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Large Array Solar Panel Cleaning

What is the best way to clean large solar panel arrays? What are the main concerns? Whether it's a large commercial community solar garden or utility-grade solar farm, following basic guidelines can increase system output and reduce panel damage.

The standard operating procedures crews should follow prior to cleaning solar panels include:

1) Inspect the entire solar array system to detect loose or broken wires, damaged panels, or improperly functioning apparatus. Make necessary repairs or modifications for electrical safety prior to cleaning.
2) Trim or remove vegetation to prevent interference with the system's operation.
3) Schedule panel cleaning early in the day or at night when it is cool. This minimizes thermal stress on photovoltaic cells and protective glass that could damage the panels. Cold water can microfracture hot panels. Also, a hot panel can evaporate water too quickly before it has dissolved and lifted contaminants.

Once the array is inspected according to system guidelines and any adjustments to meet code or specs are done, it is time to clean the panels. What should be used to clean panels?

A variety of equipment is available on the market for cleaning solar panels. Automated spray systems, much like irrigation systems, are mounted on or near panels to regularly remove dirt. Small manual systems are available with handheld or back-mounted pack devices that spray water onto panels. O&M personnel then use brushes to scrub the panels prior to a final rinse. Manual systems are useful in remote locations or where larger machines or vehicles can't navigate tightly-clustered rows of an array. Large automated truck-mounted brush systems and tanker truck operations are generally used on utility grade and larger solar systems. These often employ an assortment of hoses connected to the tanker truck reservoir, and include support personnel that scrub down panels to remove heavier grime.

For years the industry has recommended using water with this equipment to clean panels, but water alone is an ineffective cleaner. Are there additives that can enhance the cleaning performance of water?

Many solar panel manufacturers have previously claimed there is no need to clean panels, or if cleaning is necessary to just use water--more specifically, deionized water to reduce mineral deposits and spotting. However, large-scale solar farms that have been in operation for a few years often do not operate at their maximum output, causing obvious problems for the owners. Facilities located in dry climates or near agricultural fields, coastal areas, volcanos, airports, bird flight paths, or industrial areas have almost immediate output loss due to contaminant accumulation on the panels. Many arrays require more frequent cleaning simply due to their location, and many of the contaminants do not easily rinse off with water alone. What is the best option to effectively clean off bird droppings, jet fuel residue, plant matter, dust, sand, and other contaminants?

Cleaning tough contaminants off panels with water additives is relatively easy ... but cleaning safely with a product that does not degrade panel films or the aluminum support rails is the real challenge. Untested products might be effective cleaners, but can also shorten equipment life, resulting in negative economic consequences over time. Proven compatibility is paramount. Specialty solar panel cleaners are commercially available. Quality panel manufacturers test cleaning products for compatibility, and are an excellent source for recommendations.

Environmental concerns and worker safety must also be addressed. Cleaning effectiveness is a key parameter, too, as this optimizes power output, saves time and labor, and helps cut water usage—an important consideration in many locations. An approved, low-toxicity, biodegradable product that enhances the cleaning effectiveness of deionized or plain water should be the goal.

Detergent or any other product that is added to the water in a panel cleaning system should meet the following requirements:

1) It must be compatible with the solar panel films, aluminum rails, racking, and epoxy.
2) It should be approved by the solar panel manufacturer.
3) It must be biodegradable with low environmental impact and contain no VOCs.
4) It should have low toxicity for worker safety.
5) It should be specifically formulated to remove contaminants commonly found on panels.
6) It should rinse off thoroughly with no spotting or residue.
7) It should be dilutable in water and suitable for use with either tap or deionized water.
8) It should dissolve and remove dirt and dust off panels, offering hydroscopic action to achieve this performance enhancement.

These basis guidelines for cleaning and maintaining solar arrays help ensure that systems operate at their theoretical maximum output with the longest possible equipment life and ROI.

American Polywater Corporation is a specialty cleaning manufacturer that offers a product meeting these guidelines: Polywater® Solar Panel Wash™. For more information visit: http://www.polywater.com/product/polywater-spw-solar-panel-cleaner/