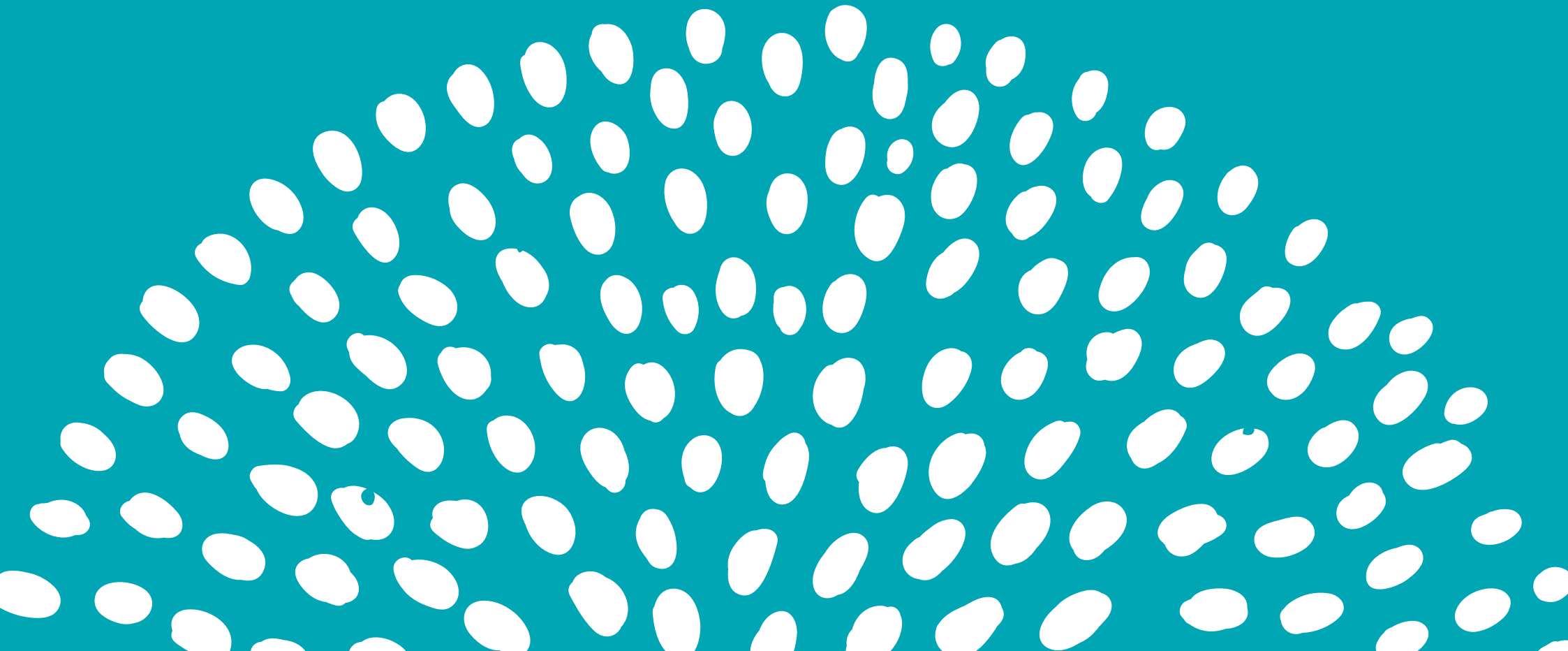
CIRCULAR ECONOMY
MINISTERIAL ADVISORY GROUP

Final Report

The Circular Advantage

Unlocking innovation, environmental resilience, productivity and net zero opportunities through a uniquely Australian circular economy transition



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Acknowledgement of Country

We acknowledge the Traditional Owners of Country throughout Australia and their continuing connection to land, skies, waters, and community. We pay our respects to their cultures and their Elders past, present and emerging.

Indigenous Knowledge is critical to living sustainably in Australia. The 65,000 years of knowledge that Aboriginal and Torres Strait Islander peoples hold as Custodians of Australia's land and natural resources can and should underpin a fair and just circular economy transition.

We recognise that the economies of First Nations peoples were and are based on Indigenous Knowledge systems, including understanding the different seasons across the continent, ways to care for land, water, species, their habitat and their inter-relatedness upon which we all depend. Generations of occupancy, land, water and sea management, cross-continental and international trade mean that First Nations peoples have an underutilised and unrecognised body of knowledges in relation to this country, its biodiversity and ways to tread lightly on this place.

We therefore acknowledge the expertise, research, advocacy and experience of First Nations peoples who have generously contributed to the work of the Circular Economy Ministerial Advisory Group and look forward to further conversations with First Nations as part of Australia's circular economy transition.

Contents

Chair’s foreword

I am honoured to present the final report of the Circular Economy Ministerial Advisory Group (Advisory Group) to the Hon Tanya Plibersek MP, federal Minister for the Environment and Water. This report reflects the collective insights and contributions of stakeholders across Australia who share a commitment to creating a more sustainable, prosperous future through the circular economy.

The circular economy represents an extraordinary opportunity for Australia. By designing out waste, keeping materials in use and regenerating natural systems, Australia can unlock innovation, drive economic diversification and support the global transition to net zero. Our unique resources, regional capabilities and advanced research infrastructure position us to lead in emerging circular markets while protecting the natural environment that sustains us all.

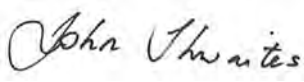
This report consolidates and publicly presents our final advice to the Australian Government, which we have made progressively over the past two years. It identifies clear, actionable recommendations for advancing Australia’s circular economy transition. From integrating circular principles into national policy frameworks to accelerating industry innovation and empowering communities, it provides a blueprint for realising the economic, social and environmental benefits of circularity. Importantly, it emphasises the need for collaboration – across government, industry and community – and the integration of First Nations knowledge to ensure a transition that is inclusive and place-based.

The Advisory Group’s work has been guided by the belief that a circular economy is not just an environmental imperative but an economic opportunity that will strengthen Australia’s global competitiveness. By investing in circular innovation, workforce skills and infrastructure, we can enhance productivity, reduce emissions and position Australian businesses at the forefront of a global shift towards sustainability.

I extend my heartfelt thanks to you, Minister, for your leadership and vision in championing this critical agenda. I also acknowledge and thank the 11 other Commonwealth ministers who engaged with the Advisory Group, including the Treasurer, Minister for Climate Change and Energy, Minister for Trade and Tourism, Minister for Industry and Science, Minister for Resources and Minister for Agriculture, Fisheries and Forestry. Their engagement reflects the whole-of-government commitment needed to drive this transformative transition.

On behalf of the Advisory Group, I thank the 250+ stakeholders who have generously shared their insights through roundtables, submissions and meetings. This final advice reflects the depth of knowledge and expertise that you have contributed and we value your commitment to shaping these outcomes.

Finally, I would like to thank my fellow Advisory Group members for their expertise and dedication. Together, we have laid the foundation for a resilient and resource-efficient economy that will benefit all Australians for generations to come.



John Thwaites

Chair, Circular Economy Ministerial Advisory Group

Executive summary

Australia's transition to a circular economy is more than an environmental goal – it's a chance to secure our unique natural heritage for future generations while growing the economy and reaching net zero.

For businesses, it opens doors to practical, profitable ways to cut emissions and waste, proving that sustainability and success can go hand in hand. For everyday Australians, the circular economy is where environmental policy becomes tangible – woven into our homes, shops, and communities, often in ways we hardly notice. It's visible in the rise of reusable products replacing single-use ones, roads and buildings crafted from recycled materials, and services that make it easier to repair, reuse, trade or recycle items we once discarded.

Our report outlines the key steps the Australian Government must take to accelerate this transition. By acting decisively, Australia can unlock greater economic and environmental value, creating a system that generates less waste and delivers more benefits for all.

Our primary recommendation is to establish a new **National Circular Economy Policy Framework**. This framework will provide an overarching guide for Australia's transition, galvanising action from industry, governments and researchers around a set of targets and priorities that are right for Australia.

We recommend introducing a **Circular Economy Act** to help meet the goals of the national policy framework. The Act will provide the government with a clear, adaptable and predictable regulatory framework to lift the environmental performance of products entering the economy. Better standards for durable, repairable product design will drive innovation and support business leadership. Improved labelling will empower informed circular choices, while a stronger mandatory product stewardship framework will catalyse action across supply chains.

Australian businesses are ready to embrace and expand the use of circular goods and services, but fragmented regulations across jurisdictions are holding them back. These inconsistencies hinder growth, limit scalability and stifle productivity. **Harmonising circular economy rules** will remove these roadblocks, streamline operations, lower production costs and enable efficient national supply chains.

This alignment will drive demand for recycled materials, making them more competitive with virgin resources and unlocking new opportunities for innovation, investment and economic growth.

In the global push towards a circular economy, Australia boasts world-leading innovators. To ensure and multiply their success, we recommend government programs supporting research and commercialisation **include clear circular economy investment priorities**. Embedding clear circular economy priorities across these programs will create a strong domestic investment platform, launching Australian innovators into a competitive position in global markets, capturing more value.

The circular economy also relies on collaboration across entire supply chains, with groups working together to solve big challenges that single businesses or innovators cannot tackle alone. This calls for **large-scale, challenge-based innovation funding.** We recommend directing major programs like Future Made in Australia towards circular economy challenges. **Local transition brokers** will also be essential, connecting businesses and coordinating place-based efforts.

Making sustainability a key part of corporate strategy is now essential, with growing pressure from governments, investors and consumers for real action on climate change. Our advice to **embed circular economy principles into environmental, social and governance (ESG) frameworks** helps businesses to more seamlessly integrate these practices into their strategies, as a practical way to address climate risks and opportunities.

In addition to these economy-wide enablers, we offer **supporting recommendations** for 4 critical supply chains: resources, the built environment, water, and food and agriculture. These align with our core advice while addressing specific challenges and opportunities unique to each supply chain.

By acting decisively and collaboratively, Australia can seize the circular economy opportunity to secure a more resilient and prosperous future for all Australians. The time to embrace this transformative shift is now.

Core recommendations

Recommendation 1

Introducing a new National Circular Economy Policy Framework

Recommendation 2

Mainstreaming circular economy principles in policies and programs

Recommendation 3

Recognising First Nations peoples and Knowledge systems

Recommendation 4

Legislating for a circular future: a Circular Economy Act

Recommendation 5

Harmonising circular economy rules to boost productivity

Recommendation 6

Using public procurement to grow and diversify markets

Recommendation 7

Partnering internationally

Recommendation 8

Unlocking Australia's competitive innovation edge through the circular economy

Recommendation 9

Embedding circularity in sustainable finance and corporate strategies

Recommendation 10

Giving industry a front door to circular economy expertise

Recommendation 11

Defining and building skills in the existing and emerging workforce

Recommendation 12

Supporting place-based transformation: regions, remote, precincts and regeneration

Recommendation 13

Partnering with First Nations enterprises, people and communities

Recommendation 14

Empowering consumers and communities by building circular economy literacy

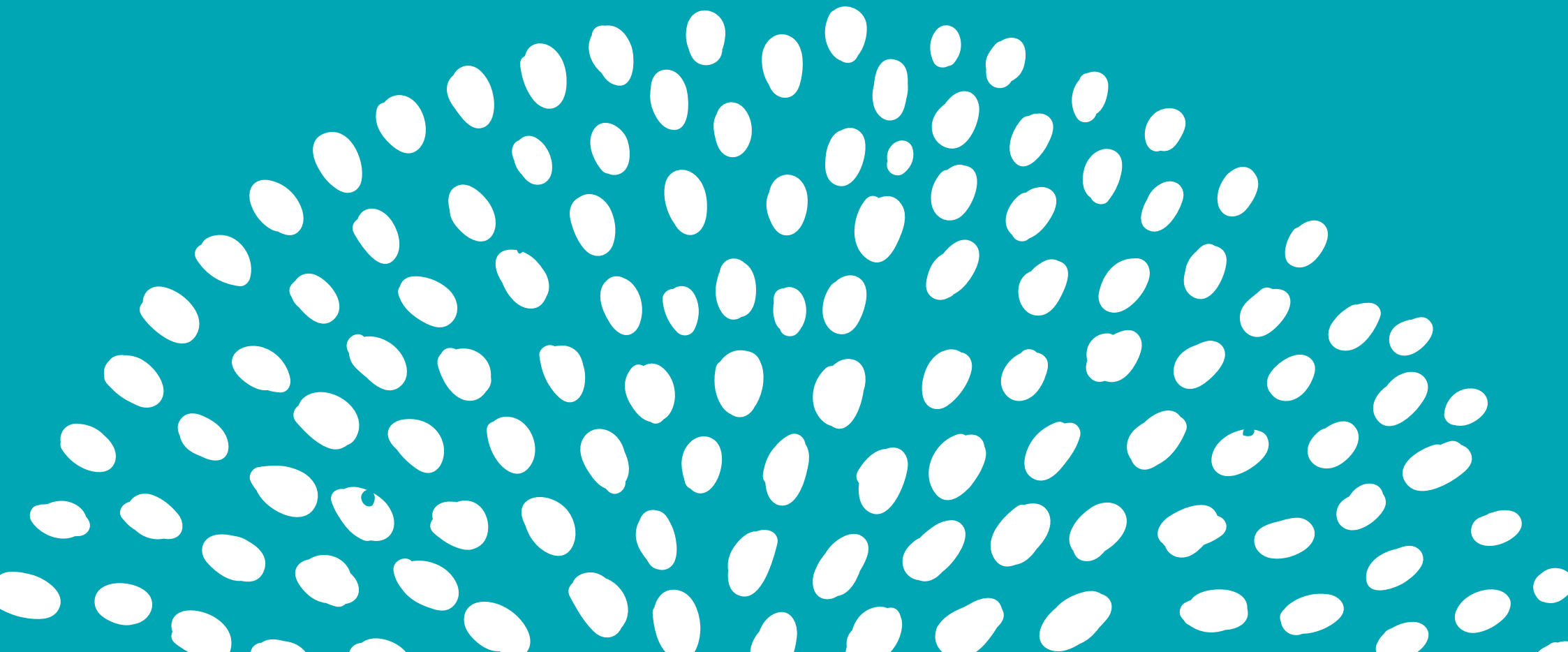
Supporting recommendations

Built environment	Food and agriculture	Resources	Water
			
a) Develop a national built environment circular economy strategy	a) Leverage existing food and agricultural programs to support circularity	a) Provide pre-competitive information supporting secondary processing and second life	a) 'All options on the table' in the National Water Initiative
b) Include circular economy and 'design for end of life' in the National Construction Code	b) Provide business support and training for small to medium enterprises (SMEs)	b) Embed circular economy into environmental, social and governance (ESG) frameworks	b) Reduce barriers for markets for biochar and other organic materials
c) Support uptake of low-carbon, circular materials through certification and standards	c) Leverage environmental, social and governance (ESG) to drive circularity and cut emissions in food supply chains	c) Increase research capability and coordination	c) Build integrated water cycle management into Australian Government precinct policies

SECTION

1

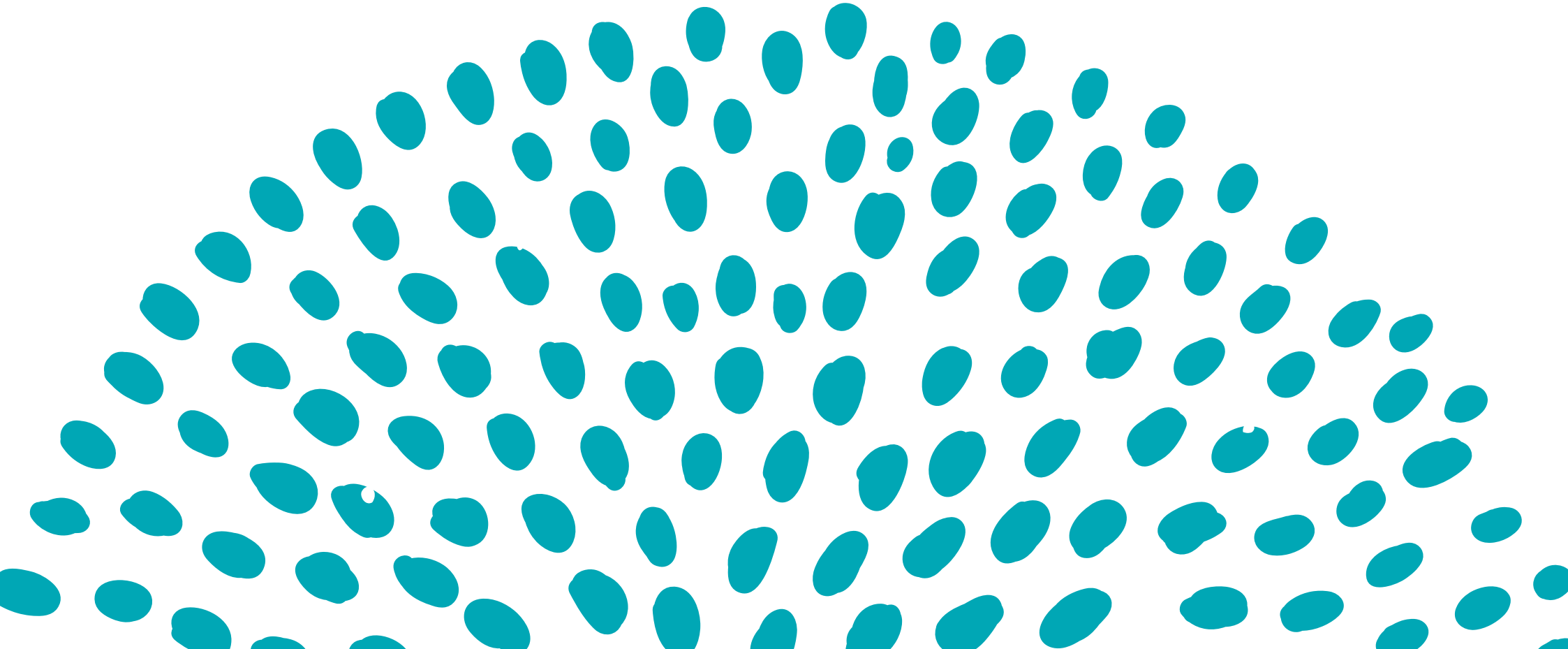
Setting the scene



CHAPTER

1

What is a circular economy?



Put simply, a circular economy is about designing out waste and keeping resources in use to create a more sustainable and efficient economy. It mirrors nature's circular processes, where resources are continuously transformed, reused and regenerated, ensuring nothing goes to waste.

More formally, it is an economic system designed to maximise resource efficiency by keeping the value of products, materials and resources in use for as long as possible.[1] Its primary aim is to prevent waste from being generated in the first place, promoting sustainable production and consumption through changes across the entire material life cycle (see Figure 1).

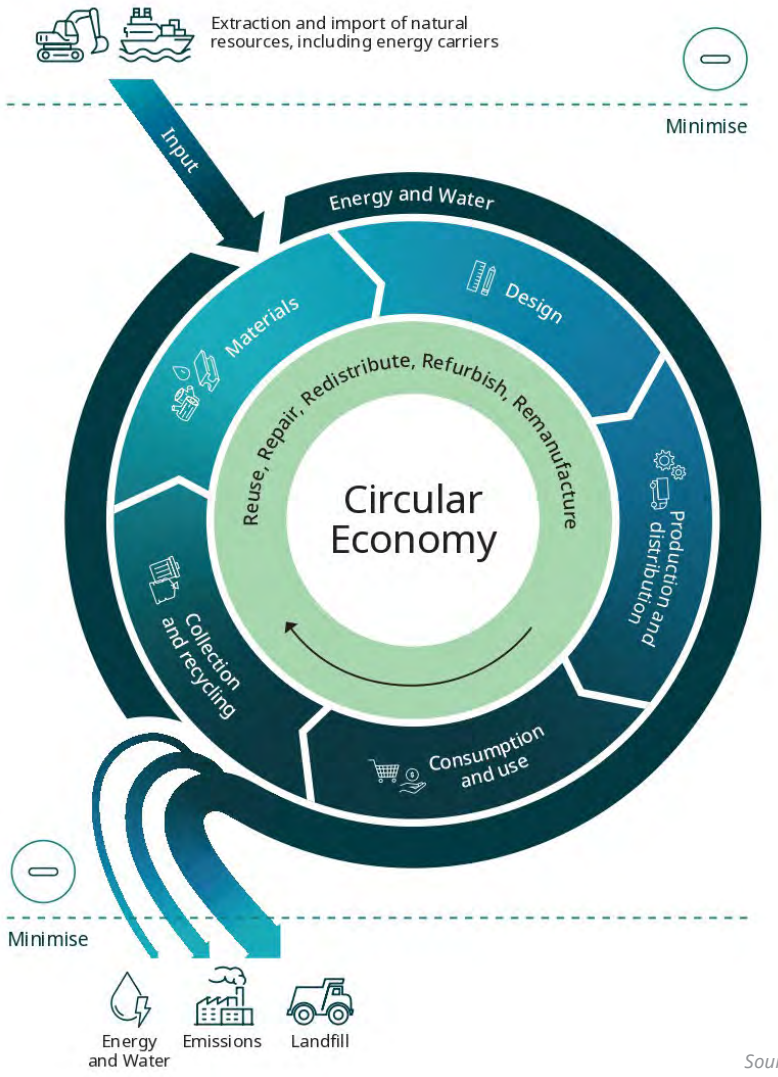
The circular economy is guided by 3 core principles:

1. designing out waste and pollution
2. keeping products and materials in use and at highest value through reuse, repair, refurbishing and re-manufacturing
3. regenerating natural systems.[2]

In a circular economy, we seek to move beyond just waste and recycling and address avoidance, better design, repair and reusability, among other opportunities across product life cycles.

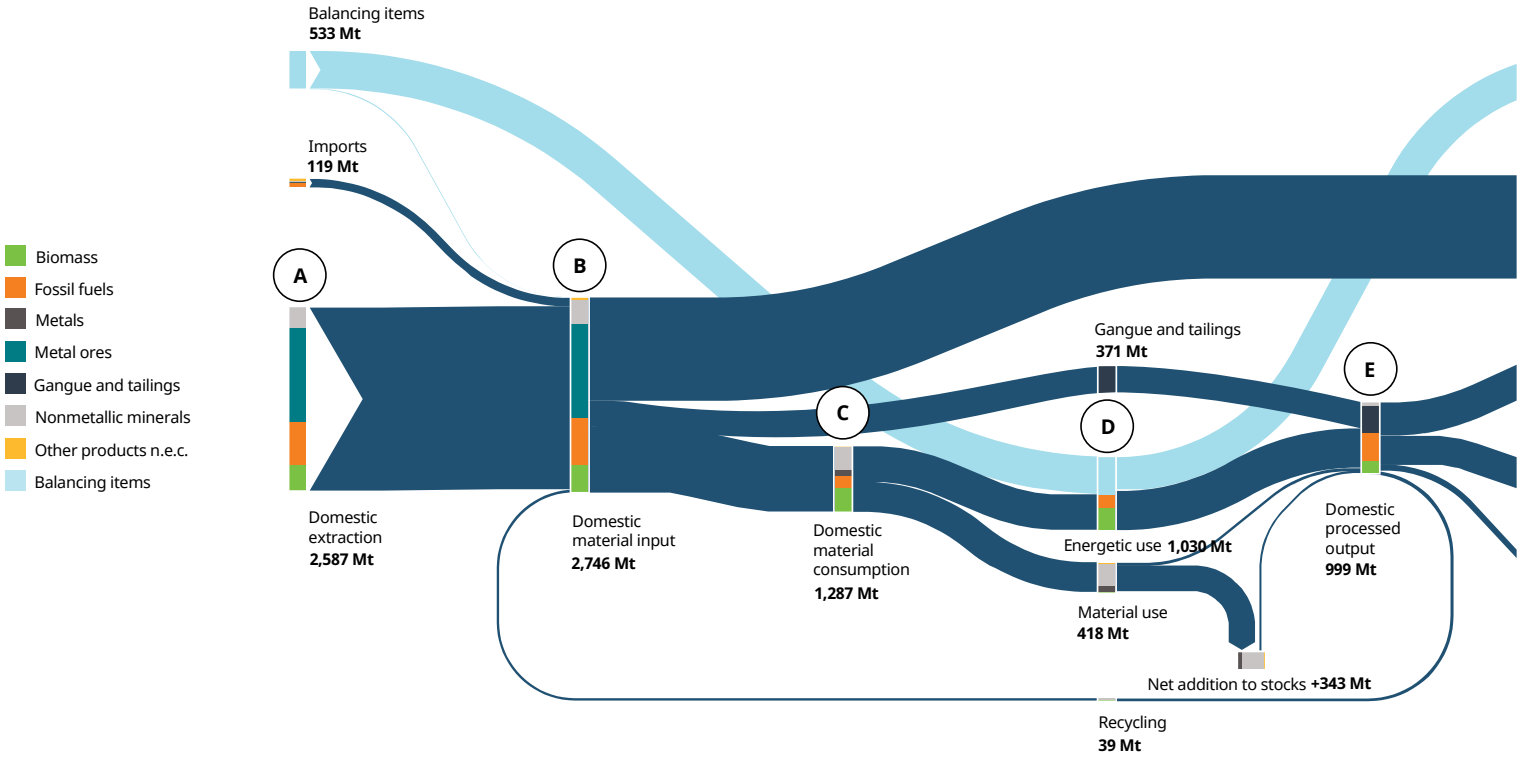
The circular economy follows the waste hierarchy, focusing on actions like reuse, repair and refurbishment. These steps are at the top of the hierarchy, farthest from landfill, and provide the biggest environmental and economic benefits.

Figure 1. The circular economy, where resources are kept in circulation and inputs and waste are minimised



Source: DCCEEW

Figure 2. Australia's material flows, 2019 *Source: CSIRO*



Australia's commitment and starting point

In 2022, Australia's environment ministers committed to advancing a circular economy in partnership with the private sector, focusing on designing out waste and pollution, keeping materials in use and fostering markets for recycled materials.[3] The commitment reflects an understanding that sustainability and economic growth are not mutually exclusive; rather, they are interconnected aspects of a resilient and forward-thinking economy.

Australia generates 2.95 tonnes of waste per person each year and has the third highest material footprint of member countries of the Organisation for Economic Co-operation and Development (OECD), which means we use, consume and discard a lot of materials per person.[4] We also have the fourth lowest rate of material productivity (how much value we get out of the goods we use).[5] Our circularity rate, the proportion of materials used that are recycled/non-virgin, is 4.6%, which is below the global average of 7.2%.[6] These figures highlight both challenges and the opportunity for improvement.

As a primary materials exporter, Australia faces structural factors that affect circularity, such as large volumes of low-value waste from mining and higher material demands driven by geographic spread and population growth. Achieving even incremental increases in circularity – like a 1% rise – requires substantial effort but can significantly benefit Australia's long-term sustainability and resource security. This journey will require strategic, targeted actions that reflect Australia's unique conditions and opportunities.

