

SECTION-VII

TECHNICAL SPECIFICATIONS (TS)

O&M of 10 MW Grid Connected Ground Mounted Solar PV Project	Tender No. SECI/C&P/OP/14/004/2022-23	TS Page 1 of 26	Signature of Bidder
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A. Project Description:

Sl. No.	Details	Input value
1	Location	Village-Badi Sid, Tehsil-Bap, Jodhpur, Rajasthan
2	Latitude	27°28'52.1" N
3	Longitude	72°23'26.2" E
4	AC Capacity	10 MW (ac)
5	DC Capacity	11.55 MWp
6	SLD & Layout	Attached
7	Design and drawing documents	The relevant documents shall be provided to the successful bidder. However, the interested bidders may visit the site and view the same at site.
8	Commissioning date	31-03-2016
9	Operational Acceptance	31-03-2018
10	Plant Area	53 Acre
11	Nearest Railway Station	Phalodi Jn- 30 KM
12	Nearest Highway	NH-11
13	Nearest Airport	Jodhpur Airport- 158 KM
14	Nearest district	Bikaner (134 km)
15	SLDC	RVPNL
16	QCA	M/s RECONNECT (https://sldc.rajabsthan.gov.in/rvpnl/downloads)
17	GSS name	RAJ_SCA_PSS_220KV_BADISID_3NO_33KV as per SLDC (RVPNL)
18	Monthly DSM statement for reference	https://sldc.rajabsthan.gov.in/rvpnl/bills/monthly-dsm-reports-statement

Major Equipment details

Sl. No.	Name	Quantity & Rating	Make
1	Module	Multi Crystalline, fixed tilt, 45408 no. (250 Wp:13820 Nos, 255 Wp: 22546 Nos, 260 Wp:9042 Nos)	Vikram Solar
2	Nos. of string and No. of modules / strings	946 nos. / 24 nos.	
3	Inverter	10 Nos, (1 MW each)	ABB
4	Power Transformer	5 Nos. (2 MVA each)	Electrotherm
5	Auxiliary Transformer	1 Nos.(100 kVA)	Melcom
6	VCB	33 KV (outdoor)	ABB
7	SCADA	01	Greenwave

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	WMS		Trinity
8	Lighting Arrester	09	Sabo Systems
9	SCB	80	Trinity
10	AC	02	Daiken & Panasonic
11	Others, Office infrastructure, Peripheral lightings etc		
12	Building	MCR (01), ICR (02)	
13	Connectivity / GSS	33/220KV RVPNL GSS	
14	Transmission line	4 KM, Plant end to GSS	
15	Type and nos. of Pole	Lattice / 96 nos.	

B. Scope of Work for Operation and Maintenance

The O&M Contractor (herein after referred to as Contractor) shall be responsible for smooth day-to-day operation of the 10MW (AC) Solar Photovoltaic Power Plant (herein after referred to as Plant Facility) for a period of 05 (Five) years w.e.f. the date of commencement mentioned in the LOA issued by SECI.

a) Contractor shall be responsible for:

The O&M contractor shall be responsible for all the required activities for the successful running, committed energy generation & maintenance of the Solar Photovoltaic Power Plant covering:

- Maintaining Plant Guaranteed CUF as per **Annexure 02**.
- Deputation of qualified and experienced engineers and technicians. It is Contractor's responsibility to arrange for tools, tackles, logistics, test kits, manpower, experts etc. required for trouble free operation of Plant.
- Deputation of Security personnel for the complete security of plant.
- Successful running of Solar Power Plant for committed energy generation.
- Ensuring availability of all equipment for $\geq 98\%$ of the time.
- Co-ordination with STU/SLDC/other statutory organizations as per the requirement on behalf of Employer for Joint Metering Report (JMR).
- Forecasting generation for scheduling of power with SLDC on continuous basis, furnishing generations schedules as per requirement, revising schedules as necessary and complying with grid requirements.

