

Pathways Call for Evidence Submission

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Operational Evidence to Inform NSW Decarbonisation Pathways

Submission to the NSW Net Zero Commission
Call for Evidence: Decarbonisation Pathway Scenarios

Submitted July 2026

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Introduction

The Australian Bedding Stewardship Council (ABSC) is pleased to contribute operational evidence to support the development of NSW's first decarbonisation pathway scenarios.

As the operator of Australia's national voluntary stewardship scheme for mattresses and bedding, the ABSC works across manufacturers, retailers, recyclers, local government and the resource recovery sector. The ABSC brings practical deployment experience in the collection, transport, processing and end-market development of recovered materials, and insight into the factors that influence the performance of circular material recovery systems.

This submission does not attempt to quantify the emissions impact of mattress and bedding recovery. Instead, it provides evidence relevant to the assumptions that underpin pathway development, including infrastructure deployment, secondary material markets, regional logistics, market mechanisms and measurement.

While this submission is primarily relevant to the Commission's Waste sector pathway, the evidence is also relevant to the Industry and Built Environment pathways, particularly where they relate to secondary material markets, embodied carbon and the recovery of manufactured products.

Evidence is drawn primarily from our NSW experience, supplemented by national data where it illustrates conditions likely to apply within NSW. Where evidence is observational rather than quantified, the submission notes this distinction explicitly.

Executive Summary

This submission draws on the ABSC's experience implementing a national product stewardship scheme to provide evidence relevant to the assumptions underpinning NSW's decarbonisation pathway scenarios. The ABSC makes five observations for the Commission's consideration.

1. **Collection infrastructure is necessary, but not sufficient.**

Processing capability, transport logistics, secondary material markets and end-market demand are equally important conditions for returning recovered materials to productive use. Pathway assumptions that treat collection capacity as the primary variable are likely to overestimate circular economy performance.

2. **Industrial demand alone does not guarantee a reliable supply of secondary materials.**

Our experience shows that secondary material market conditions can shift rapidly and significantly. Industrial decarbonisation pathways that assume reliable secondary material supply should account for market volatility as a variable, not a background constant. Demand from industrial users does not, by itself, create or stabilise that supply.

3. **Statewide assumptions can misrepresent regional and remote performance.**

The volume of recoverable material within a given area determines whether collection, aggregation and transport economics are viable. Pathway assumptions calibrated on metropolitan conditions will systematically misrepresent performance in lower-density regional and remote areas, in both directions.

4. **Operational conditions materially influence pathway performance.**

What happens in practice, such as how steel is valued, how collection volumes translate into processing outcome, or how logistics costs vary by geography, can differ significantly from the assumptions built into pathway models. Understanding where and why those gaps exist is directly relevant to building more robust pathway scenarios.

5. **Better measurement will improve future pathway development.**

Current frameworks capture material volumes but tell us less about the emissions implications of different recovery pathways. The ABSC is actively contributing to methodology development in this area. Findings will inform future evidence submissions.

Scope of Evidence

Evidence in this submission includes:

- Operational data from the implementation of Australia's national bedding stewardship scheme.
- Experience from NSW, supplemented by national evidence where relevant.
- Observations from industry participants, recyclers and local government collected through scheme operations.

Evidence not included in this submission:

- Lifecycle carbon modelling
- Economic modelling
- Policy advocacy or recommendations

Where ABSC Evidence Sits in the System

The environmental performance of circular material recovery systems depends on conditions at each stage of the following chain. A failure or constraint at any stage affects outcomes downstream.

System stage		ABSC evidence available
Producer participation	↓	Scheme data on membership and contribution
Collection systems	↓	NSW collection volumes and network coverage
Transport and aggregation	↓	Regional logistics costs and distance data
Processing infrastructure	↓	Processor capacity, shredding and dismantling
Secondary material markets	↓	Steel and foam market conditions; end-market failures
Manufacturing and reuse	↓	Comfort return pilots; hotel asset recovery program findings
Decarbonisation outcomes		Methodology; measurement gaps identified

This submission provides evidence across multiple stages of this system. It identifies the operational conditions that influence performance at each stage and the points at which the system is most vulnerable to disruption.

How this Submission Is Organised

Each section addresses a specific dependency observed through scheme operations. Sections are structured to answer four questions: what was observed; what evidence supports that observation; why it is relevant to pathway development; and what the Commission should consider when developing related assumptions.

This submission does not attempt to address all consultation themes equally. Sections reflect areas where ABSC has direct and substantive operational evidence. Where evidence is limited, this is noted.

