

QUEENSLAND HOUSEHOLD SOLAR PANEL RECOVERY PILOT FINAL REPORT

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EXECUTIVE SUMMARY

This report details the outcomes of the **Queensland Household Solar Panel Recovery Pilot Stage 2**, funded by the Queensland Government, which ran from 2024-2025. The pilot aimed to understand the challenges and opportunities in collecting, reusing, and recycling household solar panels in Queensland.

Key findings include:

- **Scale of the Problem:** Queensland has over 1.1 million homes with solar, equating to an estimated 17.6 million panels. The report suggests that current waste forecasting models underestimate the volume of decommissioned panels, with an estimated 600,000-800,000 units removed annually from households in Queensland due to breakages, weather damage, and technology upgrades (with 62% of collected panels being 7-10 years old, well short of their 25-30 year lifespan).
- **Collection Models:** The pilot tested five collection models: Retail Drop, Consolidation Points, Back to Base, Residential Milk Run, and Regional Council Drop. Installer-led models (Consolidation Points and Back to Base) were the most efficient and cost-effective, collecting the highest volumes (6,920 and 6,040 panels respectively). Resident-led models, while popular with the public, faced significant logistical challenges, high cancellation rates, and increased per-panel costs.



- **Logistics and Transportation:** Logistics costs dominate the overall expenses, accounting for over 60% of total system costs. The choice between pallets and stillages for transport impacts efficiency, with pallets being more cost-effective for high volumes when staff are adequately trained in handling.
- **Recycling Ecosystem:** The pilot involved three recyclers with mechanical, hybrid-thermal, and hybrid-chemical approaches, demonstrating varying trade-offs in cost, recovery rates, and material purity. Material recovery was successful, with materials like glass, aluminium, and silicon being reintegrated into Australian end-markets.
- **Capacity Gap:** Queensland's theoretical processing capacity is 240,000 panels annually, which is insufficient for the estimated 600,000+ panels decommissioned each year, highlighting a need for further investment and expansion.
- **Financial Viability:** Per-panel costs ranged from \$43.00 in metropolitan areas to \$80.50 in remote areas. An installer incentive of \$5-\$10 per panel proved effective, with participation remaining consistent even when halved, suggesting that a reliable disposal pathway is highly valued by commercial participants.
- **Reuse Study:** A study on approximately 5,000 collected panels revealed challenges to establishing a viable reuse market, including the need for multi-test protocols (visual, rapid triage, and safety testing) to confirm reusability. Legal and regulatory roadblocks also exist.
- **Stakeholder Engagement:** Comprehensive engagement with over 250 participants, including installers, retailers, residents, and local councils, was crucial. A call centre handled a high volume of inbound and outbound calls, addressing queries and providing reassurance, especially for residents unsure of disposal alternatives.

The report concludes that while the pilot demonstrated the feasibility of solar panel recovery and recycling at scale, policy certainty and continued investment in infrastructure, training, and streamlined data tracking are essential for a sustainable national stewardship scheme.

1. INTRODUCTION

From 2024–2025, the Smart Energy Council (funded by the Queensland Department of the Environment, Tourism, Science and Innovation) developed a pilot program to better understand the collection, reuse, and recycling of consumer scale (household) solar photovoltaic panels in Queensland.

Table 1.1: SEC partnered with expert delivery partners

COLLECTION & LOGISTICS		
New Limit Waste Services		
		
RECYCLED THE COLLECTED MATERIAL		
Pan Pacific Recycling	ACE Recycling	Sircel
		
CONTRIBUTED TO THE PANEL REUSE TESTING		
Second Life Solar	CSIRO	PV Labs
		
RETAIL COLLECTION SITES		
Rexel/ Ideal	Solar Shift	
		

The project also engaged with over 250 direct participants including Installers, Retailers, Residents and Local Councils and the collective effort of this network delivered Australia’s first solar panel recycling pilot.

This report details the Queensland household solar panel recycling pilot, its methodology, outcomes, and key learnings.

The Queensland Department of Energy and Public Works (now Queensland Treasury) provided additional

funding for the inclusion of commercial and utility-scale solar panels.

This report focuses on household solar panel recovery pilot and the commercial and utility-scale solar panels pilot will be reported under that project separately, noting the two pilots were delivered concurrently and sharing processes for efficiency.

1.1 The scale of the problem

Queensland is a world-leading adopter of household solar energy with installations in the state exceeding more than 1.1 million¹ homes. This represents approximately 50% of all homes in Queensland and rooftop solar installations are continuing to grow rapidly (e.g. an additional 75,000 systems were added in 2023).

The installation of 1.1 million homes are estimated to represent 17.6 million individual solar panels - using 16 panels per household installed. Planning for the disposal of these panels is important.

Whilst there is excellent data for the level of installations, no national or state data is collected to understand the volume of systems being de-installed, and how many solar panels are then discarded. In order to understand this problem, estimates must rely on mathematical models to forecast the volume of unwanted solar panels, supported by direct observations from recyclers, local councils and other solar panel collection points.

Solar panels have an effective life expectancy of up to 25 - 30 years, and as a result forecasters often assume that once installed, household systems will remain in place for this period. This means that a system installed in 2020 is assumed to be removed in 2040-2045. Using this method it is estimated² that approximately 6 million panels will be removed in Queensland by 2035, which represents around 324,000 solar panels being decommissioned per year.

However the findings of our research would suggest that this number does not capture the full picture.

For example it fails to take into account:

1. Breakages on installation – despite the best efforts of installers breakages occur when systems are installed - we expect these to be about 1-3% of total units installed (based on 2023 installations we forecast this to be about 40 thousand units per year)

1 “Mid-scale Solar PV System Projections” (<https://cer.gov.au/document/mid-scale-solar-pv-modelling-report-jacobs-august-2024>)

2 Australian Photovoltaic Institute, Market Analysis (<https://pv-map.apvi.org.au/analyses>)

2. Weather damages from extreme weather conditions are difficult to forecast, however we have assumed a similar number as installation breakages (40 thousand units per year)
3. Technology upgrades – Household solar can be thought of as more of a consumer product like a flatscreen TV, rather than a hot water service. Energy costs are a major household expense and rational consumers take note of their energy bills and seek to minimize them. Rapid changes in technology mean that newer technology provides more energy for the same footprint, and together with rapidly falling prices and government incentives provide a powerful motivator for regular systems upgrades. If only 2.5% of installed systems are upgraded each year - that would trigger the deinstallation of approximately 450-550k panels per year. (1.1 million x 2.5% x 16 units per household).

For these reasons this analysis suggests that the size of the problem is possibly bigger than previously thought and that the current volume of panels from households is somewhere between 600 - 800 thousand units per year, excluding volumes from large scale and commercial sources.

In order to verify this number (50,000 - 65,000 units per month), the project team interviewed recyclers, export collectors and waste management companies. These sources broadly agreed with this result.

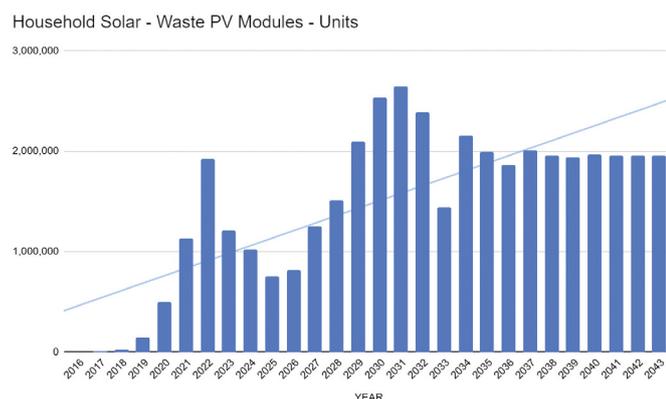


Figure 1.2.1: Estimate - Household Waste Solar Panels (Units)
Source APVI and SEC³

Using these assumptions its possible to suggest that up to 29 million units will be decommissioned out to

2040, noting that this just one basis, and that there will be a range of factors that will affect this including the volume of new housing, the type of housing built, changes in technology, the effect of government subsidies and the state of the general economy - all of which will have an impact on the rate of new systems installed.

1.2 The Household Solar Energy Market: Rapidly evolving

The household solar energy market is undergoing a significant transformation due to the rapid decline in the cost of new, highly efficient solar panels. This trend has created a two-pronged impact on the industry - early requirements and a collapse in the re-use export market.

1.3 Early Household Solar System Removals

Rapid price decreases⁴ in cost and coupled with significant improvements in power output of new PV Systems are leading to the early removal of existing household solar systems. The situation is exacerbated by changes to export markets and government policies.

- **Accelerated Upgrades:** Homeowners are now replacing their older, less efficient systems well before their 25–30 year lifespan expires. The lower cost of new panels, particularly when paired with the installation of a Battery Energy Storage System (BESS)⁵, makes upgrading a more compelling financial decision than waiting.
- **Collapsed Reuse Market:** The dramatic fall in the price of new panels has made the market for used panels largely unviable. Previously, panels from countries like Australia were exported for reuse in other regions, such as parts of Africa. Now, new, more efficient systems are available at a similar or even lower cost, making the export of used panels economically pointless.
- **Government Policy:** Federal and state incentives appear to be accelerating this trend. Schemes like Queensland’s Battery Booster Rebate⁶ and the national Cheaper Home Batteries Scheme are projected to drive a substantial number of early

³ <https://pv-map.apvi.org.au/postcode>

⁴ Solar Panel Costs: Solar Choice Price Index (<https://www.solarchoice.net.au/solar-panels/solar-power-system-prices/>)

⁵ The Qld suburbs leading home battery uptake (https://www.queenslandconservation.org.au/suburbs_leading_home_renewables_uptake)

⁶ Queensland Government. (2024). “Battery Booster Rebate.” (<https://www.epw.qld.gov.au/about/initiatives/battery-booster-program>)

panel replacements nationwide⁷. For instance, the Commonwealth's Small-scale Renewable Energy Scheme incentive⁸ has contributed significantly to Queensland's status as a global leader in rooftop solar adoption, leading to a strong, continuous uptake of new panels and a more recent surge in battery installations.

