

- (xiv) Cables and conduits that have to pass through walls or ceilings shall be taken through a PVC pipe sleeve.
- (xv) 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.
14. Earthing:
- (i) The PV module structure components shall be electrically interconnected and shall be grounded.
  - (ii) Earthing shall be done in accordance with IS 3043-1986, provided that earthing conductors shall have a minimum size of 6.0 mm<sup>2</sup> copper, 10 mm<sup>2</sup> aluminium or 70 mm<sup>2</sup> hot dip galvanized steel. Unprotected aluminium or copper-clad aluminium conductors shall not be used for final underground connections to earth electrodes.
  - (iii) A minimum of three separated and inter connected earth electrodes must be used for the earthing of the solar PV system support structure with a total earth resistance not exceeding 5 Ohm.
  - (iv) The earth electrodes shall have a precast concrete enclosure with a removable lid for inspection and maintenance. The entire earthing system shall comprise non-compressive components.
15. Surge Protection:
- (i) Surge protection shall be provided on the DC side and the AC side of the solar system
  - (ii) The DC surge protection devices (SPDs) shall be installed in the DC distribution box adjacent to the solar grid inverter.
  - (iii) The AC SPDs shall be installed in the AC distribution box adjacent to the solar grid inverter.
  - (iv) 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 IEC60364-5-53
16. Junction Boxes:
- (i) Junction boxes and solar panel terminal boxes shall be of the thermo plastic type with IP 65 protection for outdoor use and IP 54 protection for indoor use.
  - (ii) Cable terminations shall be taken through thermo-plastic cable glands. Cable ferrules shall be fitted at the cable termination points for identification.
17. Tools, Tackles and Spares:
- (i) The Installer shall keep ready stock of tools, tackles and essential spares that will be needed for the day-to-day maintenance of the solar PV system. This shall include but not be limited to, the following:
  - (ii) Screw driver suitable for the junction boxes and combiner boxes
  - (iii) Screw driver and / or Allen key suitable for the connectors, power distribution blocks, circuit breaker terminals and surge arrestor terminals;
  - (iv) Spanners / box spanners suitable for the removal of solar PV modules from the solar PV module support structure;
  - (v) Solar panel mounting clamps;
  - (vi) Cleaning tools for the cleaning of the solar PV modules;
- Spare fuses
18. Caution Signs:
- (i) In addition to the standard caution and danger boards or labels as per Indian Electricity Rules, the AC distribution box near the solar grid inverter, the building distribution board to which the AC output of the solar PV system is connected and the Solar Generation Meter shall be provided with a non-corrosive caution label with the following text:

WARNING – DUAL POWER SOURCE  
EB & SOLAR
  - (ii) The size of the caution label shall be 105mm (width) x 20mm (height) with white letter on a red background.

(iii) Caution labels as may be prescribed by WBSEDCL/CESC shall be fixed as per WBSEDCL/CESC specifications.

19. Metering:

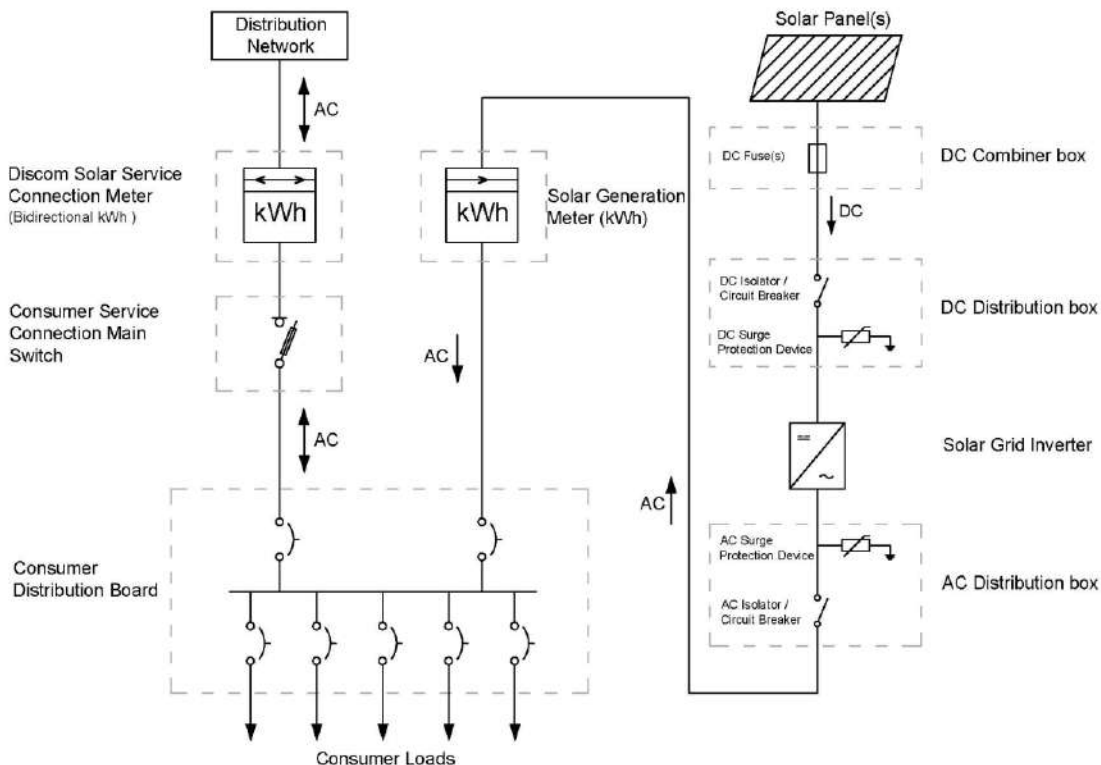
- An energy meter shall be installed in between the solar grid inverter and the building distribution board to measure gross solar AC energy production (the “Solar Generation Meter”). The Solar Generation Meter shall be of the same accuracy class as the WBSEDCL/CESC service connection meter or as specified by WBSERC.
- The existing service connection meter needs to be replaced with a bidirectional (import kWh and export kWh) service connection meter (the “Solar Service Connection Meter”) for the purpose of net-metering. Installation of the Solar Service Connection Meter will be carried out by WBSEDCL/CESC and is not in the scope of the work of the Installer.