Section	Central question	Commission questions addressed
A. Processing Infrastructure	What infrastructure capability, not just capacity, is required for recovered materials to meet industrial specification?	Q2 (technology deployment, barriers, costs); Q6 (sector evidence)
B. Secondary Material Markets	What market conditions are required for recovered materials to remain in productive use?	Q1 (market mechanisms); Q6 (operational evidence)

Section	Central question	Commission questions addressed
C. Regional and Remote Recovery	What does deployment experience show about the effect of geography on recovery system performance?	Q5 (regional and remote, just transition); Q6 (deployment evidence)
D. Measurement	What information is currently available, and what is still missing?	Q6 (evidence gaps); Q8 (methodology development)
E. Outcomes Beyond Emissions	What co-benefits does deployment experience indicate should be considered alongside emissions outcomes?	Q7 (outcomes beyond emissions); Q4 (economic impacts)

A. Processing Infrastructure

Consultation questions addressed: Q2 (technology deployment, infrastructure, barriers and costs); Q6 (evidence to inform pathway assumptions). Relevant to the Waste and Industry sector pathways, and to the Manufacturing sector where processing capability determines material specification.

Future decarbonisation pathways depend not only on the volume of material collected, but on the capability of processing infrastructure to produce secondary materials suitable for industrial reuse.

Modelling question this section answers.

If pathway modelling assumes greater availability of secondary materials, what assumptions should it make about the processing infrastructure required to produce them?

Observation: Industrial demand for secondary materials can only contribute to decarbonisation if processing infrastructure can produce materials that meet market requirements.

Capability, not capacity

Infrastructure discussions often default to questions of capacity: how many facilities, how much throughput, how many processors. Scheme data indicates that capacity is frequently not the binding constraint. The more consistent constraint observed is capability: whether processing infrastructure can produce an output that meets the specification a downstream market or industrial user requires.

This distinction matters for pathway modelling, and it introduces a distinction this submission uses throughout: **the difference between recoverable material and usable secondary material**. Recoverable material is what can be physically collected from end-of-life products. Usable secondary material is the subset of that which meets the specification required to re-enter industrial use. Processing capability determines how much recoverable material becomes usable secondary material. **A pathway scenario can assume sufficient processing capacity exists while still overestimating secondary material availability**, if the capability to meet specification is not separately assessed.

Manual dismantling

Manual dismantling of mattresses produces higher-quality separated material streams, including cleaner steel separation and reduced cross-contamination between material types. This generally results in cleaner recovered steel than conventional shredding and reduces the processing required downstream.

However, cleaner separation alone does not guarantee that the recovered steel meets market specification. Steel recovered from manually dismantled mattresses is typically baled as coils or springs. Operational experience indicates that many downstream steel processors and consolidators require **busheling-grade scrap**: processed steel cut to a size and form that can be fed directly into existing scrap handling and steelmaking systems. Baled coils frequently require an additional stage of processing before they meet those requirements. This additional processing step carries both cost and operational implications that affect whether the material progresses through the value chain.

The constraints on manual dismantling are therefore twofold. It is labour intensive, limiting throughput relative to mechanical processing, and while it produces cleaner outputs, it does not on its own eliminate the downstream processing required for many industrial markets. Scheme data indicates that manual dismantling alone cannot process the volumes required by a state-wide or national recovery system, nor does it remove the need for subsequent processing to achieve industrial specification.

Conventional shredding

Shredding processes a far greater volume of material per unit of time and is the more scalable processing pathway. However, shredded outputs frequently carry higher contamination levels and less consistent material separation than manually dismantled outputs, which limits the proportion of shredded material that meets industrial-grade specification.

Different processing pathways produce different material outcomes and should not necessarily be treated as equivalent within pathway modelling. A tonne of recovered material processed by shredding is not necessarily interchangeable, in decarbonisation terms, with a tonne processed by manual dismantling, because the proportion of each that reaches industrial-grade specification can differ substantially.

Pathway dependencies identified — processing capability

- ✓ Material separation quality (steel, foam, fibre)
- ✓ Contamination levels relative to consolidator and manufacturer specification
- ✓ Throughput capacity at a scale consistent with state-wide collection volumes
- ✓ Investment in processing technology to close the gap between volume and quality
- ✓ Consistency of output across processing sites

Investment in new processing technology

Investment in improved processing technology has the potential to increase the proportion of recovered material capable of re-entering industrial value chains. A new mattress-specific shredding technology is currently being introduced into the Australian market through ABSC's network. This investment is evidence that industry is responding to an existing processing constraint — it is not yet evidence that the constraint has been resolved. Performance data from Australian operating conditions is not yet available, and this submission does not claim a quantified improvement.

NSW context: Manual dismantling, conventional shredding and the new processing technology are all in current or imminent use within NSW operations. The capability gap described in this section is an NSW operating condition, not a historical or interstate observation.

What the Commission should consider when developing pathway assumptions

Processing capability determines whether recovered materials can become industrial inputs. Whether those inputs are ultimately used depends on the strength of the secondary material markets discussed in Section B.