1.4 Critical Minerals and Recycling

This surge in decommissioning presents a significant economic opportunity.

- **Critical Mineral Recovery:** Decommissioned solar panels are becoming a major source of critical minerals in Australia. The total value of recoverable materials is projected to exceed \$6.5 billion⁹ by the mid-2030s, with approximately 25% of this opportunity located in Queensland due to its high solar adoption rate and growing recycling infrastructure¹⁰.
- **Low Recycling Rates:** Despite this potential, current recycling rates are low. Estimates vary; however pilot participants agree that in Queensland it is likely that less than 5% of decommissioned solar panels are recycled annually, meaning fewer than one in 20 panels are recovered. This is lower than the 10% recycling rate predicted for Australia by the ABC. The fate of the remaining panels (over 90%) is unknown, however it is expected that they either stockpiled or sent to landfills, with only a small fraction (around 5%) being exported. This indicates a critical gap between the potential for mineral recovery and the current end-of-life practices for solar panels, representing a significant opportunity for the commercialisation of research and development, investment and employment.

2. HOUSEHOLD SOLAR PANEL COLLECTION PILOT – HOW IT WORKED

The Household Solar Panel Collection Pilot was designed with activities grouped into three primary components: the Pilot Collections Program, a Reuse Study, and comprehensive Stakeholder Engagement. This structure was designed to provide a holistic view

of the challenges and opportunities associated with solar panel end-of-life management.

The Household Solar Panel Collection Pilot goals were:

- To understand how to best solve the identified problems and test multiple pathways to an effective end-of-life collection and management solution that will help drive behaviour change.
- Stimulate development and growth in the panel recovery and reprocessing sector.
- Understand the feasibility of establishing a solar panel manufacturing industry in Queensland by determining the availability of end-of-life panels.

2.1 Solar Panel collection

Solar Panel collection was the core activity of the pilot, designed to understand the logistical and operational costs and challenges associated with this activity. It was conducted in four distinct phases:

1. Consultation & Design: Establishing the framework for the collection trials.
2. Activation & Collection Trials: Implementing diverse collection models in a variety of locations.
3. Data Capture & Analysis: Collecting and interpreting all relevant data, where possible
4. Reporting & Recommendations: Synthesizing findings to inform future strategies.

The pilot collection program was structured to test a range of collection methods and geographical locations to better understand the practical challenges of end-of-life solar panel management.

The pilot tested several collection methods to evaluate their efficiency and scalability. These included retail collection points, commercial consolidation points, back-to-base collections by installers, and direct household collections. To gather a comprehensive understanding of logistical challenges, collection sites were established in diverse locations: urban, inner-regional, and outer-regional areas across Queensland.

⁷ New household battery installations often trigger a full system upgrade for existing solar arrays, with an average of 16 modules decommissioned per system. Over 1 million BESS installations are anticipated due to state and federal incentives.

⁸ "Small-scale Renewable Energy Scheme" (<https://cer.gov.au/schemes/renewable-energy-target/small-scale-renewable-energy-scheme>)

⁹ SEC Estimates

¹⁰ Scoping Study: Solar Panel End-of-Life Management in Australia (Australian Centre for Advanced Photovoltaics, UNSW)

<https://www.unsw.edu.au/newsroom/news/2024/03/Bigger-better-solar-panel-recycling-centres-needed-deal-PV-waste-report?>>

2.2 Household Solar Panel Reuse Study

While the reuse of operational solar panels seems like a common-sense approach to waste reduction, little is known about the practicalities and challenges of this opportunity. This study was designed to fill that knowledge gap by identifying the primary barriers to establishing a viable reuse market, exploring the requirements for a “standardised” reuse test, and developing actionable policy recommendations. The reuse study was structured in two parts:

- **Desktop Study:** A comprehensive desktop study was conducted to bring together existing academic and industry reports on the reuse of solar panels. This synthesis aimed to identify the main obstacles hindering a robust reuse market and inform the subsequent testing and policy development.
- **Panel Testing study:** To provide empirical data, approximately 5,000 solar panels that were collected as part of the pilot were tested through a partnership with the Smart Energy Council (SEC), Second Life Solar, CSIRO, and PV Labs. Each panel underwent a multi-stage assessment:
- **Visual Inspection:** A standard visual check, similar to the one used by electricians during de-installation, was performed to assess each panel’s superficial condition and initial viability for reuse.
- **Rapid Triage Testing:** Panels were then subjected to CSIRO’s Rapid Triage Test Rig. This advanced method used electroluminescence (EL) imaging, a process similar to an X-ray that reveals hidden cracks and defects in a solar panel, to identify hidden defects, such as micro-cracks, and current-voltage (I-V) testing, a test to measure a panel’s actual power output to see how well it’s still working, to accurately assess performance.
- **Safety Testing:** Finally, a “gold standard” wet leakage safety test was performed to ensure the electrical safety of the panels, which is a critical consideration for any reuse market.

The findings from this detailed testing provided the empirical data necessary to support the study’s conclusions and recommendations.

2.3 Stakeholder Engagement

Effective stakeholder engagement was critical to the project’s success, informing both the pilot collection program and the broader study. The engagement strategy focused on two primary groups: pilot participants and the wider renewable energy community.

Engagement Methods: A variety of methods were used to gather feedback and provide back information. These included establishing advisory working groups, conducting one-on-one interviews, operating a call centre, performing site visits, and distributing feedback surveys. The Smart Energy Council and New Limit Waste Services played a central role in communicating with and gathering feedback from participants.

The combined findings and recommendations from these three components will serve to inform future state and national stewardship frameworks for solar panels.

3. PILOT PROGRAM – HOUSEHOLD SOLAR PANEL COLLECTIONS

3.1 Pilot Solar Panel Collection Program Objectives

The Household Solar Panel pilot’s primary objectives were to identify and understand the best pathways for the collection, recycling, and material recovery of solar panels. By engaging installers, retailers, and local councils, the pilot successfully created a decentralized yet connected collection network. This collaborative approach improved accessibility and minimized the logistical barriers that often hinder waste recovery programs.

The pilot was executed over a well-defined timeline, beginning with the consultation and design phase from December 2023 to August 2024, with collections commencing in August 2024, and finishing on April 30, 2025. The project included a number of consultation and design tasks between December 2023 and August 2024, including engaging with industry experts, conducting workshops with key stakeholders, and establishing logistics partnerships to ensure the safe collection of large quantities of panels.

During this period, foundational elements were established, including a site assessment and management framework, along with guidance documentation for packaging.

This planning phase was followed by the operational collection trials, which ran across various dates for different collection types. To ensure an evaluation, the pilot employed a data capture and analysis methodology. This included tracking the number of panels received, monitoring panel movements from rooftop to recycler, and assessing costs across the entire system.

In addition to quantitative data, the program gathered qualitative feedback through structured interviews and

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surveys with a wide array of stakeholders, including councils, installers, recyclers, and households. This approach allowed the pilot to capture behavioural drivers, pain points, and perceived barriers, providing a data foundation for evaluating the system and designing scalable solutions.

3.1.1 Number of panels received

The pilot collection program collected and tracked 18,082 small-scale (residential) solar panels from diverse sources across Queensland. Figure 3.1.1.1 shows a map of the source location of all panels collected, noting that panels were sourced from metropolitan, regional, and outer regional locations.

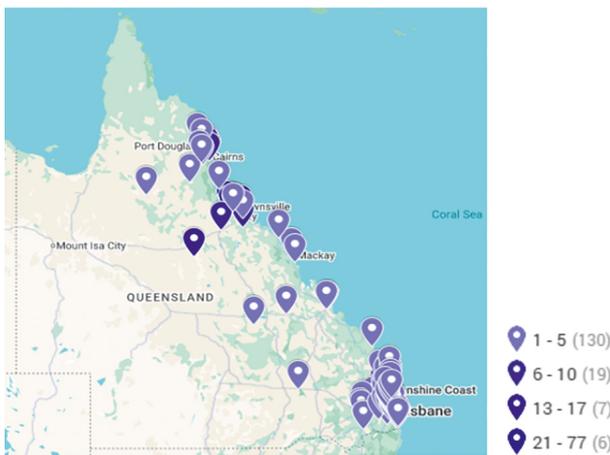


Figure 3.1.1.1: Location of collection program locations by postcode

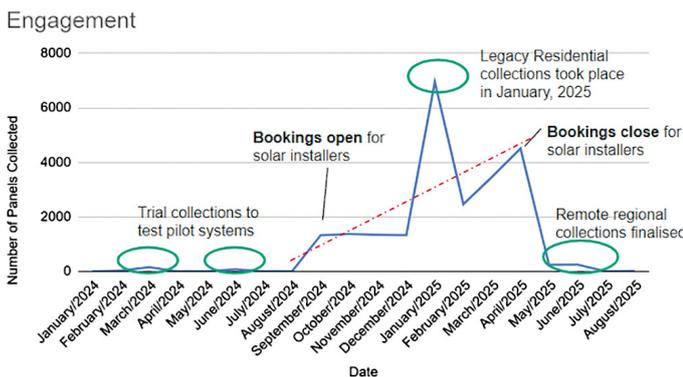


Figure 3.1.1.2: Growth in panel collections between January 2024 and April 2025

*Note: Regional Council drop collections occurred in May and June 2025

3.1.2 Types of solar panels collected

Table 3.1.2.1 illustrates the technological composition of the solar panels collected. It provides a breakdown of the collected solar panels categorized by their core manufacturing technology, quantifying the distribution

between silicon-based panels, thin-film panels, and those of an undetermined technology, presenting each as a percentage of the total sample.

Table 3.1.2.1: Technology of solar panels collected

TECHNOLOGY	PERCENTAGE OF TOTAL
Silicon	99.85%
Thin-film	0.02%
Unknown	0.13%

The collected panels are almost exclusively (99.85%) silicon-based. This aligns with the technology's dominance in the Australian market and confirms that the current waste stream accurately reflects the panels installed over the last two decades.