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- h) Arrangement of CMRI and compatible software for downloading energy meter data shall be arranged by the contractor at no extra cost to SECI.
- i) Monitoring, controlling, troubleshooting maintaining of logs & records, registers.
- j) Supply of all spares, consumables and fixing / application as required as per **Annexure 01**
- k) Module cleaning minimum 3 cycle/times per month
- l) The contractor shall make his own arrangements for sourcing of water for cleaning of modules and other requirements in the plant.
- m) Supply & use of consumables such as grease, oil etc. throughout the maintenance period as per recommendations of the equipment manufacturers.
- n) Conducting periodical checking, testing, overhauling and preventive action.
- o) General up keeping of all equipment, building, roads, Solar PV modules, inverter including all spares etc.
- p) Submission of periodical reports to SECI on the energy generation & operating conditions of the power plant.
- q) Furnishing generation data monthly to Employer by 1st week of every month for the previous month to enable Employer raise commercial bills on consumers.
- r) Replacement of Modules, Invertors/PCU's and other equipment as and when required Continuous monitoring the performance of the Solar Power Plant and regular maintenance of the whole system including Modules, PCU's, transformers, overhead transmission line, outdoor/indoor panels/ kiosks etc. are necessary for extracting and maintaining the maximum energy output from the Solar Power Plant.
- s) Corrective and preventive O&M of the Solar Photovoltaic Power Plant including supply of spares, consumables, wear and tear, overhauling, replacement of damaged modules, invertors, PCU's and insurance for his man, material and equipment as required, for a period covering the period of contract and one more year commencing from the date of start of O&M of the project.
- t) The contractor shall arrange to carry out at his cost all statutory inspections as required for the plant. Such inspections shall include but not be limited to surveillance by the CEIG, Rajasthan, Labour Inspector, etc. The Owner shall provide the required application documents and reimburse to the contractor the statutory fees against payment receipts.
- u) The period of Operation and Maintenance will be deemed to commence from the date

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of LoA to the O&M contractor for operation and maintenance of the same. O&M contract shall further be extended on the mutually agreed terms and conditions for the period of one (1) more year.

- v) All the equipment required for Testing, Commissioning, O&M and for the healthy operation of the Plant must be calibrated, time to time, from the NABL accredited labs and the certificate of calibration must be provided prior to its deployment
- w) Contractor shall be responsible for maintenance of all each and every civil infrastructure part like Building, cable trench, fencing, drain, plumbing system fire-fighting system, CCTV system, security arrangement, road, earthing, any foundations, anti-weeding, clearing bushes in the solar field etc., as per the direction of employer's Engineering In-charge.
- x) The Contractor shall also arrange to deploy a vehicle at site for use by the Owner's personnel. The vehicle shall be a double-cab (seating capacity 5) pick-up of Mahindra/ Tata make suitable for transporting personnel and goods in the rough terrain of site. The estimated use per month is 1000kms. The vehicle shall be available for all days of the week for use by the Owner.
- y) The Contractor shall in no way at any time restrict the access to the site of the Owner and his authorised personnel.

b) Operation and Performance Monitoring

- a) Operation part consists of deputing necessary manpower necessary to operate the Solar Photovoltaic Power Plant at the full capacity. Operation procedures such as preparation to starting, running, routine operations with safety precautions, monitoring etc., shall be carried out as per the manufacturer's instructions to have trouble free operation of the complete system.
- b) Daily work of the operation and maintenance in the Solar Photovoltaic Power Plant involves periodic cleaning of Modules, logging the voltage, current, power factor, power and energy output of the Plant at different levels. The operator shall also note down time/failures, interruption in supply and tripping of different relays, reason for such tripping, duration of such interruption etc. The other task of the operators is to check battery voltage-specific gravity and temperature. The operator shall record monthly energy output, down time, etc.

c) Maintenance

- a) The contractor shall carry out the periodical/plant maintenance as given in the manufacturer's service manual and perform operations to achieve committed

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generation.

- b) Regular periodic checks of the Modules, PCU's and other switchgears shall be carried out as a part of routine corrective & preventive maintenance. In order to meet the maintenance requirements stock of consumables are to be maintained as well as various spare as recommended by the manufacturer at least for 05 years to be kept for usage.
- c) Maintenance of other major equipment involved in Solar Photovoltaic Power Plant are step up transformers, overhead transmission line and metering bay equipment, indoor / outdoor 33kV VCB / SF6 kiosk, associated switchgears, other fixtures & components and metering panel. Particular care shall be taken for outdoor equipment (including transmission line, tower etc) to prevent corrosion. Cleaning of the insulators and applying RTPV silicone paste on insulators shall also be carried out at regular intervals. Earth resistivity of Plant as well as individual earth pit is to be measured and recorded every month. If the earth resistance is high, suitable action is to be taken to bring down the same.
- d) According to the recommendations, stock of special tools and tackles shall be maintained for Modules, PCU's, switchgears and other major electrical equipment.
- e) A maintenance record is to be maintained by the operator/engineer-in-charge to record the regular maintenance work carried out as well as any breakdown maintenance along with the date of maintenance reasons for the breakdown's steps have taken to attend the breakdown duration of the breakdown etc.
- f) The Schedules will be drawn such that some of the jobs other than breakdown, which may require comparatively long stoppage of the Power Plant, shall be carried out preferably during the non-sunny days or during non-solar hours of day. An information shall be provided to Engineer-incharge for such operation prior to start.
- g) The Contractor will attend to any breakdown jobs immediately for repair/replacement /adjustments and complete at the earliest working round the clock. During breakdowns (not attributable to normal wear and tear) at O&M period, the Contractor shall immediately report the accidents, if any, to the Engineer In-charge showing the circumstances under which it happened and the extent of damage and or injury caused.
- h) If negligence / mal operation of the contractor's operator results in failure of equipment such equipment should be repaired /replaced by contractor at free of cost.
- i) If any jobs covered in O&M Scope as per O&M Plan are not carried out by the

