

FACT SHEET

SOLAR MODULE RECYCLING IN AUSTRALIA: A GUIDE TO THE FUTURE

The Why and How of Solar Module Recycling

The Growing Challenge

Australia's rapid adoption of solar photovoltaic (PV) technology has created an "end-of-life" challenge as the first wave of installations reaches the end of their operational life. While the nation has enthusiastically embraced solar energy, the corresponding infrastructure for managing decommissioned modules is currently fragmented and lacking.

Recycling is essential for:

- **Resource Conservation:** Recovering valuable materials like glass, silicon, silver, and copper, reducing the need for virgin materials and lowering environmental impact.
- **Environmental Protection:** Preventing the disposal of potentially hazardous materials (like lead in older modules or cadmium in some thin-film types) in landfills and mitigating the overall environmental impact of solar energy.
- **Economic Opportunity:** Creating new jobs in collection, transportation, and processing, and promoting a circular economy.

The Two Main Module Types

Solar modules primarily use one of two technologies which are **Silicon-Based (Si) Modules** which are the most common and **Thin-Film Modules**.

Si modules (monocrystalline and polycrystalline) make up the majority of the market and are known for their

high efficiency. The less common Thin-Film Modules often use technologies like **Cadmium Telluride (CdTe)** that present rare and toxic materials.

The Recycling Process

1. **Initial Dismantling:** Removal of the easy-to-recycle aluminium frame and junction box
2. **Glass Separation:** The most challenging step, typically using one of three processes: Mechanical (shredding/crushing for financial viability), Thermal (heating to break down EVA), or Chemical (solutions to dissolve EVA)
3. **Material Recovery:** Focus shifts to extracting high-value materials like silicon, silver, and copper from the remaining components. For Thin-Film Modules, after disassembly and material separation, the valuable Cadmium Telluride (CdTe) component is purified for reuse in new solar modules.

The Material Purity Hurdle

The purity of the recovered materials dictates their final use and market value.

- **High Purity:** High-purity silicon can be used directly in new solar cells, reducing the need for virgin materials.
- **Lower Purity:** Contaminated silicon may only be suitable for lower-grade applications, such as metallurgical silicon production.
- **Advanced Techniques:** Techniques like chemical leaching and thermal processing can yield higher recovery rates and purity than simple mechanical crushing, but they often require more energy and specialized infrastructure.



The Australian Landscape and Future Roadmap

Current Australian Status and Regulation

Australia currently **lacks a comprehensive federal legislative framework** mandating solar panel recycling. Recycling is mainly driven by market forces and industry initiatives.

JURISDICTION	CURRENT APPROACH/INITIATIVE
Federal	No mandatory recycling legislation or cohesive national strategy to manage decommissioned solar panels. Solar panels have been listed on the Minister's Stewardship Priority List.
Queensland	Supported the delivery of the largest solar panel recovery pilot in the Southern Hemisphere which is a crucial step to collect data, prioritise collection/recycling, and inform future national policies
New South Wales	Currently developing a Regulatory Impact Statement (RIS) following the Energy & Climate Change Ministers Meeting in August 2025 and has introduced legislation Product Lifecycle Responsibility Act to respond to problematic waste streams.
Victoria	Landfill ban for decommissioned solar panels are in place.

The Future Roadmap: Challenges and Next Steps

Main Challenges

For Australia to establish a robust and economically viable solar recycling system, several challenges must be addressed:

- **Economic Viability:** Recycling costs (collection, transportation, labour) often outweigh the value of the small amounts of valuable materials recovered.
- **Infrastructure & Logistics:** There is a lack of widespread, accessible collection points and insufficient recycling infrastructure, particularly in remote areas.
- **Design Complexity:** The use of multiple materials, different cell/module sizes, and strong adhesives (EVA) makes developing one standardised, cost-effective process difficult.
- **Regulatory Consistency:** The lack of clear, consistent, and mandatory regulations across all states creates uncertainty and lacks incentives for modern recycling development.

Key Steps for Further Development

The long-term sustainability of the solar industry depends on the following developments:

1. **Mandatory Extended Producer Responsibility (EPR):** Implement federal EPR programs to shift the financial and logistical responsibility for end-of-life management onto manufacturers. This incentivises designing panels for easier recycling.
2. **Investment in R&D:** Develop more efficient, automated, and cost-effective recycling technologies that can recover high-purity materials faster.
3. **Design for Recycling (DfR):** Manufacturers must integrate end-of-life considerations into the initial design. This means standardising module sizes and exploring alternatives to strong adhesives like EVA to facilitate easier disassembly.
4. **National Strategy & Infrastructure:** Develop a cohesive national strategy that includes investing in local recycling facilities, establishing efficient collection networks, and creating clear guidelines for panel handling.
5. **Incentives:** Governments should provide financial incentives or subsidies (like tax breaks or feed-in tariffs for recycled materials) to offset costs and make recycling more economically viable.

For more information on solar panel stewardship, contact stewardship@smartenergy.org.au or visit <https://smartenergy.org.au/reuse-recycle/>