

SPECIFICATION FOR SOLAR SYSTEM

FOR TENDERING PURPOSE ONLY

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GENERAL POINTS

1.0 GENERAL

1.1 General Description:

The Solar system shall be used for source of Electrical Energy in Faisalabad Garment City Company, Faisalabad, "herein after FGCC" (Public Sector Company, Registered under Section 42 of Companies Ordinance 1984/Act, 2017, with Securities & Exchange Commission of Pakistan "SECP") situated at Value Addition City, 1.5 KM, Sahianwala Road, Khurrianwala, Faisalabad.

1.2 The specification covers the supply & installation of Solar system.

1.3 The vendor shall study the specification and satisfy him thoroughly and shall take full responsibility of the smooth, reliable and safe working.

1.4 All items of instrument shall be completed in all respects and any instrument not covered in the specification but essential for proper installation, operation and maintenance of the instrument shall be included by the Vendor in his offer and the reasons for such inclusion shall be clearly stated.

2.0 SCOPE OF WORK

2.1 Only and only: Existing Machine/Equipment /Items/part/accessory which is indicated on the Manufacturer's website/catalogue/brochure which model number/catalogue number will be accepted. Technical & Financial offer on original letter head pad will be accepted.

2.2 Any Special prepared model of Machine/Equipment/Item or its part/accessory to meet the requirement of FGCC will not be accepted.

2.3 Any type of alteration/modification to meet the requirement of FGCC in any existing model of Machine/Equipment/Item or its part/accessory will not be accepted

2.4 The catalogue/brochure by the quoted model must be on the web principal manufacturer/company etc. Self-made catalogue/brochure by the bidder will be considered as cheating and this attitude can create serious problems (asper PPRA rules) in the business of bidder.

2.5 Packaging, forwarding, transport, loading, unloading, precaution against damage during transit etc.

2.6 Performance Guarantee.

Special Conditions:

2.7 The firms must be registered with AEDE and other TAX Department of Govt. of Pakistan.

2.8 Interested firms are required to visit the site before submitting technical proposals.

2.9 Resident engineer (Technical staff) should be nominated by company to receive emergency calls to manage the troubleshooting on priority basis of the project two years.

10.0 The bidder /firm should ensure safety measures in bearing weather effect like thunderstorm etc.in installation of the solar system

11.1 The solar system must be operational on site (turnkey solution). The project execution (including civil, Electrical and, any other nature of alteration / modification for the company/ bidder/firm.

11.2 The firm will be fully responsible to rectify and repair / restore the infrastructure where applicable.

11.3 No boarding and loading for the installation team will be entertained by the FGCC even from starting of the project execution till the expiration of the warranty.

11.4 The Contractor will provide the monitoring software to FGCC for monitoring the track of performance of the Power System.

11.5 The Contractor will provide multiple movable step ladders (design to be submitted later) for optimum height and convenience for clearing, visual inspection, and maintenance of the pv system in future

3.0 Procedure for Bids:

Tender Proposals required under PPRA Rules 36(b) of the Public Rules 2004, as indicated in the tender advertisement.

4.0 Bidder's Eligibility:

4.1 Bidding firm must be registered with AEDB (Alternative Energy Development Board) and TAX

Departments of Govt. of Pakistan and will submit the certificate of registration.

4.2 Original Equipment Manufacturer's /any authorized distributor(s) sole agent /Firms will provide certificate for the participation in the tender from their principal manufacturer(s).FGCC may expect the production of such certificate where applicable.

4.3 An Affidavit duly attested by the Oath Commissioner/Notary Public showing that the firm is not Blacklisted from any Govt./Semi Govt. Department of the Pakistan as well as it is not involved in litigation with any Govt. department.

5.0 Conditional Tender

5.1 Any conditions imposed by bidder will not be accepted.

6.0 Performance Guarantee (PPRA rule 39):

6.1 * FOR basis: An amount of 06% will be deducted as a performance Guarantee from the bill and shall be retained for the period Two year. Two years will start from the date of installation (Commissioning certificate issued by the FGCC.

OR

Bank Guarantee (from the scheduled bank of Pakistan) will also be accepted but it should be valid for Two Year

7.0 Taxes/Duties:

FOR basis:

7.1 All Govt. Taxes/Duties/Custom clearing charges etc. will be paid by the bidder. Necessary documents will be provided to the bidder for the bidder for exemption in Govt. Taxes/Duties etc.(where applicable).

7.2 Rates/Taxes: in case of any statutory variations in the rate of applicable taxes and duties or imposition of new taxes & duties , or changes to the exchabes rate regime, during the tenure of the Agreement, the same shall be borne by the Contractor

8.0 Loading/Unloading/Commissioning/Installation/Training on site:

8.1 Loading/Unloading/Installation/Training (for operation, maintenance & troubleshooting etc.) and testing of equipment/item/machine on site: will be provided by the bidder.