20. Test Certificates / Reports from IECQ / NABL accredited laboratory for relevant IEC / equivalent BIS standard for quoted components shall be furnished. Type Test Certificates shall be provided for the solar modules and the solar grid inverters to provide evidence of compliance with standards as specified in articles 4.0 and 7.0 of this technical Specification. Customer reserves the right to ask for additional test certificates or (random) tests to establish compliance with the specified standards.

Annexe to General Technical Specification

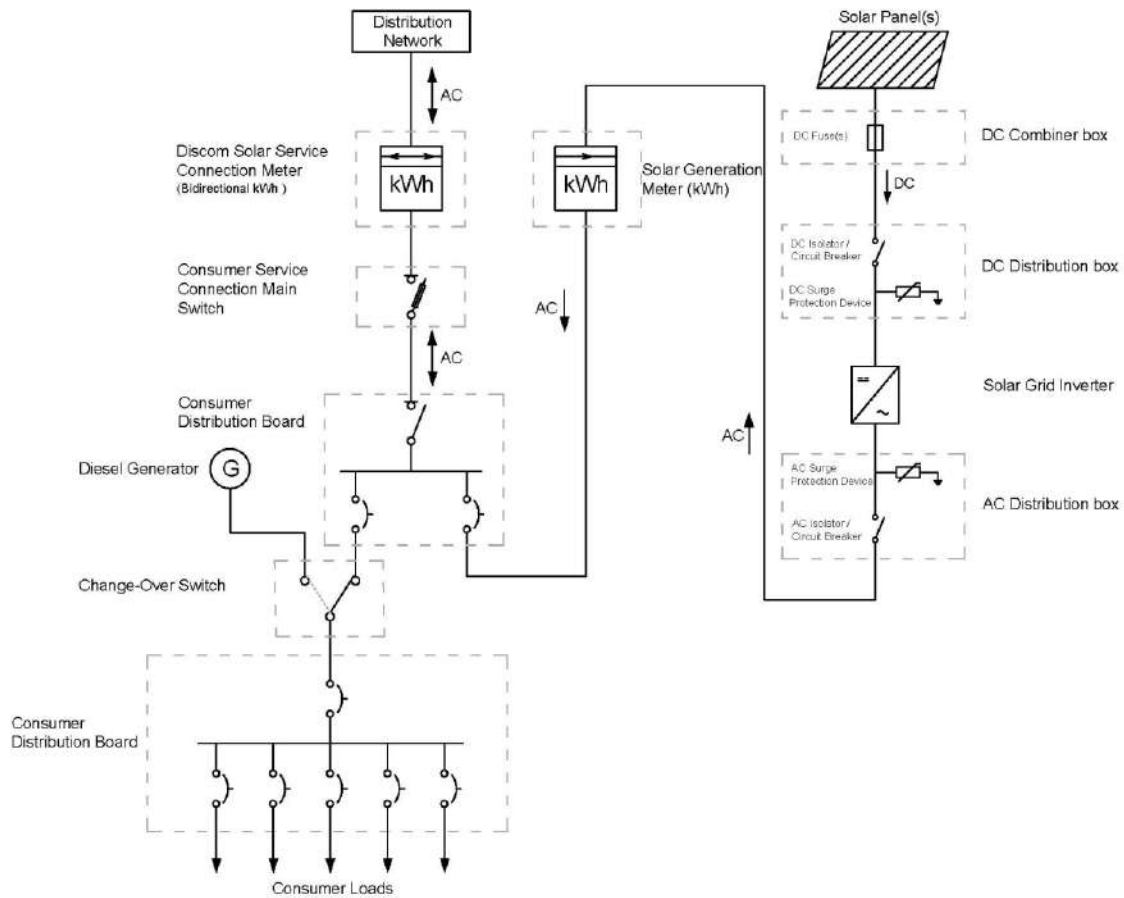
Typical Wiring Diagrams for Grid-Connected Solar System

1. Typical wiring diagram for grid-connected solar PV system *without* diesel generator.



Note: The Solar Generation Meter shown above is mandatory for consumers who avail of a generation-based incentive (GBI) and is optional for others.

2. Typical wiring diagram for grid-connected solar PV system with diesel generator.



*Note:* The Solar Generation Meter shown above is mandatory for consumers who avail of a generation-based incentive (GBI) and is optional for others.

