THIN FILM PHOTOVOLTAIC TECHNOLOGY FAQ

Q: WHAT MAKES FIRST SOLAR'S THIN FILM PV MODULES COMPETITIVE?

A: First Solar thin film modules are manufactured using a fully integrated and resource efficient process which enables affordable, high volume production with the lowest environmental impacts in the industry. In addition, First Solar's high efficiency thin film modules are proven to deliver more usable energy per watt than conventional silicon-based modules, resulting in a lower levelized cost of electricity ($/MWh).

Source: Dirnberger et al., "On the impact of solar spectral irradiance on the yield of different PV technologies," Solar Energy Materials & Solar Cells, vol. 132 pp. 431–442, 2015.

Q: WHAT ARE THE ENVIRONMENTAL BENEFITS OF THIN FILM PV TECHNOLOGY?

A: First Solar's advanced thin film PV solutions are the industry's leading eco-efficient technology due to their superior energy yield, competitive cost and smallest life cycle environmental impacts. By using less grid electricity during manufacturing, First Solar modules have the smallest carbon footprint, fastest energy payback time and lowest life cycle water use and air pollutant emissions of any PV technology.

Sources: Louwen, Atse, Ruud E.I. Schropp, Wilfried G.J.H.M. van Sark, and André P.C. Faaij. "Geospatial Analysis of the Energy Yield and Environmental Footprint of Different Photovoltaic Module Technologies". Solar Energy 155 (October 2017): 1339–53. https://doi.org/10.1016/j.solener.2017.07.056.

Leccisi, Enrica, Marco Raugei, and Vasilis Fthenakis. "The Energy and Environmental Performance of Ground-Mounted Photovoltaic Systems—A Timely Update". Energies 9, Nr. 8 (08 August 2016): 622. https://doi.org/10.3390/en9080622.

Q: HOW DOES CDTE DIFFER FROM CADMIUM?

A: First Solar modules contain cadmium telluride (CdTe) which is a stable compound that is insoluble in water and has an extremely high chemical and thermal stability. These properties limit its bioavailability and potential for exposure. First Solar modules contain very little CdTe. The semiconductor layer in First Solar modules is a few microns thick, equivalent to 3% the thickness of a human hair. Additionally, the thin film semiconductor is encapsulated between two sheets of glass and sealed with an industrial laminate, further limiting the potential for release into the environment in the event of fire or breakage.

Source: Kaczmar, "Evaluating the Read-Across Approach on CdTe Toxicity for CdTe Photovoltaics," in SETAC North America 32nd Annual Meeting, Boston, 2011.

Q: ARE THIN FILM MODULES DURABLE IN THE FIELD?

A: Yes. First Solar modules are tested for safety during breakage, fire, flooding and hail storms, and meet rigorous long-term durability and reliability testing standards. Module breakage is rare and occurs in ~1% of modules over 25 years (0.04% per year), with more than one-third of breakages occurring during shipping and installation. During operation, breakages typically consist of impact fractures whereby the module remains bound together by the industrial laminate.

Source: Sinha, P, and A. Wade. 2015. Assessment of leaching tests for evaluating potential environmental impacts of PV module field breakage. IEEE J. of Photovoltaics, Vol. 5(6), 1710-1714.

Q: IS THIN FILM PV TECHNOLOGY SAFE FOR THE ENVIRONMENT?

A: Yes. More than 50 researchers from leading international institutions have confirmed the environmental benefits and safety of First Solar's thin film PV technology over its entire life cycle; during normal operation, exceptional accidents such as fire or module breakage, and through end-of-life recycling and disposal. First Solar provides the PV technology of choice for leading utilities and power buyers such as Southern Power Co., NRG Energy, and Capital Dynamics. With more than 25,000MW sold worldwide, First Solar modules have a proven record of safe and reliable performance.

Source: http://www.firstsolar.com/Resources/Sustainability-Documents?ty=Peer+Reviews&re=&ln=

Q: CAN FIRST SOLAR MODULES BE RECYCLED AT END-OF-LIFE?

A: Yes. First Solar offers global, competitively-priced and flexible PV module recycling services. First Solar has a long-standing leadership position in PV recycling with over a decade of experience in operating high-value PV recycling facilities on a global and industrial scale. First Solar's high-value recycling process recovers more than 90% of a PV module for reuse in new modules and glass products.

Source: Sinha, Parikhit, Sukhwant Raju, Karen Drozdiak, and Andreas Wade. "Life cycle management and recycling of PV systems". PV Tech, 19 December 2017. https://www.pv-tech.org/technical-papers/life-cycle-management-and-recycling-of-pv-systems.