

Terms of Reference (ToR)

for design, supply installation and commissioning of 20 kW peak grid interactive solar PV system in Rajkot, Gujarat under the project “Promoting Low Emission Urban Development Strategies in Emerging Economy Countries” (Urban-LEDS)

Task	Designing, supply, testing, installation, commissioning, operation and maintenance for five years of 20 kW peak grid interactive solar PV system on Sarojini Naidu Girl’s School, Rajkot
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Summary	To design, procure, install and commission 20 kW peak grid interactive solar PV system at Sarojini Naidu Municipal School in Rajkot
Description of the assignment, expected outcomes	<p>The winning bidder shall</p> <ul style="list-style-type: none"> - Study the existing load pattern of the electrical load in the building and design a grid interactive solar PV system of capacity 20 kWp to be installed on terrace of the building - Manufacture/procure the system components including PV array for given peak power rating, inverter and balance of plant system - Installation, testing and commissioning of the system on site - Provide in-house training in operation, testing, monitoring and maintenance of the plant. - 5 years operation and comprehensive maintenance of system - Refer following Annexures for Details Annexure I- Bidder Eligibility Criteria and General Contract Terms Annexure II- Site and Connected Load



	<p>Details</p> <p>Annexure III- Scope Of Work</p> <p>Annexure IV- Expected Specifications of PV system</p> <p>Annexure V- Price Bid Formats for submission of bid</p>
Concrete deliverables expected	Supply, Installation and commissioning of 20 kWp grid interactive PV system with power import-export arrangement with DISCOM with 5 years operation and comprehensive maintenance
Time frame, location	<p>Information gathering and site visit at Rajkot: 1 week from date of issue of work order</p> <p>Designing of system and submission of report to ICLEI South Asia: 2 weeks from issue of work order</p> <p>Delivery, Installation and commissioning on site: 10 weeks from issue of work order</p> <p>Submission of performance report: 3 months from the date of installation and commissioning of system</p>
Available budget	<p>Stages of payment</p> <ul style="list-style-type: none"> - 30% of contract value on submission of initial design report and Bank Guarantee 1 - 50% of contract value on on-site installation and commissioning of system including connection to grid - 20% of contract value on <ul style="list-style-type: none"> i) Submission of performance report after continuous operation for 3 months ii) Training RMC personnel for operation and maintenance; and iii) Submission of Bank Guarantee 2 valid for 5 years and 6 months to Rajkot Municipal Corporation - Return of Bank Guarantee 2 by RMC to contractor on <ul style="list-style-type: none"> i) Satisfactory performance during operation and maintenance period of 5 years ii) Signing of PPA between RMC and PGVCL as and when the net metering guidelines are put into force within this 5 year period.
Deadline for indicating interest	<p>Publication of tender on ICLEI Website: May 18, 2015</p> <p>Publication of revision 01 of tender on ICLEI</p>



	<p>Website: May 26, 2015</p> <p>Last date of acceptance of proposals: June 1, 2015</p> <p>Date of announcement of successful bidder: June 8, 2015</p> <p>Issue of work order to winning bidder: June 15, 2015</p>
Contact information	<p>Ms. Soumya Chaturvedula, Programme Coordinator (Energy & Climate), ICLEI South Asia, Ground Floor, NSIC-STP Complex, NSIC Bhavan, Okhla Industrial Estate, New Delhi- 110020, India, Tel: +91-11-41067220 Fax: +91-11-41067221 Email: soumya.chaturvedula@iclei.org</p>



Annexure I: Bidder Eligibility Criteria and General Contract Terms

1.1 Bidder Eligibility Criteria

- a. Eligible bidder shall be SPV system supplier or manufacturer of SPV system conforming to relevant national/ international standards
- b. Eligible Bidder shall have completed supply, installation, testing, commissioning and handing over of at least 10 kWp PV system in a single order and operational for at least 6 months
- c. Eligible bidder to have an average turn-over of at least INR 25 lakh in last 3 financial years ending March 2015
- d. Joint Ventures are not allowed, however, subcontracting is allowed

