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جداول الكميات Bill of Quantities

**BoQs of a Solar System Installation for Obstetric Health Center
in October Hospital - Yafe'e - Lahj Governorate**

جدول الكميات والمواصفات لمشروع توريد وتركيب نظام طاقة شمسية لمركز الطوارئ في
مستشفى يافع - لحج



بتمويل من
الإتحاد الأوروبي



Specifications & BOQ of the Project : Solar System Installation for Obstetric Health Center in October Hospital - Yafe'e - Lahg Gov.

مشروع توريد وتركيب نظام طاقة شمسية لمركز الطوارئ في مستشفى يافع - لحج

BOQ					
Item No.	Item Details	Unit	Qty.	Unit Price	Total Price
				[USD]	[USD]
ELECTRICAL WORKS					
1	Solar PV Module:				
1.1	Supply, install, test, and commissioning of solar panels not less than 650W should be comprising of either mono-crystalline or polycrystalline; - The module type must conform with CE and IEC 61215, IEC 61730, IEC 61701 or equivalent standards; - Module conversion efficiency should be equal to or greater than 20.5 % under STC; - The PV manufacturer should be approved as tier-1; - The PV module shall perform satisfactorily in temperature between – 40 oC to +85 oC; - The rated output power of any supplied module shall have tolerance of 0-5 W; - The module shall be provided with a junction box with IP67; - The supplied module DC voltage should be not less than 1000 VDC; - The product warranty should be at least 10 years.	Pcs	48		
2	Solar Hybrid inverter				
2.0	Supply, install, test, and commissioning of a Hybrid solar power inverter according to the following specifications: - Inverter type : Single phase. and Max 16 pcs parallel (It can be connected as Three phase parallel Inverter) - Net power : 12 KW. - Output voltage : 230/220 VAC per phase - Frequency : 50 Hz. - Battery voltage : 48 VDC . - Compatible for use with lithium batteries. - Integrated with MMPT trackers not less than two for each mppt tracker at least three inputs with maximum short circuit current (Isc) not less than 30A. - Maximum charging capacity not less than 200 A. - Voltage range 150-425 VDC, and Voc not less than 500VDC, - Hybrid inverter with charger that supports external power supply from the best types in the market. - The contractor must provide a catalog before supply in accordance with the specifications, . - The price includes everything necessary, including all connections and accessories required in accordance with the specifications, technical drawings, device protection system for overcurrent, overload, overvoltage, overheating, battery polarity reversal, photovoltaic reverse connection, current leakage protection, network monitoring, and PV string monitoring attached with 16GB memory, two years warranty and everything necessary to complete the item in accordance with the site engineer instructions.				Notes
2.1	Hybrid inverter: 12Kw	Pcs	3		
4	Solar Battery with Racks				
