Uttar Pradesh New & Renewable Energy Development Agency
Vibhuti Khand Gomti nagar Lucknow
FY 2023-24

Discovered Rate of ON-Grid Solar Power Plant(Govt Buildings)FY 2023-24								
Plant Capacity Range(KW)	Base Rate Excluding GST (Rs/KW)	GST @ 12% on 70% amount	GST @ 18% on 30% amount	Rate Discovered including GST (Rs/KW)	Contingent charges @ 3% + GST			Total Cost including all taxes and Centage charges (Rs/KW)
					Contingent charges @ 3%	Contingent charges tax @ 18% (Rs)	Total Contigent Charges	
1 KW TO 10 KW	53820.00	4520.88	2906.28	61247.16	1614.60	290.62	1905.22	63152.38
11 KW TO 100 KW	50890.00	4274.76	2748.06	57912.82	1526.70	274.80	1801.50	59714.32
101 KW TO 500 KW	45167.00	3794.03	2439.02	51400.05	1355.01	243.90	1598.91	52998.96

SCOPE OF WORK AND TECHNICAL SPECIFICATIONS

a. Scope of work covers Design, Supply, Installation, Commissioning and five years Comprehensive warranty Maintenance and Operation of various capacity of Grid Connected SPV Rooftop Plant for captive use (Capex Mode) in various Government buildings at various places in the State of Uttar Pradesh as per the technical specification given in this bid.
b. Wiring up to Distribution Board from the SPV Rooftop system will be in the scope of the Successful bidder(s).
c. Performance testing of the complete system.
d. Remote Monitoring System
e. All the necessary approvals from UPPCL/DISCOM (Electrical Utility)/Electrical Inspectorate, feasibility study, necessary civil work, Mounting of Module Structures, PV Module Installation, Inverter Installation, DC/AC Cabling and interconnections, Installation of Lightning Arresters and Earthing System as per the standards, Net Metering, arranging all the necessary inspections from UPNEDA/UPPCL/Electrical Inspectorate/ UPNEDA District Office as part of Pre Commissioning, if any, Commissioning of the PV Power Plant, are coming under the scope of the bidder.

Make of Items must be as per the BIS/ MNRE technical specification and equivalent make offered by the bidders in the Bid. The Bidders may change the make of items with the permission of competent authority of UPNEDA as and when required on valid circumstantial conditions. The bidder shall provide Test Certificate of the proposed make of items issued from MNRE authorized testing center or NABL accredited test lab.

TECHNICAL SPECIFICATIONS

A Grid Tied Solar Rooftop Photo Voltaic (SPV) power plant consists of SPV array, Module Mounting Structure, Power Conditioning Unit (PCU) consisting of Maximum Power Point Tracker (MPPT), Inverter, Controls & Protections, Net meter, interconnect cables, Junction boxes, Distribution boxes and switches. PV Array is mounted on a suitable structure. Grid tied SPV system will be without battery and unidirectional should be designed with necessary features. Components and parts used in the SPV power plants including the PV modules, metallic structures, cables, junction box, switches, PCUs etc.,should conform to the BIS or IEC or international specifications, wherever such specifications are available and applicable. Solar PV rooftop system shall consist of following major equipment/components.

- Solar PV module
- Grid interactive Power Conditioning Unit
- Mounting structures
- Junction Boxes.
- Earthling and lightening protections.
- IR/UV protected PVC Cables, pipes and accessories
- Remote Monitoring System

The solar photovoltaic technology Crystalline based RTS projects for generation of electricity will be deployed under the Programme. Project proponents to adhere to the national/ international standards specified by MNRE from time to time.

SOLAR PHOTOVOLTAIC MODULES:

Solar PV modules should be of the crystalline solar Photovoltaic Technology, manufactured in India. Detailed specifications of the solar PV modules are given below

	Must have test certificate as per MNRE guide lines and specified in this tender
Origin	**Manufactured in India both cell and module**
Efficiency module	>= 15%
Fill factor	>= 70%
warranty	Panel output (W_p) capacity to be >=90% at the end of 12 years and >=80% of at the end of 25 years.
Module frame	Non-corrosive and electrically compatible with the mounting structure material
Termination box	Thermo-plastic, IP 65, UV resistant
Blocking diodes	Schottky type
Module minimum rated power	The nominal power of a single PV module shall not be less than 250Wp.
Identification tag for each solar module	Shall be provided inside the module and must be able to withstand environmental conditions and last the lifetime of the solar module.
Identification tag data	Name of the manufacturer with logo Month and year of manufacture Model No (Should consists of the voltage and rate wattage) Module serial number Made in India
Power output rating	To be given for standard test conditions (STC). I- V curve of the each module shall be submitted
Compliance with standards and codes	IEC 61215 / IS 14286 IEC 61730 Part 1 and 2
Salt Mist Corrosion Testing	As per IEC 61701

The bidder shall carefully design & accommodate requisite numbers of the modules to achieve the rated power output and overall performance of plant.