The brand distribution of the collected solar panels is presented in Table 3.1.2.2. It details the market share of various manufacturers within the collected sample, listing the top 12 most common brands and their respective percentages. It also consolidates the numerous less common manufacturers into an "Other Brands" category and includes a separate entry for panels where the brand could not be identified.

Table 3.1.2.2: Brands of solar panels collected

BRAND	PERCENTAGE OF TOTAL
Trina Solar Panels	8.81%
Suntech Solar	7.23%
Jinko Solar	5.79%
CSUN Solar Tech	4.24%
JA Solar	3.79%
Q CELL SOLAR	3.65%
Phono Solar Australia	3.00%
Renesola Photovoltaic panels	2.87%
ET solar	2.85%
REC Solar	2.77%
Schott Solar	2.34%
Canadian Solar	1.87%
Unknown	4.14%
Other Brands	46.65%

The brand data indicates a highly fragmented market. While several major brands like Trina, Suntech, and Jinko are prominent, no single manufacturer holds a majority share. A significant portion of the waste

stream (46.65%) is composed of a wide variety of less common “other brands”.

The age profile of the collected panels, estimated based on their wattage (Table 3.1.2.3) It groups panels into wattage ranges, assigns an estimated age bracket to each, and presents the percentage of the total collection that falls into each category.

Table 3.1.2.3: Estimated age of collected solar panels by wattage

WATTAGE RANGE (WATTS)	ESTIMATED AGE	PERCENTAGE OF TOTAL
Unknown	Unknown	0.5%
85 - 195	10+ years old	28%
200 - 275	7 - 10 years old	62%
280 - 330	3 - 6 years old	4%
> 330	0 - 3 years old	5%

The age analysis is the most critical finding. The largest proportion of discarded panels (62%) are estimated to be between 7 and 10 years old, well short of their expected 25-30 year operational lifespan. Furthermore, a notable 9% of collected panels are less than 6 years old. This strongly supports the hypothesis that solar systems are often being replaced for reasons other than reaching their end-of-life, such as homeowners upgrading to more efficient technology. This trend indicates that waste forecasting models based solely on a panel’s standard warranty period or useful life are likely inaccurate and underestimate the rate at which solar panel waste will be generated.

3.3.3 Solar Panel Collection models

The central element of the pilot revolved around trying to understand the best way to collect solar panels. In this case “best” means a combination of things, including logistics and transport cost, efficiency, breakages and industry support.

The pilot program tested five distinct collection models to evaluate their efficiency, cost-effectiveness, and operational practicality.

- **Retail Drop:** A collection method where solar panel installers book a time to drop off decommissioned panels at designated retail business locations. These retail sites serve as local, intermediate collection hubs.
- **Consolidation Points:** These are specific drop-off locations, similar to Retail Drop points, where

installers can leave decommissioned panels. The panels are gathered (consolidated) at these sites before being transferred to a central processing facility.

- **Back to Base:** A collection method where solar installers book for a collection of panels from multiple decommission jobs from their business base.
- **Residential Milk Run:** A direct collection service where panels are picked up from individual residential households after the resident has booked a collection, typically through a local council program. The collections are done on a pre-planned, multi-stop route (a “milk run”).
- **Regional Council Drop:** A collection model for regional areas where residents book a time to drop off their panels at a designated location.

Table 3.3.3.1 summarises the collection locations, solar panel collection volumes, bookings and engagement. The findings highlight a clear distinction between the effectiveness of installer-led models versus resident-led models, a crucial consideration for designing a future, scalable program.

3.3.3.1 Installer-Led Collections: Consolidation Points and Back to Base

The most successful collection pathways trialled were those driven by solar installers. The “Consolidation Point” and “Back to Base” models were designed to align with commercial operations, allowing installers to aggregate panels from multiple jobs for a single, efficient drop-off or pickup.

The “Back to Base” model was the most popular collection method among installers, who preferred consolidating panels for one bulk pickup. These models were highly effective, with dedicated consolidation points proving to be well-suited for the program due to staff having the skills and equipment to efficiently stack and wrap panels on pallets.

This professional aggregation approach, where installers took responsibility for bringing panels to a central point, yielded the highest panel volumes and demonstrated a significant potential for scalability. The data from the pilot reinforces the value of professional aggregation.

For instance, the “Consolidation Point” model logged 403 bookings from 55 unique businesses and collected 6,920 panels, while the “Back to Base” process recorded 349 bookings from 56 businesses and collected 6,040 panels. The efficiency of these

Table 3.3.3.1: Summary of the collection locations, solar panel collection volumes, bookings and engagement

	RETAIL DROP	CONSOLIDATION POINT	BACK TO BASE	RESIDENTIAL MILK RUN	REGIONAL COUNCIL DROP
Locations	Ideal Capalaba Ideal North Lakes Ideal Surfers Paradise Rexel Nambour Rexel Toowomba	Solar Shift Rockhampton Solar Shift Townsville	Solar Installer Home Base Locations	Brisbane City Council (BCC) City of Gold Coast (CGC)	Stanthorpe - Southern Downs Council Warwick - Southern Downs Council St George - Balonne Shire Goondawindi Shire Charleville - Murweh Shire
Bookings Commenced	28 August, 2024	28 August, 2024	1 September, 2024	1 November, 2024 (BCC) 1 January, 2025 (CGC)	1 May, 2025
Bookings Stopped	30 April, 2025	30 April, 2025	30 April, 2025	30 April, 2025	30 June, 2025
Who Booked	Solar Installer	Solar Installer	Solar Installer	Resident	Resident
Panel #'s	628	6,920	6,040	1,489	306
Number of bookings	43	403	349	131	28
No. unique bookers	27 businesses (24 unique to this collection type)	55 businesses (50 unique to this collection type)	56 businesses (48 unique to this collection type)	131 residents	28 residents
Highest number of bookings by one company	5 bookings	72 bookings	47 bookings	N/A	N/A
Avg. no. bookings per company	1.6	7.3	6.2	N/A	N/A
Avg. solar panels per booking	14.6	17.2	17.3	11.3	10.9
No. unique postcodes (where solar panels were installed)	32	23	110	72	N/A addresses not collected
Most common postcode (where solar panels were installed)	4512 (5 bookings)	4814 (22 bookings)	4870 (22 bookings)	4053 (9 bookings)	N/A

models stems directly from their ability to reduce per-panel transport costs through bulk collections.

To further enhance efficiency, future programs should implement minimum collection volumes to avoid the high cost of sending trucks for just one or two panels. The success of these models is predicated on their alignment with the commercial operational logic of the installers, which is a powerful lever for ensuring consistent material flow.

3.3.3.2 Resident-Led Collections: Residential Milk Run and Regional Council Drop

In contrast, resident-led collection models presented significant operational and logistical challenges despite strong public engagement. The “Residential Milk Run” model, a direct collection service from households, had the highest rate of cancellations and other unsuccessful collections. This was partly due to unique manual handling challenges, such as variable panel storage locations, residents’ reluctance to move panels to an accessible area, and difficult property layouts or weather conditions. Similarly, the “Regional

Council Drop” model, while receiving positive feedback from 98% of the public, saw the highest number of broken panels and lower-than-anticipated volumes.

This disparity between public support and operational efficiency highlights a critical tension. The high public approval ratings for these models, with 95% of “milk run” customers expressing uncertainty on how they would have otherwise disposed of their panels, clearly indicates a strong public need for such a service.

“We were not overly keen to pay to have them go into landfill. If it can be recycled, it makes sense, rather than going into the hard rubbish”. (Brisbane City Council Resident - A. from Manly West)

“We didn’t know how to recycle these solar panels, and we’re always looking at ways to recycle. We need programs like this to exist. So happy that this program was available instead of sending them to landfill.” (Brisbane City Council Resident - B. from Sunnybank Hills)

“There’s no way to dispose of solar panels in my local area let alone recycle them. We need a solution to responsibly dispose of or recycle solar panels.” (Moreton Bay City Council Resident - M. from Camp Mountain)

However, the logistical hurdles such as the unpredictable nature of residential collections, infrastructure gaps at regional sites, and manual handling risks undermined their operational feasibility and increased per-panel costs. This suggests that while public goodwill is essential, it must be channelled through operationally robust mechanisms. A future system must find a way to meet this public demand without compromising efficiency, perhaps by leveraging council engagement to promote more efficient collection methods..

3.3.3.3 Market Observation: Export Collection Sample

An additional pathway, the “Export Collection Sample,” was included to account for the existing market of used solar panel collectors and exporters. This model sourced panels directly from an established commercial operator, Resolarcycle in South-East Queensland, for two primary reasons: at the pilot’s commencement, these businesses managed a large proportion of available end-of-life panels, and the pilot’s objective was to observe rather than intervene in current market operations.

This pathway yielded 2,699 panels across two consolidated loads between September and October 2024. However, the commercial landscape for this model shifted dramatically over the course of the pilot.

By late 2024, the market for exported used panels had substantially collapsed due to falling prices for new panels, causing a number of these specialized collection businesses to cease operations. Therefore, while its inclusion provided a valuable snapshot of the market at the time, this collection method is not considered a stable or viable pathway for a future program.

3.4 Assessment of Collection Methods

Table 3.4.1 provides a consolidated assessment of the collection methods trialed, summarizing their pros, cons, and recommendations based on the pilot’s findings.

3.5 Logistics and Transportation Optimisation

The pilot program highlighted that effective logistics and transportation are the dominant factors influencing the cost and efficiency of an end-of-life solar panel recovery system. An understanding of this logistical network—from manual handling at drop-off points to the choice of transport equipment—is essential for designing a scalable solution.

3.5.1 Pallets vs. Stillages: A Trade-Off

A key element of the pilot was the comparative analysis of pallets and stillages for consolidation and transport. While stillages reduced on-site manual handling and offered better panel protection, they were expensive, bulky, and had a lower volume capacity, storing fewer panels per unit. In contrast, pallets were more cost-effective and efficient for high-volume transport, with the capacity to stack 45–55 panels when properly strapped. The pilot found that commercial sites with trained staff could leverage pallets to achieve a 100–125% increase in handling efficiency compared to the stillage-based systems used at retail sites.