4.0	Supply, install, test, and commissioning of Battery bank voltage shall be 48 volts with built in battery rack as per technical specifications and drawings . - Batteries shall be Lithium-ion type LiFePO4 with integrated BMS. - Battery cyclic life shall be at least 6000 cycles at 80% depth of discharge (DOD) @ 0.5C @ 25° C° - Built-in intelligent BMS and RS, CAN, and other necessary kits and protocols to communicate with the inverter, monitor the battery remotely & real time, and protect the battery pack at any time to prolong its service life - Reliable performance at high operating temperatures of up to 50° C; - One brand of battery shall be used for the entire installation; - The battery must allow connection with the inverters and MPPTs, offered by the supplier. In addition, the batteries must allow the parallel connection multiple racks - Battery to be certified CE or UL and to meet at least one for the following or equivalent standards IEC 62619 , UL 1973 UL 9540 and UN38.3. - Battery Rack with built in busbars should be configured for 48 VDC, powder coated with a corrosion acid proof powder, the battery rack busbars shall be covered. - Wires connected to batteries shall utilize appropriately sized and rated lugs or terminals and proper hardware; -This item includes any additional communication kits or devices for the successful and safe operation of the battery bank with the inverters and MPPTs including but not limited; power cables, ground cables, communication cables..etc" according to manufacturer recommendations - Product warranty shall be 5 years;				Note
4.1	Battery Capacity :100AH	Pcs	16		
5	DC Combiner Box (DCCB)				
5.1	Supply, install, test, and commissioning of DC Combiner Box 8 input, 8 output DC Combiner Box; - The DCCB to be provided for termination of connecting cables. The DCJB shall be made of metal or UV resistant material and suitable for outdoor installation,IP65, - All wires/cables must be terminated through cable lugs; - DC output circuit: In accordance with the maximum current X 1.25, 1000 VDC breaker; - DC fuse rating for each string:1000V, 20 A; - Built in surge protection device; - Product warranty shall be 2 years.	Pcs	1		
6	DC Cabling				
6.0	Supply, install, test, and commissioning of DC Cabling 1KV, Flexible stranded copper per EN 60228 , TUV certified. Insulation: Halogen-free, thermoset polyolefin. Jacket : low smoke non-halogenated, flame retardant, oil, abrasion, chemical and sunlight resistant meeting UL 44, UL 854. - All cables shall be marked properly according to approved design so that cable can be easily traced and identified; PV array to battery circuit(s) to be sized for maximum 3% voltage drop at rated array power (Imp); Cable ends connections are to be made through suitable lugs or terminals, crimped properly & with use of cable glands; this item is including the cables and cable trays Cable Tray :- 1mm thickness, Perforated type Galvanized steel cable trays, cable tray covers, clamping bolts and other cable tray accessories such as coupler plates, bends, tees, reducers, vertical elbows in manufactured accordance with ASTM A653 SS, Grade 33, coating designation G90.				Note
6.1	(1C*6 sqr.mm) (Red& Black)	M	540		
6.2	(1C*25 sqr.mm) (Red& Black)	M	16		
6.3	(1C*50 sqr.mm) (Red& Black)	M	80		
6.4	(1C*70 sqr.mm) (Red& Black)	M	50		

