

NAME OF WORK : "Operations and Maintenance of 1.5MWp Solar Power Plant BHEL RC Puram:

**SCOPE OF WORK**

1.1	<p><b>O&amp;M personnel</b></p> <p>1. Vendor shall deploy following minimum personnel:</p> <p>(a) Technical / administrative / office personnel</p> <p>(i) At least Two working level staff with ITI / diploma level qualifications in engineering with competence for operating electrical / electronics / mechanical equipment, taking measurements, data logging / maintaining registers, preparation of reports in computer.</p> <p>(ii) At least Two unskilled persons for regular house-keeping (cleaning / mopping etc) and water cleaning of SPV modules.</p> <p><b>Note:</b> At least one among the technical personnel shall essentially be a certified / licensed person for HT operations (33 KV minimum).</p> <p>2. Vendor shall provide separately identifiable uniforms for the respective office staff.</p> <p>3. Similarly, O&amp;M personnel shall be provided with raincoats, toolsets, earthing rods, safety gloves, safety goggles, gumboots, helmets and all other personal protective equipment (PPE) that will be relevant to ensure human safety.</p> <p>4. Names, qualification, work responsibility of personnel shall be listed on a display board within control room.</p> <p>5. Attendance register shall be maintained for both the teams.</p> <p>6. Vendor shall ensure statutory requirements such as ESI, PF and labour license for their O&amp;M personnel posted at site.</p> <p>7. BHEL shall have right to disallow any O&amp;M employee, if found unfit to perform. BHEL instructions issued in writing shall be binding on vendor who shall replace the person.</p> <p>8. O&amp;M personnel at site shall conform to general regulations in force at site and to any special instructions from BHEL's customer.</p> <p>9. O&amp;M personnel at site shall be deemed to be aware of damages and risks incidental to conditions of plant location and works from time to time and BHEL shall not be responsible for any injury to personnel arising there from.</p> <p>10. Training to O&amp;M personnel It is the absolute responsibility of vendor to ensure imparting of necessary training to their O&amp;M personnel to get them acquainted with the operations of various electrical and mechanical equipment of the power plant. For this purpose, vendor shall identify the O&amp;M personnel well in advance and involve them during installation and commissioning stages so that they become well versed with various functional aspects of the power plant.</p> <p>11. Availability of O&amp;M personnel at power plant</p> <p>(a) Vendor shall ensure that operating staff are present in the power plant during plant operation (6:00 AM – 6:30 PM) every day.</p>	
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	<p>(b) Vendor shall ensure that operating staffs are present at the power plant even on festivals, public holidays and any other unique occasions so that the plant is run under competent supervision on all days.</p> <p>O&amp;M personnel shall, strictly, not use any part of the power plant for their personal / residential purposes. Their presence at the plant shall, strictly, be meant only for the purpose of operation and maintenance of plant.</p>	
1.2	<p>O&amp;M operations – daily basis</p> <ol style="list-style-type: none"> <li>(1) Water cleaning of SPV modules</li> <li>(2) Control room cleaning – dry sweeping, wet mopping</li> <li>(3) Cleaning of toilets, urinals</li> <li>(4) Gardening of landscaping areas: watering of plants, trimming of plants as applicable and necessary.</li> <li>(5) Logging of DC, AC, grid parameters (current, voltage, power, energy) at PCUs &amp; HT panels, transformer temperatures, equipment tripping/ breakdown, grid outage etc as per BHEL formats.</li> <li>(6) SCADA data station / PC operations for daily monitoring of weather parameters, trend graphs and urgent reporting to BHEL in case of any problems / anomalies observed with any of the parameters.</li> <li>(7) Reporting the energy generation data to BHEL.</li> </ol>	
1.3	<p>O&amp;M activities – weekly basis</p> <ol style="list-style-type: none"> <li>(1) Removal of garbage from solar array field, switchyard, roads, drains, pathways, sand buckets; Cutting of the grass/shrubs falling on the PV modules in the PV array; logging in registers with signatures of operating persons and in-charge.</li> <li>(2) Monitoring and logging of fire extinguisher levels / pressures as per BHEL formats</li> </ol>	
1.4	<p>O&amp;M activities – monthly basis</p> <ol style="list-style-type: none"> <li>(1) Inspection of fire extinguishers (weight, pressure indication, physical status etc) followed by refilling actions, if necessary, based on indications. Report to be submitted as per BHEL approved recording formats.</li> <li>(2) Earthing resistance measurements for solar array structures, control room equipment, switchyard equipment, lightning arrestors (ESE): measured values shall be recorded in registers and reported to BHEL as per BHEL approved recording formats.</li> <li>(3) Submission of values / status of plant parameters and events for the corresponding month, as below, as per BHEL approved formats: <ol style="list-style-type: none"> <li>a. Daily values of solar array strings (SMB parameters)</li> <li>b. Daily values of weather parameters (solar energy, wind speed, ambient temperature)</li> <li>c. Daily energy generation</li> <li>d. Events (with date, time) of faults / tripping / breakdown of equipment</li> <li>e. Events (with date, time) of grid outage</li> <li>f. Events (with date, time) of equipment damages, accidents and thefts</li> <li>g. Activities of module cleaning</li> </ol> </li> <li>(4) Monthly reports shall be submitted to BHEL for all the above data.</li> <li>(5) Energy generation / meter reading report to be prepared and submitted to the concerned department (STATE ELECTRICITY SUPPLY &amp; TRANSMISSION BOARDS etc).</li> </ol>	