This disparity in performance reveals a dependency: the choice of equipment is not an isolated decision but is directly linked to the operational context and staff competence. The superior performance of pallets was not an inherent quality of the equipment itself but was a direct result of staff at commercial sites having received “specific training in safe panel handling”. Conversely, stillages were utilised at retail sites precisely because of “limited staff training and restricted access to appropriate equipment”. This finding demonstrates that investment in training and standardisation is a key factor, unlocking greater

Table 3.4.1: Assessment of collection method

	RETAIL DROP	CONSOLIDATION POINT	REGIONAL COUNCIL DROP	BASE TO BASE PROCESS	RESIDENTIAL MILK RUN
POSITIVES	The retail stores provided good geographic coverage for installers in metropolitan areas like Brisbane. Senior management at the retail partner, Rexel, was highly supportive of the trial.	These sites were willing to adapt to program requirements and had excellent local knowledge. The ability to use pallets and strapping led to significant cost reductions and efficiency gains.	Customer engagement was great, with 98% of the public giving positive feedback on the ability to recycle their panels.	This efficient, cost-effective model, using bulk collections, reduced per-panel transport costs. Larger installers generally had equipment and space, and adhered to packaging guidelines.	Public engagement was excellent, and residents were highly supportive. The collections yielded great panel volumes.
NEGATIVES	Store staff's primary focus was on their retail customers, making it too time-consuming to manage panel drop-offs. There were issues with panels not being checked in correctly, poor communication from stores, and manual handling concerns.	Minor issues included occasionally receiving panels from jobs not listed on the manifest and a lack of communication regarding inbound delivery ETAs	This method saw the highest number of broken panels. There were instances of panels being taken from the transfer stations after drop-off. The volume of panels collected in the region was lower than anticipated, which increased the per-panel cost of transport.	Pickup dates varied. Some smaller installers needed specific trucks (e.g., with tail-lifts) or two-person crews. Pre-collection photos of stacked pallets are essential to avoid failed transport charges.	This method had the highest rate of cancellations and other unsuccessful collections. It was also more susceptible to weather delays, and it was sometimes difficult to contact households or get them to move panels to an accessible location for pickup.
LEARNINGS	The model was challenging due to difficulties in staffing retail sites, inefficient use of stillages over pallets, which increased transport costs with required two-way movements, and retailers' concerns about manual handling and on-site 'waste'.	This collection method was highly effective. Using pallets instead of stillages increased efficiency by 100-125% and reduced transport costs. Staff at these sites were trained in handling panels and had the right equipment, which made the process smoother and faster.	This model works, but it requires significant training for the transfer station staff to ensure panels are stored correctly and are not taken by other people after being dropped off. Clear, designated drop-off areas are essential.	This was by far the most popular collection method among installers, who preferred consolidating panels from multiple jobs for one bulk pickup. To ensure efficiency, it is critical to implement minimum collection volumes to avoid sending trucks for just one or two panels.	This approach was very successful, receiving extremely positive feedback from the public; 95% of customers questioned were unsure how they would have otherwise disposed of their panels. The success of this model is greatly enhanced when promoted by engaged local councils, such as the Brisbane City Council.
CONCLUSIONS	This model is not recommended in its current form. If retail locations were to be used in the future, they would need to have adequate yard space for storage and a dedicated drop-off area to avoid disrupting normal business operations.	This model is highly recommended. The findings show that dedicated consolidation points are very well-suited for the program because their staff have the skills and equipment to stack and wrap pallets efficiently.	This method is viable but requires more investment in site setup and staff training to be effective.	This is the most highly recommended model for the installer network due to its popularity and efficiency. Future programs should enforce minimum panel quantities for collection.	This is a recommended collection method due to its success and positive public reception, especially when supported by local councils.

efficiency and cost savings from existing logistics infrastructure. Without adequate training, even a more efficient tool like a pallet can lead to higher breakage risks.

3.5.2 The Impact of Site Access and Handling

Beyond the choice of transport equipment, the pilot identified challenges related to site access and equipment availability that directly impacted operational efficiency and safety.

Regional council transfer stations, for example, often lacked adequate loading infrastructure, which increased manual handling requirements and time. Similarly, retail sites had limited storage space and access restrictions, and solar farms often stored panels on the ground in unsuitable areas, creating handling risks and requiring extra labour or equipment.

These gaps represent logistical bottlenecks that increase costs and pose safety risks. Clear minimum standards for packaging, infrastructure, handling, and consistent training are crucial for ensuring safety and cost-efficiency at scale. Future programs will need to consider investment in essential plant equipment like forklifts and loading bays at key collection points to streamline operations and mitigate these risks.

3.5.3 Data Tables for Logistics and Transport

The pilot’s findings on transport methods are summarised in Table 3.5.3.1, which provides a direct comparison of stillages and pallets across key criteria.

Table 3.5.3.1: Comparison of Consolidation and Transport Methods

CRITERIA	PALLETS	STILLAGES
Volume capacity	Higher capacity; can stack 45–55 panels per pallet with correct strapping	Lower capacity; fewer panels per stillage, limiting efficiency
Manual handling	Requires more handling; increased reliance on strapping and PPE	Reduced manual handling; panels more secure with less lifting required
Transport ease	Widely compatible with existing logistics; easier to load/unload	Easier handling in transport but bulkier; requires more space
Cost efficiency	Lower cost; pallets readily available and inexpensive	Higher cost; specialised equipment, less scalable for large volumes
Console site issues	Requires additional training in strapping, PPE, and safe handling	Storage space challenges at sites due to bulk; site education still needed
Breakage risk	Higher risk if not strapped properly	Lower risk; panels better protected in transport
Best use case	General collections where cost and volume are key	Targeted collections where safety and panel protection are priorities

Pallets



Stillages



3.6 Data Tracking and Traceability System

To ensure the integrity of the pilot, implementing an end-to-end solar panel traceability system was essential. Since this is a relatively new sector, no “off-the-shelf” system existed, and the cost of developing a bespoke system was prohibitive. Instead, the pilot applied a comprehensive, multi-platform tracking and traceability system that allowed the monitoring of each solar panel’s journey from decommissioning to final recycling.

This collection of systems was pivotal for capturing critical data points, including the total number of panels collected, their precise locations, wattage, and physical condition. The resulting dataset was essential for conducting detailed cost analysis, assessing the suitability of panels for reuse through testing, and evaluating the material outputs from the recycling process.

3.6.1 Solar Panel Data collected

The tracking system leveraged the unique barcode present on every solar panel as a primary key. This identifier, when combined with assigned job numbers, enabled the end-to-end traceability of each unit. The system was designed to capture a wide array of characteristics and logistical information at various stages:

- **Panel Identification:** Brand, model, and wattage.
- **Decommissioning Data:** The date and location of removal.
- **Logistics:** Transportation methods and routes.
- **Processing:** Records from collection sites and designated recycling facilities.
- **Material Recovery:** Data on recovered materials and their downstream destinations (Note: this is a long-term process, with data still pending months post-recycling).
- **Reuse Program:** Tracking of panels selected for the testing program and the corresponding test results.

3.6.2 Data Collection from Channels

Data was collated from multiple sources, creating a multi-faceted view of the collection and transport of used panels:

- **Solar Installers:** Provided visual grading of the panels and submitted photographic evidence of the panels on the roof pre-removal and post-removal. This served as verification that the panels were recently decommissioned and not from an existing stockpile.
- **Residents:** Contributed valuable qualitative data, including the reasons for removing their panels, the time elapsed since removal, and what they would have done with the panels in the absence of the pilot program.
- **Online Booking System:** Captured initial data from residents and installers at the point of service registration.
- **Collection and Recycling Sites:** Logged the reception, processing, and output data for each panel batch.

3.6.3 System Challenges and Learnings

While the tracking system was a first-of-its-kind success, its implementation presented several challenges. The primary difficulty was the fragmented nature of the data, which resided across multiple, disparate systems used by different stakeholders (booking platforms, collection sites, recyclers).

Key challenges included:

- **Data Integration:** Establishing seamless data flow between the various participant systems proved complex.
- **Data Gaps:** Information provided by solar installers and residents was occasionally incomplete, leading to gaps in the final dataset.
- **Manual Reconciliation:** Despite the use of unique identifiers, matching records across different systems often required significant manual intervention and reporting effort.
- **Analysis Complexity:** Analyzing large volumes of data from varied sources was a demanding task.

Despite these operational hurdles, the pilot data tracking system successfully demonstrated the immense value and opportunity of end-to-end traceability in the solar panel reverse supply chain. It provided a wealth of data that transformed anecdotal assumptions into concrete findings. The challenges encountered have provided critical learnings that will inform the architecture of a more integrated, automated, and streamlined data tracking system for the future.

3.7 Other Operational elements

3.7.1 Site set up and management

To ensure effective operational management and maintain close collaboration, a comprehensive schedule of meetings and on-site visits was implemented. Weekly project meetings were held with our Operations Management Partner to steer the project, complemented by regular meetings with collection sites, Councils, and Recyclers to address operational matters.

Hands-on support was provided through an active site visit program. The SEC team conducted multiple visits to each participating recycler, as well as to participating collection sites. Our operations partner, New Limit Waste Services, visited participating recyclers and collection sites to ensure suitability for the pilot, run site set up and training and ensure consistent performance and support across the network. See Appendix A for table of site visits and training material.

3.7.2 Call Centre - Outbound and Inbound

A call centre played a central role in supporting pilot participants during the pilot, ensuring clear communication, resolving queries, and providing

reassurance to both installers and householders. It was located with our operations management partner in Reservoir, Victoria.

