## **Greenskies Clean Energy - Goshen SCEF**

## Operations and Maintenance Plan for Proposed 4.0 MW AC Ground-mounted Commercial Solar Photovoltaic Energy Facility

# Prepared for CT Siting Council

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## 1.0 Project Introduction

Greenskies Clean Energy LLC ("Greenskies") is proposing to construct and operate a 4.6+/- megawatt (MW) DC and 4.0+/- MW AC solar farm. In addition to Greenskies resources and personnel, SLR International Corporation. ("SLR") has been actively involved in the siting, design, and environmental evaluations of the proposed Project. The Project site location is 129 Bartholomew Rd., Goshen, CT. The Project will occupy approximately 13.5 acres of land. Access to the site will be achieved through a proposed access road off the existing driveway from Bartholomew Hill Rd. and will generally follow the alignment of an existing farm road to the Project area.

The current basis of design for the proposed layout/site plan includes approximately 9792 PV design modules (475-watt), 14-foot interrow spacing, and an approximately 25-degree tilt above horizontal; modules will be set 2-high in portrait layout. Driven post panel racking systems will be utilized throughout the project site, unless subsurface conditions require an alternative installation method, which will be determined during preconstruction, geotechnical analysis for structural design. Two equipment pads, have been sited the Project area and will hold electrical equipment (e.g. inverters, transformers, switchboard, control panels). Wiring that connects the panels will be placed in above grade wire systems/cable trays or trenched conduits. The area under the panels will remain vegetated and disturbed areas will be seeded with a pollinator mix consisting of native New England species. The proposed Project will include a 7-foot-high perimeter fence surrounding the solar array, which will be underlain with herbaceous vegetation.

Correspondence and communications regarding this O & M Plan should be addressed to both of the following individuals:

Gina L. Wolfman, Senior Project Developer Greenskies Clean Energy LLC 127 Washington Ave., West Building, Lower Level North Haven, CT 06473 gina.wolfman@cleanfocus.us (860)398-5408

Dwaine Reid, VP Operations & Maintenance Greenskies Clean Energy LLC 127 Washington Ave., West Building, Lower Level North Haven, CT 06473 <u>Dwaine.reid@greenskies.com</u> (970)820-0101





# 2.0 Visual-Mechanical Checklist for Annual Preventative Maintenance

The following sections provide an overview of annual preventative maintenance task that are conducted regularly through onsite/field inspections.

#### 2.1 Monitoring System Data Review

- Review and/or modify fault and performance alarms, thresholds, and notifications.
- Review activated alarms and provide feedback as necessary for further action.
- <u>Complete 1 x per year</u>

#### 2.2 General Site Inspection

- Inspect site access/egress locations are free of obstructions and hazards.
- Security means and installation methods (Surveillance equipment inspection not included).
- Equipment access lanes are free of obstructions and hazards.
- Inspect for changes of environmental conditions such as nearby construction activity, agricultural activities, bird migrations, water table changes, acts of vandalism, and shading;
- Complete 1 x per year

#### 2.3 Mechanical System Inspection – Racking, Modules

- Racking structures visual and mechanical inspection.
- Mechanical inspection 2% of Module-to-racking attachments for torque specification.
- Module visual inspection.
- Foundations, driven piers, mechanical attachments, and earth screw visual inspection.
- Equipment Grounding Conductor electrical continuity inspection.
- Equipment bonding to ground electrical continuity inspection
- <u>Complete 1 x per year</u>

## 2.4 DC & AC Electrical System Inspection - (DC Collection Panels, AC Collection Panels, Safety Disconnect Switches)

- Verify safety and Identification labeling is present and legible.
- Enclosure mounting, gaskets, interior, and exterior visual inspection Equipment.
- Grounding and bonding inspection.





