

WATER & HABITAT DEPARTMENT

Annex-2 _ Request For Quotation No.: RFQ-IRQ-0015-24

Solar System of 15 kW, to power (RO Unit) with TDS up to 10,000 PPM and Capacity of 2 m3/hr

تجهيز ونصب منظومة الطاقة الشمسية سعة 15 كيلو واط لمحطة تحلية تعمل على املاح 10,000 ملغم /لتر وسعة 2 متر مكعب بالساعة

Electrical Works

Item	Description
Solar Photovoltaic System (PV)	
1	<p>General Description : Provision of materials, labour, machines, transportation means for Solar components matching the RO power load (rating of 15 kW). the work should be conform to IEC 60364-7-712 Electrical installations of buildings - Requirements for special installations or locations - Solar photovoltaic (PV) power supply systems All materials must be certified and according to the drawings & specifications</p>
1.1	<p>PV Solar Modules : Supply , install , connect and operate best quality Monocrystalline panel, 144 Half-cell, 12 bus-bar,N-type , Bifacial , positive power , HJT . The PV cell should also has the following electro-mechanical specifications: - Rated maximum power (Pmax) =450 Wp - Module efficiency shall be ≥21%. - Nominal voltage (56.1 VDC) - Maximum power voltage (Vmpp)=44.98 V - Open circuit voltage (Voc)=(52.09 VDC) - Short circuit current (IMP)=10.01 A, class A - Power tolerance (w) 0→+5% - Temperature Coefficient at least -0.26%/°C - Operating temperature: -40→+85°C - Internationally certified by TUV and comply with (ISO 9001, 9806) standards. - Anti-crack and scratch - Linear reduction of 0.4% per year from 5-25 years so that 87% of Pmax guaranteed after 25 years.</p>
1.2	<p>Inverters 10 kW: Supply , install and operate (Hybrid inverter of 10kW capacity) type (infinisolar,Growatt, Must) or equivalent, and should cover the following requirements and specification: - 3 phase IP 3phase O/P, DC/AC (input / output) transformer, pure sine wave output, suitable for indoor/ outdoor installations, can operate with or without batteries, AC nominal power output rating must be ≥ the design load and efficiently covering the starting surge load, humidity (0-90% RH) and operating temp (-10→+55)C, max. DC power 25kW, max. DC voltage 950 VDC ,nominal DC voltage 720 VDC ,max. DC current 72A,nominal AC voltage 230- 400 VAC , frequency range 49 -60.5 HZ. , efficiency 95% . The work includes supply and install (DC - MCB 63A , 4 nos.) , plus connection of inverters in parallel with programming for all required data to perform the operation perfectly. The contractor must submit manufacturer warranty for the inverter for a period not less than 5 years. see attached drawing AO1.</p>
1.3	<p>Combiner: Supply ,install , and operate combiner ,all devices with the following specifications:- Schneider Electric components, 4 inputs max , voltage in open circuit 1000 VDC , relative humidity 0-100% condensing , degrees of protection IP 54 , IK10 , protection on both polarities gPv fuses max. 30A , compliance HV switch -gear IEC /EN 61439-1 , and 61439-2 , DC overvoltage protection (Surge arrester , 1000 VDC , type 2 , max 40A) The work includes connection of DC cables from the PV modules with inverter and all that is required to make the job perfectly. -see attached drawing AO.1</p>