The rated output power of any supplied module shall have maximum tolerance of +/- 3%.

The peak-power point voltage and the peak-power point current of any supplied module and/or any module string (series connected modules) shall not vary by more than 2 (two) per cent from the respective arithmetic means for all modules and/or for all module strings, as the case may be.

WARRANTIES:

a) Material Warranty:

i. Material Warranty is defined as: The manufacturer should warrant the Solar Module(s) to be free from the defects and/or failures specified below for a period not less than twenty five (25) years from the date of sale to the original customer.

ii. Defects and/or failures due to manufacturing

iii. Defects and/or failures due to quality of materials

Non conformity to specifications due to faulty manufacturing and/or inspection processes. If the solar Module(s) fails to conform to this warranty, the manufacturer will replace the solar module(s), at the Owners sole option.

Test reports/ certificate from IEC/NABL/MNRE accredited laboratory to be mandatorily enclosed for relevant IEC/equivalent BIS Standards.

Solar PV Mounting Structure:

The PV modules shall be mounted on fixed metallic structures having adequate strength and as per requirement of site to withstand the load of the modules and high wind velocities. The mounting structure steel shall be as per latest IS 2062: 1992 and galvanization of the mounting structure shall be in compliance of latest IS 4759.

Detailed specifications for the mounting structure are given below:

Wind velocity withstanding capacity	150 km / hour The designs have been certified by a recognized Lab/ Institution/certified engineers in this regard and submit wind loading calculation sheet to users if they desire so. Suitable fastening arrangement such as grouting and calming should be provided to secure the installation against the specific wind speed.
Structure material	Pre galvanized sheet steel with a minimum galvanization thickness of 80 microns and the structural patterns shall be made before galvanizing
Bolts, nuts, panel mounting clamps, fasteners (with spring washers)	Stainless steel SS 304
Mounting arrangement for metal sheet roofs	Mounting directly on the sheet metal, ensuring stability and wind withstanding capacity or penetrating the sheet metal and fixing to the sub-structure, ensuring that the roof remains water proof and ensuring stability and wind withstanding capacity
Mounting arrangement for elevated structures	The elevated structure has to be securely anchored to the supporting surface. Concrete foundations of appropriate weight and depth for elevated structures mounted directly on the ground; Bolted with anchor bolts of appropriate strength for elevated structures mounted on RCC surfaces.
Mounting arrangement for RCC-flat roofs Installation	With removable concrete ballast made of pre-fabricated PCC (1:2:4), M15. The structures shall be designed for simple mechanical on-site installation. There shall be no requirement of welding or complex machinery at the installation site.
Minimum distance between roofedge and mounting structure	0.5m
Access for panel cleaning and maintenance	All solar panels must be accessible from the top for cleaning and from the bottom for access to the module- junction box.
Panel tilt angle	North – south orientation with an adjustable tilt angle arrangement of 25-30 degrees (depending on location), south facing. However to accommodate more capacity the angle inclination may be reduced until the plant meets the specified performance ratio requirements.

Regarding civil structures the bidder need to take care of the load bearing capacity of the roof and need arrange suitable structures based on the quality of roof.
The total load of the structure (when installed with PV modules) on the terrace should be less than 60 kg/m2. The array structure shall be grounded properly using maintenance free earthing kit suitable for mounting over building terrace

Solar Array Fuse

The cables from the array strings to the solar grid inverters shall be provided with DC fuse protection. Fuses shall have a voltage rating and current rating as required. The fuse shall have DIN rail mountable fuse holders and shall be housed in thermoplastic IP 65 enclosures with transparent covers.

Solar Grid Inverter

As SPV array produce direct current electricity, it is necessary to convert this direct current into alternating current and adjust the voltage levels to match the grid voltage. Conversion shall be achieved using an electronic Inverter and the associated control and protection devices. All these components of the system are termed the "Power Conditioning Unit (PCU)". In addition, the PCU shall also house MPPT (Maximum Power Point Tracker), an interface between Solar PV array & the Inverter, to the power conditioning unit/inverter should also be DG set interactive. If necessary. Inverter output should be compatible with the grid frequency. Under normal condition the building load is fed from a SPV electricity and in the absence of SPV power or low SPV power conditions an external AC source can be used for supply of electrical energy to load. In case the PV power generated at any instant of time is more than the load requirement of building or at no load conditions this excess PV power shall be reduced or make it open automatically. All these operation should be automatic.
Typical technical features of the inverter shall be as follows:

1	Total output power AC	To match solar PV plant capacity while achieving optimum system efficiency Single or three phase as per requirement of Site and capacity of plant.
2	Input DC voltage range	As required for the solar grid inverter for corresponding capacity
3	Maximum power point (MPPT)	Shall be incorporated
4	Number of independent MPPT inputs	1 or more
5	Operation AC voltage	As per requirement of the site
6	Operating Frequency range	47.5 – 52.5 Hz
7	Nominal frequency	50 Hz
8	Power factor of the inverter	>0.95 at nominal power
9	Total harmonic distortion	Less than 3%
10	Built-in Protection	AC high / low voltage; AC high /low frequency
11	Operating ambient temperature range	-5 ^{o}C to +55 ^{o}C
12	Humidity	0 – 95% Rh
13	Inverter efficiency	>93% (In case of 10 kW or above with in-built galvanic isolation) >97% (In case of 10 KW or above without in- built galvanic isolation)
14	Inverter efficiency	> 90% (In case of less than 10 kW)
15	Protection degree	IP 65 for outdoor mounting, IP 54 for indoor mounting
16	Communication interface	RS 485 / RS 232 / RJ45
17	Safety compliance	IEC 62109-1, IEC 62109-2
18	Environmental Testing	IEC 60068-2 (1, 2, 14, 30)
19	Efficiency Measurement Procedure	IS/IEC 61683
20	Cooling	Convection
21	Display type	LCD for data display. LCD /LED for status display

22	Display parameters to include	Output power(W), cumulative energy (Wh), DC voltage (V), DC current (A), AC voltage (V), AC frequency (Hz), AC current (A), cumulative hours of operation (h).

a) Three phase PCU/ inverter shall be used with each power plant system (10kW and/or above) but in case of less than 10kW single phase inverter or as per building requirement can be used.
b) PCU/inverter shall be capable of complete automatic operation including wake-up, synchronization & shutdown.
c) The output of power factor of PCU inverter is suitable for all voltage ranges or sink of reactive power, inverter should have internal protection arrangement against any sustainable fault in feeder line and against the lightning on feeder.
d) Built-in meter and data logger to monitor plant performance through external computer shall be provided.
e) Anti-islanding (Protection against Islanding of grid): The PCU shall have anti islanding protection in conformity to IEEE 1547/UL 1741/ IEC 62116 or equivalent BIS standard.
f) The PCU/ inverter generated harmonics, flicker, DC injection limits, Voltage Range, Frequency Range and Anti-Islanding measures at the point of connection to the utility services should follow the latest CEA (Technical Standards for Connectivity Distribution Generation Resources) Guidelines.
g) The power conditioning units / inverters should comply with applicable IEC/ equivalent BIS standard for efficiency measurements and environmental tests as per standard codes IEC 61683/IS 61683 and IEC 60068-2 (1,2,14,30)/ Equivalent BIS Std.
h) The MPPT units environmental testing should qualify IEC 60068-2 (1, 2, 14, 30)/ Equivalent BIS std. The junction boxes/ enclosures should be IP 65 (for outdoor)/ IP 54 (indoor) and as per IEC 529 specifications.
   The PCU/ inverters should be tested from the MNRE approved test centres/ NABL/ BIS/ IEC accredited testing- calibration laboratories.

Servo Controlled Automatic Voltage Stabilizer

Providing, erecting Servo Controlled Automatic Voltage stabilizer suitable for out put voltage of 415 Volt +/-1%, 3 Ph, 50 Hz, with copper wound transformer (air/oil cooled) as mentioned below. The stabilizer shall function satisfactorily even if incoming supply is unbalanced between phases within range of 10%. The stabilizer should be constructed in cubical box, with bi-directional wheels for easy handling, necessary monitors and user's controls on front panel such as indication, alarm; volt meter and selector switch for measuring input and out put voltage, Auto/Manual selector switch, Raise/Low push buttons etc. Suitable capacity termination strips and bus bars for incoming and out going cable should be provided. All three phases shall be independently monitored and corrected. Following protections and indications shall be incorporated Over Voltage / Under Voltage, Single Phasing, Cut off contactor with electronic output sensing unit Servo Controlled Automatic Voltage Stabilizer (Out put 415 +/-1%) Input 220 to 460 Volt.

The Voltage stabilizer fulfilling the above specification shall be installed at location where voltage fluctuation is beyond 10% of the supply voltage.

REMOTE MONITORING SYSTEM

Remote Monitoring system with per minute logging of data, GPRS based, viewable on desktop and

smart phones.
Remote Server and Software for centralized Internet monitoring system shall be also provided for download and analysis of cumulative data of all the plants and the data of the solar radiation and temperature monitoring system.
Remote Monitoring and data acquisition through Remote Monitoring System software at the owner location with service connectivity for online / real time data monitoring / control complete to be supplied and operation and maintenance / control to be ensured by the bidder.

