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Dear Ms Chang

Re: Draft Solar Panels Responsibility Amendment (Photovoltaic Panels) Regulation 2026

As the national peak body representing Australia's $20 billion waste and resource recovery (WARR) sector, the Waste Management and Resource Recovery Association of Australia (WMRR) welcomes the opportunity to comment on the *draft Product Lifecycle Responsibility Amendment (Photovoltaic Panels) Regulation 2026* (Draft Regulations), together with the accompanying Regulatory Impact Statement (RIS), Explanatory Document and Issues Paper concerning the proposed mandatory product stewardship scheme for solar photovoltaic (PV) panels in NSW ("the scheme"), which is expected to commence in early 2028. The scheme would be the second product (after household batteries) to be regulated under the State's new product stewardship framework. Solar panels have been identified as a priority product stream for federal product stewardship since 2016, and as noted by Environment Ministers nationally, the NSW scheme is being developed with the capability of adoption by other jurisdictions, or potential to be a future Commonwealth scheme.

The objectives of the scheme are to ensure producer responsibility for solar panels throughout their full lifecycle and promote recycling and higher-level resource recovery for solar panels. Under the scheme, brand owners who supply into NSW would be required to participate in a product stewardship organisation (PSO), overseen by the EPA. Detailed delivery requirements would sit in administration agreements and EPA-approved action plans. If there is no PSO, brand owners would need their own action plans. The RIS supports a staged approach to improving recovery, with a preference for "Option 1" – that is, a scheme initially focused on Tier 2 recovery (removing frames and junction boxes, delaminating panels and recovering some materials with any remaining material downcycled, landfilled or sent for further processing) with potential progression to Tier 3 (separating and recovering all valuable materials) as processing capacity and operational experience develop. The Explanatory Document says recovery rates, collection access and coverage could be included in PSO agreements and action plans, and that targets and other incentives would also be considered during a scheme review.

As presently drafted, the NSW scheme will apply to "regulated PV panels", being photovoltaic panels that are either a monocrystalline (or mono) panel or a bifacial panel. The RIS indicates this is intended to capture installed (including rooftop) non-portable panels, whether large, commercial or residential. The Draft Regulation expressly excludes portable photovoltaic panels, accessories connected to a PV panel; and energy storage systems and batteries. However, the EPA has

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signalled the scheme settings will be reviewed and scaled up over time, which may include expanding the scheme to cover further technologies and products that are currently excluded.

WMRR remains a strong advocate for mandatory stewardship of problematic products such as solar panels, grounded in extended producer responsibility (EPR) wherein those that supply products into the market are legally and financially obligated to manage those materials within that market throughout their entire product lifecycle to mitigate both their environmental and economic impact. In WMRR's view, the principal barrier to increasing solar panel recovery and reuse is the commercial viability of a currently un-integrated system that manages panels across their lifecycle with limited end markets. Recycling involves complex processes and materials that are costly to recover, while heavy, specially manufactured solar glass adds substantially to transport costs. Australia's solar manufacturing and recycling industries remain underdeveloped, with most panels imported from numerous overseas supplier and reliance on consumers paying for disposal have constrained participation in recycling initiatives and contributed to industry instability. Meanwhile, gaps in standards, warranties and regulatory clarity continue to impede viable reuse markets and broader circular solutions. Hence, there is a need for significant system transformation, supported by clear regulation, to implement producer obligations to design solar panels with circularity front of mind.

A genuine product stewardship scheme must influence the design of products entering the market, rather than focus solely on end-of-life collection and management. Current solar panel designs can make separation and recovery of materials technically complex and commercially expensive. Improving durability, modularity, repairability and material separability would extend product lifespans and reduce future recovery costs. Given that Australia is one (1) market, NSW's leadership in developing the scheme for Commonwealth or state-by-state adoption should aim to establish nationally consistent and enforceable product design requirements, that also introduce incentives that reward improved durability, repairability, reuse and recyclability**.** Eco-modulated producer fees, where contributions reflect the environmental performance and actual end-of-life management costs of different products, can incentivise brand owners to supply panels that are more durable, easier to repair, suitable for reuse and designed for efficient disassembly and material recovery.