1.4	<p>Batteries Bank : Supply , install connect and operate (Batteries Bank) with bellow specs: Lithium Batteries 48V 150 AH , LifePo4 LS Metasol , Felicity powerall or equivalent LBPT 48200 , Lithium Battery Pack 7.5KWH Long life cycle, >3000 times at 80% DOD Protection Class: IP64 Cell Technology Lifepo4 Efficiency: 98% Battery Pack Max Discharge Current: 100A Battery System Charge Current (Standard): 10A Battery Pack Charge Current (Normal): 20A Battery Pack Max Charge Current: 50A Battery System Discharge Current (Standard): 20A Battery Pack Discharge Current (Normal): 50A Operation Cycle Life: Over 4000 times Operation Temperature: 32-122F (0-50C) Life Span 10 years .</p>
2.1	<p>PV Ground Mounting structure: Using of rectangular/ square tube, (two stages / layers ,with approx. height 5m) hot galvanized steel (G.S) sections of (4x8 cm) for the base frame or (8x8 cm) , and (5X5 cm) for the laterals, vertical and inclined beams with thickness not less than 1.8 mm and according to EN1090-1 . For optimum results, the solar array installation must be orientated south with an inclination of 30°. The racks should be well fixed to withstand the static and high wind loads and velocities up to 150 km/hr. the contractor have to be submit in advance, a detailed design & report for the analysis of the aforementioned load proofed that the structure is safe and the must be signed by consultant engineer or office having valid mebership in Iraqi Engineering Association. All any additional supports in concrete, structure, and section size must be covered according to the consultant recommendation, its includes (welding, rod bolts, or anchor bolts embedded in concrete, and alignment with base plates.The base plates, with a recommended thickness ranging between 4-6 mm, or integral to the structural stability. The price encompasses the following elements for each of the eight concrete strips M15 , dimensions of (8 X 0.4X 0.3) meter, utilizing a mechanical ready-mix plant for optimal efficiency: Reinforcement by steel bars with a diameter of 12 mm will be used for reinforcement, consisting of two bars at the top and two at the bottom of each strip. Stirrups must be spaced at 25 cm intervals along the length of the strips. The Structure should include a walk way for easy cleaning, monitoring and installation, should be at least 60 cm width and ladder for easy access taking all the safety requirement.the walk-way must be</p>
3	<p>Surge Arrester Rod with Earthing</p>
3.1	<p>Surge Arrester Rod with Earthing : Provision of materials and works and all that is required to make job complete in every part to supply , install , test and operate (Surge Arrester Rod with Earthing) with bellow specs: Surge Arrester Rod (pure copper)(quantity 4 rods) one in each corner , with base and core 10mm, distance ,single core copper cable 25mm2 from the Lightning arresters rods to the one point earthing node to be connected to the earthing pure copper rod 2m in systematic way , Three Rods for Earthing Network (Traingle) , Single core 25mm2 wiring to earth system , and the resistance from the grounding electrode to earth must be lower value of resistance. the work includes to connect all PV modules and all components and devices to the earthing network , earthing of lightning arresters should be separated with earthing network . The work should be conform to IEC 60364-4-44, and IEC 60364-5-54 Electrical installations of buildings - Selection and erection of electrical equipment - Earthing arrangements.</p>
4	<p>Power Works</p>