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contractor during the O&M period, the Engineer-In-Charge can issue a notice to the Contractor. Repetition of such instances may lead to the Termination of the O&M Contract by the Employer.

- j) Arrangement of enough service and drinking water for resource deployed at power plant.
- k) Maintenance of Batteries, water level top-up and maintaining the maintenance records. Supply of DM water for top-up level in batteries in the contractor's scope.
- l) Outdoor/indoor lighting fixtures maintenance, Distribution board, control room switches, power outlets, including panels, cables, and fans etc., including all consumable required. (List of consumables will be given by SECI).
- m) Repair, Maintenance of peripheral lights / road lights (40 Watt / 100 Watt LED) installed within the plant premises including replacement of damaged lights.(approx. 60 nos.) including DM water top up. The replacement of faulty battery and lighting fixtures is in SECI's scope.
- n) On the event of finding /noticing any inaccuracy in the metering system, the contractor shall arrange for a joint inspection, testing by DISCOM/SLDC or any other DISCOM/SLDC authorised agency within 24 hours with intimation to the Employer. It shall be followed up by its rectification /replacement as required. All the expenses occurred in the rectification /replacement in this regard shall be in the SECI's account.
- o) Necessary intervention to SLDC & QCA shall be provided.

p) **Painting & Finish**

- 1) All metal surfaces and support structures shall be thoroughly cleaned of rust, scale, oil, grease, dirt etc. painted with epoxy based paint as per existing paint shade.
- 2) White washing and colour washing work shall conform to relevant IS codes. The right of selection of colour/ shades shall lie with the Employer. Contractor as to follow respective and relevant IS codes of practice for the finishing process.
 - Internal walls: Acrylic distempering
 - External walls: Heat reflective synthetic enamel
 - MMS foundations and Earth pit enclosures: Cement painting
 - Steel/ Al doors, windows and ventilators, rolling shutters: Powder coated paint
- q) Maintenance of Water Tank, Maintenance of drainage system, rain water harvesting

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system etc.,

- r) Sowing new plants, maintaining existing plants at site.
- s) Vegetation removal - Herbicide / Grass Cutters/Bushes removal as required to avoid generation loss
- t) Civil works - Maintain roads (plant premise), drains, lighting, LCR Rooms for Minor repairs etc.
- u) Oil filtration of Transformer shall be as per the BDV reading /done yearly basis and accordingly the oil filtration as necessary shall be carried out.

d) PF & ESIC

- a) The contractor shall at his own expense provide all amenities to his workmen as per applicable laws and rules. ESI policy, EPF account shall be in the name of employees deployed by the contractors at site. The contractor shall submit a copy of insurance policy for group insurance / insurance for its employees and insurance for its material & equipment along with every RA bill.
- b) The contractor shall submit the required PF and ESIC details statement with challan copy of their employees posted for the duty with every RA bill.
- c) Contractor shall maintain the monthly wage sheet and submit along with RA bill. The wage sheet proforma is as given below:

Name of engaged employee	PF no.	ESIC no.	Minimum wage monthly salary	PF deduction by Employee	PF deduction by Employer	Total	Deduction if any	Net Salary

- d) Contractor shall ensure payment of minimum wages to the entire employees engaged by him as per the Labour Act. Contractor must give / ensure weekly rest to their technicians, Overtime & Bonus as per Labour Act.
- e) Contractor shall carry out Police verification of engaged employee and submit the SECI. No deduction shall be made from the engaged employees salary for the same.
- f) The contractor must submit the medical test certificates of all deployed employees (once in year) issued by registered MBBS doctor at his own cost. No deduction shall be made from the engaged employees' salary for the same.
- g) Contractor shall take undertaking from his engaged employees for no claim for regular

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job in SECI.