1.2 Documents to be submitted by participating bidders

- a. A copy of valid PAN number
- b. In case of authorized dealer, additionally, authorization letter from manufacturing company along with other documents as mentioned in above point a, b and c
- c. Proof of registration with Service Tax/ Sales Tax/ VAT certificate
- d. Last 3 Financial Year's balance sheet audited by certified Chartered Accountant
- e. Details of similar work previously carried out mentioning Beneficiary, Capacity of Installation, Contract Value, Date of Commencement, Date of Commissioning, Contact details (with telephone no.) of contact person for the given contract. Along with performance certificate issued by previous client.
- f. Details of similar work at hand mentioning Beneficiary, Capacity of Installation, Contract Value, Date of Commencement, Date of Commissioning, Contact details (with telephone no.) of contact person for the given contract.
- g. Details of tools, tackles, machinery available with bidder
- h. Details of all the technical personnel whom the bidder shall engage for this project. Please include their resume providing name, qualification, nature of work (field or office), mode of employment, previous experience
- i. A bidder shall produce, original documents for cross verification as and when requested by ICLEI South Asia

Each page of all the documents mentioned above as well as technical and price bid documents shall be duly signed by bidder.

1.3 General Conditions of Contract

- a. Bidders are advised to inspect and examine the site and its surroundings and satisfy themselves before submitting their tenders as to the nature of the site, the means of access to the site, the accommodation they may require and in general shall themselves obtain all necessary information. A bidder shall be deemed to have full knowledge of the site, whether he inspects it or not and no extra charges consequent on any misunderstanding or otherwise shall be allowed.
- b. The contractor is expected to study the existing loads and carry out a concise energy audit to arrive at a recommended capacity of PV system and submit an initial design report. The



decision on the capacity of system to be installed will be taken in consultation with RMC senior officials and ICLEI South Asia.

- c. The contractor may sub-contract part of his deliverables to another agency. In such case, prior information of the same has to be provided to ICLEI South Asia at the time of bid submission. The information of such intention has to be sufficed with suitable letter of authorization from sub-contracting agency expressing their consent to work on behalf of bidder.
- d. In case the bidder wishes to sub-contract part of the deliverables, the final responsibility of delivery and performance solely lies with the bidder.
- e. The bids shall be submitted by electronic mail to below mentioned email ids soumya.chaturvedula@iclei.org, tejas.shinde@iclei.org on or before 1st June, 2015
- f. The bidder shall also submit the tender in hard copies in 3 sets, to be delivered at below mentioned address
Ms. Soumya Chaturvedula,
Programme Coordinator (Energy & Climate),
ICLEI South Asia, Ground Floor, NSIC-STP Complex,
NSIC Bhavan, Okhla Industrial Estate,
New Delhi- 110020, India,
Tel: +91-11-41067220 Fax: +91-11-41067221
Email: soumya.chaturvedula@iclei.org
- g. **Technical bid (Envelop 1) & price bid (Envelop 2) should be submitted in a sealed envelopes as mentioned below**
 - Technical bid in a separate envelope with heading as “Technical Bid- 20 kWp Solar PV System Rajkot, Urban LEDS” sealed and signed
 - Financial bid in a separate envelope with heading as “Financial Bid- 20 kWp Solar PV System Rajkot, Urban LEDS” sealed and signed
 - Both the envelopes placed inside a single sealed envelope with heading “Bid Submission for Supply, Erection and Commissioning of 20 kWp Grid Interactive PV System, Rajkot, Urban LEDS”
- h. The hard copies of the bid documents shall reach the above mentioned address not later than 3 days from the last date of submission of bids, provided, the bid has been submitted by the bidder through email as well.
- i. **Bank Guarantee**
 - The contractor, within 7 days of receipt of letter of intent (LOI), shall submit a bank guarantee (**Bank Guarantee 1**) of value 10 % of contract value, valid for a period of 6 months, in favour of ICLEI South Asia as a security.
 - At the time of installation and commissioning of the system, the contractor shall submit another bank guarantee (**Bank Guarantee 2**) of value 10 % of contract value in favour of Rajkot Municipal Corporation valid for a period of 5 years and 6 months from the date of commissioning as a performance bank guarantee
 - **Bank Guarantee 1** shall be handed over to bidder once a confirmation of receipt of **Bank Guarantee 2** by Rajkot Municipal Corporation is furnished.
- j. If the performance of the bidder, with respect to the approved scope of work is found to be unsatisfactory, ICLEI South Asia may forfeit the Bank Guarantee 1.