POWER CONSUMPTION:

Regarding the generated power consumption, priority need to give for internal consumption first and thereafter any excess power can be made open.

PROTECTIONS

The system should be provided with all necessary protections like earthing, Lightning, and grid islanding as follows:

LIGHTNING PROTECTION

The SPV power plants shall be provided with lightning & overvoltage protection. The main aim in this protection shall be to reduce the over voltage to a tolerable value before it reaches the PV or other sub system components. The source of over voltage can be lightning, atmosphere disturbances etc The entire space occupying the SPV array shall be suitably protected against Lightning by deploying required number of Lightning Arrestors. Lightning protection should be provided as per IEC 62305 /IS 2309 standard. The protection against induced high-voltages shall be provided by the use of metal oxide varistors (MOVs) and suitable earthing such that induced transients find an alternate route to earth.

SURGE PROTECTION

Surge protection shall be provided on both the DC and the AC side of the solar system. The DC surge protection devices (SPDs) shall be installed in the DC distribution box adjacent to the solar grid inverter. The AC SPDs shall be installed in the AC distribution box adjacent to the solar grid inverter. The SPDs earthing terminal shall be connected to earth through the above mentioned dedicated earthing system. The SPDs shall be of type 2 as per IEC 60364-5-53.

EARTHING PROTECTION

(a) Each array structure of the PV yard should be grounded/ earthed properly as per IS:3043- 1987. In addition the lighting arrester/masts should also be earthed inside the array field. Earth Resistance shall be tested in presence of the representative of Discom /UPNEDA as and when required after earthing by calibrated earth tester. PCU, ACDB and DCDB should also be earthed properly.

(b) Earth resistance shall not be more than 5 ohms. It shall be ensured that all the earthing points are bonded together to make them at the same potential.

CABLES

The rate quoted by the bidder shall be inclusive of required AC and DC Cables Length.

Cables of appropriate size to be used in the system shall have the following characteristics:

a) Shall meet IEC 60227/IS 694, IEC 60502/IS1554 standards Temp. Range: –10oC to +80oC. Voltage rating 660/1000V

b) For the DC cabling, Solar cables with multi stranded copper conductors XLPE or XLPO insulated and sheathed with the voltage rating of 1000 V DC or higher UV stabilised single core flexible copper cables

shall be used. Multi-core cables shall not be used.

c) For the AC cabling, PVC or XLPE insulated and PVC sheathed single or multi-core flexible copper cables shall be used. Outdoor AC cables shall have a UV-stabilised outer sheath

d) The total voltage drop on the cable segments from the solar PV modules to the solar grid inverter shall not exceed 1.0%.

e) The total voltage drop on the cable segments from the solar grid inverter to the building distribution board shall not exceed 2.0%

f) The DC cables from the SPV module array shall run through a UV-stabilised PVC conduit pipe of adequate diameter with a minimum wall thickness of 1.5mm or through a High Density Poly Ethylene (HDPE) conduit. The conduits shall not run across the path way of the terrace. Flexible corrugated PVC conduits shall not be used.

g) Cables and wires used for the interconnection of solar PV modules shall be provided with solar PV connectors (MC4) and couplers.

h) All cables and conduit pipes shall be clamped to the rooftop, walls and ceilings with thermo-plastic clamps at intervals not exceeding 50 cm. The minimum DC cable size shall be 4.0 mm2copper. The minimum AC cable size shall be 4.0 mm2 copper for up to 10kWp and 16.0mm2 for above 10kWp / required standard size. In three phase systems, the size of the neutral wire shall be equal to the size of the phase wires. The following colour coding shall be used for cable wires

i) DC positive: red (the outer PVC sheath can be black with a red line marking)

j) DC negative: black

k) AC single phase: Phase: red; neutral: black

l) AC three phase: Phases: **red, yellow, blue**; neutral**: black** Earth wires: **green**

m) Cables and conduits that have to pass through walls or ceilings shall be taken through a PVC pipe sleeve.

n) Cable conductors shall be terminated with tinned copper end-ferrules to prevent fraying and breaking of individual wire strands. The termination of the DC and AC cables at the Solar Grid Inverter shall be done as per instructions of the manufacturer, which in most cases will include the use of special connectors.

o) Cable lugs and end –ferrules for all cable conductor and wire terminations shall be crimped with crimping pliers and end-ferrule pliers

p) All cable ties shall be UV resistant.

q) The Cable should be so selected that it should be compatible up to the life of the solar PV panels i.e. 25years

r) The ratings given are approximate. Bidder to indicate size and length as per system design requirement. All the cables required for the plant provided by the bidder. Any change in cabling sizes if desired by the bidder/approved after citing appropriate reasons. All cable schedules/layout drawings approved prior to installation.