- h) Contractor shall furnish an indemnity Bond for SECI to protect against any legal case filed by his employee.
- i) After awarding the contract; following documents is to be submitted by the contractor to SECI
 - a. Accepted copy of work order
 - b. Agreement copy against the work order
 - c. PF registration of contractor
 - d. Electrical "A" class contractor license certificate copy
 - e. ESIC certification copy
 - f. All other documents such as qualification records of the employees engaged by him, police verification records, Medical check-up certificates etc.

e) Quality Spares & Consumables / Mandatory spares

- a) During the comprehensive O&M period, the contractor shall at his cost maintain the spares for minimising system outage due to time required in getting replacements of defective part(s) of equipment from the manufacturer. The contractor has to use the mandatory spare(s) available at site for replacing defective part(s) of equipment for minimising system outage temporarily and top up the quantity of spares so that the required quantity of spares shall be made available at site at all the times and same shall be handed over to the Employer at the end of O&M period.
- b) Contractor shall supply the Mandatory spares as per the list provided at **Annexure 01** of the tender document. The mandatory spares are being procured for minimising system outage due to time required in getting replacements of defective part of equipment from the manufacturer. The contractor may use the mandatory spare available at site for replacing defective part of equipment for minimising system outage temporarily and top-up the quantity of mandatory spares so that the required quantity of mandatory spares as mentioned in Schedule of Rates (SOR) shall be made available at site at all the times.
- c) Contractor shall handover the list of Mandatory Spares (which are duly tagged and stored) and along with all the mandatory spares (**Annexure 01**) to the Employer at the time of completion of O&M contract of the project.
- d) If contractor shall not be able to maintain the required quantity of mandatory spares as mentioned in Schedule of Rates (SOR) at site while handing over the plant to the owner, then owner shall be entitled to deduct the cost of respective mandatory spare

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from the O&M charges.

- e) Contractor shall submit the reconciliation of inventory of spares in monthly performance reports.

f) Testing Equipment, Tools and Tackles

- a) The Contractor shall arrange for all the necessary testing equipment, tools and tackles for carrying out all the construction, operation and maintenance work covered under this contract.
- b) Following equipment already available at site which can be used by the contractor during the period of contract:

Sl. no.	Name of the Equipment	Make	Quantity
1	Thermal Imager	Fluke	01 No.
2	Digital Multi-meter	Fluke	01 No.
3	Earth Resistance Tester	Metravi	01 No.
4	Clamp meter	Metravi	01 No.
5	Inverter Testing Kit	Fluke	01 No.

g) Security Services

- a) Contractor shall provide for the watch and ward of the Plant at all times during the Term. The watch and ward deployment plan shall take care of comprehensive Project level security and the Contractor shall take necessary steps to prevent sabotage, theft, vandalism and malicious damage of the assets comprising the Plant, and shall also coordinate and liaison with law enforcement authorities. The Contractor shall take all possible measures to keep the plant operational and secure.
- b) The contractor shall arrange the security system including deputation of security personnel at his own cost for the vigil to be maintained at the Solar Power Plant site. The security staff may be organized to work on suitable shift system; proper checking & recording of all incoming & outgoing materials vehicles shall be maintained. Any occurrence of unlawful activities shall be informed to SECI immediately. A monthly report shall be sent to SECI on the security aspects.
- c) Contractor may deploy armed security guards holding valid weapon licence.

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- d) It shall be the sole responsibility of the contractor to verify the background of security agencies, including their personnel details, police verifications etc deployed by them. The contractor shall furnish to the Owner copies of relevant documents, including a copy of the police verification report, to substantiate the background check process undertaken.

h) Safety

- a) The Contractor shall develop and implement plans and procedures including those for firefighting, maintenance planning, procuring and inventory control of stores and spares, plan to meet emergencies (Emergency preparedness plans), plant safety and security; and such other facilities and systems as may be necessary to commence Contractor's ongoing responsibilities. Regular Emergency Preparedness exercises and drills shall be conducted at site together with the Owner's personnel.
- b) The Contractor shall conform to standard industry practices for Health, Safety and Environmental (HSE);
- c) The Contractor shall be responsible for maintaining all safety measures at the site to avoid accidents to his or his sub-contractor or SECI's Workmen. **SECI's EHS plan is attached for implementation.**
- d) All representatives of the contractor shall strictly adhere to the Applicable Laws and the Health, Safety and Environmental (HSE) practices of the Employer as provided in the Reference Documents;
- e) Contractor shall be responsible to comply with all applicable National and International Standards as well as local statutory provisions related to Environmental Protection Regulations, Health and Safety requirement.
- f) Contractor will ensure that O&M is being carried out by a licensed Electrician/Supervisor. A test certificate is to be produced to the ENGINEER-IN-CHARGE for his approval.
- g) Contractor shall submit an Emergency Preparedness plan of the site and shall maintain the Fire Fighting Systems of the plant
- h) It shall be the responsibility of the contractor to keep, restore, or improve every facility of the buildings, Materials (Office infrastructure such as Computer, Printer, AC, exhaust fan etc, Peripheral lights) including Housekeeping and cleaning of office, storage and all buildings.

