



# EVERSOLAR

Protect your solar investment with robotic precision and certified performance results.

## Asset-Grade Solar Maintenance

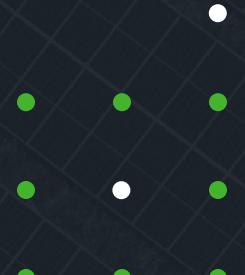
A Commercial Guide to Solar Performance  
and Protection

JULY 2025

Commercial PV Module Cleaning & Maintenance White Paper

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*Commercial solar installations are long-term investments intended to reduce operating costs, improve ESG performance, and enhance energy resilience. Yet, many property managers underestimate a critical threat to performance and asset value: soiling.*

*Dust, air pollution, pollen, bird droppings, and salt spray can reduce system output by 7–50% annually, depending on environmental exposure and location [4]. Contrary to common belief, rainfall does not effectively clean solar panels, and hardened residues often require professional removal.*

*This white paper examines the science of solar panel soiling, performance degradation, and financial risk—drawing on peer-reviewed research and industry guidance. It also presents economic justifications for scheduled professional cleaning, which can deliver 300–1000% ROI and protect warranty coverage worth tens of thousands of dollars. [5]*

*By understanding these risks and solutions, building owners and facility managers can take practical, high-impact steps to protect their solar assets, boost long-term yield, and maximize the return on their investment.*



# The Overlooked Risk Undermining Solar ROI

**Regular cleaning is essential to protect solar performance, warranties, and ROI. Neglect can slash output, trigger warranty voids, and shorten system lifespan.**

- 7–50% energy loss from dust, pollution, and debris [8]
- 300–1000% ROI from routine professional cleaning [5]
- Warranties often void without 6–12 month cleaning
- Dew and dust harden into cement-like grime — rain won't remove it
- Hot spots form, damaging cells and reducing efficiency

## NREL, 2021 Study on Soiling Effects

*Once dust combines with moisture and bakes under the sun, it forms a crust that's almost impossible to remove without professional equipment.” [2]*



# Maximized Output. Measurable Returns

7-50%  
**LOSS**

10-25%  
**GAIN**

While the risks of solar neglect are well-documented, the upside of scheduled, professional cleaning is equally measurable. Numerous studies show that solar systems can recover 10–25% of lost performance after a single clean—translating to thousands in regained energy and revenue annually for commercial sites. [9]

## Energy Recovery

- Up to 25% output restored after cleaning in urban/coastal environments [9]

## Revenue Impact (per 100kW system)

- At 32.5c/kWh, even a 10% gain = \$4,875 **annual return**

*Based on typical commercial solar system savings [14], NSW electricity rates [10], and performance recovery data from peer-reviewed studies [9] and verified service benchmarks. [12]. 7-50% loss [1]. 10-25% gain [5].*



## What the Research and Industry Data Show

*Soiling can reduce panel output by up to 18.5% in just two months in semi-arid climates [4].*

Solar panel soiling refers to the build-up of environmental contaminants that reduce solar energy absorption. These include:

- Dust & soot (airborne particles from wind and urban activity)
- Pollen, fungal spores, algae (especially in agricultural zones)
- Bird droppings & animal waste
- Salt spray (in coastal or marine areas)
- Industrial fallout (metallic particulates, chemicals)

### ***Annual Soiling Loss Potential in NSW***

30%

*Estimated annual energy losses of 5–30% on commercial rooftops in NSW—equates to 7,500–45,000 kWh (or \$1,500–\$9,000) lost per 100 kW system - the equivalent of losing 1.5–3 months of free solar generation annually [7]*



# Warranty Compliance

## Why It Matters



Adhering to manufacturer maintenance guidelines is crucial. Commercial warranties often mandate professional solar panel cleaning with approved tools and water to safeguard performance and investment.



Reputable manufacturers, such as Canadian Solar, mandate certified maintenance for valid warranty coverage—including documentation and proper methods.



Failure to comply can void warranties, leading to repair costs upwards of \$50,000 and potential denial of insurance claims.