- Terminations (conductors) thermography scanning.
- Visual inspection of conductor termination torque markings.
- Fuse and breaker thermography scanning.
- Visual inspection of conduits, fittings, junctions/splice boxes, and enclosures.
- Complete 1 x per year

#### 2.5 Inverter Inspection

- Verify safety and Identification labeling is present and legible.
- Enclosure mounting, gaskets, interior, and exterior visual inspection.
- Grounding and bonding inspection.
- Inverter operation verification.
- Thermography scanning of terminations, fuses, breakers, and electronics.
- Vacuum clean interior.
- Per manufacturer's recommendations, clean air intake/exhaust screens, fans, and filters.
- Supply and install new inverter filters per manufacturer's requirements.
- Complete all other manufacturer specific maintenance procedures not listed above.
- Complete 1 x per year
- 2.6 Stormwater Management System Inspection (e.g. Stormwater basins, stormwater buffers, gabion baskets, culverts)
  - Drainage swale visual inspection.
  - Pervious area inspection within the array area, around perimeter and at edge of wetland buffer areas.
  - Stormwater management/sedimentation basin inspection, including outfall areas.
  - See attached Stormwater Inspection & Maintenance Plan for detailed protocols and frequency.
  - Complete as required

### 2.7 Data Acquisition System Inspection

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

### 2.8 Reporting





- Provide digital commissioning report including results from all steps with responses noting Pass, Values, or Failure with explanation.
- Photo report of deficiencies.
- NABCEP PV Installation professional to review commissioning reports for completeness.
- Complete 1 x per year

#### 2.9 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 GCE 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 GCE finds a system component that needs to be repaired while O&M provider is not on site:

- O&M provider will confirm receipt of GCE'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

### 3.0 Module Replacement Protocol

- 1. Environmental conditions are assessed to determine the appropriate course of action.
  - If there is to be any precipitation expected, the removal/replacement date is normally re-scheduled
  - If there is excessive wind or gusts expected, the removal/replacement date is normally re-scheduled.
- 2. Modules are electrically isolated from the PV array.
  - The string (DC circuit) is opened which isolates the series of modules from the array and reduces the amount of available energy to ground.
  - The particular module(s) is/are disconnected electrically.
- 3. The modules are physically detached from the array racking system.
  - Hardware is assessed as to whether it is suitable for re-use.
  - If the hardware is not suitable for re-use, it is replaced at this point.





- 4. The new modules are physically installed
- 5. The new modules are electrically connected to the string (circuit).
- 6. The string (circuit) for the new modules is closed and the modules are placed into operation.
- 7. The removed modules are removed from the roof. (This step occurs earlier in the process if required due to certain wind conditions.)
- 8. The removed modules are discarded or recycled depending on the contents of the modules.
  - Modules with no hazardous contents are discarded at a nearby facility.
  - Modules that have hazardous or questionable contents are recycled.
    - A manifest is created for the modules from removal from the place of origin to the recycling facility. Each possession/change of hands is documented.
    - o A facility is located which recycles the modules.
    - Depending on the location of the facility and the number of modules, the modules are transported to the facility; or, transportation is arranged for the modules to the recycling facility.
    - O The modules are recycled by the recycling facility. The recycling facility provides the method and place of storage for the questionable/hazardous contents, which completes the modules' recycling manifest.

## 4.0 Vegetation Maintenance/Mowing

Vegetation maintenance and mowing will be conducted by a third-party contractor and/or landowner, if they choose to exercise that option. Mowing will occur two - three (2-3) times annually or per growing season. Any agricultural co-uses within and outside the perimeter fence will be managed by landowner.

## 5.0 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**

- Contact the Greenskies Field Operations Office
  - Direct Phone Line 860-398-5408 ext. 372
  - Email OM\_office@greenskies.com

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

- Contact Greenskies Escalation
  - Direct Phone Line 860-398-5408 ext. 316

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

- Santiago Risatti Northeast Dispatch
  - Personal Phone: 860-304-2062
  - Email srisatti@greenskies.com
- Dwaine Reid Vice President of Operations and Maintenance
  - Personal Phone: 970-820-0101
  - Email dwaine.reid@greenskies.com

#### 6.0 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.

### 7.0 Chemical Usage and Storage

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 will be onsite. In the event of a spill, proper clean up and removal with take place. Storage of flammable liquids are kept in code compliant cabinets, and containers, as follows:

- *Carbon based fuels* Will be stored outside of vehicles. For a solar project ranging from 1-5 MW, the crew will store less than 25 gallons on site.
- *PVC glues* –For projects ranging from 1-5MW in size, there will be less than one gallon of PVC glues on site.
- Other chemicals are limited in scope or will be used in de minimis quantities.
- 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.





## 8.0 Construction, Operation and Removal – Dangers

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. The following items are address regularly:

- *Construction* There are the normal OSHA related concerns with the construction of the facility.
- *Operations* 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.
- *Removal* 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.

## 9.0 Clearing, Stockpiling or Removal of Topsoil

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.