Table 3.7.2.1: Call Centre – Outbound and Inbound information

INBOUND CALLS	<ul style="list-style-type: none"> A total of 884 inbound calls were recorded. Most enquiries, from householders and installers, concerned drop-off and booking information, despite its availability online and in confirmations. Call feedback indicated many participants, especially older individuals, valued personal confirmation before travelling to drop off items to ensure they wouldn't be turned away. The pilot program provided a crucial disposal pathway for solar panels, with over 95% of surveyed customers unaware of alternatives.
OUTBOUND CALLS	<ul style="list-style-type: none"> The call centre also made 1511 outbound calls, excluding calls handled via NewLimit staff. These were primarily follow-ups to confirm bookings, coordinate logistics, and provide reminders to ensure panels were prepared correctly for collection or drop-off.

The high volume of outbound calls demonstrates that the call centre was very proactive in managing collections. Many queries reflected the novelty of solar panel recycling for participants, showing that education and reassurance are vital components to panel recovery. The high level of satisfaction expressed by callers illustrates that the call centre acted as a valuable bridge between the program's logistics operations and the public, helping to build trust and engagement.

3.8 Material recovery

The pilot program demonstrated that an approach to recycling is required to optimise both economic and environmental outcomes. By engaging three primary recycling partners with differing technological approaches, the program provided a view of the trade-offs between cost, recovery rates, and material purity.

3.8.1 Comparative Analysis of Recycling Technologies

The pilot engaged three recyclers, each with facilities located in around Brisbane, Queensland, and each representing a different technological approach to solar panel recycling: mechanical, hybrid, and chemical.

- Mechanical:** This method is cost-effective and highly scalable, with high throughput suitable for large volumes. It involves mechanically separating panels into glass, metals, and residuals. However, due to contamination during crushing, it offers moderate recovery rates for high-value components like silver and silicon.
- Hybrid-thermal:** This process combines mechanical separation with thermal treatment to achieve higher recovery rates for silver and silicon than mechanical systems. While more energy-intensive and costly, it shows promise for producing high-purity materials for manufacturing.
- Hybrid-chemical:** This process combines mechanical separation with chemicals to dissolve the EVA layer, separating the glass from the semiconductor layers. It delivers the highest recovery rates for silver, copper, and very pure silicon. However, this method is the most expensive and complex, and it currently processes smaller volumes than the other systems.

The pilot's findings on these technologies demonstrate that a single recycling method is not optimal for all scenarios. A future system could strategically deploy a mixed-technology ecosystem, leveraging high-throughput mechanical systems for the majority of panels while using more advanced hybrid or chemical processes for specific, high-value material streams. This approach would optimize both economic returns and resource recovery.

3.8.2 Quantifying Material Recovery and End-Markets

The pilot collected and tracked 18,082 small-scale solar panel panels, with the majority being crystalline silicon solar panels. Based on a standard average panel mass of 21 kg, the program demonstrated the volumes of materials that can be recovered and reintroduced into domestic supply chains.

Table 3.8.2.1: Assumptions used for calculating the estimated materials recovered for an average panel mass of 21 kg

MATERIAL	GLASS	ALUMINIUM	PLASTIC*	SILICON	COPPER	SILVER
Average material split (by weight, %)	75%	10%	5%	2.5%	0.2%	0.003%
Recovery rates (%)	95%	98%	50%	85%	95%	90%

* EVA + (bonding / glue) backsheet

Table 3.8.2.2: Approximate results using assumptions described in Table 3.8.2.1 (above)

MATERIAL	SHARE	PER PANEL (KG)	TOTAL MASS (KG)	RECOVERY RATE	RECOVERED (KG)
Glass	75.0%	15.75	284,792	95%	270,552
Aluminium	10.0%	2.10	37,972	98%	37,213
Plastic*	5.0%	1.05	18,986	50%	9,493
Silicon	2.5%	0.53	9,493	85%	8,069
Copper	0.2%	0.03	570	95%	541
Silver	0.003%	0.001	11	90%	10

* EVA + backsheet

The recovered materials were successfully reintegrated into diverse Australian end-markets, demonstrating a viable economy where materials are reused rather than thrown away. Examples include:

- **Glass:** Supplied to the construction materials industry for transformation into tiles and benchtops.
- **Aluminium Extrusion:** Remanufactured into new products within the aluminium manufacturing sector.
- **Silicon:** Directed into programs for strengthening aluminium products.
- **Plastics:** Utilized in 3D-printing applications for housing.
- **Silver and Copper:** Transferred to the precious metals and metals recycling industries for further refining.

3.8.3 Scalability and the Capacity Gap

Prior to the program’s commencement, the state had no operational capacity for processing end-of-life solar panels. There was one recycler who was piloting solar recycling, with other businesses planning investments. The pilot stimulated investment in solar recycling in Queensland and through the collections phase of the trial, two additional recyclers became operational.

This new infrastructure provides a current, state-based processing theoretical capacity of approximately 30,000 panels per month, which translates to an annual capacity of around 240,000 panels. While this newly established capacity proved sufficient for managing the volumes generated throughout the pilot program, a significant gap remains when compared to the total current market demand.

As previously mentioned, it is likely that the annual volume of panels decommissioned in Queensland is likely to be currently in excess of 600,000 units. The current infrastructure, therefore, addresses a fraction of the state’s total recycling need,

highlighting a significant gap between the current processing capacity and the state’s total estimated recycling need. Site selection, equipment acquisition, construction, licensing and approvals is a handbrake on rapid expansion to meet market demand. Licensing required from the State Government and Local Councils in Queensland can add six to twelve months to project scaling. Recycling companies who have existing licences in other waste streams or acquire existing sites or equipment may be able to accept solar panels for processing more quickly.

Since the closure of the solar panel collections program at the end of April 2025, the solar panel recyclers that were part of the pilot program have seen substantial decreases in the volume of panels from homeowners. This supports anecdotal evidence that homeowners do not want to pay the cost to get solar panels to a recycler and have them recycled.

A key solar panel recycling business in the pilot identified opportunities and limitations in material recovery, market demand, and infrastructure readiness for end-of-life solar panels.

“This pilot proved that solar panels can be recovered and recycled at scale, but without a national stewardship scheme the industry cannot sustain investment. Policy certainty is essential to turn this opportunity into jobs, infrastructure, and critical resource recovery for Australia.” (Participating Recycler)

3.9 Financial and Economic Viability

An objective of the pilot was to assess the financial viability of a scalable end-of-life solar panel recovery system. The program captured detailed cost data across different logistics and collections methods, identifying the primary economic drivers and providing insights for future policy design.

3.9.1 Per-Panel Cost Analysis

The pilot’s cost analysis revealed a variance in per-panel costs across different geographical areas. The total cost per panel was lowest in metropolitan areas at \$43.00, rising to up to \$70.50 in regional areas and \$80.50 in remote areas.

This substantial increase—remote costs being over 60% higher than metro costs—is primarily driven by lower panel volumes and the lack of loading infrastructure in remote and regional locations.

3.9.1.1 The Dominance of Logistics Costs

The cost breakdown highlights a dynamic: logistics dominate the cost structure. Transport and handling accounted for the majority of the total cost representing more than 60% of the overall system expenses. This is in stark contrast to the recycling component, which remained relatively stable at approximately \$10-20 per panel, regardless of location.

This finding reinforces the conclusion that the economic viability of small-scale panel recovery depends overwhelmingly on optimising logistics and ensuring high collection volumes, rather than on the cost of the recycling technology itself.

3.9.1.2 The Installer Incentive

To encourage participation, the pilot initially offered an incentive of \$10 per panel to installers, which was later reduced to \$5 per panel as confidence in the program grew. A key finding from this initiative was that installer participation remained consistent even after the incentive was halved.

This suggests that for commercial participants, the value of a structured, reliable, and compliant disposal pathway outweighs the direct financial subsidy. This is a data point for future policy design, indicating the benefit of investment in a robust network infrastructure and operational efficiency over large, direct cash payments, which may be a more sustainable funding model in the long term.

3.9.1.3 Data Tables for Financial Analysis

The following tables provide a granular breakdown of the cost components for both small-scale and “Legacy Milk Run” collections.

Table 3.9.1.3.1: Small-Scale Collection and Recycling Costs (per panel)

COST COMPONENT	METRO	REGIONAL	REMOTE
Installer Incentive	\$5.00 - \$10.00	\$5.00 - \$10.00	\$5.00 - \$10.00
Logistics (average)	\$28.00	\$45.50	\$55.50
Recycling	\$10.00 - \$20.00	\$10.00 - \$20.00	\$10.00 - \$20.00
Total	\$43.00 - \$58.00	\$60.50 - \$75.50	\$70.50 - \$90.50

* Note: Admin, Liabilities & IT costs are not included in these per-panel totals.

Table 3.9.1.3.2: Milk Run Collection and Recycling Costs for Legacy Residential pick up (per panel)*

COST COMPONENT	METRO	REGIONAL COUNCIL
Installer Incentive	\$5.00 - \$10.00	\$5.00 - \$10.00
Logistics (average)	\$23.00	\$39.50
Recycling	\$10.00 - \$20.00	\$10.00 - \$20.00
Total	\$38.00 - \$53.00	\$54.50 - \$68.50

* Note: Admin, Liabilities & IT costs are not included in these per-panel totals. **This pricing structure is specifically tailored for the legacy residential collection model.

