REUSE OF SOLAR PANELS

Old Panels Can Power a New Future

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Executive Summary

Australia’s rapid adoption of solar photovoltaic (PV) panels is creating a growing challenge: what to do with the surge of solar panels reaching end-of-life. Most end-of-life panels are directed to landfill or recycling. However, recycling is not always economically viable, with significant volumes still ending up in landfill (Riahi et al., 2023).

Even though reuse sits higher in the waste hierarchy, it has received limited attention in practice, with few initiatives focused on extending panel lifespans and advancing a circular economy.

Drawing on in-depth interviews and observational data with 46 participants and analysis of key documents, this report presents the key barriers and enablers on reuse of solar panels. Our findings highlight that simply recycling panels is not enough and reusing functional panels can significantly extend their lifespan and reduce waste.

However, large-scale reuse of PV panels faces technical, economic and regulatory barriers. Key challenges include the low cost of new panels undercutting the resale market, a lack of financial incentives for reuse, fragmented policies across states, unclear liability for second-hand installations, and limited infrastructure for testing and refurbishing used panels.

We recommend robust certification and traceability frameworks as a central foundation to build confidence in second-hand solar panels, alongside supportive policy incentives and technological innovations that can further enable a trusted second-life market.

The report outlines the perspectives of industry leaders, policymakers, researchers, and consumers on PV panel reuse, and highlights how certification, combined with broader policy and technological enablers, can enable a trusted, sustainable second-life market for solar panels.

Introduction

As Australia leads the world in per-capita solar PV installations, the nation now faces an emerging sustainability issue: the management of end-of-life solar panels. Solar PV systems typically have a lifespan of 20-30 years, but in practice, many panels are being removed or replaced much sooner.

Lifespan
20 - 30 years

Projected Waste
1.7 to 8 million tonnes

International Renewable Energy Agency projected a cumulative PV waste of 1.7 to 8 million tonnes, depending on their regular or early loss. This escalation is linked to the first wave of mass installations of panels nearing the end of their operational lives.

The paradigm shift in moving from a linear "take-make-dispose" model to a circular model emphasizes the importance of reusing, refurbishing and recycling panels to minimize waste, reduce the need for virgin materials and decrease the overall environmental footprint of solar energy (Tsanakas et al., 2019).

To understand the challenges and identify potential solutions, this report presents the findings based on the perspectives of key stakeholders in Australia's solar sector. It draws on semi-structured interviews with industry experts, government policymakers, academic researchers, and consumers, supported by document analysis. The study provides a comprehensive overview of the current state of reuse. By consolidating these diverse viewpoints, the report provides a comprehensive overview of the current state of solar PV panel reuse in Australia.

Traditionally, the focus has been on recycling old panels for raw material recovery. However, to promote circularity, it is important to prolong the "use phase" of the panels, which requires a shift of focus towards reuse of decommissioned panels. Promoting reuse will require addressing key enablers and barriers such as regulatory frameworks, consumer trust, and market incentives.

Major Insights from Our Research

Our research suggests that the future of solar panel reuse in Australia is shaped by three interconnected dimensions: the barriers currently preventing reuse, the opportunities that reuse presents, and the critical role of certification and testing that the respondents consistently identified as essential to move forward. Together, these insights highlight both the complexity and the potential of reusing solar PV panels, and underscore the importance of creating trusted systems to enable reuse.

Barriers - Technical, Economic and Regulatory Hurdles

Our respondents reported that significant challenges hinder the reuse of solar PV panels in Australia. These challenges are multi-faceted, spanning technical issues, economic issues and regulatory gaps that together create a difficult environment for the reuse of second-hand panels.

Economic barriers: From an economic standpoint, the falling cost of new panels undermines the resale market for second-hand panels, leaving little financial incentive for consumers or businesses to choose reuse.

Solar technology costs have fallen so sharply in recent years that buying new is often only marginally more expensive than buying second-hand, while offering higher performance and full warranty coverage. This sentiment was widely shared among stakeholders. A second major economic hurdle is the lack of financial incentives for reuse. Australia's solar subsidy regime, particularly the Small-Scale Technology Certificates (STCs) for new installations makes new panels more attractive. Currently, there are no equivalent rebates or credits for installing second-hand panels, leaving reused solar panels at a financial disadvantage. Together, cheap new panels and misaligned incentives mean that under present conditions the business case for panel reuse is weak or non-existent in Australia.