- Processing capability, not only processing capacity, as a determinant of the secondary material volume available to industrial users.
- Material specification and contamination as variables that affect the proportion of collected material that reaches industrial-grade output, independent of total tonnes collected.

- Manual dismantling and mechanical shredding as distinct processing pathways with different quality and scale trade-offs, which should not be modelled as equivalent.
- Processing technology investment as a forward-looking indicator of future pathway capability, relevant to 2035 and 2050 scenario horizons, while noting that current evidence of its performance is not yet available.

B. Secondary Material Markets and Industrial Decarbonisation

Consultation questions addressed: Q1a (market mechanisms and barriers); Q1d (cross-sector collaboration); Q2b (deployment constraints); Q6 (evidence to inform pathway assumptions); Q7 (outcomes beyond emissions). Relevant to both the Waste and Industry sector pathways.

Industrial decarbonisation increasingly depends on reliable supplies of secondary materials. Operational experience from the ABSC scheme provides evidence on the conditions required to generate and sustain that supply.

Observation: The decarbonisation contribution of recovered materials depends on the availability of viable secondary material markets. Without functioning end markets, collection and processing infrastructure cannot deliver the material substitution outcomes that industrial decarbonisation pathways increasingly assume.

Steel as a worked example of a broader value chain problem

Mattress-derived steel is a small volume within NSW's overall scrap steel supply. On its own, it would not warrant significant attention in pathway modelling. Its value to this submission is as a worked example of a constraint likely to recur across multiple recovered material streams feeding into industrial decarbonisation pathways.

Steel recovered from mattresses and bedding is a potential input into NSW's industrial decarbonisation pathway, where electric arc furnace steelmaking depends on reliable scrap steel supply. The transition to lower-emissions steelmaking, including increased use of electric arc furnace technologies where applicable, illustrates the growing importance of reliable secondary steel inputs. BlueScope's Port Kembla operations are a relevant NSW example of this broader industry trend.

Demand from an end user does not guarantee that mattress-derived steel reaches that end user.

The value chain between mattress collection and electric arc furnace-grade scrap input involves several intermediate steps, each with its own cost and viability conditions: separation of steel from foam, fibre and other contaminants during processing; achievement of the gauge and purity specification that scrap consolidators require before they will accept material; aggregation of sufficient volume to make consolidator engagement commercially worthwhile; and transport from processing sites, which are often regionally dispersed, to consolidation points.

This observation is drawn from ABSC's operational engagement with recyclers, steel processors and downstream market participants over an extended period of scheme operations, not from published market analysis. Our experience indicates that mattress-derived steel frequently does not meet consolidator specification without additional processing investment that is not currently resourced at scale. Steel that is technically recoverable, and for which demand exists at the BlueScope end of the chain, does not reliably reach that demand. This is a different and more specific problem than commodity price alone. **Price volatility affects whether recovery remains commercially viable. Specification and aggregation constraints affect whether the material can physically enter the industrial value chain at all, independent of price.**

Commodity price movements compound this. When scrap prices are low or negative, there is little commercial incentive to invest in the separation and processing technology required to close the specification gap, which entrenches the constraint over time.

While this submission is limited to evidence from the bedding sector, the operational characteristics observed in the steel example, where the value of a recovered material depends on processing capability, logistics and downstream market demand, are likely to be relevant wherever manufactured products require multiple stages of recovery before re-entering industrial use.

Within the bedding sector, similar characteristics are evident in textile recovery. Mattresses contain textile components in addition to steel and foam. Operational experience indicates that viable recovery pathways for these textiles depend not only on available technologies, including waste-to-energy and emerging processes such as pyrolysis, but also on transport economics, aggregation and the commercial viability of moving recovered material to suitable processing facilities. The same dependency structure observed for steel, between recovery and a usable industrial input, is observed again here in a different material stream and with different technologies.

NSW context: This dynamic applies directly in NSW. BlueScope's Port Kembla operations are one geographically proximate example of industrial demand for recycled steel, illustrating a broader pattern likely to extend to other NSW manufacturers as low-emissions steelmaking technologies are adopted more widely. The question is not whether demand exists in NSW. It is whether the value chain connecting NSW mattress recovery to that demand is currently resourced to deliver supply at the specification required.

Why this matters for pathway modelling

Pathway scenarios that assume increasing recycled steel inputs to industrial decarbonisation should not treat that supply as a function of price alone. The relevant assumption is the cost and commercial viability of the full value chain from collection to consolidator-grade specification, not simply the price recyclers receive for scrap as collected. A complete assessment requires consideration of processing investment requirements, aggregation economics and transport costs alongside commodity pricing — effectively a lifecycle view of the value created by making a recovered material usable by an industrial end user, not just a market price for the material in its raw recovered state.