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Item No.	Item Details	Unit	Qty.	Unit Price [USD]	Total Price [USD]
7	AC Cabling				
7.0	Supply, install, test, and commissioning of AC Cabling Stranded type, TUV certified, double insulation material 1kV XPLE/PVC/CU - All cables shall be marked properly according to approved design so that cable can be easily traced and identified; - All outdoor exposed wiring to be protected from UV radiation and physical damage, all cabling above ground should be suitably mounted inside cable trays with proper covers; - XLPE insulated and PVC sheathed single or multi core flexible copper cables meeting IEC 60227 and IEC 60502; - Cable ends connections are to be made through suitable lugs or terminals, crimped properly & with use of cable glands;			Note	
7.1	4C*10sqm.m include remove tiles and including outdoor suspended cable tray.	M	120		
7.2	4C*35sqm.m include remove tiles and including outdoor suspended cable tray.	M	20		
8	Inverter DC Breakers Box				
8.1	Supply, install, test, and commissioning DC breakers box including 3 X150 DC breaker and all the required accessories as per drawings	Pcs	2		
9	Battery DC Breakers Box				
9.1	Supply, install, test and commission DC breakers box including 1X200 DC breaker with Bus-bar Positive & Negative and all the required accessories as per drawings	Pcs	4		
10	DC Bus-bar Box				
10.1	Supply and install NEMA 3R enclosure, powder-coated steel construction with bus bar hard drawn copper, electro-tinned (Rated of Bus-bar (400A)) and a lockable front door, as per technical specification and drawing.	Pcs	2		
11	AC Coupling Panel				
11.1	Supply, install, test, and commissioning of Metal Enclosure, Indoor, Built in SPD, RCCB, MCCB as shown on schematic wiring diagram - Internal connection should be through busbars; - Ingress protection must be at least IP41; - Enclosure material should be galvanized steel sheets; - Fault level for the main breaker: At least 10 kA; - advised to use high quality breakers; - The EMDB should be in accordance with the drawings; - Warranty: at least 1 year.	Pcs	1		
12	Earthing System				
12.1	Supply, install, test and commissioning Earthing System As per technical specifications and drawings including cabling, cable lugs, earthing rods and all required accessories - Each array structure of the PV modules should be grounded properly; - All metal casing/shielding of the system and its components should be thoroughly grounded; - Earthing pit with Bentonite clay - Earth resistance should be tested in presence of the representative by calibrated earth tester, the earth resistance should not be more than 5 Ohm. - Earthing installation in accordance with the IEE Wiring regulations, BS 7671 - All conductive materials shall be copper. - The size of conductor shall be according to table 54.7 of IEE – BS 7671 – IEC 60365-5-54.	SYSTEM	4		
13	Lighting Protection System				
13.1	Supply, install, test and commissioning Lighting Protection System As per technical specifications and drawings including cables, mast and all required accessories - lighting arrester shall be copper. - All metal casing/shielding of the system and its components should be thoroughly grounded; - Earthing pit with Bentonite clay - Earth resistance should be tested in presence of the representative by calibrated earth tester, the earth resistance should not be more than 5 Ohm. - Earthing installation in accordance with the IEE Wiring regulations, BS 7671 - All conductive materials shall be copper. - The size of conductor shall be according to table 54.7 of IEE – BS 7671 – IEC 60365-5-54.	SYSTEM	2		
14	Main Distribution Board and MDBs				
14.1	Supply, install, wire, test, and commissioning of essential loads AC distribution board (EMDB) unit as shown in the drawings, the price shall include all wires and conduits needed for proper installation - Internal connection should be through busbars; - Ingress protection must be at least IP41; - Enclosure material should be galvanized steel sheets; - Fault level for the main breaker: At least 20 kA; Bidders are advised to use high quality breakers preferably Schneider, ABB or equivalent. - Warranty: at least 1 year.	Pcs	1		
14.2	Supply, install, wire, test, and commissioning of sub distribution board (A/C SDB) unit as shown in the drawings, the price shall include all wires and conduits needed for proper installation - Must be suitable for indoor installations; - Enclosure material should be galvanized steel sheets; - Fault level for the main breaker: At least 20 kA; Bidders are advised to use high quality breakers preferably Schneider, ABB or equivalent. - the work include dismantling load from old SDBs to new SDBs , inspecting and repairing any earth leakage or short circuit prevents the Panel from proper operation. - Warranty: at least 1 year..	Pcs	4		
15	Automatic Transfer Switch				
15.1	Supply, install, test, and commissioning of Low Voltage ATS 4P, 100A, 2 ways as per technical specifications including metal enclosure	Pcs	1		
16	Ventilation System				
16.1	Supply, install, test and commissioning ventilation system for balancing airflow to ensure a negative pressure relationship include: civil work to demolish two separate locations in room walls (Two fans "One fans in each group") as per drawing, sequence of operation is to operate one fans per time (one group) with timer for each group, including all accessories and installation requirements (exhaust Fan, ducts, electrical wiring requirements, air inlet and outlet windows with louvers, PVC Pipe, ...etc.) -Centrifugal fan with aluminum radial plats - copper motor. -Single phase 220v, 50Hz, - Fans CFM is to be not less than 800	L.S	1		
17	Alarm System				