1.5	<p><b>O&amp;M activities - quarterly basis</b></p> <p>(1) Cleaning of PCUs, transformers, HT panels, battery chargers etc. to remove accumulated dust.</p> <p>(2) Monitoring and status review, followed by rectification / calibration / replenishment / replacement actions as necessary and applicable for following:</p> <ul style="list-style-type: none"> <li>(a) Spare items of all electrical equipment</li> <li>(b) First aid box items - medicines and accessories</li> <li>(c) Safety gadgets</li> <li>(d) Tool kits and measuring instruments</li> <li>(e) Yard lights</li> <li>(f) Pumps, starters</li> <li>(g) Control room appliances: air conditioners, lights, fans, exhaust fans, switch boards etc</li> </ul> <p>(3) Pest control for control room (rats, snakes etc) – sprays, chemicals, medicines etc to be applied wherever required.</p> <p>(4) Submission of quarterly report on above activities to BHEL.</p>	
1.6	<p>O&amp;M activities – half yearly basis</p> <p>(1) Cleaning of water storage tanks</p>	
1.7	<p>O&amp;M activities – yearly basis</p> <p>(1) BDV measurements for oil samples from all the transformers and submission of report to BHEL.</p> <p>(2) Filtration of oil to be arranged, if required, based on BDV measurement report.</p> <p>(3) Lubrication of moving contacts (VCBs, GOS switches, Earth switches etc) with appropriate grease etc</p> <p>(4) Cleaning of sewerage lines, septic tanks (if found necessary)</p> <p>(5) Painting of main gate, switchyard gate / fencing, earthing chambers, other steel structures within control room and switchyard, as intimated by BHEL based on conditions of rusting etc.</p> <p>(6) Checking tightness of hardware in solar array structures and tightening wherever required.</p> <p>(7) Checking tightness of power cable terminations in SPV modules (MC4), SMBs, electrical panels of control room and switchyard</p>	
1.8	<p><b>O&amp;M activities - as and when required (contextual basis)</b></p> <p>(1) Monitoring and operation of plant electrical equipment as and when required:</p> <ul style="list-style-type: none"> <li>(a) 33 KV GOS Air break switches (with / without earth switch)</li> <li>(b) VCB on/off: local operations from outdoor HT panel and remote operations from indoor remote annunciation(SCADA) panel</li> <li>(c) Settings of numerical relays in HT panels: review and revision in consultation with BHEL.</li> <li>(d) ACB and MCCB on/off operations on LT side</li> <li>(e) PCU operations: emergency close, LCD displays (selection of settings, monitoring the DC/AC/event/fault status parameters), operation of duct fans</li> <li>(f) Battery and battery charger operations</li> <li>(g) Bore well pump operations to fill the overhead tanks</li> </ul>	

	<p>(2) Coordinating, on behalf of BHEL, and obtaining renewal of statutory licenses, clearances and approvals from state departments such as State Electricity Supply &amp; Transmission Boards/CEIG/etc.</p> <p>(3) Repair and replacement of vendor supplied items, by vendor, with urgent action plans and implementation, when the items are found non-working / damaged. The same shall be reported to BHEL within 12 hours from time of observation.</p> <p>(4) Reporting, on an immediate basis (within max 2 hours) of functional problems / damages in BHEL supplied items to facilitate repair / replacement by BHEL. Further, vendor shall correspond / coordinate with respective equipment vendors / service centers, on behalf of BHEL, for getting the service engineers to the site. Later, coordinating with the service engineers during their visit to site, and assisting them in the trouble shooting process until the problem is resolved. Vendor shall report to BHEL (within max 2 hours) immediately after the problem is resolved.</p> <p>(5) Vendor shall keep updating the spares inventory at the site every time there is consumption of spare items towards replacement. In case of shortage of spares, the same shall be reported on an urgent basis (with max 2 hours) to BHEL.</p> <p>(6) Coordinating with sub-station upon grid failures, line problems etc and implementing the needful steps to restore the plant to normal operation.</p> <p>(7) The electrical charges for the auxiliary consumption and broadband telephone charges, if any, of the SPV plant during the entire period will be in scope of the vendor</p> <p>(8) Theft incidents: immediate reporting to BHEL, filing FIRs with police stations on behalf of BHEL, coordination for site inspection by insurance companies and clearance of insurance claims, logging of events (date, time) and maintaining records.</p> <p>(9) Accidents: immediate reporting to BHEL, coordinating with hospitals, logging of events (data, time) and maintaining records.</p>	
1.9	<p><b>Penalty</b> This is in addition to the standard Penalty clause.</p> <p>(1) Daily activity report to be submitted by 9 AM the next day. Daily activity are listed in the scope and are carried out on working days (sundays and holidays excluded) In case of non carrying out operation on any working day will be treated as non performance of the daily activity. A penalty of 2% will be levied for every non performance in the monthly bill. The penalty is pro rata basis and proportional to the non operation i.e. if in a month there are 4 non operation a penalty of 8% will be levied.</p> <p>(2) weekly activity to be conducted and reported on every monday, In case the weekly activity are not completed by Wednesday of the week it will be treated as non performnace and a penalty of 5% will be levied for every non performance.</p> <p>(3) Monthly activity to be conducted and reported on the 1st of the month. In case the monthly operation are not conducted by 15th of the month it will be treated as non performance and a penalty of 15% will be levied on the monthly bill.If the quarterly acticity, Halfyealy activity and Full year Activity are not performed then the Security Deposit will not be released.</p>	