To assist the EPA in finalising the scheme, WMRR has provided comments on the Draft Regulations, developing an advanced solar manufacturing/remanufacturing industry and a realistic timeframe for the rollout of the scheme.

Comments on the Draft Regulations

WMRR notes that the Draft Regulations provide for:

- Producer responsibility with sections 20–22 placing obligations on brand owners, including relevant suppliers bringing panels into NSW. Where a product stewardship organisation (PSO) has an agreement with the regulator, brand owners must participate through agreements with that PSO.

- Reuse and recycling with Schedule 1, Part 2, sections 8–11 requiring circular economy outcomes and maximising panel reuse, recycling and material recovery, as far as reasonably practicable. Section 14 requires reasonable steps to keep panels intact during collection, transport and storage.

- Collection by installers with section 24(2) expressly contemplating PSOs contracting third parties to collect panels - this provides a much-needed mechanism for engaging installers to collect removed panels and deliver them into the scheme. Schedule 1, Part 2, section 15

requires sufficient accessible collection points for the public, electricians and other supply-chain participants, including in regional areas. However, the Draft Regulation does not expressly regulate installation services, require producers to appoint installers, or oblige installers to collect old panels whenever they install replacement systems.

In WMRR's view the Draft Regulations must go beyond mandatory PSO membership to impose transparent, enforceable producer obligations to design and fund the full costs of collection, transport, reuse, recycling and environmentally sound disposal, consideration must also be given to how legacy and orphan panels already in the market will be addressed. In particular, the scheme must explicitly require producer-funded installer take-back when panels are installed or replaced and incentivise better product design and viable markets for reused panels and recovered materials. As such, WMRR recommends that the final regulations establish explicit requirements that:

- Ensure that producer funding covers the whole management chain: design, reuse, repair, receipt, sorting, packaging, storage, collection, transport, processing, downstream treatment and lawful disposal of unrecoverable residues.

- Set clear responsibilities for installers, system owners and decommissioning contractors for directing removed panels into authorised pathways, with documented handover.

- Ensure that the scheme is designed to ensure participants across the value chain (e.g. councils and WARR operators) receive appropriate payments for services provided (including capital and operational costs to deliver these), rather than becoming default collection and storage providers at their own expense. NSW has key learnings from the operations of the CDS scheme.

- Financial assurance, reserves and continuity arrangements protect against supplier exits or PSO failure. The fallback requirement for individual brand-owner action plans does not, by itself, resolve funding for orphaned products, and the success of the scheme in terms of both improved recovery outcomes and improving consumer confidence in such schemes necessitates that possibilities for stockpiling orphan products (and negative media attention) are avoided.

- Establish transparent performance measures for collection, whole-panel reuse, material recovery, recovery quality and verified end use, with material-specific reporting for glass, aluminium, silicon, silver and other valuable materials (rather than simply reporting "total tonnes recovered"). This should include provision for audited downstream traceability.

- Include minimum enforceable recovery requirements (targets) from commencement and publish a timetable for progressively strengthening recovery standards.

- Consider how to fund legacy and orphan panels, including panels already installed and those whose manufacturers or importers have ceased operating.

WMRR makes the following key comments for the EPA's consideration in support of these recommendations.

i. *Clarify the coverage of existing, legacy and emerging solar technologies under the scheme*

The Draft Regulation proposes to regulate specified solar PV panels, including monocrystalline and bifacial panels, while excluding portable panels, associated accessories, energy storage systems

and batteries. WMRR is concerned that the proposed scope may leave significant quantities of solar equipment as well as legacy panels outside funded recovery arrangements. In particular, clarification is required regarding the treatment of already in situ polycrystalline panels, thin-film technologies and other types of 'orphan' panels that have already entered the waste stream.

WMRR notes the experience of the NSW battery stewardship framework, where exclusions relating to certain embedded batteries may result in products continuing to enter mixed waste streams, creating ongoing safety risks for WARR operators which the battery scheme intended to mitigate. Similar unintended consequences should be avoided in the solar panel scheme.