Economic barriers

- Falling cost of new panels
- No financial incentives

Regulatory gaps

- No national framework
- No clear pathways/ guidelines for reselling

Technical and infrastructure challenges

- Lack of reuse logistics
- Costly testing
- No traceability/panel history

Regulatory gaps: On the policy and regulatory front, stakeholders described a landscape of uncertainty that discourages reuse initiatives. In the absence of a national framework, different Australian states and territories have developed inconsistent rules for solar panel end-of-life. For businesses operating across jurisdictions, it is challenging to navigate varying standards on what can be done with decommissioned panels. There is also no clear approval pathway or guidelines for re-selling and installing used panels, leaving installers wary of potential legal liabilities. This uncertainty makes installers and suppliers hesitant to handle second-hand panels. Interviewees stressed that without a unified, national approach to standards and liability, companies will continue to avoid reuse due to compliance risks.

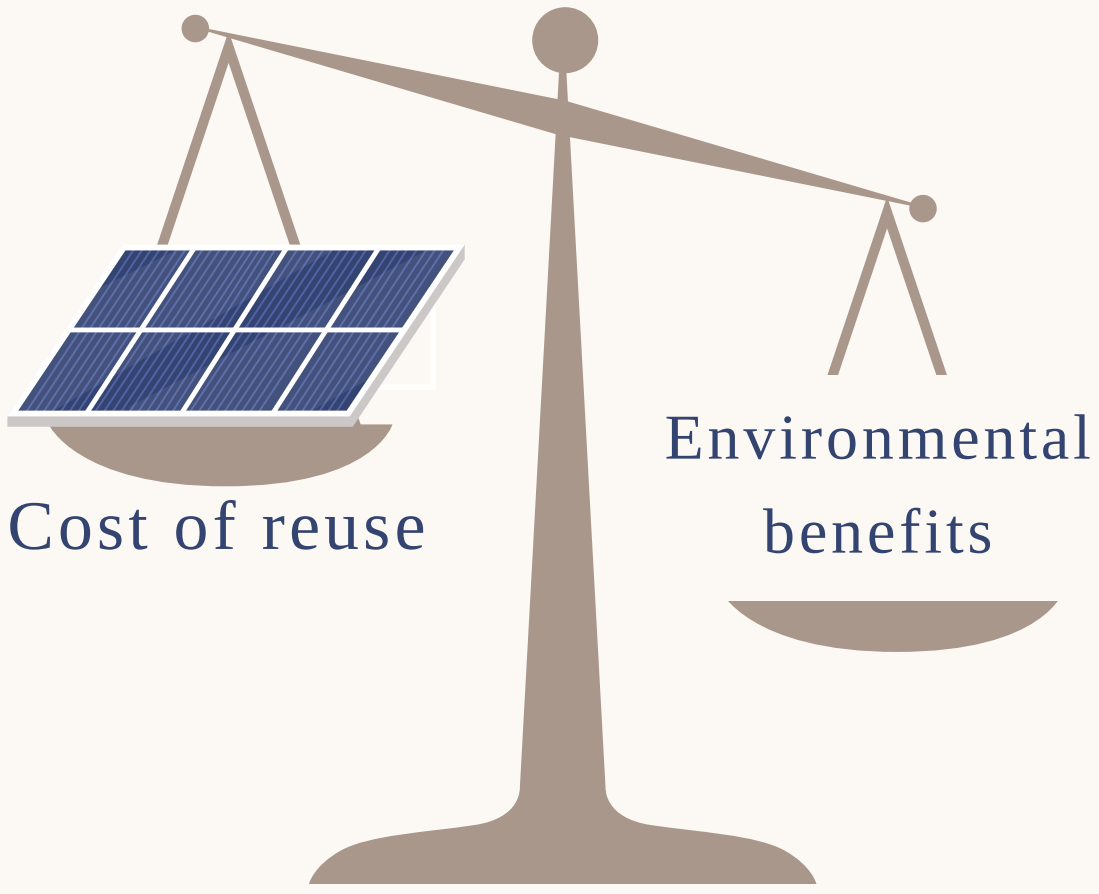
Technical and infrastructure challenges: Beyond economics and policy, there are technical challenges that make reusing solar panels difficult. A pervasive theme in the interviews was that Australia lacks an established reuse infrastructure for PV panels. Collecting used panels can be difficult because there is no coordinated system to identify where decommissioned panels are or how to channel them into second-life uses. This lack of logistics means many panels that could be reused instead end up in landfill or sent for recycling (which is energy intensive and often not cost effective).

