Operations & Maintenance Plan, Shepaug Solar

Shepaug LLC
2225 River Road, Southbury Connecticut

	Service Area/Item Description	Frequency
1	**Environmental, Health and Safety (EHS)**	
1.1	Ensure that all regulatory required policies/procedures/plans are written, certified when applicable, and maintained for the Site as required. This includes, but is not limited to, spill prevention, control, and countermeasure ("SPCC") plans, emergency response plans, fall prevention plans, personal protective equipment ("PPE") policies, fire prevention plans, electrical safety policies, hot work procedures, hazard communication procedures, first aid/CPR/blood borne pathogens etc. Plans that are required to be in place for site operation, such as an SPCC plan, and not for Operator's employees and Subcontractors to perform work, will be performed as an Additional Service if the plans are not available. Updates or revision to policies in order to conform to current regulatory requirements shall not be considered an Additional Service.	Ongoing
1.2	Operator shall maintain and submit all health and safety reports as required from the Operator as it pertains to the asset(s) for which Operator provides Services. Operator will provide information to the Customer or generate reports or forms, as may be required by Customer, in compliance with Customer's procedures and processes for fulfilling health, safety and environmental reporting requirements set forth by Applicable Law and applicable to the operation and ownership of the Project. This includes, but is not limited to, waste reporting, hazardous materials business reports (HMBPs), spill reports, and state and federal injury reporting (OSHA, BLS, state specific). Reporting requirements that will either require third-party specialized experts or would lead Operator to incur material out-of-pocket expenses will be performed by Operator and billed to Customer as an Additional Service. Operator shall notify Customer of any new regulatory or environmental reporting/filing requirements of which it becomes aware pursuant in relevant section of final Agreement.	Ongoing
1.3	Inspect and replace as necessary signs and labels in accordance with regulatory requirements. This includes, but is not limited to emergency exit signs, chemical storage labels, traffic control signage, electrical safety signage & labels. For clarification, Customer to pay for cost of signs while labor to inspect and replace will be provided by Operator as part of the Service Fee (labor limited to 1 man-hour).	Ongoing

	Service Area/Item Description	Frequency
1.4	Ensure that arc flash risk assessments are performed in accordance with NFPA 70E and available for all on-site electrical equipment. Ensure that compliance with NFPA 70E and 29 CFR 1910.269 is maintained throughout the Term.	As required
1.5	Allow Customer or Customer's representative to access Site and site personnel to perform EHS auditing on a periodic basis. Customer and/or its representative shall follow the Project's safety procedures, including use of appropriate PPE.	Ongoing
1.6	Ensure compliance with incident reporting expectations identified in this reporting matrix and agreed to by Customer to Operator	Ongoing
1.7	Ensure that all on-site personnel are trained in accordance with applicable regulatory requirements and applicable required certifications/qualifications are maintained and available for review. When required, this includes, but is not limited to qualified electrical worker certifications, fall protection, competent persons and environmental certifications, etc.	Ongoing
1.8	All safety, environmental and emergency response equipment must be maintained by Operator throughout the Term. This includes but is not limited to fire extinguishers, spill kits, PPE, eyewash & shower stations, etc. Response equipment not on-site at hand over to Operator may be provided as an Additional Service. Re-charging or re-stocking of emergency response equipment used in response to an emergency event will be billed as an Additional Service.	Ongoing
2	**System Monitoring and Alarm Response**	
2.1	System Monitoring by the Operator. Operator shall notify the Company when an alarm is received and Dispatch to the Site is necessary.	Ongoing
2.2	Respond to alarm and alert conditions and dispatch service personnel 7 days a week according to the response times indicated in Exhibit B of the Agreement.	Ongoing
2.3	Generation and outage management in accordance with Project Agreements and current statutory/regulatory rules and requirements.	Ongoing
3	**Maintenance – PV Array and Balance of Systems**	