The RIS clearly intends for the scheme to address panels already installed before commencement. It identifies legacy panels as a major reason to prefer a government-led framework: original manufacturers may have left Australia or ceased operating, making responsibility and funding difficult to assign and identifies the ability to fund legacy-panel recovery as an advantage over a landfill ban alone. However, it is not clear how legacy costs would be divided among current brand owners, how panels from defunct or unidentifiable suppliers would be funded, whether any existing stockpiles would qualify to be under the scheme or what financial reserves would cover future liabilities. Without explicit funding arrangements, legacy and 'orphan' panels risk becoming an unfunded responsibility for councils, consumers and WARR operators. As such, WMRR recommends that the scheme:

- explicitly funds the collection, transport, reuse assessment, recycling and residual disposal of legacy and orphan panels;
- establishes a clear and equitable methodology for allocating legacy costs among participating producers;
- clarifies the treatment of existing stockpiles;
- require appropriate financial reserves and assurance arrangements so as to establish continuity arrangements to protect against supplier exits or a PSO failure; and,
- publicly reports on legacy-panel collection, recovery and associated expenditure.

The exclusion of associated equipment, including inverters, cables, racking and other components under the Draft Regulation, also raises questions about responsibility for managing the complete solar panel system when it is removed or replaced. For this reason, performance reporting on the recovered and residual materials is an important aspect of the scheme, so that there is visibility over the entire lifecycle of solar panels being managed and funded. Excluded components that are necessary for the use of solar panels should not become an unfunded responsibility for the WARR sector. EPA issued guidance for the management of these materials (for those collecting and receiving this material – notably, installers) would be welcome in the first instance. The scheme must also recognise that not all solar panel components will be recoverable. Producer funding must therefore extend to the environmentally sound management of unrecoverable or contaminated fractions, including testing, transport, treatment and lawful disposal.

ii. Producer responsibility must extend beyond scheme participation and include transparent obligations for funding, collection accessibility, reuse, recovery, residual management and transparent reporting.

While WMRR supports mandatory participation, joining a PSO does not, in itself, demonstrate that producers are meeting the full costs of managing their products throughout and at end of life. The scheme requires brand owners to participate in a PSO and meet notification, recordkeeping and reporting obligations, however, as noted in the Explanatory Document, the proposed framework leaves significant operational and performance requirements to subsequent administration agreements and EPA-approved action plans.

The regulatory framework must ensure that producer responsibility is demonstrated through actual environmental outcomes rather than administrative compliance alone, and as such clear and transparent targets must be set and monitored. WMRR recommends that minimum obligations should be clearly established, publicly communicated and enforceable from commencement, including requirements for funding, collection accessibility, reuse, recovery, residual management and transparent reporting.

Funding

Under section 22(4) (b) (v) of the *Product Lifecycle Responsibility Act,* when determining whether to enter an agreement to administer a scheme, the EPA must consider whether the stewardship administration agreement adequately deals with governance and organisational matters, including funding to achieve the outcomes of the agreement. Whilst the RIS recognises that revenue from recovered materials is insufficient to cover the costs of collection and processing (demonstrating the need for ongoing producer contributions), the proposed scheme arrangements do not yet establish a final fee methodology, contribution formula or explicit guarantee of no-charge consumer collection.

WMRR recommends that the scheme establish transparent, cost-reflective service payment arrangements, with regular fee reviews reflecting actual operating costs, commodity prices, panel composition and recovery standards. In particular, collection of panels for recovery should be modelled using realistic collection methods that are convenient and financially accessible (especially to households) to encourage participation and minimise landfilling, stockpiling and inappropriate disposal. Costs for the testing and assessment of solar panels for reuse must also be included, which is explained further in the next section.

Scheme funding must explicitly cover funding the complete management chain for solar panels, including:

- Receipt, collection and sorting
- Assessment and testing for reuse.
- Safe handling, packaging and storage.
- Transport, including regional freight.
- Processing and material recovery.
- Downstream treatment and verification of material uptake.
- Lawful disposal of unrecoverable or contaminated residues (including relevant testing, transport, landfill gate fees and waste levies).
- Insurance, compliance and associated operating costs.

