Net Zero Commission

Pathways Call for Evidence Submission

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Practical Evidence to Inform NSW Decarbonisation Pathways

Evidence Submission to the NSW Net Zero Commission

Prepared by

earthecco

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Executive Summary

earthECO welcomes the opportunity to contribute practical evidence to the NSW Net Zero Commission's development of decarbonisation pathways for New South Wales.

This submission is informed by almost a decade of engineering development, testing and commercial implementation associated with reusable transport packaging system. Throughout this work earthECO has gained practical insight into the opportunities and barriers associated with transitioning from linear resource consumption towards circular economy models.

The NSW Government has rightly identified renewable energy, electrification and low-emissions transport as critical components of the transition to net zero. However, achieving legislated emissions reduction targets will also require greater attention to industrial resource efficiency and the opportunities to reduce emissions through improved material use, product design and circular supply chains. These opportunities are often less visible than energy related initiatives but can deliver measurable emissions reductions while improving productivity, reducing waste and strengthening supply chain resilience.

The practical evidence presented in this submission suggests that many industrial resource efficiency opportunities are commercially available today and can be implemented within existing manufacturing and logistics systems. In many cases the principal barriers are no longer technological but relate to procurement practices, lifecycle assessment methodologies, market incentives and organisational behaviour.

Accordingly, this submission encourages the Commission to recognise industrial resource efficiency as a complementary pathway alongside energy transition measures. It also highlights the importance of incorporating lifecycle thinking, circular economy principles and whole-of-system outcomes into future pathway modelling.

The submission focuses primarily on the Industry, Transport, Waste and Built Environment sectors identified within the Commission's consultation paper and provides practical observations that may assist the Commission in developing realistic, evidence-based decarbonisation pathways.

About eartheco

eartheco is an Australian company specialising in circular economy solutions for transport packaging systems.

Over the past nine years the company has undertaken engineering design, independent laboratory testing, finite element analysis and commercial field trials associated with reusable transport packaging systems. This work has provided practical evidence regarding lifecycle emissions, material efficiency, operational performance and barriers to implementation.

While this experience has been developed within transport packaging systems, many of the observations are broadly applicable across manufacturing, logistics and resource recovery sectors where circular economy principles have the potential to reduce emissions while improving productivity and resource efficiency.

This submission is intended to contribute practical evidence to support pathway development and does not seek to advocate for a specific commercial product or technology.

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Key Observations

Based on eartheco 's practical experience, five observations are considered relevant to the Commission's development of decarbonisation pathways.

1. Industrial resource efficiency represents an under-recognised emissions reduction opportunity

Decarbonisation is often considered through the lens of energy generation, electrification and transport fuels. While these remain essential significant opportunities also exist to reduce emissions through improved resource efficiency, circular product design and the reuse of industrial assets.

Recognising these opportunities alongside energy-related initiatives will support a broader and more resilient pathway to net zero.

2. Commercial readiness is no longer the primary barrier

Practical experience indicates that many circular economy technologies have progressed beyond research and development and are capable of deployment using existing manufacturing and logistics infrastructure.

For these technologies the principal barriers relate to procurement practices, lifecycle valuation, market incentives and organisational behaviour rather than technical capability.

3. Policy settings influence investment decisions

Government policy has an important role in creating the conditions that encourage investment in resource-efficient technologies.

Procurement frameworks that recognise lifecycle performance, consistent approaches to embodied emissions accounting and greater alignment between circular economy and net zero policies would improve confidence for both public and private investment.

4. Circular economy initiatives deliver benefits beyond emissions reduction

Industrial resource efficiency contributes to a range of broader economic, environmental and social outcomes including:

- reduced waste generation
- improved material productivity
- enhanced workplace safety
- greater supply chain resilience
- strengthened domestic manufacturing capability
- improved resource security

Recognising these co-benefits provides a more complete assessment of the value delivered through circular economy initiatives.

5. Practical implementation should inform pathway modelling

The Commission's pathway modelling should reflect not only emerging technologies but also commercially available solutions capable of delivering measurable emissions reductions in the near term.

Practical implementation experience provides valuable evidence regarding technology readiness, barriers to adoption, deployment rates and the policy settings most likely to accelerate uptake.

1. Policies and Market Mechanisms

Industrial resource efficiency should form part of NSW's decarbonisation pathway

Achieving net zero will require more than decarbonising energy and transport systems. It will also require greater attention to how materials are designed, used and recovered throughout the economy.

Improving industrial resource efficiency through circular product design, reuse and recovery can reduce emissions while strengthening productivity, reducing waste and improving supply chain resilience. These opportunities complement existing decarbonisation initiatives and should form part of NSW's long-term emissions reduction pathway.

