

How to Clean Solar Panels?



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Category

Photovoltaic (PV) modules require minimal maintenance after installation and are designed to last 25 years. However, it is important to keep them clean to maintain optimal power production.

Dust and dirt buildup on solar panels can cause energy loss (pollution) of up to 7% annually in parts of the United States and up to 50% in the Middle East. So how should solar panels be treated to remove contamination?

The most effective way to keep PV panels clean and some factors that affect solar panel cleaning and maintenance Let's look at.

Ways To Clean Solar Panels

There are several ways to keep solar panels clean, ranging from manual cleaning to fully automated techniques. Rainwater can remove some of the dirt that builds up on the panels over time, but it also causes dirt to build up on the underside of the panels and is not sufficient to remove heavy dirt.

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1. Automatic Robotic Cleaning

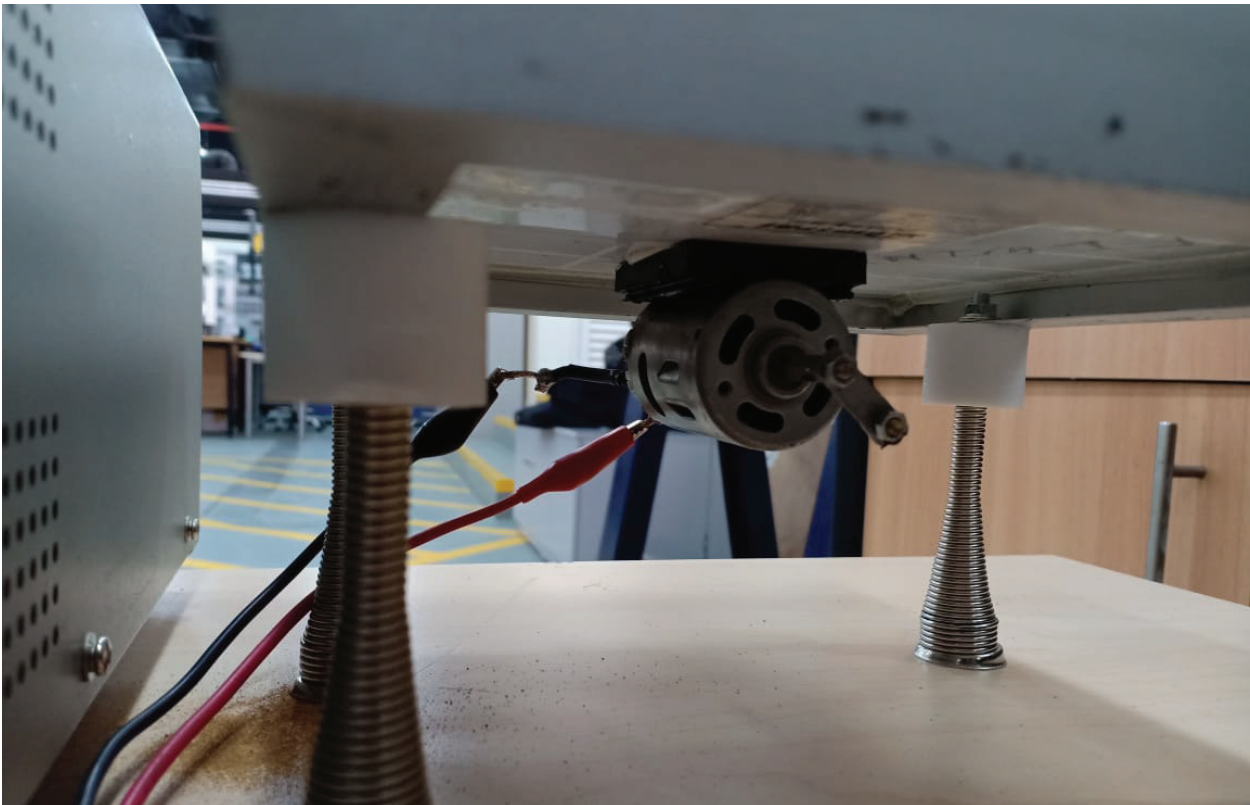


Robotic technology allows companies like Italy-based Washpanels to manufacture automatic and semi-automatic robots specifically designed to clean solar panels. We offer portable semi-

automatic robots for installing panels on carports, greenhouses, shed roofs, etc. We also offer fixed roof robots for large-scale installations in dusty environments that require regular cleaning.

In the Middle East, Ecoppia uses solar-powered autonomous robots to clean PV modules nightly using soft microfibers and a stream of air instead of water, as high-pressure washing can damage the modules. is being washed. The robot also cleans its onboard solar panel and quickly recharges its battery between uses.

2. Vibrational Cleaning



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Scientists at [Heriot-Watt University](#) in Scotland and a NASA-funded project in the United States have developed a way to vibrate solar panels to shake off the dust from their surfaces. The Heriot-Watt solution has a direct current (DC) motor mounted behind a panel that can be adjusted to induce vertical vibration.

3. Nano-particle coatings





Scientists at the Advanced Research Center for Powder Metallurgy and New Materials (ARCI) branch of the Ministry of Science and Technology of India have developed a coating for solar panels that prevents dirt from accumulating in harsh environments. In India, the efficiency of PV modules is affected by a combination of high temperatures, high humidity, and high levels of pollution.

Nanoparticle-based technology repels dust so it can be easily washed off with water, and the high transparency ensures that the coating does not affect the panel's efficiency. Indian company Marichin Technologies manufactures coatings for commercial use.