It is vital however that the scheme is more than simply a collection and processing scheme, and whilst the above service costs are one part of the scheme fees, it is equally as important that fees be set at a level that drives improved design for reuse, repair and recoverability, as well as incentivises market development for the resultant materials recovered.

Collection accessibility (incorporating installer led models)

Without adequate funding for the full cost of managing solar panels at end of life, councils and WARR operators risk becoming default collection and storage providers at their own expense, contrary to the principles of EPR. It follows that the scheme must provide cost-reflective payments that support the circular supply chain in full – including those that will enable reuse and repair – in addition to those that collect, transport, process and recover. Technicians who install and decommission solar panels will play a key part in delivering a scheme that optimises safe and efficient material recovery from, and repair and reuse of solar panels. Moreover, scheme funding must be cognisant of the significant differences in costs across metropolitan, regional and remote NSW.

Given that solar panels are commonly removed during system upgrades and replacements, WMRR consider that solar installers and decommissioning contractors are central to establishing an efficient and financially viable collection system. WMRR notes that the Queensland Government's Household Solar Panel Recovery Pilot final report, found that the effectiveness of end-of-life management systems depended heavily on efficient logistics and professional collection, with installer-led models playing a critical role in capturing value from panels suitable for recycling and use and supporting a financially viable recovery system.

The Draft Regulations allow for a producer-funded model involving installers collecting removed panels for reuse or recycling, but it does not require that model or give producers control over installation. It does not expressly require payment to installers for removal, collection and transport; take-back at replacement; or testing and sorting functioning panels for reuse before recycling. Its detailed reporting provisions also focus predominantly on recovered materials, rather than whole panels returned to service.

Given that NSW end-of-life panel volumes are projected to increase from 14,000 tonnes annually to 89,000 tonnes in 2045-6, WMRR considers that the collection opportunity at installation and replacement must be a defined part of the scheme, in order that:

- the scheme clearly distinguishes between the costs of electrical disconnection and physical removal of panels from buildings and the subsequent costs of collection, transport and end-of-life management; and,

- the allocation of these costs must be transparent and must not create financial disincentives for consumers or installers to direct panels into authorised recovery pathways.

Reuse

Reuse is recognised as an objective of the scheme, with the RIS supporting reducing design obsolescence, repowering and recycling panels where economic, and recognising that system upgrades and battery installations can cause panels to be retired early. Yet a detailed system for reusing whole panels is not established with the RIS saying 'implementation arrangements' should address recycling and reuse, including the types of panels eligible for each pathway. Improving reuse outcomes requires the establishment of a practical pathway to identify panels suitable for reuse from the outset, with funded reverse logistics: covering collection, transport, protective

packaging and timely movement, including regional services. Most importantly this must be grounded in safe handling and storage, which requires installer training and procedures that minimise breakage and deterioration, and national alignment supporting consistent product warranty and installation standards and markets across jurisdictions.

WMRR notes that the absence of nationally consistent standards for testing and certifying used solar panels creates significant barriers to the development of legitimate reuse markets – and this again risks transferring an unfunded lifecycle management liability from the supplier to another owner or jurisdiction. WMRR recommend that the scheme includes separate transparent targets and reporting for whole-panel reuse and explicit requirements for producer-funded installer take-back arrangements of solar panels for potential reuse when solar systems are replaced. This should include:

- Clear responsibilities for installers, system owners and decommissioning contractors.
- Appropriate payments for collection, handling and transport.
- Documented handover to authorised collection and recovery operators.

  Requirements to preserve panels in a condition suitable for reuse assessment.
- Accessible collection infrastructure across metropolitan and regional NSW.
- Transparent arrangements for managing panels that are damaged or unsuitable for reuse.

To support a genuine circular supply chain for reused panels, WMRR also recommends that the EPA work with relevant jurisdictions and industry to establish nationally consistent testing and certification standards for used panels and establish funding and incentives for safe reuse and repair. This would necessarily require appropriate assessment for reuse before panels are directed to recycling, and the development of clear warranty, liability and traceability requirements. For further commentary on national opportunities for solar panel reuse, please refer to WMRR's submission into the federal inquiry into solar panel and reuse in Australia.