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17.1	Supply, installation and testing of smoke/ heat detector Supply, install and testing stand-alone Smoke and heat detector, including button for false alert, battery for three years long life, warning sound delivers sounds of >85 dB, wires, PVC wires trucking, and other all required accessories to complete the item according to the recommendations of the supervision team and as per drawings, technical specifications.	Pcs	2		
17.2	Supply, install, test and commissioning 5kg Carbon Dioxide (CO2) Extinguisher	Pcs	1		
17.3	Supply, install, test and commissioning 6kg Powder extinguisher	Pcs	1		
18.0	Others				
18.1	Supply, install, test and commissioning of wall Mounted LED 40W to 50 W Outdoor lighting fixture include Photocell cell according to technical specification and drawing, include all accessories and installation requirement (PVC Pipe, Wiring,...etc.) - LED outdoor light shall withstand all the weather and working conditions and corrosive environment; - LED light 40-50 W; - Lamp luminous efficacy: not less than 90 lm/w; - Voltage rating: 220-240 VAC, 50 Hz ±2%; - The color temperature range: 5000K – 6500K; - Deigned with IP 65 protection; - Operating Temperature range: up to 40°C; - Certification: All related certificates shall be provided such CE, RoHS; - Wall Mounted type; - Warranty: at least two years.	Pcs	6		
18.2	Supply, install, test and commissioning of 1 RT Spilt Air Condition inverter type include alternate operation and temperature control unit with al wiring requirements - Adjustable fan speed; - Capacity: - Capacity: 12,000 BTU (1 Ton). - Voltage: 220-240; - Frequency: 50 Hz; - Single phase; - Noise level shall not exceed 45 dB; - Star rating 3 star or above; - Suitable for wall mounting;	Pcs	1		
18.3	Supply and wiring 25A wall mount Switch for Split Type Air Conditioner , with all necessary components and earthing insulated copper (3x4 sq.mm) wire run inside the trunking including supply of all fixing materials, accessories and interconnections complete as required and approved by the consultant	Pcs	20		
19	Project sign boards				
19.1	Supply, installation, and maintenance of project signboard (1.6m x 1.4m and 1.2m from ground) as per drawing, material similar to specified large sign support. The following information will be written in Arabic and English Languages as shown in attached drawings, and any other information instructed by the Employer/Engineer.	Pcs	1		
20	System Training				
20.1	Carrying our training as per required.	LS	1		
SUB TOTAL ELECTRICAL					
CIVIL WORKS					
21	Rooftop Mounting Structure:				
21.0	General Requirements:				
21.0	The Contractor has to submit Detailed Shop Drawings to be approved by the Engineer before the commencement of the work, and all required materials should be supplied as specified and subject to the Engineer approval. - All works shall be done according to the Engineer's instructions, Drawings, and attached specification. - The Contractor should include in his price the costs of sampling and testing as required and according to technical specifications and a work requirement. - Benchmark and leveling network shall be approved prior to starting next works. - The locations of the building's columns/Beams shall be stakeout by the professional way (such as a total station) as per drawings . - This work prepared to cover 8 solar panels (2384mm x 1303mm) approximately. - Measurement will apply to the outline of steelwork for top framing plan (level of solar panels),the payable area includes the projected parts of the PV panels				Note
21.1	Supply and install steel structure mountain as per drawings, specification and as per the following details: - Supplying, fabricating, deliverin at site, hoisting and fixing in position, including all temporary staging and supporting work and making all structural steel work in accordance with the design, drawing prepared by the consultant for columns, beams, purlins, bracing, brackets, etc. with connections using plates, channels and angles, gusset plate, anchor bolt, cleats, fasteners etc., galvanized steel (min galvanized 80~120mic) with minimum yield strength of 240Mpa .The rate of steel work shall include assembly, jointing, cost of fasteners (nuts, bolts and washers) etc. The rate shall also include necessary bolts & washers for fixing including grouting of bolts for fixed members on the R.C slab with 1:3 non shrink cement grout (min Fc'= 30Mpa for 28 days as ASTM Standers) etc., complete all as per design, details, drawings, specifications etc. with all lead & lift for all materials & labour and as directed, at all heights & locations. - As ASTM all bolts is A325 or A490 high strength bolts. - Grouting work with adjustable hight (not exceeding 5cm) as shown in the specification and drawings. - Supply and installation Cold-formed galvanized steel (min galvanized 80~120mic) column channel C75X35X3mm with base plate P200x200x6mm As Per Drawings And Included: • 4Ø12mm L120mm anchor bolt. • 3Ø12mm connection bolts with 25 mm length. • C90X45X6mm L=6cm welded with 3mm Fillet All around , and welding to be performed in the fabrication workshop , and galvanizing to be performed after welding as per Drawings. The columns details As following: Chanel C75X35X3mm L =600±150 mm Chanel C75X35X3mm L =1420± 150 mm - Beam And Bracing Structure Mounting As per technical specification and drawings details. Supply and installation Cold-formed galvanized steel (min galvanized 80~120mic) beam channel C75X35X3mm and C80X40X3mm as shown in drawings with Ø12mm connection bolts with 25 mm length at all ends. - Supply and installation Cold-formed galvanized steel (min galvanized 80~120mic) bracing channel C75X35X3mm L=1520±150 mm with Ø12mm connection bolts with 25 mm length at all ends. - The work describe above include all accessories and fixtures materials needed to complete the work as per drawings and specifications.	Sqr.m	150		Note
SUB TOTAL CIVIL					
TOTAL PRICE					