



26 March 2026

Committee Secretary  
Standing Committee on Climate Change, Energy, Environment and Water  
PO Box 6021  
Canberra ACT 2600

Dear Secretary,

**The House of Representatives Standing Committee on Climate Change, Energy, Environment and Water – Inquiry into Solar Panel Re-use and Recycling**

The Clean Energy Council (CEC) welcomes the opportunity to respond to the Inquiry into Solar Panel Re-use and Recycling.

**Executive Summary**

Australia is entering a steep and inevitable end-of-life (EOL) curve for solar photovoltaic (PV) systems installed from 2010 onwards, with national waste volumes projected to rise from approximately 59,000 tonnes in 2025 to more than 91,000 tonnes by 2030 and towards one million tonnes by 2035. Without coordinated national action, systemwide inefficiencies, escalating stockpiles, and increasing cross-border waste movements will compound environmental and economic risks.

At present, the majority of EOL panels are landfilled, stockpiled, transported interstate or overseas to exploit lower disposal costs, or sold second hand without testing or traceability. These practices undermine domestic circularity and create uneven regulatory and economic outcomes across jurisdictions. While up to 95 per cent of panel materials are technically recoverable, low commodity values, fragmented regulation, and the absence of a mandatory product stewardship scheme suppress recycling uptake and private investment.

Nationally expanding onshore reuse and recycling capability offers significant advantages for households, the environment, supply chain resilience, and regional economic development. Properly tested and warrantied second life panels can improve energy access for low-income and remote communities. High-recovery recycling reduces pollution, conserves critical minerals, and strengthens Australia's clean energy supply chains. Emerging commercial models, combined with federal pilot programs, indicate that coordinated logistics and



regulated stewardship can make reuse and recycling cost-competitive with landfill while delivering superior public and environmental value.

However, Australia's current system remains constrained by technical processing challenges, inconsistent state-based landfill rules, informal export channels that divert panels from legitimate reuse markets, and a lack of national standards for testing, warranties, and data reporting. Reform must therefore focus on correcting the underlying price signals and governance gaps that currently favour disposal over circular outcomes.

The CEC proposes the following key Recommendations

1. Establish a Mandatory National Product Stewardship Scheme
2. Implement Nationally Consistent, Staged Landfill Restrictions
3. Adopt a "Reuse-First" Framework with Strong Consumer Protection
4. Strengthen Export Controls and Basel Convention Compliance
5. Invest in Regional Recycling Infrastructure and Logistics
6. Introduce a National Traceability, Data and Transparency Framework
7. Strengthen Market Integrity and Public Confidence

A national, mandatory product stewardship scheme that is supported by staged landfill restrictions, traceability requirements, strengthened export controls and investment in regional recycling infrastructure would establish the market and regulatory conditions needed to scale reuse, improve recycling viability, and ensure that the economic value of the emerging waste stream is retained within Australia. Embedding robust safety, transparency, and consumer protection measures will also be essential to maintain public confidence and uphold the social licence of the clean-energy transition. Our detailed responses to the Terms of Reference follows.

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## **CEC responses to the Terms of Reference:**

### **a. Current and projected waste volumes from end-of-life solar panels in Australia**

Australia is entering a steep end-of-life (EOL) curve as early rooftop systems (circa 2010 to 2016) reach their 20 to 25 year nominal replacement window. Environmental Solar Recycling Australia (ESRA) estimates that PV waste will rise from ~59,000 tonnes in 2025 to

>91,000 tonnes by 2030, and toward ~1 million tonnes by 2035. The CEC has separately cited a projection of >1.5 million tonnes by around 2050, underscoring both the scale and certainty of the coming waste stream.

## **b. current disposal practices and trends**

Today, EOL panels are commonly either:

- (i) sent to landfill,
- (ii) stockpiled at depots or on properties due to limited options,
- (iii) shipped interstate/overseas to chase lower disposal costs, and
- (iv) informally resold second-hand, often without performance testing or traceability.

ESRA also warns that some removed Australian panels are entering loosely regulated export markets such as parts of Africa and the Middle East, shifting environmental burdens offshore and undermining domestic circularity.

The CEC has previously broadly highlighted both that 95% of solar panel content is recyclable and the low recycling uptake and the role of fragmented policy in achieving this outcome.