The Circular Economy Ministerial Advisory Group

Following the 2022 commitment of environment ministers to transition Australia to a circular economy, the federal Minister for the Environment and Water, the Hon Tanya Plibersek MP, established the Circular Economy Ministerial Advisory Group (the Advisory Group). The Advisory Group's role is to advise the Australian Government on opportunities and barriers to this transition, taking a birds-eye view of the settings needed for a whole-of-economy shift and identifying priorities for action.

Our advice has focused on:

- opportunities associated with Australia's circular economy transition (nationally and within specific sectors)
- regulatory, commercial and other barriers to a more circular economy
- best-practice initiatives that show promise for adoption and/or expansion in Australia
- circular economy research, development and innovation needs
- effective measurement and communication about progress towards Australia's circular economy.

Over the course of 2 years, we have engaged with over 250 stakeholders and more than 12 Australian Government portfolios, including direct engagement with 11 ministers. Through 7 topical meetings, we have considered strategic areas essential to the circular economy transition. This work forms the basis of the advice presented in this report. Further information on our process can be found at Appendix B.

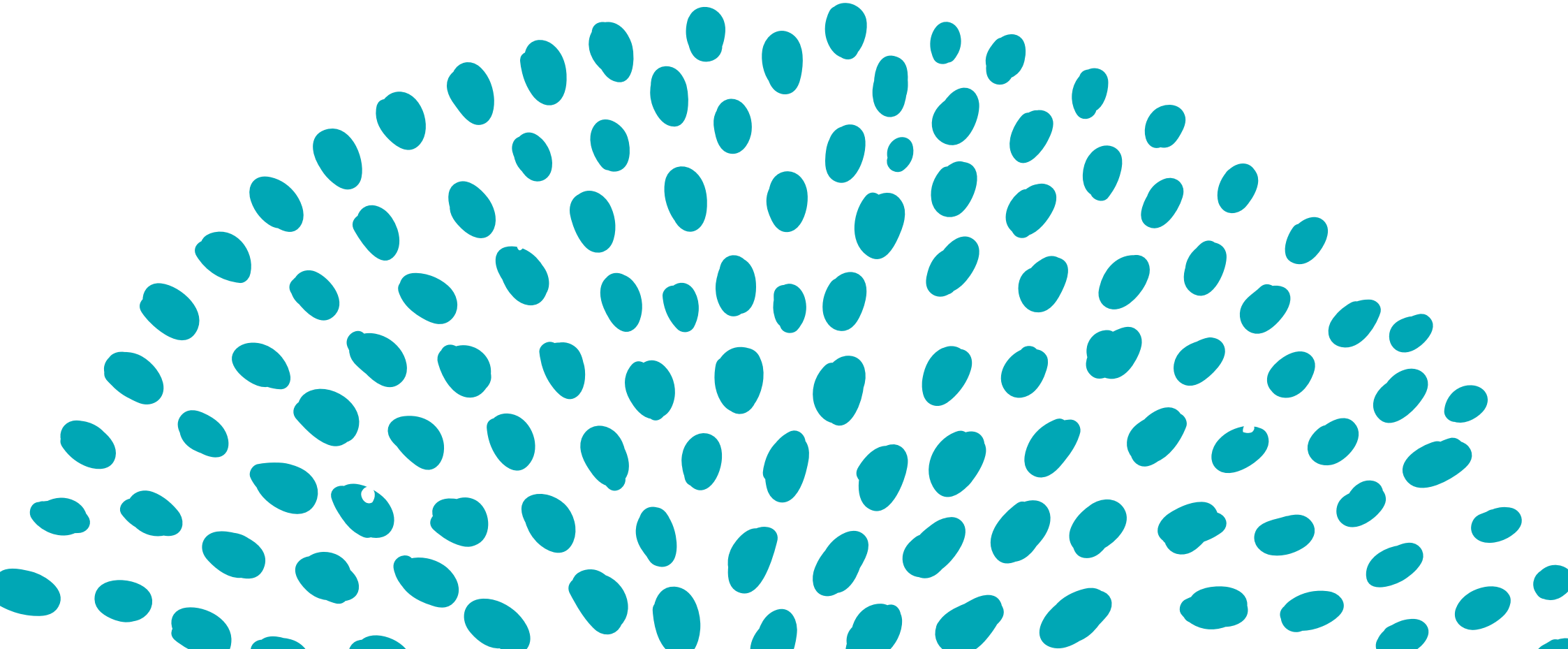
Above: The Circular Economy Ministerial Advisory Group, from left to right: Lisa McLean, Claire Kneller, Michael Jackson, Dr Larry Marshall, Dr Dominique Hes, Minister Plibersek, Minister Farrell, Vaughan Levitzke, Professor John Thwaites (Chair), Mark Rawson, Dr Cathy Foley, Romilly Madew, John Gertsakis. Absent – Samantha Read, Professor Robynne Quiggin, Paul Klymenko and Dr John Spoehr.

Figure 3. Schedule of the Advisory Group's 2023–24 topical meetings

CHAPTER

2

Circular solutions for today's issues



Circular solutions for today's issues

Embracing a circular economy offers a powerful solution to the polycrisis of pollution, biodiversity loss and climate change. Australia's 2021 State of the Environment report underscores our unique opportunity: by shifting to resource-efficient, waste-reducing practices, we can protect our ecosystems, preserve biodiversity and reduce pollution across air, soil and waterways.[7]

But the circular economy also offers the opportunity to combine innovation, collaboration and stewardship into a foundation for sustainable economic strength. This approach not only safeguards the natural environment but also strengthens the resilience of our economy, ensuring that our resources, communities and industries are equipped to thrive in the face of global challenges and opportunities.

FAST FACTS

CSIRO estimates Australia is around 4% 'circular', which is lower than the global average of around 7%.[8]

Per capita, **Australia has the highest material footprint of the G20**, at 31 tonnes per person.[9]

Australia has the fourth lowest rate of material productivity in the Organisation for Economic Co-operation and Development (OECD), generating only USD1.20 of economic output for every kilogram of materials consumed, compared with the OECD average of USD2.50.[10]

15 members of the G20 have a national circular economy strategy.

40% of Australia's exports are going to economies embracing the circular economy.

Global trade in green goods – including products designed to use fewer resources and produce less pollution – **is projected to quadruple by 2030**.[11]

KPMG estimates that a circular economy will add up to AUD210 billion in gross domestic product (GDP) value and an additional 17,000 full-time equivalent jobs in Australia by 2047–48.[12]

Productivity, competition and economic growth

The circular economy represents a major economic opportunity for Australia, with the potential to boost productivity and diversify our economy. According to PwC, transitioning to a circular economy could generate AUD1.9 trillion in direct economic benefits over the next 20 years.[13] This includes savings from reduced material costs, increased efficiency and new market opportunities.

Early mover advantage

Early movers in the circular economy stand to gain significant economic and financial advantages. By adopting circular practices, businesses can tap into new revenue streams, reduce costs through resource efficiency and position themselves as leaders in sustainability – a factor increasingly valued by investors and consumers. The transition to a circular economy is expected to contribute trillions of dollars to the global economy by 2030, with early movers already preparing to capture this value.[14]

Conversely, lagging behind in the circular transition carries significant risks. Countries and trading blocs are moving quickly to set regulatory standards on circular practices, including stringent eco-design requirements for goods and services. For Australia, this means that industries without the right circular economy credentials may face new barriers to key export markets, particularly in Europe and Asia, where circular economy standards are advancing rapidly. The longer businesses delay, the harder and costlier it will be to catch up with evolving regulatory and market expectations – potentially jeopardising market access and national economic security. Without ambitious domestic reform, Australia also risks becoming the destination for low-quality goods that are no longer accepted by our international peers.

Productivity advantage

By enhancing material productivity, the circular economy creates economic value at a national scale. Right now, Australia extracts and uses natural resources at twice the rate of other OECD countries but generates only half the economic value per kilogram of these resources.[15]

By improving how we use materials, we can get more value from them, driving economic growth and lifting our overall productivity.

The circular economy also addresses waste and lost value within supply chains. Australian businesses spend AUD1.4 billion each year to dispose of materials worth AUD26.5 billion in landfill.[16] By adopting circular economy practices – like designing products to minimise waste and using recycled materials – companies can reduce these landfill costs. For instance, some new sustainable buildings in Australia have diverted up to 99% of construction waste from landfill, while Sydney's Quay Quarter Tower reused its existing core, saving 12 months of construction time. These approaches save money and contribute to a more sustainable economy.

Job creation advantage

A circular economy transition can support job creation in Australia. Research undertaken by WRAP in the United Kingdom (UK) found that the circular economy had the potential to create 550,000 jobs by 2030 and boost UK gross value added by GBP82 billion.[17] A study for the European Union (EU) estimated that each percentage point increase in resource efficiency in the EU could create between 100,000 and 200,000 additional jobs.[18]

In Australia, it is estimated that recycling alone creates 3 times more jobs than landfill, with higher order circular economy actions like repair and reuse holding more job potential again (up to 25 times more).[19] Circular economy initiatives in the built environment, transport, manufacturing and recycling industries alone can create some 150,000 ongoing jobs across Australia by 2025.[20]

These opportunities are currently being considered in both our cities and our regions to boost their local economies. For example, the new plastics recycling facility in Albury supported more than 200 jobs during construction and now employs 40 people in the region. Even very remote parts of Australia can benefit from the circular economy; for example, new infrastructure on Norfolk Island has catalysed a new local industry and lifted the island's recycling rate to 75% (see Chapter 9).

Supply chain resilience and a Future Made in Australia

Introducing more circular supply chains creates additional local sources of materials that can strengthen Australia's supply chain resilience. A survey of Belgian businesses during the COVID-19 pandemic revealed that those employing circular economy business models were substantially more resilient, experiencing fewer losses compared to their non-circular counterparts.[21] For instance, Australia currently imports a large portion of its phosphorus – an essential component in agriculture. Disruptions in international supply chains can pose significant risks to these supply chains. Domestic recycling of phosphorus for fertilisers reduces this dependence on imports and strengthens Australia's supply chains.

A circular economy transition backs in Australia's ambitions for a Future Made in Australia by boosting local manufacturing from recycled materials (re-manufacturing). Re-manufacturing processes use up to 85% less energy than traditional manufacturing while also saving significantly on material costs, making these processes up to twice as profitable for businesses.[22] Such cost efficiencies, combined with added supply chain resilience, can enhance the global competitiveness of Australia's manufacturing sector.

Innovation precincts across Australia are already capitalising on circular economy principles to attract and retain businesses (see Chapter 9). By co-locating industries, these precincts enable companies to share materials and resources more easily and cost-effectively, lowering operational expenses. This collaborative approach not only reduces waste but also fosters innovation as businesses learn from one another and develop new ways to repurpose their by-products.

Reducing pressure on cost of living

In a more circular economy, the business case for repairing, refurbishing and reusing goods becomes stronger, offering consumers more affordable options. Repairs can save consumers a substantial amount of money compared to purchasing new items.[23] For example, repairing a washing machine can cost between AUD150 and AUD300, whereas buying a new one can cost more than AUD600.

EU 2030 projections suggest that disposable income in a circular economy could be up to 11 percentage points higher, with households potentially saving around EUR600 (approximately AUD976) annually.[24] Reducing waste for consumers also assists with the cost of living. Modelling shows that reducing food waste can save the average family up to AUD3,800 per year.[25]

The circular economy reduces costs by fundamentally addressing waste in the system. In construction, waste management can account for up to 30% of project costs. By adopting circular economy practices – such as reusing materials, reducing waste and increasing recycling – industries can lower these expenses and pass the benefits on to the customer.

Trade into circular economy markets

Australia's trading partners like the European Union (EU), Japan and China are leading the shift, imposing circular economy requirements on imports and driving the adoption of environmental, social and governance (ESG) standards. In the EU, for instance, eco-design standards will mandate circularity-focused improvements in product design, affecting Australian exporters with operations or value chains linked to the EU market. Similarly, Japan's *Basic Act on Establishing a Sound Material-Cycle Society* (2000) requires products to meet resource efficiency and recycling standards, impacting foreign suppliers aiming to enter Japanese markets. The Netherlands – one of the leading international circular economy adapters – is Australia's second largest export market in the EU and a key entry point for Australian goods distributed across Europe. The Netherlands is also the ninth largest investor and fifth largest source of direct investment in Australia. China, Australia's biggest trading partner, is prioritising the circular economy through initiatives such as green product design and material productivity targets driven through advanced re-manufacturing and industrial precincts, as outlined in its 14th Five-Year Plan (2021–2025).

Net zero

A more circular economy is essential to reaching net zero greenhouse gas emissions by 2050. The *Circularity Gap Report 2021* highlights that applying circular economy strategies could cut global greenhouse gas emissions by 39% by 2050, aligning with the goal of limiting global warming to 1.5°C.[26] In the industrial sector, particularly in materials production, circular economy approaches can lead to significant emission reductions. Research published in *Nature Communications* suggests that resource-efficiency and circular economy strategies could reduce emissions from material production by up to 56% by 2050.[27]

The circular economy lowers energy demand and associated scope 1 and 2 emissions by retaining existing goods and materials for longer. This avoids the need for new extraction and processing activities and their associated emissions. For example, recycling aluminium uses up to 95% less energy than producing new aluminium from bauxite.[28] Extending the life span of products can also reduce costs and save emissions. Re-manufacturing wind turbines can save up to 70% of materials and on average 45% of carbon dioxide emissions compared to new replacement, even after accounting for transportation.[29] These approaches also reduce overall demand for renewable energy, easing pressure on renewable infrastructure and supporting a more sustainable transition.

The circular economy also addresses the scope 3 emissions of materials – particularly in the built environment. These are the emissions associated with materials manufacturing and use, throughout their whole life cycle. Circular economy strategies retain these embodied emissions for longer, maximising their value. Circular economy actions like reuse, particularly in buildings and infrastructure, can significantly reduce emissions by minimising the need for new steel and cement – both emissions-intensive materials.

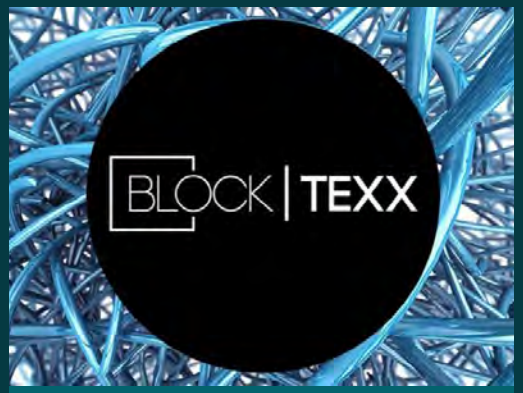
Importantly, circular economy actions are practical things that industry can do now to immediately reduce emissions; they are not dependent on waiting for a renewable energy grid.

Leveraging the circular economy for net zero: examples

Quay Quarter Tower

The Quay Quarter Tower in Sydney is a landmark example of circular economy principles in action within the construction industry. Originally built in 1976, Quay Quarter Tower was redeveloped into a 49-storey, 90,000 square metre building – double the floorplate of the original.

Co-funded by the Commonwealth's Clean Energy Finance Corporation, the tower retained 66% of the building's existing columns, beams and slabs and 95% of its entire walls. This innovative approach conserved significant amounts of material, reducing construction waste and minimising the demand for new raw materials. By retaining the core, the project team estimates they avoided approximately 12,000 tonnes of embodied carbon emissions – equivalent to taking around 2,500 cars off the road for a year. This circular approach also led to a AUD130 million cost saving **and 12 months reduced build time** for the project.



BlockTexx

Using their patented separation of fibre technology (SOFT), BlockTexx is able to process what is otherwise difficult to recycle clothing into textile fibre grade pellets. Dubbed as Polytexx, the soft pellets retain the properties and characteristics of the original virgin material and are readily available for textiles and construction use. For every 10,000 tonnes of recycled textiles processed using the BlockTexx ecosystem, carbon dioxide emissions are reduced by more than 800 tonnes.

Downer

Developed by Downer Group, Reconophalt™ is an Australian-first road surfacing material that contains recycled content that would normally go to landfill. Reconophalt™ provides a more sustainable alternative to conventional asphalt, as it sequesters waste, is perpetually recyclable and provides increased performance. For every 1-kilometre, 2-lane road using Reconophalt™, the waste diverted from landfill equates to a saving of 8.08 tonnes of carbon dioxide and 3 cars off the road every year.

SecondBite

SecondBite is a leading Australian food rescue organisation that diverts over 25 million kilograms of surplus food annually from going to waste. This effort not only provides meals for those in need but also prevents approximately 2,600 tonnes of greenhouse gas emissions each year, showcasing the environmental and social benefits of reducing food waste.

Nature positive: restoring biodiversity and repairing nature

Unsustainable resource consumption drives habitat destruction and biodiversity loss, with wasteful practices taking a significant toll on Australia's natural landscapes. For instance, the land required to grow food that ends up wasted in Australia is estimated to be as large as the state of Victoria – land that could otherwise support diverse ecosystems.[30] By reducing resource extraction and waste, the circular economy offers a pathway to mitigate these impacts. Practices like recycling, reuse and sustainable agriculture lessen the demand for new raw materials, which in turn can slow habitat conversion and allow ecosystems the space they need to recover.

The circular economy closely aligns with Australian Government initiatives aimed at nature repair and biodiversity restoration – for example, the National Biodiversity Strategy and Action Plan, which seeks to halt and reverse biodiversity loss by 2030.[31] This strategy highlights the vital role of circular economy principles in protecting biodiversity with a specific target to reduce the impacts of materials and pollution on ecosystems. By reintegrating materials into production cycles and minimising waste, circular practices can help regenerate soils, promote carbon sequestration and reduce pollution from harmful chemicals that affect soil and water quality. These efforts collectively create healthier, more resilient habitats, supporting diverse species and aiding in the repair of ecosystems degraded by overuse and pollution.

Less waste and a cleaner environment

Waste and pollution that leak into and contaminate our environment are the by-products of an inefficient, linear economy. In 2020–21, Australians sent 28 million tonnes of waste to landfill.[32] Each year, approximately 130,000 tonnes of plastic waste enter Australia's oceans, where plastic constitutes about three-quarters of coastal marine debris, primarily from Australian sources.[33] New waste types and pollutants also enter into circulation; chemicals like per- and polyfluoroalkyl substances (PFAS), known for their toxicity and persistence, are now widely present in the environment. The circular economy offers a powerful opportunity to address these issues, by designing them out as well as creating systems to recover material, divert toxic substances from landfill and curb the environmental footprint of emerging waste streams. By doing so, Australia can reduce waste and pollution at their sources, supporting a healthier and more resilient environment.

SECTION

2

Core advice

Our core advice describes the overarching settings needed for a national circular economy transition and recommends actions for the Australian Government.

Commonwealth levers for a circular economy

Each sector and system we examined operates within its own unique policy, regulatory, and market settings, with responsibilities spread across various government portfolios and levels. The Australian Government has several levers it can use to promote circularity, spanning policy, regulation, economics, research and communication. This chapter focuses on the government's role in shaping national *policy* direction, while other chapters explore the additional levers outlined in the table below.

Policy	Regulation
• National policy setting, which includes First Nations rights and Knowledge systems (Core Recommendations 1, 2 and 3) • Setting targets and indicators (Core Recommendation 1) • International engagement including entering treaties and trade agreements (Core Recommendation 7) • Convening powers to work with governments, businesses and communities (Core Recommendation 5)	• Product and material design standards including for energy and water efficiency (Core Recommendation 4) • Mandatory product stewardship and extended producer responsibility (Core Recommendation 4) • Warranties and consumer protections (i.e. against greenwashing) (existing consumer law) • Regulations on pollutants and chemicals of concern in our environment (existing environmental laws)
Economics and investment	**Research and communication**
• Economic and tax settings including tax relief, accelerated depreciation, consumer tax reductions etc. (Productivity Commission investigating) • Commonwealth procurement (Core Recommendation 6) • Public funding including grants and subsidies (Core Recommendation 8) • Public investment and green bonds (Core Recommendation 9) • Corporate disclosures (Core Recommendation 9) • Fines and penalties (Productivity Commission to investigate)	• Partnerships and engagement with peak organisations, businesses and communities (Core Recommendations 10, 12 and 13) • Embedding circular economy knowledge and skills in education and training (Core Recommendation 11) • Commissioning research and data collection (Core Recommendations 11 and 12) • Campaigns and education (Core Recommendation 14) • Ecolabels and certifications (Core Recommendation 4)

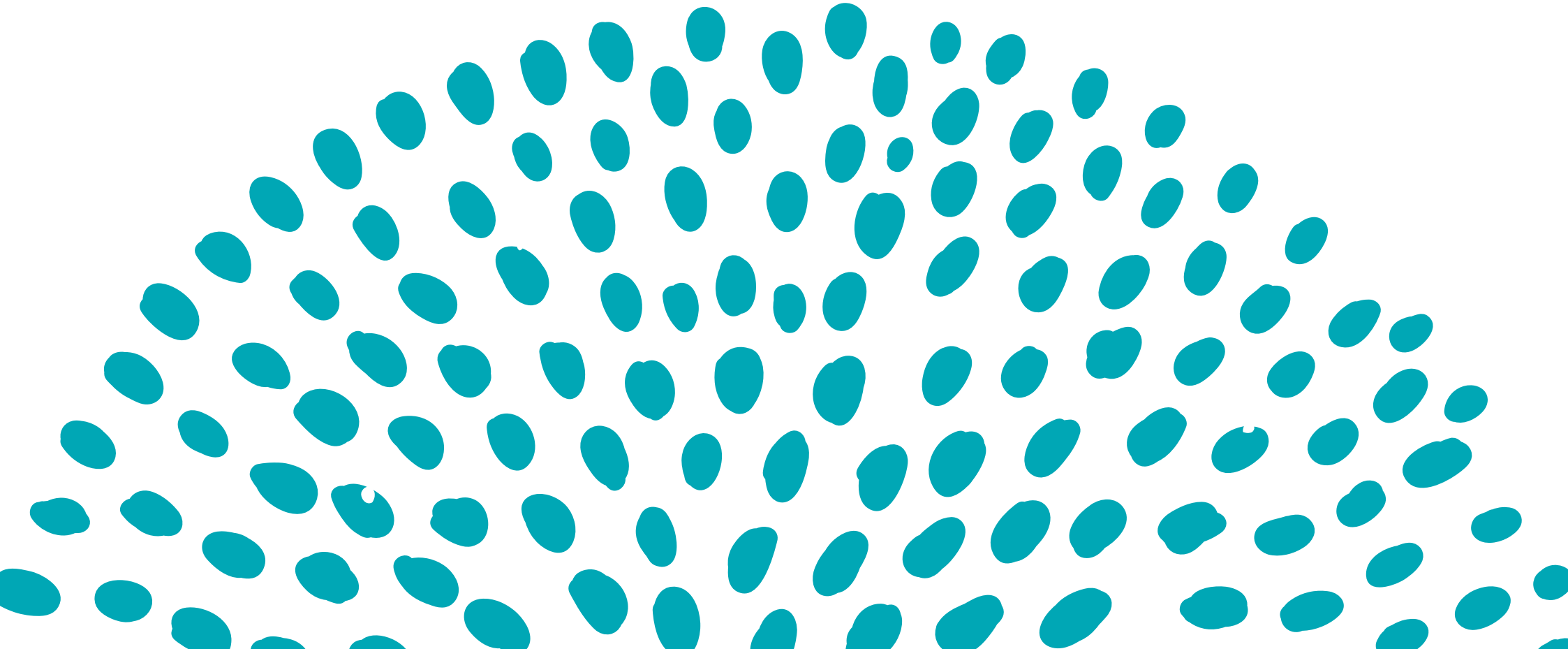
A note on economic and tax settings including fines and penalties

The Advisory Group has not made specific recommendations on tax settings or fines or penalties. There are likely to be economic settings in Australia that currently reinforce a linear economy and present as barriers to circularity. The Productivity Commission Inquiry inquiry into the circular economy announced by the Treasurer is well placed to explore these settings in depth, which is why we recommended the establishment of the inquiry in our interim report.

CHAPTER

3

The power of national policy leadership



Context

With Australia's environment ministers committing in 2022 to a circular economy transition, it is now crucial to define clear targets, priorities and metrics for measuring progress through a National Circular Economy Policy Framework.

States and territories, local governments, regions, businesses and different sectors of the economy have developed or are in the process of developing circular economy plans and policies (Figure 4). They have reiterated to us that the lack of a clear, overarching national approach is a major gap, creating uncertainty and limiting investment and policy confidence. Without a unifying policy framework, Australia risks a fragmented and less effective transition. A national policy framework is essential to provide clarity and ensure all stakeholders are working towards common goals.

Internationally, the policy focus has shifted from 'waste' to a 'circular economy', recognising that waste issues cannot be resolved, and environmental, economic and social benefits cannot be captured, without action upstream in supply chains and across sectors. Australia must adopt a similar approach, moving beyond the current National Waste Policy (see right).

Sustainable resource management has also become a major focus of high-profile multilateral agreements, including the G7 Alliance on Resource Efficiency, the G20 Resource Efficiency Dialogue and the various partnerships and initiatives launched by the World Economic Forum.