Recovery targets and transparent reporting of material recovery

WMRR notes that there is no scheme-wide numerical recovery target as a settled regulatory requirement. The Explanatory Document says that targets could be included in PSO agreements and action plans, and that targets and other incentives could also be considered during a scheme review. The RIS models 70% of discarded panels going to processors from the 2030s, and, under the preferred Option 1, 70% of processed panels receiving Tier 2 processing by 2030. WMRR would encourage the regulations to include the modelled 70% recovery target for recycling in order that this is publicly reported against by PSOs. In WMRR's view this will also encourage design by panel producers to improve environmental outcomes, especially if eco—modulated fees are introduced, as discussed in the RIS.

Moreover, whilst WMRR acknowledges that scheme administration agreements will need to be confidential, for the scheme to increase public and investor engagement in solar recycling, the scheme's operation must be transparent and visible. The scheme must incorporate publication of targets, service standards, fee methodology, performance, material destinations and a transparent complaints process to demonstrate meaningful recovery. WMRR recommends that minimum

recovery outcomes should be enforceable from commencement of the scheme, and that specific material recovery should be publicly reported (rather than total tonnes).

The RIS modelling assumes recovery by mass of 16% for Tier 1 recovery (aluminium frame and junction boxes), 85% for tier 2 (delaminating panels and junction boxes with remaining downcycled recovery fand further processing) and 90% for Tier 3 recovery (separation of valuable materials for advanced processing) respectively. Glass and aluminium alone account for approximately 86% of a representative panel's mass, meaning a high overall recovery percentage can still obscure poor recovery of silicon, silver and other materials. To ensure visibility and tracking of materials recovery from solar panels, and appropriate review of the success of the scheme in improving recycling outcomes, WMRR recommends that the scheme require:

- Material-specific reporting, including glass, silicon and silver, rather than relying solely on total tonnes recovered.
- A published timetable for reviewing and strengthening recovery requirements (or progressing from tier 2 to Tier 3 recovery).
- Audited downstream traceability through to a materials actual secondary use - so delivery to a recycler or for export does not automatically count as successful "recycling".
- Producer incentives for durable, repairable and readily separable panels, including differentiated fees reflecting actual end-of-life costs.
- Product standards for the materials recovered for recycling – noting that procurement and market development for recovered materials will require consistent and reliable outputs. This is especially important given that the RIS identifies limited higher-value markets for solar glass, (comprising approximately 68% of panel mass).

Independent auditing should verify these reported recovery outcomes as well as the scheme's financial performance.

Developing remanufacturing and advanced manufacturing for solar panels in NSW

More collected panels resulting from the introduction of the mandatory scheme will require funded capacity, approvals and downstream markets, otherwise, the scheme risks increasing stockpiles. Schedule 1, Part 2, section 13 of the Draft Regulation requires panels and recovered materials to be managed, as far as reasonably practicable, in a way that considers developing recycling, remanufacturing and resource recovery capabilities within NSW. Separately, Schedule 2, Part 2, section 4(e) requires action plans to explain how recycling in Australia will be supported. For WMRR, the success of the scheme in developing local capability (and generating investment in local manufacturing and remanufacturing capability for solar panels) requires government having a significant role to play in bridging the gaps to address transport costs, uncertain demand and competition from virgin materials and imported products.

Firstly, recovering materials from end of life products does not automatically make them suitable for local manufacturing or remanufacturing. The NSW Government should support uptake of recovered materials from solar panels through targeted procurement that recognises verified recycled content and lifecycle performance, alongside providing funding for product testing and qualification to help build market demand. WMRR points to the experience of Sircel – an advanced solar recycler based in Parkes which went into voluntary administration in 2025 – as evidence of the need for government

intervention in this space, particularly as far as mandated recycled content thresholds are concerned. For example, the recovery of copper and silicon, could be used in the build of data centres if such recycled content thresholds were in place. Moreover, to ensure there is demand for recyclable components from solar panels, WMRR recommends developing specifications with intended buyers (before selecting processing equipment), in order that recovery processes produce materials that local manufacturers can actually use. This will in turn facilitate investment in appropriate technologies and infrastructure to facilitate recovery.