	Service Area/Item Description	Frequency
3.1	Visually inspect all electrical enclosures (including but not limited to disconnect switches, combiner boxes, re-combiner boxes, inverters and transformers) for, corrosion, heat distortion, moisture entry, electrical termination torque marks, insect infestation, rodent issues and exterior damage.	Annually
3.2	Visually inspect PV modules, racking, tracker equipment (if applicable) and wiring for broken/missing modules, damage, unexpected wear, loose racking hardware, unsecured wiring, chafing of electrical conductor insulation, and evidence of corrosion.	Annually
3.3	If applicable, perform manufacturer-recommended maintenance on single-axis trackers including, but not limited to: a) Inspection for evidence of wear, moisture intrusion, loss of lubrication, or distortion/damage in all motor drive/gearbox assemblies, bushings/bearings, linkage and torque tubes, b) Calibration of sensors/tracker (calibration to be paid by Customer as Additional Service), c) Inspection of electronic enclosure seals for integrity, d) Perform inspection and lubrication of gearboxes/slew drives.	Annually
3.4	Visually inspect equipment grounding connections for loose or corroded connections at module frames and module racking/support structure.	Annually
3.5	Visually inspect array and remove debris and trash.	Annually
3.6	Visually inspect all accessible wiring runs, elbows, weather heads, piping, conduits and wireways for loose connections, missing sealant, corrosion, or moisture intrusion.	Annually
3.7	Operate all inverter AC and DC disconnect switches. Validate inverter response to shut down and proper start-up.	Annually
3.8	Check inverter supplier display readings against SCADA and/or remote monitoring system.	Annually
3.9	Perform a thermal imaging scan of all combiner boxes and recombiner boxes.	Annually

	Service Area/Item Description	Frequency
4	**Maintenance – Inverters and LV/MV Transformers, Switchgear and Protection Devices**	
4.1	Perform inverter preventative maintenance as recommended by inverter manufacturer including, but not limited to: cable termination tightness (dc power cables from combiner/recombiner boxes to the inverter, ac power cables from the inverter to the pad mounted step up transformer, and connections from the inverter to the ground system), thermal imaging scans, replacement/washing of filters, clean-out of debris, verification of switches/fuses, check coolant level, check for moisture intrusion, checking of door seals, verification of ventilation/heating systems, checking for firmware upgrades. Updating firmware is considered an Additional Service if not covered under the inverter warranty.	Annually
4.2	Visually inspect inverter and/or transformer pad or skid (where applicable) for evidence of settlement or undermining/erosion.	Annually
4.3	Perform visual and mechanical testing of all electrical enclosures and equipment (including but not limited to disconnect switches, circuit breakers, metal-clad switchgear, protective relaying, battery systems, transformers, exposed bus work and containing structures).	Annually
4.4	Perform functional testing of any battery back-up systems (including but not limited to, verification the battery ventilation/heating system operates, inspection of physical and mechanical condition, inspection of battery support racks or cabinets, mounting, and grounding, electrical testing per OEM, measurement of charger float and equalizing voltage levels, and verification of all charger functions and alarms).	Annually
4.6	Perform NETA MTS non-optional visual and mechanical inspections for low voltage ("LV") to LV and LV to medium voltage ("MV") step up power transformers. Dissolved gas analysis of all oil filled LV to LV and LV to MV is considered an Additional Service.	Annually
4.7	Perform applicable inspection and testing of protective relays and other protection and control equipment per NETA MTS. Excludes any inspections and testing that require an MV specialist/subcontractor or a partial/total shutdown of the Project or the Site (unless Customer has provided prior approval of such shutdown). Operator will request approval for shutdown from Customer prior to performing such inspections and testing.	Annually

	Service Area/Item Description	Frequency
5	**Medium Voltage - Transformer**	
5.1	Inspect enclosure and devices for corrosion, heat distortion, moisture entry, insect and rodent infestation, and exterior damage. Confirm that all signage and labeling is in place.	Annually
5.2	Confirm that all signage and labeling is in place	Annually
5.3	Inspect anchorage and alignment.	Annually
5.4	Perform thermographic survey of all field terminations	Annually
5.5	Inspect and clean bushings	Annually
5.6	Verify tap-changer position is set as specified	Annually
5.7	Check and record existing and high temperature, pressure, and fluid level	Annually
5.8	Fluid & Gad Analysis Test Dissolved gasses in oil, water content, color number, interfacial tension, neutralization number, dielectric breakdown voltage, power factor @RTC °C, relative density/specific gravity, furanic compounds in oil, inhibitor content.	As required
	Medium Voltage - Cabling	
5.9	Inspect exposed insulation jacket for physical damage, evidence of overheating and corona	Annually
5.10	Inspect terminations and splices for physical damage, evidence of overheating and corona	Annually
5.11	Inspect compression-applied connectors for correct cable match and indentation	Annually
5.12	Inspect shield grounding and cable support	Annually