Policy opportunities

Practical experience suggests that technology is no longer the primary barrier for many circular economy solutions. Instead, policy and market settings play a significant role in determining adoption.

The Commission may wish to consider the following opportunities.

a) Lifecycle procurement

Procurement frameworks that consider whole-of-life environmental and economic performance, rather than upfront cost alone, would better recognise the long-term value of resource-efficient products and systems.

b) Recognise embodied and avoided emissions

Consistent approaches to measuring embodied emissions and emissions avoided through reuse and extended product life would improve investment confidence and provide a more complete understanding of emissions reduction opportunities.

c) Align circular economy and net zero policy

Closer alignment between procurement, waste, manufacturing and emissions reduction policies would create clearer market signals and encourage investment in technologies that reduce both emissions and material consumption.

d) Support commercial implementation

Many technologies have progressed beyond research and development but face barriers to broader market adoption. Demonstration projects and independent validation can help reduce implementation risk and build industry confidence.

e) Encouraging private investment

Private investment is supported by clear policy, consistent market signals and confidence in long-term returns.

Many industrial resource efficiency initiatives deliver both environmental and economic benefits by reducing material consumption, improving operational efficiency and lowering waste generation. Policy settings that recognise these whole-of-life benefits will encourage broader private sector investment.

f) Collaboration

Delivering net zero will require collaboration across government, industry, research organisations and supply chains.

Industrial resource efficiency demonstrates how changes in one part of the value chain can deliver benefits across manufacturing, freight, waste and resource recovery. This highlights the importance of systems thinking and coordinated policy development.

Implications for pathway development

Future pathway modelling should recognise industrial resource efficiency as a complementary decarbonisation pathway alongside energy transition measures.

Many opportunities are commercially available today and can contribute to near-term emissions reductions, while supporting the longer-term transition to a more circular and resource-efficient economy.

2. Technology and Behaviour Change

Technology readiness and deployment

Achieving net zero will require both the development of new technologies and the broader adoption of technologies that are already commercially available.

While much attention is focused on emerging innovations, practical experience demonstrates that many circular economy solutions are technically proven and capable of deployment using existing manufacturing and logistics systems.

For these technologies, the primary barriers are no longer technical. Instead, adoption is influenced by procurement practices, market incentives, policy settings and organisational behaviour.

Recognising the contribution of mature technologies alongside emerging innovations will help accelerate emissions reductions across multiple sectors.

Barriers to adoption

Practical implementation highlights several factors limiting broader uptake of resource-efficient technologies:

- procurement decisions based primarily on upfront cost rather than lifecycle value
- limited recognition of embodied and avoided emissions
- fragmented policy across procurement, waste and emissions reduction
- established linear operating practices
- inconsistent lifecycle assessment methodologies

Addressing these barriers is likely to have a greater impact on adoption than further technology development alone.

Whole-of-life value

Experience suggests that technologies should be assessed on their lifecycle performance rather than their initial purchase price.

Although reusable transport packaging systems may require higher upfront investment they can deliver long-term benefits through reduced material consumption, lower waste generation, improved operational efficiency and extended asset life.

Future pathway modelling should recognise that many resource efficiency initiatives reduce both emissions and operating costs over time.

Behaviour change

Technology alone will not achieve NSW's emissions reduction targets.

A broader shift towards lifecycle thinking is required where materials and transport packaging systems are viewed as recoverable assets rather than disposable consumables. This influences decisions across product design, procurement, logistics and end-of-life recovery.

Achieving this transition will require collaboration between government, industry and the supply chain to support circular business models, improve procurement practices and build confidence in commercially proven solutions.

Implications for pathway development

Future decarbonisation pathways should distinguish between technology readiness and market readiness.

Many technologies capable of reducing emissions are already commercially available. The greater challenge is creating the policy, procurement and market conditions that enable their widespread adoption.

Recognising this distinction will help identify practical opportunities that can deliver emissions reductions in the near term while supporting longer-term transformation.

3. Economic and Industry Impacts

The opportunity for industry

Industrial resource efficiency offers an opportunity to reduce emissions while strengthening business productivity and competitiveness.

Unlike some decarbonisation measures that involve additional operating costs, circular economy initiatives can deliver environmental and economic benefits simultaneously by reducing material consumption, minimising waste and improving operational efficiency.

These outcomes can strengthen business resilience while contributing to NSW's emissions reduction objectives.

Supporting investment and innovation

Businesses are more likely to invest in resource-efficient technologies where there is confidence in long-term policy direction and consistent approaches to measuring environmental performance.

Clear policy signals, lifecycle procurement and recognition of whole-of-life value can encourage innovation while supporting the commercial deployment of proven technologies.