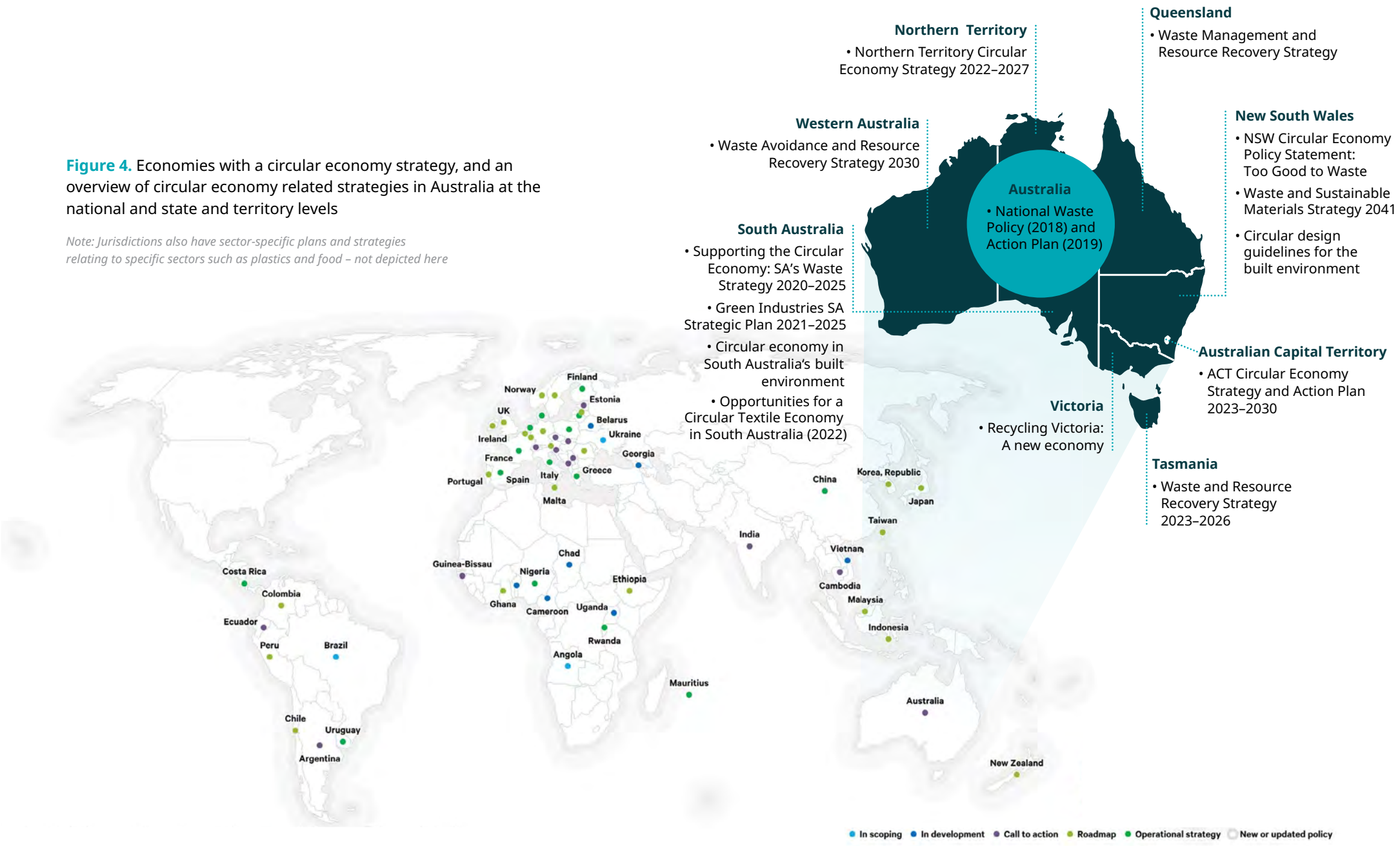
A National Circular Economy Policy Framework is a necessary first step to align Australia with global circular economy trends and provide a platform to clearly communicate our goals and priorities for the transition, both domestically and internationally.

Australia's National Waste Policy and Action Plan

- The Australian Government currently supports the National Waste Policy, agreed by all governments in 2019. **The policy is implemented through an Action Plan that outlines 7 national targets and 79 actions to guide investments and efforts to avoid waste and enhance resource recovery by 2030**. While the National Waste Policy is based on circular economy principles, in practice its focus has been on recycling and waste avoidance through end-of-life interventions.
- The success of the policy and action plan is mixed. There has been an increase of 3% total waste generated per person in Australia compared to 2016–17, rather than a decrease (see the 'Circular Economy' indicators in Australia's Measuring What Matters dashboard). **Resource recovery rates have stayed at about 63% for the past few years – well below the 80% target**. Waste export bans are now in place for all identified waste products, including plastics, glass, tyres, paper and cardboard, and there has been progress in eliminating problematic and unnecessary plastics.
- Despite some progress towards the targets, there is a broad consensus that Australia must take action earlier in the product and material life cycle. **A new, 'circular economy' policy focus is needed.**

Figure 4. Economies with a circular economy strategy, and an overview of circular economy related strategies in Australia at the national and state and territory levels

Note: Jurisdictions also have sector-specific plans and strategies relating to specific sectors such as plastics and food – not depicted here



Recommendation 1

Introducing a new National Circular Economy Policy Framework

Develop a new National Circular Economy Policy Framework for Australia that includes ambitious and achievable targets and clearly defined priorities, and highlights discrete market opportunities. The national policy framework should establish the pace and direction for Australia's transition, clearly outlining priorities for governments, industry, researchers and others to focus their efforts towards.

Recommendation 2

Mainstreaming circular economy principles in policies and programs

Embed circular economy principles across Australian Government policies and programs, particularly:

- net zero and climate policies – including Australia's Nationally Determined Contribution and Sustainable Finance Strategy – recognising the benefit of a circular economy to Australia's emissions reduction goals and a sustainable net zero transition
- Australian Government policies and programs, including grants and procurements, that significantly influence materials production and use or where incorporating circular economy principles advances the program's objectives
- Australian Government corporate planning and reporting processes.

Recommendation 3

Recognising First Nations peoples and Knowledge systems

A truly Australian circular economy must recognise the rights of First Nations peoples and integrate their Knowledge systems and practices into our transition by:

a) recognising the status of First Nations peoples, and their inherent rights as custodians of land, waters and Knowledge systems by adopting the principles of Indigenous self-determination and free prior and informed consent. Recognise also that First Nations peoples' Knowledge systems and practices implement a respectful relationship with land, water and species, utilising design principles that align with circularity.

b) recognising and valuing First Nations peoples' Knowledge systems and practices, adopting them where permitted and possible, ensuring proper permissions, recognition, attribution and remuneration. This includes actively respecting and incorporating First Nations Cultural Land, Water, and Biodiversity Practices into Australia's transition to a circular economy.

The galvanising effect of a circular economy framework

A new National Circular Economy Policy Framework can focus Australia's transition efforts on areas where we hold strong comparative and competitive advantages. It is essential for the success of the remainder of the core recommendations in this report.

Ambitious targets to drive action

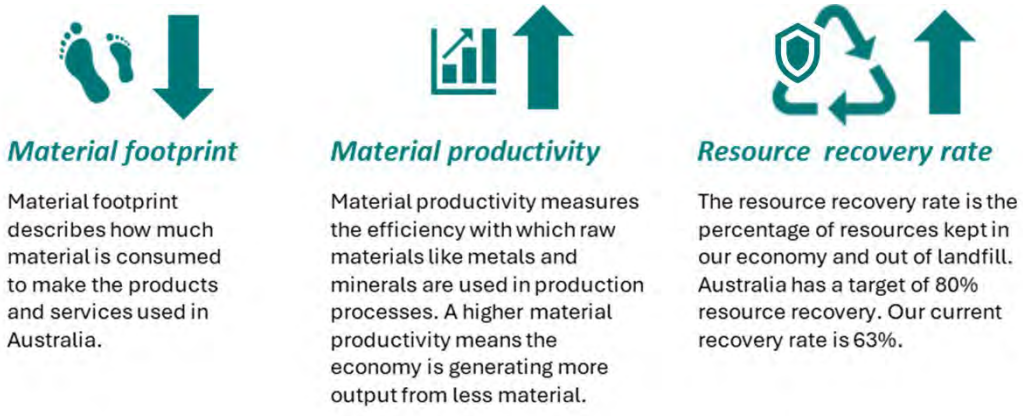
Australia's national framework should reflect the urgency to act and the need to keep pace with or surpass the efforts of other nations to maintain a competitive advantage. It should include ambitious but achievable targets that are evidence based, along with clear metrics to drive and track progress. This clarity will guide both public and private sector actions, making it easier to measure outcomes and adjust strategies as needed.

Australia's framework should take a holistic approach to the circular economy, addressing virgin resource consumption rates at the start of the material life cycle, extending material and product use in the middle of the life cycle, and recovering materials and products at their end of life.

At our October 2023 meeting, we discussed target setting and highlighted key considerations for Australia's circular economy targets. First, the more robust the targets, the better the market's confidence, with industry and investors consistently citing targets as essential for supporting investment in the circular economy. Second, targets need to be achievable, meaningful and measurable, with national targets based on metrics that allow for international comparison and ongoing reporting. Australia already reports several key circular economy metrics against its progress towards the United Nations (UN) Sustainable Development Goal 12 on responsible consumption and production. These metrics include material footprint and the resource recovery rate. Material productivity is another useful metric illustrating the dollar value added per tonne of material and reported by the OECD and in the European Union (EU) Circular Economy Monitoring Framework. The Australian Government is now regularly reporting on these 3 metrics as part of the Measuring What Matters wellbeing framework.

Australia's National Waste Policy already includes a resource recovery target of 80%. However, achieving a truly circular approach will require shifting focus further up the waste hierarchy to prioritise waste avoidance and prevention through product and system design. Establishing targets for reducing Australia's material footprint/consumption and improving material productivity will drive these upstream opportunities. We recommend that these 3 indicators (material footprint, material productivity and resource recovery rates) serve as the foundation for Australia's circular economy targets.

Figure 5. Circular economy target indicators



Clear and well-defined priorities and market opportunities

Australia's circular economy transition should prioritise areas that deliver the greatest environmental and economic benefits. In our interim report, we recommended that the Australian Government analyse Australia's unique circular economy strengths to inform national policy development. This analysis, now available (see below), highlights these advantages. We recommend incorporating these findings into Australia's National Circular Economy Policy Framework to focus national efforts on areas with the highest potential impact.

Defining sector-specific priorities is crucial for a successful circular economy transition and will be important to include in a new national policy framework. While a systems approach is necessary, stakeholders have stressed that sector-focused priorities will better engage those responsible for implementation across industry and government. It will be especially important to define these priorities in material-intensive sectors and supply chains where Australia holds a competitive advantage, where changes can deliver significant environmental or climate benefits or where they can enhance consumer confidence and engagement in the circular economy.

In parallel, a national framework should address cross-cutting priorities – such as jobs, skills and innovation – that are essential enablers of a successful transition.

To guide investment decisions effectively, a new national policy framework should include a 'market vision' to set the long-term view of market trends, emerging needs and growth opportunities.

A market vision outlines key aspects like positioning, target audiences, competitive advantages and future goals, helping investors assess growth potential and strategic direction. Australia should identify where it can add the most value in international trade and supply chains, describing specific market opportunities for circular economy investment. This includes products, technologies and waste streams where Australia can competitively innovate to address local issues and capture global markets, aligned with evolving international regulations.

Australia's comparative and competitive advantages

A CSIRO report published in 2024 commissioned through the National Science and Technology Council, investigated Australia's comparative and competitive advantages in transitioning to a circular economy. The analysis revealed strong comparative advantages in workforce capacity and capabilities, product and service development, and research and innovation.

The report also identified 5 key industries with the most potential to advance Australia's circular economy – mining, construction, manufacturing, agriculture and resource recovery. These industries were identified based on 3 criteria:

- The industry produces large quantities of either raw materials or products that are able to be reused or recycled within the circular economy.
- The industry currently has a high impact on the environment and an opportunity to reduce that impact through a circular economy.
- The industry has comparative strengths that can be leveraged and lead to increased international competitiveness.

Market opportunities defined in Australia's national framework should reflect and be informed by related Australian policies, including the National Reconstruction Fund, the Australian Green Economy Prospectus (2023) and Future Made in Australia – particularly the goal of making Australia a renewable energy superpower.

An evolving approach that illustrates the value proposition

The circular economy is rapidly evolving, with many countries exploring new and innovative approaches. A new national policy framework should acknowledge this and be designed with built-in agility and flexibility. For instance, the framework could set long-term targets and initial priorities but plan for regular reviews to adjust these priorities as new information and opportunities arise.

The framework should also provide clear roles and implementation pathways for both government and industry, ensuring that all stakeholders understand their responsibilities in driving the transition. We recommend developing sector-specific transition strategies under the overarching framework, each tailored to the specific needs and opportunities within key industries. These strategies could include sector-specific targets and focus on priority materials to drive circularity.

The circular economy is still new to many Australians – only about 1 in 4 are familiar with the term, although over two-thirds support its principles once explained.[34] A new national policy provides an ideal opportunity to highlight the benefits of this transition, increasing awareness and understanding. Including a clear, practical definition and examples of what the circular economy means for Australia would enhance the policy's impact.

Above: Circular Economy Ministerial Advisory Group meeting on economic and market opportunities with the Treasurer and Minister Plibersek in attendance.

The advantage of taking an integrated policy approach

Integrating circular economy principles across Australian Government policies ensures it becomes a standard approach rather than relying on multiple specialised policies or programs. This approach reflects that the circular economy is an economic strategy that can support diverse policy agendas and leverage government strengths in innovation, skills, market development, science, trade and data. Many of the biggest policy opportunities to support a circular economy lie outside traditional environmental or resource recovery portfolios – within agriculture, infrastructure, industry, and areas promoting innovation and skills. The Australian Government should focus on embedding circular economy principles in these and other key policy areas.

The Australian Government has a significant property and operational footprint that it can leverage to demonstrate circular economy practices in action. This provides 2 benefits: 1) showcasing government leadership on its own policies, and 2) embedding circular economy knowledge across portfolios.

Corporate reporting

To further integrate circular economy principles into corporate operations, the government should explore options such as direct reporting of circular economy practices as part of annual reporting requirements and formally recognising the role of the circular economy in achieving net zero, potentially as part of Commonwealth climate disclosures and other climate-related reporting. Incorporating circular economy principles into corporate reporting would also create the incentive to build circular economy expertise and capability across the public service.

Recognising First Nations peoples and Knowledge systems

A truly Australian circular economy must recognise the rights of First Nations peoples and integrate their Knowledge systems and practices into our transition. Their profound connection to Country, rooted in tens of thousands of years of understanding of land, water and species, provides the foundation for an approach that is uniquely Australian. Valuing and strengthening First Nations communities and enterprises while elevating their Knowledge systems and practices ensures a circular economy that reflects Australia's identity – one that nurtures resilience, cares for Country, and fosters a sustainable future for all.

First Nations Knowledge systems embody a respectful relationship with land, water, and biodiversity, applying design principles that align with and enhance circular economy goals. Regenerative practices such as cultural burning, water stewardship, and traditional land management sustain natural systems and strengthen resource cycles. Integrating these Knowledge systems into the circular economy transition offers innovative pathways for sustainable resource management and economic growth. By combining caring for Country principles with place-based circularity, Australia can undertake regenerative practices to restore ecosystems. Collaborating to understand local contexts and respect natural systems enables ecological, cultural, and economic benefits for all Australians.

This report's recommendations, including a new National Circular Economy Policy Framework (Recommendation 1), should ensure that the rights of First Nations peoples, their Knowledge systems and their rights to control them are recognised, making them essential partners in shaping a sustainable future from the outset.

Reflecting circularity in climate policy and reporting

As of 2023, **27% of countries' Nationally Determined Contributions (NDCs) explicitly mention the circular economy** as part of their mitigation measures. Analysis by the World Resources Institute and Chatham House shows the broader set of countries with NDCs that mention circular economy or equivalent strategies.[35] This focus reflects calls by the Intergovernmental Panel on Climate Change (IPCC), United Nations (UN) Development Programme, UN Environment Programme and United Nations Framework Convention on Climate Change (UNFCC) for policymakers to include circular economy approaches in national climate plans.[36]

- At COP28, governments agreed to the importance of circular economy approaches in addressing climate change, reflected by direct inclusion in negotiated outcomes.[37]
- The UNFCCC secretariat, in conjunction with the UN Environment Programme, has developed a practical toolbox for building circularity into NDCs aimed at policymakers working on national climate policy.
- The IPCC, including through its *Climate change 2023: synthesis report*, identifies circular economy interventions as opportunities for greenhouse gas abatement with high confidence.[38]

At least 12 EU countries integrate the circular economy in their climate policies:

- **Germany** has integrated the circular economy into its national greenhouse gas neutrality scenario analysis.[39]
- **Austria's** Integrated National Energy and Climate Plan 2021–2030 includes development of technologies and processes that close material cycles and reduce the use of primary energy and raw materials.[40]
- **Greece's** National Energy and Climate Plan includes the circular economy as a policy priority to reduce greenhouse gas emissions.[41]
- **France's** Climate and Resilience Law includes sustainable public procurement, consumer product environmental information, and promotion of bulk selling and advertising regulation.[42]

These policies include reporting on the emissions savings from circular economy initiatives.

We recommend that Australia reflect the circular economy in its next updated NDC, drawing on the available tools and working with similar economies that have pursued this as a national decarbonisation strategy.

Embedding circularity in Australia's net zero 'big build'

The net zero transition is a national 'big build' opportunity to integrate circularity into supply chains, products and infrastructure servicing Australia's net zero transition. It is estimated that, by 2050, Australia will need 10,000 kilometres of new transmission lines and 6 times more solar and wind than we have currently.[43] Representing one of our biggest current infrastructure projects, the net zero big build is an opportunity to demonstrate circular economy in practice, including strategies that reduce emissions and waste.

More than 90% of the materials from renewable energy infrastructure can be used again when designed for reuse and recycling.[44] Designing assets for longevity, repair, reuse and recyclability prevents future waste stockpiling and ensures valuable materials, like critical minerals, are retained. Reusing these materials reduces the need for future extraction, along with its associated emissions.

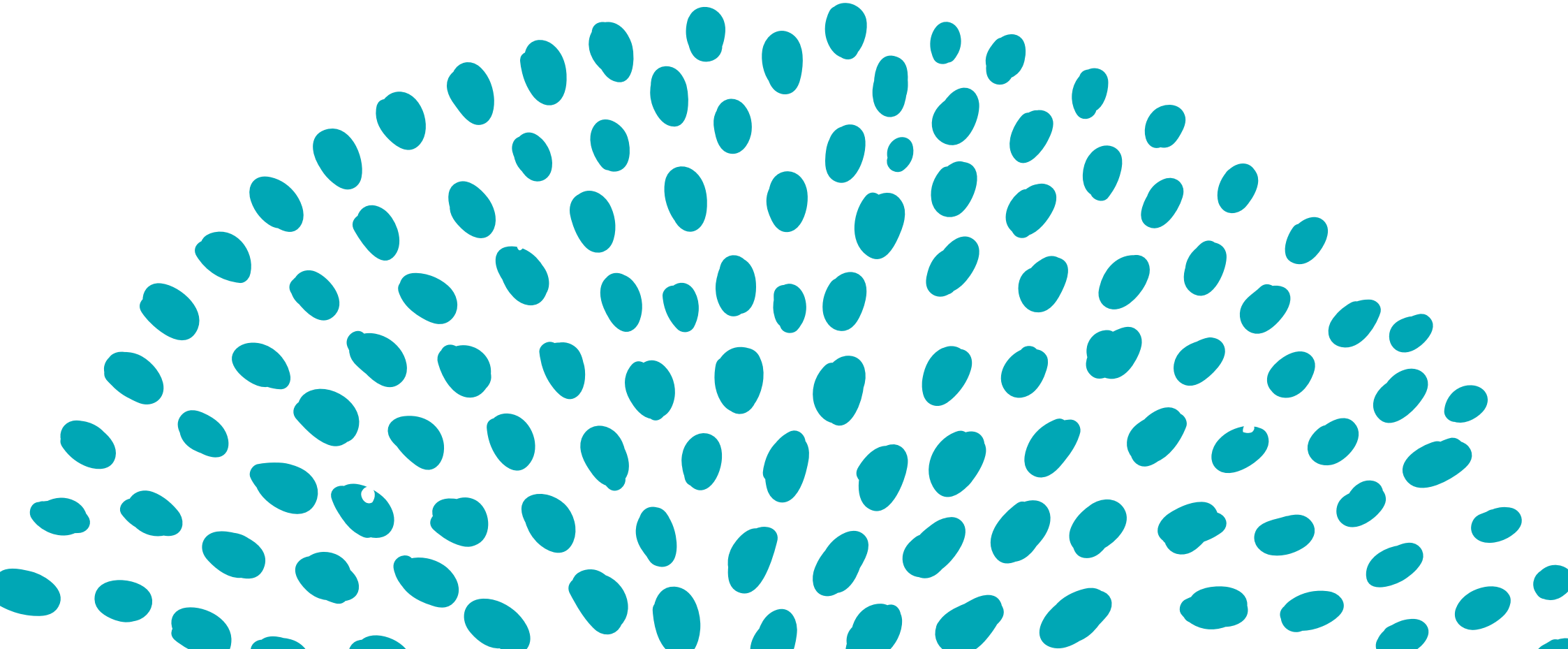
A circular design approach to renewable energy technology and infrastructure would also reduce the additional costs for project developers and the public that are associated with end-of-life management and decommissioning. For example, the total cost of decommissioning offshore wind farms alone in the United Kingdom (UK) until 2045 is estimated at between GBP1.28 billion and GBP3.64 billion, with public liability at between GBP1.03 billion and GBP2.94 billion.[45] Notably, while financial assurance requirements for end-of-life obligations are common in the traditional energy sector, they have been less frequently applied to renewable energy projects, making this an area ripe for reform.

We recommend that circular economy criteria are included in the evaluation process for investments and procurements for net zero infrastructure and technology. This should involve consideration of emissions-lowering activities such as using recycled content and designing for longevity and reusability of parts and materials. Additionally, end-of-life management should be addressed by embedding conditions that require proponents to 'do no significant harm' to Australia's circular economy transition and to include end-of-life management strategies in their business cases.

CHAPTER

4

Transforming supply chains through targeted regulation



Context

Countries leading the transition to a circular economy share a common approach: they back ambitious policies with proactive regulations.

Industry stakeholders have consistently highlighted to us that a proactive and predictable regulatory approach is essential for enabling business leadership, as it levels the playing field and rewards industries that adopt sustainable practices. They have emphasised that the right regulations would foster an environment that supports circular innovation, ensuring all players meet the same minimum standards and making circular practices more competitive. These regulations also provide an opportunity to gather data and build evidence to adapt and improve outcomes associated with a more circular economy.

Setting environmental standards for products and materials in Australia is essential for achieving a circular economy. Product regulation ensures that all items entering the market meet consistent environmental and safety criteria. For instance, Australia's energy efficiency labelling scheme has successfully phased out the least energy-efficient products. Leading circular economy countries are now moving further, adopting regulations that focus specifically on circular properties like recyclability, material composition and product life span.

These standards encourage businesses to design products with circularity from the outset, which is critical in our interconnected global supply chains. Imported products that ignore circular principles can undermine Australia's circular economy goals.

Our advice is to create a more agile, clear and comprehensive legislative instrument the Australian Government can use to predictably regulate the environmental performance of products entering the Australian market. This instrument should include a clear framework for setting standards for the design of imported and locally manufactured goods mirroring the approach in the European Union (EU), a stronger framework to mandate participation in extended producer responsibility schemes, and a clear ability to require relevant businesses to disclose information that will help consumers make informed product choices.
We recommend applying this instrument in line with the policy goals and objectives outlined in the National Circular Economy Policy Framework.

International approaches to product and material regulation

There is a growing international trend towards circular economy legislation that goes beyond waste and recycling, focusing on the entire product life cycle. The most advanced frameworks emphasise holistic approaches, including product design and extended producer responsibility (EPR).

The **European Union** is at the forefront of the circular economy transition. A cornerstone of its approach is the Ecodesign for Sustainable Products Regulation, which came into force in July 2024 – see page 34.

Similarly, the **French** Anti-waste Law for a Circular Economy (2020) includes new obligations for polluters to pay and greater transparency on the environmental and health impacts of products. It also has new tools to assist in better design of products and to give consumers better information on things like repairability.

In the **Netherlands**, product stewardship schemes are guided by an EPR framework, which shifts the responsibility for the collection, recycling and disposal of products to the producers. Once 75% of an industry is involved in these schemes, the Dutch government steps in to regulate the remaining participants.

China, under its revised Circular Economy Promotion Law (2017), is placing a greater emphasis on industrial systems, including improving resource utilisation efficiency. This includes a product stewardship type requirement for producers of certain products to take responsibility for the recycling of those products.

The benefit of focusing on design

Design is an important opportunity to improve the circularity of products and materials. Up to 80% of a product's environmental impacts can be influenced and determined in the design phase. The 2020 *Circularity Gap Report* identified poor design of products as a chief contributing factor inhibiting circularity. The ability to repair, reuse, re-manufacture or recycle a product and its components largely depends on the initial design of the product.

Accordingly, the EU is targeting design as one of the most effective ways to reduce pollutants and emissions from products within its Ecodesign for Sustainable Products Regulation (ESPR). Australia has an important opportunity to mirror this approach.

EU Ecodesign for Sustainable Products Regulation

The ESPR came into force in July 2024. It establishes a framework for the EU to create 'ecodesign requirements' (rules) for almost all categories of physical goods. New ecodesign requirements can include rules to:

- improve product durability, reusability, upgradability and reparability
- make products more energy and resource efficient
- address the presence of substances that inhibit circularity
- increase recycled content
- make products easier to re-manufacture and recycle
- set carbon and environmental footprints
- improve the availability of information on product sustainability.

The ESPR expands the EU's existing framework for energy and water efficiency by adding requirements for product durability, repairability, recyclability and overall circularity. It applies the same approach of setting minimum standards and mandatory labelling, extending it to broader sustainability aspects for greater environmental benefits across the EU. Other measures include:

- **A digital product passport:** A digital identity card for products and their materials will store information to support sustainability and promote circularity.
- **Rules to address the destruction of unsold consumer goods:** The rules will include a ban on the destruction of unsold textiles and footwear, opening the way for similar bans in other sectors.
- **Green public procurement:** Mandatory procurement criteria will be set to boost demand for sustainable products.

As part of the ESPR's implementation approach, 'working plans' outline the timeline and priorities for setting ecodesign requirements. These plans identify which products will be targeted next and what sustainability standards will apply, such as requirements for energy efficiency, durability or recyclability. This approach gives businesses predictability and guidance on upcoming regulatory changes.

Compliance with the ESPR is handled through a combination of self-assessment by businesses and enforcement by national authorities in EU member states. Manufacturers need to ensure that their products meet the ecodesign requirements before placing them on the market. National authorities carry out market surveillance, checking products for compliance with the regulations.

Recommendation 4

Legislating for a circular future: a Circular Economy Act

Introduce a Circular Economy Act that provides an overarching, integrated regulatory framework for the circular economy. The Act should equip the Australian Government with a streamlined, agile and proactive tool to regulate the environmental performance of materials and products, including imports, in line with the priorities of the National Circular Economy Policy Framework. Priorities include:

- clear objectives and circular economy principles embedded into the purpose of the Act
- a clear framework for setting design rules for products and labelling their performance, similar to the European Union's Ecodesign for Sustainable Products Regulation. These design rules should allow the setting of circular economy requirements for products, including on durability, repairability, recyclability and the presence of chemicals of concern
- a regulatory framework for product stewardship that provides an enhanced focus on mandatory participation, reporting, measurement and governance principles
- mandatory disclosure by relevant businesses relating to resource efficiency and waste, including disposal of unsold goods
- implement mandatory product stewardship / extended producer responsibility (EPR) for priority materials/streams as a priority
- a proactive and transparent implementation approach that includes a forward work plan describing how priority products will be determined and regulated, including a more strategic and targeted approach to extended producer responsibility
- more information for consumers about the environmental performance / circularity of products. An initial focus on durability and repairability, including for consumer electronic products and appliances, would be consistent with the recommendations of the Productivity Commission 'right to repair' inquiry, with additional opportunities including the circularity performance of textiles and other priority products such as batteries and furniture.

