

**Project Name: Supply and Installation of a Solar Power System for the RO Desalination Plant, Gawsawayne Town, Sanaag Region,
Somaliland**

Tender No. :

BOQs of Required Works

Sr.No.	Item Description	Unit	Quantity	Unit Price (USD)	Total Price (USD)
1	Operating System of a Solar Water Desalination Plant				
1.10	<p><u>Supply, Installation, Operation, and Testing of Solar Panels with Global Specifications, as per the following requirements:</u> PV Module Type: PV Solar Panel N-type Mono Rated Power in Watts: 700W for each panel (preferably higher) Open Circuit Voltage: VOC > 45.0 Volt Solar Module Efficiency: > 21% Operational Temperature Range: -10°C to +80°C Maximum System Voltage: 1500VDC Panel Cable Type: Must be pure copper Manufactured Date: After 2025 Price Must Include: All costs for Installation, Configuration, and Inland Transportation to the site. Warranty: Minimum 10 Years</p>	NO	42		
1.20	<p><u>Supply and Testing of Hybrid Inverter (20KW, 3Ph) (Comparable to Deye) according to the following specifications:</u> <u>Battery Input:</u> Battery Type: Lithium-Ion Battery Voltage Range (V): 48 Max. Charging / Discharging Current (A): 100 / 100 Number of Battery Inputs: 2 Charging Strategy for Li-Ion Battery: Self-adaptation to BMS Grid Type: Three Phase Efficiency: Max. Efficiency: 97.60% MPPT Efficiency: 99.00% Protection: DC Reverse Polarity Protection AC Output Overcurrent Protection Thermal Protection</p>	NO	1		

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	AC Output Overvoltage Protection AC Output Short Circuit Protection DC Component Monitoring Arc Fault Circuit Interrupter (optional) Anti-islanding Protection DC Switch Insulation Impedance Detection Residual Current Detection Communication with BMS: RS485, CAN Operating Temperature Range (Celsius): -40 ~ 60 °C Protection Degree: IP65 Installation Style: Wall-mounted				
1.30	<u>Supply and installation Rack for Batteries</u> Supply and test rack for batteries (Battery Bank) according to the following specifications: Rack Type: Steel Rack Rack Capacity: 1x4Batteries (the rack fits4 batteries with the control breaker) Included Cables: Connections between batteries and to inverters from the factory Rack Accessories: Includes all other accessories.	NO	1		
1.40	<u>Supply and Testing of PV DC Combiner Box (Kayal or equivalent) with the following specifications:</u> Rated Voltage: 1500V DC Number of Input Circuits:4 Number of Output Circuits: 4 Reverse Protection: 20A 4pc - 1000V DC Blocking Diode:4x35A - 1000V DC Surge Protection (Arrester): SPD 4pc - 1000V DC Circuit Breaker:4x32A DC 2pole Box Protection: Waterproof box, Class IP -65 Protection	NO	1		

