

**Overview:**

- ❖ Dirt built-up over the solar arrays can substantially affect system performance.
- ❖ It is essential to clean the modules regularly to maximize energy output from a solar power plant. However, wrong cleaning practices, bad quality water and use of inappropriate cleaning agents may damage modules and other array components and lower system performance as well.
- ❖ It is also essential to train the cleaning personnel on proper cleaning methods and use of appropriate cleaning tools.
- ❖ Solar modules are connected in series and generate upto 1500V DC. Damaged cables or joints in a string are extremely dangerous for cleaning person particularly when the modules are wet.
- ❖ Cleaning personnel shall wear appropriate Personal Protective Equipment (PPE) during cleaning.

**Cleaning Time:**

- ❖ The recommended time for cleaning modules is during low light conditions when power generation is lowest.
- ❖ The best time to clean modules is from dusk to dawn when the plant is not in operation and risk of electrical shock hazard is minimum.

**Cleaning Tools**



Glass Wiper



Microfiber cloth Wiper

**Water temperature:**

- ❖ Temperature of water used for cleaning should be same as ambient temperature at the time of cleaning.
- ❖ Cleaning should be carried out when the modules are cool to avoid thermal shock which can potentially cause cracks on the modules.

**Removing stubborn marks:**

- ❖ To remove stubborn dirt such as bird droppings, dead insects, tar etc., use a soft sponge, micro-fiber cloth or non-abrasive brush. Rinse the module immediately with plenty of water.

**Water pressure:**

- ❖ Water pressure should not exceed 35 bar at the nozzle. Use of high pressure hoses for cleaning may exert excess pressure and damage modules.

**Quality of water:**

- ❖ De-ionized water should be used to clean the modules.
- ❖ If de-ionized water is not available, rainwater or tap water can be used. Tap water must be of low mineral content with total hardness less than 75ppm & pH level <10.
- ❖ In case mineral content of water used is more than 75ppm but less than 200ppm the water must be mopped off to prevent scale build up over module surface. Water with mineral content of more than 200ppm should NOT be used. Water must be free from grit and physical contaminants that could damage the panel surface.

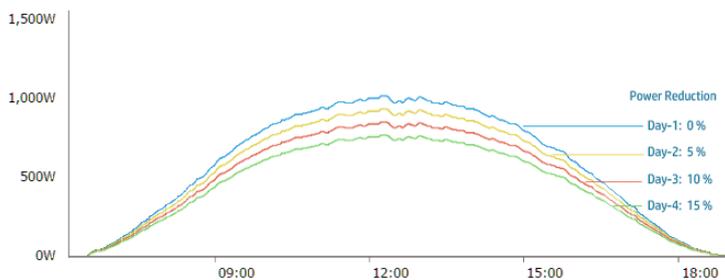
**Use of cleaning agent:**

- ❖ A mild, non-abrasive, non-caustic detergent with deionized water may be used. Abrasive cleaners or de-greasers should not be used. Acid or alkali detergent must not be used.
- ❖ In the case of soiling by dust or sand, modules may be cleaned with a soft brush without using water.
- ❖ Never scrape or rub off dirt, as this may result in micro-scratches and can damage the anti-reflective coating on the module glass.
- ❖ Do not use a pressure washer or walk on the solar modules.

**Regular maintenance:**

- ❖ **GOLDI SOLAR** recommends regular annual inspections of the PV system to ensure that:
  - ❖ All fixtures are securely tightened and corrosion-free;
  - ❖ Wiring is securely connected, properly arranged and free of corrosion; Cables are free of damage.

**Effect of dust on solar PV Modules**



**Drying:**

- ❖ Modules should be dried after rinsing using a chamois or rubber wiper with a plastic frame on an extension pole. Wipe the module surface from top to bottom to remove any residual water from the module.