This points to a cross-sectoral methodology question that extends beyond ABSC's own scheme:

What does it cost, across the full chain from collection to industrial-grade input, to make a given recovered material usable by the industrial sector seeking it?

Mattress steel offers a contained, observable case study of this question. The same analytical approach may also be applicable to other commodities and industries undertaking similar material substitution as part of their own decarbonisation strategies. Working across industry and commodity boundaries will be necessary to close these gaps, and this represents an underexplored opportunity within the Commission's consideration of cross-sector collaboration barriers.

If these intermediate value-chain conditions are not represented, pathway scenarios may overestimate the volume of secondary steel available to support industrial decarbonisation under otherwise favourable demand conditions.

This is an evidence gap the ABSC has identified through operations but has not yet fully quantified. It is a candidate area for further methodology development, potentially in partnership with industry stakeholders including scrap processors and steel manufacturers, to map the full cost and value chain from mattress collection to electric arc furnace-grade input.

Pathway dependencies identified — steel

- ✓ Viable scrap commodity markets
- ✓ Processing capability to meet consolidator specification
- ✓ Sufficient volume aggregation
- ✓ Transport from regionally dispersed processing sites
- ✓ Continuity of industrial demand (e.g. electric arc furnace steelmaking)

Foam

Recovered polyurethane foam from mattresses has established end-market pathways, primarily as carpet underlay and acoustic insulation, substituting for virgin polyurethane production. Virgin polyurethane manufacture is an emissions-intensive process. Material substitution at scale has the potential to reduce embodied emissions in downstream manufacturing.

In NSW, foam end-market conditions are currently constrained, and the constraint varies by foam type. Operational experience and recycler reporting indicate that straight polyurethane foam generally has an accessible pathway to recyclers and end markets. Memory foam does not have an equivalent viable pathway in most cases, and is typically directed to landfill in the absence of a viable alternative. Recovered foam that could displace virgin material production may therefore be stockpiled or landfilled where a viable market pathway is unavailable.

As with steel, this is not solely a price problem. The processing pathway to produce usable recovered foam exists for straight polyurethane. The constraint is a combination of market demand at the consuming end and the commercial conditions required for recovered foam to compete with virgin alternatives on cost and consistency of supply, and for memory foam specifically, the absence of an established recovery pathway at all. **The same value chain logic applies: the existence of a theoretical substitution opportunity does not guarantee that recovered foam reaches the manufacturers who could use it.**

NSW context: Foam end-market constraints are directly observed in NSW scheme operations. This is current, not historical.

Why this matters for pathway modelling

Circular economy contributions to embodied emissions reduction in the built environment and manufacturing sectors should not be assumed as a fixed input. They depend on market development that is not currently guaranteed, and on the same kind of value chain connectivity between recovery and industrial-grade specification observed in the steel example above. Similarly, assuming stable end markets for recovered polyurethane may overstate the emissions contribution of material substitution where manufacturer uptake remains uncertain.

Pathway dependencies identified — foam

- ✓ Processing capacity to produce usable recovered foam (currently exists)
- ✓ Manufacturer uptake at the consuming end
- ✓ Consistent quality and supply
- ✓ Commercial competitiveness against virgin polyurethane
- ✓ Logistics connecting processors to manufacturers

Recovery systems are allocation systems: evidence from the hotels pilot program

Reuse extends product life and delays the manufacture of replacement products. This is a decarbonisation outcome, not simply a waste diversion outcome: avoided manufacture avoids the embodied emissions of producing a new product, in addition to avoiding the processing emissions associated with recycling.

NSW's hospitality sector generates significant end-of-life volumes of mattresses, bases, linen and other furnishings, and currently has no structural recovery pathway in place for these material streams. National evidence from two Queensland hotel pilots demonstrates both the scale of the avoided-production opportunity and a more fundamental operational insight: that well-designed recovery systems do not produce a single recovery outcome. They allocate assets across multiple pathways according to condition, market demand and social need.

In 2025-26, the ABSC engaged Project Net Zero, a 100% Indigenous-owned social enterprise, to manage end-of-life asset recovery at two hotels in Brisbane. The participating hotels had no structured recovery pathway in place prior to these pilots, with mattresses and linen generally directed to landfill at end of commercial life.

Across the two pilots combined, 3,873 items totalling 68,351 kg were collected. The diversion rate was 98%. The operational task was not simply to maximise diversion from landfill. It was to allocate each recovered asset to the highest-value remaining pathway available, taking account of condition, safety, market demand and community need. Material was allocated across multiple recovery pathways: direct community reuse and donation (40% by weight, 27,577 kg); commercial recirculation through PNZ

warehouse for ongoing resale and donation (25%, 17,296 kg); material recycling including metal recycling (part of the 33% recycling stream, 22,218 kg); energy recovery via Process Engineered Fuel for mattresses that could not be reused (part of the same stream); and landfill residual (2%, 1,260 kg — primarily stained linen that could not enter any other pathway).

