# Solar panel effectiveness over time

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Panel efficiency and longevity stand as critical factors shaping sustainability in the solar industry. Understanding the balance between harnessing sunlight for optimal energy conversion and the unavoidable degradation is essential. Today let us find solar panel efficiency and why it degrades over time.

The process of converting sunlight into electric energy with respect to the ability of solar photovoltaics is called solar panel energy efficiency  is determined by the amount of energy produced per unit of surface area. Ahigher energy output from a specific surface area indicates greater efficiency,while a lower energy output implies lower efficiency projection.

However, after some time, solar panels degrade in their efficiency which decreases their life span gradually.

TheNational Renewable Energy Laboratorymentions that thedegradation rate is around 0.5% to 0.8 % per yearbut varies depending on the model, brands, and types of panels.

1. Degradation Due to Light Induction:This occurrence affects solar panels, in which efficiency is reduced temporarily at the primary exposure of sunlight. This is due to the motion of boron and oxygen within the silicon cells.

2. Degradation due to Potential Induction:The process by which PV in the solar panels originated by the flow of current between cells and other components causes the loss of performance.

3. Aging-related Degradation:PV modules after years of operation lose their performance due to environmental factors and thermal stress.

4. Backsheet Failure:For a PV module, the back sheet acts as a rear protective layer and is made up of polyvinyl fluoride polymer material.When this has a discoloration, the formation of bubbles of delamination would lead to degradation.

The following formula is used to calculate the efficiency

Solar Efficiency in Percentage(%) = ((Maximum Power /Area)/(1000)) * 100%

Efficiency (%) = ((200/1)/1000)*100% =20%

Energy"s National Renewable Energy Laboratory (NREL) mentions in their studies that the highest efficiency rate is39.5% for a triple junction solar cell.

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