TOOLS & TACKLES AND SPARES:

After completion of installation & commissioning of the power plant, necessary tools & tackles are to be provided free of cost by the bidder for maintenance purpose.

DANGER BOARDS AND SIGNAGES:

Danger boards should be provided as and where necessary as per IE Act. /IE rules as amended up to date. Three signage shall be provided one each at battery –cum- control room, solar array area and main entry from administrative block. Text of the signage may be finalized in consultation with UPNEDA/ owner.

FIRE EXTINGUISHERS:

The firefighting system for the proposed power plant for fire protection shall be consisting of: Portable fire extinguishers in the control room for fire caused by electrical short circuits Sand buckets in the control room The installation of Fire Extinguishers should confirm to TAC regulations and BIS standards. The fire extinguishers shall be provided in the control room housing PCUs as well as on the Roof or site where the PV arrays have been installed.

DRAWINGS & MANUALS:

Two sets of Engineering, electrical drawings and Installation and O&M manuals are to be supplied.

PLANNING AND DESIGNING:

The bidder should carry out Shadow Analysis at the site and accordingly design strings & arrays layout considering optimal usage of space, material and labor.

SOLAR PV SYSTEM ON THE ROOFTOP FOR MEETING THE ANNUAL ENERGY REQUIREMENT

The Solar PV system on the rooftop of the selected buildings will be installed for meeting the annual energy requirements depending upon the area of rooftop available and the remaining energy requirement of the office buildings will be met by drawing power from grid at commercial tariff of DISCOMs

SAFETY MEASURES:

The bidder shall take entire responsibility for electrical safety of the installation(s) including connectivity with the grid and follow all the safety rules & regulations applicable as per Electricity Act, 2003 and CEA guidelines etc.

DC Combiner Box

A DC Combiner Box shall be used to combine the DC cables of the solar module arrays with DC fuse protection for the outgoing DC cable(s) to the DC Distribution Box.

DC Distribution Box

A DC distribution box shall be mounted close to the solar grid inverter. The DC distribution box shall be of the thermo-plastic IP65 DIN-rail mounting type and shall comprise the following components and cable terminations:

Incoming positive and negative DC cables from the DC Combiner Box;

DC circuit breaker, 2 pole (the cables from the DC Combiner Box will be connected to this circuit breaker on the incoming side);

DC surge protection device (SPD), class 2 as per IEC 60364-5-53;

Outgoing positive and negative DC cables to the solar grid inverter.

As an alternative to the DC circuit breaker a DC isolator may be used inside the DC Distribution Box or in a separate external thermoplastic IP 65 enclosure adjacent to the DC Distribution Box. If a DC isolator is used instead of a DC circuit breaker, a DC fuse shall be installed inside the DC Distribution Box to protect the DC cable that runs from the DC Distribution Box to the Solar Grid Inverter.

AC Distribution Box

An AC distribution box shall be mounted close to the solar grid inverter. The AC distribution box shall be of the thermos plastic IP65 DIN rail mounting type and shall comprise the following components and cable terminations:

Incoming 3-core / 5-core (single-phase/three-phase) cable from the solar grid inverter

AC circuit breaker, 2-pole / 4-pole AC surge protection device (SPD), class 2 as per IEC 60364-5-53

Documentation

The Installer shall supply the following documentation:

- System description with working principles.
- System single line diagram.
- Solar PV array lay-out.
- Routing diagram of cables and wires.
- Data sheets and user manuals of the solar PV panels and the solar grid inverter.
- A system operation and maintenance manual.
- Name, address, mobile number and email address of the service centre to be contacted in case of failure or complaint.
- Warranty cards.
- Maintenance registers.

Test Certificates and Reports to be Furnished

Test Certificates / Reports from IECQ / NABL accredited laboratory for relevant IEC / equivalent BIS standard for quoted components shall be furnished. Type Test Certificates / reports shall be provided for the solar modules and solar grid tied inverters up to 20kW to provide evidence of compliance with standards. For solar gridtied inverters above 20kW, self- certification by the manufacturer of the said inverter is acceptable.

General Instructions

Security, safety, watch, and ward of all materials at sites shall be the responsibility of the Contractor/Bidder

Expenses for any other works, supply of material, and providing services required for the successful commissioning and operation of the plant, but not specifically mentioned in this document.

Safety management to be strictly complied with by the Contractor/Bidder throughout implementation activity.