**List of Main Equipments and Preferred Vendor:-**

List of Item	Capacity	Preferred Vendor
Solar PV panel	Each panel shall be minimum 400 Wp.	TATA POWER, TOPSUN, RATTIKA, VIMAL, SOVA SOLAR, WAAREE, ADANI, Havells or equivalent As approved by Tender Inviting Authority.
Inverter	Each inverter shall be minimum of <b>10 KW</b>	DELTA , EMERSON, ABB
Structure	Shall be made with IS compliance	As per the specifications
DC cables	Shall be as per the specifications	POLYCAB, FINOLEX, KEI
DC combiner box	Shall be as per the specifications	DO
AC distribution box	As per the specification	Reputed
Surge Protection Device	As per the specification	Reputed
Meter	As per the specification	Reputed
Earthing	As per the specification: Chemical	Reputed
Lightening Arrestor	As per the IS	Reputed

**BOQ shall have be filled by the vendor:-**

<b>List of Item</b>	<b>Unit</b>	<b>Size</b>	<b>Total Capacity</b>
Solar PV panel			
Inverter			
Structure			
DC cables : Aray to Aray:			
DC cables Aray to Array JB or DC combiner box			
DC cables from DC combiner box to Inverter			
AC cable from Inverter to ACDB			
AC cable from ACDB to Grid			
Earthing Cable or wire from Panel Structure to Earth			
Earthing Cable or wire from DC combiner box to to Earth			
Earthing Cable or wire from Inverter to to Earth			
DC combiner box			
AC distribution box (ACDB)			
Surge Protection Device			
Meter			
Earthing			
Lightening Arrestor			

Seal and Signature of the Tenderer

**BOQ SL.No. - 01**

e-NIQ No- 04/WBTDCL/GM (North) OF 2021-22

Memo. No.37/Computer No: 349690/File No: WBTDCL-14099(13)/4/2021-TA (WBTDCL)-WBTDCL

Dated: -10.05.2021

**Name of work: - SITC of 10KW Roof Top Solar PV power project with State of the art Technology at Batabari Tourism Property with allied work on LT side (WBSEDCL) in the dist. Of Jalpaiguri.**

SI no	DESCRIPTION OF WORK	Unit	Quantity	Rate	AMOUNT
1	Supply of Solar Photovoltaic Panels.Mono Crystalline 385Wp to 400Wp (Each) (Make: Vikram/Sova/Trina/Adani) The PV modules used must qualify to the latest edition of IEC PV module qualification test or equivalent BIS standards Crystalline Silicon Solar Cell Modules IEC 61215/IEC 61730.The rated output power of any supplied module shall have 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.The module shall be provided with a junction box with either provision of external screw terminal connection or sealed type and with arrangement for provision of by-pass diode. The box shall have hinged, weather proof lid with captive screws and cable gland entry points or may be of sealed type and IP-65 rated.	Nos	26	₹ 0.00	₹ 0.00
2	Supply of Module Mounting Structure: Hot dip galvanized MS mounting structures may be used for mounting the modules/ panels/arrays. Each structure should have angle of inclination as per the site conditions to take maximum insolation.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 4Structural material shall be corrosion resistant and electrolytically compatible with the materials used in the module frame, its fasteners, nuts and bolts.Thiknes of Galvanization shall be more than 85µ and windstand should be more than 150KM/hr. Aluminium structures also can be used which can withstand the wind speed of respective wind zone. Necessary protection towards rusting need to be provided either by coating or anodization.The minimum clearance of the structure from the roof level should be 300 mm [Design to be approved by EIC before fabrication].	Kg	900	₹ 0.00	₹ 0.00
3	Supply of 1 Nos. PV Array Junction Box (AJB): a) The junction boxes are to be provided in the PV array for termination of connecting cables. The Boxes (JBs) shall be made of Powder Coated Aluminium /cast aluminium/M.S alloy with full dust, water & vermin proof arrangement. All wires/cables must be terminated through cable lugs. The JB's shall be such that input & output termination can be made through suitable cable glands.b) Each Junction Box shall have High quality Suitable capacity Metal Oxide Varistors (MOVs) / SPDs, suitable Reverse Blocking Diodes. The Junction Boxes shall have suitable arrangement monitoring and disconnection for each of the groups. Voltage: Max. 1000V DC [Make: Hensel/Spielberg/ABB/L & T/AVO].	No	1	₹ 0.00	₹ 0.00

