# Comparing the Reliability of PV Modules in USA and India (PV-5)

A joint India-U.S. research consortium funded under the *Joint Clean Energy Research & Development Center (JCERDC)*

## Scientific Achievement:

**In this bi-national project, we have studied and compared the performance and reliability of c-Si PV modules in the field in the USA and India. This provides an important comparison as to what effects are due to climate, and what are due to other "local" considerations.**

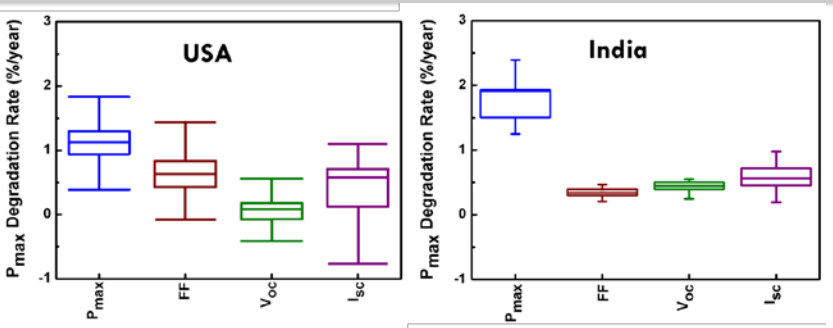
## Significance and Impact:

**The results show that the climatic variations in the two countries are broadly similar. In particular, the "hot and dry" and "hot and humid" climates show higher degradation rates than cooler climates in both countries. This warrants special attention to hot climates. However, the value of the degradation rate is higher in India than in the USA. This needs to be explored further.**

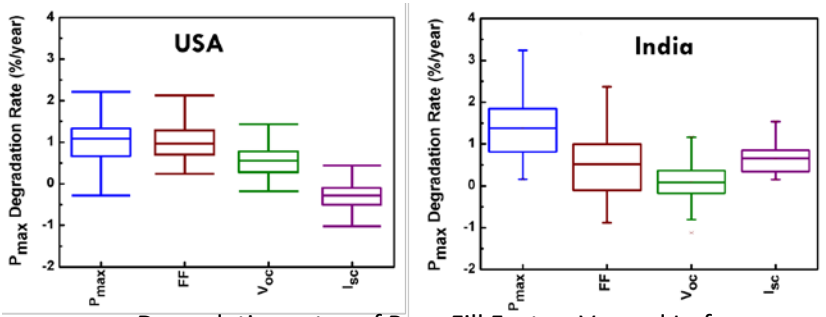
## Research Details:

In both the USA and India, the field survey was done at many sites covering several thousand modules.

- Different climatic zones were covered.
- Different technologies were also included.
- Work was performed by ASU (USA) and IITB and NISE (India).




Degradation rates of $P_{max}$, Fill Factor, $V_{oc}$ and $I_{sc}$ for modules in USA and India for the **'Hot and Dry'** climate.




Degradation rates of $P_{max}$, Fill Factor, $V_{oc}$ and $I_{sc}$ for modules in USA and India for the **'Hot and Humid'** climate.

| | Hot & Dry | Hot & Humid | Cold & Dry |
|---|---|---|---|
| USA | **1.20 (%/y)** | **1.06 (%/y)** | **0.72 (%/y)** |
| India | **1.93 (%/y)** | **1.38 (%/y)** | **0.80 (%/y)** |

Power $P_{max}$ degradation rates (in %/year) in different climatic zones of USA and India.


**Conference Presentation:** G. Tamizhmani, S. Tatapudi, R. Dubey, S. Chattopadhyay, C. Solanki, J. Vasi, B. Bora, O.S. Sastry, and A. Kottantharayil, "Comparative study of performance of fielded PV modules in two countries," 26th International Photovoltaic Science and Engineering Conference, Singapore (2016).



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