- k. It should be noted that the project is being implemented in Rajkot Municipal Corporation (RMC) owned premises and hence instructions to bidders will be given in consultation with RMC officials.
- l. Also, once the system is installed, commissioned and operated successfully for 3 months, RMC being the rightful beneficiary of the system, it will stand transferred to RMC. Hence, the instructions to the contractor, post-transfer should be taken from RMC officials.
- m. The contractor shall abide by the terms and obligations mentioned in the scope of work and Bank Guarantee 2. In case of default or non-performance by contractor, post- installation and commissioning of system, RMC will have right to forfeit the Bank Guarantee 2.
- n. A bidder shall submit the tender that satisfies each and every condition laid down in this notice, failing which, the tender is liable to be rejected.
- o. The validity of the tender shall be up to **90** (ninety) days from the date of opening of Tender.
- p. Schedule of activities and payment**

Timeline	Activity	Payment to Contractor
2 weeks from issue of work order	Submission of initial design report and Bank Guarantee 1 valid for a period of 6 months	30 % of work value
10 weeks from issue of work order	On-site installation and commissioning of system including connection to grid	50 % of work value
3 months from the date of installation and commissioning of system	Submission of performance report after continuous operation for 3 months; training RMC personnel for operation and maintenance; and submission of Bank Guarantee 2 valid for 5 years and 6 months to Rajkot Municipal Corporation,	20 % of work value and return of Bank Guarantee 1 to contractor
5 years from the date of installation and commissioning of system	Satisfactory performance of the system without default post installation and commissioning of system during operation and maintenance period of 5 years; signing of PPA between RMC and PGVCL as and when the net metering guidelines are into force	Return of Bank Guarantee 2 to contractor by RMC



Annexure II: Site and connected load details

Name: Sarojini Naidu Girls Highschool

Address: Ambaji Kadva Plot, Sardar Nagar, Rajkot, Gujarat 360004

Building plan: Main Building- Ground Floor Only, approx. 40 m (N-S) X 4 m (E-W)

Computer Room- Ground + 1 Floor, approx. 3 m (N-S) X 10 m (E-W)

Preferable location of PV System- Computer Room Terrace

Construction Type- RCC

Electrical Energy Demand: Fixed Load

Name of the Appliances	Total Nos.	Load (W)/ Appliances	Hours of operation/ Day	Average working days/ year	Hours of Operation/ year	Consumption / Day (kWh)	Annual consumption (kWh/ year)
Ceiling Fans	62	59	6	250	1,500	21.95	5,487
Table Fan	1	40	6	250	1,500	0.24	60
Computer	28	500	5	250	1,250	70.00	17,500
Printer	2	20	2	250	500	0.08	20
Fluorescent tube light, 4 feet - 40 Watt	53	55	6	250	1,500	17.49	4,373
Fluorescent tube light, 4 feet - 40 Watt	5	55	15	250	3,750	4.13	1031
TOTAL		729			10,000.0	113.88	28,470.75



