or reject the whole or parts of the bid as deemed serves its interest
4. Pact may request for sample checking of the product during the selection process as deemed necessary.

G. Evaluation of Quotes:

Quotes will be evaluated based on the following criteria:

- Adherence to product specifications.
- Price
- Delivery date
- Past experience and performance in supplying similar items in Ethiopia.
- Availability of material at stock
- Has the representative in Ethiopia for International supplier.

H. Award Criteria:

Pact is not obligated to make an award by virtue of having issued this solicitation. Any award is predicated on Pact receiving funding for this express purpose. Pact can only make an award if the product fully complies with the technical specifications mentioned in the RFQ. Pact may make an award to a single offeror should such an award be advantageous to Pact. Alternatively, Pact may make awards to different offerors should such multiple awards be more advantageous to Pact. Any award(s) will be made to the responsible offeror whose offer(s) has/have been determined to be most advantageous to Pact. Pact reserves the right to cancel or reject the offer, in part or the whole as deemed best serve its interest

I. How to apply

The bidders should submit the quotation (Technical and Financial) in hand delivery with **SEALED ENVELOP** with copy of the quote to Pact Ethiopia Office. International suppliers can send their quotation (Technical and Financial) by the following email address (infoethiopia@pactworld.org) or stesfaye@pactworld.org up to August 15, 2019, before 5:00 P.M and late quotes shall not be considered.

Interested supplier can ask further clarification or question through the following email address (infoethiopia@pactworld.org) and Pact will provide you.

Please see detail specification in the Annex 1 below to this document.

Pact's office is located at Wuhalemat area, Bole Sub-City Wereda 4, House NO. 533. Telephone: +251-11-661 65 72/26 44/63 04/67 22

J. Terms and Conditions

A. Disclaimers

- Pact reserves the right to modify by written notice the terms of this solicitation at any time in its sole discretion. Pact may cancel the solicitation at any time
- Pact may reject any or all proposals received.
- Issuance of solicitation does not constitute award commitment by Pact.
- Pact reserves the right to disqualify any quotation based on vendor's failure to follow solicitation instructions.
- Pact will not compensate Vendors for their response to the solicitation.
- Pact reserves the right to issue an award based on initial evaluation of applications without further discussion.
- Pact may choose to award only part of the quantities in the solicitation or to issue multiple awards.
- Pact reserves the right to waive minor proposal deficiencies that can be corrected prior to award determination to promote competition.
- Pact may contact Vendors to confirm contact person, address, and that the proposal was submitted for this solicitation.
- Pact may contact listed past performance references without notice to the Vendor. Pact also reserves the right to contact other past performance information sources that the Vendor did not list in the proposal.
- By submitting a proposal, the Vendor confirms they understand the terms and conditions.
- Information pertaining to and obtained from the Vendor as a result of participation in this solicitation is confidential. The Vendor consents to the disclosure of the documents submitted by the Vendor to the reviewers involved in the selection process. Please note that all reviewers are bound by non-disclosure agreements.
- In exceptional circumstances, Pact Myanmar may request to supplier to extend for the validity of Quotation beyond what has been initially indicated in this RFQ. The quotation shall then confirm the extension in writing, without any modification whatsoever on the Quotation.

B. Purchase Order Terms and Conditions for Commercial Items

APPLICABLE LAW – This purchase order shall be enforced in accordance with the body of law applicable to procurement of goods and services and the laws of the Ethiopia shall apply. By accepting this agreement Vendor agrees to waive any rights to invoke the jurisdiction of the local national courts where this contract is performed.

