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Terawatt-scale photovoltaics: Trajectories and challenges

Nancy M. Haegel, Robert Margolis, Tonio Buonassisi, David Feldman, Armin Froitzheim, Raffi Garabedian, Martin G...

[+ See all authors and affiliations](#)

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Problems of photovoltaics solar energy

Yoshiyasu Takefuji, Professor,
Keio University

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Nancy M. Haegel and et al., described challenges of photovoltaics (1). However, they must depict the obstacles or disturbances of photovoltaics for advancing photovoltaics research. Piled snow / sands / dusts / stains / debris / leaves, and aging dramatically degrade power production of photovoltaics solar panels. In slicing process silicon ingots for photovoltaic cells, we lose a half of the silicon ingots as industrial waste. Semiconductor factories need 'clean' manufacturing environments and are expensive to build & maintain. Excessive heat from sunlight severely reduces the solar panel's production of power. Huge energy is consumed for fabricating silicon ingots and solar cells. There are other issues (2):

1. Installing solar panels on a house is expensive and requires experienced people. These systems used fixed solar panels since alignment systems are too expensive for the average homeowner.
2. Giant solar farms have been built in desert regions and have reduced the installation cost since a larger economy-of-scale is created. But these large, inexpensive tracks of lands are found far from cities where the power is needed. Expensive transmission lines are needed to bring the power to a distant market.

References:

1. Nancy M. Haegel and et al., Terawatt-scale photovoltaics: Trajectories and challenges, *Science* 14 Apr 2017: Vol. 356, Issue 6334, pp. 141-143
2. <http://www.solarpoweristhefuture.com/problems-with-solar-energy.shtml>