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Table 3.9.1.3.3: Solar panel collection process

	RETAIL DROP	CONSOLIDATION POINT	REGIONAL COUNCIL DROP	BACK TO BASE PROCESS	RESIDENTIAL MILK RUN
No.	7,548	2,699	306	6,040	1,489
	The installer deinstalls the panels of their customers roof.				
	The installer places an order with Newlimit to drop off the panels.	The resident places an order with Newlimit to drop off the panels.	The resident places an order with Newlimit to collect the panels		
	The installer is given a job number to write on the side of each of the panels. They are advised of their closest retail drop point.	The installer is given a job number to write on the side of each of the panels.	The resident is given a job number to write on the side of each of the panels. They are advised of their closest transfer station to drop off the panels.	A manifest is provided with the total number/type /brand of panels. This may be multiple installers jobs being collected.	The resident is given a job number to write on the side of each of the panels. They are advised of their estimated collection day.
	The installer takes the panels to the retail drop point.	The installer the takes the panels to the consolidation point	The resident takes their panels to the designated transfer station.	Panels are then loaded onto pallets and strapped by the installer.	Panels are then hand loaded onto the truck when it comes to collect, This truck will be collecting multiple jobs on this day.
	The retail drop point then receipts in the panels and confirms the state/quality and quantity of the panels.	The consolidation point then receipts in the panels and confirms the state/quality and quantity of the panels.	The transfer station operator receives the panels and confirms the state/quality and quantity of the panels.		
	The solar panels are stored at the retail drop point in the designated stillages of which there are the appropriate number depending on the footprint of the store.	The solar panels are stored at the consolidation point with other panel jobs until a semi trailer load of panels ready to be shipped.the panels loaded onto the truck	The solar panels are stored at the transfer station until the end of the 2 month trial. when they will be collected on a milk run.	The installers pallets of solar panels are then loaded onto the truck	The pallets of solar panels are then loaded onto the truck with other jobs that are on the milk run for that day.
	The stillages of panels are then delivered to the recycling facility.	The pallets of panels are then delivered to the recycling facility.	The panels are collected by a specific transporter on a milk run and transported to a recycling facility.	The pallets of panels are then delivered to the recycling facility.	
	The stillages of panels are then unloaded at the recycling facility				
	The recycling facility receives the panels and completes a visual inspection.				
	The solar panel enters an automated recycling machine. The solar panel is scanned and time and date stamped when the junction box is removed.				
	The solar panel is deframed and the aluminium is removed from the panel.				
	Then the glass is removed. The panel then enters a pre-shredding process.				
	Size separation then occurs, then gravity separation.				
	Once the solar panel has been recycled the following commodities are produced. (copper, aluminium, plastic, glass & silica.)				

3.10 The Two Pathways of a “waste” Solar Panel: A Narrative of Reuse Potential

Analysing the “waste” solar panels collected by the pilot reveals a clear and defining story: a panel’s potential for a second life is determined less by its age and more by the speed and method of its collection. The data shows two distinct groups emerging – a professionally managed, immediate “resource recovery” stream and a delayed, resident-led “disposal” stream.

Guide to Panel Conditions Table 3.10.1 details the condition of solar panels as graded by installers when they are removed from a roof. The grades determine if a panel can be reused.

Panels Suitable for Reuse

- A Grade: Brand new condition.
- B Grade: Functional and reusable, even with minor issues like a cut connector.

Panels Not Suitable for Reuse

- C Grade: Too damaged to be reused.
- X Grade: Severely damaged, such as with cracked glass.
- Y Grade: A special category for panels with a distinct yellowing, indicating they are at their end-of-life.

3.10.1 The Resource Recovery Pathway: Capturing Value Through Professional Channels

The collection methods managed by solar installers—Back to Base, Consolidation Point, and Retail Drop—are overwhelmingly successful at capturing reusable panels. Over 85% of panels in the “Back to Base” stream and over 74% in the other professional

channels are graded ‘A’ or ‘B’, making them suitable for reuse.

Context from the pilot programs explains why this pathway is so effective. These channels primarily receive panels that are assessed by an installer at the exact moment of removal. Crucially, council data shows that the main driver for removal is complete system replacement (60-74% of cases), not panel failure. This means a large volume of perfectly functional panels are entering the system simply because homeowners are upgrading. The efficiency of these installer-led models, which are designed for bulk aggregation and professional handling, ensures that the inherent value of these freshly removed, working panels is preserved.

3.10.2 The Disposal Pathway: The Impact of Delayed Collection

In stark contrast, the Regional Council Drop stream consists of 100% non-reusable panels (‘C’ and ‘X’ grade). Whilst we do not have sufficient information to explain why this is the case, it is possible, based on data from the Brisbane and Gold Coast residential collections pilots that panels collected through this resident-led channels have often been removed and stored for a significant period of time—in many cases, for more than a year. It’s possible that prolonged storage leads to degradation, damage, and obsolescence, effectively destroying any reuse potential the panels may have had when they were first taken down. It is also possible that residential locations are also only “left” with solar panels that have no commercial volume. More research needs to be undertaken to fully understand this.

Table 3.10.1: Small-Scale Collection grades

COLLECTION TYPE	A GRADE	B GRADE	C GRADE	X GRADE	Y GRADE
Back to Base	0.7%	85.2%	0.4%	13.7%	0.0%
Consolidation Point	0.2%	75.1%	0.1%	24.6%	0.0%
Retail Drop	3.2%	71.2%	0.0%	25.6%	0.0%
Export Collection Sample	66.0%	5.7%	7.0%	14.1%	7.2%
Regional Council Drop	0.0%	0.0%	95.3%	4.7%	0.0%
Residential Milk Run*	N/A				
All Graded Panels (Total)**	0.5%	77.7%	2.3%	19.5%	0.0%

* Residential Milk Run collections were not graded as bookings were made by residents.

** Weighted average of the total panels that were graded across the “Back to Base,” “Consolidation Point,” “Retail Drop,” and “Regional Council Drop” collection types

Regardless, these programs remain vital. Without them, council data shows the majority of these residents would have sent the panels to landfill or had no disposal plan at all.

3.10.3 The Outlier: A Commercial Sidenote

The Export Collection Sample, with its remarkable 66% 'A Grade' (brand new) composition, should not be viewed as a typical end-of-life stream. This data clearly represents a pre-selected batch of high-value, often new, panels being graded for a specific commercial purpose, rather than a random sample of decommissioned household panels.

3.10.4 Responsible management is key

The most critical factor determining a solar panel's reuse potential is its treatment at the point of removal.

Panels handled professionally and immediately captured at the time of a system upgrade have the highest likelihood of being suitable for a second life. In contrast, panels left unattended, unsecured, or in long-term storage at a residence are highly susceptible to damage and will almost certainly require recycling.

The collection method demonstrated its value in the pilot: nearly 80% of the panels collected through professional installer channels were initially graded by those installers as being in good enough condition for potential reuse. A sample of over 5,000 of these carefully collected panels was then selected for the rigorous physical testing detailed in the next section (4. Household Solar Panel Reuse Study).

4. REUSE STUDY – HOUSEHOLD SOLAR PANEL

The Household Solar Panel Reuse Study was a core component of the Pilot, designed to investigate the feasibility of establishing a sustainable, safe, and transparent market for second-life solar panels in Australia. The initiative combined a foundational desktop analysis to map the existing landscape and challenges with a large-scale physical testing program to generate empirical data.

4.1 The Case for Solar Panel Reuse

The primary motivation for pursuing solar panel reuse is the significant energy and economic value remaining in "waste" panels.

- **Realistic Reuse Potential:** While initial estimations based on visual grading by installers suggested

up to 80% of panels might be reusable, the pilot's rigorous testing established a more realistic baseline. The study found that approximately 29% of professionally collected panels are suitable for a second life after passing comprehensive safety and performance checks.

- **Future Economic Value:** Applying the pilot's findings to Queensland's panel retirement forecasts (29 million by 2040), the state could see a potential of up to 8.4 million reusable panels by 2040. This volume represents a substantial energy and economic asset.
- **Value Proposition:** A functionally reused panel is worth up to 133 times more than the material value recovered through recycling, providing a clear economic incentive for prioritising second-life deployment.
- **Market Imperative:** The decline of the overseas second-hand panel market, driven by cheaper and more efficient new panels, has increased the urgency to establish a domestic solution to prevent end-of-life panels from being unnecessarily sent to landfill.

4.2 Challenges to Establishing a Reuse Market

Prior to testing, a review of 127 international and domestic documents identified five key systemic barriers to a functioning reuse market:

1. **Regulatory & Policy Gaps:** A significant obstacle is the lack of a clear, national regulatory framework for solar panel reuse, with current legislation in some jurisdictions still permitting landfill disposal.
2. **Technical Uncertainty:** No agreed-upon Australian standards exist for the testing, grading, approval, and safe reinstallation of used panels, undermining consumer confidence in quality and safety.
3. **Economic Barriers:** The current market favours the "take-make-waste" model, with the low cost of new panels making second-hand panels uncompetitive. Furthermore, the absence of standardised warranties for used panels deters buyers.
4. **Logistics and Infrastructure:** Australia's large geography results in high collection, transport, and storage costs, particularly for regional areas, due to a lack of dedicated reuse infrastructure.
5. **Skills and Awareness:** There is a shortage of accredited training for tradespeople in the safe removal and handling of panels for reuse, coupled with low public awareness of reuse options.

4.3 Results from Physical Panel Testing

The cornerstone of the reuse study was a comprehensive physical testing program led by CSIRO, which processed over 5,000 solar panels. This initiative is the largest structured assessment of second-life potential for solar panels undertaken in Australia to date.

4.3.1 The Reuse Assessment Process

The testing procedure followed a rigorous, sequential process, demonstrating that extensive technical screening is essential for ensuring quality and safety:

1. **Initial Grading:** Installers visually graded collected panels, deeming nearly 80% potentially reusable.
2. **Performance Screening:** 5,067 of the initially selected panels were put through CSIRO’s high-tech test rig for detailed performance checks and hidden defect detection (e.g., micro-cracks). This critical step rejected over half, with only 2,200 panels passing.
 - **Finding:** The technical screening was vital, rejecting more than half of the panels visually graded as acceptable, proving that performance screening is essential.
3. **Final Safety Test:** The remaining 2,200 panels were subjected to the “wet leakage” electrical safety test, which checks for insulation integrity. 1,869 panels (85%) passed this final safety benchmark.

4.3.2 Confirmed Reusability Rate

The detailed process established a clear, evidence-based reusability figure:

- Of the 5,067 panels initially put forward for testing, only 37% (1,869 panels) successfully passed the entire rigorous performance and safety process.
- **Conclusion:** For every 100 panels professionally collected, approximately 29 can be expected to be confirmed as safe, high-quality, and ready for a second life.