This needs to be adequately resourced to support implementation of work plans and effective monitoring and enforcement to ensure compliance. The regulatory framework could be achieved through a new Act or by amending the *Recycling and Waste Reduction Act 2020* (Cth).

Coverage of Australia's existing regulations

The Australian Government

The *Recycling and Waste Reduction Act 2020* (Cth) (RaWR Act) is the Australian Government's primary legislative framework to manage the environmental and human health and safety impacts of products and waste material. It regulates waste material exports and establishes rules and government support for product stewardship. The RaWR Act covers voluntary, co-regulatory and mandatory product stewardship arrangements. However, the legislative scheme for product stewardship has not been as effective as it could be.

The RaWR Act does not contain a general power to set design standards, except as part of mandatory product stewardship provisions of the legislation. These standards have been used once – to create the Mercury-added Products Scheme, established in 2021 – but have not been extended to address other aspects of product design.

This limited application arises from 2 key factors. First, the provisions are embedded within the broader product stewardship framework, implying, if not requiring, the establishment of a full product stewardship scheme for their use. Second, there is no clear, publicly defined pathway for their application, including commitments to when and how they will be deployed to address market failures. These challenges restrict the RAWR Act's capacity to drive broader circular economy outcomes.

Australia also has separate legislative frameworks that support improved water and energy efficiency of products entering the Australian market. These regulations include minimum energy and water efficiency standards, which influence the design of products. They also include mandatory labelling requirements which support consumers' purchasing decisions about these products.[46] The benefits of these schemes are well recognised. For example, for the period 2019–2021, Australia's energy efficiency program contributed more than AUD3.7 billion to the Australian economy in avoided energy costs.

Between the RaWR Act and Australia's energy and water labelling schemes, Australia has some capabilities to influence the design and use of products. However, these provisions are not clear, conflate design standards with full product stewardship schemes, and are not used proactively or predictably in a way that goes beyond water and energy efficiency, to address the full environmental performance of products and materials.

States and territories

States and territories have primary responsibility for waste and pollution management and have implemented various rules and standards such as single-use plastic bans. They have also implemented product stewardship schemes for containers, which have been successful in creating clean streams of recycled materials for reuse. This success likely reflects the fact that states and territories, as the primary managers of waste and pollution, have the supporting infrastructure and compliance mechanisms needed for effective implementation and enforcement. However, having different schemes with different rules across different states adds to complexity and cost.

How to better address environmental performance

Australia should have a Circular Economy Act that provides an overarching, integrated regulatory framework for the circular economy. The Act should equip the Australian Government with a streamlined, agile and proactive tool to regulate the environmental performance of materials and products, including imports, in line with the priorities of the National Circular Economy Policy Framework.

The regulatory framework could be achieved through a new Act or by amending the RaWR Act.

Create a stronger eco-design framework under the Circular Economy Act

We recommend revising the structure of the RaWR Act to establish a clearer framework for setting product design rules, similar to the EU approach. Currently, the RaWR Act only briefly addresses design provisions within its mandatory product stewardship sections. In contrast, the EU framework provides detailed guidance on when and how eco-design rules are established – an approach Australia should adopt.

A robust ecodesign framework would enable the setting of product standards that support the circular economy independently of full product stewardship schemes, while also complementing and enhancing the effectiveness of such schemes where they are implemented.[47]

Australia's patchwork of product stewardship

The Australian Government's product stewardship system includes a national scheme for oil; co-regulated product stewardship schemes for televisions and computers, used packaging (National Environment Protection (Used Packaging Materials) Measure) and ozone-depleting greenhouse gases (Refrigerant Reclaim Australia); and 8 active accredited industry-led schemes covering products such as mobile phones, tyres, large plastic bags, batteries, aluminium cladding, plastics and packaging, plastic paint pails, newspapers and magazines. It also includes a minister's priority list of products for industry-led action. This is complemented by 7 state and territory regulated product stewardship schemes for beverage containers.

The Advisory Group has heard from stakeholders that voluntary approaches to product stewardship are not sufficient; in many cases these have not performed effectively because of free-rider problems and lack of reporting and oversight. Stakeholders are calling for schemes to be regulated to lift their effectiveness and to address the full life cycle of products, including their design, collection and sorting systems.

Extended producer responsibility (EPR) policies hold producers accountable for their products throughout the life cycle, from design to post-consumer stages. They shift physical and/or economic responsibility to producers and incentivise environmentally conscious product design. EPRs create certainty for participants in the life cycle, such as creating supply for reuse, repair and recycling operations and end-market demand for products.

Create a clear framework for setting mandatory disclosure requirements

Australia should establish a legislative framework mandating disclosures from relevant businesses, modelled on the ESPR. This framework should empower the government to require annual reporting on key metrics such as resource inefficiency, waste generation and the disposal of unsold goods. Mandatory reporting would enhance transparency, enable effective tracking of resource flows and hold businesses accountable for their environmental impact across value chains. Consistent, comprehensive data would also support better policymaking, create a level playing field and drive industries to prioritise sustainability.

Strengthen product stewardship with a focus on mandatory participation

Australia has largely relied on voluntary product stewardship schemes, whereas other developed countries with successful product stewardship schemes have tended to apply more mandatory approaches. A 2020 review of the predecessor to the RaWR Act found that voluntary schemes face challenges with set-up costs and free-rider issues.

Within updated legislation, we recommend strengthening product stewardship provisions in a way that increases the focus on mandatory participation, reporting, measurement and governance principles. These provisions should clarify the process through which products are assessed for mandatory stewardship. Factors influencing a decision for a mandatory stewardship scheme might include:

- free-rider problems
- the level of harm or risk associated with disposal of the product
- the volume of the material and its impact on landfill
- costs and difficulty associated with industry-led schemes
- whether a voluntary scheme has been successful.

Where national regulated product stewardship provisions are deployed, these should be supported by better monitoring and compliance. Without ongoing oversight, schemes are likely to fail even when backed by regulation.

Give consumers better visibility of durability and repairability

One of the most effective elements of Australia's water and energy labelling schemes is that they empower consumers to buy more efficient products through star ratings. Similarly, the French have introduced a labelling scheme to empower consumers to buy more durable and repairable products.

As a Circular Economy Act is deployed, we strongly recommend consumers are granted similar visibility of high-performing, materially efficient products through supporting labelling schemes. Labelling schemes could be introduced independent of changes in design of products and be used as a lever to incentivise improvements in these characteristics. Such a label was recommended by the Productivity Commission as part of the 'right to repair' inquiry and would save consumers money by avoiding the need to repair and replace products as frequently. Our advice is to develop a labelling scheme covering durability and repairability of electronic products, building on the success of Australia's energy and water efficiency labelling schemes. This could be delivered through circular economy legislation, rather than through consumer law, which was the focus of the Productivity Commission's advice.

Proactively deploy the regulation with an agreed work plan

We recommend the development of a proactive work plan for addressing the circularity of products and materials. This should clearly articulate priorities and the preferred pathway for action – whether that be design rules, labelling, information requirements or creation of a product stewardship scheme. Without a strategy for forward action, there is a risk that activity will default back to a focus on waste management and recycling.

Prioritisation could be assessed against the following variables:

1. **Ease of introduction:** The speed, geographical reach and market conditions all determine how fast any intervention can be adopted and implemented.
2. **Environmental outcomes:** This should assess impacts from life cycle pollutants, life cycle energy and greenhouse gas impacts, the impact on natural resources and the impact on water usage.

3. **Social outcomes:** This would assess the social awareness profile of the intervention – that is, market research; behavioural change impacts; improvements to public health and safety (including toxicity); and improvements to amenity and associated values.
4. **Economic outcomes:** The cost to the public; return on investment; contribution to building economic complexity; cost of new infrastructure; value add to systems and infrastructure; and sovereign risk assessment, including importance to local suppliers/ manufacturers.

We recommend focusing initially on fast-moving consumer goods such as packaging, electronics, textiles and batteries. These goods are highly tangible for consumers, and positive design changes can help improve social outcomes by demonstrating the benefit of a circular economy to all Australians. Lifting the performance of these consumer goods will help make the circular economy 'real'.

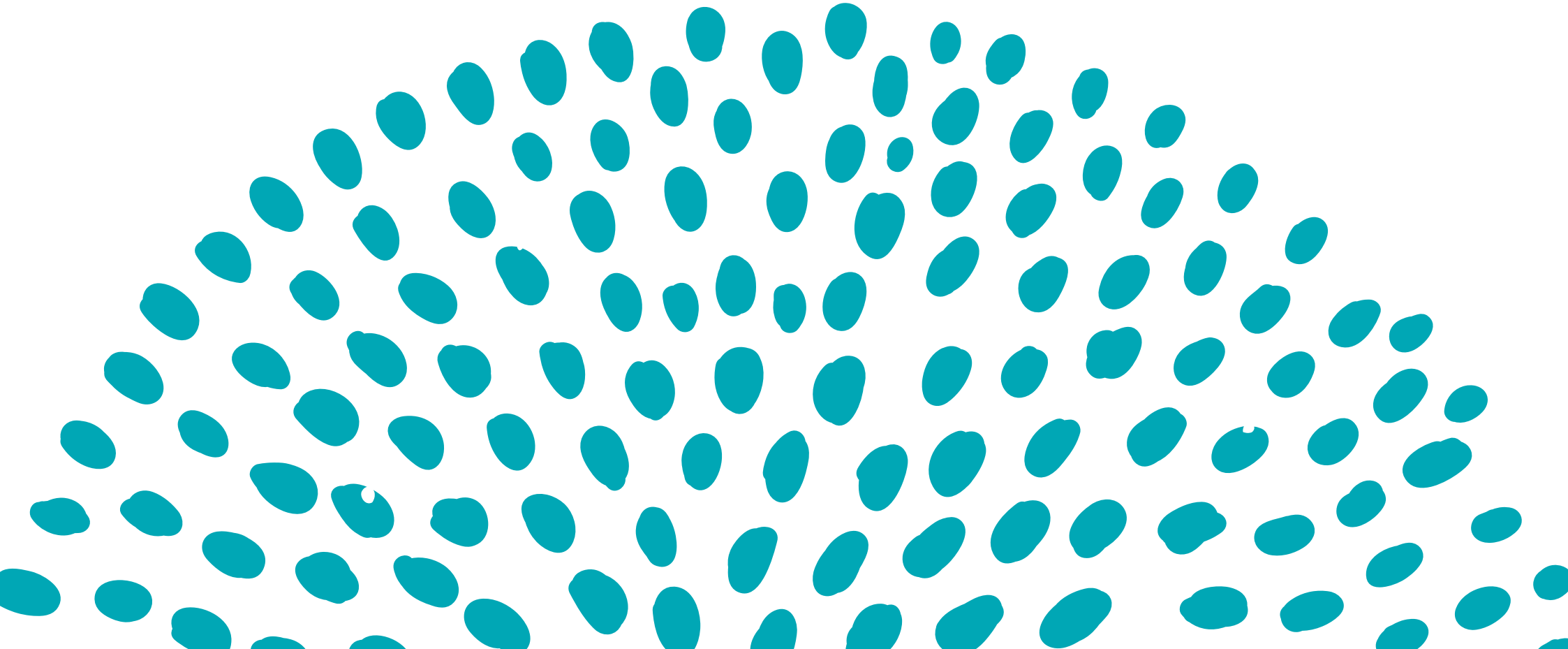
Stakeholders have raised concerns about slow regulatory responses to emerging environmental challenges (for example, battery fires in waste collection) and unclear pathways for assigning regulatory responsibility and intervention strategies. This highlights 2 core issues:

1. the need for adequate resourcing to support implementation of work plans and effective monitoring and enforcement to ensure compliance
2. the need for a clear pathway to decide when and how to regulate. In moving towards a more proactive approach, clear decisions must be taken on regulatory division of responsibility, balancing the benefits of a consistent national approach with the unique powers and resources that states and territories bring to this space. This is the focus of Chapter 5.

CHAPTER

5

Unlocking competitive markets



Context

Competitive markets for circular goods and services are essential to creating a self-sustaining circular economy. They fuel the innovation, investment and workforce development that circularity demands. Without strong markets, recycled and re-manufactured goods will struggle to compete with cheaper, readily available virgin materials that benefit from established supply chains and economies of scale.

Growth opportunities for recycling end-markets in Australia

A strong market for recycled materials remains a missing foundation in Australia's circular economy. Without competitive end-markets for these materials, there is little financial incentive to divert them from landfill and keep them in circulation.

Australia has significant potential to grow these end-markets, particularly in re-manufacturing and construction supply chains. For example, a market capacity study on recycled content in Australian roads estimated that up to 54 million tonnes of conventional road material could be replaced with recycled materials in infrastructure projects by 2031 if barriers including fragmented standards, limited platforms connecting supply and demand, and resistance to change were overcome.[48]

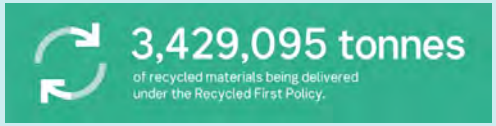
Public procurement has proven effective in overcoming some of these challenges. For instance, Victoria's Recycled First Policy for major infrastructure projects has already led to commitments for 3.4 million tonnes of recycled materials in transport projects, demonstrating the potential of government-led initiatives to drive market growth.[49]

Re-manufacturing can also drive demand for recycled content in Australia. Re-manufacturing can offer significant resource and energy savings – up to 60–80% compared to producing new items.[50] Australia's relatively small manufacturing sector, which accounts for approximately 6% of GDP, currently limits the domestic capacity for using recovered materials in re-manufacturing. The Australian Government's AUD15 billion National Reconstruction Fund aims to expand the manufacturing base and includes the circular economy as an investment priority. Investment in manufacturing capabilities will be critical to creating end-markets for recycled materials and supporting circular economy growth.

Victoria's Recycled First Policy

Since March 2020, all tenderers on Victorian major transport projects have had to demonstrate within their bid how they will optimise the use of recycled and reused materials at the levels allowed under current standards and specifications.

Tenderers can also identify opportunities to trial new innovative products or opportunities to boost recycled and reused material quantities within existing standards and specifications.



Successful tenderers must report against their recycled first commitments during delivery. This ensures recycled and reused materials are considered over virgin materials and will divert valuable materials from landfill.

The Recycled First Policy allows for continuous improvements to transport standards and specifications and research and development.

ecologiQ plays a key role in implementing the Recycled First Policy. It provides guidance, support and resources to project teams and suppliers on integrating recycled materials into infrastructure projects. ecologiQ helps coordinate efforts between industry and government, offering training, tools and case studies to promote innovation and best practices in sustainable construction.

Opportunities for market growth higher up the waste hierarchy

An effective circular economy will also need to go beyond end-markets for recycling and support actions higher up the waste hierarchy, including reuse and repair. For example, Victoria has estimated that the use of recycled plastic in its infrastructure projects can absorb just 2% of the plastic waste generated in the state each year.[51] Without rethinking the flow of materials entering the economy, markets for recycled content will not be enough.

Repair and reuse represent important opportunities to keep products in use for longer and out of landfill. In 2018, there were about 57,000 repair and maintenance businesses in Australia, and the sector makes up 1% of total sales revenue across all business sectors.[52] The charitable reuse sector generates AUD1 billion a year for the economy and, in New South Wales alone, saved 10.7 million second-hand items from going to landfill in 2022–23.[53] There are also emerging new circular business models in Australia. This includes product-as-a-service models, where companies retain ownership of goods and materials; and the sharing economy, where individuals pool resources (for example, rideshare and short-term home rentals). Australia's sharing economy was estimated to be worth approximately AUD15 billion in 2017.[54] It is critical that actions to grow circular economy markets also support these kinds of activities and services.

A note on the Productivity Commission inquiry into the circular economy

The Advisory Group is pleased to see the Productivity Commission given a reference by the Treasurer, the Hon Jim Chalmers MP, to undertake an inquiry into Australia's opportunities in the circular economy to improve materials productivity and efficiency in ways that benefit the economy and the environment. We recommended this in our interim report to the government, recognising the need to further examine market settings that can drive uptake of circular goods.

The inquiry is a significant opportunity to raise the profile of the circular economy and bring it into mainstream conversation. We anticipate that the evidence, data and policy recommendations provided by the inquiry will support a robust foundation to our shift to a circular economy.

The Advisory Group has already gathered strong evidence of some key areas where the Australian Government can significantly influence the market settings to better support circularity. These are actions that can be taken now and complement additional findings from the Productivity Commission.

Recommendation 5

Harmonising circular economy rules to boost productivity

Develop, with states and territories, a new governance model to modernise and harmonise regulations, standards and specifications related to the circular economy, resource recovery and waste that will accelerate productivity and support industry to innovate and scale. This model should:

- have a clear mandate and authority to coordinate and align standards across jurisdictions.
- have a time-bound delivery of results to ensure meaningful actions are achieved.
- have inclusive representation from all relevant sub-national entities.
- have an independent chair to facilitate impartial decision-making.
- have industry engagement and input into identifying the significant regulatory barriers and market opportunities.

Recommendation 6

Using public procurement to grow and diversify markets

Leverage Commonwealth procurement power to drive uptake of circular goods and materials in the Australian economy – for example, by setting clear targets for recycled materials, prioritising product-as-a-service models and creating incentives for repairable, recyclable designs and for sharing resources.

Include circularity requirements in all major agreements relating to procurement of materials, products and services – for example, the Federation Funding Agreements related to infrastructure and transport – and support adoption of circular economy requirements in state, territory and local government procurements.

Recommendation 7

Partnering internationally

Develop circular supply chain partnerships with strategic international partners, particularly in the region. These could be through bilateral agreements, regulatory cooperation, standards harmonisation (including mutual recognition agreements, and mirroring regulations with the European Union), and joint research and innovation programs. This will strengthen Australia's competitiveness in circular goods and services while closing supply chain loops.

Productivity-enhancing harmonisation

In Australia, waste management and recycling are primarily regulated by state and territory governments.[55] These regulations are essential for protecting the community and environment from pollution and impacts of waste. However, our consultations revealed that regulatory inconsistencies or incongruities across jurisdictions can unnecessarily hinder market development and make it difficult for businesses to scale economically productive activities at a national level.

A common example is the *classification* of waste materials. When materials are diverted from landfill for recycling, they often retain their 'waste' classification, even if they have the same properties as virgin materials. This classification increases handling and transport costs and restricts reuse potential, making recycled materials less competitive. Improving the competitiveness of recycled materials will be essential to supporting local re-manufacturing, directly creating high-value jobs and stimulating job growth in related sectors. An example of a related sector is the recycling industry, which contributes an estimated AUD18.9 billion to the economy at salaries AUD12,000 above the average Australian weekly earnings.

Fragmented *definitions and standards* present further challenges for recyclers operating across state and territory borders.[56] For instance, over 20 different regulations govern the classification and management of waste plastic in Australia, posing significant administrative barriers for businesses expanding into new regions.[57] A 2023 report by Standards Australia and ACOR found that these inconsistencies discourage the use of recycled materials.[58] Establishing consistent, performance-based national standards was recommended to boost confidence in recycled materials, streamline procurement and support wider adoption in infrastructure projects.

Existing forums, like environment ministers or senior officials meetings, have not successfully resolved these longstanding regulatory inconsistencies. We recommend a stronger governance mechanism, similar to the Australian Building Codes Board (see below), to harmonise national standards. This mechanism should enable collaboration between states and territories, have a clear mandate to address productivity barriers, and allow input from industry and experts to identify key areas for harmonisation.

Harmonising building codes in Australia

The Australian Building Codes Board (ABCB) is responsible for developing and maintaining the National Construction Code (NCC), which sets out the minimum standards for building, plumbing and construction work across Australia. The NCC aims to harmonise building codes across states and territories, ensuring a consistent regulatory framework for the construction industry. The ABCB works in collaboration with state and territory governments, industry stakeholders and technical experts to develop these standards, which cover areas such as safety, health, accessibility and energy efficiency.

By providing a uniform code, the ABCB reduces regulatory complexity, ensuring that builders, architects and developers can operate under the same rules across all regions. Although each state and territory has its own building regulatory authority responsible for enforcing the NCC, the ABCB's role in coordinating national standards helps to streamline compliance, reduce costs and facilitate innovation in building practices.

The NCC is updated every 3 years to reflect advancements in building technology, environmental sustainability and safety requirements, ensuring that Australia's building codes remain modern and cohesive across the country.

Our advice is that a stronger arrangement should include:

- **A clear mandate and authority:** Any arrangement should have a well-defined mandate with clear authority to coordinate and align standards across jurisdictions, accompanied by specific timeframes for progress. This mandate could be provided by environment ministers, similar to the approach of the Australian Buildings Codes Board, whose work plan is set by building ministers.
- **Time-bound delivery schedule:** While stronger governance is a priority for governments and industry, any new initiative should be given a short window to demonstrate achievement, preventing bureaucratic delays. If meaningful results are not achieved within this timeframe, the initiative should be reconsidered or revoked to maintain accountability and momentum.
- **Inclusive representation:** Any arrangement must include representatives from all relevant sub-national entities to ensure buy-in and cooperation.
- An **independent chair:** An independent chair can facilitate impartial decision-making and collaboration across stakeholders. The Australian Building Codes Board, for instance, uses an independent chair to guide discussions and build consensus.

Using public procurement to grow markets

The lack of strong end-markets for recovered materials is a factor limiting the expansion of Australia's recycling and resource recovery sector.[59] Recycled content suppliers have advised they can increase supply capacity if major materials purchasers provide clear, long-term demand signals to the market. Longer term purchasing commitments allow suppliers to optimise production and manage fluctuations in feedstock and stockpiling, allowing for more cost-effective options and cheaper, more competitive material prices.[60]

Public procurement is a powerful lever to create the clear, long-term demand signals needed by the market. In practice, circular procurement can include rethinking the need for purchase, choosing services instead of products, reusing or refurbishing existing assets and using shared ownership models, as well as purchasing recycled content products. These requirements can be implemented through contractual arrangements that enhance circularity (for example, supplier take-back systems, product-as-a-service, rental or leasing options) or setting circular criteria for products and services that suppliers must meet to be successful (for example, products must be durable, repairable, reusable, must contain recycled material, must be able to be disassembled, and so on).

Circular procurement in the Netherlands

The Netherlands leverages procurement as a key driver for the circular economy, using public purchasing power to stimulate demand for circular products and services. The Dutch government set a target to make 100% of its public procurement circular by 2030, focusing on sectors like construction, infrastructure, textiles and electronics. To achieve this, the Netherlands has integrated circular economy principles into its procurement processes by prioritising the use of recycled materials, promoting product longevity and encouraging reuse and repair.

Key initiatives include the Green Deal Circular Procurement, which involves over 80 public and private organisations committed to using procurement as a tool to stimulate circular innovations. The government also employs tools like life cycle assessments and total cost of ownership evaluations to ensure that long-term sustainability and circularity are factored into decision-making.

By setting clear criteria for circular products and working closely with suppliers, the Netherlands has created a market shift to one where circular business models, such as product-as-a-service, are prioritised.

The Australian Government has significant market power it can leverage to create a reliable market for circular economy materials and products. In 2022–23, the total value of Australian Government contracts was AUD74.8 billion.[61] These procurements are already supporting the circular economy through the Environmentally Sustainable Procurement Policy, which commenced on 1 July 2024. From 1 July 2025, this policy applies to Australian Government procurements of construction services, furniture, fittings and equipment, information and communications technology goods, and textiles.

The Environmentally Sustainable Procurement Policy is a positive step, but continued momentum is essential. Procurement must better leverage the circular economy as a strategy for reducing emissions. Incorporating genuine recycled content and investing in more durable products – supported by longer warranties and repair services – can significantly lower scope 3 emissions. However, these savings are often overlooked in public procurement processes.

Robust traceability and verification are crucial to ensure genuine recycled content use, prevent greenwashing, and promote fair competition. The Australian Government's National Framework for Recycled Content Traceability offers consistent guidance to verify the provenance and quality of recycled materials across supply chains.

To further maximise impact, procurement policies and guidance should explicitly account for emissions reductions achieved through circular practices. Embedding life cycle emissions assessments into procurement decisions and aligning purchasing criteria with circular economy principles will help drive both environmental and economic benefits.

State and territory and local governments are also major procurers, responsible for materials-intensive activities like building infrastructure, schools and hospitals, and road maintenance. The Australian Government can influence these procurements through instruments like Federation Funding Agreements.

Other financing mechanisms

Market-shaping instruments like the National Reconstruction Fund and the Future Fund, along with the potential role of super funds, have significant potential to grow circular economy markets in Australia. These funds can strategically direct capital into industries and projects that help to establish strong market demand for circular goods and services. By investing in circular economy ventures, these instruments not only support innovation and job creation but also help de-risk private investments, encouraging broader participation from industry and other investors. Super funds, with their large capital reserves, can also play a key role in scaling circular economy markets by aligning their investments with circular economy goals and providing long-term funding to support the transition. In Chapter 6, we recommend that these instruments are pointed at the circular economy priorities described in a new National Circular Economy Policy Framework.