Even when used panels are recovered, testing and refurbishment present technical hurdles. There is significant variability in solar panel models and conditions, which complicates standard testing procedures. Stakeholders reported that current testing processes for panels are labour-intensive and costly involving steps like visual inspections, electrical safety tests, Current-Voltage (IV) curve tracing, and possibly electroluminescence imaging to detect micro-cracks. These procedures ensure safety and performance but add significant overhead costs. Efficiently processing used panels at scale remains a technical challenge that must be overcome for reuse to be economical.

Finally, an important issue raised by many participants is the lack of trustworthy data and traceability for used panels, which feeds into broader concerns about quality and safety. Important details like a panel's age, whether it ever sustained damage or how much its performance has degraded are often not available. This trust deficit is fundamentally a technical and informational challenge and points to the need for better tracking of panels' history and transparent certification of their safety and performance before reuse.

Opportunities for Reuse

Despite the challenges our findings highlight compelling opportunities and benefits in pursuing solar panel reuse. our respondents reported that with the right interventions, Australia can unlock a secondary market for used panels that delivers both environmental and social dividends. The following are key opportunities that emerged from the interviews:



Environmental and economic benefits: Expanding the reuse of PV panels would advance Australia's sustainability goals by reducing waste and moving closer to net zero. A key government circular economy report found that even when the additional costs of reuse are accounted for, they are outweighed by the environmental benefits of keeping panels in use longer (Productivity Commission, 2025). In effect, reuse can significantly lower the life-cycle footprint of solar energy. Some interviewees noted that reuse could help delay the looming solar e-waste wave, buying time for recycling capacity to scale up for when panels truly reach end-of-life.

Moreover, reuse can make solar energy more accessible and affordable for a broader segment of the community. Second-hand panels, if properly certified, could be sold at lower prices to community organizations or lower-income households that otherwise might find the upfront cost of solar expensive.

Policy interventions and incentives: Our respondents suggested that targeted policy changes could tip the scales in favour of reuse, creating new opportunities. The respondents pointed to international examples: for instance, the European Union's Waste Electrical and Electronic Equipment (WEEE) Directive requires manufacturers to take back solar panels at end-of-life, a model that could be adapted in Australia to ensure panels are collected and assessed for reuse before recycling. However, reports suggest that Australia's heavy reliance on imported panels makes the Extended Producer Responsibility (EPR) approach challenging. Another related suggestion was to introduce rebates or subsidies for using second-hand panels. A few policymakers imagined a future where installing a certified used panel might earn a small rebate or some form of credit, helping to level the playing field with new panels. This could be especially impactful after 2030, when Australia's current new-solar subsidies are scheduled to end. In the regulatory domain, participants highlighted the opportunity to develop a national standard or framework for reused panels, which could include technical standards, safety certifications and clear liability rules.

Technological innovation and traceability: Our respondents saw an opportunity in leveraging technology to address current barriers, particularly regarding panel traceability and testing efficiency. Digital traceability systems were frequently mentioned as a game-changer for reuse. If each solar panel's history and performance data could be recorded in a database accessible to buyers and regulators, it would dramatically reduce uncertainty. Industry experts proposed solutions ranging from simple QR-code labels to blockchain-based platforms that track a panel's "digital passport" throughout its life. This transparency would enable quicker decisions on whether a panel is fit for reuse, without requiring extra testing at each change of hands. Participants also noted that if testing could be achieved at a fraction of current costs, many more panels would become economically viable to reuse, suggesting a market opportunity for technology providers.

