وزارة الإعلام
Ministry of Information
State of Kuwait | دولـــة الكويت

# Supply, install, terminate, commission and maintain Solar energy system to feed Radio Building second floor

## 1. General Conditions:

1.1 The work should involve, but not be limited to the following items mentioned in these specifications. As the successful tenderer shall do all work necessary to complete the project satisfactorily even if it is not mentioned in the specifications or BOQ and if contractor does not mention the extra work in BOQ, contractor is obliged to achieve work with out any charges.

1.2 The entire works shall be carried out in strict accordance with the latest issues of the rules and regulations of the electrical installation works issued by the Ministry of Electricity and Water, IEC and BS.

1.3 Any foreseen amendment shall be clearly stated by the bidder upon submitting technical and financial offer.

1.4 All electrical installations are to be supervised by a licensed electrical supervisor and carried out by an approved CTC bidder.

1.5 The bidder shall be of CTC grade 2 in minimum.

1.6 The bidder must be from an established company with a proven track record in installing and maintaining solar energy systems.

1.7 The contractor must hold valid certifications and license for electrical and solar installations as required.

1.8 The bidder shall submit a compliance sheet with the technical and financial offer.

1.9 Upon submitting the technical and financial offer, the bidder shall submit a breakdown bill of quantity for all materials included in the offer.

1.10 The bidder shall be experienced in electrical works and shall have a minimum experience of 15 years in the field of public sector projects and minimum of 5 years in the private sector projects and shall submit the profile with the experience and relevant projects.

1.11 The bidder shall be of an established company.

1.12 The contractor shall ensure that all staff are registered under one general trading and contracting company.

1.13 The contractor's established company shall have a storage to ensure the availability of any electrical material upon the urgent requirement.

1.14 All electrical installation materials should be the best of their kinds in terms of technology and quality .

1.15 The contractor shall submit a detailed project timeline for approval prior to commencing work, including major milestones for procurement, installation, testing and commissioning.

1.16 The contractor shall provide a warranty covering workmanship, equipment and materials used in solar energy systems.

1.17 Upon equipment arrival; the contractor shall submit a clear delivery note indicating the equipment, no's and the contractor's company name. The delivery note shall be submitted alongside the equipment to the MOI stores to be inspected and approved.

1.18 Upon completion of the project, the contractor shall clean up the site, removing any debris, waste, materials and temporary installations.

1.19 Any damage to the site or facilities caused during the project must be repaired or restored by the contractor.

1.20 Any modifications required in circuits, connections, wire reconnections, power supply, breakers, isolators, busbars, etc, shall be carried out by the contractor without any extra expenses.

1.21 A warranty of 5 years shall cover all works and materials.

End of section

## **Introduction**:

- The ministry of information of Kuwait is committed to enhancing its sustainability initiatives and operational efficiency. In alignment with Kuwait's Vision 2035 and the global drive towards renewable energy, this tender invites qualified contractors to participate in the design, installation and commissioning of a solar energy fed electrical supply system for the ministry's Radio building second floor.

The objective of this project is to reduce the building's reliance on conventional energy sources by harnessing solar power, thus contributing to the ministry's environmental stewardship and cost effective energy management. The contractor is expected to provide comprehensive solutions that meet international standards ensuring high performance, reliability and integration with existing electrical infrastructure.

This tender seeks innovation and technically sound proposals that reflect a commitment to excellence, energy efficiency and long term sustainability; thereby positioning the ministry of information as a leader in Kuwait's transition to renewable energy.

## Compliance with standards:

- The contractor shall ensure that the design, supply, installation and commissioning of the PV on grid system adheres to the latest editions of IEC, BS and MEW regulations. This includes but not limited to:
- IEC 61215: Design qualifications and type approvals of PV modules
- IEC 61730: PV modules safety qualifications
- IEC 62446: PV system Requirement

# 2. Scope of work:

2.1 Submittals and documentation requirement:

- Project TimeLine
    - A detailed schedule outlining key milestones, including procurement, installation, testing, commissioning, and handover

- Initial Single-Line Diagram
    - A preliminary schematic showing the overall system layout and interconnection points.
- Commissioning Test results
    - The contractor shall submit comprehensive commissioning test reports in accordance with IEC 62446-1 (Category 1), covering:
        a. Earthing continuity
        b. Polarity verification
        c. Voltage and current measurements
        d. Insulation resistance
        e. Functional performance tests
- Initial System Layout
    - Drawings illustrating schematics, component diagrams, and structural layout details of the proposed installation.
- Technical Layout
    - Detailed representation of:
        a. PV module placement and roof utilization strategy
        b. Mounting structure design
        c. Cable routing (AC/DC), conduits, and trays
        d. System configuration and grid interconnection points
        e. Protective devices including anti-islanding protection
- Load Assessment
    - Load profile analysis and peak load calculations, along with a system sizing and feeding plan.
- Product Data Sheets
    - Manufacturer specifications and certifications for all proposed equipment and materials.
- Final As-Built Drawings
    - Complete documentation reflecting the final installed system, including any modifications during execution.
- Operation and Maintenance Manuals

- Comprehensive O&M manuals outlining system operation procedures, routine maintenance, and troubleshooting protocols.