4	<p>Supply of ACDB : Designed for 10KWp solar power plant with all protections as per MNRE guidelines. DC DPBs shall have sheet from enclosure of dust &amp; vermin proof conform to IP 65 protection. The bus bars are made of copper of suitable size. Suitable capacity fuse &amp; MCBs/MCCB shall be provided for controlling the DC power output to the PCU along with necessary surge arrestors . AC Distribution Panel Board (DPB) shall control the AC power from PCU/ inverter, and should have necessary surge arrestors.</p> <p>Interconnection from ACDB to mains at LT Bus bar while in grid tied mode.All switches and the circuit breakers, connectors should conform to IEC 60947, part I, II and III/ IS60947 part I, II and III. All the Panel's shall be metal clad, totally enclosed, rigid, floor mounted, air - insulated, cubical type suitable for operation on three phase / single phase, 415 or 230 volts, 50 Hz.All indoor panels will have protection of IP54 or better. All outdoor panels will have protection of IP65 or better. [Make: Hensel/Spielberg/Citel/ABB/L &amp; T/schneider/Elmax]</p>	No	2	₹ 0.00	₹ 0.00
5	<p>Supply of Grid Connected Solar Inverter  Rating: 10KW, 3Ph Inverter, Make:  ABB/KACO/Delta/Fronius/THEA . Control : Microprocessor /DSP  Capacity of Each Inverter: 10kW String Inverter .Nominal AC output voltage and frequency : 415V, 3 Phase, 50 Hz . Output frequency : 50 Hz . Max. DC input Power 10.3kW. MPPT Voltage Range250 - 850 VDC. Max. input current per MPPT 11A. Output Voltage Range - 320V - 480V AC. Grid Frequency Synchronization range : +/- 5 Hz. Ambient temperature considered : -20o C to 50o C. Humidity : 95 % Non-condensing. Protection of Enclosure :: IP-65(Minimum) for outdoor. Grid Frequency Tolerance range : +/- 5 Hz. Grid Voltage tolerance : 280 V to 480 V. No-load losses : Less than 1% of rated power. Inverter efficiency(minimum) : &gt;93%. Inverter efficiency (minimum ) : &gt; 90%. THD : &lt; 3%. Efficiency Measurement IEC 61683/ Equivalent BIS Std.Environmental testing IEC 60068-2 (1,2,14,30) / Equivalent BIS Std.Interfacing with utility grid IEC 61727. Islanding Prevention Measurement IEC 62116. EMI/EMC : IEC 61000-6-3&gt;16 Amps IEC 61000-6-4&lt;16 Amps. Safety: IEC - 62109-1 (2010/4) C - 62109-2 (2011/6). All above IEC's should be from NABL / IEC Accredited Testing</p>	No	1	₹ 0.00	₹ 0.00
6	<p>Supply of Earthings System : Each array structure of the PV yard should be grounded/ earthed properly as per IS:3043-1987. The array field, PCU, ACDB and AJB should also be earthed properly. 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. At least 4 nos ground pipe / plate electrod as per PWD schedule for system earthing with soil treatment &amp; earth inspection pit and GI flat of suitable size &amp; quantity should be considered [Make: SGI/OBO/Beterman/Gmax].</p>	Nos	5	₹ 0.00	₹ 0.00

7	Supply of Remote Monitoring System (GPRS Type): The RMS system is integrated or External unit. The following parameters are accessible via the operating interface display in real time separately for solar power plant: AC Voltage., AC Output current, Output Power, DC Input Voltage, DC Input Current, Power produce, Protective function limits (Viz-AC Over voltage, AC Under voltage, Over frequency, Under frequency ground fault. vi. The data shall be recorded in a common work sheet chronologically date wise. The data file shall be MS Excel compatible. The data shall be represented in both tabular and graphical form. viii. Simultaneous monitoring of DC and AC electrical voltage, current, power, energy and other data of the plant for correlation with solar and environment data shall be provided	Job	1	₹ 0.00	₹ 0.00
8	Supply of DC Cables ( 4 Sqmm Single Core Copper Tinned Solar DC Cable): Sizes of cables between array interconnections, array to junction boxes, junction boxes to Inverter etc. shall be so selected to keep the voltage drop of the entire solar system to the minimum. The cables (as per IS) should be insulated with a special grade PVC compound formulated for outdoor use. The size of each type of DC cable selected shall be based on minimum voltage drop however; the maximum drop shall be limited to 1%. [Make of DC PolyCab/Sterlite/Finolex/Havells/Anchor].	Meter	300	₹ 0.00	₹ 0.00
9	Supply of AC Cables(10 Sqmm 4 Core Copper Flexiable cable ): The size of each type of AC cable selected shall be based on minimum voltage drop however; the maximum drop shall be limited to 2%. i. Shall meet IEC 60227/IS 694, IEC 60502/IS1554 standards. Cost is inclusive of fixing accessories as required. [Make of AC cable: PolyCab/Sterlite/Finolex/Havells/Anchor].	Lot	50	₹ 0.00	₹ 0.00
10	Supply of import export type 3 phase Energy Meter, Make: L&T / Schneider / Secure	No	1	₹ 0.00	₹ 0.00
11	Supply of ESE Lightning Arrester, Make: SGI/OBO/Equivalent	No	1	₹ 0.00	₹ 0.00
12	Supply, Installation, Testing & Commissioning of all items of this BOQ should comply to the detailed Technical Specification given.	KW	10	₹ 0.00	₹ 0.00
13	Module cleaning system - SITC of plumbing material with accessories for module cleaning system	Job	1	₹ 0.00	₹ 0.00
14	Operation and maintenance for 3 years after warranty period 1 year	years	2	₹ 0.00	₹ 0.00
TOTAL (Incl. all Taxes)					<b>₹ 0.00</b>
Say					<b>₹ 0.00</b>

N.B: Above Price is inclusive of GST, Cess and Duties as per Govt. Noms.