Annexure III: Scope of Work

1. Design, detailed engineering, manufacturing, testing, supply, erection and commissioning of 20 kW grid interactive SPV power plant with operation and maintenance of 5 years at Sarojini Naidu School, Rajkot, Gujarat. The SPV power plant should be designed, installed and commissioned as per technical specifications provided in Annexure 3, and in conformance with IS/ BIS/ IEC/ MNRE Standards
2. Supply of solar PV modules of capacity 250 Wp each and erecting on a suitable mounting structure designed for round-the-year performance
3. Civil work with respect to grouting/ fixing the panels/ mounting structure on the roof top of the identified building.
4. Design, supply and erection of sufficient number of junction boxes for each array
5. Supply of appropriate size cables on DC as well as AC side of inverter
6. Supply and installation of appropriate size cables including interconnecting cables and cables from array to junction box, junction box to inverters, DC Distribution box, AC Distribution box, LT Panel and all required accessories e.g. lugs, jointing material, bolts, screws, clamps and cable trays
7. Supply, installation and commissioning of all earthing and lightning protection equipment as per technical specifications in Annexure III.
8. Supply and installation of control equipment, SCADA system, remote monitoring system, with data loggers and data transmission system, required for monitoring of system.
9. Successful commissioning of plant and providing 3 months of successful operation report
10. Provide necessary manpower for initial operation and maintenance as well as training of two of the Rajkot Municipal Corporation (RMC) staff for initial period of 3 months.
11. All necessary, statutory permissions required for installation of grid interactive system, required from any government or concerned agency should be sought by contractor
12. Operation of PV system to generate optimal power output from the system for 5 years with monthly performance report generation.
13. Comprehensive Maintenance of System for a period of 5 years from the date of commissioning in consultation with RMC and ICLEI South Asia
 - Currently, the state of Gujarat has net metering policy in place but no clear guidelines have been provided for export of power. Hence, in case of absence of net-metering policy, provision for blocking export of PV system generated power to grid using blocking diode or similar arrangement shall be made by the bidder.
 - Net Meter for future implementation as and when relevant policy is in place: This work includes supply, erection and commissioning of tested two-way (power import export) energy meters, tested and sealed by state electricity board/ nodal agency.
 - Liaising with PGVCL/GERC and all concerned government agencies for seeking permission for operation of 20 kW peak grid interactive solar PV System as well as signing of power purchase agreement between RMC and PGVCL to export excess power to grid.Ensure proper selection, procurement, installation and functioning of the two way meter and other requisite interconnection components adhering to MNRE/ State guidelines, as applicable, to ensure success of net metering arrangement.



Annexure IV: Expected Technical Specifications of 20 kW PV System

4.1 Details of PV System

Sr No.	Particular	Specifications
1	SPV Power Plant Capacity	20 kW
2	Module	Mono/ Poly Crystalline, minimum capacity 250 Wp(@ STC),and minimum efficiency 15 %
3	Power Conditioning Unit	20 kW, Grid Interactive type, either single unit or multiple string inverters with total capacity of 20 kW
4	Desired Output	3 phase - Alternating Current
5	Output Voltage	AC 415± 15 V

4.1.1 PV Module:

- a. PV Modules supplied should be of mono/ poly crystalline with quoted output as 250 Wp at standard test conditions. The efficiency of module should not be less than 15 %. Contractor to work out total quantity of modules required and strings designed to give combined output of 20 kW.
- b. To use modules conforming to standards issued by BIS or relevant IEC standards for qualification and safety of modules
- c. To provide warranty for performance of module where the designed output should not be less than 90 % at the end of a period of 10 years and 80 % at the end of 25 years.
- d. The module should be designed with corrosion free frame, electrically compatible with structure material used for mounting structure.
- e. The front glass surface should be made of low iron, low transmissivity, toughened glass
- f. Cells shall be hermetically sealed to protect from moisture, dust or external factors
- g. The module material shall be known to withstand the weather conditions for its life span of 25 years of outdoor operations.
- h. Terminal boxes attached to module shall be of IP66/ IP67 rating and provided with bypass diode to protect cell overheating due to localized shading.
- i. A derating factor of 0.8 % per year of module's rated power is permissible for period of first 10 years restricted to 10 % of plant capacity at the end of 10th year and thereafter further derating restricted to another 10 % of the capacity at the end of 25th year.
- j. Open Circuit Voltage should not be less than 38 V
- k. Voltage derating should be limited to 0.35 % at 25 Deg C

Electrical Characteristic under STC	Value
Maximum Power	≥ 250 Wp
Power Tolerance	± 5 Wp
Temperature Co-efficient of Power	-0.45 %/ C
Voltage at Pmax, Vmp (Volt)	28.5
Current at Pmax	8 A
Open Circuit Voltage Voc	38 V
Short Circuit Current Isc	6-8 A
Temp co-efficient of Voc	-0.30 %/C
Temp co-efficient of Isc	+0.045 %/A



