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Sustainability of photovoltaics: The case for thin-film solar cells

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Abstract

To ensure photovoltaics become a major sustainable player in a competitive power-generation market, they must provide abundant, affordable electricity, with environmental impacts drastically lower than those from conventional power generation. The recent reduction in the cost of 2nd generation thin-film PV is remarkable, meeting the production milestone of \$1 per watt in the fourth quarter of 2008. This achievement holds great promise for the future. However, the questions remaining are whether the expense of PV modules can be lowered further, and if there are resource- and environmental-impact constraints to growth. I examine the potential of thin-films in a prospective life-cycle analysis, focusing on direct costs, resource availability, and environmental impacts. These three aspects are closely related; developing thinner solar cells and recycling spent modules will become increasingly important in resolving cost, resource, and environmental constraints to large scales of sustainable growth.



Keywords

Photovoltaics; Tellurium; Indium; Germanium; Availability; Resources; Recycling

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