4. Manual Cleaning



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Manually cleaning PV modules is the good old way. Robotic, waterless vibration or specialized coating solutions are innovative and efficient, but there are many scenarios where these types of solutions are very expensive and inefficient. This is especially true for smaller installations of residential or commercial scale and specialize **ORIENT** Expert d structures and installations such as agricultural power plants.

In order to do the task properly, there are some very useful tools for **cleaning solar panels**. On the one hand, there are many special brushes that rotate while brushing the floor from the

A Comparison Of Various Solar Panel Cleaning Technologies:

Cleaning Technique	Merits	Demerits	Power Output Efficiency Compared to clean Panel
Natural cleaning	No investment cost is involved.	Depends on the location's weather condition.	4%
Manual cleaning	Involves simple design.	Requires expensive materials and the use of human labor.	90.67%
Robotic cleaning	Effective and sustainable in all climates.	Requires complex construction.	99.5%
Heliotex cleaning	Effective for non-sticky dirt.	Requires a lot of water.	12.5%
Electrostatic cleaning	Effective for dry dust and requires no moving parts.	High voltage is required and design is costly.	3.35–11.5%
Hydrophobic and hydrophilic coating	Does not require water and labor.	Coating presence reduces screen efficiency.	6.62%
Vibrating cleaning system	Applicable for dry dirt in dry weather.	An external source is required to power the vibrating motor.	95%
Forced-air cleaning system	Applicable for dry dirt in dry weather.	An external source is required to power the air pump. Only removes small dust larger than 20 μm .	86.4%

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Efficiency Degradation Due To Dust/dirt On Solar Panels.

Studies show that ordinary contaminants such as dust, dirt, and pollen have minimal impact on efficiency. On average, less than 0.05% efficiency is lost. Homeowners can save about \$20 a year by cleaning their solar panels in the middle of summer.

Basically, under normal circumstances, you may pay more to clean your panels than to regain solar efficiency.

How To Clean Your Dirty Solar Panels?

1. If necessary, be sure to read the panel manufacturer's instructions regarding shutting down the system before cleaning. Avoid going to the roof to clean the system. Dangerous for both you and your panel. 2nd Brushing off dirt before spraying water makes the squeegee process quicker and easier.
2. Attaching a suitable nozzle to your garden hose may help. If dust or dirt accumulates, it should be cleaned more thoroughly. Try cleaning with a squeegee extension like this one. If you are interested in a whole-house solar vacuum cleaner kit or kaboodle, Longarm is the most popular.
3. Do not use metal objects, abrasives, or detergents. Scratches on solar panels can cast shadows and affect efficiency.

1. How flat are your panels? Do they lie between zero and five degrees? They may accumulate more surface soiling than panels over time.
2. What's the wind like where you live? Do you live downwind from an airport, highway, or farmland? The air in your area may carry high levels of dust if you answered yes to any of the following.
3. Does heavy dust buildup occur when rainfall is sparse? Water may be needed to clean your panels.
4. Do you live in an area that is susceptible to industrial smog or wildfire smoke pollution? Solar panels may be covered in a hazy film if there has been a lot of smog or wildfire smoke in your area.
5. Do you live in a house surrounded by tall trees? You may experience a buildup of fallen leaves and/or bird droppings on your panels if you have trees covering them.
6. Have you been feeling a lot of pollen lately? You may find a sticky residue that prevents the rain from washing away dirt and dust.
7. Is the climate in your area humid enough to grow moss around your home? Don't expect rain to keep the panels clean. Rain can be an issue.

What Is The Effect Of Location On Solar Panel Cleaning?

The location of your solar panels also affects how you clean them and how often they need to be cleaned to maintain efficiency.

As a general rule, clean at least once or twice a year. However, some locations may benefit from more frequent cleaning.

- **Contaminated Area :**

PV modules installed in highly polluted areas, especially near factories, highways, or airports, experience high levels of atmospheric dirt and oil deposits.

- **Woodlands :**

In a facility with many trees around, many leaves fall on the panels, which hinders the absorption of sunlight. Trees also attract birds, droppings can accumulate and obscure PV cells, and acids can damage surfaces and reduce efficiency.

- **Desert :**

In areas with dry and dusty climates, such as the Middle East and the southwestern United States, more sand accumulates on PV modules, blocking light and scratching the surface. In areas like California and Australia, wildfire ash can quickly fall onto panels in large clumps.

In addition, the angle of the roof where the solar modules are installed affects the frequency of cleaning. Angled panels are cleaner by runoff rainwater than flat panels where water can pool in the pool and leave a residue.

Large commercial solar systems need to be cleaned more often than residential systems because the larger the system, the more fouled the panels and the more they interfere with

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PV Module

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Performance Warranty Of ORIENT SOLAR (A BRAND OF ADM SOLAR POWER)

1. Solar Modules (Panel) :- Performance Guarante will be 25 Years for power output of 3 to 5 unit per KW per day. (Approx 2% degradation in 1st Year and 1% to 2% in consecutive years) when below mentioned necessary instruction are followed by the Consumer/ Customer

Modules/Panel must be in shadow free area.

Panels have to be cleaned with shampoo and fresh water, dry it wiper/ cloth in 7 days regularly.

Panels Cleaning Time - before sunrise and after sunset

Panels must be In south facing +/-15Degree.

Step on to your cleaner journey by

Contacting us at 18002020280 or mail us at www.orient solar.com

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