4.1.2 Power Conditioning Unit

The PCU shall serve following listed functions

- a. Should provide optimum performance characteristic, should provide necessary power for inverting and protect from reverse polarity and short circuit
- b. Shall provide all the necessary alarms, monitoring units and control circuits
- c. The PCU should be provided with LCD display to show input kWh, input Ah, input voltage, input current and output voltage, output current, output kWh, output frequency, output power factor, instantaneous and cumulative insolation of running day
- d. PCU shall be able to communicate with remote terminal and communicate following parameters for remote monitoring
 - Input Voltage
 - Input Current
 - Input Power
 - Input Energy
 - Input ampere hour
 - Output current
 - Output voltage
 - Output energy (cumulative)
 - Output frequency
 - Output power factor
 - Instantaneous solar PV Insolation
 - Hours of SPV system operation
 - Alarms and Faults
- e. The grid availability, connectivity, de- synchronization and re-synchronization time of SPV system shall be monitored and logged
- f. The PCU shall have micro-controller based control to adapt to changing solar insolation and ensure optimal energy transfer from SPV system using Maximum Power Point Tracking technique and not just a fixed SPV voltage for maximum energy transfer.
- g. All necessary tests e.g. Burn In Test, Load Test to be carried out at manufacturer's premises
- h. Insulation Resistance Test: The insulation test of fully wired PCU should not be more than 50 MΩ (by disconnecting all external loads)

Electrical specifications of Power Conditioning Unit

Particular	Specifications
PCU Rating (Nominal)	20 kW (single unit or multiple strings unit totalling to capacity 20 kW)
Purpose	Grid Synchronizing type with priority to supply power to load, and excess power if generated, fed to grid. Also, in case the PV power falls short of requirement, the PCU shall take power from grid
PV Array Configuration	Negative Ground Type
Input DC Voltage Range	400- 800 V
Minimum Start-up input SPV power	< 1 kW



Output Voltage	Grid Synchronous, 415 ± 5 V
Output Frequency	50 Hz ± 1 Hz, True Sine Wave
Power Factor at Full Load	>0.99
System Voltage	DC Side, Maximum voltage 1000 V
Operating Temperature/ Humidity	0 to 55 Deg C, Up to 95 % RH, non- condensing
Housing Cabinet	<ul style="list-style-type: none"> - Ingress Protection IP66/ IP67 rating outdoor or IP 54 Indoor - Weatherproof, waterproof, insect-proof - Acoustic level < 60 dB at 1.5 m
Desired Safety Features	<ul style="list-style-type: none"> - Circuitry with solid state switching techniques - Protection against over-voltage by isolation of circuit and reconnection on returning to normal voltage - Protection against reverse polarity - Protection against short circuit/ Over load - Fuse/ Circuit Breaker with current limiting devices
Required Alarms and Indicators	<ul style="list-style-type: none"> - SPV Output Voltage low - SPV Output Voltage high - Over Current - Short Circuit - Solar Array Reverse Current - Over Temperature - Under/ Over Output voltage - Under/ Over Frequency - Automatic/ Manual Isolation at input/ Output - Equipment Circuit Breaker Trip

4.1.3 DC Distribution Board (DCDB)

- a. In case of single inverter, a DCDB shall be provided in between AJB and PCU
- b. The Panel shall be floor mounted and shall be made of powder coated MS sheet of gauge not less than 2mm. The enclosure shall have Epoxy powder coating of at least 55 microns.
- c. The panel shall be outdoor/ indoor-type (as per site requirement) with IP 54 degree of protection, dust, vermin, insect and rodent proof. Suitable canopy shall be provided for the DCDB. The door shall be provided with locking arrangement. Location of the DCDB shall be decided in conjunction with concerned city engineer.
- d. It shall have a copper bus-bar of rating 1000V DC, 400A. Adequate quantity of isolators of rating 1000V DC, 100A each, shall be provided at the input of the DCDB for terminating the output cables coming from various AJBs to DCDB. The quantity shall be worked out by the bidder depending on the quantity of the AJBs. A DC MCCB of rating 1.5 times the short circuit current of the PV array, shall be provided at the output of the bus-bar, for connection to the PCU. All switchgear equipment shall be of ABB/ Siemens make.
- e. The panel shall be equipped with digital DC voltmeter, digital DC ammeter and digital DC energy meter, door-mounted type. Voltmeter shall be of range 0-1000 VDC, ammeter of range 0-400 A. The Measuring CT shall be of DC rating 400/1A and measuring PT shall be of DC rating 1000/1 V. All the meters shall have display accuracy up to 2 decimal places. All the measuring instruments such as voltmeter, ammeter, frequency meter, Electronic Energy



Meter (for measuring the deliverable units (kWh) for sale), selector switches, Mimic etc. shall be mounted in the front door.