First-aid medical facilities at the Site during construction to be provided by the Contractor/ Bidder(s)

All local labour, employment, and other issues shall be handled independently by the Contractor/ Bidder(s)

The entire responsibility and risk relating towards the workforce working at the Site, and compliance of different statutory regulations like Workman Compensation Act, Employees‟ State Insurance Corporation (ESIC), Factory Act 1948, Contract Labour Regulation, and Abolition Act 1970, Shop and Establishment Act 1948, and other Statutory regulatory bodies shall solely lie with the Contractor/ Bidder(s).

The Contractor/ Bidder(s) shall also be solely responsible for payment of wages, provident fund, bonus, retrenchment compensation leave, etc. applicable as per various statutory regulations to their entire workforce,

The following Statutory Clearances shall be obtained by the/Bidder(s) wherever applicable:

- Drawings approvals from UPNEDA .
- Electrical Safety approval for system more than 10 KW (Chief Electrical Inspector)
- All equipment, accessories, materials, civil construction & erection works

should comply with statutory requirements, BIS and required and highlighted IEC standards

.The Contractor/ Bidder(s) should not misuse the area and/or assign responsibility for the safety of machinery within the premises.

Term

The term for operation and maintenance of the plant may be extended for another five years on mutually agreed terms and conditions and charges.

Electricity Generation

The Contractor/Bidder shall be solely responsible for the performance of the plant(s) and shall make all necessary efforts to maximize the electricity generation of the plant.

Metering and associated facilities

The metering of electricity shall be carried out as per the regulations stipulated by Uttar Pradesh Electricity Regulatory Commission and/or Central Electricity Authority.

Failure to rectify the problem

If the Contractor/ Bidder(s) fails to rectify the plant downtime within seven (7) days from the date of identification of such defect, unless the extension in time is mutually discuss and agreed between the bidder and the respective Beneficiary.

If the Contractor/Bidder(s) fails to rectify the problem, the respective Beneficiary shall/may rectify the problem at the expense of the Contractor/ Bidder(s), in such case on genuine complaint, UPNEDA will take appropriate action including forfeiture of PBG and blacklisting/debarring of the firm.

Completion of Term

On completion of the term of Operation and Maintenance the Contractor/ Bidder(s) shall apply to the respective Beneficiary for the issue of power plant performance certificate. Such document is required for release of PBG of the firm.

Make of Module and PCU in technical bid will be indicative, bidder can use its equivalent as per MNRE test report/guidelines and submits its details test report before execution.

NET METERING AND UTILITY INTERCONNECTION:

As per UPERC Notification No. U.P.E.R.C./Secretary/RSPV Regulations/118 Dated: June 01, 2022 , U.P.E.R.C. (Rooftop Solar PV Grid Interactive System Gross/Net Metering) Regulation, 2019 (First Amendment/Addendum) has kept provision of Net-billing / net feed-in Scheme for the consumer other than Domestic Consumer and Agriculture Consumer.

Under this Scheme a prosumer of any category, in the area of supply of the Distribution Licensee, who intends to/ has set up a grid connected rooftop solar PV system in his/ her premises, which can be self-owned or third party owned, where-in the energy imported from the Grid and energy exported to the Grid Interactive rooftop Solar photovoltaic system of a Prosumer are measured through a single bi-directional energy meter valued at two different Tariffs which are determined by the Commission.

Solar rooftop system under the net metering or net billing / net feed-in scheme, such eligible consumer shall be entitled to use the power generated from the rooftop solar PV system at his premises. The surplus power can be injected to the distribution system of the Licensee at the interconnection point.

Energy Accounting and Settlement shall be as per the UPERC Regulation 2019 and amendment thereof.

Standards and Limits

Following specifications shall be applicable for the activities related to meters and grid interconnection.

