

WORRY-FREE MAINTENANCE

PARTNER WITH THE LARGEST AND MOST EXPERIENCED COMMERCIAL SOLAR PROVIDER IN THE UNITED STATES.

- Servicing over 188 MW at 340+ sites across the United States.
- 24/7 dedicated solar service electricians for your project.
- Competitive pricing.
- Greenskies works with your Data Acquisition Service (DAS) provider and sync with our custom in-house 24/7 monitoring platform.
- Experience with ground mounts, commercial rooftop and carport systems.



OPERATIONS CENTER
MIDDLETOWN, CT



**SOLAR TECHNICIAN INSPECTING
ELECTRICAL WIRING**

WHY HAVE AN OPERATIONS AND MAINTENANCE AGREEMENT?

1. Make more money per kilowatt.
 - Proper maintenance helps ensure maximum energy output over the life of your solar installation.
2. Spend less time worrying.
 - Real-time monitoring, reporting, and professional field operations come standard.
3. Proactive maintenance strategy.
 - Greenskies O&M team use cutting edge technology to test and inspect as part of scheduled maintenance plans. Our local teams are dispatched for any emergency visits.

CASE STUDY

WESLEYAN UNIVERSITY



WESLEYAN UNIVERSITY
MIDDLETOWN, CT 1 MW

"Greenskies continues to be our valued solar services provider. From the earliest stages of design through start-up and now into year three of operations, Greenskies continues to provide Wesleyan with the highest quality of engineering, design and operations maintenance."

—ALAN RUBACHA
*Director of Physical Plants,
Wesleyan University*

Visual-Mechanical Checklist for Annual Preventative Maintenance & Emergency Response Plan

1. Monitoring System Data Review

- 1.1. Review and/or modify fault and performance alarms, thresholds, and notifications.
- 1.2. Review activated alarms and provide feedback as necessary for further action.

Completed 1x per year

2. General Site Inspection

- 2.1. Verify safety and Identification labeling is present and legible.
- 2.2. Inspect site access/egress locations are free of obstructions and hazards.
- 2.3. Security means and installation methods (Surveillance equipment inspection not included).
- 2.4. Equipment access lanes are free of obstructions and hazards.
- 2.5. Inspect for changes of environmental conditions such as nearby construction activity, agricultural activities, bird migrations, water table changes, acts of vandalism, and shading.

Completed 1x per year

3. Mechanical System Inspection – (Racking, Modules)

- 3.1. Racking structures visual and mechanical inspection.
- 3.2. Mechanical inspection 2% of Module-to-racking attachments for torque specification.
- 3.3. Module visual inspection.
- 3.4. Foundations, driven piers, mechanical attachments, and earth screw visual inspection.
- 3.5. Equipment Grounding Conductor electrical continuity inspection.
- 3.6. Equipment bonding to ground electrical continuity inspection.

Completed 1x per year

4. DC & AC Electrical System Inspection - (DC Collection Panels, AC Collection Panels, Safety Disconnect Switches)

- 4.1. Verify safety and Identification labeling is present and legible.
- 4.2. Enclosure mounting, gaskets, interior, and exterior visual inspection Equipment.
- 4.3. Grounding and bonding inspection.
- 4.4. Terminations (conductors) thermography scanning.
- 4.5. Visual inspection of conductor termination torque markings.
- 4.6. Fuse and breaker thermography scanning.
- 4.7. Visual inspection of conduits, fittings, junctions/splice boxes, and enclosures.

Completed 1x per year

5. Inverter Inspection

- 5.1. Verify safety and Identification labeling is present and legible.
- 5.2. Enclosure mounting, gaskets, interior, and exterior visual inspection.
- 5.3. Grounding and bonding inspection.
- 5.4. Inverter operation verification.
- 5.5. Thermography scanning of terminations, fuses, breakers, and electronics.
- 5.6. Vacuum clean interior.
- 5.7. Per manufacturer's recommendations, clean air intake/exhaust screens, fans, and filters.
- 5.8. Supply and install new inverter filters per manufacturer's requirements.
- 5.9. Complete all other manufacturer specific maintenance procedures not listed above.

Completed 1x per year

6. Stormwater Management System Inspection – (Drainage swales, Pervious Areas)

- 6.1 Drainage swale visual inspection.
- 6.2 Pervious area inspection within the array area, around perimeter and at edge of wetland buffer areas.
- 6.3 Stormwater management/sedimentation basin inspection.
- 6.4 Catch basin inspection – contact Town of Royalston, Department of Public Works, as needed, to arrange maintenance and repair of King Street catch basin

Completed 2-4x per year

7. Data Acquisition System Inspection

- 7.1. Verify safety and Identification labeling is present and legible.
- 7.2. Battery health inspection (when applicable).
- 7.3. Meteorological data sensor cleaning, positioning, and operation.
- 7.4. Inverter communication (when applicable).

Completed 1x per year

8. Reporting

8.1. Provide digital commissioning report including results from all steps with responses noting Pass, Values, or Failure with explanation.