4.1	المراسم الفنية الخاصة بالموصلات الكهربائية	<p>Provision of materials , works and all that is required to make job complete in every part to supply ,install, exten and connect systematically (DC & AC) cables & Bus-Bars ,as in bellow:</p> <ol style="list-style-type: none"> 1. Copper Bus - Bars 2.5 Wx0.5 Th. (between Batteries polarities(+ & -) series connection) -if needed . 2. Aluminium Twist Cables 4x35 mm2 (from the NG pole(outside) to the input MCCB 63A). 3. Cable 4x16mm2 from M1P (NG panel) to the MCP . 4. Cable 4x16mm2 from M2P (Inverters output) to the MCP . 5. DC cables 10 mm2 (solar panels) to combiner. 6. DC cables 10 mm2 (combiner) to Inverter. 7.Re-wiring power cables from MCP to the motors and devices as in drawing AO1. <p>all other required cables and accessories and must be labeled and identified in proper way.</p> <p>The work includes supply , extend and connect above cables (Jordanian , Saudi or equivalent) in systimatic way in both in apperant way . by using Galvanized Steel Cable Tray (5x30 , 5x20 and 5x10)cm according to the cables arrangement with all its accessories (Elbow,Tee, Reducer, expansion, hanging supports , etc.) , and thickness should not be less than 2 mm. the following route are :</p> <p>From PV Panels to the Inverters room ,Inside the Invertor room, From Invertor room to RO Unit Carvan , Inside RO unit Carvan reached to all components and Accessories Any other necessary components (earthing rods, submersible pumps, level switches, NG components, etc)</p> <p>The contractor have to submit shon drawing hihlighting the cable trays routes , sizes ,any required supports in advance to the supervisor engineer to be approved</p>
4.2	المراسم الفنية الخاصة بالعمود الكهربائي الخاصة بوحدة الكوربان	<p>Provision of materials and works and all that is required to make job complete in every part to supply and install Round Tubular steel poles length 9m as in bellow specs :</p> <p>effective lenth of pole : 9m Length of Top section : 2m Outside diameter of top section : 89mm Length of middle section : 2.3 m Outside diameter of bottom section : 139 mm planting depth : 1.5 m Working load : 210 kgf point of application of loaid : 60 cm bellow top wall thickness of the poles must be for ST51 or ST 52 : >=3.7 mm</p> <p>the work includes concrete base of materials, tools, and labours to Excavation and casting Concrete Foundation 50*50*150 cm , as well as casting concrete mixture kicker 40*40*30 cm from the ground level with mix ratio of (1:2:4) using sulphate resistance cement, laying one layer of plastic nylon underneath and isolating the base using tar coat. With all requirement as per Iraqi national electricity standards . inaddition to install insulatoors and connection requirements for Twisted cable (4x35 mm2) to insure the work properly.</p>
4.3	المراسم الفنية الخاصة بالعمود الكهربائي	<p>Provision of materials , works and all that is required to make job complete in every part to supply ,install, connect and operate (AC Split Units)one ininverters caravan and the other in pumps room , in bellow specs:</p> <p>AC Split Unit 18000 BTU , 220VAC , 50HZ , R410A , Inveerter type , GREE , Wastin or equivalent..</p>
4.4	المراسم الفنية الخاصة بالوحدة الكهربائية	<p>Provision of materials , works and all that is required to make job complete in every part to supply , install, connect and operate Main Panes (M1P) & (M2P) (M1P / NG panel) with specs :</p> <p>steel electric panel type Himel or equivalent , size (60 x 50 x 25) cm thickness not less than 1.8 mm waterproof and dust prof contains MCCB 63A 4poles , Scgneider Electric , variable , ISC 35KA ,</p> <p>(M2P / Inverters panel) with specs :</p> <p>steel electric panel (40x50x20)cm thickness not less tahn 1.8 mm IP65 , contains MCCB 63A 4poles , Scgneider Electric , variable , ISC 35KA ,</p> <p>The work includes remove an existing board (NG board) and then replacing with new one as in above , with all connection and operation requirements (glands , shrinkage , cable shoes , insulations , etc , ...) to perform the job perfectly. -see attached drawing AO1-</p>
4.5	المراسم الفنية الخاصة بالرفع الكهربائي	<p>Provision of materials and works and all that is require to make job complete in every part to supply , connect and operate (3 PH , AVR Automatic Voltage Regulator type Delta or equivalent) with bellow specs :</p> <p>Power KVA : 23 Input Voltage Correct Interval : 275-450 VAC , (Optional 190-415 VAC) Operation frequency : 47-65 HZ Line input Protection : Overcurrent , Low and High Voltage Protection Output Voltage : 380/400/415 VAC RMS +- 1% Overloading : 10 sec 1% Correction Speed : 30 V /sec Working Principle : Servo Motor , Microprocessor Controlled , Full automatic . Cooling : Smart fan system Total Efficiency : > 98% Protection Level : IP 20 Working temperature : - 10 / 50 C Storage Temperature : - 25 / 60 C Dimensions : (110 x 40 x 63) cm Mechanical By-pass : Manually controlled line , PAKO switch selects voltage regulator , Switch turns ON-OFF</p>

تجهيز المواد والمعدات اللازمة للقيام بأعمال تجهيز ونصب الالات التعريفية والمواصفات التالية :

الآلات الخاصة بجزء مخططات و عملية الصيانة بإبعاد (1 متر * 0.75 متر) ومنظومة الخزانات باستخدام هيكل من الالمنيوم واستخدام الزجاج لكلا من :

- مخطط خاص بمنظومة الطاقة الشمسية

-لائحة خاصة بآراءات التشغيل والصيانة الدورية لمنظومة الطاقة الشمسية

مع كل ما يتطلبه العمل من التامه وحسب توجيهات المهندس المشرف