Standards and Limits

PARAMETER	REFERENCE	REQUIREMENT
Service conditions	Relevant regulation/order by Uttar Pradesh Electricity Regulatory Commission	Compliance
Overall Grid Standards	Central Electricity Authority (Grid Standard) regulations 2010	Compliance
Equipment	BIS / IEEE / IEC	Compliance
Meters	Central Electricity Authority(Installation and Operation of Meters) Regulation 2013 & relevant regulations by Uttar Pradesh Electricity Regulatory Commission	Compliance
Safety and Supply	Central Electricity Authority(Measures of Safety and Electricity Supply) Regulation 2010	Compliance
Harmonic Current	IEEE 519 and CEA (Technical Standards for Connectivity of the Distributed Generation Resources) Regulations 2013	Harmonic current injections from a generating station shall not exceed the limits specified in IEEE 519
Synchronization	IEEE 519 and CEA (Technical Standards for Connectivity of the Distributed Generation Resources) Regulations 2013	Photovoltaic system must be equipped with a grid frequency synchronization device. Every time the generating station is synchronized to the electricity system. It shall not cause voltage fluctuation greater than +/- 5% at point of connection.
Voltage	IEEE 519 and CEA(Technical Standards for Connectivity of the Distributed Generation Resources) Regulations 2013	The voltage-operating window should minimize nuisance tripping and should be under operating range of 80% to110% of the nominal connected voltage. Beyond a clearing time of 2 second, the photovoltaic system must isolate itself from the grid.
Flicker	IEEE 519 and CEA (Technical Standards for Connectivity of the Distributed Generation Regulations 2013 Resources)	Operation of Photovoltaic system should not cause voltage flicker in excess of the limits stated in IEC 61000 standards or other equivalent Indian standards, if any.
Frequency	IEEE 519 and CEA (Technical Standards for Connectivity of the Distributed Generation Resources). Regulations 2013	When the Distribution system frequency deviates outside the specified conditions(50.5 Hz on upper side and 47.5 Hz on lower side), There should be over and under frequency trip functions with a clearing time of 0.2 seconds
DC injection	IEEE 519 and CEA (Technical Standards for Connectivity of the Distributed Generation Resources). Regulations 2013	Photovoltaic system should not inject DC power more than0.5% of full rated output at the interconnection point under any operating conditions

Power Factor	IEEE 519 and CEA (Technical Standards for Connectivity of the Distributed Generation Resources). Regulations 2013	While the output of the inverter is greater than 50%, a lagging power factor of greater than 0.9 should operate.
Islanding and Disconnection	IEEE 519 and CEA (Technical Standards for Connectivity of the Distributed Generation Resources). Regulations 2013	The photovoltaic system in the event of fault, voltage or frequency variations must island / disconnect itself within IEC standard on stipulated period
Overload and Overheat	IEEE 519 and CEA (Technical Standards for Connectivity of the Distributed Generation Resources). Regulations 2013	The inverter should have the facility to automatically switch off in case of overload or overheating and should restart when normal conditions are restored
Paralleling Device	IEEE 519 and CEA (Technical Standards for Connectivity of the Distributed Generation Resources). Regulations 2013	Paralleling device of photovoltaic system shall be capable of withstanding 220% of the normal voltage at the interconnection point.

Notes for Bidder:

1. The installation should not be protruding outside the building and there should not be overhang type structure on any terrace.
2. Location and area for inverter and other interconnection equipment should be located in suitable and secure place and this should be approved by the respective Beneficiary.
3. Installation diagram and wiring from array to proposed location of inverter and interconnection should be clearly presented by the Bidder before work starts to UPNEDA.

QUALITY CERTIFICATION, STANDARDS AND TESTING FOR GRID-CONNECTED ROOFTOP SOLAR PV SYSTEMS/POWER PLANTS

Quality certification and standards for grid-connected rooftop solar PV systems are essential for the successful mass-scale implementation of this technology. It is also imperative to put in place an efficient and rigorous monitoring mechanism, adherence to these standards. Hence, all components of grid-connected rooftop solar PV system/ plant must conform to the relevant standards and certifications given below:

Solar PV Modules/Panels	
IEC 61215/IS 14286	Design Qualification and Type Approval for Crystalline Silicon Terrestrial Photovoltaic (PV) Modules
IEC 61701	Salt Mist Corrosion Testing of Photovoltaic (PV) Modules
IEC 61853-Part 1/IS 16170: Part 1	Photovoltaic (PV) module performance testing and energy rating:- Irradiance and temperature performance measurements and power rating.
IEC 62716	Photovoltaic (PV) modules Ammonia (NH3) Corrosion Testing, (As per site condition like dairies, toilets)
IEC 61730-1,2	Photovoltaic (PV) module Safety Qualification- Part 1: Requirements for Construction Part 2:- Requirements for Testing

Solar PV Inverters	
IEC 62109-1, IEC 62109-2	Safety of power converters for use in photovoltaic power systems Part 1: General requirements, and Safety of power converters for use in photovoltaic power systems Part 2: Particular requirements for inverters. Safety compliance (Protection degree IP 65 for outdoor mounting, IP 54 for indoor mounting)
IEC/IS 61683	Photovoltaic Systems – Power conditioners: Procedure for Measuring Efficiency (10%,25%, 50%, 75% & 90-100% Loading Conditions)
IEC 62116/ UL 1741/ IEEE 1547 (as applicable)	Utility-interconnected Photovoltaic Inverters – Test Procedure of Islanding Prevention Measures
IEC 60255-27	Measuring relays and protection equipment Part 27: Product safety requirements
IEC 60068-2 / IEC 62093 (as applicable)	Environmental Testing of PV System – Power Conditioners and Inverters
Fuses	
IS/IEC 60947 (Part 1, 2 & 3), EN 50521	General safety requirements for connectors, switches, circuit breakers (AC/DC): Low-voltage Switchgearand Control