1. **ASSIGNMENT** – This purchase order or any interest therein nor claim thereunder shall not be assigned, transferred, or subcontracted by the Vendor.
2. **CHANGES** – (a) By written order, Pact may direct changes for: (i) technical requirements; (ii) shipment or packing methods; (iii) place of delivery, inspection or acceptance; (iv) reasonable adjustments in quantities, delivery schedules or both; and, (v) terms and conditions of this contract required to meet Pact’s obligations under funding agreement. (b) If any such change causes an increase or decrease in the price or in the time required for its performance, Vendor shall promptly notify Pact thereof and assert its claim for equitable adjustment within thirty (30) days after the change is ordered, and an equitable adjustment shall be made. However, nothing in this provision shall excuse Vendor from proceeding immediately with the directed change(s). Changes shall not be binding upon Pact except when specifically confirmed in a written modification.
3. **CONFIDENTIAL INFORMATION** – Vendor shall not publish any information developed under this Purchase Order, nor disclose, confirm, or deny any details about the existence or subject matter of this Purchase Order, or use Pact’s name in connection with Vendor’s sales promotion or publicity without prior written approval by Pact.
4. **DISPUTES** – In case of a dispute arising from this agreement, the parties shall use their best efforts to arrive at an agreeable resolution. Any dispute that is not settled through the above “best efforts clause” shall be settled by arbitration administered by the American Arbitration Association in accordance with its Commercial Arbitration Rules, and judgment on the award rendered by the arbitrator(s) may be entered in any court having jurisdiction thereof. The arbitrator(s) may not award punitive or special damages. The parties in dispute shall each pay its own expenses in conjunction with the arbitration, but the compensation and expenses of the arbitrator(s) shall be borne in such manner as may be specified in the decision of the arbitrator(s). The Vendor shall proceed diligently with its performance of this purchase order pending the final resolution of any dispute arising or relating to this purchase order. Pact shall continue to reimburse the Vendor for its allowable costs in accordance with the payment provisions of this purchase order except for those costs related to the dispute.
5. **ETHICAL STANDARDS OF CONDUCT** – Vendor shall neither receive nor give any gifts or gratuities in connection with this Purchase Order. Vendor’s employees are required to conduct company business with integrity and maintain a high standard of conduct in all business-related activities. Vendor shall not participate in any unethical conduct during performance of this Purchase Order. Vendor shall not engage in any personal, business, or investment activity that may be defined as a conflict of interest, whether real or perceived.
6. **EXCUSABLE DELAYS** – The Vendor shall be liable for default unless nonperformance is caused by an occurrence beyond the reasonable control of the Vendor and without its fault or negligence such as, acts of God or the public enemy, acts of the Government in either its sovereign or contractual

capacity, fires, floods, epidemics, quarantine restrictions, strikes, unusually severe weather, and delays of common carriers. The Vendor shall notify Pact in writing as soon as it is reasonably possible after the commencement of any excusable delay and shall include the Vendor's estimate of the likely duration of the delay.

7. **EXPORT AND TRANSPORTATION CLEARANCES** – Vendor shall secure in a timely manner all necessary licenses, approvals, permits and other authorizations, and shall successfully comply with all applicable laws and binding regulations and complete all required administrative processes and other formalities, for export of the Goods and any Related Services from their country of origin, through any intermediary countries, to their destination as specified in the Purchase Order.
8. **INDEMNIFICATION** – The Vendor is solely and exclusively liable to third parties for all costs incurred by the Vendor, all claims of damages against the Vendor arising out of or based on its performance of this purchase order.
9. **INDEPENDENT CONTRACTOR STATUS** – Vendor is, and shall remain, an independent contractor during the performance of this Purchase Order.
10. **INVOICING AND PAYMENT** – The Vendor shall submit proper invoices to Pact for Delivered Goods and Related Services that have been successfully performed in accordance with any directions stipulated in the Purchase Order form, and the Term and Conditions attached. To constitute a “proper invoice” within the meaning of this clause each invoice shall provide the following information and attached documentation:
 - a. Vendor name, invoice date, and delivery date (for Delivered Goods) or performance date (for Related Services);
 - b. Purchase Order number;
 - c. Description of each type of Delivered Goods and Related Services included in the invoice, together with the applicable Unit Price; and
 - d. Vendor payment information
 - e. The following certification, manually signed by an authorized official of Vendor:

“ The undersigned hereby certifies that (i) the invoice has been prepared from Vendor's books and records in accordance with the terms of the cited Purchase Order, and to the best of my knowledge and belief, it is correct, the sum claimed is proper and due and has not been claimed or paid before, the Goods have been delivered and any Related Services have been performed, the quantities and prices specified are consistent with the Order, and all necessary Pact approvals have been obtained, and (ii) appropriate refund to Pact will be made promptly upon request in the event of disallowance of any portion of the invoice pursuant to the terms of the Contract.