The recycling pathway for mattresses that could not be reused involved processing into Process Engineered Fuel (PEF) at CDS Recycling. PEF displaces virgin fossil fuel inputs in industrial applications, producing an emissions benefit through avoided fossil fuel combustion rather than material substitution. This is energy recovery rather than material recovery, but represents a documented emissions benefit for material that would otherwise have gone to landfill.

Linen items sorted as suitable for reuse were donated to the Remote OpShop Project, which supports a network of community-run op shops across multiple First Nations communities in the Northern Territory. Goods were consolidated at the Darwin hub before distribution to individual communities. Across both pilots, 290 boxes of linen reached these remote communities where retail access to essential household goods is otherwise limited.

Operational experience indicates that recovery systems do not produce a single recovery outcome. They allocate assets across multiple pathways according to condition, market demand and social need. Pathway modelling that treats recovered material as a homogeneous output, or that counts only recycling volumes as a circular economy contribution, is likely to misrepresent the emissions benefit ultimately achieved.

NSW context: The pilots were conducted in Queensland but the disposal baseline, hotel mattresses and linen to landfill as standard practice, applies nationally, including in NSW. The scale of the avoided-production and community donation opportunity in NSW is directly proportional to the size of the NSW hospitality sector. No equivalent structured recovery system currently exists for NSW hotel operators.

What the Commission should consider when developing pathway assumptions

The steel and foam evidence in this section point to a single underlying pattern: demand does not guarantee supply, and recovery does not guarantee substitution. Each stage between collection and industrial use carries its own conditions, and the robustness of a pathway scenario depends on the assumptions made at each stage of the value chain.

- Secondary material price volatility as a variable affecting the supply of recovered materials to industrial users. Stable commodity prices should not be assumed as a baseline.
- Value chain connectivity, not commodity price alone, as the relevant modelling variable for whether recovered materials reach industrial decarbonisation end users. A material can have clear demand-side pull while still failing to reach that demand due to intermediate processing and specification constraints.
- End-market development as a precondition for circular economy emissions contributions. Collection and processing infrastructure investment delivers its intended pathway contribution only where viable end markets exist to absorb recovered materials.
- Recovery pathway allocation, not only total diverted volume, as the relevant modelling variable for circular economy emissions contributions. Reuse, recycling, energy recovery and landfill each carry different emissions implications. Pathway modelling that treats recovered material as a homogeneous output will misrepresent the emissions benefit achieved.
- The hospitality sector as an unmodelled source of recoverable materials in NSW, currently operating at a near-total landfill baseline.
- Cross-commodity, cross-sector collaboration to map value chain costs from recovery to industrial-grade input, an approach this submission's steel example suggests may also be applicable to other recovered materials and other industries.

C. Regional and Remote Recovery

Consultation questions addressed: Q5 (regional and remote factors, just transition, workforce impacts); Q6 (evidence to inform pathway assumptions). Relevant to the Waste sector pathway and to cross-sector considerations around infrastructure investment and system design.

Observation: Circular economy performance varies significantly between metropolitan, regional and remote NSW because the underlying operating conditions are fundamentally different. Pathway scenarios that apply a uniform statewide recovery assumption are likely to misrepresent performance in both directions — overstating what is achievable in areas with lower volumes of recoverable material without deliberate investment, and understating what becomes possible when systems are deliberately designed for those conditions.

Modelling question this section answers

Can a single statewide circular economy assumption accurately represent recovery system performance across NSW?

Recoverability as the explanatory variable

The volume of recoverable material within a given geographic area helps explain why circular economy performance differs across NSW more precisely than transport cost alone.

In metropolitan areas, high population density means there is a high volume of recoverable material per area. This supports frequent collection runs, viable load aggregation over short distances, competitive logistics markets and access to multiple processors. These are the conditions under which current circular economy pathway assumptions are most likely to hold.

As that volume falls, the entire system changes. Collection intervals lengthen to accumulate viable loads. Transport distances increase, often substantially. Backloading and reverse logistics opportunities, which can significantly reduce effective transport costs in metropolitan and corridor routes, become less available. Processor options reduce. And the system becomes more fragile: where metropolitan operators can absorb the exit of a single processor by redirecting to an alternative, regional operations often cannot.

Scheme data indicates that transport economics in regional NSW vary considerably depending on whether reverse logistics or backhaul arrangements can be established. This variability is itself a modelling consideration: there is no single regional transport cost assumption that accurately represents the range of conditions experienced across the state. The cost depends on route, volume, operator, and whether complementary freight movements exist that can absorb recovery loads.

NSW context: Many regional centres fall within ABSC's NSW operational experience. These areas present the collection density, transport and processor access conditions described above. They are within the NSW recovery system but operate under meaningfully different economics than metropolitan areas.