Importantly, many resource efficiency solutions are available today and can contribute to emissions reductions without requiring significant new infrastructure.

Workforce and capability

The transition to a circular economy will require new skills across product design, manufacturing, logistics, resource recovery and lifecycle assessment.

It will also create opportunities for Australian businesses to develop expertise in designing, manufacturing and managing reusable systems that improve both environmental and economic outcomes.

Supporting workforce capability alongside technology adoption will help maximise the benefits of the transition.

Evidence for pathway development

Practical implementation provides valuable evidence to support pathway modelling.

In eartheco's experience commercial deployment has demonstrated that industrial resource efficiency can deliver measurable environmental and operational benefits while highlighting the market and policy barriers that influence broader adoption.

Incorporating evidence from commercially implemented solutions will help ensure future pathways reflect both technical feasibility and practical implementation.

Implications for pathway development

Future pathway modelling should consider the broader economic contribution of industrial resource efficiency, including improved productivity, reduced material consumption, waste avoidance and enhanced supply chain resilience.

Recognising these wider benefits will support a more comprehensive assessment of the opportunities available to NSW as it transitions to a low-emissions economy.

4. Sector Opportunities and Recommendations

A systems approach to decarbonisation

The transition to net zero will require coordinated action across multiple sectors rather than isolated initiatives.

Industrial resource efficiency demonstrates how improvements in one part of the value chain can deliver benefits across manufacturing, transport, waste management and the built environment. Recognising these interdependencies will support more effective pathway development and maximise emissions reduction opportunities.

Waste

Reducing waste should focus first on preventing waste from being created.

While recycling remains an important component of the circular economy, greater emissions reductions can often be achieved by extending product life, promoting reuse and reducing the demand for new materials.

Recognising reuse as a priority within resource recovery strategies will complement existing waste reduction initiatives and contribute to lower embodied emissions.

Built Environment

The built environment presents significant opportunities to improve resource efficiency through lifecycle thinking and circular procurement.

Embedding whole-of-life assessment into procurement and project delivery can encourage the adoption of products and systems that reduce material consumption, improve durability and minimise waste over their service life.

Manufacturing and Transport

Manufacturing and freight are closely linked through the movement of products and materials across supply chains.

Improving the efficiency of industrial transport systems through reusable assets, optimised logistics and circular design can reduce material consumption while improving operational performance and lowering associated emissions.

These opportunities illustrate how resource efficiency can support both environmental and economic outcomes.

Carbon Management

Future emissions accounting should continue to evolve beyond operational emissions to better recognise embodied emissions and emissions avoided through reuse, repair and extended product life.

A more comprehensive approach will improve decision-making and ensure resource efficiency initiatives are appropriately recognised within decarbonisation pathways.

Recommendations

Based on practical implementation experience, earthECO recommends that the Commission consider the following when developing NSW's decarbonisation pathways.

1. Recognise industrial resource efficiency as a complementary pathway alongside energy transition measures.
2. Promote lifecycle assessment and whole-of-life procurement to support better investment and purchasing decisions.
3. Encourage consistent approaches to measuring embodied and avoided emissions across sectors.
4. Support the commercial deployment of proven circular economy solutions through demonstration, validation and knowledge sharing.
5. Adopt systems-based pathway modelling that recognises the interactions between manufacturing, transport, waste and resource recovery.
6. Continue engaging with industry to ensure future pathways are informed by practical implementation experience as well as emerging research.

Conclusion

Achieving NSW's net zero targets will require a broad portfolio of emissions reduction opportunities.

While renewable energy, electrification and low-emissions transport remain fundamental to this transition, industrial resource efficiency also has an important role to play. Practical experience demonstrates that many circular economy solutions are already commercially available and capable of delivering measurable environmental and economic benefits.

The greatest opportunity now lies not in developing new technologies, but in creating the policy, procurement and market conditions that enable proven solutions to be adopted at scale.

By recognising resource efficiency alongside energy transition measures, NSW can strengthen its decarbonisation pathways while improving productivity, reducing waste and supporting a more resilient circular economy.

eartheco appreciates the opportunity to contribute practical evidence to the Commission's work and looks forward to the continued development of evidence-based pathways that support NSW's transition to a low-emissions future.

Appendix A

Case Study: Practical Implementation of Circular Transport Packaging Systems

Purpose

This appendix provides practical evidence from earth**eco**'s development and commercial implementation of a reusable transport packaging system. It demonstrates how circular economy principles can reduce material consumption, improve operational efficiency and support emissions reduction across industrial supply chains.

The case study is provided to illustrate the practical application of the policy and pathway considerations discussed throughout this submission.