BY: _____
TITLE: _____
DATE: _____

Invoices shall be submitted in an original and two (2) copies, to the party identified in receive invoices in the Purchase Order. Invoices determined not to be proper due to the existence of deficiencies will be returned to Vendor, generally within ten (10) business days of submission, with major deficiencies noted for correction.

11. **PACKING AND MARKING** – Vendor shall pack, mark for export and ship goods in compliance with the requirements of this Purchase Order, as well as all applicable transportation regulations, carrier tariffs and sound commercial practice. Packing must be sufficient to ensure safe arrival at destination, and fully cover such any foreseeable hazards. Vendor shall be solely responsible for

complying with all applicable laws as well as sound international practices for the packaging, labeling, transportation and shipping of the Goods (including, if applicable, hazardous materials safeguards). Vendor shall enclose a packing slip with this Contract number in a secure and durable envelope attached to each container.

12. **PRICE** – The Price specified on the Purchase Order form is a firm, fixed, all-inclusive total price covering performance of all of Vendor’s obligations pursuant to this Contract, including but not limited to, supply of delivered goods to destination and successful performance of all Related Services; warranty-related costs and charges; any and all required licenses, maintenance or use charges; and all other costs and charges of whatever description or amount, in connection with or resulting from Vendor’s performance.
13. **QUALITY ASSURANCE (INSPECTION AND ACCEPTANCE)** – All Goods delivered, and services rendered pursuant to this Purchase Order shall be subject to inspection and testing by Pact prior to acceptance. Payment shall only be made for accepted Goods and services. If Vendor delivers non-conforming Goods, Pact may, at its option and Vendor’s expense: (i) return the Goods for refund or credit; (ii) require Vendor to promptly correct or replace the Goods; (iii) correct the nonconformance; or (iv) obtain conforming Goods from another source. Pact shall specify the reason for any return or rejection of nonconforming Goods and/or shall describe the action taken. Prompt removal and replacement or correction (as applicable) of the issue will be done by the vendor no later than (10) business days after receiving notification of rejection of Goods or services. Vendor shall be liable for any increase in costs, including procurement costs attributable to Pact’s rejection of the non-conforming Goods or Services.
14. **SEVERABILITY** – If any court of competent jurisdiction determines that any provision of this agreement is invalid or unenforceable, such a determination shall not affect the remaining provisions of this agreement. Further, each valid provision under this agreement shall be enforced to the fullest extent permitted by law.
15. **TERMINATION** – Pact may terminate performance of work under this purchase order, in whole or in part, if (a) the funder terminates the prime agreement, (b) the Vendor defaults in delivering the proper goods and fails to cure the default within ten (10) days after receiving a notice from Pact specifying the default, or (d) the funder orders the termination of the purchase order. Default includes failure of the Vendor to make progress in the work so as to endanger performance. If this purchase order is terminated for convenience, Pact shall be liable only for the actual, reasonable, substantiated and allowable costs with the total amount to be paid by Pact being determined by negotiation. If terminated for cause, Pact shall not be liable to the Vendor for any amount for supplies not accepted by Pact.
16. **WARRANTY** – In addition to any warranties required by any other provision of this Purchase Order, and any other warranties that may be established by operation of the applicable laws, Vendor hereby expressly warrants that all Goods (including without limitation their parts) and Services supplied, as applicable:
 - a. are free of defects in material and workmanship for the warranty period specified in the manufacturer’s standard warranty commencing on the date the Goods are accepted;
 - b. conform to applicable specifications and regulatory agency requirements, and are free of defects in design;
 - c. are free of latent defects (as used herein, defects that meet the following criteria: (a) such defects are not apparent to either Party during customary manufacturing or quality testing and/or inspection; and (b) such defects result solely from defective material, workmanship, or design and are not caused by misuse or misapplication of the