<b><u>BOQ SL.No. - 02</u></b>					
e-NIQ No- 04/WBTDCL/GM (North) OF 2021-22					
Memo. No.37/Computer No: 349690/File No: WBTDCL-14099(13)/4/2021-TA (WBTDCL)-WBTDCL				Dated: -10.05.2021	
<b>Name of work: - SITC of 10KW Roof Top Solar PV power project with State of the art Technology at Moorti Tourism Property with allied work on LT side (WBSEDCL) in the dist. Of Jalpaiguri.</b>					
SI no	DESCRIPTION OF WORK	Unit	Quantity	Rate	AMOUNT

1	<p>Supply of Solar Photovoltaic Panels.Mono Crystalline 385Wp to 400Wp (Each) (Make: Vikram/Sova/Trina/Adani) The PV modules used must qualify to the latest edition of IEC PV module qualification test or equivalent BIS standards Crystalline Silicon Solar Cell Modules IEC 61215/IEC 61730.The rated output power of any supplied module shall have 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.The module shall be provided with a junction box with either provision of external screw terminal connection or sealed type and with arrangement for provision of by-pass diode. The box shall have hinged, weather proof lid with captive screws and cable gland entry points or may be of sealed type and IP-65 rated.</p>	Nos	26	₹ 0.00	₹ 0.00
2	<p>Supply of Module Mounting Structure: Hot dip galvanized MS mounting structures may be used for mounting the modules/ panels/arrays. Each structure should have angle of inclination as per the site conditions to take maximum insolation.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 4Structural material shall be corrosion resistant and electrolytically compatible with the materials used in the module frame, its fasteners, nuts and bolts.Thickness of Galvanization shall be more than 85µ and windstand should be more than 150KM/hr. Aluminium structures also can be used which can withstand the wind speed of respective wind zone. Necessary protection towards rusting need to be provided either by coating or anodization.The minimum clearance of the structure from the roof level should be 300 mm [Design to be approved by EIC before fabrication].</p>	Kg	900	₹ 0.00	₹ 0.00
3	<p>Supply of 1 Nos. PV Array Junction Box (AJB): a) The junction boxes are to be provided in the PV array for termination of connecting cables. The Boxes (JBs) shall be made of Powder Coated Aluminium /cast aluminium/M.S alloy with full dust, water &amp; vermin proof arrangement. All wires/cables must be terminated through cable lugs. The JB's shall be such that input &amp; output termination can be made through suitable cable glands.b) Each Junction Box shall have High quality Suitable capacity Metal Oxide Varistors (MOVs) / SPDs, suitable Reverse Blocking Diodes. The Junction Boxes shall have suitable arrangement monitoring and disconnection for each of the groups. Voltage: Max. 1000V DC [Make: Hensel/Spielberg/ABB/L &amp; T/AVO].</p>	No	1	₹ 0.00	₹ 0.00



4	<p>Supply of ACDB : Designed for 10KWp solar power plant with all protections as per MNRE guidelines. DC DPBs shall have sheet from enclosure of dust &amp; vermin proof conform to IP 65 protection. The bus bars are made of copper of suitable size. Suitable capacity fuse &amp; MCBs/MCCB shall be provided for controlling the DC power output to the PCU along with necessary surge arrestors . AC Distribution Panel Board (DPB) shall control the AC power from PCU/ inverter, and should have necessary surge arrestors.</p> <p>Interconnection from ACDB to mains at LT Bus bar while in grid tied mode.All switches and the circuit breakers, connectors should conform to IEC 60947, part I, II and III/ IS60947 part I, II and III. All the Panel's shall be metal clad, totally enclosed, rigid, floor mounted, air - insulated, cubical type suitable for operation on three phase / single phase, 415 or 230 volts, 50 Hz.All indoor panels will have protection of IP54 or better. All outdoor panels will have protection of IP65 or better. [Make: Hensel/Spielberg/Citel/ABB/L &amp; T/schneider/Elmax]</p>	No	2	₹ 0.00	₹ 0.00
5	<p>Supply of Grid Connected Solar Inverter  Rating: 10KW, 3Ph Inverter, Make:  ABB/KACO/Delta/Fronius/THEA . Control : Microprocessor /DSP  Capacity of Each Inverter: 10kW String Inverter .Nominal AC output voltage and frequency : 415V, 3 Phase, 50 Hz . Output frequency : 50 Hz . Max. DC input Power 10.3kW. MPPT Voltage Range250 - 850 VDC. Max. input current per MPPT 11A. Output Voltage Range - 320V - 480V AC. Grid Frequency Synchronization range : +/- 5 Hz. Ambient temperature considered : -20o C to 50o C. Humidity : 95 % Non-condensing. Protection of Enclosure :: IP-65(Minimum) for outdoor. Grid Frequency Tolerance range : +/- 5 Hz. Grid Voltage tolerance : 280 V to 480 V. No-load losses : Less than 1% of rated power. Inverter efficiency(minimum) : &gt;93%. Inverter efficiency (minimum ) : &gt; 90%. THD : &lt; 3%. Efficiency Measurement IEC 61683/ Equivalent BIS Std.Environmental testing IEC 60068-2 (1,2,14,30) / Equivalent BIS Std.Interfacing with utility grid IEC 61727. Islanding Prevention Measurement IEC 62116. EMI/EMC : IEC 61000-6-3&gt;16 Amps IEC 61000-6-4&lt;16 Amps. Safety: IEC - 62109-1 (2010/4) C - 62109-2 (2011/6). All above IEC's should be from NABL / IEC Accredited Testing</p>	No	1	₹ 0.00	₹ 0.00
6	<p>Supply of Earthings System : Each array structure of the PV yard should be grounded/ earthed properly as per IS:3043-1987. The array field, PCU, ACDB and AJB should also be earthed properly. 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. At least 4 nos ground pipe / plate electrod as per PWD schedule for system earthing with soil treatment &amp; earth inspection pit and GI flat of suitable size &amp; quantity should be considered [Make: SGI/OBO/Beterman/Gmax].</p>	Nos	5	₹ 0.00	₹ 0.00