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- i) HSE Training for on-site personnel - Ensure presence and adherence to the health and safety standards to ensure minimal accidents.

i) Qualified Coordinating Agency (QCA)

- a) Rajasthan State Load Despatch Centre (SLDC) has nominated a Qualified Coordinating Agency (QCA) at the Pooling Substation Level for operating the Deviation Settlement mechanism (In accordance with the Deviation Settlement Mechanism Regulations, as applicable) at the Pooling station level (220KV GSS Badi Sid). The Contractor shall be responsible for carrying out the forecasting and scheduling of the energy generation from the plant facility and coordinating with the QCA for incorporating the same in the generation schedule of the GSS prepared by the QCA. Scheduling given by the Contractor shall be such that no penalty is levied on the Employer due to any deviation of actual generation from scheduling beyond the allowed limit. If any penalty is imposed on the Employer due to such deviations beyond allowed limit the same shall be passed on to the Contractor and the recovery of the same will be done from the O&M Price payable to the Contractor.
- b) QCA shall coordinate with SLDC, Contractor shall submit a quarterly reconciliation report regarding the DSM, energy scheduling and forecasting to SECI. This report shall be certified by the QCA.
- c) Necessary intervention to SLDC & QCA shall be provided

j) Manpower

The Contractor shall deploy enough manpower at Solar Photovoltaic Power Plant site to carryout work instructions and preventive maintenance schedules as specified. The contractor shall keep the following manpower at site to supervise the jobs that are being carried out at site. The undermentioned manpower shall be available at site at given time of day.

Sl. No.	Designation	Qualifications	Nos.
1.	Plant O&M Engineer	Bachelor's in Electrical engineering with 5 years / Diploma in Electrical engineering with 7 years of experience in executing O&M services for MW scale Solar PV power plants.	01

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2	Plant Operator	Bachelor's in Electrical engineering with 2 years / Diploma in Electrical engineering with 5 years of experience in executing O&M services for MW scale Solar PV power plants.	01
3	Technician	Diploma in Electrical engineering with 2 years / ITI with 5 years of experience in Solar Plant O&M	02
4	Security staff (including one Gunman) (all through the day)		10
5	Office Boy		01
6	Labour		As per requirement

k) Record Keeping:

- The Contractor shall maintain all accounting records regarding the facility in accordance with the generally acceptable accounting principles under the Laws of India.
- The Contractor shall keep the measured daily data at regular interval and provide the same to Employer in electronic form compatible in CSV format. The right to use the data shall remain with Employer.
- The Contractor shall maintain accurate and up-to-date operating logs, records and monthly reports regarding operation and maintenance of the Plant facility which shall include details of power output, other operating data, repairs performed and status of equipment. All such records to be maintained for a minimum of 60 (sixty) months after the creation of such record or data and for any additional length of time required by regulatory agencies with jurisdiction over the Parties. Upon expiry of term, the Contractor shall hand over all such records to Employer. However, Employer shall have access to all such records at any time.

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I) SCADA & WMS

O&M of SCADA and Weather Monitoring System. **The contractor shall be responsible for carrying out routine, preventive and breakdown maintenance of SCADA & WMS installed at the project site. It will include following:**

- a) Daily cleaning of all the Pyranometers installed at site.
- b) Each LCR is having one SCADA Panel and at MCR, main server & data logger is available for remote monitoring. WMS system is installed near to MCR.
- c) Carrying out SCADA & WMS O&M and coordinate with OEMs for AMC and as per the operational requirements
- d) The Contractor shall co-ordinate with SCADA OEM to implement software updates to control and monitoring systems including SCADA to meet the plant facility operating requirement in consonance with the grid operations and in compliance with the grid codes as applicable during the operation.
- e) The Contractor shall provide all administrative rights/privileges/passwords of the SCADA system to the Employer.