2.2 System Design:

- The contractor shall submit a detailed system design with clear calculations of the optimal size design (KW peak) to meet the energy consumption needs in the radio floor 2 considering available space constraints.

2.3 Supply and install all required:

- Photovoltaic (PV) solar modules compliant with IEC 61215, IEC 61730, and IEC 62804
- Grid-tied inverters compliant with relevant international standards, equipped with anti-islanding protection.
- Mounting structures and hardware, including support frames, clamps, bolts, and fixings suitable for rooftop installation and site conditions.
- DC isolators, AC isolators, circuit breakers, and surge protection devices for system protection.
- Metering equipment, including production meters and monitoring systems as required.
- Bypass diodes integrated within PV modules to protect against partial shading and reverse current.
- All necessary components and accessories required for the complete and safe operation of the solar on-grid system, including earthing materials, warning labels, cable trays, and civil works (if applicable).

2.4 Cables and cable works:

- The contractor shall supply , install, connect and terminate all cables and cable trays and conduits according to technical specifications.

2.5 Distribution Boards:

- The contractor shall supply ,install, terminate and commission all distribution boards and breakers

2.6 Maintenance

- The contractor shall carry out all maintenance works according to specifications below.

2.7 Warranty

- All materials and works shall have a warranty of 5 years.

End of section

## 3. **Technical Specifications**:

3.1 The PV module shall be Crystalline silicon type (mono or polycrystalline).

3.2 The encapsulation material shall be EVA (ethaline vinyl Acetate) front and rear encapsulation.

3.3 Backsheets shall be PVC , PET, or Tedlar .

3.4 Frontsheets shall be of high transparency tampered glass, 3.2 mm thickness.

3.5 Operating temperature range shall be between -40 °C to +85 °C.

3.6 Maximum voltage system shall operate according to Kuwait's MEW regulations.

3.7 Fire rating must comply with IEC standards and MEW regulations.

3.8 Fire rating shall be of class C minimum for surface burning.

3.9 PV modules shall be resistant to PID (potential induced degradation).

3.10 PVC modules shall endure wind load > or = 2400 Pa in addition to resistance to rain, hail and dust storms.

3.11 PV modules shall have an insulation resistance > 40 M Ω.

3.12 For electrical protection, bypass diodes must be installed for partial shading protection.

3.13 PV modules shall endure local UV exposure conditions up to 25 years.

3.14 PV modules shall perform 200 cycles ranging from -40 °C to +85 °C.

3.15 PV modules shall adhere to STC ratings in addition to all required tests according to IEC and BS.

3.16 PV modules must include certification labels with electrical ratings, class, fire rating, and serial numbers.

3.17 PV arrays shall be designed with consideration of voltage temperature coefficients to avoid exceeding system max voltage in cold/hot conditions.

3.18 Array design shall avoid reverse current hazards and include blocking or bypass diodes where needed.

3.19 Junction boxes, connectors, and combiner boxes must be IP65 or higher and accessible for maintenance.

3.20 Inverters must support anti-islanding and grid-disconnection features, compliant with local utility regulations.

3.21 Inverter efficiency shall be > or = 97% at nominal load, and equipped with MPPT (Maximum Power Point Tracking).

3.22 Inverter installation must include surge protection devices (SPDs) on both AC and DC terminals.

3.23 The mounting structure must be corrosion-resistant galvanized steel or anodized aluminum and anchored to withstand wind speeds up to local code.

3.24 The tilt angle and spacing must account for self-cleaning, shading avoidance, and maintenance access.

3.25 All exposed wiring shall be secured with UV-stable fasteners, not hanging or loose on rooftops.

3.26 All components must be clearly and permanently labeled, including disconnects, junction boxes, and PV strings, with a string layout map provided. No adhesive allowed.

3.27 The system must be designed to ensure safety, accessibility, and compatibility with exiting AC infrastructure, with protections against overvoltage, overcurrent, ground faults, and lighting.

3.28 The contractor must ensure future modifications or maintenance can be performed safely, and provide clear disconnection and safety procedures for rooftop or nearby work.

3.29 The system shall be one of the following manufacturers:

a. Huawei FusionSolar

b. Ledvanced
c. SolarEdge
d. Fronius
e. Enphase
f. SunPower
g. Tesla Energy

End of section

4. Cables and cable works:

4.1 All cable materials, terminations, trays, conduits, glands, and accessories shall be new, branded, of a high quality and comply with the latest editions of relevant IEC and BS standards.

4.2 Cables shall be suitable for continuous outdoor operation under Kuwait's climate conditions (high temperatures, UV exposures, sand and humidity).