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8	Supply of DC Cables ( 4 Sqmm Single Core Copper Tinned Solar DC Cable): Sizes of cables between array interconnections, array to junction boxes, junction boxes to Inverter etc. shall be so selected to keep the voltage drop of the entire solar system to the minimum. The cables (as per IS) should be insulated with a special grade PVC compound formulated for outdoor use. The size of each type of DC cable selected shall be based on minimum voltage drop however; the maximum drop shall be limited to 1%. [Make of DC PolyCab/Sterlite/Finolex/Havells/Anchor].	Meter	300	₹ 0.00	₹ 0.00
9	Supply of AC Cables(10 Sqmm 4 Core Copper Flexiable cable ): The size of each type of AC cable selected shall be based on minimum voltage drop however; the maximum drop shall be limited to 2%. i. Shall meet IEC 60227/IS 694, IEC 60502/IS1554 standards. Cost is inclusive of fixing accessories as required. [Make of AC cable: PolyCab/Sterlite/Finolex/Havells/Anchor].	Lot	50	₹ 0.00	₹ 0.00
10	Supply of import export type 3 phase Energy Meter, Make: L&T / Schneider / Secure	No	1	₹ 0.00	₹ 0.00
11	Supply of ESE Lightning Arrester, Make: SGI/OBO/Equivalent	No	1	₹ 0.00	₹ 0.00
12	Supply, Installation, Testing & Commissioning of all items of this BOQ should comply to the detailed Technical Specification given.	KW	10	₹ 0.00	₹ 0.00
13	Module cleaning system - SITC of plumbing material with accessories for module cleaning system	Job	1	₹ 0.00	₹ 0.00
14	Operation and maintenance for 3 years after warranty period 1 year	years	2	₹ 0.00	₹ 0.00
TOTAL (Incl. all Taxes)					<b>₹ 0.00</b>
Say					<b>₹ 0.00</b>

N.B: Above Price is inclusive of GST, Cess and Duties as per Govt. Noms.

<b><u>BOQ SL.No. - 03</u></b>
e-NIQ No- 04/WBTDCL/GM (North) OF 2021-22
Memo. No.37/Computer No: 349690/File No: WBTDCL-14099(13)/4/2021-TA (WBTDCL)-WBTDCL <span style="float: right;">Dated: -10.05.2021</span>
<b>Name of work: - SITC of 10KW Roof Top Solar PV power project with State of the art Technology at Tilottama Tourism Property with allied work on LT side (WBSEDCL) in the dist. Of Jalpaiguri.</b>

SI no	DESCRIPTION OF WORK	Unit	Quantity	Rate	AMOUNT
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2	Supply of Module Mounting Structure: Hot dip galvanized MS mounting structures may be used for mounting the modules/ panels/arrays. Each structure should have angle of inclination as per the site conditions to take maximum insolation.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 4Structural material shall be corrosion resistant and electrolytically compatible with the materials used in the module frame, its fasteners, nuts and bolts.Thiknes of Galvanization shall be more than 85μ and windstand should be more than 150KM/hr. Aluminium structures also can be used which can withstand the wind speed of respective wind zone. Necessary protection towards rusting need to be provided either by coating or anodization.The minimum clearance of the structure from the roof level should be 300 mm [Design to be approved by EIC before fabrication].	Kg	900	₹ 0.00	₹ 0.00
3	Supply of 1 Nos. PV Array Junction Box (AJB): a) The junction boxes are to be provided in the PV array for termination of connecting cables. The Boxes (JBs) shall be made of Powder Coated Aluminium /cast aluminium/M.S alloy with full dust, water & vermin proof arrangement. All wires/cables must be terminated through cable lugs. The JB's shall be such that input & output termination can be made through suitable cable glands.b) Each Junction Box shall have High quality Suitable capacity Metal Oxide Varistors (MOVs) / SPDs, suitable Reverse Blocking Diodes. The Junction Boxes shall have suitable arrangement monitoring and disconnection for each of the groups. Voltage: Max. 1000V DC [Make: Hensel/Spielberg/ABB/L & T/AVO].	No	1	₹ 0.00	₹ 0.00