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1.50	<p>Supply and implementation of solar panel bases: Supply and implementation of solar panel bases that include the following specifications:</p> <ul style="list-style-type: none"> • Carrying out all site leveling work, including removing waste and tree remains and transporting them to designated places in the area. • Supplying, installing and fixing the bases of solar panels in the specified places according to the drawings and instructions of the supervising engineer, including scaffolding and temporary support and doing all the metal structural work according to the executive plans and technical specifications of the platforms carrying the panels and their bases. <p>Supply and implementation of reinforced concrete foundations with dimensions (0.8m length * 0.8m width * 0.60m height) for 6 foundations in one matrix, for 3 matrices with a mixing ratio of 1:2:4 (resistant cement: sand: clay) with the use of Cica material and light reinforcement including Make two layers of rebar, top and bottom, with a diameter of 16 mm, at a distance of 15 cm, with side reinforcements for each skewer on both sides, at a height of not less than 60 cm, for all the bases of the platforms, including the four installed anchor bolts, 4 with a diameter of 16 mm, with installation. The item also includes excavation and backfilling works to a depth Not less than 40 cm for all bases. The item also includes making two layers of demolition for all buried parts and covering the visible parts with resistant cement with Cica material. And Two layers of paint are made in the required color and two layers of primer are applied to the visible parts of the concrete bases. The item also includes making a 5 cm thick brush of 2 cm thick grout on the area inside the iron fence protecting the entire solar energy systems. Grout cement is also made for the top of the concrete bases where the iron plate and the anker bolt are located and all the work is done. Relevant requirements according to the executive drawings, technical specifications, and instructions of the supervising engineer .</p> <p>Supply and installation of the iron structure and metal sheets for bases, columns, bridges, vertical tensioners, supports, purlins and all other metal structural parts, complete according to drawings and specifications and in accordance with the directives of the supervising engineer. The item also includes cutting, welding, grinding, perforating, lifting and fixing in position at all required heights and levels. The clause also includes not making connections between sections of the iron structure except with the approval of the supervising engineer, and performing all necessary related work in accordance with the executive drawings, technical specifications, and directives of the supervising engineer.</p> <p>Supply and implement a coat of certified zinc chromite and two coats of industrial enamel on all specified and directed steel structures.</p> <p>The item includes doing everything necessary to complete the item according to the specifications and instructions of the supervising engineer</p>	LS	1	5,000	
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1.60	<p><u>Supply and Testing of AC Combiner Box (ACBD) (Legrand or equivalent) with the following specifications:</u> Circuit Breaker:1x125A MCCB, 4pole AC (Legrand or equivalent) Surge Protection: 1x SPD, 4pole Features: Box Protection: Waterproof box, Class 65 Protection Busbars: Sheathed and insulated Indicators: LED indicators Meter: V/A meter All items must be sampled for approval before delivery.</p>	NO	1		
1.70	<p><u>Supply, Installation, and Operation of LiFePO4 HV Lithium-Ion Battery (5.0 kWh)</u> According to the quantity: Supply and test of LiFePO4 HV Lithium-Ion Battery (5.0 kWh): (Compared to Deye) with the following specifications: Technical Parameters: Battery Unit: 5.12 kWh Unit Capacity: 100 Ah Number of Units: 4 (quantity of battery units in parallel) Nominal System Voltage: 48 V Features: Cell Chemistry: LiFePO4 Operating Temperature: Charging: 0°C ~ +55°C / Discharging: -20°C ~ +55°C Connection: CAN / RS485 Container Protection Rating: IP20 The manufacturing period should not be less than six months from the date of manufacture. Warranty: Minimum of 5 years.</p>	NO	4		

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1.80	<p><u>Supply and installation of connection cables from panel groups to the assembly and distribution box in the solar system site:</u> Supply and installation of a copper cable for solar energy, positive + negative - PVC DOUBLE Insulated Cu cable 1 * 10mm², according to the specifications and instructions of the supervising engineer, and it contains the following specifications: -</p> <ul style="list-style-type: none"> •Withstands a voltage of no less than 1500 volts • Copper filaments with a diameter of 1*10 mm². Each electrode contains an insulating material separate from the other (each individual electrode is separate from the other and in a different color to facilitate movement) in accordance with TUV&UL, IEC 60189 specifications. IEC 69947 <p>The item includes doing everything necessary to complete the item according to the specifications and instructions of the supervising engineer</p>	LS	1		
1.90	<p><u>Supply and installation of a copper cable specifically designed for solar energy, PVC insulated, with a size of 1*50 mm², in accordance with TUV, UL, IEC 60189, and IEC 69947 specifications. The cable is UV resistant and has a voltage testing capacity of no less than 1.5 KV DC, with a carbon-resistant layer. The cable should be installed within an appropriate cable tray as per the instructions of the supervising engineer.</u></p>	LS	1		
1.10	<p><u>Supply and Installation of Cable Trays and Pipes with Trenches and Inspection Manholes for Cable and Wire Protection:</u> For the supply and installation of polyethylene pipes used in underground and overhead electrical installations with high pressure, and to perform the connections (trenches with manholes according to the drawings, including concrete manhole covers). In cases where the cables have a large cross-sectional area, high-pressure plastic pipes with a 2-inch diameter will be used. The pipes will cover the total length of the wires, with excavation depth of 50 cm - 80 cm in any type of soil, including rocky and backfilled areas, and carrying out all necessary work to ensure the project is completed to the highest standards according to specifications and under the guidance of the supervising engineer.</p>	LS	1		