Table 4.3.2.1: Reusability rate results

STAGE	PANELS PASSED	PERCENTAGE OF INITIAL POOL (5067 selected for further testing)	EXPECTED RATE PER 100 COLLECTED
Installer Visual Grading	5,067	100%	
High-Tech Screening (CSIRO - EL/IV)	2,200	43%	≈43
Passed Final Safety Test	1,869	37%	≈29

4.4 The Necessity of Multi-Test Protocols

The study confirmed that reliance on a single test is insufficient, as different tests address different failure modes:

- **Performance Tests (Visual/Imaging):** Determine panel usability by checking for surface damage and hidden defects (like micro-cracks) that reduce power output.
- **Electrical Safety Tests (Wet Leakage):** Essential for safety, these tests ensure insulation integrity to prevent electric shock risk, particularly in adverse weather.

4.5 Findings

Evolving Challenges and Future Testing

- **Cost and Speed:** While the pilot rig was fast (scanning a panel in under a minute), the commercial success of reuse depends on developing highly scalable, low-cost testing methods.
- **Worrying Trend:** Panels manufactured after 2020 exhibited a higher failure rate, potentially due to thinner glass and larger formats. This suggests future testing standards must continuously adapt to modern panel manufacturing changes.

Balancing the need for safety and the economics is a crucial element for further exploration - One possible pathway is that the required level of testing must align with the reuse end market. Panels sold directly to homeowners require the highest performance and safety standards, while panels retained by a company (e.g., in a leased model) still require essential safety checks, with a focus on performance for business viability.

4.6 Legal and Regulatory Roadblocks

The most significant immediate roadblock to market creation for reusable solar panels is the absence of a clear framework for testing, grading, and certifying second-hand solar panels.

- **Lack of Trust and Liability:** Without certification, buyers lack assurance of quality, and installers face uncertainty regarding liability for reinstalled used products.
- **Uncertainty:** The process for proving a panel is safe for reuse is more complex and burdensome than simply sending it for recycling.
- **Positive Step:** A successful trial of a panel tracking system in Queensland demonstrated the feasibility of creating a traceable supply chain. Such a system is vital for building trust, enforcing standards, and underpinning a robust, regulated reuse market.

5. STAKEHOLDER ENGAGEMENT – HOUSEHOLD SOLAR PANEL

The Queensland Solar Panel Recovery Pilot relied on a multifaceted stakeholder engagement strategy to gather input, manage logistics, and build broad support across industry, government, and the community. The following key activities were delivered:

5.1 Advisory Working Groups and Industry Meetings

Formal governance and technical guidance were established through dedicated working groups. The Reuse Advisory Working Group and the Recycler Advisory Working Group met 6 and 5 times, respectively. These sessions were complemented by input and feedback from broader industry and Stewardship Expert Committee (SEC) Member working groups (complete meetings calendar in Appendix B).

5.2 Interviews and Testimonials

Discussions with key individuals involved –including residents and recyclers–revealed practical, regulatory, and logistical challenges. Participants highlighted difficulties accessing proper disposal, reliance on informal networks, and jurisdictional inconsistencies, underscoring the urgent need for clearer, formal end-of-life pathways.

5.3 Events & Speaking Engagements

Members of the SEC team acted as key advocates for the program, delivering presentations at over 20 state and national events. These included major industry forums (e.g., Smart Energy Queensland Conference) and academic symposiums (e.g., RMIT University), alongside targeted speaking engagements with partners like the Product Stewardship Centre for Excellence, to deepen understanding and collaboration.

5.4 Media

A targeted, phased media campaign was crucial for activating the pilot and raising public awareness.

- **Widespread Coverage:** The strategy, initially focused on Queensland before expanding nationally, secured extensive coverage across digital, print, radio, and television platforms.
- **Enhanced Credibility:** Featuring Pilot Participants in interviews provided an authentic voice that was instrumental in establishing credibility and fostering broad public support.
- **Milestone-Driven Impact:** Media attention was strategically managed to peak around key program milestones, maximising activation and highlighting the issue of panel decommissioning. (See Figure 5.4.1 for early engagement data, and Appendix C for the full Media Register).



Figure 5.4.1: Early Media Engagement

5.5 Peak Body & Community Group Engagement

To ensure broad support and alignment, the SEC initiated monthly consultations in May 2024 with a diverse coalition of over 40 organisations. This engagement was structured into two key streams:

- **Community and Environmental Groups:** We partnered with more than 20 grassroots organisations, including Gecko and the Queensland Conservation Council, to provide regular updates on the progress of the pilot and foster community-level support.

- **Industry Peak Bodies:** We actively collaborated with key industry associations such as the Australian Council of Recycling, the Local Government Association, and the Waste Management and Resource Recovery Association to drive industry-wide engagement.

6. KEY FINDINGS AND CONCLUSIONS

The purpose of the pilot was to test management channels for “waste” solar panels to ensure panels from households enter appropriate collection and recovery systems and the pilot. The goal of this pilot is to understand how to best solve the identified problems and test multiple pathways to an effective end-of-life collection and management solution that will help drive behaviour change, stimulate development and growth in the panel recovery and reprocessing sector, understand the feasibility of establishing a solar panel manufacturing industry in Queensland by determining the availability of end-of-life panels, and deliver environmental and economic outcomes. The trial in Queensland addressed the goals of the pilot as follows:

6.1 Key Findings

- The annual volume of household solar panel “waste” is underestimated by traditional forecasts, which assume a 25-30 year lifespan for panels. Data from the pilot suggests the actual volume of solar panels decommissioned in Queensland is currently between 600,000 and 800,000 units per year.
- The majority of decommissioned panels (62%) are only 7 to 10 years old, indicating that technology upgrades, rather than product failure, are the primary drivers of early replacement.
- The international market for reused panels has collapsed due to falling costs of new, more efficient panels, redirecting a greater volume of end-of-life panels back into the domestic waste stream.
- Installer-led collection models (Consolidation Point and Back to Base) are the most efficient and popular for their ability to aggregate panels and reduce per-panel transport costs.
- Logistics and handling account for over 60% of the total cost of a sustainable recovery system, significantly more than the stable recycling cost of \$10-20 per panel.
- The use of pallets for transport was found to be 100-125% more efficient than stillages at commercial sites with trained staff.

- A panel’s potential for a second life is determined by the speed and method of collection. Over 74% of panels collected via professional installer channels were graded as potentially suitable for reuse, whereas 100% of panels from the resident-led Regional Council Drop stream were non-reusable.
- The value of a reused panel can be up to 133 times greater than the material value recovered through recycling.
- A multi-stage, technical assessment process is necessary to accurately determine a panel’s reusability. The process confirmed 37% of panels that were professionally collected and initially visually graded as reusable ultimately passed all safety and performance tests.
- The pilot stimulated investment, activating a new solar panel recycling sector in Queensland with an annual theoretical capacity of approximately 240,000 panels.
- This new capacity is currently insufficient to meet the total annual panel waste volume, highlighting a significant capacity gap.
- A key recycler reported that without a national scheme for the responsible disposal of solar panels, the industry cannot sustain investment.

6.2 Conclusions

- The solar panel waste challenge is immediate and greater than previously forecast, driven by early decommissioning due to technological upgrades.
- The viability and efficiency of an end-of-life solar panel management system are primarily dependent on optimised logistics and professional collection methods.
- Installer-led collections are crucial for capturing the value of panels suitable for a second life and for creating a financially sustainable recovery system.
- Establishing a trustworthy and safe reuse market requires a standardised, multi-test protocol to ensure consumer confidence and product safety.
- The current recycling infrastructure cannot handle the full volume of waste and requires substantial scaling.
- The willingness of the private sector to invest is constrained by the lack of long-term policy certainty.
- Without a funded program to facilitate proper disposal, homeowners are likely to continue to use less responsible methods such as landfilling or stockpiling panels.

7. APPENDICES

Appendix A - Table of Site Visits

SITE VISITED	SEC TEAM VISITS #	NEW LIMIT WASTE SERVICES VISITS #
Pan Pacific	10	Fortnightly
Ace Recycling	2	6
Sircel	2	3
Participating Collection Sites	Visited most of the sites	Quarterly

Information Flyer

WHAT HAPPENS TO THE PANELS AFTER THEY ARE DROPPED OFF?

The Smart Energy Council is partnering with reputable and certified partners to ensure logistics, testing, and recycling is conducted to the highest standards.

- 1. Collection**
Installers drop off their used solar panels at designated points.
- 2. Centralisation**
The Smart Energy Council collects these panels and transports them to a central location.
- 3. Recycling**
85% of the panels are sent to various recycling centers. This helps establish best practices in resource recovery and landfill redirection.
- 4. Re-use Testing**
15% of the panels are tested in certified laboratories. The purpose of testing is to inform a national testing standard that will ensure a consistent national approach to identify panels that are safe and reliable for the reseller market.

Ultimately, the goal is to make the collection, testing, recycling, and re-use of solar panels cost-effective and safe for installers, consumers, and recyclers

The Smart Energy Council received funding from the Queensland Government's Recycling and Jobs Fund and the Queensland Renewable Energy Industry Association Grant to deliver the end-of-life solar panel recovery trial.

JOIN THE PV SOLAR STEWARDSHIP PILOT IN QUEENSLAND

As part of our commitment to accelerate Australia's solar, storage, and smart energy industry, the Smart Energy Council is proud to partner with the Queensland Government to launch Australia's first solar panel recycling pilot.

Collection sites include Brisbane, Sunshine Coast, Gold Coast and Regional Queensland, with exciting plans for further expansion.

By making recycling easy, efficient, and cost-effective, we aim to support installers and their businesses through a robust stewardship program.

For more information or to book a panel drop-off:
smartenergy.org.au/pv-solar-stewardship-pilot-queensland
www.newlimitws.com.au
 (P) 1800 960 890

\$5*

incentive payment per residential panel*

Scan this QR code to book →

THE PROGRAM AIMS TO:

Explore the feasibility of collecting, reusing, and recycling solar panels from households and solar farms and gather data and insights to inform policies for a nationwide solution.