By using recycled materials, we can reduce the use of raw materials in new energy-generating products and in other manufacturing sectors. Global competition for materials essential to the renewable energy transition is projected to increase in coming years. Use of recovered and recycled materials, including critical minerals that can be extracted from end-of-life renewables and electronics, can help meet these demands. *Recycling the future: sustainable solutions for renewable energy technologies. Clean Energy Council*

It is worth noting that in Victoria, solar panels are classified as e-waste and banned from landfill. Other jurisdictions are at different stages, this lack of jurisdictional consistency in regulation unfortunately contributing to cross border waste movements and uneven incentives for re-use or recycling.

## **c. The comparative costs of solar panel reuse, recycling and landfill disposal, including valuation processes behind landfill disposal prices**

Australia's end-of-life solar panel challenge sits within an economic landscape where landfill disposal continues to appear deceptively inexpensive. This perceived cost advantage is largely artificial as landfill gate fees rarely account for the long-term environmental risks, resource losses, or the broader societal costs associated with unmanaged waste. At the same time, producers currently shoulder little responsibility for collection or processing, this further skewing the economics toward disposal. The Clean Energy Council (CEC) is of the view that this imbalance is structural rather than inherent. When logistics are coordinated and volumes aggregated under an effective product stewardship scheme (such as container deposit schemes), practical reuse and recycling solutions can rival or even outperform landfill on cost whilst also delivering superior environmental outcomes. Matters to consider further here include the:

- **Observed cost reality:** Landfill often appears “cheapest” because gate fees typically exclude externalities (e.g., long-term pollution risk, lost resource value) and because producers currently bear little to no cost for collection and processing. When logistics are coordinated and volumes aggregated under a product stewardship model, reuse and recycling can become cost-competitive. The CEC emphasises that the low material recovery value relative to processing costs is a key barrier in today's market.
- **Valuation mechanisms behind landfill prices:** Landfill pricing is a function of gate fees, levies and to a lesser extent local market competition. But in the absence of stewardship or landfill bans, external costs are not priced in, tilting decisions toward disposal. The CEC therefore argues for regulatory reforms so that landfill is no longer the default least cost option.
- **Implication:** Introducing producer funded stewardship fees, harmonised landfill restrictions and better logistics coordination should rebalance the economics in favour of tested reuse first, and then towards high recovery domestic recycling.

Meaningful reform of Australia's solar panel waste system requires shifting the underlying price signals that currently distort decision making. With prudent measures in place, the economic centre of gravity would move decisively toward verified reuse and high recovery domestic recycling, supporting a circular economy.

**d. Potential benefits to Australia of expanding onshore reuse and recycling of solar panels, including for households, the environment, energy security supply chain resilience and the economy, including the economic benefits of recovering solar panel resources (such as glass, silicon, aluminium, copper, silver and other critical minerals)**

Expanding Australia's onshore capacity for solar panel reuse and recycling offers a suite of interconnected benefits that extend well beyond waste reduction. The Clean Energy Council emphasises that, when supported by strong standards and coordinated national frameworks, these practices can simultaneously improve social equity, strengthen environmental protection, enhance national resource security, and stimulate regional economic development. The following points outline how a well designed end-of-life solar management system can deliver broad value across households, communities, and the wider economy.

- **Households & communities:** Verified, tested second-life panels (with traceability and warranties) can lower energy access barriers for lower income households, for community energy projects, and for remote and off-grid users provided that safety and performance standards are enforced.
- **Environment & Health:** Diverting panels from landfill avoids breakage related leachate risks and micro-fragment pollution. Specialist recyclers can now recover up to 90% of panel materials in some Australian contexts.
- **Energy security & supply chains:** Recovering aluminium, copper, silver, high-purity silicon and specialty glass reduces import reliance, supports domestic manufacturing inputs and aligns with circular economy goals. The CEC has previously emphasised the use of responsible decommissioning and resource recovery as part of "doing renewables right." See CEC: *Recycling the future: sustainable solutions for renewable energy technologies*.
- **Economy & jobs:** Federal announcements around the national pilot for solar panel recycling and recovery point to a multi-billion dollar upside. The CEC believe that a regional hub model can create durable jobs in collection, testing, refurbishment, logistics and processing, especially in rural and regional centres.

By embedding robust safety standards, fostering domestic recovery industries, and ensuring that material value is retained within Australia, governments can help deliver cleaner environments, more resilient supply chains, and long-term economic gains, particularly in regional areas poised to host new circular-economy infrastructure.