m) Data Access

- a) Contractor shall provide access to the Employer to all data for the Plant Facility from the SCADA system.
- b) Contractor shall at all times allow and provide Employer all necessary information for the operation of SCADA system (with no notification or approval of access being required unless specifically and otherwise agreed to by the Parties) full, free, unconditional, safe and complete access to the SCADA system. Contractor shall monitor and operate the Plant in accordance with the contract and shall ensure smooth operation of the plant.

n) Coordination:

- a) The Contractor shall be responsible for liaisoning with statutory authorities-and local authorities in order to ensure smooth operation of the Power Plant.
- b) The Contractor shall co-ordinate with all OEMs related to plant's infrastructure for rectification of defects, if any, and to meet the plant facility operating requirement in consonance with the grid operations and in compliance with the grid codes as

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- applicable during the operation.
- c) Duly and timely provide the Employer (or parties designated by the Employer) with all notifications required under the Contract.
 - d) Contractor shall Coordinate with **<concerned SLDC>** and other related entities/departments as required for proper operation of the Plant Facilities.
 - e) Contractor shall take appropriate approval from Employer before dismantling of any part of plant or any such work is carried out that may affect the plant facility. Also coordinate with SECI, SLDC, other relevant agencies for monthly Joint Meter Readings, meter testing, and any other requirements such as any audit or inspection by the government agencies or authorities, financiers, any designated third-party agency etc. for the Project operations.
 - f) Contractor will be responsible for coordinating with the OEMs for securing warrantee conditions and services from OEMs and provide status to the employer as per the warrantee of each equipment,
 - g) Arrangement of vehicle for conveyance of resources / manpower, material, and equipment shall be in the scope of contractor. SECI shall not provide any accommodation /Transportation for the employees of vendor. Everything has to be arranged by the contractor for his employees.

o) Statutory & legal Compliances

- a) The Contractor shall comply with the provision of all relevant acts of Central or State Governments including payment of Wages Act 1936, Minimum Wages Act 1948, Employer's Liability Act 1938, Workmen's Compensation Act 1923, Industrial Dispute Act 1947, Maturity Benefit Act 1961, Mines Act 1952, Employees State Insurance Act 1948, Contract Labour (Regulations & Abolishment) Act 1970, Electricity Act 2003, Grid Code, Metering Code, MNRE guidelines or any modification thereof or any other law relating whereto and rules made there under from time to time.
- b) Water requirement for module cleaning arrangement and the cost for the same shall be borne by Contractor. The Contractor shall arrange for water on it's own, by ensuring ESIA norms relevant government norms of Rajasthan for the use of water.
- c) Contractor shall be responsible to comply with all applicable National and

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International Standards as well as local statutory provisions related to Environmental Protection Regulations, Health and Safety requirement as notified by Govt. of India.

- d) Availing Insurance for contractor's man, material, equipment etc., shall be the sole responsibility of the Contractor.
- e) All other statutory approvals such as CEIG inspection as per CEA/State rules & regulations etc. and permissions not mentioned specifically but are required to carry out hassle free operation of the plant. Statutory fee for inspection shall be paid by SECI.
- f) Compliance of regular Audit observation.
- g) Strictly follow up of safety regulations including supply of PPE and Safety equipment's and maintaining the records.
- h) Strictly follow up of COVID-19 protocols as issued by the Government of India on time to time.
- i) Compliance to all labors laws including to 3rd Party contractor employees like Security guards, Workers, Laborers etc.

p) AMC of the Equipment:

(a) Warranty Management and Support

The Contractor shall arrange to obtain maintenance support from the OEMs of the major equipment to ensure their availability and maintenance throughout the period during which the Contractor shall be responsible for O&M of the plant. The support from the OEM shall include but not be limited to annual maintenance, service and repair support contracts. The Contract shall ensure that the maintenance support procured by him from the OEMs shall be adequate to meet the requirements of the scope of the work (like availability, generation, CUF, etc).

To facilitate provision of the services, the Contractor shall ensure:

- i. labor for removal and replacement of hardware and equipment, as well as labor for preparing any defective hardware and equipment that needs to be shipped back to an OEM
- ii. timely notification to the warranty provider of all such warranty claims pursuant to the terms of such Project Hardware Warranties and BOS Warranty;

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- iii. providing reasonable information to such warranty provider relating to the nature of such warranty claim;
 - iv. providing notice to Employer of such claim and requesting Employer support when necessary; provided that the foregoing shall not limit O&M Contractor's obligation to perform any maintenance required with respect to any of the Covered Equipment;
- (b) Contractor shall enter into AMC contract with the OEM for the following items to cover requirements of maintenance and repairs.
- 1) Inverters
 - 2) Inverter transformers
 - 3) 33KV circuit breaker
 - 4) 33KV instrument transformers (all CTs and VTs)
 - 5) All types of meters and relays installed at 33KV level
 - 6) SCADA
 - 7) Transformers
 - 8) Any other equipment as per plant requirement