4	<p>Supply of ACDB : Designed for 10KWp solar power plant with all protections as per MNRE guidelines. DC DPBs shall have sheet from enclosure of dust &amp; vermin proof conform to IP 65 protection. The bus bars are made of copper of suitable size. Suitable capacity fuse &amp; MCBs/MCCB shall be provided for controlling the DC power output to the PCU along with necessary surge arrestors . AC Distribution Panel Board (DPB) shall control the AC power from PCU/ inverter, and should have necessary surge arrestors.</p> <p>Interconnection from ACDB to mains at LT Bus bar while in grid tied mode.All switches and the circuit breakers, connectors should conform to IEC 60947, part I, II and III/ IS60947 part I, II and III. All the Panel's shall be metal clad, totally enclosed, rigid, floor mounted, air - insulated, cubical type suitable for operation on three phase / single phase, 415 or 230 volts, 50 Hz.All indoor panels will have protection of IP54 or better. All outdoor panels will have protection of IP65 or better. [Make: Hensel/Spielberg/Citel/ABB/L &amp; T/schneider/Elmax]</p>	No	2	₹ 0.00	₹ 0.00
5	<p>Supply of Grid Connected Solar Inverter  Rating: 10KW, 3Ph Inverter, Make:  ABB/KACO/Delta/Fronius/THEA . Control : Microprocessor /DSP  Capacity of Each Inverter: 10kW String Inverter .Nominal AC output voltage and frequency : 415V, 3 Phase, 50 Hz . Output frequency : 50 Hz . Max. DC input Power 10.3kW. MPPT Voltage Range250 - 850 VDC. Max. input current per MPPT 11A. Output Voltage Range - 320V - 480V AC. Grid Frequency Synchronization range : +/- 5 Hz. Ambient temperature considered : -20o C to 50o C. Humidity : 95 % Non-condensing. Protection of Enclosure :: IP-65(Minimum) for outdoor. Grid Frequency Tolerance range : +/- 5 Hz. Grid Voltage tolerance : 280 V to 480 V. No-load losses : Less than 1% of rated power. Inverter efficiency(minimum) : &gt;93%. Inverter efficiency (minimum ) : &gt; 90%. THD : &lt; 3%. Efficiency Measurement IEC 61683/ Equivalent BIS Std.Environmental testing IEC 60068-2 (1,2,14,30) / Equivalent BIS Std.Interfacing with utility grid IEC 61727. Islanding Prevention Measurement IEC 62116. EMI/EMC : IEC 61000-6-3&gt;16 Amps IEC 61000-6-4&lt;16 Amps. Safety: IEC - 62109-1 (2010/4) C - 62109-2 (2011/6). All above IEC's should be from NABL / IEC Accredited Testing</p>	No	1	₹ 0.00	₹ 0.00
6	<p>Supply of Earthings System : Each array structure of the PV yard should be grounded/ earthed properly as per IS:3043-1987. The array field, PCU, ACDB and AJB should also be earthed properly. 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. At least 4 nos ground pipe / plate electrod as per PWD schedule for system earthing with soil treatment &amp; earth inspection pit and GI flat of suitable size &amp; quantity should be considered [Make: SGI/OBO/Beterman/Gmax].</p>	Nos	5	₹ 0.00	₹ 0.00

7	Supply of Remote Monitoring System (GPRS Type): The RMS system is integrated or External unit. The following parameters are accessible via the operating interface display in real time separately for solar power plant: AC Voltage., AC Output current, Output Power, DC Input Voltage, DC Input Current, Power produce, Protective function limits (Viz-AC Over voltage, AC Under voltage, Over frequency, Under frequency ground fault. vi. The data shall be recorded in a common work sheet chronologically date wise. The data file shall be MS Excel compatible. The data shall be represented in both tabular and graphical form. viii. Simultaneous monitoring of DC and AC electrical voltage, current, power, energy and other data of the plant for correlation with solar and environment data shall be provided	Job	1	₹ 0.00	₹ 0.00
8	Supply of DC Cables ( 4 Sqmm Single Core Copper Tinned Solar DC Cable): Sizes of cables between array interconnections, array to junction boxes, junction boxes to Inverter etc. shall be so selected to keep the voltage drop of the entire solar system to the minimum. The cables (as per IS) should be insulated with a special grade PVC compound formulated for outdoor use. The size of each type of DC cable selected shall be based on minimum voltage drop however; the maximum drop shall be limited to 1%. [Make of DC PolyCab/Sterlite/Finolex/Havells/Anchor].	Meter	300	₹ 0.00	₹ 0.00
9	Supply of AC Cables(10 Sqmm 4 Core Copper Flexiable cable ): The size of each type of AC cable selected shall be based on minimum voltage drop however; the maximum drop shall be limited to 2%. i. Shall meet IEC 60227/IS 694, IEC 60502/IS1554 standards. Cost is inclusive of fixing accessories as required. [Make of AC cable: PolyCab/Sterlite/Finolex/Havells/Anchor].	Lot	50	₹ 0.00	₹ 0.00
10	Supply of import export type 3 phase Energy Meter, Make: L&T / Schneider / Secure	No	1	₹ 0.00	₹ 0.00
11	Supply of ESE Lightning Arrester, Make: SGI/OBO/Equivalent	No	1	₹ 0.00	₹ 0.00
12	Supply, Installation, Testing & Commissioning of all items of this BOQ should comply to the detailed Technical Specification given.	KW	10	₹ 0.00	₹ 0.00
13	Module cleaning system - SITC of plumbing material with accessories for module cleaning system	Job	1	₹ 0.00	₹ 0.00
14	Operation and maintenance for 3 years after warranty period 1 year	years	2	₹ 0.00	₹ 0.00
TOTAL (Incl. all Taxes)					<b>₹ 0.00</b>
Say					<b>₹ 0.00</b>

**N.B: Above Price is inclusive of GST, Cess and Duties as per Govt. Noms.**

**BOQ SL.No. - 04**

e-NIQ No- 04/WBTDCL/GM (North) OF 2021-22

Memo. No.37/Computer No: 349690/File No: WBTDCL-14099(13)/4/2021-TA (WBTDCL)-WBTDCL

Dated: -10.05.2021

**Name of work: - SITC of 10KW Roof Top Solar PV power project with State of the art Technology at Aranya Tourism Property with allied work on LT side (WBSEDCL) in the dist. Of Jalpaiguri.**