Equipment);

- d. are new; unused; non-remanufactured and non-refurbished; not previously disposed as Government surplus; and produced entirely from Goods meeting all of the foregoing requirements (including but not limited to materials, parts, components and sub-assemblies thereof);
- e. will, to the extent found to be in breach of any warranty specified in this purchase order, be removed, and repaired or replaced, covered by new warranties identical to those that applied to the originally supplied Goods and services, extending for the longer of [a] the remainder of the original warranty period, or [b] a new warranty period;
- f. ensure that all spares and replacement parts are the same as the original spares and parts unless formally replaced by an improved and Pact-approved technical equivalent;
- g. comply with the description on the Purchase Order form and all other requirements of this Purchase Order in all respects;
- h. Vendor has no knowledge of any patents or copyrights which are infringed or may be infringed, or any trade secrets or other proprietary rights of other persons which are or may be misappropriated or violated by using, making, copying, licensing, distributing or selling the Goods.
- i. If any Goods or services supplied hereunder are defective or otherwise do not meet the warranties specified herein or otherwise applicable, Pact may, at its option: (1) reject the affected item(s) and require a full refund or credit; (2) reject the affected item(s) and require prompt correction or replacement (freight prepaid) at Vendor's sole expense; (3) retain it/them at a equitably adjusted price; or (4) require Vendor to provide, if available, corrections in the form of field change order kits (including components, instructions and other necessary materials) from Vendor so that Pact may make necessary changes or repairs. Repaired or corrected items shall be subject to the same warranties as if they were new. While returned item(s) are in Vendor's possession and while in transit during return to Vendor and reshipment to Pact, all risks and costs of loss, destruction or damage shall be for Vendor's account.
- j. Pact shall submit warranty claims to Vendor within a reasonable time after Pact becomes aware of any breach, indicating the nature and date of the claim.
- k. Vendor shall promptly correct any problem reported by Pact by making necessary changes in the Goods or their manufacturing processes so that further Goods to be delivered to Pact shall be as warranted herein. If Vendor becomes aware of any non-conformance to any warranty relating to the Delivered Goods, Vendor shall promptly notify Pact thereof in writing.
- l. Pact shall have the right, at any time and from time to time, to stop further shipments of Goods from Vendor to Pact that do not conform to the warranties and other requirements of this Contract, and in such event Pact shall advise Vendor of Pact's best identification and assessment of the problems. Further shipments of Goods shall not be made to Pact until and unless Vendor has corrected the specified areas of non-conformance in Products, or Pact authorizes in writing the shipment of such Products pending Vendor's correction.

Annex 1.

Technical Specification of Supply and Installation of Solar PV Backup Systems For 12 Woredas and 5 Zones Offices and One Regional Bureau

1. Types of equipment and their quantities

Major system components and their respective quantities are indicated in the table below.

| S. No | Items | Unit | Qty (for 1 institutes) | Qty (for 18 institutes) |
|-------|--|----------------|------------------------|-------------------------|
| 1 | Mono or poly cristalline 100Wp module | Pc | 20 | 360 |
| 2 | Charge Controller 24V, 65A | Pc | 1 | 18 |
| 3 | Pure sine Waves inverter (24Vdc to 230 ac) 1.2KW, | Pc | 1 | 18 |
| 4 | PV Array Structure with Complete set of Stainless screw, bolt and nuts, fence and foundation | set | 1 | 18 |
| 5 | Gel sealed Battery 140Ah, 12VDC | pc | 16 | 288 |
| 6 | Battery box to hold batteries and prevent human contact from batteries acid, made of Wood. | PC | 1 | 18 |
| 7 | Earthing System including Conductors, bus bar, straps, connectors and all necessary accessoires | Pc | 1 | 18 |
| 8 | Cable XLPE/PVC insulated from PV Solar Array to Inverter Charge Controller System, 2x160 sq.mm (varies institution to institution) | m | 40 | 720 |
| 9 | Cable XLPE/PVC insulated from Charge Controller System to Battery, 2x160 sq.mm | m | 40 | 720 |
| 10 | DC circuit breaker 24VDC, 65A | pc | 1 | 18 |
| 11 | Change over Switch single phase 230Vac and 5A | Pc | 1 | 18 |
| 12 | All necessary accessoires (jonction boxes, conduites, batteries interconnections cables, etc. | set | 1 | 18 |
| 13 | Fence | m ² | 32 | 576 |
| 14 | Training for 4 technical service providers at the facility | Site | 1 | 18 |