8.2. Photo report of deficiencies.

8.3. NABCEP PV Installation professional to review reports for completeness.

Completed 1x per year

Corrective Repairs

Repairs found by the O&M provider during inspection visits deemed readily repairable will be promptly attended to in the following steps:

- O&M provider will request CRE permission to execute work
- Upon approval, O&M provider will complete repairs and send work order report to CRE within two business days

The following steps will be taken if GWU or CRE finds a system component that needs repaired while O&M provider is not on site:

- O&M provider will confirm receipt of CRE's request with written response
- O&M provider will dispatch technician within guaranteed response time
- O&M provider will complete repairs and send work order report to owner within two business days

Emergency Response Plan

In case of an on-site emergency that calls for the immediate shutdown of the Solar System, please follow the below procedure. In the event of an emergency not caused by the Solar System, whereupon the client chooses to shut down the Solar System, the client shall be responsible for all lost generation during the time the System is inactive. The procedure for shutdown is as follows:

1. In the event of a fire or an emergency requiring emergency services, Call 911 immediately
2. Open AC Disconnects at the service location to de-energize AC power to the site.
3. Call Greenskies O&M

Contacting Greenskies O&M

- **Tier 1 Communications**

- o Contact the Greenskies Field Operations Office
 - Direct Phone Line 860-398-5408 ext 323
 - Email – OM_office@greenskies.com

- **Tier 2 Communications** – If you do not get an immediate response from Tier 1 contacts please contact the following:

- o Contact Greenskies Escalation
 - Direct Phone Line 860-598-4890

- **Tier 3 Communications** – If you do not get an immediate response from Tier 2 please contact the following:

- o Brandon Sheridan – Manager of Field Operations
 - Personal Phone - (203) 915-7722
 - Email – bsheridan@greenskies.com
- o David Rutty – Vice President of Operations and Maintenance
 - Personal Phone – (203) 314-8382
 - Email – drutty@greenskies.com

1. Traffic flow plan

- Traffic relative to the site includes standard construction trucks, small earth moving equipment, and all terrain fork lift equipment. Weights information on specific equipment can be provided during preconstruction phase. Activity with this equipment is isolated to the specific site property lines. Vehicle trips would be relative to scheduled deliveries of the major materials such as solar racking, solar panels, electrical equipment to serve the solar site, and fencing materials to be installed around the perimeter of the solar field. Construction activity and associated traffic will take place from 7:00 AM to 3:30 PM daily Monday through Fridays. Depending on approval, and timing of project, contractors may work on Saturdays if required to meet project schedule. Site specific traffic flow plans, and associated site logistic plans showing access & circulation will be provided during preconstruction phase.
- Modules deliveries: There will be approximately 3 trucks per Megawatt (MW) of solar capacity. The average weight per truck axle will not exceed 10,000lbs.
- Racking delivery: There will be approximately 3 trucks per MW of solar. The average weight per axle will not exceed 12,000lbs.
- Electrical deliveries: There will be approximately 4-5 trucks per 2MW (same for 1MW but multiplier is at 2) for conduit, gear, miscellaneous balance of system equipment. Average weight not to exceed 10,000lbs per axle.
- Equipment, mobilization: There will be approximately 5-6 trucks on and 5-6 off for construction related equipment at no more than 10,000lbs per axle. If heavy earthwork is required, then we might need heavy haulers for this equipment. Heavy equipment trucks will be scheduled during normal business hours. The majority of trucks will be within the first three weeks of mobilization. There will be trucks for demobilization. The number of trucks on site will be determined by how many MW of solar capacity. 1-5MW of solar capacity should max out at five to six trucks per day. 5+ MW of solar capacity could have up to 10 trucks per day.
- Traffic flow patterns would depend on the site and access limitations based on access, as well as site requirements set forth by the local AHJ.

2. List of chemicals that will be on site in excess of household quantities and measures taken to prevent their release into the environment.

- Items considered “chemicals” to be used on the site would include PVC glue for use with electrical conduit installations. No risk on release to the environment. Equipment that uses both gasoline, and oil. In the event of a spill, proper clean up and removal will take place. Storage of flammable liquids are kept in code compliant cabinets, and containers.
- a. Carbon based fuels – Will be stored outside of vehicles. For a solar project ranging from 1-5MW, the crew will store less than 25 gallons on site.

- b. PVC glues –For projects ranging from 1-5MW in size, there will be less than one gallon of PVC glues on site.
- c. Other chemicals are limited in scope.
- d. All chemicals will be stored in approved containers. Spill kits will be in all vehicles and equipment on site and daily monitoring of chemical use will be managed to ensure compliance to requirements.

3. List of dangers related to construction, operation, and removal of the system.

- Construction companies do not typically list dangers, but rather avoid dangers through proper construction related training and compliance to Occupational Safety and Health Administration (Standards-29 CFR). Weekly training sessions are conducted to maintain safety on project site during construction, period of use, and decommissioning.
- a. There are the normal OSHA related concerns with the construction of the facility.
- b. The facility is a 1000v (1,500V) DC collection system, therefore the most significant concern during operation is electrical shock. The site will have restricted access protected by code- required fencing and lock outs. Supervised and qualified personnel will be required on site during all maintenance activities.
- c. Removal of the system will have normal OSHA related exposures. No special conditions or special hazardous materials are anticipated. Module recycling will be instituted for disposal of modules. Racking and wire systems will be recycled.

4. Refuse expected to be generated during construction and waste disposal methods.

- There is minimal refuse and debris relative to installations on a solar field. Construction dumpsters will be provided and located within the site limits. All recyclable materials such as wood pallets and cardboard will be separated and properly disposed of.
- Construction-related waste will be disposed of per plans and Town requirements. This will include a combination of recycled goods and waste destined for landfills.
- There are about 10 40 cubic yd roll-off dumpsters per 1MW of solar construction.

5. Plans for clearing, stockpiling or removal of topsoil on site, including where the soil will go if it is to be permanently removed.

- Plans for clearing of trees, light brush, and other obstructions are site specific, and will be determined after contract execution relative to final design. In the event we need to stock pile soil on the site, it will be done to civil industry standards. Should soil need to be removed from the site, proper procedures in selecting final destination, with logs will be provided for record document.
- It is not the intent to remove top soils on the site unless excavation is required. If the site requires excavation, excess soil will be stockpiled per a local civil engineer's standards. The soil will then be redistributed across the site per civil engineer's standards.