



Dimbach, Germany (1.4 MW); Blitzstrom / Beck Energy



Collection and Recycling Program

First Solar is creating truly sustainable energy solutions by combining the abundant resource of the sun with low-cost PV technology and an industry-leading product collection and recycling program. The result? Energy solutions that protect and enhance the world we live in.

As part of its collection and recycling program, First Solar has developed a module recycling process that enables substantially all module components to be recovered and used in new solar modules or other new products. First Solar is the only PV manufacturer to voluntarily implement a prefunded collection and recycling program.

First Solar's Module Collection and Recycling Program is designed to:

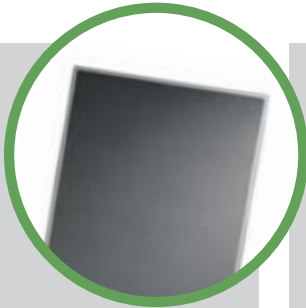
- Provide collection and recycling of waste modules at no additional cost to customers
- Reduce the number of PV modules that are disposed of as waste at end-of-life
- Recover valuable materials for use in new solar modules or other new products
- Reduce the life cycle energy consumption and the associated environmental impacts of PV module production

Module Recycling Process

Aspiration System



Collection



First Solar provides packing materials and collects waste modules upon customer request. Once at First Solar's recycling plant, the modules are collected in hoppers and loaded by forklift into a shredder.

Shredder



The modules are reduced in size in a two step process. Step one uses a shredder to break the modules into large pieces.

Hammermill



In step two, the hammermill crushes the glass further into approximately 4-5mm pieces, small enough to ensure the lamination bond is broken.

Film Removal



The semiconductor films are removed by the addition of acid in a slowly rotating, stainless steel drum.



The aspiration system is used for dust control in all dry parts of the recycling process and is equipped with pre-filters and high efficiency particulate air filters (HEPA) which are 99.95% efficient. Collected dust and filters are disposed of in an environmentally safe manner.

Solid-Liquid Separation

Precipitation

Dewatering

Metal-Rich Filter Cake

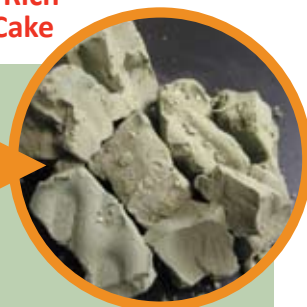


The drum is slowly emptied into a classifier where glass materials are separated from liquids. A rotating screw conveys the glass up an incline, leaving the liquids behind.

The metal-rich liquids are pumped to the precipitation unit. The metal compounds are precipitated in three stages at increasing pH.



The precipitated materials are concentrated in a thickening tank. The resulting metal-rich filter cake is packaged for processing by a third party to create semiconductor material for use in new modules.



Results: 95% recycling of semiconductor material for use in new modules.

Glass-Laminate Material

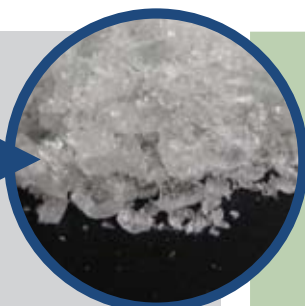
Glass Rinsing

Clean Glass

A vibrating screen separates the glass from the larger pieces of laminate material (which formerly sealed the two pieces of glass together).



The glass is rinsed to remove any residual semiconductor films that physically remain on the glass. The cleaned glass is packaged for recycling.



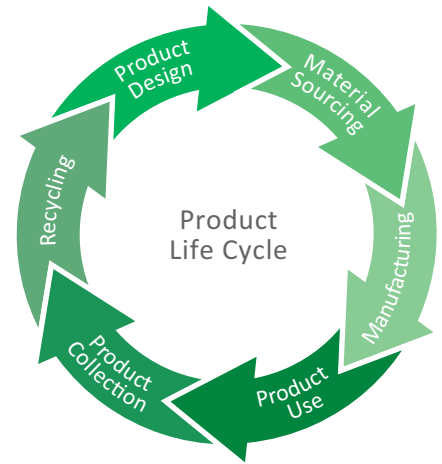
Results: 90% recycling of glass for use in new glass products.



Recycling—A Critical Element of First Solar’s Focus on Product Life Cycle Management

First Solar is the leading supplier of thin film PV modules, stemming largely from the superior product design and unique semiconductor technology that makes First Solar modules the most cost-effective on the market.

Underlying First Solar’s success is a commitment to Product Life Cycle Management. From raw material sourcing through end-of-life collection and recycling, First Solar is focused on creating cost-effective renewable energy solutions that protect and enhance the environment.



Collection

At any time, anyone in possession of a First Solar module may request collection. First Solar provides packing materials and instructions and will arrange for collection and recycling. First solar covers all costs of collection and recycling. The module owner’s only requirement is to dismantle and package the material in accordance with First Solar’s instructions.

Recycling

First Solar has developed and implemented a solar module recycling process that produces clean glass for use in new glass products and a metal-rich filter cake that will be further processed to create semiconductor materials for use in new solar modules.

First Solar’s Module Recycling Process results in a 90% overall recycling rate, including:

- 95% recycling of semiconductor material for use in new modules
- 90% recycling of glass for use in new glass products

Financing

First Solar has designed the financing of its Module Collection and Recycling Program to provide assurance to its customers that funding will be available for module collection and recycling whenever customers choose to dispose of modules. To provide additional security for this obligation, First Solar practices a “pay as you go” policy, consistent with the philosophy of extended producer responsibility, setting aside sufficient funds at the time of module sale to meet the estimated future collection and recycling costs of modules at the end of their useful life. First Solar sets aside these funds into a restricted investment account, controlled by a major international insurance company, to ensure the funds will be available for collection and recycling regardless of First Solar’s financial status.

Request for Collection and Recycling

For more information on the First Solar Module Collection and Recycling Program, or for help in processing a collection request, please email recycling@firstsolar.com or call 1(866) 456.8938 (North America), or +0.800.433.32.333 or +00.800.433.32.333 (International Free Phone).



www.firstsolar.com