2. Detail Specifications and Standards

2.1. Photovoltaic (PV) modules:

- The type of photovoltaic (PV) module should be mono or polycrystalline.
- PV modules must be approved to IEC/EN 61215 and 61730 or UL 1703 certified and listed
- The efficiency of the PV modules should be minimum 15% and fill factor should be more than 70%.
- The terminal box on the module should have a provision for “opening” for replacing the cable, if required.
- Crystalline modules shall have a bypass diode which is located in the PV module junction box so that they can be replaced without replacing the module.
- Each PV module must use a RF identification tag (RFID), which must contain the following information:
 - a. Name of the manufacturer of PV Module.
 - b. Model or Type Number/ Serial Number. The serial number of the module must be encapsulated inside the solar panel.
 - c. I-V curve for the module.
 - d. Peak Wattage of the module.
 - e. I_m , V_m and FF for the module.
 - f. Open Circuit Voltage and Short Circuit Current of each module.
- Module junction box with IP65, connector MC4 with 4 mm² cable with a length of 70% of module length.
- The module framing should be such that it permits secure connection to the mounting structure, prevents edge damage and has the longevity to withstand environmental factors for the duration of the module warranty period.
- Module liner warranty: The PV modules must be warranted to retain at least 90 % of its nominal rated output measured at STC for 10 years and 80% at 20 years.
- Solar panel junction boxes must include bypass diodes to protect the solar panel against “hot spot” phenomena, which can lead to module destruction. By pass diodes must be easily replaced, without changing the module or the junction box, welded diodes are not accepted.
- Other relevant information.

2.2. Batteries

- The batteries to be supplied shall be sealed Gel battery, maintenance free and deep cycle.
- The battery banks shall be able to effectively provide at least for two days of autonomy of the daily load requirement as indicated design parameters.
- The basic requirements for the battery 5 years or longer rated service life when the average Depth of Discharge (DOD) is 30%.
- Minimum battery terminal voltage is 12Volts dc.
- The battery will also be IEC-896-1 compliant.
- Self-discharge shall not exceed 3% per month.

- At an average daily duty cycle of 30% depth of discharge at C10 rate, the battery should achieve a minimum of 5,000 cycles of operation.
- Maximum allowable DOD in service shall be 80%.
- The battery delivered in a dry charged condition.
- Its shelf life at 30°C must be 2 years or more if stored in its original packing.
- The battery case must be mechanically strong enough to allow being transport and carried by hand over flat land. As a part of the documentation, the conditions required for transport of the cells shall be provided and will include information as to any requirement for maintaining of a specific cell orientation during transport.
- Inter-connection cables with the proper connection lugs shall be provided with the batteries. It should be of the correct type and size.
- The following information shall be included with the offer for the battery proposed:
 - Ah capacity at C10 to C100 discharge rate conditions.
 - Specific gravity vs. cell voltage curves
 - Curves or tables for cycle life vs. average DOD
 - Physical characteristics including weight dry and wet, height, width, length, connection post dimensions, case material and cell cap type.
 - Complete English language manuals for handling, initial charging, installation, operation and inspection,
 - Warranty terms and procedures for making warranty claims

2.3. Charge Controller

- The charge controller should have MPPT to provide the maximum energy delivery to the battery. The charge controller should full fill the following requirements:
 - Overcharge protection;
 - Deep-discharge protection;
 - Reverse polarity disconnection;
 - Great efficiency;
 - Battery temperature monitor;
 - Overload protection; and
 - Variable setting of all relevant operating parameters.

➤ The controller shall have an indication to users the following:

- Solar Charge indicator;
- Battery is full;
- Battery is low;
- Load off.