- f. All insulated conductors shall be fire retardant as per IS 1554 and shall withstand the maximum current and voltage during fault and overload.
- g. It is expected that the cables be secured in position within DCDB using the best engineering practices and methods to avoid any stray cable running loose within DB. Wherever the cable enters or exits the panel through hole in panel covers, proper bushing and glanding has to be done.
- h. Use of suitable quality of bolts, screws and nuts to stay protected against corrosion due to humid atmospheric condition
- i. The DCDB should house the Power Conditioning Unit

4.1.4 AC Distribution Board (ACDB)

- a. An ACDB shall be provided in between PCU and Load point.
- b. The Panel shall be floor mounted. The panel shall be made of powder coated MS sheet of gauge not less than 2mm. The enclosure shall have Epoxy powder coating of at least 55 microns.
- c. The panel shall be indoor-type with IP 54 class enclosure provided with locking arrangement.
- d. It shall have a 3-ph MCCB of rating 1.5 times the rated output current of the PCU, for connection to load point.
- e. It shall have digital AC voltmeter, digital AC ammeter and digital AC energy meter, door-mounted type, and able to display the parameters of all 3 phases and lines separately. AC voltmeter shall be of range 0-600V, ammeter of range 0-250 A. The Measuring CT shall be of rating 250/1A and measuring PT shall be 600/1V. All the meters shall have display accuracy upto 2 decimal places.
- f. The Energy meter shall be supplied from reputed company. The energy meter shall be tested and sealed by State Electricity Board (SEB). Testing certificate of the same shall be submitted.
- g. All insulated conductors shall be of the rating enough to withstand the maximum current and voltage during fault and overload. The wires and cables used shall be fire retardant as per IS 1554 with amendment 1 (June 94).
- h. To provide proper glanding and bushing wherever cable passes through the panel wall/ door
- i. Use of corrosion resistant nuts, bolts and screws

4.1.5 Cables and conductors

- a. All cables supplied shall conform to IS-8130/1984 and IS - 7098 (Part-1) 1988 shall be of 1.1 kV AC grade (1000 V dc in case of DC cables) as per requirement. Only XLPE insulated copper cables shall be used. All the cables shall be selected with prime motive of reducing the losses and keeping voltage drop to minimum.
- b. To study the site and details of power evacuation, work out the estimated length of cabling required, get it approved from concerned RMC engineer before quoting.
- c. All inter-module connections up to AJB shall be carried out with minimum single-core, 4 sq mm XLPE insulated solar grade multi-stranded tinned copper conductor, flexible DC power cable with suitable MC3/ MC4 connectors for modular interconnections. Flexible PVC conduits of adequate size shall be provided.
- d. Wires should be run through well designed cable trays with layout designed considering best engineering practices and avoiding any interference between signal and power cables



4.1.6 Protection Systems Required

- a. Earthing and lightning protection for PV array, distribution system, with properly designed earthing pit
- b. Lightning and Over-Voltage Protection provided with metal oxide varistors inside array junction boxes and inverters.

4.1.7 Spare parts and tool-kits

Essential spares shall be kept in stock at each site at the cost of the bidder during the CMC of 5 years including 2 years guarantee. List of such spare parts shall be enclosed with the technical bid



Annexure V: Price Bid Formats for submission of bid

Format for Submission of Price Bid

Name of the bidder		Per Unit kW Cost (Rs)	Total Cost (Rs.)*
	Design, Supply, Installation, Testing, Commissioning of 20 kWp grid interactive roof top solar PV system to be installed at Sarojini Naidu School, Rajkot, Gujarat (Inclusive of O&M cost for 5 years) **		
		Total	
Total Cost in Words			
*Note- All the rates should be inclusive of all taxes, duties, excise, insurance etc. ** Scope of work subject to approval by ICLEI South Asia and RMC authority.			

1. Delivery site
2. Validity of Price Bid- 90 Days from the date of submission of bid/ quotation
3. Payment Terms- Payment within 15 days from the date of submission of bills accompanied with acceptance certificate/ letter from ICLEI South Asia and concerned RMC officials.

PAN No.: _____

VAT/ TIN Registration No.: _____

Company Seal and Signature: _____

Business Address

Name: _____

Date: _____

Place: _____