	Service Area/Item Description	Frequency
5.13	Verify that visible cable bends meet or exceed ICEA and/or manufacturer's minimum allowable bending radius	Annually
6	**Maintenance – Telecommunications and Sensors**	
6.1	Validate functionality of all communications, data logging and computer equipment, verify loss of communication alarms, test battery back-up systems and validate monitored data points appear correctly on the remote monitoring system.	Annually
6.2	Troubleshoot and reset site telecommunications as required to maintain connectivity between Site and monitoring platform/ user interface ("UI").	Ongoing, As required
6.3	Perform scheduled maintenance on SCADA and data acquisition systems, in accordance with manufacturer's instructions.	Annually
6.4	Perform software updates within 30 days of software update release.	Ongoing, As Required
7	**Corrective Maintenance – All Project Equipment**	
7.1	Assess and make recommendations regarding required maintenance, repair, and replacements of Project equipment (other than required as part of the Services), which shall include such items as replacement of equipment or components prior to their reasonably expected replacement date, repairs or replacement of failed equipment or components, and repairs and replacements covered by insurance due to a casualty event including as a result of a Force Majeure event or non-warranted equipment malfunction or underperformance ("Corrective Maintenance"). Operator shall provide engineering support (as required), search for replacement parts, obtain quotation(s) and negotiate with replacement part suppliers on behalf of Customer.	Ongoing
7.2	Perform on-site trouble shooting Corrective Maintenance.	As required
7.3	Subject to Customer's approval, procure all Spare Parts and install all Replacement Spare Parts not covered under warranty or not required for Services for the Project.	As required

	Service Area/Item Description	Frequency
8	**PV Module Cleaning (Including all water, cleaning agents, equipment and supplies required)**	
8.1	Perform, or cause to be performed, cleaning of 100% of PV modules following manufacturer's recommendations for water conditioning (if any) and use of chemical agents. Brushes may be used, if approved by manufacturer, to remove soiling on modules. Operator shall perform, or cause to be performed, module cleanings after approval by Customer.	As required
9	**SCADA, Data Acquisition Systems and Protection and Control Systems**	
9.1	Perform scheduled maintenance on SCADA and data acquisition systems, in accordance with manufacturer's instructions.	Annually
9.2	Perform software updates within 30 days of software update release	As required
10	**Record Keeping**	
10.1	Perform comprehensive record keeping of all relevant project documentation provided by Customer and generated by Operator including, but not limited, as-built drawings, equipment specifications, safety manuals, detailed maintenance and repair logs, preventative maintenance logs, equipment operating manuals, environmental compliance documents, contact lists, etc.). When required by Applicable Law, the purchasing or interconnecting utility or called for by Prudent Industry Practice, hard copy project documentation shall be stored at the Project. Equipment maintenance and operations manuals that are available in hard copy only will be stored at the Project Site provided a suitable storage facility is available. All other hard copy only documentation may be stored in Operator's hard copy library. Digital copy of project documentation, including copies of all maintenance and repair logs, shall be stored and maintained in Operator's digital record keeping system. Provided internet access is available, Customer and Operator shall have remote access to the digital records.	Ongoing
11	**Maintenance and Performance Reporting**	
11.1	Generate for Customer review within 10 days of completion of each service activity, a service report for each maintenance service performed. The service	Ongoing

	Service Area/Item Description	Frequency
	report shall contain as applicable, the problem statement, apparent cause, corrective action, test report(s), photographs and thermal images.	

Exhibit B

Dispatch. Operator shall dispatch resources in response to System alarms and service requests received by DAS and/or System Owner. Travel and on-site labor shall be billed per agreed upon rates. DAS alarms may vary and dispatch will be made based on priority level outline below:

Priority	Definition	On-Site Time
CRITICAL	Safety concerns, risk to life or property	Same Day
URGENT	>50% system unavailability	Within 1 business day
HIGH	>25% system unavailability, system communications loss	Within 3 business days
MEDIUM	10–25% system unavailability, system underperformance, etc.	Within 5 business days or as soon as practical
LOW	<10% system unavailability, device communications loss, cosmetic issues, etc.	Within 10 business days or as soon as practical