The Employer shall maintain spares of major components. Spare stock of MCBs, MCCBs, fuses, lamps, indication lamps, indicating meters, terminals, wires, etc shall be maintained by the O&M Contractor as per requirement.

q) Maintenance schedule

The Contractor shall follow the following preventive maintenance schedule as a minimum requirement. If required, additional maintenance activities other than the schedule will be proposed by the Contractor.

SI No	Equipment	PM Frequency			
		Monthly	Quarterly	Half yearly	Yearly
1	SCB	X			
2	Illumination	X			
3	Fire Fighting	X			

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4	Earth pit	X			
5	CCTV		X		
6	SCADA	X			
7	SPV Module		X		
8	Inverter		X		
9	Isolator			X	
10	LT Panel			X	
11	HT Panel			X	
12	Transformer	X			
13	Transformer			X	
14	Auxiliary Transformer			X	
15	CT/PT				X
16	Transmission line		X		
17	WMS		X		
18	VCB			X	
19	UPS		X		
20	Plant Road & Boundary including Service Road			X	
21	Mechanical Maintenance of the plant			X	
22	Lighting Arrestor			X	
23	All Building				X

The contractor shall maintain the complete documentation of the maintenance activities performed. The Employer shall provide to the Contractor a set of the standard maintenance procedures and check lists for the use by the Contractor. To encourage best practices, the Contractor can improvise upon the same with consent of the Employer.

r) Calibration

- (a) Contractor shall carryout the timely Calibration of all the required equipment, tools, meters etc.
- (b) The calibration and all the required testing must be done through a NABL certified /accredited labs of India. The contractor shall submit the calibration certificate of the reference equipment and calibrating equipment / tools as the case may be with the employer immediately after performing the calibration.
- (c) An indicative list of equipment and tools for calibration is given hereunder:

Sl. No.	Equipment Name	Make	Frequency	Remark's	QTY.
Testing Equipment / Tools					
1	Power logger	Fluke	2 years	Kept at Plant site	1
2	Clamp meter	Metravi			1
3	Megger	WACO			1
4	ERT Digital	WACO			1
5	ERT	Metravi			1
6	Multi Meter	Fluke			1
7	Functional Generator	Metravi			1
8	Infrared thermometer	E-TECH			1
9	BDV tester				1
Energy Meters					
10	Main meter (02814247)	Elester	Annual	At 220 kV GSS Badi sid	1
11	Check meter (02814236)	Elester		At 220 Kv GSS Badi sid	1

12	Main meter (02814245)	Elester		At Switch Yard	1
13	Check meter (02814246)	Elester		At Switch Yard	1
14	CT	Gawde		at metering yard	6
15	PT	Gawde		at metering yard	6
16	MFM	SECURE		MCR	3
17	Protective Relay Testing				All

- s) Any other equipment not included in the list but required calibration for the uninterrupted operation of the site shall be carried out O&M Contractor. The calibration shall be done before completion of the due date of the same. Any delay in the calibration from its due date will constraint employer to hold the 2% of the quarterly payment per equipment for a period till the submission of calibration certificate to the employer.
- (d) Annual testing of Transformer oil BDV and water content and DGA by NABL accredited agency. Transformer oil level top up and oil filtration work will be in the scope of the contractor.
- (e) Annual and as per requirement testing of Air Circuit Breaker (ACB) & Vacuum Circuit Breaker (VCB) by OEM representatives.
- (f) Half yearly testing of Drinking water Quality provided at site.

t) Reports and Other Deliverables:

The O&M Contractor shall be required to submit to SECI following Reports and deliverables. The Formats shall be finalized with SECI at the time of signing of Contract.