On-Grid Firm Details Year 2023-24					
S.N.	**Firm Name**	**Firm Address**	**Email Id**	**Ranking**	**Capacity**
1	M/S True power Ltd.	D-370, Vibhuti Khand,Gomti Nagar,Lucknow-226010	sale@truepowerearthings.in	L-1	1-10
2	M/S Servotech Power System Ltd.	806,8th Floor,Crown Height,Hotel Crown Plaza,Sector-10, Rohini, New Delhi-110085	sarika78@servotechindia.com	L-2	
3	M/S KLK Ventures Pvt. Ltd.	1517, Hemkunt Chambers 89,Nehru Place, New Delhi-110019	info@klkindia.com	L-3	
4	M/S Vortex Solar Energy Pvt. Ltd.	B-98,First Floor, Sector -C, Wireless Square,Mahanagar, Lucknow-226006	gosolar@vortexsolar.in	L-4	
5	M/S Intecco Technical Services Pvt. Ltd.	102,Mahaveer Arcade,Picnic Spot Road, Faridi Nagar,Lucknow-226015	intecco.ashish07@gmail.com	L-5	
6	M/S Raghuvar Assosiates	10,Sant Puram,Tikrohi,Lucknow-226016	raghuvarassociates@gmail.com	L-6	
7	M/S SPH Traders	C-1139, Indira Nagar Lucknow-226016	sphtraderslko@gmail.com	L-7	
8	M/S Power Group	Plot No-8A Khasra No-50,Nizammudinpur,Chandan Road,Faridi Nagar Lucknow-226015	powergroup.pk@gmail.com	L-8	
9	M/S Intecco Technical Services Pvt. Ltd.	102,Mahaveer Arcade,Picnic Spot Road, Faridi Nagar,Lucknow-226015	intecco.ashish07@gmail.com	L-1	11-100
10	M/S Mittal Machines Pvt. Ltd.	108/3,Chandan Nagar, Dehradun,U.K.-248001	accounts@mittalmachinery.com	L-2	
11	M/S Srinet & Shandilya Construction Pvt. Ltd.	2nd, Floor, Green Plaza Complex Opppsite Altura Residency,Abhaykhand-3,Indirapuram, Ghaziabad-221010	office@ssconstruction.org	L-3	
12	M/S Paawan Energy India Pvt. Ltd.	Near Sarvoday School,New Shambhoo Nagar,Shikohabad-Firozabad-283135	info@paawanenergy.com	L-4	
13	M/S HFM Solar Power Pvt. Ltd.	1506,Hamkunt Tower,98 Nehu Place,New Delhi-110019	pradeep.yadav@hfmsolar.com	L-5	
14	M/S Vortex Solar Energy Pvt. Ltd.	B-98,First Floor, Sector -C, Wireless Square,Mahanagar, Lucknow-226006	gosolar@vortexsolar.in	L-6	
15	M/S Servotech Power System Ltd.	806,8th Floor,Crown Height,Hotel Crown Plaza,Sector-10, Rohini, New Delhi-110085	sarika78@servotechindia.com	L-7	
16	M/S Srinet& Shandilya Construction Pvt. Ltd.	2nd, Floor, Green Plaza Complex Opppsite Altura Residency,Abhaykhand-3,Indirapuram, Ghaziabad-221010	office@ssconstruction.org	L-1	101-500
17	M/S Paawan Energy India Pvt. Ltd.	Near Sarvoday School,New Shambhoo Nagar,Shikohabad-Firozabad-283135	info@paawanenergy.com	L-2	
18	M/S Mittal Machines Pvt. Ltd.	108/3,Chandan Nagar, Dehradun,U.K.-248001	accounts@mittalmachinery.com	L-3	
19	M/S HFM Solar Power Pvt. Ltd.	1506,Hamkunt Tower,98 Nehu Place,New Delhi-110019	pradeep.yadav@hfmsolar.com	L-4	
20	M/S Vortex Solar Energy Pvt. Ltd.	B-98,First Floor, Sector -C, Wireless Square,Mahanagar, Lucknow-226006	gosolar@vortexsolar.in	L-5	
21	M/S Rich Phytocare Pvt. Ltd.	D 11-12,4th Floor,Vibhuti Khand, Gomti Nagar, Lucknow-226010	officelucknow@richphytocare.com	L-6	
22	M/S Intecco Technical Services Pvt. Ltd.	102,Mahaveer Arcade,Picnic Spot Road, Faridi Nagar,Lucknow-226015	intecco.ashish07@gmail.com	L-7	