2.4. Inverter

The inverter should be pure sine wave inverter and full fill as a minimum the following conditions:

- Digital MPPT solar Battery Charging;
- Intelligent switching from solar to main or low battery situation;
- Full electrical specifications including self-consumption at various load output levels ranging from 10% to 150% of rated continuous power;
- De-rating curves for ambient temperature in the range of 20°C to 45 °C; and
- Operating efficiency of at least 80% at 10% of specified maximum load and greater than 90% at 70% or more of the specified maximum load.

2.5. Power Cable

The cables from the array to the control cabinet and from the control cabinet to the pump shall meet with the following specifications: “IEC 60811-common test methods for insulating and sheathing materials of electric cables”.

- The cable should be flexible and used to supply electrical motors.
- Power cable should be insulated with PVC sheath having; flexible, annealed and tinned copper conductors of high conductivity.
- The selected cable from panel to controller and controller to Battery should be clearly indicating the number of cores, cross section and material.
- Cable diameter to be such that the voltage drop at the maximum depth setting is not more than 3% at an ambient temperature of 30°C.
- Cables must be color coded in accordance with the existing electric coding norms in PV applications. (I.e. blue being negative pole).

2. 6. PV Mounting structure

The PV array is mounted on a pedestal which is made from concrete and Masonry with a height of not less than 40 cm from the ground. Mounting structures should be anodized aluminium and should be able to withstand wind speeds of minimum 120km/h. The lower part of the array shall be between 1m from the ground level so as to ensure easy cleaning.

No tracking systems are permitted. Fixed Mount structures are less expensive and tolerate higher wind loading.

PV modules are generally tested, labelled and listed with four mounting holes used for bolting the modules to the mounting surface. Module manufacturers shall provide instruction manuals that specify where top clamps may be used on the module frame where required.

Drawing for the support structure which includes number of modules on lines and system wiring should be submitted with the offer during the material supply.

Excavation of foundation for the structure

- ❖ All trees, bushes and hedges are to be removed within a distance of 5 meters from the area of the foundation foundations. Roots are to be killed or removed within this width in order to minimize shed for the PV module. NB:- And this trees , bushes and hedges at the site shall not be cut down, damaged or destroyed without the approval of the Engineer/or the community in order to minimize complains.
- ❖ Excavation for structures shall be to width and depth necessary to provide adequate space for structural foundation and supporting formwork, and if required over excavation of unsuitable material, over excavation required because of unsatisfactory soil conditions resulting from lack of drainage or dewatering equipment will be the responsibility of the contractor.
- ❖ Depth of excavation for black cotton soil shall be up to a depth of 1.5m or until the soil texture changes. For other stabilized soils the minimum depth of excavation for the foundation should be up to depth of 1m.
- ❖ Any excavation, backfill or mass concrete foundations in excess of that specified on the drawings or ordered by the site engineer will be at the **Contractor's expense**.
- ❖ The bulk excavated shall be filled with selected material and compact in layers not exceeding 150mm
- ❖ If excess foundation excavation is executed by the contractor, the over laying structure should be placed there without back filling. Thus, the excess volume of work of the structure put is due to the expense of the contractor.

Concrete work for the structure

- ❖ Minimum Cement Content of the concrete of class C-15 shall be 200 kg/m³.
- ❖ Minimum Cement Content of the concrete of class C-25 shall be 300 kg/m³.

- ❖ The water/cement ratio shall be the minimum consistent with adequate workability but in any case not greater than Maximum free water/cement ratio of 0.55. The Contractor shall take into account that this requirement may need the inclusion of a workability agent in the mix as per the engineer approval.
- ❖ Concrete shall not be placed during rain which is sufficiently heavy or prolonged to wash mortar from coarse aggregate on the exposed faces of fresh concrete.
- ❖ Concrete shall be protected during the first stage of hardening from loss of moisture and from the development of temperature differentials within the concrete sufficient to cause cracking.
- ❖ The methods used for curing shall not cause damage of any kind to the concrete. Curing shall be continued for as long as may be necessary to achieve the above objectives but in any case for at least seven days or until the concrete is covered by later construction whichever is the shorter period.
- ❖ The concrete block of C-25 grade should be reinforced with the reinforced bar of 10mm diameter and with 1:2:3 ratios.
- ❖ Minimum size of support structure shall be 70cmx70cm and the depth should be as per the actual soil formation of the area. That is for stabilized soils 70cm and for black cotton soil up to 1.5m.