SI no	DESCRIPTION OF WORK	Unit	Quantity	Rate	AMOUNT
1	Supply of Solar Photovoltaic Panels.Mono Crystalline 385Wp to 400Wp (Each) (Make: Vikram/Sova/Trina/Adani) The PV modules used must qualify to the latest edition of IEC PV module qualification test or equivalent BIS standards Crystalline Silicon Solar Cell Modules IEC 61215/IEC 61730.The rated output power of any supplied module shall have 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.The module shall be provided with a junction box with either provision of external screw terminal connection or sealed type and with arrangement for provision of by-pass diode. The box shall have hinged, weather proof lid with captive screws and cable gland entry points or may be of sealed type and IP-65 rated.	Nos	26	₹ 0.00	₹ 0.00
2	Supply of Module Mounting Structure: Hot dip galvanized MS mounting structures may be used for mounting the modules/ panels/arrays. Each structure should have angle of inclination as per the site conditions to take maximum insolation.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 4Structural material shall be corrosion resistant and electrolytically compatible with the materials used in the module frame, its fasteners, nuts and bolts.Thickness of Galvanization shall be more than 85µ and windstand should be more than 150KM/hr. Aluminium structures also can be used which can withstand the wind speed of respective wind zone. Necessary protection towards rusting need to be provided either by coating or anodization.The minimum clearance of the structure from the roof level should be 300 mm [Design to be approved by EIC before fabrication].	Kg	900	₹ 0.00	₹ 0.00
3	Supply of 1 Nos. PV Array Junction Box (AJB): a) The junction boxes are to be provided in the PV array for termination of connecting cables. The Boxes (JBs) shall be made of Powder Coated Aluminium /cast aluminium/M.S alloy with full dust, water & vermin proof arrangement. All wires/cables must be terminated through cable lugs. The JB's shall be such that input & output termination can be made through suitable cable glands.b) Each Junction Box shall have High quality Suitable capacity Metal Oxide Varistors (MOVs) / SPDs, suitable Reverse Blocking Diodes. The Junction Boxes shall have suitable arrangement monitoring and disconnection for each of the groups. Voltage: Max. 1000V DC [Make: Hensel/Spielberg/ABB/L & T/AVO].	No	1	₹ 0.00	₹ 0.00

4	<p>Supply of ACDB : Designed for 10KWp solar power plant with all protections as per MNRE guidelines. DC DPBs shall have sheet from enclosure of dust &amp; vermin proof conform to IP 65 protection. The bus bars are made of copper of suitable size. Suitable capacity fuse &amp; MCBs/MCCB shall be provided for controlling the DC power output to the PCU along with necessary surge arrestors . AC Distribution Panel Board (DPB) shall control the AC power from PCU/ inverter, and should have necessary surge arrestors.</p> <p>Interconnection from ACDB to mains at LT Bus bar while in grid tied mode.All switches and the circuit breakers, connectors should conform to IEC 60947, part I, II and III/ IS60947 part I, II and III. All the Panel's shall be metal clad, totally enclosed, rigid, floor mounted, air - insulated, cubical type suitable for operation on three phase / single phase, 415 or 230 volts, 50 Hz.All indoor panels will have protection of IP54 or better. All outdoor panels will have protection of IP65 or better. [Make: Hensel/Spielberg/Citel/ABB/L &amp; T/schneider/Elmax]</p>	No	2	₹ 0.00	₹ 0.00
5	<p>Supply of Grid Connected Solar Inverter  Rating: 10KW, 3Ph Inverter, Make:  ABB/KACO/Delta/Fronius/THEA . Control : Microprocessor /DSP  Capacity of Each Inverter: 10kW String Inverter .Nominal AC output voltage and frequency : 415V, 3 Phase, 50 Hz . Output frequency : 50 Hz . Max. DC input Power 10.3kW. MPPT Voltage Range250 - 850 VDC. Max. input current per MPPT 11A. Output Voltage Range - 320V - 480V AC. Grid Frequency Synchronization range : +/- 5 Hz. Ambient temperature considered : -20o C to 50o C. Humidity : 95 % Non-condensing. Protection of Enclosure :: IP-65(Minimum) for outdoor. Grid Frequency Tolerance range : +/- 5 Hz. Grid Voltage tolerance : 280 V to 480 V. No-load losses : Less than 1% of rated power. Inverter efficiency(minimum) : &gt;93%. Inverter efficiency (minimum ) : &gt; 90%. THD : &lt; 3%. Efficiency Measurement IEC 61683/ Equivalent BIS Std.Environmental testing IEC 60068-2 (1,2,14,30) / Equivalent BIS Std.Interfacing with utility grid IEC 61727. Islanding Prevention Measurement IEC 62116. EMI/EMC : IEC 61000-6-3&gt;16 Amps IEC 61000-6-4&lt;16 Amps. Safety: IEC - 62109-1 (2010/4) C - 62109-2 (2011/6). All above IEC's should be from NABL / IEC Accredited Testing</p>	No	1	₹ 0.00	₹ 0.00
6	<p>Supply of Earthings System : Each array structure of the PV yard should be grounded/ earthed properly as per IS:3043-1987. The array field, PCU, ACDB and AJB should also be earthed properly. 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. At least 4 nos ground pipe / plate electrod as per PWD schedule for system earthing with soil treatment &amp; earth inspection pit and GI flat of suitable size &amp; quantity should be considered [Make: SGI/OBO/Beterman/Gmax].</p>	Nos	5	₹ 0.00	₹ 0.00

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TOTAL (Incl. all Taxes)					<b>₹ 0.00</b>
Say					<b>₹ 0.00</b>

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