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Sr.No.	Item Description	Unit	Quantity	Unit Price (USD)	Total Price (USD)
1.11	<p><u>Supply and installation of the grounding system for all components of solar energy systems (panels, inverter, collection box, and all parts of the system), including all required civil works:</u> In numbers: Supply, installation, testing and operation of an integrated grounding system, which includes excavation and backfilling with the dimensions of the excavation according to the drawings and details. It includes installing a copper skewer for each hole with a length of not less than 120 cm, mounted on a copper plate with dimensions of 30 cm * 30 cm and a thickness of 5 mm, buried around it with charcoal and salt, and connecting cables to the skewer with special clips, achieving a resistance of no more than 5 ohms. DC grounding Earth hole: (1x10mm²) ground cable for each group, also includes copper base bar. (1x35mm²) grounding hole cable. AC grounding Earth hole: (1x35mm²) grounding cable leading to the motor. (1x35mm²) grounding cable leading to the inverter. (1x35mm²) grounding hole cable. The item includes doing everything necessary to complete the item according to the specifications and instructions of the supervising engineer.</p>	NO	4		
1.12	<p><u>Supply and implementation of lightning arrester system:</u> In numbers: Supply, installation and operation of the lightning rod system, which includes excavation and backfilling work with the dimensions of the excavation according to the drawings and details. It includes installing a copper skewer for each hole with a length of not less than 120 cm, mounted on a copper plate with dimensions of 30 cm * 30 cm and a thickness of 5 mm, buried around it with charcoal and salt, connecting cables to the skewer with special clamps, achieving a resistance of no more than 5 ohms, and making a lightning rod fork from copper, including... This includes all civil works required according to the electrical and mechanical drawings and technical specifications, which include: • Earthing HOLE cable.(1x35mm²) • A lightning rod must be installed at a height of 6 m to protect all PV arrays. • The lightning arrester system must comply with IEC / BS EN 62305-3. • System resistance must not exceed 5 ohms. The price includes transportation, installation . The item includes doing everything necessary to complete the item according to the specifications and instructions of the supervising engineer.</p>	LS	2		

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1.13	<p>Supply and installation of Cables for connecting between AC combiner boxes and inverters and Main D.B and inverters and Solar Water Desalination Plant : AC Power Cable: 4x16mm², cable, color (Bahra or equivalent) Cable Specs: Copper, multi-stranded, and flexible Cable Protection: PVC, insulated, and sheathed Rated Voltage of the Cable: 350 volts - 750 volts AC Samples of all items must be taken for approval before delivery</p>	LS	1		
1.14	<p>Supply and installation of economical inverter air conditioners: Supply and installation of economical inverter air conditioners (one ton, 1-phase) with a control circuit, connecting them to the power source, and implementing operational protection using switches and circuit breakers</p>	NO	1		
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1.15	<p>Supply and installation of air extraction fans (30x30). Supply and installation of air extraction fans (30x30). with and implementing operational protection using switches and circuit breakers Perform all necessary tasks to complete this item according to the drawings, specifications, and the instructions of the supervising engineer.</p>	NO	2		
1.16	<p>Supply and delivery of a mobile cleaning tool for solar panels: In quantity: Supply of a mobile cleaning tool equipped with a built-in, high-cleaning performance with all the accessories needed to clean solar panels including 14-meter water hoses and all the chemicals required to clean quality solar panels. isolar The item includes doing everything necessary to complete the item according to the specifications and instructions of the supervising engineer.</p>	NO	1		
1.17	<p>Supply and installation of powder fire extinguisher for the room: In number: Supply, installation, testing and operation of an automatic powder fire extinguisher with a capacity of 6 kg, high quality, in accordance with engineering principles .The item includes doing everything necessary to complete the item according to the specifications and instructions of the supervising engineer.</p>	NO	1		
1.18	<p>Supply and installation of carbon dioxide fire extinguisher: In number: Supply, installation, testing and operation of a carbon dioxide fire extinguisher with a capacity of 5 kg of high quality, in accordance with engineering principles .The item includes doing everything necessary to complete the item according to the specifications and instructions of the supervising engineer.</p>	NO	1		