## Why Choose Professional Solar Cleaning?

*Proper cleaning restores up to 25% lost output, delivering up to 1000% ROI annually [5]*

Unmaintained systems don't just underperform—they drain profits silently and expose you to warranty voids. Professional cleaning safeguards your energy output, compliance, and long-term returns.

Unlike rain or DIY efforts, professional cleaning uses deionized water, low-pressure tools, and surface-safe techniques approved by manufacturers—ensuring no microcracks, scratches, or sealant damage occurs.

Certified solar maintenance providers also deliver:

- Time-stamped service records and photos for warranty and insurance compliance
- Evidence-based maintenance intervals tailored to your site's dust load, tilt, and climate
- Risk reduction for hot spots, cementation, and permanent cell degradation

For commercial building owners and facility managers, this means fewer unexpected faults, faster ROI recovery, and total peace of mind.



# Take Action: Protect Your Investment and Maximize Returns

**The verdict is clear. Neglecting solar maintenance comes at a cost:**

- Up to 50% annual energy loss due to soiling
- Up to \$9,000 lost per year on a standard 100 kW system
- Warranties voided without documented servicing
- Professional cleaning can deliver up to 1000%+ ROI annually

Professional solar panel maintenance isn't optional — it's the difference between long-term performance & warranty protection and silent financial loss and risk.

## Your Next 3. Steps with EverSolar:

- 1) Book a tailored site assessment
2. Receive a custom maintenance schedule
3. Gain full compliance and ROI reporting



## References

- [1] Smestad, G.P., et al. (2020). Modelling photovoltaic soiling losses through optical characterization. *Scientific Reports*, 10, Article 58. <https://www.nature.com/articles/s41598-019-56868-z>
- [2] Hicks, W. (2021). Scientists Studying Solar Try Solving a Dusty Problem. NREL Feature Article. <https://www.nrel.gov/news/detail/features/2021/scientists-studying-solar-try-solving-a-dusty-problem>
- [3] International Solar Cleaning Association. (2022). Solar Panel Cleaning - What Do Warranties Say? <https://theisca.org/index.php/2022/10/27/solar-panel-cleaning-what-do-warranties-say/>
- [4] Ghosh, A., et al. (2022). Experimental investigation of soiling effects on photovoltaic modules. *Energy Harvesting and Systems*, 9(2), 37-48.
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- [7] Gough, K., Colley, R., & Stojcevski, A. (2023). Analysis of the impact of soiling on photovoltaic (PV) performance in three Australian climates. *arXiv preprint arXiv:2304.11814*.
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- [9] Seda, J.D., et al. (2021). The effect of dust accumulation and cleaning on photovoltaic performance. *Renewable Energy*, 168, 1319–1330. <https://doi.org/10.1016/j.renene.2020.12.007>
- [13] Gough et al. (2023) – Soiling performance across 3 Australian climates (Melbourne, Mildura, Darwin)

## Notes and Industry-Sources

- [10] NSW-specific rates and system data: <https://shellenergy.com.au/energy-plans-terms-conditions/default-rates>
- [14] <https://www.solarchoice.net.au/blog/commercial-solar-pv-system-prices-april-2024/>
- [15] <https://www.energy.nsw.gov.au/households/solar-power-guides>
- [11] Losses of 7-50% annually are cited by NREL, CSIRO, and industry summaries in comparable urban/dusty environments. <https://docs.nrel.gov/docs/fy22osti/83486.pdf>
- [12] Service benchmarks were obtained from industry case studies and maintenance project data, including:
- Delfos Energy: “Reducing Energy Losses in a Solar Plant” (Prevented ~10% day-loss in inverter output) and “Combating Soiling in Solar Plants During the Dry Season” (Efficiency gains through data-driven monitoring) <https://resources.delfos.energy/reducing-energy-losses-in-a-solar-plant-proactive-fault-identification-with-delfos-analytics>
  - GEM Energy case studies: Various commercial rooftop systems, featuring increased efficiency and ROI after cleaning. <https://www.solarpanelcleaningltd.co.uk/studies/solar-array-hereford/>



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**Services:** - Professional solar panel cleaning and maintenance - Warranty compliance documentation - Performance analysis - Solar bird proofing - Thermal imaging

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