9.0 Country of Origin and Packing:

9.1 The items must be brand new and complete in all respect with original packing of manufacturer and strictly conforming to the given specifications. Country of origin and model must be mentioned in technical proposal. It's any specific part/accessory (locally made) will not be accepted unless categorically mentioned in the technical specification.

10.0 Prices:

10.1FOR prices must be in Pak rupees.

Note: whereas a specific brand is indicated, equivalent option should be added as per PPRA rule-10.

10.2 The bidder / firms should quote the prices **per kilowatt** considering the total project capacity of 50Kw.

11.0 Payments:

11.1 Payments shall be made upon completion of the project as turnkey solution one month as per PPRA rules after the issuance of certificate of commissioning by technical committee of FGCC. However, Net metering process will be initiated by the contractor. Contractor will be responsible to apply for the licensing process. FGCC will provide the necessary documents where applicable. Payment will not be delay due to delay in licensing at FESCO/NEPRA etc. Applicable Government / FESCO / NEPRA etc. fee for licensing will be paid by FGCC.

12.0 WARRANTY:

12.1 Warranty should be Two years, Two years: will start from the date of installation (Commissioning certificate issued by the technical committee of FGCC).The items or any part must be BRAND (originally manufactured & assembled) & complete in all respects with original manufacturer's packing and strictly conforming to given specifactions.Any used part /component (inner or outer) will not be accepted.

12.2 All expenditure {technical, personal , boarding and loading any transportation (National/International)or any type of charges of repair/replacement of any part (s)/equipment during warrantee period will be borne by the

supplier/ bidder.

CAPABILITY AND EXPERIENCE

12.1 The vendor shall have executed at least three (3) similar kind of work within last three years. The vendor shall submit along the offer the reference list of the similar work. Offers received without the reference list may be rejected. Only those bidders are eligible to apply who have valid NTN No., PRA and GST No. with attested copies of registration numbers as their profile duly issued by FBR / quarters concerned.

13.0 PRE-BID DISCUSSIONS

13.1 Before quoting the vendor shall visit FGCC with prior appointment for understanding the exact Tenders quoted.

15.0 QUOTATION / BIDDS

15.1 Vendor should submit bids /quotation in PKR only. The bid shall comprise a single package containing two separate envelopes. Each envelop shall contain separately the financial proposal and the technical proposal; 15.2 Envelops shall be marked as “FINANCIAL PROPOSAL” and TECHNICAL PROPOSAL” in bold and legible letters to avoid confusion.

Note:

Company will use the quality & cost method based formula for (technical & financial) evaluation where applicable and samples may be required from the qualified bidders.

FGCC reserves the right to reject all bids or proposals at any time prior to the acceptance of a bid or proposal. The FGCC shall upon request communicate to any supplier or contractor who submitted a bid or proposal, the grounds for its rejection of all bids or proposals, but is not required to justify those grounds.

Specifications of Solar System 50KW

1. Photovoltaic Module

Parameters	Min. Specifications required
Module Make	Quoted Brand should be verifiable (Tier 1 grade product) (Product make / model / specifications / performance parameters given by manufacturer and should be available on manufacturer official website)
P.V. Module Capacity	Monocrystalline half cut 530 watt or better quality
Module Efficiency	Minimum 21 %
Power Tolerance	Should be on positive Side
Certification	T.U.V. Certified as per IEC 61215, IEC 61730, or equivalent. Potential Induced Degradation (P.I.D) free certificate from T.U.V must be provided.
Junction Box	Must comply I.P.66 standard with 1000 V (I.E.C.) insulation class or above (must comply with safety standards concerning the system, i.e., connecting wire insulation class, etc.
Cable	Must comply 1000 V (I.E.C.) insulation class or better
Warranty	12 years product replacement warranty 10 years for 90% of warranted minimum power 25 years for 80% of rated minimum power.

2. Solar Grid inverters and control

The overall system must have a reverse power blocking feature as a power junction point, i.e., Grid, Gen-Set coupling point, that can be controlled/ configured. Gen-Set Synchronization, stability, and overload / underload protection must be kept in view during installation.