4.3 All conductors shall be annealed tinned copper with 99.9% purity **class 5.**

4.4 For all DC side cablings the cables shall be double sheathed to form double insulation and shall operate at temperatures from -40°C up to +90°C.

4.5 All cables intended to be installed for DC side shall all be Low Smoke Zero Halogen sheath type as per IEC recommendation.

4.6 Voltage drop calculations shall be made to ensure proper cross sectional area selection.

4.7 All DC side cables shall be UV resistant , conduits, cable trays with covers or directly fixed with UV rated cable ties.

4.8 All DC side cables shall be segregated from AC cables to avoid interference.

4.9 All AC side cablings shall be single or multi core , XLPE insulated or Low smoke zero halogen and shall be routed via cable trays, ladders or underground ducts with proper segregation.

4.10 All wirings inside panel boards or string monitoring shall be flexible copper type and PVC insulated with a typical cross section not less than 1.5 $mm^2$.

4.11 All cable trays shall be hot dip galvanized steel trays zinc coated and rust and corrosion resistant.

4.12 For DC cables, solid bottom trays shall be installed whereas for AC cables perforated trays in ventilated areas shall be used.

4.13 All trays shall be bonded to the system's earthing.

4.14 All cables shall be tested as follows:

a. Insulation resistance test
b. Continuity test
c. Polarity Verification for DC test
d. Earth Continuity test
e. Voltage drop test

End of section

5. Distribution Boards:

5.1 This section covers the requirements for the design, supply, installation, connection , testing and commissioning of low voltage distribution boards for on grid solar PV system integration at floor 2 radio building it will apply for both:

- Replacement of existing DB if required
- Installation of new DB's for PV integration

5.2 All works shall comply with the following standards

- IEC 61439 Low voltage controlgear assemblies
- IEC 60947 Circuit breakers

5.3 All DB's shall be factory-built type tested assemblies as IEC.

5.4 DB's shall be modular and wall mounted with easy access.

5.5 DB's shall be of sheet steel , powder coated with minimum thickness of 1.5 mm.

5.6 Protection class shall be minimum IP 42 indoor and IP 54 in semi exposed or kitchen adjacent.

5.7 All metallic parts shall be treated for anti corrosion properties.

5.8 DB's shall be designed for three phase four wire system.

5.9 Busbars shall be pure copper of 99.9% purity rated 100% at continues current.

5.10 Busbars temperature shall not exceed 70°C.

5.11 Busbars shall have phase identification

5.12 Busbars shall withstand a short circuit breaking capacity of no less than 65 kA.

5.13 For kitchens and heavy load areas , busbars shall be rated accordingly.

5.14 MCCb's shall be adjustable.

5.15 MCCb's shall include SCC protection and overload protection with a minimum breaking capacity of 65 kA.

5.16 MCB's shall have breaking capacity of no less than 10 kA.

5.17 All breakers shall be of type D for heavy loads.

5.18 RCCBO's shall all be minimum 30 mA and 100 mA where there are heavy appliances.

5.19 Separate , adequately rated neutral (N) and earth (PE) bars.

5.20 Sufficient terminals to allow all circuits to terminate individually without sharing , earth bars shall be bolted and electrically continues.

5.21 All internal wirings shall have a minimum cross sectional area of 2.5 $mm^2$ thickness.

5.22 All circuit breakers shall be labeled clearly with name plates and shall have voltage rating and SCC clearly mentioned with stainless steel tags.

5.23 All DB's shall have a documentation holder and shall have the SLD's inside of them.

5.24 All DB's shall have a distinctive earthing terminal for system grounding.

End of section

6. Maintenance

6.1 Maintenance Plan

a. The contractor shall submit a comprehensive preventative maintenance plan detailing the required monthly inspections, cleaning schedules, electrical testing, firmware updates, and system calibration procedures.

b. The maintenance activities must align with relevant IEC standards and British Standards for photovoltaic systems.

6.2 Reporting Requirements

a. The contractor shall prepare and submit a monthly Maintenance Report using a standard template in accordance with IEC/British Standards.

b. The report must include:

- Inspection checklist results.
- Photographs of key system components (e.g., modules, inverter rooms, combiner boxes).
- Electrical measurements (voltages, currents, insulation resistance).
- Observed anomalies and corrective actions.
- Preventive maintenance actions carried out.

c. Each monthly maintenance report must be reviewed and signed by one of the assigned project supervisors as confirmation of maintenance completion and performance assessment.

d. The contractor shall include spare parts incase of any material defection.

6.3 Hotline Support and emergency response

a. The contractor shall establish a 24/7 hotline dedicated for the project to respond to emergency maintenance or operational issues.

b. In the event of any failure in system feeding, energy supply, critical alarms, or inverter shutdowns:

- The contractor must dispatch a technical team to the site within 12 to 24 hours maximum from the time the issue is reported.
- Emergency repair work shall be prioritized to ensure minimal downtime and to restore normal operation as quickly as possible.

End of section

7. Warranty:
    - All works shall have a warranty of 5 years.

End of section