S. No.	Reports	Periodicity
1.	Breakdown/Troubleshoot/Downtime Report	Daily / Monthly
2.	Failure Analysis/history/trouble shooting details of all the Equipment	Daily / Monthly
3.	RCA Report	Within 3 weeks of Breakdown Event
4.	Generation Report	Daily
5.	Spares Consumption and Inventory Report	Daily / Monthly

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S. No.	Reports	Periodicity
6.	PV Modules Cleaning Schedules (Scheduled and Actual)	Daily / Monthly
7.	PV Modules Thermal Imaging Report	Half Yearly
8.	Preventive Maintenance Schedules (Actuals)	Monthly
9.	Grid Interruptions Report	Monthly
10.	Vegetation Cleaning Report (to clear Shading Objects)	Monthly
11.	Preventive Maintenance Schedule for ensuing Month	Daily / Monthly
12.	DSM report	Daily / Monthly
13.	DSM reconciliation statement	Quarterly

ANNEXURE 1: LIST OF MANDATORY SPARES REQUIRED AT SITE

Sl. No.	Material description	Qty. required
1	Central Inverter	
	Fuse	10 Nos of each rating & type
	Blocker diode	2 Nos.
	Optical fibre cable (meter)	9 Nos (1 meter each)
2	HT switch gear	
	All type of rotary switch	1 set
	MCB/MCCB each type	1 set
3	DC System components	
	MCCBs/MCB/AC & DC Fuses	1% of total population of minimum 1 No for each type
	MC4 connectors	5% of total population
	Module bypass diode	1% of total population
4	Transformer	
	WTI with contacts	1 set
	OTI with contacts	1 set
	Buchholz relay complete	1 set
	Magnetic oil gauge	1 set
	HV/LV bushing with metal parts and gasket for Transformer	2 set
	Ethernet switch	

Already in stock

Sl. No.	Description	Detail of Equipment/item	Quantity in stock
1	Current transformer	TRAFO.	1
2	Potential transformer	TRAFO.	1
3	Pressure Booster pump	PUMP	1

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4	Mersen Fuse 63A AC	FUSE	6
5	Mersen Fuse 20 A 690V	FUSE	6
6	Mersen Fuse 690v. 1000A	FUSE	2
7	DC SPD DC SEC.OF ABB-INV	SPD.	1
8	DC Contactor ABB	Contactor	1
9	Power Supply mini 240 AC	P. SUPPLY	1
10	Power supply 24/10v	P. SUPPLY	1
11	Optical fibre cable for inverter in mtr	CABLE	1
12	String Cable 6sq.mm in mtr	CABLE	600Meter

ANNEXURE -2 : Power Plant Performance & Guaranteed Generation

Capacity Utilization Factor shall be calculated as per the following formula:

$$CUF = Eac / (8760 \times Pac \times [1 - DF (N-1)])$$

Where,

Eac = is the number of units recorded in the ABT meter located at plant facilities after excluding auxiliary consumption, kWh

8760 = refers to the number of hours in non-leap year. It shall be replaced by 8784 hours during leap year.

Pac = is the plant AC capacity

DF = is module degradation factor, 0.75% per year

N = is the number of years of operation after operational acceptance of the Plant

Plant operation acceptance was issued on 31/03/2018.

Plant Performance :

Sl. No.	Year	Plant Generation (MU)	CUF on AC capacity
1	2016-17	18.9	21.58%
2	2017-18	19.4	22.15%
3	2018-19	18.5	21.12%
4	2019-20	18.7	21.35%
5	2020-21	19.1	21.80%
6	2021-22	18.87	21.54%
7	2022-23	On going	

Guaranteed Generation:

Sl. No.	Year	Guaranteed Plant Generation
1	2023-24	21%
2	2024-25	21%
3	2025-26	21%
4	2026-27	21%

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5	2027-28	21%
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Employer's Responsibility

1. The Employer shall provide the complete set of Plant documentation, Drawings, GTPs, Warranty Certificates to the Contractor.

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Draft scope: Insurance Policy for 10 MW (AC) SPV plant at Badi Sid Rajasthan

Industrial All Risk (IAR)

Inbuilt Covers	Coverage	Sum Insured	
1. Earthquake (Fire and Shock) 2. Storm Tempest Flood Inundation 3. Forest/Jungle Fire 4. Fire & Explosion 5. Burglary 6. Theft 7. Collapse 8. Material Damage / Machinery Breakdown (MB)	Covered (As per the provision of IAR policy notified by IRDA)	SFSP: Rs. 32 Crore MB: Rs. 30 Crore	
Additions, Alternations, Extensions			
Temporary removal of stock			
Cover for specific contents			
Start-up Expenses			
Riot strike malicious damage			
Professional Fees			
Cost for removal of debris (including foreign / external)			
Architects, surveyors and consulting engineer's fees			
Cost compelled by Municipal Regulations			
Waiver of Underinsurance			
Business Interruption			
Business Interruption		Covered	FLOP: Rs. 13.3 Crore MLOP Rs. 13.3 Crore
Third Party Liability	Covered	Rs: 1 Crore	