a. Grounding

Grounding issues shall be free from failing inspection at PV installations as a result of hardware and product installation inconsistencies. Typically, a module has four labeled grounding holes that have been tested to meet UL 1703 requirements for safe connection to earth through the equipment-grounding system. Module instruction manuals and tech notes shall be provided with detail on how these labeled grounding holes are intended to be used to ground the PV modules.

The system shall be grounded to a single point using the shortest practical route to an adequate earth contact using an uninterrupted copper conductor of at least 16mm of diameter and 1500mm length to be properly installed in the ground.

The maximum allowable earth resistance will be 10 ohms with the maximum bonding resistance 0.2 ohms. The maximum allowable earth resistance between consumer earth terminals to earth spike will be 1.7 ohms.

Note that the grounding rod should be copper in material.

b. Fencing

- A fence shall be built around the array.
- The surfaced enclosed by the fence shall be such that the area taken up by the array constitutes no more than 40% of the total enclosed area.
- The height of the fence is to be a minimum of 2.0m high, measured from the top.
- The Contractor is responsible for ensuring the stability of the fencing at all stages of construction.
- The fences shall be gabion mesh wire.
- The fence post shall be of galvanized steel (angular iron 40x40x4mm) placed in c-20 class concrete filled pits. The corner posts and the gate posts shall extent at least 100cm into the ground; the other posts shall extent at least 50cm into the ground. The gate and all corner posts shall be braced by a same size steel angle iron or pipe
- The engineer will reject any damaged posts or any posts with missing weather tight sealing plugs. The Contractor will be responsible for removing and replacing any rejected fence posts and supplying and fixing any missing weather tight sealing plugs.
- The entrance gates shall be single leaf or double leaf, as per the size of project.
- The gates shall be hinged to reinforced posts and shall be complete with locks and stops.
- The Contractor must ensure that the gate and all items fitted to the gates are correct for the required handing and opening of the gate.
- There shall be a barbed wire running along the top of all the posts and the gate.
- The wire of the netting shall have at least 2mm diameter. The netting shall be attached to the poles by galvanized steel wire. A hinged and lockable steel gate shall be provided.

3. Provision of certificates and documentation

a. Certificates

The system manufacturer must operate a quality management system that is ISO 9001 or equivalent and have recognised third party verification. Knowledge and proof of adherence to necessary product safety standards must be demonstrated. Bidders must have availability of TÜV or equivalent listed products for supply. Solar modules, pumps, motors, and control equipment must meet the necessary CE / international standards for safety and where applicable functionality.

b. Users' manual

The supplier must provide a User's Manual intended for safe operation/maintenance. This manual will be included with each of the systems and will be the basis of the training of the water system caretakers by the suppliers. The manual must be in English and Amharic and all documentation should be simple and easy to follow and understand. Use of sketches or graphics should be made to make the manual easier to use. The documentation is to include the following:

How the system works: The relationship between energy available on a daily basis, sunlight conditions and how the solar water pump works should be clearly and simply explained.

- A description of all user interactive hardware including disconnect switches and status indicators.
- Any user maintenance items.
- A user trouble-shooting guide.
- A block diagram showing the main components.
- Contact information of suppliers and manufacturers for maintenance and access to spare parts.
- The user manual shall be amply illustrated.

c. O&M manual

The supplier must provide an Operations and Maintenance Manual to be used by the service technicians. The manual must be in English. The manual will include the specific details on installation, operation and maintenance:

- A detailed technical description of the system and all its components.
- A complete copy of the User's Manual.
- A complete list of all system components, with associated manufacturers documentations, specifications and warranties.
- A recommended periodic maintenance schedule of the complete water supply system, with complete maintenance instructions.
- A detailed troubleshooting guide, referencing all the system components. This shall include diagnostic and repair procedures that can be done by the supplier or a qualified third party. Repairs and procedures to be done by trained electricians familiar with photovoltaic systems shall also be identified (if any).
- A functional block diagram, electrical single-line drawing showing the placement of all hardware and ratings of all component and physical layout diagram.