Secondly, *a*n advanced manufacturing industry requires reliable logistics, equipment maintenance, engineering, laboratory testing, quality assurance and traceability services, whilst a solar panel reuse industry additionally needs competent electrical assessment, installation services, product information, insurance, warranties and clear arrangements for managing panels at their eventual end of life. This means that priority infrastructure for government support should also identify collection points and secure storage that protects panels from damage, testing and assessment facilities for reuse, equipment for dismantling, delamination and material separation of solar panels, and suitable laboratories for composition, contamination and performance testing.

Thirdly, government infrastructure support should also consider workforce availability within the region, noting that whole-panel reuse and advanced material recovery are different competencies. WMRR notes that there are regions such as the Hunter (established energy and manufacturing economy), Illawarra-Port Kembla (manufacturing and existing port/transport infrastructure) and Wagga-Riverina (freight infrastructure and industrial precinct) which may prove beneficial for capitalising on existing workforce capability and transport links. A network of regional collection and consolidation points linked to specialist processors may be more viable than multiple facilities.

Realistic development timeframe for the rollout of the scheme

As noted throughout this submission, WMRR encourages NSW to maintain national alignment throughout implementation to support eventual adoption by other jurisdictions or transition to a Commonwealth framework. Implementation arrangements for the NSW scheme should provide sufficient certainty for industry investment while avoiding unnecessary delays in addressing the growing waste challenge. For this reason, the EPA should establish a clear implementation roadmap covering finalising producer obligations and funding arrangements; establishing the PSO and its governance framework; developing collection and installer take-back networks; setting minimum recovery and reuse requirements; addressing legacy and orphan panels; ensuring processing capacity and downstream market readiness; and implementing performance monitoring, review and continuous improvement mechanisms. The transition must ensure that collection volumes do not increase beyond the capacity of the system to safely store, process and recover materials.

WMRR notes the consultation question in the issues paper around proposed timeframes and appreciates that a staged approach would be more credible than committing immediately to a complete domestic solar manufacturing supply chain. Ideally, WMRR recommends that the scheme considers an indicative ten (10) year horizon as follows:

Timeframe	Suggested Benchmarks

0-2 years	• Implement scheme in NSW in 2028 including:
	  ○ Finalisation of producer obligations and funding arrangements.
	  ○ Establishment of the PSO and associated governance requirements.
	  ○ Development of collection and installer take-back networks.
	  ○ Confirmation of minimum recovery and reuse requirements.
	  ○ Arrangements for legacy and orphan panels under the scheme.
	  ○ Processing capacity and downstream market readiness.
	  ○ Performance monitoring, review and progressive improvement mechanisms.
	• Introduce transition to Commonwealth /state aligned scheme.

2-5 years	• Scale proven separation processes for Tier 2 recovery. • Establish commercial supply into suitable existing manufacturing markets. • Demonstrated technology, facility approvals (and trained operators). • Establish consistent specifications and purchasing agreements. • Explore viability for Tier 3 recovery.
5-10 years	• Scheme operational across the Commonwealth . • Proven economics and sufficient throughput for infrastructure. • Maintain reliable demand for recovered materials from solar panels.

WMRR again welcomes NSW's leadership in progressing mandatory product stewardship for solar panels and recognises the opportunity for the proposed framework to support the development of a more circular and sustainable solar industry. However, the success of the scheme will depend on whether it addresses the underlying commercial and regulatory barriers that currently prevent solar panel reuse and recycling at scale. A scheme focused primarily on producer participation and material recovery, without clear funding obligations, accessible collection pathways, reuse standards and viable downstream markets, risks perpetuating existing challenges. A comprehensive, nationally aligned EPR framework is essential to ensuring that solar panels are designed for circularity, retained in productive use for longer and recovered responsibly at end of life.

WMRR trusts that the EPA will consider these comments in finalising the scheme. Please contact the undersigned if you wish to further discuss WMRR's submission.

Yours sincerely



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