Parameters	Min. Specifications required
Inverter Make	Quoted Brand should be verifiable (Product make / model / specifications / performance parameters by manufacturer and should be available on manufacturer official website)
Operating Conditions	String Type preferred I.P. 65 Rated under shed Having must Anti Islanding feature Maximum efficiency of 98.0 % or better D.C. input voltage of up to 1500 V (I.E.C. compliance) or as per design Multistring capability for optimum system design Multiple M.P.P. ranges Data logging Remote access Advance metering Infrastructure (AMI) must be installed

Parameters	Min. Specifications required
P.V. and Inverter Ratio Performance	1:1
guarantee	Must have 5 Years replacement warranty.
Certification	Equaling or applicable standards such as I.E.C. 62109-1/-2, IEC 62116, IEC 61727,

3. Cabling

- All exposed wiring (with the possible exception of the module interconnects) must be covered in conduits /duct. Wiring through roofing, walls and other structures must be protected through the use of bushings. Wiring through roofing must form a waterproof seal (applicable for wiring only).
- Field installed wiring must be joined using terminal strips or screw connectors. Soldering or crimping in the field must be avoided if at all possible. Wire nuts are not allowed. The rated current carrying capacity of the joint must not be less than the circuit current rating. All connections must be made in junction boxes with I.P. 66 Rated if open and I.P. 65 Rated if used under shed. Fittings for light switches, and polarity sensitive socket outlets may be used as junction boxes where practical.
- Installation including wiring shall meet the requirement and recommendations given in 8.3 of IEC 62124 ed 1.
- The commissioning and acceptance will be subject to the fulfilment of all requirements specified in the above-mentioned paragraphs of IEC 62124 ed.1 and additional requirement as detailed below.
 - No conduit or fitting shall be attached directly to hatch or any other non-supportive surface
 - Especially avoid installing the conduit direct over the roof; there must be distance not less than 3 inches between the roof surface and conduit/duct.
 - Cables must be joined by the use of junction boxes, screw-connectors, and block connectors.
 - All wires must be terminated with proper end sleeves and wire thimbles with different colours for positive and negative polarity.
 - Field installed wiring must be joined using terminal strips or screw connectors. Soldering or crimping in the field must be avoided if at all possible. Wire nuts are not allowed.
 - The rated current carrying capacity of the joint must not be less than the circuit current rating.
 - Fittings for P.V. must be with polarity sensitive socket outlets to avoid short circuiting.
 - Size, voltage grade and manufacturer name should be printed on every cable
- Cable specifications are as followed with BS/IEC standards compliance.

Item	Requirement
1. P.V. to inverter:	99.9% pure copper (Stranded and flexible) with voltage drop less than 2%, U.V. resistive
2. Grid to Inverter	99.9% pure copper (Stranded) with voltage drop less than 2%, U.V. resistive
3. Inverter to Load D.B:	99.9% pure copper (Stranded) with voltage drop less than 2%,

4. Breakers for A.C. and D.C. Power:

- Circuit Breaker Voltage rating must be greater than the maximum circuit voltage, and the current rating must be between 125% - 150% of the maximum design current for the circuit.
- Breakers Must have a clear visual indication of their state (ON/OFF or I/O) and marking.

5. External Surge Arrester (A.C. and D.C.)

Parameters	min. Specifications required
Impulse current (I_{mp})	min. 25kA (10/350µsec.)
Response time	≤ 50nsec

Leakage current	≤ 1 mA
Dielectric strength	2000 V AC @ 1 minute
Protection Class	Class 2(Type2)
Discharge voltage	As per design
Ingress Protection	IP20 or above
Short circuit withstand capacity	min. 20kA

6. Lightning arresters & Surge Protection System accessories

Calculation must be done in accordance with rolling sphere method or equalling (share the calculation at the time of execution)

Parameters	Min. Specifications Required
All calculations of air termination rods must be done using rolling sphere method or Equivalent	
Air termination rod material	Copper
Air termination rod length	As per design
Air termination rod diameter	As per design
Air termination rod	As per design
Cable for interconnecting metal structure and S.P.D.*.	16mm ² or higher, 99.99% pure copper or higher (1 core) or equaling strip for grounding
Insulated Spacer	As per design
Cable Bracket	As per design
Stand – Fang Fix system	As per design
Compliance	Earthing of 2.5 ohm or less (with standard earthing pit) Applicable standards that may include ICE 62305-3 (EN62305-3) IEC62305-3 (EN 62305-3) DIN VDE 0151 and DIN 18014

7. PV Mounting Structure

Description	Requirement
Wind loading	Mounting system should be able to allow air circulation for cooling in high temperature and withstand wind speed of 130 Km/hour at 3 sec gust
Mounting structure	Suitable angle adjustment Hot dip galvanized structure minimum 12 Gauge thickness or better with minimum 80-micron coating. Nut Bolt S.S 304 Grade or better
Certification	Vender will provide certificate from structural engineer for all installation (Structure Life grantee of 25 years)

8. Monitoring of PV system

Real time online and remote monitoring, data must be available online, locally stored on hard drive, and displayed on L.E.D. screen with customized G.U.I. as per site requirement.

Computing device

P.C. with min core i3, 1 TB HDD, 4 GB RAM & 50 inch or above HD LED screen along with networking port is part of BoQ.