Pathway dependencies identified — regional recovery

- ✓ Sufficient volume of recoverable material to support viable collection run economics
- ✓ Reverse logistics or backhaul arrangements to reduce effective transport costs
- ✓ Processor access within economically viable transport distance
- ✓ Sufficient volume to sustain processor engagement
- ✓ Redundancy in processor options to maintain system resilience

Why this matters for pathway modelling

A pathway scenario that applies a single statewide recovery rate assumption will systematically overestimate performance in areas where the volume of recoverable material is low, transport distances are long and processor options are limited. Conversely, it may underestimate what is achievable in regional areas where deliberate infrastructure investment addresses those conditions.

Remote recovery: deliberate system design rather than market response

The remote context presents a different problem from regional recovery. In truly remote areas, including parts of the Northern Territory where ABSC has direct experience, market mechanisms do not produce recovery pathways. The economics of collection, transport and processing, assessed against available material volumes and distances to processors, do not support commercially viable recovery without deliberate intervention.

The ABSC's work in remote communities demonstrates that recovery is possible in these contexts, but requires deliberate system design. The hotels pilot program, which directed 290 boxes of recovered linen from two Queensland hotels to remote First Nations communities via the Remote OpShop Project's NT network, did not emerge from market response. It was the result of deliberate program design, partnerships and logistics arrangements that would not have formed independently.

This has a direct implication for pathway modelling. Where pathway scenarios assume that circular economy systems will expand to capture material currently going to landfill in remote areas, those scenarios should not assume that market mechanisms alone will drive that expansion. The conditions under which remote recovery is viable include deliberate policy, investment and program design decisions that are themselves pathway choices, not background assumptions.

There is also a material difference in what remote recovery achieves. In metropolitan and regional contexts, the primary value of recovery is material substitution: recovered steel, foam or textiles displacing virgin inputs in industrial processes. In remote communities, the primary value of a well-designed recovery system may be product reuse — extending product life, avoiding the embodied emissions of replacement products, and delivering goods to communities where access is otherwise limited. These are distinct outcomes and should not be treated as interchangeable in pathway accounting.

NSW context: ABSC's direct remote deployment experience is from the Northern Territory; the modelling insight is relevant to NSW's most remote operating environments. Within NSW, regional centres with the characteristics most closely resembling remote conditions — high transport costs, limited processor access, lower volumes of recoverable material — include far western NSW communities. The modelling considerations apply to these areas even where formal remote program design has not yet been implemented.

What the Commission should consider when developing pathway assumptions

The conditions which determine circular economy performance are not uniform across NSW. A pathway scenario calibrated on metropolitan conditions will produce assumptions that are systematically wrong when applied to regional and remote areas.

- The volume of recoverable material as a variable in pathway modelling, rather than a background constant. Recovery system performance scales with the density of available material in ways that affect collection economics, aggregation, transport and processor viability.
- Regional transport economics as a range rather than a single assumption. Scheme experience indicates that effective transport costs vary significantly with route, volume and the availability of reverse logistics or backhaul arrangements.
- System fragility as a regional modelling consideration. Regional recovery systems with fewer processor options are more vulnerable to disruption than metropolitan systems, and pathway assumptions should account for the conditions required to maintain system resilience.
- Remote recovery as a deliberate system design question, not a market response assumption. Where pathway scenarios project recovery expanding into remote areas, those projections should reflect the investment and program design conditions required to make that expansion viable.
- Reuse and avoided production as the primary circular economy contribution in remote contexts, distinct from material substitution in industrial processes, and requiring different measurement and modelling approaches.

D. Measurement

Consultation questions addressed: Q6 (evidence to inform pathway inputs and assumptions); Q8 (additional evidence, methodology development). Relevant to all sector pathways where circular economy contributions are modelled as pathway inputs.

Observation: Current measurement frameworks are well suited to recording how much material has been collected and processed. They provide more limited insight into whether recovered materials are delivering the emissions outcomes that decarbonisation pathway modelling assumes. Through operating the scheme, the ABSC has identified specific measurement gaps that affect the reliability of circular economy inputs to pathway modelling.

Modelling question this section answers

What is currently measurable, what is not, and where do measurement gaps affect the reliability of circular economy pathway assumptions?

What current frameworks measure well

Reporting frameworks for product stewardship schemes, including ABSC's own reporting, are designed to measure material volumes: tonnes collected, tonnes processed, diversion from landfill. These are appropriate metrics for scheme accountability and performance tracking.

The ABSC collects scheme data on collection volumes, material destinations and processing pathways. This data provides a useful evidence base for pathway modelling at the level of material flow — what is collected, where it goes, and in what quantities.

