NCPRE NEWS

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National Centre for Photovoltaic Research and Education

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A Project of the Ministry of New and Renewable Energy at IIT Bombay

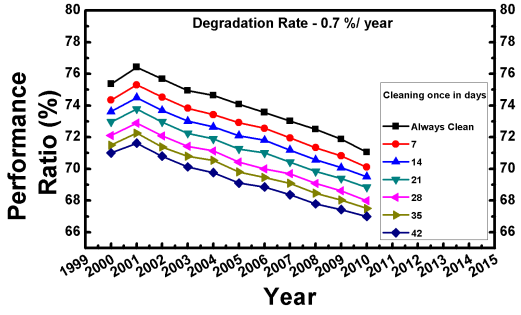
Soiling of Solar Photovoltaic Panels – Performance Loss and Solutions

NCPRE has research activities grouped in five major areas: Crystalline Silicon Solar Cells, Thin Film Materials and Devices, Energy Storage, Power Electronics and Module Reliability. **This month's Newsletter focuses on recent research activities on performance and reliability of photovoltaic modules in the field.**

Deposition and accumulation of soil on the glass surface of solar PV panels is a well-known cause for loss of energy production in PV plants.

Two identical panels, mounted in the conventional way at the NCPRE PV performance monitoring station at IIT Bombay after 100 days of outdoor exposure. One is cleaned every day and the other is left to soil naturally.

Although this is well acknowledged in the industry circles, the extent of losses due to soiling is not well quantified due to the seasonal variations in soil deposition on the glass surface. Cleaning of the surface of glass is the most widely used mitigation strategy. Due to the difficulties in the determination of losses due to soiling, the optimum frequency of cleaning is difficult to determine. NCPRE jointly with the SERIIUS project, has developed a methodology for the quantification of the losses due to soiling.



Loss of performance ratio due to soiling in Mumbai, for different cleaning frequencies. Performance degradation rate of clean panels is assumed to be 0.7%/year.

Scientists at NCPRE has proposed the use of vertically mounted bifacial solar panels for mitigation of soiling losses. In a bifacial panel, light can enter the panel from both sides. No soiling is seen on vertically mounted bifacial panels.

Vertically mounted bifacial solar panel, at NCPRE performance monitoring station at IIT Bombay, after 100 days of outdoor exposure. The panel was never cleaned!

Vertically mounted bifacial panels can be highly suited for integration with agriculture (also termed as *agrivoltaics*), as the lateral space occupied by the panel is much lower than in the case of conventional panels. Low maintenance due to zero soiling losses is an added advantage. In the Indian context, *agrivoltaics* can effectively hedge farm incomes against the vagaries of the weather.

NCPRE is currently focusing on the development of anti-soiling coatings, and the evaluation of such coatings with Indian industry. NCPRE is also partnering with industry to evaluate the effectiveness of different panel surface cleaning strategies. We are also scouting for partners to set up demonstration projects for the field assessment of vertically mounted bifacial panels for *agrivoltaics*.

The works summarized in this newsletter were presented at the recently concluded World Conference on Photovoltaic Energy Conversion 2018 in the USA.

For more detailed information on NCPRE research on the topic, please contact anilkg@iitb.ac.in