4. Performance Specifications and Warranty

- 1) The PV Modules must be warranted with a specified insurance policy from the supplier for output wattage, which should not be less than 90% at the end of 10 years and 80% at the end of 20 years.
- 2) Inverter and controller for a minimum of 5 years;
- 3) batter for a minimum of 5 years; and
- 4) The whole system shall be warranted for 3 years.

5. BILL OF QUANTITIES

The Bill of Quantities for the solar PV backup systems should be listed according to the following template. Use the sample formats below for each and every site and note that the local portion shall be quoted in Ethiopian Birr and goods supplied from abroad can be quoted in foreign currency.

5.1. Local Material and Installation costs for site

| # | Item | Description | unit | Qty | Unit price in Birr | Total price in Birr |
|-----------|---------------------------------------|--|------|-----|--------------------|---------------------|
| 1 | Foundation of array support structure | Made of concrete with grade of RC 25. Use reinforcement bar with $\varphi = 8\text{mm}$, c/c 200mm vertically and horizontally in all faces Excavate: 70cmx70cmx70cm for stabilized soils and 70cmx70cmx1.5m if black cotton soil | Ls | | | |
| 2 | Fence for solar array | Mesh wire 2m away from solar array support structure foundation in all directions & 2m height. | LS | | | |
| 3 | System Installation | Installation of the pumps, panels, fixing the equipment, wiring, system check and make ready for commissioning; | LS | | | |
| 4 | Training of technicians | On job training for four persons of which two are staff members and two people from the woreda/zone/region Water, Mines and Energy office. | L.s | | | |
| Sub-Total | | | | | | |
| VAT | | | | | | |
| Total | | | | | | |

5.2. Bill Quantity for Power Generating Part for site

| # | Item | unit | Qty | Unit price in USD/equivalent | Total price in USD/equivalent |
|---------------|--|------|-----|------------------------------|-------------------------------|
| 1 | Mono or poly crystalline 100Wp module | Pc | 20 | | |
| 2 | Charge Controller 24V, 65A | Pc | 1 | | |
| 3 | Pure sine wave inverter (24Vdc to 230 ac) 1.2KW, | Pc | 1 | | |
| 4 | PV Array Structure with complete set of stainless screw, bolt and nuts, fence and foundation | set | 1 | | |
| 5 | Gel sealed Battery 140Ah, 12VDC | pc | 16 | | |
| 6 | Battery box to hold batteries and prevent from human contact from battery acid, made of Wood. | PC | 1 | | |
| 7 | Grounding system including Conductors, bus bar, straps, connectors and all necessary accessories | Pc | 1 | | |
| 8 | Cable XLPE/PVC insulated from PV Solar Array to Inverter Charge Controller System, 2x160 sq.mm (varies institution to institution) | m | 40 | | |
| 9 | Cable XLPE/PVC insulated from Charge Controller System to Battery, 2x160 sq.mm | m | 40 | | |
| 10 | DC circuit breaker 24VDC, 65A | pc | 1 | | |
| 11 | Change over Switch single phase 230VAC and 5A | Pc | 1 | | |
| 12 | All necessary accessories (junction boxes, conduits, batteries interconnections cables, etc.) | set | 1 | | |
| Sub-Total | | | | | |
| Tax (VAT 15%) | | | | | |
| Grand total | | | | | |

5.3. Grand summary of bid cost

| S.No. | Total sub Cost by Type of delivery | Currency |
|-----------------|---|----------|
| 1 | Local Material | |
| 2 | Power generation | |
| 3 | Transportation of goods up to warehouse of Pact Addis Ababa | |
| 4 | Installation | |
| 5 | Training | |
| Sub-total | | |
| Local Tax (VAT) | | |
| Grand Total | | |