#### **e. The state of development of Australia's solar panel reuse and recycling capabilities, domestic markets for second hand solar panels and recycled materials, and relevant policy and regulatory frameworks at state and federal levels**

Australia has a small but growing number of recyclers and/or refurbishers and logistics providers. The Commonwealth has launched a National Solar Panel Recycling Pilot

(A\$24.7 m) aiming for up to 100 collection sites and ~250,000 panels collected to generate national logistics and processing data. The current capacity is improving but not yet sized to the projected volumes, especially outside major cities.

Therefore specific and urgent direction is required to develop:

- **Second hand markets:** The CEC believes that demand exists for tested second hand modules where standards/warranties are clear. However, this potential is disrupted by parallel informal export channels that lack testing and traceability displacing domestic circular activity.
- **Policy & regulation:** The Federal Government is progressing a national approach via the pilot and work toward a product stewardship proposal and broader consultations such as *Wired for Change* which consider regulated stewardship for PV panels. Mixed settings in jurisdictions at different stages creates a patchwork that can encourage cross-border disposal to the lowest standard, and should be addressed.

#### **f. Barriers to reusing and recycling solar panels at scale in Australia, including technical, commercial, regulatory or any other challenges.**

Australia's ability to scale solar panel reuse and recycling is currently constrained by a combination of technical, commercial, regulatory and market integrity challenges, each of which limits the efficiency, consistency and credibility of end-of-life management.

- **Technical:** Multi-layer lamination and adhesive encapsulants make material separation complex. While advanced processes exist, scaling them cost effectively and consistently remains a challenge.
- **Commercial:** Low commodity values (relative to processing costs), high transport and logistics costs, and insufficient throughput certainty (without stewardship) may be suppressing private investment.
- **Regulatory/policy:** Fragmented rules such as state landfill policies, the absence to date of a mandatory national stewardship scheme, and a lack of reuse/testing/data standards each impede national and systemwide performance.
- **Market integrity:** Informal secondhand exports and untested domestic resales risk leakage and reputational damage, undermining future legitimate reuse markets.

## **g. Alternative policy options for governments to help overcome these challenges**

### **A synthesised package would include:**

- 1. Mandatory National Product Stewardship:** Producer-funded (per-unit fees), with binding reuse/recycling and landfill diversion targets, accreditation of service providers, and periodic re-use target ratchets.
- 2. Nationally Consistent, Staged Landfill Restrictions:**  
Phase 1 (by 2027) national ban on landfilling of intact modules. Phase 2 (by 2028) extend to all modules. To be coordinated through relevant ministerial councils to avoid cross border “dumping”. Align panel landfill pricing with environmental externalities.
- 3. Reuse First Policy with Consumer Protection:**  
National testing/performance standards, warranties, and labelling for second-life panels. Targets and incentives for verified second-life deployment in social housing, community energy and perhaps remote community applications.
- 4. Export Controls and Basel Compliance:**  
Phase out of poorly regulated exports. Require full documentation and (post export?) compliance guarantees for any remaining exports to prevent offshore dumping.
- 5. Infrastructure & Regional Logistics:**  
Target a permanent hub-and-spoke network covering most LGA’s leveraging ARENA and “Future Made in Australia” programs to establish recycling commercialisation.
- 6. Data, Traceability & Transparency:**  
Implement unique IDs like QR codes and a national registry to track panels across lifecycle stages. Mandate the reporting of diversion and recovery outcomes to inform any fee setting and inform policy adjustments.

### **h. Any other relevant matter.**

- **Equity and public confidence:** Reuse and recycling must be safe, auditable, and consumer protective. Clear standards and warranties help build trust, and publicly reported performance data helps sustain the social licence for the clean energy transition. These are already key CEC themes.



## Sources

- **Clean Energy Council (CEC):** Submission to House Inquiry on waste management & recycling (PV & wind); *Wired for Change* submission (2023); Recycling/decommissioning fact sheets and briefs; public statements on national coordination.
- **ESRA:** *Submission 02 – ESRA submission to Parliamentary Inquiry*: waste projections; landfill bans; reuse-first; export controls; hubs/logistics; standards/traceability; regional jobs.
- **Government:** DCCEEW National Solar Panel Recycling Pilot; Sustainability Victoria's national approach and Victorian e-waste landfill ban.

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