

# Preventive maintenance on solar power plants



There are 4 common types of maintenance: corrective maintenance, preventive maintenance, risk-based maintenance and condition-based maintenance. The solar panel cleaning robot from SolarCleano is one of the key elements of predictive maintenance for solar power plants.



of the panel's fixations and the good general state of the solar panels. Solar panel manufacturers give specifications as to how to inspect a solar installation, and large-scale power plants dedicate team to these inspections so as not to run any risk of failure. If any of these test yield issues or raise concern, corrective measures will be undertaken.

#### What are the risks of not using preventive maintenance on solar power plants?

For many years, it was commonly believed that solar panels do not need any cleaning. Their natural inclination and precipitations would result in an automatic cleaning. Measurements however show that the energy output of solar panels reduces drastically when they are left uncleaned. This is particularly visible in dusty, arid and windy areas, as the wind blows sand on the panels.

However, even in milder conditions, with rainy weather and an inclination that helps water to flow downwards, it is noticeable that dried dirt remains on the panels. Moreover, it tends to become engrained dirt and stay on the panels for a longer amount of time.

While shade on the panels temporarily diminishes their production, dirt will keep production down permanently. On any size plant, the accumulated dirt on the panels within a year, can lead to a productivity decrease anywhere from 1.5% to 30%. In some desert areas, even higher productivity decreases were noted.

Without routine maintenance, the probability increases for a larger issue to arise, which could substantially impact the overall production or the safety of the system.<sup>2</sup>

#### Cleaning as an essential part of preventive maintenance

As outlined in the opening paragraph, regular maintenance is essential to ensure the good functioning of a machine or, in this specific case, a whole solar plant. By cleaning solar panels regularly, you will permanently reduce dirt accumulating. Aside from the fact that this will give solar panels full energy generating potency again, it is also useful for preventing the creation of hotspots. Hotspots result from sticky dirt (e.g. bird droppings) heating up the surrounding areas as a consequence to being exposed to the sun. Indeed, dirt usually being a darker shade than the actual solar panels, it concentrates more solar energy on one specific spot, hence more heating. Hotspots interrupt the flow of energy production, decreasing the capacities of the cells that are covered as well as all the neighboring cells. These hotspots can damage electric components of the panel and can lead to microcracks putting the entire panel in jeopardy. Indeed, microcracks represent a safety issue that can only be handled by replacing the entire

#### What is preventive maintenance?

Preventive Maintenance, also referred to as PM, is a proactive maintenance strategy that involves regular and routine maintenance of equipment to reduce the likelihood of failure leading to unplanned downtime. Through scheduled cleaning, repairs, adjustments, and part replacements, a preventive approach

increases the availability and operational output of equipment and machinery.<sup>1</sup>

Specifically, solar panel preventive maintenance focuses on testing regularly electrical connections, controlling the status

<sup>1</sup> <https://comparesoft.com/cmms-software/preventive-maintenance/>

<sup>2</sup> <https://solect.com/preventative-maintenance/>



SolarCleano camera dusk

panel. It is costly in financial terms as well as in terms of time.<sup>3</sup>

Regular cleaning is therefore an essential part of the maintenance schedule ensuring a well-performing, environmentally friendly power plant with little downtime. Even without the creation of hotspots or the appearance of microcracks, cleaning has shown to increase the lifetime of solar panels, keeping their efficiency in the long term and preventing reaction to the soiling it is exposed to.

#### Preventive maintenance while cleaning

SolarCleano semi-automatic robots currently exist in 2 designs: an F1 SolarCleano robot and an M1 SolarCleano robot. Both can be used with brush types of blue, yellow, green and red. Both are dismantlable and remote-controlled. They can be used for cleaning with water or for dry cleaning, should water not be easily available, with an average cleaning capacity of 1500sqm/h, for SolarCleano F1.

The modular robots can be fitted with several

brush types for cleaning installations with differing types of dirt by a simple switch of brush and intuitive cable reconnection. From the blue brush, efficient against sand and recommended for dry cleaning, to the red brush, favored for floating installations as it clears bird droplets within one passage, SolarCleano brushes cover all types of fouling of solar panels. Flexible, it can be used for rooftops, as well as for ground-mounted installations. Given the variety of installations and the vast diversity in their landscapes and meteorological conditions, it is a 100% unique solution for the solar market as it exists today.

The modularity of the robots is a multiple one: dismantlable in 5 parts, each of them can be carried easily by a person, so that reaching solar panels on roofs does not require any specific access equipment. Last but not least, SolarCleano robots can be fitted with accessories that make them usable with all solar panel installations. For instance, for installations that would require human presence at heights and therefore at a risk of falling, it is possible to install a camera on top of the robot, which enables the operator to steer it from the ground, in

safety. For longer cleaning times, SolarCleano developed a night cleaning set of LEDs and camera. With this, the operator can keep cleaning in the dark while always knowing where their robot is currently active. And for sloped installations with inclinations over 25°, the safety glider is a lifeline destined to keep the robot efficient in all conditions.

The SolarCleano robots do not require access to a power supply. Given the growing sizes of solar panel installations around the world and the preference for isolated locations (in the desert, on high roofs that are difficult to reach or as floating ensembles away from shore), this capacity of working without an electricity supply cable is an obvious advantage. For these numerous large installations, the F1 can be fitted with extra-large brushes, speeding up the cleaning process.

The development of new cleaning machines is progressing fast at SolarCleano for more efficient preventive maintenance: new, solar installation-oriented and disruptive machines will become available this year!

[www.solarcleano.com](http://www.solarcleano.com)

<sup>3</sup> <https://www.thehartford.com/resources/energy/solar-energy-risks>