The following functionality is expected:

1. Generation data must be logged and available online for future access.
2. Solar Irradiance data and air temperature data must be integrated in G.U.I.
3. Generation data must be logged and secured off-line with time tracks.
4. Automated frequent data collection, analysis, and display of the fundamental parameters of the system output (especially Inverter's all parameters)
5. Alarms/alerts and timely notification of key performance indicators
6. Daily, Monthly, quarterly, and yearly reporting of deviations from the guaranteed PR
7. Data must be readily available for the fulfilment of all warranties and performance guarantees
8. Equipment condition monitoring
9. Separate inverter parameters monitoring and Data logging.

9. Reverse flow controller & Dynamic Genset Controller, compatible with Gen-Set, Grid & Inverter

PV Gen-Set Synchronizer (Generator Ratings must-visit powerhouse for understanding)

(For Generator Ratings must-visit sites for understanding)

1. Integrates locally available energy analyzers for specified inverter
 2. Integrates mains sync controllers for Zero Injection Controller application
 3. Can control up to the string of the designed/selected inverter
 4. Must Act as P.V. Zero Export controller
 5. Webserver + Zero Export Controller + D.G. Protection Controller + Data-logger must be provided in one G.U.I./Package
 6. Flexible control to Prevents/allow power feed-in to the grid
 7. Prevents generator running in an underloaded condition
 8. Protects the generator from reverse power conditions from the on-grid solar inverters
 9. Ensures availability of sufficient power to meet load demands
 10. Ensures optimized fuel consumption
 11. Prevents over limiting of the solar inverters
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Certificates and compliance with standards

Compliance with applicable Safety regulations for electrical measuring, control, regulation, and laboratory equipment such as but not limited to EN 61010-1:2010, electromagnetic compatibility EN 61000-6-2:2005, EN 61000-64:2011 or

Note:

- The company must train concerned staff / faculty members nominated by the authorities on site.
- All documentation and application processing for net metering will be the responsibility of vender.
- The company must provide an appropriate schedule for maintenance to the officials.
- All bidders should submit samples of quoted items (all types of the cables, complete solar plate, mounting structure with nut bolts etc.) other than Invertor. The submitted samples should be properly tagged with standard manufacturer and supplier information. The sample of each category and capacity of cable will be of 1 foot long, one nut bolt of each size, one piece of galvanized material fittings and one solar plate.
- Vendors must design galvanized fitting material according to installation site. All the holes and cuttings must be done before the coating. No cutting edges making of holes or drilling will be allowed in structure laying to avoid rusting after installation.
- In case of system failure or break down during the warranty period, vender is bound to rectify the issue or replace the faulty equipment within 48 hours from the reporting time maximum.
- The company must provide the import documents and submit the pre-shipment inspection (P.S.I.) report and certificate of conformity (C.O.C.) from approved / Authorized Govt firms.
- Performance of the solar panel must be insured from international reputable company / agency that would be arranged by manufacturer of PV panel and will transfer to end user.
- If panel would not provide committed power per years as per agreement then the contractor would be liable to provide more panels to achieve the committed energy.

50k.W on Grid Solar System

S#	Items	Brand	Description	Qty	Unit	unit Price	Total price
1	Solar Panels	Tier 1 Grade A	Half Cut Monocrystalline >21% efficiency, >540W panels	93	No.		
2	Inverter	Tier 1	>50kW, with LCD and Efficiency>98% with Online	1	No.		
3	LV Panel	Local	Swg 16-18 DB Box with	1	No.		
4	AC Breaker (Inverter out)	Schneider/ ABB	80A, 4 pole Rated 1000V	4	No.		
6	Mounting Structure supply with installation (L2)	Local	SWG 12,1x2 Landscape, Hot dip- Galvanized with GI Nuts and Bolts S.S 304 Grade or batter	50 k.w	RS/Watt 's		
7	Installation Labor	Electrical	Installation with PVC Pipes, MC4, Ducting, Cable tie, Tumble, Nut, bolt, Tape etc.	Job	RS/Watt s		
Cables and Conductors & Misc.							
8	DC Cable modules	Fast/New Age / GM	4 sq.mm S/C CU/PVC/PVC	As per	Meters		
9	AC Cable (Inverter to	Fast/New Age /GM	16 sq.mm 3.5core core	As per	Meters		
10	Grounding Cable(modules)	Fast/New Age /GM	2.5Sqmm S/C Flexible	As per	Meters		
11	Grounding structure, Earthing DC	Fast/New Age /GM	6sq.mm S/C PVC/PVC	As per	Meters		
12	Miscellaneous Items and	Local	ESL	As per	Job		
13	Ground Cable, Earthing AC	Fast/New Age / GM	10 Sq.mm Single Core	As per	Meters		
14	Lightning Rods	Local	Non-isolated lightening	1	No.		
15	Earthing Rods	Local	3 meter Rod copper clad for inserting inside ground	2	No.		