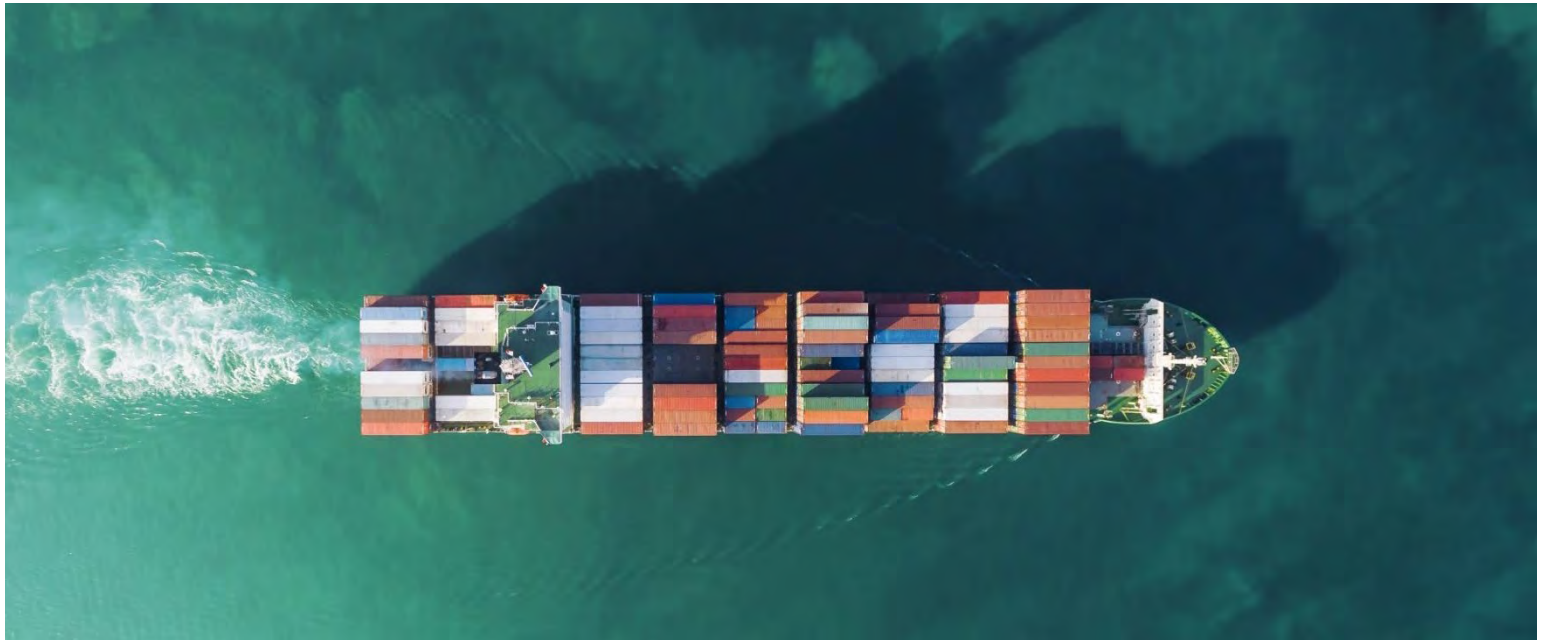
International partnerships to close loops

Even with stronger domestic end-markets for recycled materials, some materials will remain difficult to process onshore. This is a challenge faced globally, and even nations with a large manufacturing base and advanced recycling systems, like South Korea, still rely heavily on export markets to manage certain materials, such as specialised plastics. For Australia, this highlights the importance of building not only robust local recycling capacity onshore but also strategic international partnerships.

Australia can look to foster more circular supply chains through its bilateral agreements and memorandums of understanding (MOUs). For example, the Singapore-Australia Green Economy Agreement combines trade, economic and climate objectives and includes scope for circular economy collaborations, particularly those with emissions reduction potential. Another example is the MOU between the Netherlands and Australia to support the development of renewable hydrogen supply chains, which can include in its scope how to apply circularity to this emerging supply chain.

Differences in the design and implementation of standards and regulations between countries can be barriers to broader adoption of the circular economy, imposing additional costs to exporters and acting as a non-tariff barrier to trade. Australia can look to leverage its partnerships and international engagements to foster cooperation on circular economy standards and regulations to facilitate trade and market access.

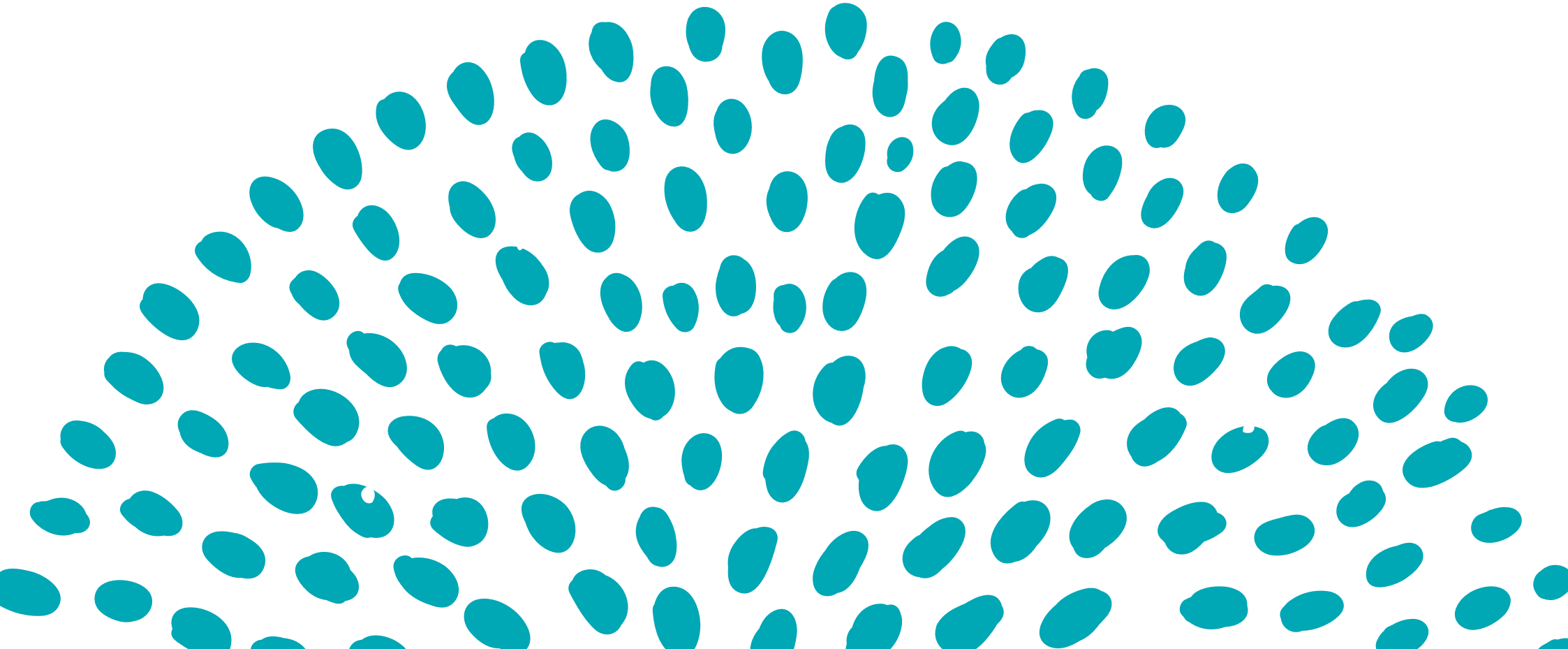
International partnerships will also be fundamental to building the research and innovation capability needed to support the circular economy transition. Australia has a number of partnerships globally supporting research and innovation across a range of sectors. With circular economy now part of Australia's National Science and Research Priorities, the Australian Government should look to how it can leverage its international research partnerships to further circular economy innovation.



CHAPTER

6

From vision to value: unleashing Australia's competitive edge



Context

Australia has strong innovation potential where it matters most for a circular economy – in materials research and development, in technology development, in sustainable design practices and in materials-intensive sectors like food and agricultural manufacturing, mining innovation and the built environment.[62] Pioneering Australian innovations in these areas, such as the high-tech polymerisation of plastics, now widely used in manufacturing, have already shaped global industries. But we have often failed to capture the full economic value of these breakthroughs.

The global shift towards a circular economy creates a new window of opportunity for Australia to reclaim this value. As the world demands fresh solutions to narrow, slow and close material loops, Australia can leverage its strengths to deliver disruptive innovations.

To turn this potential into reality, the government must provide a clear market vision – one that describes where Australia's scientific and inventive capabilities can be best focused to address circular economy challenges. And this market vision must be integrated in the pipeline of end-to-end public investment programs supporting innovation – from fundamental research through to commercialisation. This includes the Australian Research Council and Cooperative Research Centres, Australian Economic Accelerator, the Business Research and Innovation Initiative, the Industry Growth Program and, critically, public venture capital that has been instrumental to the success of Australia's leading startups (see below). Embedding clear circular economy priorities across these programs will establish a strong domestic investment platform for Australian innovators to leverage, helping them scale to the position where they become globally competitive and attract international investment.

Aside from individual technological or product breakthroughs, the circular economy relies on whole-of-supply-chain innovation, bringing together consortia to tackle system-wide challenges that single businesses or innovators cannot solve alone. In the words of one stakeholder, 'No business can go circular alone'. Yet only 12% of Australian businesses collaborate on innovation – well below the OECD average of 34.7%, placing Australia 28 out of 34 countries. Australia ranks last in the OECD for 'business collaboration with higher education or government institutions', with just 1.6% of innovation-active businesses engaged in these partnerships, compared to the OECD average of 14.2% (2016–17).

Our view is that this kind of collaboration is rare because the major public funding programs that would be capable of supporting this large-scale transformation (like the National Reconstruction Fund and Future Made in Australia) are not structured to encourage full supply chain solutions. Challenge-based funding models, like those being implemented in the quantum computing space, are more effective at fostering this kind of supply-chain-wide collaboration.

Australia's strong foundations in research and innovation

Australia's innovation ecosystem is relatively strong, supported by high-quality institutions, human capital and infrastructure, with the country ranking 23rd out of 133 in the 2024 Global Innovation Index.

We excel in areas such as university quality (third), scientific publication impact (sixth), and knowledge-intensive employment (ninth). In circular economy research, Australia is recognised as a global leader, consistently producing top-tier studies.

The circular economy startup sector makes up about 22% of Australia's climate technology landscape, which is valued at just over AUD4 billion.

Capitalising on innovation will be critical

Translating innovation into commercial success remains a challenge for Australia, as reflected in our lower rankings in the 2024 Global Innovation Index for knowledge diffusion (71st) and creative goods and services (47th). This is also reflected in Australia's ranking of 93 out of 133 in the Economic Complexity Index – a measure of the knowledge and skill intensity of Australian products. Improving performance against these measures requires adopting an increasingly ambitious approach to translating innovation and value-adding, grounded in the circular economy and sustainability agenda. Those companies at the forefront of the agenda will be rewarded by rapidly rising global demand for circular economy certified products and services over the next decade.

Circular economy innovators in Australia

The Advisory Group engaged a range of circular economy innovators to understand their experience in establishing their business in Australia.

Access to venture capital was a common, critical enabler for each of these businesses. The European Investment Bank contributed EUR3.4 billion (about AUD5.6 billion) between 2018 and 2022 to support circular economy initiatives.[63]

In Australia, only AUD200 million was raised for circular ventures – a clear indicator that circular economy innovation remains an untapped frontier. The startups we engaged represent companies that have successfully tapped into global funding and export opportunities, and our advice reflects opportunities that will help build this pool of Australian talent.

A common barrier for many startups is that the circular economy is still an emerging concept and does not yet provide a clear competitive advantage, especially when applying for grants or other government support. As a result, many of Australia's most promising circular economy innovators do not market themselves as 'circular' because it does not offer a competitive edge. Calling out the circular economy specifically in public investment programs will help address this.

Innovators in this space are also not seeing the same level of support compared to overseas counterparts in terms of access to laboratory and manufacturing spaces (as well as other critical infrastructure).

In Australia, sharing of facilities and access to joint infrastructure are uncommon (9%), and this lack of access has been a significant barrier to scaling innovations domestically.[64] The Australian Government has major programs supporting shared infrastructure, including the National Collaborative Research Infrastructure Strategy, that could be leveraged to address this need.

Many First Nations businesses in Australia inherently embrace circular economy principles, rooted in cultural practices that prioritise sustainability, resource stewardship and respect for natural ecosystems. This ethos drives First Nations businesses to create sustainable products – through traditional land management, eco-friendly food production and natural material sourcing – closely aligned with the goals of a circular economy. Yet this inherent circularity remains under-recognised in grant funding and innovation support – limiting the competitive advantage and scaling potential of these initiatives.

Emerging technologies to empower circularity

Artificial intelligence (AI) can help design new circular materials, optimise the allocation of resources, improve product life cycle management, transform process and predict behavioural patterns. For example, AI is being used to design enzymes that can process plastic waste, while AI-driven robotic sorting systems use machine learning algorithms to significantly improve recycling rates compared to manual processes.

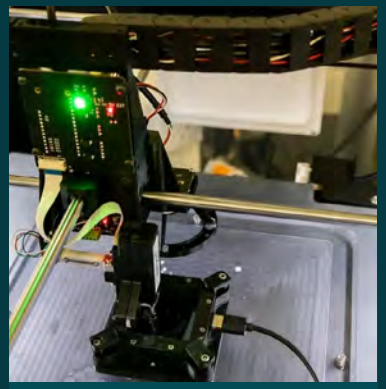
Blockchain technology has revolutionised the management of projects, people and supplies through increased transparency. Blockchain technologies tracing the provenance of products like diamonds and batteries can be applied more broadly to verify the sustainability credentials of products.

Radiofrequency identification (RFID) allows better tracking and inventory management to reduce waste, including the ability to map materials within a product – improving maintenance and traceability.

Digital watermarks embed invisible codes into products and packaging, enabling precise sorting of materials for recycling. By improving the accuracy of waste separation, they enhance the quality of recycled materials.

Samsara Eco

Samsara Eco is an Australian startup tackling plastic waste. Founded in 2021, Samsara Eco has pioneered a breakthrough recycling technology that uses enzymes to infinitely break down plastics at the molecular level. Unlike traditional plastic recycling, which degrades plastic quality over time, this process allows for continuous reuse without loss of material integrity. The technology can recycle PET and nylon 6,6 plastics. Its partnership with athletic apparel brand Lululemon is creating the first infinitely recycled nylon 6,6 and polyester and, in February 2024, the first apparel made from this process was released on to the market.



Syenta

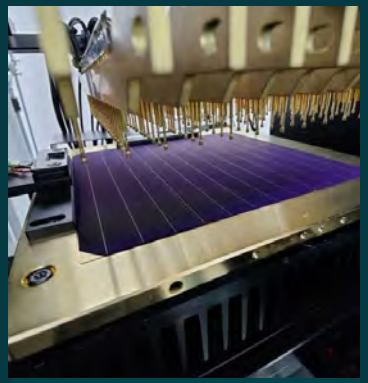
Syenta has patented a method to 3D print multi-material electronics. This method enables 3D printing of sensors, batteries, circuit boards and antennae on demand and avoids the manufacturing waste from traditional methods. 3D printing electronics is also 100 times faster and 98% less energy intensive than traditional printed circuit board manufacturing, reducing energy and material input. The process is also reversible and can be applied to deconstruct electronics.

Nanosonics

Nanosonics is an Australian infection prevention company that has successfully developed and commercialised a unique automated disinfection technology for ultrasound probes. The disinfection process uses fewer chemicals, involves no chemical waste disposal and saves on water. Sustainability is part of Nanosonics's mission and vision, and the company applies an overlay of sustainability in all its design decisions. New devices entering the market are designed for end of life, with 70% of materials recoverable.

Uluu

Uluu, an innovative Australian startup, creates sustainable alternatives to petroleum-based plastics by feeding seaweed to microbes that produce a fully biodegradable material with plastic-like properties, greatly reducing environmental impact. Using farmed seaweed as a feedstock offers a nature-positive solution, absorbing excess ocean carbon and nutrients to support marine health. Recently, Uluu partnered with Quiksilver to produce eco-friendly bioplastic surf wax combs, marking its first commercial venture.



SunDrive Solar

SunDrive Solar is a solar technology company based in Sydney which has broken a world record for the most efficient ever commercial-size solar cells. SunDrive Solar is employing circular economy design principles as it prepares for manufacturing. For example, by replacing silver with copper plating in its cells, SunDrive Solar's products use a more sustainable material than conventional cells. Theoretically, this also enables easier recycling, as copper is simpler to recycle than silver.

Recommendation 8

Unlocking Australia's competitive innovation edge through the circular economy

A more strategic approach to innovation funding and support will drive a higher proportion of market-disrupting innovations, including whole-of-supply-chain innovation:

a) Integrate circular economy priorities into the investment foci and selection criteria of the government's innovation funding programs, guided by the overarching National Circular Economy Policy Framework.

b) Prioritise venture capital funding and shared infrastructure access for startups aligned with circular economy goals, focusing on early-stage companies while also supporting growth-stage businesses with proven circular models ready to scale. This focus should be captured in the investment priorities of the Clean Energy Finance Corporation, National Reconstruction Fund and CSIRO venture capital funds.

c) Consider a 'challenge-based' approach to innovation and research funding, which targets systemic circular economy barriers and aligns with national priorities. Challenge-based funding should be flexible in scale to support large-scale systemic change and agile targeted solutions.

d) Support greater collaboration between Australian businesses to work together to innovate and progress Australia's circular economy transition, including through:

- hosting regular circular economy showcases to bring together innovators, investors and policy decision-makers
- establishing a network of Australian circular economy innovators to support the exchange of circular economy good practice and inform policy development and investment
- empowering transition brokers in regions, precincts and sectors like the built environment to facilitate local transitions (see Recommendation 12)
- getting competition settings right to ensure businesses can collaborate and coordinate across supply chains to develop circular economy solutions
- supporting businesses to collaborate on sharing infrastructure and equipment that support circular economy activities.

Pointing innovation funding towards Australia's competitive advantages

Circular economy investment in Australia remains limited, partly due to the absence of a clear market vision with defined goals and targets. By articulating specific circular economy targets, as recommended in Chapter 3, the Australian Government can make the investment landscape more attractive by quantifying the opportunity. Aligning public investment programs with these targets is critical for building investor confidence and signalling the government's commitment to the circular economy.

The circular economy is explicitly recognised in Australia's National Science and Research Priorities as essential for achieving a net zero future and protecting and restoring the environment. Its inclusion enables government research funding to support circular economy innovations.

The Australian Government is a major investor in research and development, funding organisations like CSIRO, the Australian Research Council (ARC) and Cooperative Research Centres (CRCs), as well as initiatives like Australia's Economic Accelerator. Additionally, the government facilitates the commercialisation of research through venture capital investment vehicles. Through the AUD22.7 billion Future Made in Australia package, the government is aiming to maximise economic and industrial benefits, focusing initially on major projects in energy, transport and defence. This package also supports disruptive technologies, such as quantum computing, and workforce capability building, positioning Australia within a changing global economic and strategic landscape.

To further advance circular economy innovation, funding should strategically address cross-cutting challenges and barriers impacting supply chains and product life cycles. Targeting these systemic issues will unlock comprehensive, impactful solutions that enable greater circularity across industries.

Our advice is to prioritise circular economy initiatives across the full spectrum of funding opportunities, from fundamental research to commercialisation. Key programs should include the ARC Linkage Program, a dedicated call for centres of excellence in the circular economy, CRCs, Australia's Economic Accelerator (circular economy as a new priority area), Business Research and Innovation Initiative, Industry Growth Program, National Reconstruction Fund, Future Made in Australia funding, and the National Collaborative Research Infrastructure Strategy. This integrated approach will embed circular economy principles at every stage of innovation and investment.

Dedicated venture capital funding stream for the circular economy

Australian circular economy startups can access venture capital through CSIRO's Main Sequence Venture Fund and the Clean Energy Finance Corporation Virescent Ventures. However, there is no dedicated venture capital funding stream exclusively supporting Australia's circular economy potential and no clear government signal on circular economy priorities for these funds. Our recommendation to establish a national policy with defined competitive advantages (Recommendation 1) partially addresses this need. Ongoing venture capital support for circular innovators is also essential, whether through existing funds or a new, dedicated stream.

A dedicated venture capital stream for the circular economy would fast-track growth of innovative businesses and unlock new economic opportunities.

By providing essential early-stage and growth capital, this funding would support companies advancing scalable, high-impact technologies and business models focused on resource efficiency, waste reduction and sustainability. Targeted circular economy funding not only offers financial support but also raises awareness of circularity among Australia's cohort of innovation leaders. It helps illustrate that it is a competitive, sustainable and viable path forward, fostering a culture of innovation that aligns business success with circular economy principles and promotes industry-wide adoption.

Showcasing and networking Australia's circular economy innovators

Australia should hold a regular circular economy innovation showcase to highlight the innovative work being done by Australian startups, research institutions and industry leaders and also serve as a platform to demonstrate the country's commitment to transitioning towards a circular economy.

A showcase would provide a platform for startups and innovators to demonstrate their cutting-edge circular solutions. This would further raise the profile of circularity in Australia's innovation industries and encourage others to adopt and scale circular approaches by highlighting successful business models and technologies. The showcase would create opportunities for investment, joint ventures and partnerships by bringing together businesses, investors and government. It would signal to global markets that Australia is a hub for circular economy innovation, helping to attract both domestic and international capital to fund new projects. The showcase can serve as a platform to connect startups with government officials from industry, science and education portfolios, sparking policy discussions on overcoming barriers and accelerating circular innovation.

A dedicated innovators network would provide a more predictable and coordinated approach to facilitating these engagements. It would help assemble a domestic quorum of innovators that could engage in emerging international innovation partnerships that Australia is establishing – such as CSIRO's India Australia Rapid Innovation and Startup Expansion (RISE) Accelerator or the Innovation in Food for Sustainability (IF4S) program with Singapore.

Supporting First Nations innovators

As part of Australia's circular economy transition, it is essential to highlight and promote First Nations innovators and enterprises, whose deep connections to Country and sustainable practices align closely with circular economy principles. There is a clear opportunity to ensure First Nations enterprises help drive and benefit from Australia's transition to a circular economy.

This support can occur through:

- **capacity building and education**, raising awareness of circular economy programs and offering training and support for First Nations enterprises in applying circularity principles – for example, through building participation of First Nations businesses in initiatives like the circular economy challenge fund
- **showcasing First Nations innovation**, featuring First Nations champions in circular economy programs and circular economy showcases to provide visibility of First Nations businesses.

A circular economy challenge fund for Australia

Several countries and regions have successfully implemented challenge-based funding models to address various societal and environmental issues, including the circular economy. For example, the European Innovation Council (EIC) Pathfinder Challenges are part of Horizon Europe – the EU's key funding program for research and innovation – and the EIC is currently running challenges supporting circular innovation, including more energy-efficient electronics and more sustainable food packaging.[65] These models are designed to stimulate innovation and collaboration by setting specific challenges with targeted outcomes, often bringing together diverse stakeholders such as businesses, academia and government. They also need to be adaptable to various types and scales of collaboration.

Australia should consider implementing similar challenge-based funding models. This could be delivered as a new, standalone fund or be issued as challenges within an existing innovation funding program such as the National Reconstruction Fund.

Australia's quantum Critical Technologies Challenge Program could serve as a model or vehicle for challenge-based investment applied to the circular economy. The program supports the development and adoption of quantum technologies to address nationally significant challenges. Aligned with the National Quantum Strategy, it enhances collaboration between quantum researchers, businesses and technology end-users, thereby accelerating the commercialisation of quantum innovations.

Possible circular economy challenges could consider:

- **Circular packaging supply chain:** Challenge the market to create scalable circular packaging solutions for a single type of packaging. These could include a model that eliminates single-use packaging, minimises resource input or maximises reuse, recycling, or compostability through innovative materials and efficient recovery systems.
- **Battery life cycle management:** Support innovations for a circular battery economy that connect collection and recycling of used batteries to re-manufacturing and reuse models, aiming to reduce electronic waste and recover valuable materials.
- **Circular solar:** Develop and implement innovative solutions to increase the recovery, recycling and reuse of materials from end-of-life photovoltaic (PV) systems, ensuring sustainable management of solar energy technologies and minimising environmental impact. This challenge would focus on creating closed-loop supply chains and designing PV systems for easier disassembly and material recovery.
- **Zero-waste construction materials and processes:** Challenge participants to develop construction materials that can be fully recycled and reused at end of life. Solutions should focus on reducing the waste generated from construction sites and lifting the recyclability rate of materials.
- **Circular design for consumer goods:** Challenge companies to redesign a targeted set of everyday products to improve repair, modularity or recycling. The goal would be to extend product life cycles and lift the number of products that can be easily recycled in Australia.
- **Cross-industry resource sharing:** Develop partnerships that focus on designing materials that can be reused across different sectors and also leveraging these opportunities from existing materials.
- **Circular economy districts:** Create precincts, neighbourhoods or districts designed on circular principles – for example, designing efficient use, recovery and repurposing of energy, water and materials which are cycled continuously. The challenge could encourage new business models, urban agriculture and shared spaces.

Challenge-based innovation funding should be focused where Australia has significant portions of supply chains onshore or the potential to develop them. This will help ensure innovations support domestic circularity and economic growth. It should be structured with clear goals, timelines and metrics to ensure that funded projects deliver measurable impacts, such as resource efficiency, waste reduction or carbon emissions benefits.

Showcasing and networking circular economy innovators

ecologiQ

An initiative of the Victorian Government, ecologiQ is a prime example of how circular economy showcases can drive innovation and collaboration. ecologiQ promotes the use of recycled and sustainable materials in major infrastructure projects across the state, including roads, rail and other public works. By organising regular industry showcases, ecologiQ provides a platform for businesses, contractors and suppliers to display their innovative materials and technologies, demonstrating how circular economy principles can be applied to large-scale infrastructure. Through these events, ecologiQ has successfully encouraged the adoption of circular practices in Victoria's infrastructure sector, driving demand for recycled materials and setting new sustainability benchmarks for the industry.

ACCEZ

ACCEZ is a Dutch platform that oversees the progress and funding of triple helix (industry, academia and government) circular economy research projects. It provides a network for circular economy actors to operate within, pooling the knowledge amassed from the 3 stakeholder groups. By doing this, it facilitates knowledge exchange, accelerates research advancements and promotes the transition to a circular economy.

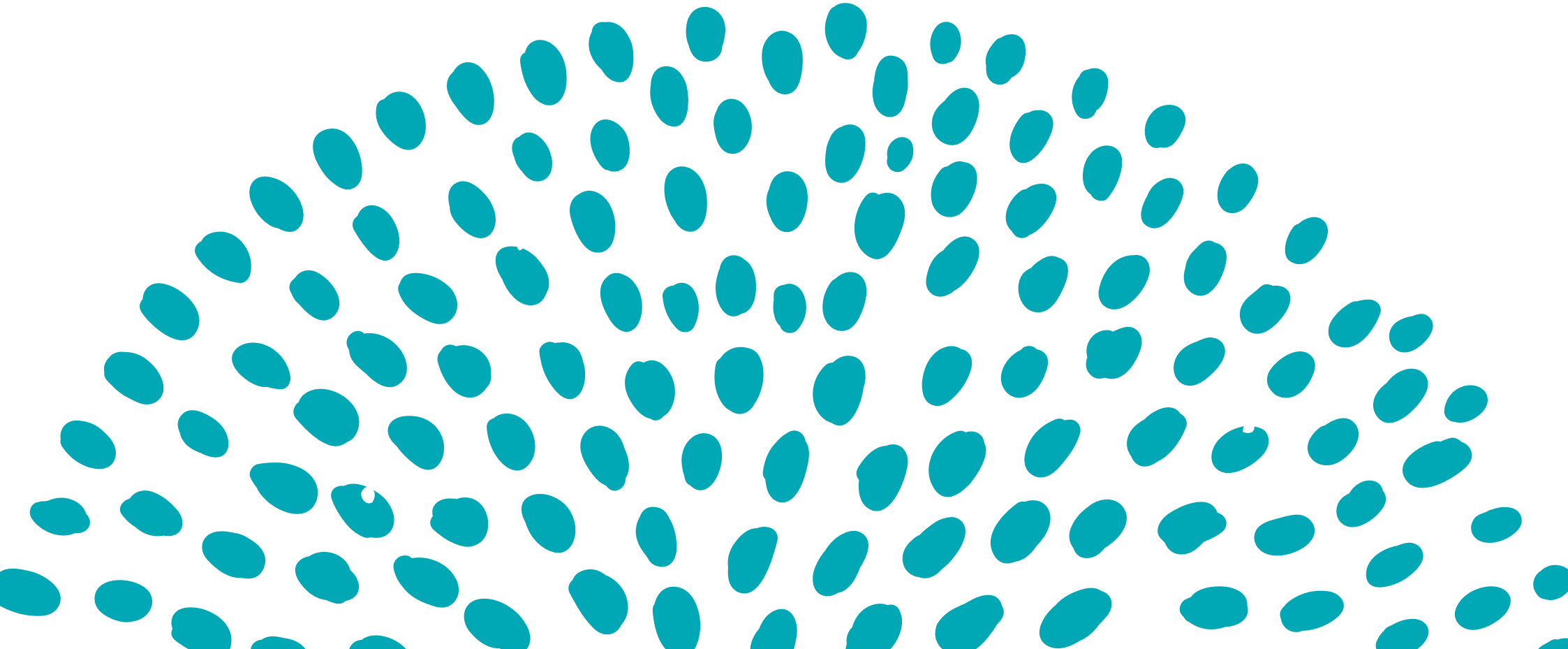
Quantum Australia

Quantum Australia is a new national centre aiming to shepherd the Australian quantum industry's growth by promoting the adoption and marketability of quantum technologies. The Australian Government backed effort is led by a consortium of partners from industry, research and quantum companies and will drive collaboration to grow the quantum ecosystem. It also aims to educate industries and bring broader stakeholder attention to the opportunities that quantum technology brings.