Where measurement gaps affect pathway reliability

Three specific gaps have been identified through scheme operations that affect the reliability of circular economy contributions to pathway modelling.

Collected tonnes are not the same as industrial-grade inputs

As evidenced in Sections A and B, the proportion of collected material that reaches industrial-grade specification depends on processing capability, contamination levels and market conditions. Current reporting does not systematically distinguish between total recovered material and the proportion that successfully re-enters industrial use. In other words, recoverable material and usable secondary material are not equivalent measures. A pathway assumption based on collected tonnes will therefore overestimate the volume of secondary material available to industrial users under current processing conditions.

Recycled tonnes are not the same as avoided emissions

Material that is recycled is not equivalent, in emissions terms, to material that is reused. A mattress redirected to reuse avoids both the processing emissions of recycling and the embodied emissions of a replacement product. Current reporting frameworks do not consistently distinguish between these two outcomes, which means the emissions benefit of circular economy systems may be understated where reuse is a significant pathway, and overstated where recycled material does not displace virgin production at the assumed rate.

The hotel pilots demonstrate why pathway allocation matters to measurement. One pilot recovered 50,970 kg of material distributed across multiple recovery pathways including reuse, commercial recirculation, material recycling, energy recovery and a landfill residual. Identical recovered tonnes produce materially different emissions outcomes depending on which pathway they follow. If the entire 50,970 kg were reported only as tonnes diverted from landfill, the allocation between pathways, and therefore the actual emissions benefit achieved, would be invisible. **This is precisely the measurement gap current frameworks do not close.**

Logistics emissions vary by geography but are not currently captured

The emissions associated with collection, transport and processing vary significantly between metropolitan, regional and remote contexts, as evidenced in Section C. **The carbon footprint of recovering a mattress from far western NSW is materially different from recovering one in metropolitan Sydney.** Current scheme reporting does not capture logistics emissions by geography, which means the net emissions benefit of recovery in high-transport-cost areas may be lower than uniform pathway assumptions suggest.

Methodology development in progress

The ABSC has identified these measurement gaps through operations and initiated work to address them on two fronts.

First, through a pro bono engagement with an external professional services partner, the ABSC is developing a methodology to quantify the emissions implications of different recovery pathways, accounting for processing capability, material destinations and logistics. This work is in progress. Its findings will be submitted as supplementary evidence when available and are expected to provide more granular inputs to future pathway modelling than current reporting frameworks allow.

Second, the ABSC has developed a landfill cost calculator to quantify the economic cost of mattresses that are not recovered. This tool is designed to make visible a cost that is currently diffuse and underweighted in procurement and disposal decisions, and to provide a basis for comparing the economic value of recovery against the cost of landfill. While primarily an economic tool, the methodology is designed to be extensible to carbon cost accounting, providing a second input to the emissions measurement gap identified above.

The landfill cost calculator is developed and available. The carbon methodology project is ongoing. This submission identifies the measurement gaps that motivated both as evidence that ABSC has directly observed these limitations through scheme operations.

Measurement gaps identified

- ✓ Distinction between collected tonnes and industrial-grade secondary material volume
- ✓ Distinction between recycled tonnes and reused tonnes in emissions accounting
- ✓ Logistics emissions by geography, not only total material volume
- ✓ Net emissions benefit by recovery pathway (reuse vs recycling vs landfill diversion)
- ✓ Carbon cost equivalent of materials directed to landfill

What the Commission should consider when developing pathway assumptions

Sections A through C of this submission identify operational conditions that affect whether circular economy systems deliver the outcomes pathway modelling assumes. This section identifies measurement gaps that affect whether those outcomes, when delivered, are accurately counted.

- Distinguishing between collected tonnes and industrial-grade secondary material in pathway inputs. Using total collected volume as a proxy for available secondary material supply is likely to overestimate circular economy contributions to industrial decarbonisation.
- Treating reuse and recycling as distinct pathway outcomes with different emissions implications, rather than aggregating them as a single diversion metric.
- Accounting for logistics emissions by geography in net circular economy benefit calculations, particularly for regional and remote recovery.
- Noting that methodology development to address these gaps is underway within the sector, and that more granular evidence will be available as that work progresses. This submission offers to provide supplementary evidence once methodology work is complete.

E. Outcomes Beyond Emissions

Consultation questions addressed: Q7 (outcomes beyond emissions reduction); Q4 (economic and social impacts). Relevant to all sector pathways where the viability of circular economy systems depends on co-benefits that sustain investment and participation.

Observation: Circular economy systems that contribute to decarbonisation also generate economic and social outcomes that, while not directly counted in emissions accounting, affect whether those systems remain commercially viable over time. Pathway scenarios that assume sustained circular economy contributions should account for the conditions that keep those systems operating — which include co-benefit flows that underpin investment, participation and system resilience.