Certification as a Solution

A dominant theme across all our interviews was the call for a formal certification and product traceability system for reused solar panels. Our respondents believed that if Australia can implement a robust certification scheme it would dramatically improve confidence in second-hand panels and unlock the reuse market. This section examines what such a certification system would entail.

At its core, the goal of certification is to ensure that any reused panel meets safety and performance standards, thereby making it a trustworthy product. Currently, the lack of any standard certification for used panels means buyers and installers have little to rely on besides a seller's word. An official certification process would change that. According to stakeholders, a credible certification program should include several elements: standardized testing protocols for used panels, grading of panels based on condition or remaining efficiency, documentation of test results, and a clear label or certificate that follows each panel in the market. Importantly, participants stressed that the certifying entity must be an independent authority, emphasizing that self-certification by manufacturers or sellers would lack credibility.

Another widely agreed principle was that the certification system should be uniformly adopted and implemented across the national. Industry and government stakeholders alike noted that a patchwork of different standards in each state would be counterproductive, instead, a single Australian certification framework for reused PV panels would ensure consistency. By bridging the trust gap, certification can transform reused panels from a risky option into a transparent and standardized product category.

A number of respondents also recommended that certification be accompanied by a clear, consumer-friendly grading system such as a Gold/Silver/Bronze classification or a star-rating label to indicate the remaining efficiency and expected lifespan of a panel. This would allow buyers to make informed decisions.

A critical complement to the certification idea is the implementation of product traceability tools, such as panel tracking databases or digital tags. Certification would typically be done at a point in time when a panel is tested for resale, but traceability ensures that information about each panel is recorded and accessible throughout its life. Implementing traceability from the point of manufacture onwards would significantly streamline the eventual reuse process.

Conclusion and Recommendations

The reuse of solar photovoltaic panels in Australia stands at a crossroads. On one hand, the barriers of cost, policy, and trust have so far kept the idea of a second-life solar market largely in the realm of theory. On the other hand, there is a growing recognition across industry, government, academia and consumers that these barriers can and must be overcome to fully realize a circular economy in the solar sector. The findings presented in this report underline that with the right frameworks in place, Australia can safely and profitably extend the life of its solar panels, reaping environmental and social benefits in the process. The key to unlocking this potential is to build confidence through standards, specifically via independent certification and robust product traceability. By addressing the root concerns of quality and safety, certification can help the development of reuse infrastructure, marketplaces, and supportive policies.

However, this will require concerted action and commitment from all stakeholders. Based on the insights of this research, we offer the following recommendations:

1. Establish a National PV Panel Reuse Certification Scheme:

Develop and implement a nationwide certification program for second-hand solar panels, led by an independent body with government backing. This should include defined testing protocols, grading criteria and a clear label or certificate for approved panels.

2. Implement Product Traceability Systems:

Mandate the use of traceability tools for solar panels, such as serial number registries or QR code tags that link to a panel's history and test records. Consider a digital platform that records each panel's entire lifecycle events. This will provide transparency and support the certification scheme by maintaining the chain-of-custody and status of each panel.

3. Introduce Financial Incentives for Reuse:

Develop economic incentives to support the reuse market. This could include rebates or credits for installing certified second-hand panels and subsidies to cover testing and certification costs. For example, when the STC new-installation subsidy ends in 2030, part of its budget could be reallocated to a "Reuse Rebate" to encourage adoption of certified pre-owned panels.

4. Invest in Reuse Infrastructure and Innovation:

Provide support for developing the infrastructure needed to collect, test and refurbish used panels at scale. This may involve funding grants or incentives for companies to set up testing facilities and refurbishment centres in each region. Support R&D into automation of panel testing to reduce labour costs and into improving panel design for future reuse.

By acting on these recommendations, Australia can address the concerns identified by stakeholders and create an environment in which solar panel reuse becomes an integral and trusted part of the solar industry. In doing so, Australia will not only mitigate a looming waste problem but also extract maximum value from its clean energy investments, setting a powerful example of sustainability in action.

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