CHAPTER

7

Circular economy as a corporate advantage



Context

Mainstreaming sustainability into corporate strategy has become a business imperative, driven by shareholder expectations and growing demands for climate action from governments, investors and consumers. The circular economy provides a tangible pathway for businesses to demonstrate leadership in sustainability and climate action while addressing regulatory and market pressures.

Internationally, businesses are integrating circular economy principles into their corporate strategies as part of their efforts to mitigate climate risks and prepare for evolving regulations like nature-related financial disclosures.

Nearly 70% of executives now recognise the importance of these principles in shaping sustainable business models, reflecting a broader shift towards long-term resilience and profitability alongside decarbonisation goals.[66]

However, a 2022 report by PwC found that, while a similar proportion of *Australian* companies are aware of the circular economy concept, only 12% have fully integrated it into their business models.[67] This gap is particularly evident in key sectors such as construction, manufacturing and retail, where resource inefficiencies and waste generation remain high. A study by Planet Ark revealed that only 35% of Australian businesses have set measurable targets related to waste reduction and recycling.[68] The gap between awareness and action highlights a significant opportunity for Australian businesses to align with global sustainability trends.

Australian businesses have stressed the need for clearer examples of how to integrate circular economy principles into business strategy. Many face challenges navigating government support programs, including funding, and fear breaching competition laws when collaborating across supply chains.

The Australian Government can encourage corporate circular economy adoption by setting supportive financial frameworks, refining competition laws and enhancing funding and program accessibility.

Businesses adopting the circular economy

IKEA: The furniture giant has committed to becoming fully circular by 2030 by using only renewable and recycled materials and designing products for reuse, refurbishment and recycling.

Apple: Apple is incorporating circular design principles by using recycled materials in its products, such as recycled aluminium in iPhones, and promoting device repairability.

Nike: Through its Move to Zero initiative, Nike focuses on circular design, aiming to create products with less waste and more recycled materials.

Unilever: The consumer goods company has embraced circular economy principles, with efforts to make all plastic packaging recyclable, reusable or compostable by 2025.

Patagonia: Known for its strong environmental ethos, Patagonia promotes product repairability and second-hand sales through its Worn Wear program, extending the life of its clothing.

H&M: The fashion retailer is investing in circular business models, including garment recycling initiatives and partnerships to develop sustainable materials.

Recommendation 9

Embedding circularity in sustainable finance and corporate strategies

a) Expand the scope of Australia's sustainable finance taxonomy and Green Bond Framework to capture a broad range of circular practices and metrics, particularly in relation to its benefits in abating scope 3 emissions, in line with international best practice. At a minimum, include 'do no significant harm' requirements for the circular economy in the taxonomy.

b) Support businesses to reflect emissions reductions associated with circular economy practices in newly mandated climate disclosure requirements and transition planning.

c) Encourage broader, voluntary sustainability reporting aligned with the materials/resource-focused aspects of International Financial Reporting Standards (IFRS) S1 and eventually mandate disclosure of sustainability-related risks and opportunities.

d) Explore opportunities to raise the profile of circular economy activities in directors' duties.

Recommendation 10

Giving industry a front door to circular economy expertise

Ensure industry front-door services in government have access to circular economy expertise and can support businesses to collaborate up and down supply chains. These services should be capable of supporting small to medium enterprises as well as larger organisations, recognising the different business needs and level of support required.

Building circular economy into environmental, social and governance frameworks and corporate strategy

Throughout our consultation, stakeholders consistently reflected on the foundational role that sustainable finance settings play in determining corporate strategy and investment decisions. The more explicitly the circular economy is recognised in sustainable finance frameworks and supporting guidance documents, the easier it is for businesses to reflect it into their corporate strategies, planning and disclosures.

The European Union (EU) has been a leader in this space, embedding circular economy considerations into its sustainable finance agenda through initiatives like the EU Taxonomy for Sustainable Activities.[69] This taxonomy provides criteria for investments that contribute to resource efficiency, waste reduction and the decarbonisation of industries. In doing so, the EU acknowledges that the circular economy plays a crucial role in preserving natural resources, reducing environmental impacts and ensuring economic resilience in the face of climate change.

In June 2024, the Australian Government released its Sustainable Finance Roadmap, outlining the next steps to mobilise private capital and modernise financial markets to achieve net zero. The roadmap includes the development of the Australian sustainable finance taxonomy and issuance of Australian sovereign green bonds.

The government has partnered with industry, through the Australian Sustainable Finance Institute (ASFI), to develop an Australian sustainable finance taxonomy. The taxonomy will support mobilisation of private capital towards sustainable activities and provide a base for further measures to address greenwashing and help facilitate Australia's transition to net zero. ASFI will finalise development of the initial Australian sustainable finance taxonomy by the end of 2024. The taxonomy will cover 'green' and 'transition' activities that contribute to climate change mitigation, in 6 priority sectors, as well as 'do no significant harm' and 'minimum social safeguard' criteria. ASFI's second consultation paper, which closed for public consultation on 1 December 2024, included transition to the circular economy as part of the proposed 'do no significant harm' framework. We strongly support this inclusion.

Circularity in ESG and green bonds

Circular economy principles align closely with the 'environmental' pillar of environmental, social and governance (ESG) frameworks, which assess how companies manage their environmental impact.

Investors are now placing a premium on companies that can demonstrate circular practices such as waste reduction, sustainable resource use, and product life cycle management.

- **BlackRock's focus on circularity:** As one of the world's largest asset managers, BlackRock has placed increasing emphasis on ESG integration in its investment processes. In 2022, the company noted that sustainability-linked investments, including those that embody circular economy principles, make up 71% of new product launches. Circularity is particularly relevant in sectors such as industrials and consumer goods, where resource efficiency can drive long-term value creation.
- **The Ellen MacArthur Foundation's partnership with the finance sector:** The Ellen MacArthur Foundation, a leading voice in the circular economy, has worked closely with financial institutions to embed circularity in investment frameworks. Its collaboration with asset managers and banks, such as Intesa Sanpaolo, resulted in the launch of circular economy focused funds, with EUR6 billion allocated to projects that support circular innovation and sustainable growth.

Green bonds are another key mechanism driving the integration of circular economy principles into corporate and public sector strategies. These bonds allow companies and governments to raise capital specifically for environmentally beneficial projects, including those that reduce waste, enhance resource efficiency or support renewable energy transitions. Globally, the green bond market has surpassed USD1 trillion in issuance, with projects often explicitly linked to circular economy goals.[70] Australia's first green bond, issued in June 2024, raised AUD7 billion to finance a range of environmentally sustainable projects, including green hydrogen hubs, community batteries and clean transport initiatives, aimed at reducing greenhouse gas emissions and increasing renewable energy production. The bond was heavily oversubscribed, attracting over AUD22 billion in bids, highlighting strong demand from international investors for green finance opportunities. While Australia's Green Bond Framework incorporates circular economy as an eligible expenditure, it could be broadened to explicitly cover initiatives and metrics beyond waste reduction and provide a powerful vehicle for delivering circular economy financing.

Circular economy adoption in disclosures and transition planning

Starting on 1 January 2025, large Australian businesses and financial institutions will be required to disclose information about their climate-related risks and opportunities. To support this, the Australian Accounting Standards Board (AASB) has introduced the mandatory AASB S2 Climate-related Disclosures standard, which provides guidance on reporting climate risks and opportunities. This standard indirectly reflects circular economy practices by requiring measurement and reporting of scope 3 emissions across an entity's supply chain, but our consultation has shown that only a small number of companies are currently considering the circular economy as part of their decarbonisation strategies.

In addition to these requirements, entities must report on any transition plans they have in place. Transition plans lay out a business's greenhouse gas targets, actions and resources being dedicated to achieving these targets. By disclosing transition plans, businesses demonstrate to investors how they manage climate risks and opportunities, as a key aspect of financial disclosures. This transparency helps investors to assess the credibility of climate commitments.

How circular business strategies help with climate risk and opportunity

Adopting circular economy strategies helps businesses effectively manage climate risk by reducing reliance on virgin materials, lowering greenhouse gas emissions and enhancing supply chain resilience. Examples of business action are highlighted in Chapter 2.

Circular economy business strategies (like using recycled materials, designing products for durability and reuse, and implementing take-back schemes) are particularly effective in addressing scope 3 emissions. These often represent the largest share of a company's carbon footprint.

For example, product-as-a-service models and extended producer responsibility programs enable businesses to maintain control over product life cycles, ensuring resources are reused or repurposed instead of contributing to landfill emissions. These circular strategies not only reduce scope 3 emissions but also provide valuable data for more accurate emissions reporting and target setting, enhancing corporate transparency.

Circular economy strategies also unlock significant climate-related opportunities. Businesses can create new revenue streams through innovative product-as-a-service models, re-manufacturing and recycling. Leveraging circular approaches positions companies to capture growing demand for sustainable products and services while benefiting from cost savings through improved resource efficiency.

We recommend that the Australian Government develop guidance on how to integrate circular economy principles into climate disclosure reporting and transition plans.[71]

This will help normalise consideration of circular economy in corporate strategy. Guidance could illustrate examples of businesses doing this successfully and will help other businesses to adopt similar approaches.

We also recommend that the Australian Government collaborate with the Australian Securities and Investments Commission to develop clear and comprehensive guidance for the industry on the broader adoption of *voluntary* sustainability reporting specific to circular economy practices. While mandatory climate-related disclosures are being introduced, there is significant value in encouraging businesses to voluntarily report on circular economy initiatives that contribute to sustainability more generally. Encouraging voluntary reporting now will help lay the groundwork for future regulatory updates that could see circular economy disclosures become a standard part of corporate sustainability reporting.

Raising the profile of circular economy in directors' duties

Directors' duties offer an important pathway for integrating circular economy principles into corporate decision-making. While these duties have traditionally focused on financial, legal and operational responsibilities, there is increasing recognition that sustainability – especially climate-related risks – must be incorporated into governance frameworks. As sustainability factors become more central to long-term business success, the Australian Institute of Company Directors (AICD) should consider how circular economy strategies can help directors discharge their existing responsibilities.

By promoting the circular economy as a strategic tool, the AICD can help companies move beyond viewing it as a compliance obligation and see it as an opportunity for innovation, long-term value creation and investor confidence. This shift would also position Australian businesses as leaders in the global transition towards sustainable and regenerative economic models, attracting investment and driving new growth opportunities.

Supporting more businesses to engage in the circular economy

Australian businesses face significant challenges in adopting circular economy practices, partly due to the complexity of navigating government programs. With a mix of federal, state and local initiatives supporting sustainability, many businesses, particularly small to medium enterprises, struggle to find the right pathways for funding, advice and regulatory guidance.[72] The lack of a streamlined entry point makes this process time-consuming and confusing.

To support businesses in transitioning to circular models, the Australian Government needs a well-coordinated approach through its industry 'front door' services. These services, which include portals for grants, funding and policy guidance, should be equipped to address the specific needs of businesses adopting circular practices.

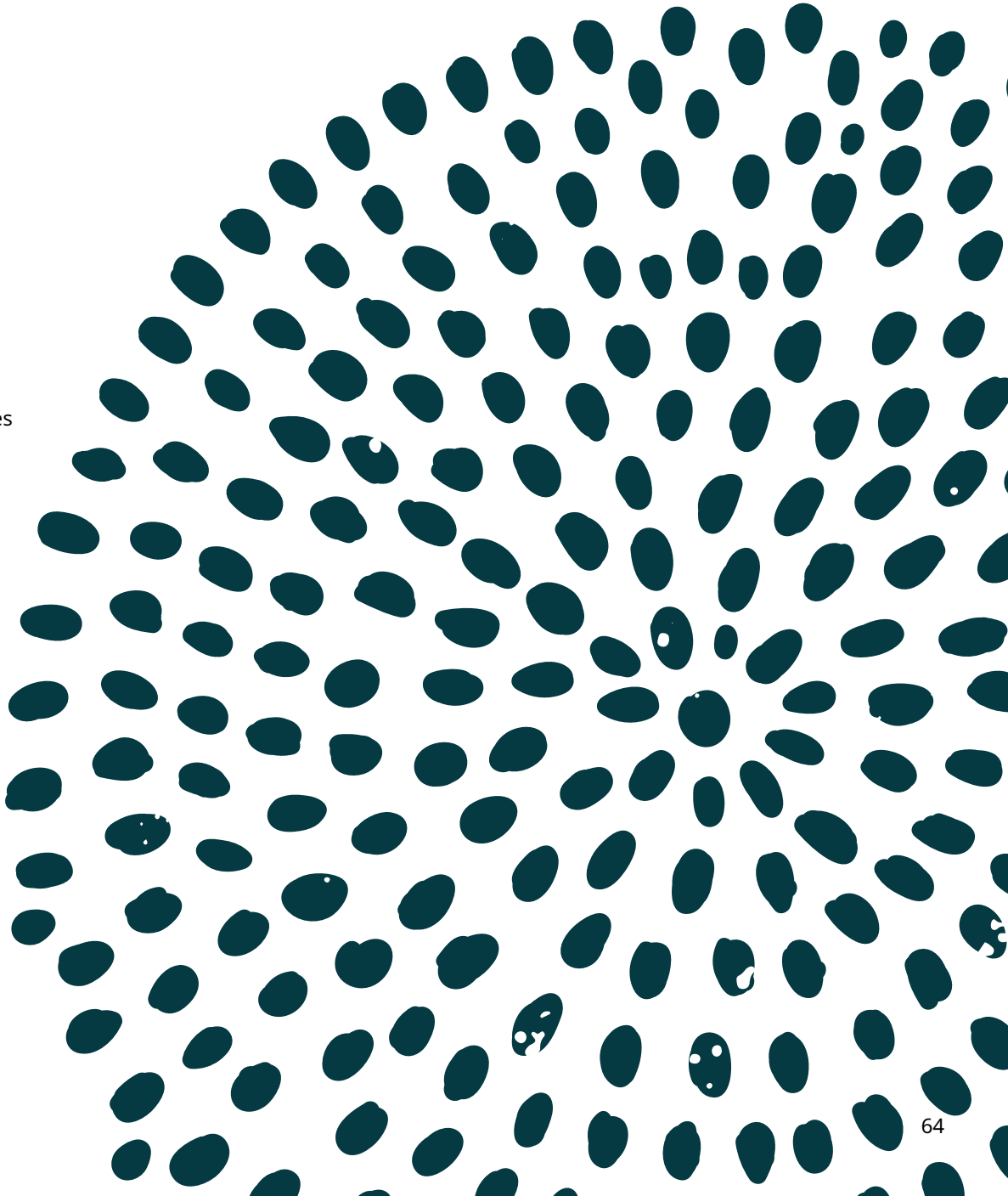
Existing front doors, such as those offered by the Department of Industry, Science and Resources, Austrade and the Future Made in Australia initiative, already provide valuable services like export assistance, innovation support and manufacturing guidance. To maximise their impact, these programs must have access to both circular economy policy expertise – embedded within each service or provided through a centralised government function – and industry expertise.

Enabling collaboration – the role of competition settings

Competition regulation is crucial in shaping business collaboration for a circular economy, yet strict competition laws can unintentionally hinder both horizontal (competitor) and vertical (supplier-buyer) partnerships essential for circular practices. Our consultation revealed that many businesses are hesitant to share resources or coordinate on sustainability initiatives due to concerns over breaching anti-competition laws.

Internationally, competition regulators are adopting a posture that is more conducive of circular economy collaboration. The European Commission and the United Kingdom Competition and Markets Authority have clarified how cooperation for environmental outcomes can align with competition rules, and Japan's Fair Trade Commission has issued guidelines encouraging joint circular economy projects.

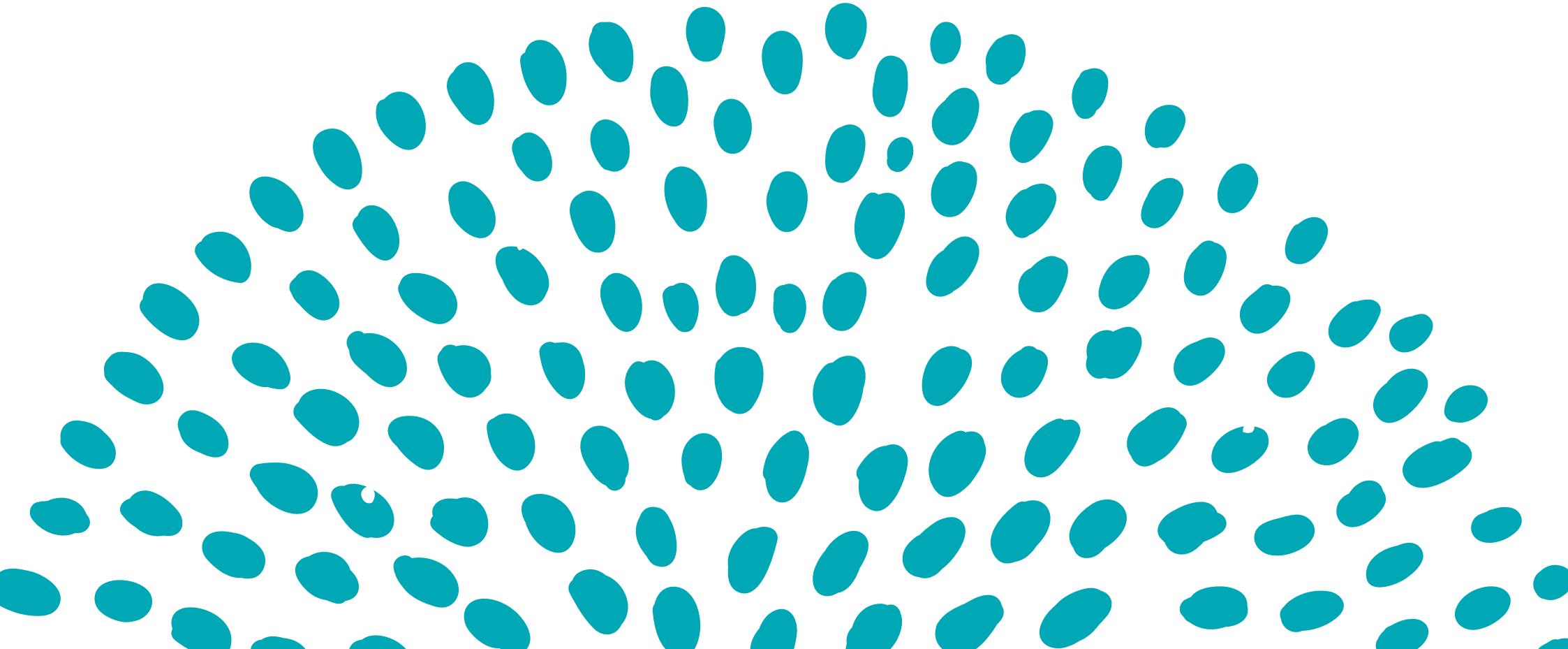
It is promising to see the Australian Competition and Consumer Commission developing guidance around sustainability collaborations within the context of Australian competition law. The government must maintain and build on this momentum, ensuring that businesses have the confidence to collaborate on circular economy initiatives without fear of breaching competition regulations. This will require clear, accessible guidance covering regulatory requirements, legal considerations and best practices for collaboration, helping to reduce uncertainty and enabling businesses to confidently participate in collaborative efforts.



CHAPTER

8

Building tomorrow’s workforce: skills for a circular economy



Context

The transition to a circular economy holds significant job creation potential for the Australian workforce, requiring manual and practical labour as well as highly skilled work in areas like design and engineering. The circular economy is a significant reason for increases in employment in the European Union (EU), with more than 4 million people employed in sectors relating to recycling, repair and reuse, and rental and leasing in 2021.[73] In Australia, it is estimated that accelerating our recycling rate alone can create 28,000 new jobs within the next 5 years.[74]

Developing and embedding circular economy skills across all professions is essential to unlocking the job creation potential of a circular economy. This is already recognised by Australian businesses, with a recent Australian Industry Group survey showing that 48% of Australian businesses think their future skills needs will be in the circular economy.[75] These needs go beyond collection and recycling and include new capabilities in design, new business models, re-manufacturing, value-adding and the digitisation and tracking of materials flows and logistics, to name a few opportunities.[76]

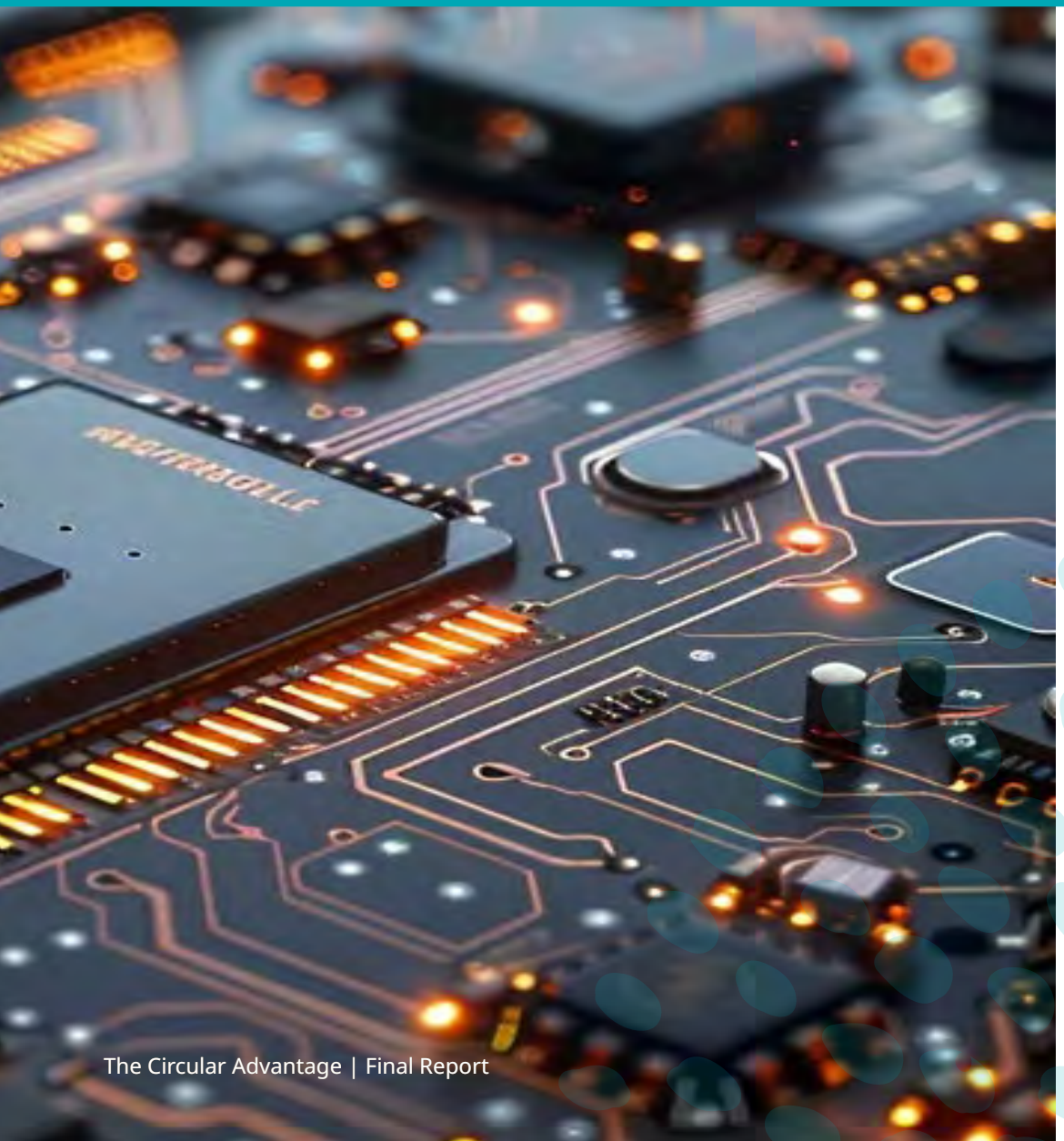
The shift to a circular economy will require developing the workforce's ability to think across systems, including understanding how circular strategies align with net zero and climate reporting requirements. Equally important is building circular economy skills at the senior leadership level, including boards and C-suite executives, to ensure they can effectively lead the changes required. A shared understanding of circular economy principles at the board table, linked to achieving net zero objectives, is critical for informed decision-making and long-term strategic alignment.

There will also need to be a focus on supporting women's participation. Many industries critical to the circular economy (such as clean energy; science, technology, engineering and mathematics (STEM); and manufacturing) remain heavily gender-segregated, with women significantly under-represented, particularly in technical and leadership roles. This imbalance stifles the diversity and innovation essential for solving complex sustainability challenges. Prioritising women's participation is essential to driving economic growth and ensuring the circular economy transition is inclusive, equitable and enriched by diverse perspectives.

Circular economy skills

Circular economy skills encompass a wide range of competencies needed to support sustainable practices and the transition to a circular economy:

1. **Digital skills:** Proficiency in digital tools and technologies is essential for optimising resource use and improving efficiency. This includes skills in data analysis, digital modelling and smart manufacturing.
2. **Green skills:** These are skills that enable individuals to work in environmentally sustainable ways. They include environmental management, sustainable resource management and renewable energy technologies.
3. **Transversal skills:** Also known as soft skills, these are critical for adapting to new roles and collaborating effectively. They include problem solving, systems thinking, critical thinking, innovation and collaboration.
4. **Business and management skills:** Skills in this category help integrate circular economy principles into business models. They include sustainable supply chain management, circular business model innovation and sustainable finance.