Modelling question this section answers

What outcomes beyond emissions should pathway modelling account for to maintain the viability of circular economy systems over time?

Regional employment and economic activity

Pathway scenarios that project sustained circular economy contributions over the period to 2035 depend on recovery systems remaining commercially operational throughout that period. Regional employment is a factor in that viability. Scheme data indicates that mattress and bedding recovery involves labour-intensive dismantling work that is performed at or near collection points rather than centralised facilities, creating economic activity distributed across the recovery geography.

This matters for pathway modelling in two respects. Regional employment in recovery operations contributes to operator viability — workforce availability and labour economics directly affect whether regional operations remain commercially sustainable. And it represents a co-benefit relevant to the Commission's just transition considerations under Q5, in areas where alternative employment in low-emissions industries may be limited.

Procurement as a demand-side signal

Government and institutional procurement decisions influence secondary material markets by creating or withholding demand for recovered content products. Scheme experience indicates that procurement represents an underutilised mechanism for stabilising the market conditions that circular economy systems depend on.

This has a direct modelling implication. Section B identified secondary material market stability as a pathway dependency. Where pathway scenarios assume stable or growing secondary material markets over the period to 2035, those scenarios carry an implicit assumption about the demand signals that underpin those markets. Procurement policy is one of the more controllable variables in that demand picture. Pathway assumptions that treat secondary material markets as exogenous may therefore underestimate the influence of government and institutional procurement decisions on whether those assumptions hold.

NSW context: NSW government procurement represents a significant potential demand signal for recovered materials. Deployment experience suggests this signal is not currently being used to its potential as a market stabilisation mechanism, which is relevant to whether current secondary material market assumptions in pathway modelling are likely to hold.

Product reuse and equitable access

Pathway scenarios that rely on sustained circular economy contributions need the systems producing those contributions to remain viable and politically supported. The hotel asset recovery pilots provide evidence that well-designed recovery systems generate social outcomes that support both. Across the 2 pilots, goods were allocated to more than ten community organisations, including charities supporting people escaping domestic violence, NDIS service providers, food relief organisations, and op shops serving communities facing hardship. A further 290 boxes of linen reached remote First Nations

communities via the Remote OpShop Project's network across the Northern Territory, consolidated through the Darwin hub before distribution.

These outcomes matter for pathway modelling because they demonstrate that circular economy systems generate social and equity outcomes that emissions-only accounting makes invisible. Systems that deliver this breadth of community benefit are more likely to sustain the investment, participation and political support required to operate at scale over the long term.

System viability as a pathway condition

The commercial viability of circular economy systems is a precondition for their continued contribution to decarbonisation pathways. Systems that are not commercially viable do not persist. Where pathway scenarios assume sustained or growing circular economy contributions over the period to 2035 and 2050, those contributions depend on recovery systems remaining commercially operational throughout that period.

Co-benefit flows — regional employment, procurement demand signals, social value — are not peripheral to this. They are part of the commercial and policy environment that determines whether circular economy operators invest, remain viable and expand. **A pathway scenario that models emissions contributions without accounting for the conditions that keep those systems viable is modelling an outcome that depends on conditions it has not assessed.**

What the Commission should consider when developing pathway assumptions

- Regional employment and economic activity as co-benefits that contribute to recovery system viability and resilience, relevant to just transition considerations.
- Government and institutional procurement as a demand-side mechanism that influences the secondary material market conditions identified in Section B as critical dependencies for circular economy performance.
- Product reuse as generating social outcomes beyond emissions accounting, including equitable access to goods in remote communities, which provide additional policy rationale for sustaining circular economy systems.
- System commercial viability as a pathway condition, not a background assumption. Pathway scenarios that project sustained circular economy contributions should assess the conditions under which those systems remain viable, including co-benefit flows that support investment and participation.

Conclusion

The ABSC operates a national stewardship scheme for mattresses and bedding. This submission draws on that experience to offer evidence relevant to one question: **under what conditions do circular economy systems deliver the decarbonisation outcomes that pathway modelling assumes they will?**

Demand does not guarantee supply. Recovery does not guarantee use.

The evidence presented in this submission suggests that circular economy contributions to decarbonisation are determined not simply by collection volumes, but by the operational conditions that connect recovered materials to productive use. Those conditions are observable, measurable and capable of informing more robust pathway assumptions.

The ABSC makes the following offer to the Commission:

- Supplementary evidence on our carbon methodology and landfill cost calculator work will be provided once methodology development is complete and is expected to provide more granular pathway modelling inputs than current reporting frameworks allow.
- Commercially sensitive operational data — including facility-level cost data, recycler commercial terms and end-market pricing — can be made available under the Commission's confidential submission process.
- The ABSC is willing to participate in any technical working group or stakeholder engagement process the Commission establishes to develop pathway assumptions for the waste and circular economy sector.