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Sr.No.	Item Description	Unit	Quantity	Unit Price (USD)	Total Price (USD)
1.19	<p>Supply and implementation of a protection fence around solar energy systems:- Supply and installation of a metal mesh fence coated with plastic and barbed wire according to the executive plans and technical specifications. The work includes the following:</p> <ul style="list-style-type: none"> •Conduct all site leveling work, such as digging and backfilling in any type of soil, and clean all areas planned for making the fence from materials, waste, and tree remains... and dispose of the waste to the authorized area before starting work. •Materials for making the fence are supplied at a height of not less than 2.50 meters above the natural ground, made of galvanized iron, which is resistant to corrosion and rust. It includes the supply of columns made of galvanized iron with a diameter of 2.5 inches, and they are installed in concrete bases made of regular concrete and reinforced with dimensions of (40 cm). Length * 40 cm width * 60 cm height) It is made every 2 meters along the fence with a mixing ratio of 1:2:4 (resistant cement: sand: cree) with the use of cica material. The fence mesh holes are 50 mm x 50 mm in size. 3.15 mm thickness. The work includes installing and installing three lines of barbed wire above. All requirements are according to the technical specifications, executive plans, and instructions of the supervising engineer, with the work of regular concrete with a mixing ratio of 1:2:4 (resistant cement: sand: clay), with the use of Cica material along the entire length of the mesh fence, 20 cm wide and 20 cm thick, with work of 4 iron rods with a diameter of 12 mm (2 upper rods and 2 lower rods), they are welded to the galvanized iron columns before pouring on them, and pipes with a diameter of 2.5 inches are made in the places specified by the supervising engineer, so that there are no less than 12 pipes for rainwater drainage, with a Damen net made for them. • Supplying and implementing materials for making a double-sided gate with a width of 2 meters (1 m for each door), by making galvanized iron columns with a diameter of 2.5 inches and a height of 2.5 meters on the sides of the door, while making the door doors from 2-inch empty doors, with 3 mm thick diamond mesh, and making a 5-cm iron sash * 5 cm * 5 mm for the main ring of the door. The work includes shutters, locks, and hinges. Painting is done for all parts of the iron fence, two sides of anti-rust paint, and two sides in the required color. <p>The item includes doing everything necessary to complete the item according to the specifications and instructions of the supervising engineer.</p>	LS	1		
1.20	<p>Supply and installation of smoke and heat detection sensors: Supply, install, test and operate independent smoke and heat detection sensors (one independent smoke detector, one independent heat detector) .The item includes doing everything necessary to complete the item according to the specifications and instructions of the supervising engineer.</p>	LS	1		

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1.21	<p><u>Supply, installation, testing and operation of external lighting poles:</u> Supply, installation, testing and operation of 4 hybrid outdoor lighting poles powered by solar energy, 6 meters high with a reinforced concrete base with dimensions (0.6 m length * 0.6 m width * 0.60 m height) for 4 bases with a mixing ratio of 1:2: 4 (resistant cement: sand: Cree) with the use of Cica and light reinforcement, which includes making two layers of reinforcement steel at the top and bottom, with a diameter of 16 mm, at a distance of 15 cm, with side reinforcements for each skewer on both sides, with a height of not less than 40 cm. For all bases, including the four installed anchor bolts, 4 with a diameter of 14 mm, with installation. The item also includes excavation and backfilling works to a depth of not less than 40 cm for all bases. The item also includes making two layers of demolition for all buried parts, covering the visible parts with resistant cement with Cica, and painting two layers with the color What is required is two layers of foundation for the visible parts of the concrete bases. Grout cement is also made for the top of the concrete bases where the iron plate and the anker bolt are located, and all necessary related work is done. The work also includes the following:- Supply, installation, testing and operation of a street lighting system integrated with an excellent quality solar panel (4) AC/DC Hybrid LED that runs on solar energy.</p> <ul style="list-style-type: none"> - A 60-watt LED lighting source with MPPT control according to the technical specifications and instructions of the supervising engineer. - The color temperature should be in the range of 4000 - 5000 Kelvin. - Lighting should be uniform, without dark streaks or sudden differences. - Lamps must be placed in a group suitable for outdoor installation. - IP rating must be at least 65. - The total lighting effectiveness must not be less than 180 lumens per watt. -The LEDs used in Luminaire must have a lifespan of more than 50,000 hours, according to IEC 62722-2-1 . <p>The power consumption of the LED luminaire/bulb should be as detailed above.</p> <ul style="list-style-type: none"> - Connecting wires used inside lamps must be low-smoke, halogen-free, and fire-resistant. - Manufacturer's warranty of no less than 5 years. - Steel lighting pole height = 6 meters Diameter 3 inches with a reinforced concrete foundation as placed at the beginning of the clause. <p>The item includes doing everything necessary to complete the item according to the specifications and instructions of the supervising engineer.</p>	LS	1		
1.22	<p><u>Supply, Installation, Testing, and Commissioning of the Monitoring and Protection System:</u> This includes the adjustment of all faults to protect the system and implementing all necessary safeguards, including circuit breakers and current monitoring devices, as well as voltage monitoring devices, to isolate the system in case of operational errors</p>	LS	1		
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Grand Total					-