Recommendation 11

Defining and building skills in the existing and emerging workforce

a) Define and track circular economy jobs and skills, including workforce needs, potentially as part of Jobs and Skills Australia's regular reporting. Focus areas should align with the priorities outlined in the National Circular Economy Policy Framework.

b) Support development of micro-credentials that help professionals build expertise in circular practices and thinking, enabling them to contribute effectively to a more sustainable and resilient economy.

c) Support a challenge-based undergraduate competition to drive circular economy innovation and equip the emerging workforce with essential skills in systems thinking, cross-disciplinary collaboration and problem-solving, aligned with the future emerging technology and skills needs required by industry.

Pinpointing needs by defining the skills

Since the circular economy spans multiple sectors – such as construction, manufacturing and waste management – it is crucial to carefully define the specific skills and roles required to support this whole-of-economy transition. Defining and measuring circular economy skills provides a clear framework for workforce development, allows tracking of progress and helps align education and training with industry needs.

Australia needs a clear, nationally consistent definition of circular economy jobs and skills, along with a strong framework for tracking progress over time. International models, such as the EU's work on circular job metrics, could offer valuable guidance for classifying and measuring skills within Australia's unique economic landscape. Identifying critical skill areas – like supply chain management and sustainable materials design – will also be key to aligning workforce training with industry demands.

One opportunity is to commission a circular economy capacity study through Jobs and Skills Australia, similar to the recent study for clean energy. This could assess current skills gaps and forecast future needs, providing a foundation for targeted workforce development. Ongoing reporting on circular economy jobs and skills is essential for tracking progress, and Jobs and Skills Australia is well positioned to lead this work. Establishing a framework for regular reporting – similar to the EU's circular employment data – would enhance transparency, equipping policymakers and industry leaders with the insights needed to adapt and strengthen Australia's circular economy transition.

Maximising the contribution of the current workforce

With most of Australia's workforce for the next 10 to 20 years already employed, reskilling is essential to building the skills needed to meet future job demands. Upskilling the existing workforce is just as critical – if not more so – as training new graduates. Stakeholders have highlighted a current gap in both education and professional development when it comes to supporting systems thinking and cross-disciplinary collaboration.

Micro-credentials offer a flexible and scalable solution to build specific circular economy skills and capabilities across

Green skills for sustainable futures

Zero Waste Scotland's Green Skills for Sustainable Futures initiative focuses on equipping individuals and organisations with the skills needed to transition to a circular and low-carbon economy. The program includes:

- **Education and training:** Developing curriculum resources for schools, apprenticeships, college and university courses.
- **Work-based learning:** Providing opportunities for upskilling the existing workforce through work-based learning modules and training for educators to incorporate sustainability into their teaching.
- **Professional development:** Offering executive leadership modules and green internships to increase awareness and knowledge of net zero and circular economy practices.

This initiative aims to build a workforce capable of meeting the challenges of climate change and driving the transition to a sustainable future.

sectors of the existing workforce. These are short, focused courses that provide individuals with specific skills and knowledge, allowing them to quickly upskill or reskill in response to evolving job markets.

We recommend government support development of micro-credentials in priority sectors with long domestic value chains, such as construction and agriculture. These credentials can equip workers with a comprehensive understanding of how supply chain actors can collaborate to improve resource efficiency and circularity, as well as realise untapped economic and emissions benefits through more circular goods and services.

Jobs and Skills Councils, with their sector-specific expertise, are well positioned to identify the unique circular economy skills needed across industries. Drawing on their understanding of industry trends, each council can highlight areas where circular practices – such as waste reduction, resource recovery and sustainable design – can be incorporated into the workforce. By leveraging their knowledge of existing training pathways, these councils can develop targeted strategies to fill skills gaps, designing tailored training models, including micro-credentials, that align with established career frameworks. Through their collaborations with educational institutions and training providers, the councils are uniquely positioned to ensure training is practical, accessible and industry-relevant, creating a clear pathway to upskill current workers and prepare new entrants. Collaborating with accreditation bodies like Engineers Australia could further standardise these micro-credentials, ensuring relevance and value across industries.

Preparing the emerging workforce

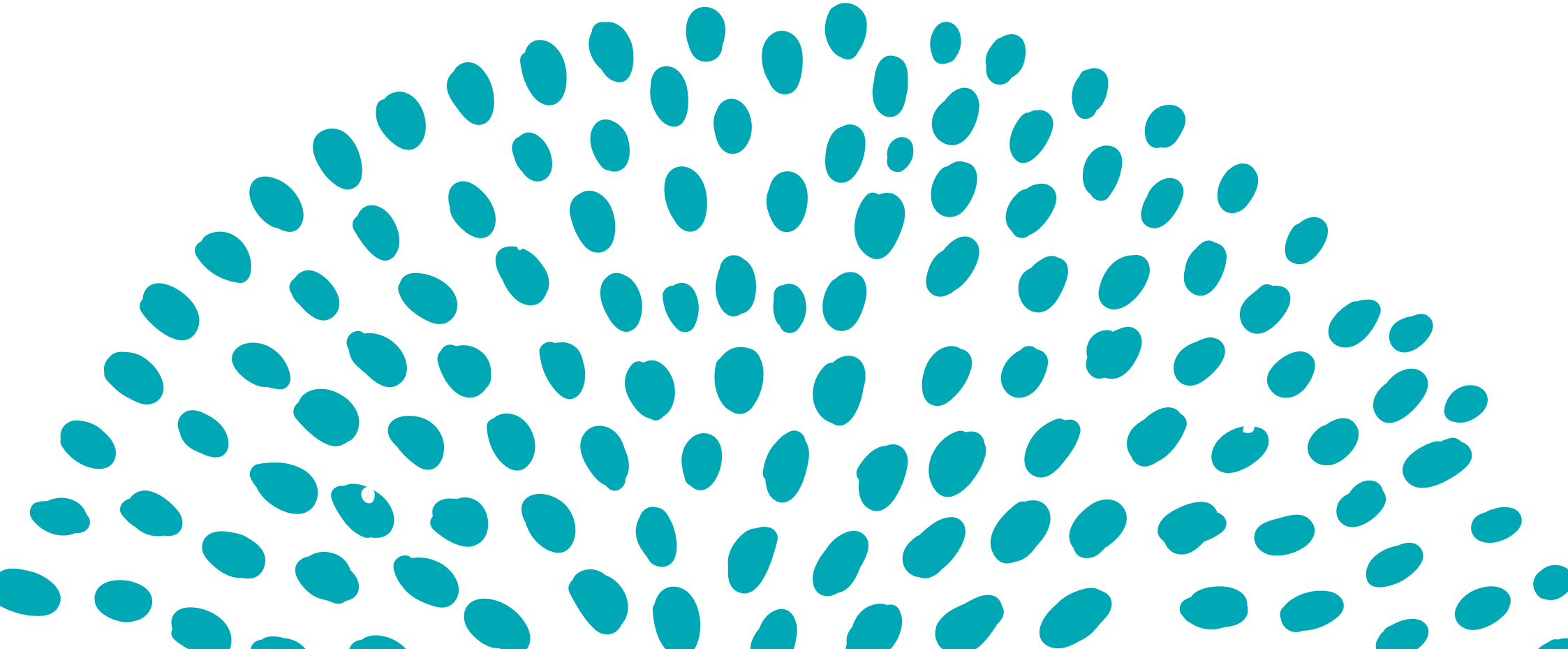
Interdisciplinary collaboration is vital to a successful circular economy and can be cultivated as early as the undergraduate level. Australian universities already offer courses on circular economy and related topics, such as 'green chemistry' and 'sustainability' within individual faculties. However, the key opportunity lies in encouraging cross-disciplinary cooperation. For example, while engineering programs address aspects of circularity, they often lack opportunities for students to collaborate with peers in architecture and design. Such collaboration would allow students to explore alternative designs for products and infrastructure across the construction value chain, fostering a systems-thinking approach.

To develop these capabilities in the emerging workforce, we recommend supporting an undergraduate circular economy competition. It should bring together students from diverse fields – such as environmental science, engineering, business, economics and design – to collaborate on solutions to real-world circular economy problems. Modelled on the successful Formula SAE-A competition, which allows engineering students to design, build and race Formula-style vehicles, this new initiative should similarly provide practical, hands-on experience but with a focus on circular principles. Teams could address 'sticky issues' where solutions are not yet clear, such as reducing construction waste, designing sustainable packaging or optimising material recovery in electronics. Engineers might focus on technical functionality, designers on user experience, environmental scientists on sustainability metrics, and business students on market strategies, fostering cross-functional thinking and collaboration. Partnering with industry bodies could ensure relevance, provide mentorship and give students the opportunity to tackle real-world problems with measurable impact.

CHAPTER

9

Accelerating place-based transitions: regions, remote Australia and precincts



Context

Regional Australia is central to the nation's circular economy transition, driving nearly 70% of exports through agriculture, forestry, fishing and mining. With a critical role in resource production, regions are uniquely positioned to champion circular practices that reduce waste, lower emissions and strengthen resilience. An embrace of the circular economy will lead to opportunities to create jobs, boost economic stability and protect fragile environments through locally adapted solutions. Many regions are already exploring place-based circular economy transitions, showcasing the potential for sustainable growth.

A place-based approach tailors strategies to the unique strengths, resources and needs of specific regions, making it a highly effective method for regional development. Recent findings by the Australian Government emphasise that place-based policies excel at fostering regional growth by addressing the distinct economic, social and environmental contexts of each area.

This approach is particularly powerful when applied to the circular economy, where solutions are often rooted in local resources, industries and community engagement. Circular practices such as resource recovery, repair and reuse thrive when supported by local expertise and infrastructure. For instance, leveraging regional agricultural by-products or industrial waste streams to create value-added products requires deep knowledge of local supply chains and collaboration across sectors.

Central to the success of place-based circular economy strategies are local transition brokers. These brokers act as connectors, bringing together businesses, community groups and governments to identify opportunities, align efforts and overcome barriers. They play a critical role in fostering trust, facilitating partnerships and ensuring that circular initiatives align with regional priorities and capacities. By empowering local transition, regions can more effectively harness their unique potential and drive the systemic change needed for a circular economy transition.

Benefits of a circular economy for regions

Decarbonisation: Localising resource management decreases carbon emissions, particularly those associated with long-range waste transport, and creates local jobs.

Economic growth: Local circular economy infrastructure serves as a catalyst for job creation and support. Regional businesses' collaboration to close material loops through circular supply chains strengthens local economies.

Wellbeing: Grassroots circular economy initiatives, such as community repair workshops and second-hand markets, offer cost-effective alternatives to new purchases and are often led by local community groups.

Resiliency: Regional areas, rich in natural assets and agricultural land, are well positioned to benefit from circular economy actions that address environmental challenges; strengthen resilience to climate impacts; and protect soil, water and air quality.

Regions leading Australia's circular economy transition

Bega (NSW)

The Bega Valley has embarked on an ambitious circular economy transformation to address climate change and build sustainability across the agriculture, aquaculture and tourism sectors as well as to protect and restore the natural environment and build community wellbeing.

Initiatives in Bega Valley are led by the Regional Circularity Co-operative supported by funding from the Bega Group. The cooperative includes large businesses, corporations, financial institutions, universities and research organisations. They contribute significant knowledge, resources and networking opportunities, greatly enhancing the acceleration of circularity projects within the region. Through regular workshops, participants engage in detailed discussion to coordinate efforts, exchange ideas and outline specific responsibilities and investment allocations. Deep community integration and engagement is also fundamental.

Albury (NSW)

The AUD50 million Circular Plastics Australia (PET) recycling facility in Albury will substantially reduce Australia's plastic waste by recycling the equivalent of around one billion 600 millilitre PET beverage bottles each year. The recycling plant produces more than 20,000 tonnes a year of high-quality, food-grade resin which is used by Asahi Beverages and Coca-Cola to manufacture new recycled PET beverage bottles and by Pact Group to make food packaging, all of which can be recycled again and again. The facility received funding through the New South Wales Government's Waste Less, Recycle More initiative and the Australian Government's Recycling Modernisation Fund. The facility is part of the NEXUS industrial precinct north of Albury.

Key drivers of the circular economy in the region include market demand from Albury's food manufacturing and packaging industries (such as Mars, Nestlé and Danone) for sustainable packaging materials, Albury's strategic location providing efficient transport access to Sydney and Melbourne, the council's existing focus on sustainability and circular economy initiatives, and the pressing need to address limited landfill capacity.

Norfolk Island (external territories)

Norfolk Island's transition to a circular economy was initiated by Norfolk Island Regional Council through an Australian Government grant aimed at upgrading waste recycling infrastructure and equipment. This investment significantly improved municipal waste diversion, increasing the rate from 35% to 75% – well above the Australian average; and reduced the need for landfill and ocean dumping.

Today, Norfolk Island utilises a data management system shared through a community dashboard that tracks waste recovery and diversion rates by material type, along with the greenhouse gas reduction benefits achieved through circular practices. The centrepiece of the island's circular economy efforts is the Norfolk Wave Recycling Centre, managed by Revolve Your World, which serves as a shared waste management hub for the community. The centre is equipped with a variety of specialised equipment, including a plastic shredder, extruder and aggregate processor, as well as glass crushing and screening, and a biochar kiln. These processes add to other equipment operated by the council to divert material from landfill, such as an in-vessel composter and bulk steel compactor.

Limestone Coast (SA)

The Limestone Coast region's transition towards a circular economy is a collective, industry-driven movement focused on agriculture, forestry and fishing. Green Industries South Australia (GISA) has played a critical role in supporting industry initiatives as a facilitator and advocate.

GISA, in collaboration with Regional Development Australia Limestone Coast, has developed a report on circular economy opportunities which identifies comparative strengths in the region. The report provides a detailed analysis of the region's economic composition, resource use and waste generation profile; and identifies the relevant industry sectors and specific initiatives that offer the greatest opportunity for circular action. Opportunities across the food and drink value chain, recapturing the value of food loss at farm and at manufacturing sites that may otherwise be destined to become waste, were key opportunities identified.

Recommendation 12

Supporting place-based transformation: regions, remote, precincts and regeneration

a) **Regions:** Include 'circular economy' as a priority in the Regional Development Australia charter – supporting more place-based circular economy transition brokers. Support the development of a common approach to collecting regional circular economy data. Empower local transition brokers through guidance and support, including connecting transition brokers through a 'community of practice'.

b) **Remote Australia:** Provide grant funding to support circularity in remote and very remote Australia, including supporting waste collection and recycling as well as reprocessing and re-manufacturing.

c) **Precincts:** Ensure supports for precincts (e.g. regional hydrogen hubs, net zero and advanced manufacturing precincts) encourage adoption of circular economy principles into the precinct design and operation.

d) **Regeneration:** Across all these place-based interventions, the circular economy transition should include consideration of the need for restorative practices to support natural systems and improve resource cycles reflecting the practices of First Nations peoples. In addition, regional and remote transition activities provide opportunities to engage with First Nations peoples and businesses.

Supporting regional circular economies

Including circular economy in the Regional Development Australia charter

Regional Development Australia (RDA) is a network of 50 committees established by the Australian Government to facilitate regional development and strengthen partnerships between governments, businesses and communities. RDAs operate across Australia and play a key role in identifying local priorities, coordinating investment strategies and advocating for regional interests at the national level. Several RDAs are prioritising circular economy regional development strategies – exemplified by the Murraylands and Riverland RDA.

The government sets policy expectations for RDAs through a charter that aligns regional investment priorities with national objectives. This ensures that funding and resources are directed towards projects that enhance economic resilience, promote innovation and improve infrastructure. The government should look to include the circular economy in the next update of the charter, reflecting its position as a national objective.

A common approach to data collection and reporting

Regions transitioning to a circular economy need clarity on the most relevant data collection and reporting tools, standards and metrics – particularly those that align with investor expectations and national reporting requirements. Currently, regions employ varying methodologies and indicators depending on the consultancies or partners they engage, each promoting their own tools and metrics. Standardised investor- and government-aligned data would not only support national reporting but also strengthen the value proposition for other regions to adopt similar approaches.

Data collection must also adhere to established principles of responsible stewardship. This includes the CARE Principles for Indigenous Data Governance (Collective Benefit, Authority to Control, Responsibility and Ethics) to ensure cultural relevance and equity; and the FAIR Principles (Findability, Accessibility, Interoperability and Reusability) to enhance technical efficiency. A balanced approach integrating these principles ensures that data collection and use are both ethically sound and effective in driving the circular economy transition.

Empowering transition brokers

Each of the regions at the forefront of Australia's circular economy transition has an active transition broker as the driver of change. In some cases this is a local business leader and in other cases it is a local organisation. Across these regions no 2 transition brokers, or drivers of the transition, are identical.

Across all these regions one of the key benefits of the transition broker is advocacy, with the broker in a good position to seek and apply for funding, advocate to government about regulatory barriers blocking innovation, and develop the business plans needed to generate broader support. Our advice is that the Australian Government look to empower these transition brokers by:

- **Creating a community of practice:** Given the diversity of approaches being undertaken, there are likely to be transferrable learnings that can be shared between regions. The Australian Government could use its role as a facilitator to support greater engagement between regions taking a circular economy approach.
- **Demonstrating the value proposition of the circular economy:** Through its research and communication capabilities the Australian Government can collate and evaluate the benefits to regions undertaking a circular economy approach and raise the profile of these benefits. Demonstrating the value of the actions taken would help signal to other regions the opportunities available.
- **Supporting development of business plans and pilots:** There are Australian Government programs available that can support the development of regional business plans and precinct-based activities, like the Regional Precincts and Partnerships Program. These programs are highly relevant given most regional activity on the circular economy is in early-stage development, with many regions developing or seeking to develop business plans or pilot programs.

Driving circularity in remote Australia

Remote and very remote parts of Australia often face significant challenges in advancing a circular economy due to limited infrastructure and resources for activities like repair, waste collection and recycling. However, the case study of Norfolk Island demonstrates that even highly remote territories can make significant gains in the circular economy, with the recycling rate on the island now estimated to exceed the national average. This success was driven by strong community engagement and the availability of Australian Government grant funding to invest in local recycling infrastructure.

Insights from stakeholders suggest that similar opportunities could be realised across remote and very remote Australia, helping communities take more control of their resources. One of the benefits of adopting circularity in these locations is that things like crushed glass and rubber tyres can be reused in local infrastructure such as roads, saving on the need to transport these resources from distant locations.

The value of precincts for circular innovation

A network of world-class, large-scale innovation precincts is emerging in Australia, and these can play a pivotal role in accelerating the adoption of circular economy principles. The precincts, developed in partnership with state governments, industry and research partners, include the Advanced Manufacturing Research Facility at Bradfield in New South Wales, the Advanced Robotics for Manufacturing Hub in Queensland, the Core Innovation Hub in Western Australia, the Factory of the Future at Tonsley Innovation District in South Australia, and Fishermans Bend in Victoria.

Innovation precincts, both metropolitan and regional, offer significant opportunities to embed circular economy principles into their design and operation. By enabling industry co-location, these precincts facilitate economies of scale, resource optimisation and waste reduction through shared infrastructure and services. Their systemic benefits extend beyond individual businesses, fostering whole-of-system approaches to recycling, resource recovery and information exchange across industries.

Research by ACIL Allen, commissioned by Beyond Zero Emissions, underscores the economic and environmental potential of precincts that align with circular economy and net zero objectives. For example, in Gladstone, Queensland, co-locating industries within a precinct to coordinate energy use resulted in 206 additional full-time jobs and AUD2.4 billion in real economic output.[77] Such clustering demonstrates how precincts can achieve scalable efficiencies while driving economic growth.

Moreover, sustainable design within these precincts demonstrates the value of circular economy principles. The Tonsley Innovation District in South Australia, which repurposed a former car factory through adaptive reuse, avoided 90,000 tonnes of emissions and achieved a 6-Star Green Star Communities certification. This approach not only reduced environmental impacts but also attracted cutting-edge industries, reinforcing the appeal of precincts designed with sustainability at their core.

To maximise the potential of these precincts, we recommend that the Australian Government explicitly encourage the adoption of circular economy principles in the design and operation of precincts, including regional hydrogen hubs, net zero precincts and advanced manufacturing hubs.

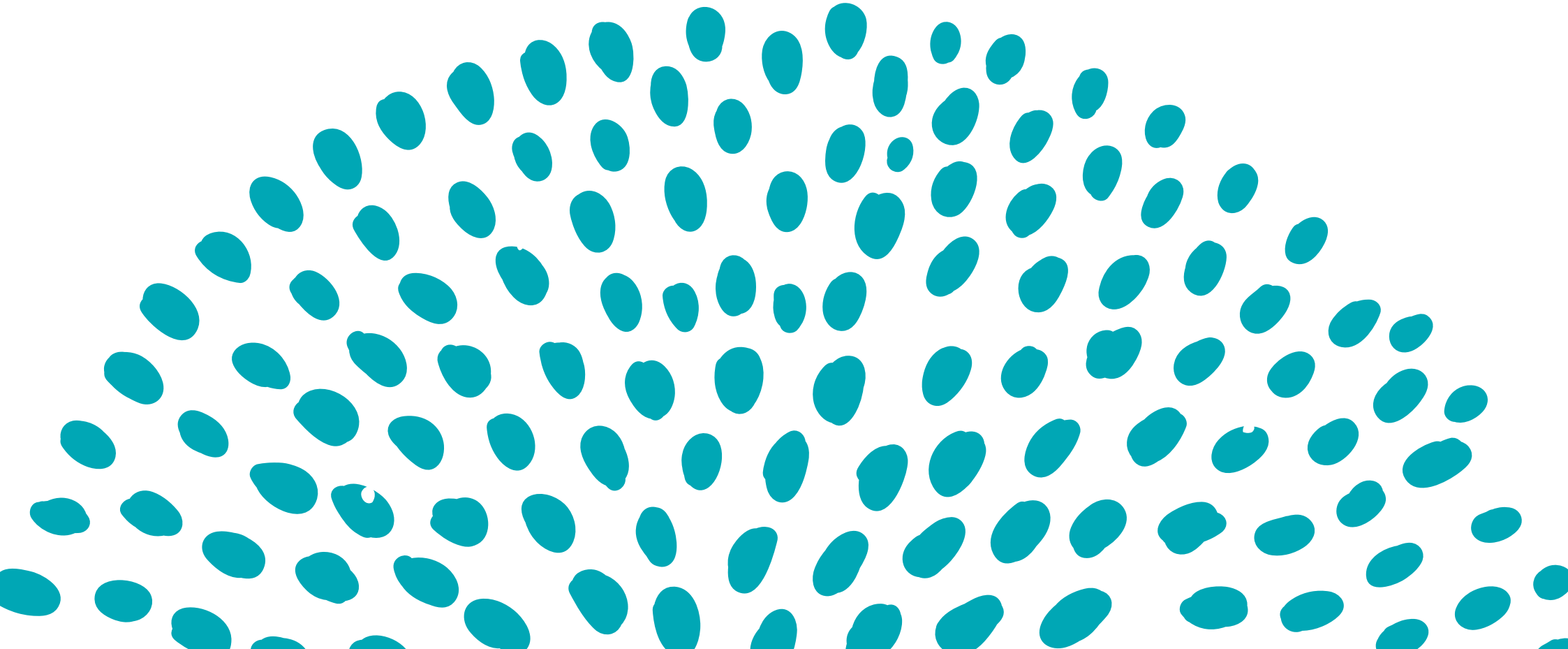
The importance of regenerative practices in a place-based approach

Regenerative practices actively restore natural systems by improving soil health, enhancing water cycles and supporting biodiversity. A place-based approach adapts these practices to the unique ecological and cultural characteristics of each location, enabling local, sustainable resource management. First Nations peoples hold Knowledge about regenerative practices that maintain soil health; sequester carbon; and sustain water quality, quantity, and biodiversity. Collaborating with First Nations peoples and fostering respectful relationships ensures these practices are meaningfully integrated into place-based approaches, reinforcing the resilience of local ecosystems and communities.

CHAPTER

10

Empowering consumers and community



Context

Communities and citizens have an important role to play in the circular economy. Behaviour changes and sustainable lifestyles are important factors for accelerating and scaling the circular economy. Therefore, as citizens and consumers, Australians need to be integrated and empowered as part of the transition.

A successful transition to a circular economy relies on consumers and communities understanding it, actively participating in it and seeing clear benefits from their involvement. Consumer awareness of the circular economy remains low in Australia. For instance, research by Sustainability Victoria found that 46% of Victorians had never heard of the circular economy and only 26% had some understanding of it.[78] Similarly, a Commbank study highlighted that, while terms like 'recycling' and 'sustainability' are familiar, 'circular economy' is often misunderstood.[79]

Making it easier for consumers to find clear, specific information about products can greatly increase their participation in the circular economy. A 2020 European Commission report found that 59% of consumers would make more eco-friendly choices if products had clear sustainability labels. In Australia, a 2021 CHOICE survey showed that, while 85% of people think product durability is important and 73% value repairability, only 39% often choose longer lasting items and just 46% prioritise repairable ones.[80] Clearer information at the point of sale can turn consumer interest into real shifts in purchasing choices.

Ultimately, for people to engage in a circular economy, as citizens, customers and consumers, they need systems and information that empower and enable them to identify, purchase and use more circular products.

Behavioural enablers of a circular economy

The *Behavioural roadmap to circular consumption* report by BehaviourWorks Australia identifies 8 core behaviours that consumers and organsations can adopt to reduce material consumption, aligned with United Nations Sustainable Development Goal 12. The roadmap was developed through a 3-year research program and uses behavioural science and systems thinking to outline practical interventions for circular consumption. Borrowing/renting, buying second-hand and purchasing durable products are identified as the priority behaviours for change. The report emphasises the importance of government intervention in setting regulations that encourage durability and repairability, as consumer influence alone is limited. Findings also highlight the risks of greenwashing and call for clear product information to support informed consumer choices.

Recommendation 13

Partnering with First Nations enterprises, people and communities

First Nations communities and enterprises will play a critical role in Australia's circular economy transition and should be engaged early and on an ongoing basis. To ensure this, we recommend:

a) Prioritising early and comprehensive engagement with First Nations peoples and communities in circular economy initiatives to ensure their Knowledge systems, values and priorities shape Australia's transition. This includes ensuring initiatives are informed by and harmonise with First Nations led research and development and community and business projects and prioritise circular economy opportunities for First Nations peoples in clean energy strategies, net zero and renewable energy strategies and initiatives.

b) Identifying new opportunities for partnership where First Nations peoples' Knowledge systems and practices will contribute to circular economy outcomes, ensuring these Knowledge systems, practices and contributions are properly recognised, remunerated and protected where necessary.

c) Facilitating and supporting First Nations community and business opportunities to lead, engage and partner in the circular economy by providing information, building expertise, and supporting Indigenous-led research and development, as well as public and private investment in circular economy and related initiatives. Raise the profile of the circular economy as an opportunity for First Nations enterprises, by highlighting businesses already engaging in the circular economy and supporting organisations that build capacity for First Nations enterprises to engage in Australia's transition.