HOW THE PROGRAM WORKS:



Site Evaluation

NewLimit Site Evaluation

Site Evaluation Template

Project Name: [Insert Project Name] Site Address: [Insert Site Address]
 Assessor Name: [Insert Name] Date of Assessment: [Insert Date]

1. General Information

- Property Tax ID: [Insert ID]
- Current Owner: [Insert Name]
- Brief Site Description: [Describe the site's current state, including any existing buildings, clearings, or notable features.]

2. Physical and Land Characteristics

- Site Topography:
 - Flat:
 - Gentle Slope:
 - Steep Slope:
 - Comments: [Explain any significant slopes, ridges, or drainage patterns.]
- Dimensions and Boundaries:
 - Total Area: [e.g., acres, square meters]
 - Shape: [e.g., rectangular, irregular]
 - Survey/Boundary Markers: Visible / Not Visible
- Existing Structures:
 - Description: [List any buildings, fences, or other structures on the site.]
 - Condition: [e.g., excellent, poor, requires demolition]

3. Utilities and Infrastructure

- Water Supply:
 - Municipal:
 - Wells:

- Other: [Specify]
- Comments: [Note water pressure, capacity, and tie-in costs.]
- Electricity:
 - Available: Yes / No
 - Provider: [Insert Name]
 - Comments: [Assess capacity and distance to nearest substation.]
- Sewerage:
 - Municipal:
 - Septic System:
 - Comments: [Note tie-in costs or condition of the septic system.]
- Telecommunications:
 - Internet/Phone: Available / Not Available
 - Provider(s): [List providers]
 - Comments: [Check for high-speed internet access.]
- Road Access:
 - Primary Road Access: [Name of road]
 - Condition of Access Road: [e.g., paved, dirt, well-maintained]
 - Comments: [Note traffic flow, turning lanes, or other transport-related issues.]

4. Environmental and Hazard Assessment

- Flood Zone: Yes / No / Unknown
- Presence of Wetlands/Waterways: Yes / No
- Contamination/Hazardous Materials:
 - Known Contaminants: Yes / No
 - Red Flags: [e.g., unusual odors, soil discoloration, old industrial equipment]
 - Comments: [Recommend a Phase I Environmental Site Assessment if needed.]
- Historical Significance: Yes / No

5. Regulatory and Community Context

THERE ARE NO LIMITS

THERE ARE NO LIMITS

- Zoning Designation: [Insert Zoning Code, e.g., R-1, Commercial, Industrial]
- Permit Requirements: [List any known permits required for the project.]
- Community Acceptance:
 - Is the project compatible with the neighborhood? Yes / No
 - Potential for Opposition: High / Low
 - Comments: [Note any known community concerns or support.]
- Local Workforce:
 - Available Labor Pool: Sufficient / Insufficient
 - Comments: [Assess the availability of skilled labor for the project.]

6. Overall Evaluation and Recommendation

- Strengths of the Site: [Summarize the positive aspects, e.g., "Excellent road access, all utilities available."]
- Weaknesses/Risks: [List potential challenges, e.g., "Steep slopes will require significant excavation and grading."]
- Final Recommendation:
 - Proceed with Site
 - Proceed with Conditions (e.g., "requires further environmental testing")
 - Do Not Proceed
- Reasoning: [Provide a final summary of the decision, weighing the pros and cons.]

NewLimit Sign Off

Name.....

Signature.....

Date.....

THERE ARE NO LIMITS

QUEENSLAND HOUSEHOLD SOLAR PANEL RECOVERY PILOT – FINAL REPORT



Safe Work Method Statement

Packaging Guidelines

Each of the consolidation locations and retail drop point received packaging guidelines for safe handling and packaging of the panels for Transport.

Transport Packaging requirements:

For safety, all panels are required to be strapped and secured to a pallet as illustrated in the following photo:



All panels are to be stored on an appropriately sized pallet for transport: 1700mm x 1120mm for residential panels (up to 1680mm long and 1100mm wide).

They are to be stacked, in a method that has the biggest panels on the bottom of the pallet and smaller panels on the top. If panels are damaged i.e., broken glass is required to be wrapped in pallet wrap to ensure all glass breakage during transport is contained and ensure a safe workplace for logistic partners.

Where this is not possible, it must be disclosed during the booking process to ensure a custom collection is organized and ensure no collection partners are exposed to avoidable OHS risk.

PV Solar Stewardship



Smart Energy Council

July Update

1. Solar Panel Recovery Pilot Stage 2
 - Project Update
 - Risks / Delays
 - Discussion
2. Consumer Scale Battery Energy Storage Systems
 - Project Update
 - Risks/Delays
 - Discussion
3. Any further updates from industry, other jurisdictions or federal government
4. Actions - Next Meeting



Solar Panel Recovery Pilot Stage 2 - Project update

- Task 3. Pilot Collection and Testing of PV Panels**
- Remote regional council bookings concluded (285 panels) - Southern Downs (Stanthorpe 104 panels, Warwick 145 panels), Goonawindi Shire (36 panels)
 - Pan Pacific Recycling received their DA from City of Logan on 27 June
 - Sirec (222) and Ace Recycling (6,549) have processed the program panels, and Pan Pacific is completing processing of the panels from the reuse testing program (16,200 processed, 500 remaining)
- Task 4. Determine if a reuse market for PV panels is feasible**
- Task 2 - Panel Testing Study and Development of Gold Standard Safety Test
 - Final tranche of testing has completed with Second Life Solar (CSIRO test rig EL/IR tests) and PV Labs (wet leakage test). 5000 panels have been tested so far.
 - Pallet of panels have been shipped to CSIRO for comparison lab tests which are underway this week
 - Dr Marina Lunardi and Chris Fell (CSIRO) are underway with the reuse reporting due for 31 August



Solar Panel Recovery Pilot Stage 2 - Project update

- Task 5. Creation of Guidance Materials and Community Engagement**
- Kobie Keenan continuing 'Stakeholder Engagement Plan'
 - Temperature Check survey underway
 - Sector based Webinar series commencing in this month
 - 'EOL Volume Forecasting tool' in development



- Milestone 7. Draft Completion Report (due 31 August)**
- On track



Issues or Risks

- None

Any further updates from industry, other jurisdictions or federal government



Appendix B - Advisory Working Groups and Industry Meetings

DATE	LOCATION	MEETING DESCRIPTION
27 August, 2024	Brisbane	Recycler Working Group
28 October, 2024	Online	Recycler Working Group followed by Reuse Working Group
5 December, 2025	Canberra	Recycler Working Group followed by Reuse Working Group
29 January, 2025	Brisbane	Recycler Working Group followed by Reuse Working Group
20 February, 2025	Online	Recycler Working Group followed by Reuse Working Group
20 August, 2025	Online	Recycler Working Group and Reuse Working Group

Appendix C - Media Register

- June 26, 2024 – Darren Johannesen - ABC Radio Queensland. Subject/s: Solar panel recycling stewardship pilot. [Link](#)
- September 2, 2024 – John Grimes in Energy Magazine. Subject/s: Qld solar stewardship, solar pv recycling, reuse, recovery. <https://www.energymagazine.com.au/qld-gov-launches-solar-recycling-program/>
- August 30, 2024 – John Grimes in PT Tech. Subject/s: Qld solar stewardship, solar pv recycling, reuse, recovery. <https://www.pv-tech.org/queensland-launches-solar-module-recycling-programme/>
- August 29, 2024 – John Grimes in Mirage News. Subject/s: Qld solar stewardship, recycling, reuse, recovery. <https://www.miragenews.com/miles-govt-launches-australias-top-solar-panel-1305426/>
- February 22, 2025 – Smart Energy Council in SMH/The Age. Subject/s: National solar recycling stewardship program, recycling, product stewardship. <https://www.theage.com.au/national/this-wind-farm-is-retiring-so-what-happens-to-its-tonnes-of-steel-20250217-p5lcph.html>
- May 21, 2025 – Darren Johannesen on Solar Insiders. <https://reneweconomy.com.au/solar-insiders-podcast-australias-waste-panel-problem-and-how-to-turn-it-into-a-goldmine/>
- June 19, 2025 – Robyn Cowie on ABC Radio Adelaide. Subject/s: solar panel recycling.
- April 2, 2025 – Robyn Cowie and Ria O’Hehir in Women’s Agenda. <https://womensagenda.com.au/latest/your-presence-matters-sydneys-largest-annual-renewable-energy-expo-features-trailblazing-female-speakers/>
- October 23, 2024 – Robyn Cowie and Pan Pacific in The Guardian. Subject/s: Solar panel recycling, reuse, recovery, SEC solar stewardship pilot. <https://www.theguardian.com/environment/2024/oct/23/australia-renewable-energy-solar-waste>
- October 11, 2024 – Robyn Cowie on ABC Radio Perth, Mornings - Solar panel recycling. Subject/s: Qld solar panel recycling pilot, national solar panel recycling, WA solar panel recycling. [Link](#)
- October 8, 2024 – John Hill on 4BC radio. Subject/s: SEC solar panel recycling pilot, Pan Pacific recycling plant launch, plan to take recycling scheme to other states. [Link](#)
- October 8, 2024 – John Hill on ABC Radio Brisbane. Subject/s: SEC solar panel recycling pilot, Pan Pacific recycling plant launch, plan to take recycling scheme to other states. [Link](#)
- October 7, 2024 – Robyn Cowie, John Hill on Channel 10 News Qld. Subject/s: SEC Qld solar panel recycling pilot, Pan Pacific solar recycling launch. [Link](#)
- October 7, 2024 – Robyn Cowie on Channel 9 News Qld. Subject/s: SEC solar panel recycling pilot, Pan Pacific solar recycling launch. [Link](#)
- October 7, 2024 – Pan Pacific on 7 News Queensland. Subject/s: Pan Pacific solar panel recycling launch. [Link](#)
- October 7, 2024 – Robyn Cowie in Renew Economy. Subject/s: SEC solar panel recycling pilot, Pan Pacific solar recycling launch. https://reneweconomy.com.au/solar-recycling-machine-powers-up-as-key-export-market-closes-to-used-australian-panels/#google_vignette