Background

Industrial transport systems play a critical but often overlooked role in manufacturing and supply chains. Across many industries products are transported using temporary framing and packaging systems that are designed for a single use before being discarded. This linear approach results in ongoing material consumption, waste generation and repeated embodied emissions associated with manufacturing, transport and disposal.

Recognising this opportunity earth**eco** commenced the development of a reusable transport packaging systems designed to challenge the traditional "use and discard" model. Rather than treating transport framing as a consumable the objective was to develop a durable, recoverable asset capable of repeated use throughout its lifecycle.

The result is the earth**eco** framing system a reusable transport packaging system developed to improve resource efficiency while maintaining the safety, performance and practicality required within industrial supply chains. Although developed for a specific application, the principles underpinning the system are broadly applicable to many industries seeking to transition from linear consumption to circular resource management.

Development of the earth**eco** framing system has spanned almost a decade and has included engineering design, finite element analysis, independent laboratory testing, fatigue and durability assessment, collaboration with the University of Queensland and commercial implementation. This extensive program has provided valuable practical evidence on the opportunities and challenges associated with adopting circular economy solutions within existing manufacturing and logistics systems.

This case study does not seek to evaluate the commercial performance of the earth eco framing system. Rather it demonstrates how circular design principles can be successfully applied to industrial transport systems and highlights the broader policy insights that emerge from practical implementation. These insights have informed the observations and recommendations presented throughout this submission.

Development and Validation

Development of the system has involved an extensive program of engineering, testing and commercial evaluation, including:

- engineering design and finite element analysis
- laboratory testing and structural validation
- fatigue and durability testing
- collaboration with the University of Queensland
- commercial manufacturing trials
- operational deployment within industrial supply chains

The development program has focused on ensuring the system meets the functional, safety and durability requirements expected within demanding industrial environments. This progression from concept to commercial implementation provides practical evidence of technology readiness.

Practical Outcomes

Commercial implementation has demonstrated several outcomes relevant to decarbonisation pathway development.

a) Resource efficiency

The reusable system significantly reduces demand for single-use transport materials by extending product life through multiple reuse cycles.

This supports more efficient use of raw materials while reducing waste generation across the supply chain.

b) Operational performance

Implementation has demonstrated improvements in handling, transport and logistics efficiency while maintaining the functional performance required for industrial applications.

These operational improvements contribute to broader productivity benefits alongside emissions reduction.

c) Environmental performance

The system supports circular economy outcomes through:

- reduced material consumption
- lower waste generation
- improved opportunities for reuse
- recovery of materials at end of life
- reduced embodied emissions over the lifecycle.

These benefits illustrate the contribution that industrial resource efficiency can make to broader emissions reduction objectives.

d) Commercial implementation

Practical deployment has confirmed that reusable transport packaging system can be integrated into existing manufacturing and logistics operations without fundamental changes to infrastructure.

This demonstrates that the principal barriers to wider adoption are increasingly commercial and behavioural rather than technical.

Lessons for Pathway Development

Several broader observations have emerged through practical implementation.

a) Technology readiness does not guarantee adoption

Commercially proven technologies may still experience slow uptake where procurement practices, policy settings or market incentives do not recognise lifecycle value.

b) Whole-of-life assessment supports better decisions

Considering lifecycle performance rather than upfront cost provides a more accurate assessment of environmental and economic outcomes.

c) Circular economy creates system-wide benefits

Resource efficiency improvements influence manufacturing, transport, waste management and supply chain resilience simultaneously.

Recognising these interactions enables a more comprehensive understanding of emissions reduction opportunities.

d) Practical implementation strengthens policy development

Evidence generated through commercial deployment provides valuable insight into technology readiness, market barriers and implementation pathways.

This complements modelling and research by demonstrating how circular economy principles perform under real operating conditions.

Relevance to NSW Decarbonisation Pathways

The experience summarised in this appendix demonstrates that industrial resource efficiency can contribute to NSW's emissions reduction objectives through practical, commercially available solutions.

The case study illustrates the importance of:

- recognising industrial resource efficiency within decarbonisation pathways
- supporting lifecycle procurement and whole-of-life assessment
- improving recognition of embodied and avoided emissions
- encouraging circular economy business models
- using practical implementation evidence to inform future policy and pathway development.

The transition to net zero requires practical examples of how emissions reduction can be achieved alongside improved productivity and resource efficiency.

eartheco 's experience demonstrates that circular economy principles are not simply a future aspiration but can be successfully implemented today. While this case study reflects one application, the broader lessons regarding lifecycle thinking, industrial resource efficiency and systems-based decision-making are applicable across many sectors of the NSW economy.