Recommendation 14

Empowering consumers and communities by building circular economy literacy

Ensure new programs and reforms support consumer and community participation in the circular economy. This should include, for instance, implementing packaging disclosure requirements for online retailers, prioritising product durability information in regulatory disclosures (as outlined in Chapter 4), and establishing repairability ratings to guide consumers towards sustainable choices. It should also include building literacy and capacity for the community to engage in the circular economy.

Supporting communities to participate

At the community level, initiatives like repair cafés, swap meets and second-hand shops not only keep items in circulation longer, reducing waste, but also create spaces for social connection and build community wellbeing. These initiatives meet local needs, foster pride and encourage environmental responsibility. They are also linked to positive mental health outcomes. A 2022 report found that communities with strong social bonds and shared sustainable goals reported higher levels of community resilience and trust, especially in times of economic or environmental stress.[81] This community buy-in will be critical to sustaining Australia's transition towards a circular economy.

Recognising and engaging with First Nations communities

Recognising and engaging First Nations communities early in the circular economy journey is essential to ensuring that their Knowledge systems, values, and priorities shape Australia's approach to sustainability from the outset.

First Nations peoples' Knowledge systems and practices implement a respectful relationship with land, water and species. The circular economy transition must recognise the status of First Nations peoples and their inherent rights as custodians of the land, waters, skies, and Knowledge systems by adopting the principles of Indigenous self-determination and free prior and informed consent, as well as recognise the value of these Knowledge systems and practices. This extends to First Nations Data Sovereignty and the right of their people to govern collection, ownership and application of data about their communities, peoples, lands and resources.

Involving First Nations leaders and communities from the outset allows for Indigenous leadership and can help to avoid practices that may harm ecosystems or disregard cultural significance. Early engagement also builds trust, creating a foundation for genuine partnerships where First Nations peoples are respected and valued as equal contributors to national sustainability goals.

This early involvement can also strengthen circular economy outcomes by embedding sustainable practices that are better adapted to local environments and communities, enhancing both ecological and economic resilience. When First Nations communities are part of the planning and decision-making, Australia can more effectively address the social and environmental challenges unique to each region. By valuing this early input, the circular economy can become a model of inclusivity and collaboration, leading to more sustainable, equitable outcomes across the nation.

The circular economy also offers unique job opportunities for First Nations communities, especially as Australia moves towards net zero emissions. Building local industries that focus on regenerative agriculture, sustainable land and water management, and waste minimisation can provide meaningful employment while preserving cultural practices. First Nations led enterprises and opportunities for partnerships could play a central role in managing materials locally, repurposing organic waste, or providing sustainable tourism experiences that educate others about circular and regenerative practices. These place-based jobs not only empower local communities but also foster a resilient economy that supports the transition to net zero.

Building social licence through the circular economy

The circular economy empowers communities to engage in sustainable practices, building essential social licence for transformative changes like Australia's net zero transition. Major infrastructure projects, such as renewable energy installations, transmission lines and battery storage, often face resistance due to concerns about environmental impacts, disruptions and end-of-life waste. Integrating circular economy principles, like establishing end-of-life recycling plans, can address these concerns and foster community trust.

Supporting consumers to participate

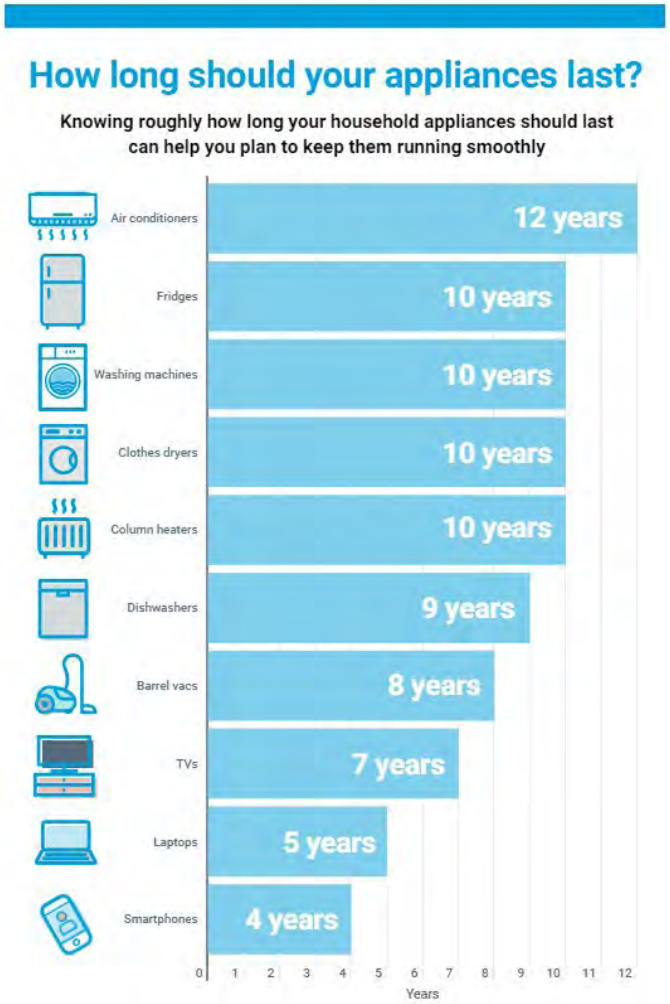
With the right information, consumers can make purchasing decisions that support circularity. This means choosing products that are designed to last longer, be repaired or be recycled.

Providing the right information

CHOICE, an Australian consumer advocacy group, provides its members with data on product durability and repairability, enabling consumers to select items that last longer and are easier to repair, reducing waste and supporting circularity. In France, the repairability index rates products on ease of repair, providing clear information at the point of purchase and encouraging manufacturers to design for durability.

However, this kind of product-based information is not widely accessible in Australia. Building on the recommendations in Chapter 3, here we specifically recommend prioritising regulatory reforms that provide consumers with durability and repairability information to enhance participation in the circular economy.

Figure 6. CHOICE durability information



Navigating greenwashing

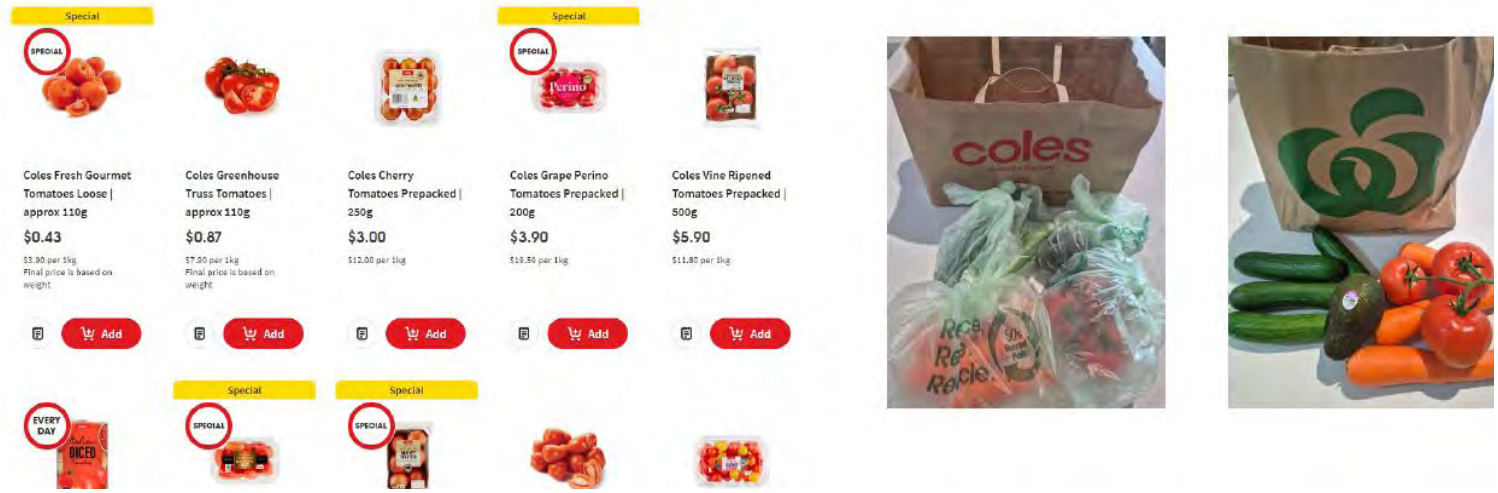
A key challenge in the circular economy is greenwashing, where companies make misleading claims about the environmental benefits of their products. This not only confuses consumers but also erodes trust. To address this, consumers need access to credible certifications and should be cautious of vague or unsubstantiated claims. Regulatory bodies have a vital role to play in setting clear standards and ensuring transparency to protect consumers and uphold confidence in the circular economy.

Providing the right information in online retail platforms

Changes to online retail platforms are a prime opportunity to enhance consumer choice in support of the circular economy – for example, by providing information on the type and amount of packaging used with products. In physical stores, consumers can assess packaging firsthand and choose items with minimal or recyclable materials. Online, however, packaging details are often unavailable, leaving customers unaware if their purchase will arrive in excessive, single-use plastic or in sustainable, recyclable packaging. Research from the University of Melbourne reveals that consumers tend to choose what appears un-packaged in images, even if the product is actually packaged or will be packaged for delivery (see Figure 7). This lack of transparency can lead to consumer frustration, as customers may end up with unwanted waste they had not anticipated. By improving transparency, online retailers can empower consumers to make more sustainable choices and reduce unexpected packaging waste.

Figure 7. Items that appear un-packaged online and arrive packaged

Source: University of Melbourne (unpublished)



SECTION

3

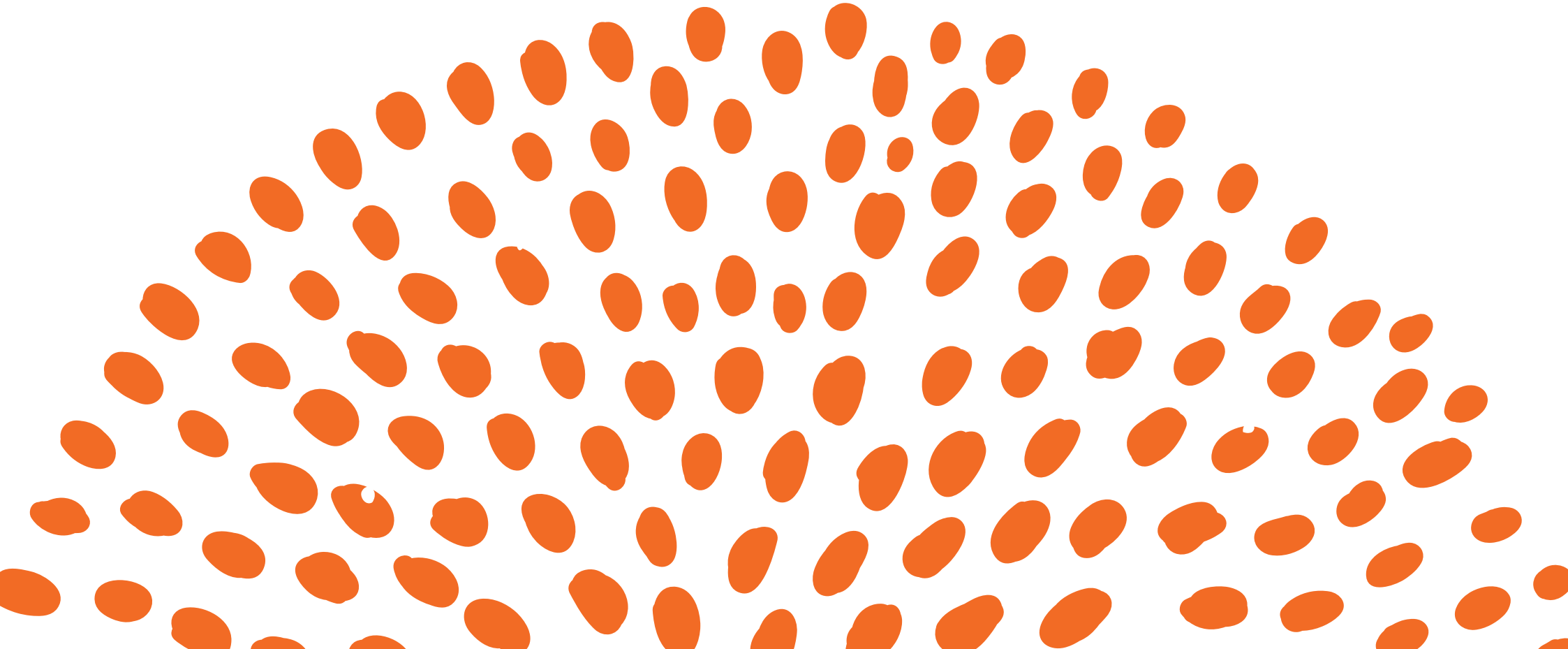
Sectoral deep dives

These chapters delve into sector-specific opportunities and challenges identified through our consultations, offering targeted recommendations that complement the headline recommendations in our core advice.

CHAPTER

11

The built environment



FAST FACTS

The building and construction industry represents 10% of Australia's GDP and employs around 1.35 million people.[82]

The industry produces 87 tonnes of waste per million dollars of economic value added and spends over AUD2 billion on waste services – more than any other sector.[83]

Infrastructure Australia estimates that using recycled alternatives in roads can save up to 83% of project costs, with up to 43% of conventional materials potentially replaceable by recycled ones.[84]

Construction and demolition waste has surged by 61% over the past 13 years, compared to an 18% increase for overall waste.[85]

Approximately 17 cubic metres of waste is generated in the construction of a house and costs the typical house buyer about AUD10,000 to send to landfill.

According to the Australian Infrastructure Budget Monitor 2024–25, the Australian Government has allocated significant funds to infrastructure projects, **with a total of AUD270.4 billion in general government expenditure over the 4 years to FY2027–28.**

Over 80% of the buildings that will exist in 2050 have already been built, underscoring the importance of reusing and retrofitting existing infrastructure to meet future needs, rather than relying solely on new construction.[86]

Overview

The built environment – our homes, offices, shops, roads and infrastructure – accounts for roughly one-third of all resource consumption, with construction waste alone making up 38% of Australia's landfill.[87] As the primary destination for materials in the Australian economy (including their embodied greenhouse gas emissions), the built environment must be a central focus in Australia's transition to a circular economy.[88] Moreover, the built environment represents a key investment avenue for many Australians – whether through property ownership, superannuation or share portfolios. Embracing circularity will help ensure the long-term viability and profitability of these investments.

Circularity offers the opportunity to cut construction time and costs, including through practices like refurbishment over rebuilds, modularity and use of locally sourced recycled materials. It is estimated that adopting more circular economy practices in the built environment could generate AUD773 billion in direct economic gains over 20 years and reduce emissions by 3.6 million tonnes of carbon dioxide equivalent by 2040.[89]

As the energy grid decarbonises, emissions from materials and construction will represent the largest source of building-related emissions. Buildings and infrastructure account for 40% of Australia's energy-related carbon emissions – approximately 25% of which stems from the manufacture of materials and construction processes used.[90] For example, a typical detached home embodies an estimated 118 to158 tonnes of carbon emissions.[91] As highlighted in the recently published report on the sector pathway for the built environment to reduce emissions, released by the Climate Change Authority, the circular economy is the opportunity to address these embedded emissions.[92]

Australia has strong credentials in sustainable and circular building

Australia has strong credentials in sustainable building which it can capitalise on for its circular economy transition. The Global Real Estate Sustainability Benchmark has consistently ranked Australia as one of the most sustainable real estate markets over the past decade.[93]

Sustainability rating systems such as the Green Building Council of Australia's (GBCA) Green Star, the National Australian Built Environment Rating System (NABERS) and the Infrastructure Sustainability Council's IS Rating Scheme have been instrumental in driving Australia's sustainability gains in the built environment. Examples in the commercial property sector illustrate the opportunity from the circular economy.

Levels of government roles and responsibilities

Building and construction activities in Australia are regulated by state and territory governments, with the Australian Government working to promote nationally consistent standards through the National Construction Code (NCC). The Australian Building Codes Board (ABCB) oversees the maintenance of the NCC, which sets minimum requirements for building, plumbing and construction, including sustainability standards. Updates to the NCC are proposed by the ABCB and agreed through the meeting of all jurisdictional building ministers. States and territories are then able to adopt and enforce elements of the NCC as they feel appropriate for their jurisdiction.

Several states and territories have already taken steps to support the circular economy within the built environment: New South Wales has introduced guidelines for circular building design; South Australia has policies for construction material reuse and recycling infrastructure to boost reclaimed product markets; the Australian Capital Territory has set ambitious targets for waste reduction and resource recovery in construction, advancing standards that integrate recycled materials; and Victoria's Recycled First Policy mandates recycled materials in major infrastructure projects.

Areas of focus

Our advice is that Australia's circular economy should enable a focus on design and planning in the built environment by concentrating on the following:

1. **Reusing existing assets:** By repurposing or renovating existing buildings (as opposed to decommissioning or demolishing them), additional embodied carbon emissions can be avoided, and existing materials can be reused or recycled. It is estimated that this approach can save up to 50% of embodied emissions.[94]
2. **Embedding circularity in project design choices:** Early design decisions – such as using prefabricated, modular, flexible layouts and designing for longevity, reuse, decommissioning and repair – can dramatically lower the need for new resources, cut emissions and reduce waste.[95] Creating capacity at the local government level will be critical to enabling momentum in the implementation of circular solutions.
3. **Designing buildings and infrastructure with circular materials:** By using circular materials, the construction sector can lower its carbon footprint, avoiding the emissions required to produce new materials. For example, using recycled asphalt in road construction in New South Wales alone could avoid nearly 100,000 tonnes of carbon dioxide equivalent emissions per year. Circular materials also create demand for recycled content, diverting waste from landfill and encouraging resource recovery.

Case study: ecologiQ

The Victorian Government established ecologiQ to support its Recycled First Policy, which leverages purchasing power to boost recycled material use in major infrastructure projects and foster local markets for recycled products. Key objectives include:

1. **Promoting recycled material use:** ecologiQ coordinates with contractors to incorporate recycled asphalt, concrete, glass and plastics into projects, reducing virgin material use and environmental impact.
2. **Supporting industry transition:** ecologiQ aids industry partners with guidance, resources and training on recycled material standards, fostering innovation in sustainable materials.
3. **Stimulating local demand:** By driving demand for recycled materials, ecologiQ creates jobs, supports local manufacturing and reduces reliance on imports.
4. **Ensuring accountability:** ecologiQ tracks and reports on recycled material usage, emissions reduction and cost savings, demonstrating the policy's environmental benefits across Victoria's infrastructure projects.

Examples of flagship circular commercial buildings in Australia

Barangaroo South precinct (Sydney)

Barangaroo South is designed to be carbon neutral and have minimal environmental impact, and it achieved a 6-Star Green Star Communities rating for its sustainable precinct development. The precinct achieved a 99% recycling rate for construction waste and now diverts 80% of its operational waste from landfill. It operates an onsite recycled water plant that produces up to one million litres of recycled water daily, cutting potable water use by 50%.

Burwood Brickworks (Melbourne)

Burwood Brickworks is a certified 6-Star Green Star Community and one of the first Australian retail centres to meet the international Living Building Challenge standards, meaning it produces more energy than it consumes. Water consumption is minimised through rainwater harvesting and an onsite wastewater treatment plant, reducing reliance on external water sources by up to 100%. In construction, Burwood Brickworks achieved over 95% waste diversion from landfill, and its design prioritises materials that are recyclable or biodegradable. The centre also features an extensive rooftop urban farm that supplies fresh produce to local restaurants.

Supporting recommendations

Several of our core recommendations support circularity in the built environment, especially those focused on public procurement (Recommendation 6). The following recommendations complement these.

Develop a national built environment circular economy strategy

The management of Australia's built environment is complex, engaging all levels of government and many different sets of stakeholders in the private sector. Transitioning this sector towards a circular economy will require significant collaboration and coordination across industry and up and down supply chains. A national circular economy strategy for the built environment – developed in collaboration by government and industry – would provide a unified framework for aligning stakeholders on goals, standards and practices, facilitating greater collaboration and accelerating progress. Such a strategy is vital for establishing consistent policies such as a consistent approach to reuse of existing assets and enabling the built environment sector to adopt circular principles in a coordinated and impactful way.

Include circular economy and 'design for end of life' in the National Construction Code

Designing buildings with end of life in mind – such as planning for disassembly and reuse of structural elements and the selection of non-hazardous, recyclable materials – would drastically reduce both the carbon footprint and waste associated with demolition and new material production. Currently, most buildings are constructed without requirements for end-of-life planning, leading to substantial waste and missed opportunities for resource recovery during their operational life and at their end of life. We recommend that the ABCB update the NCC to address embodied carbon in fit-outs and capital works and also consider how the code can support circular end-of-life practices for buildings, such as disassembly, reuse and recycling, and record keeping across the life of buildings to support reuse at end of life.

Support uptake of low-carbon, circular materials through certification and standards

New digital and data tools are emerging with the potential to drive circularity in Australia's built environment. NABERS has recently launched an embodied carbon rating tool, allowing measurement and comparison of a building's up-front embodied carbon and encouraging the use of circular materials like recycled content to reduce emissions. Similarly, the GBCA's upcoming Green Star Fitout rating tool will promote longevity and reuse in interior fit-outs, embedding circular principles from the design phase.[96]

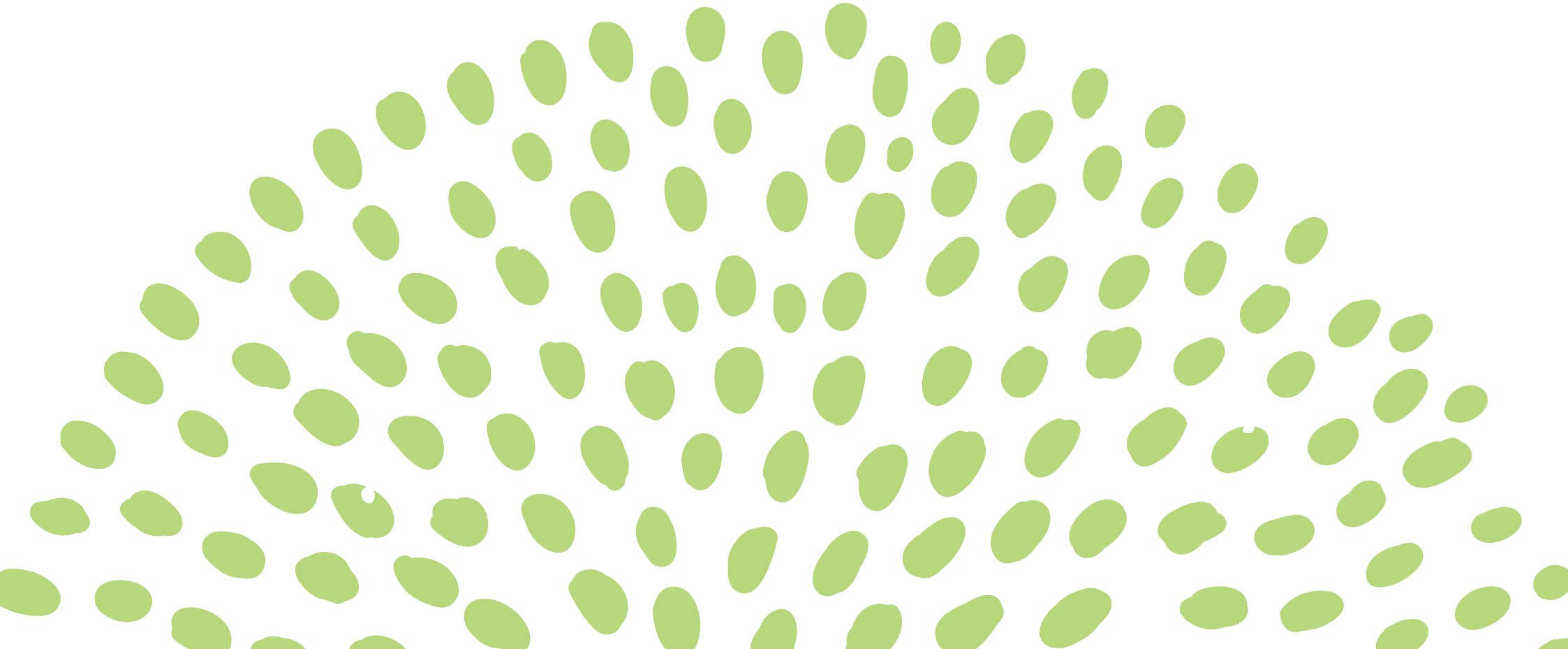
The impact of these tools on Australia's circular economy depends on users understanding how circular strategies lead to positive results. For example, the NABERS embodied carbon tool shows that keeping a building's core structure can greatly reduce emissions. This tool will help influence decisions in new building design – but decision-makers need to grasp the benefits through use of it. Upskilling the industry is key, with support through guidance, training and resources that showcase best practices for using these tools to achieve maximum sustainability outcomes.

In Australia, the lack of streamlined standards, certification and specifications for recycled materials is a major barrier to circular and low-carbon construction. Certification processes for recycled materials are often lengthy and complex, causing project delays and discouraging the use of sustainable materials. Clear, efficient standards are needed to allow builders and suppliers to confidently specify and source recycled materials without disrupting schedules. Our recommendation to establish a governance approach for harmonising state and territory regulation (see Recommendation 5) aims to address these issues. Additionally, moving from input-based to performance-based specifications would enable unrestricted use of recycled content, if it meets performance criteria, thereby supporting greater adoption of circular materials in construction.

CHAPTER

12

Food and agriculture



FAST FACTS

Australia's food system feeds an estimated 60 million to 75 million people across domestic and export markets[97] and is estimated to have contributed 11%, or AUD187 billion, to Australia's GDP in 2018.[98]

Food and beverage manufacturing is Australia's largest manufacturing sector at 52.5% of total manufacturing gross value added, accounting for 65.4% of all jobs.[99]

Australia's agriculture sector accounts for 55% of Australian land use and 74% of water consumption,[100] and in 2021–22 it contributed 16.8% of Australia's emissions.[101]

The Australian food sector is the third largest consumer of materials from a material footprint perspective behind the mobility sector (vehicles and infrastructure) and housing.[102]

The land required to grow the amount of food wasted in Australia is larger than the state of Victoria.[103]

Food waste alone accounts for 3% of Australia's total greenhouse gas emissions.[104]

Overview

Australia's food system captures the entire food pipeline from production through to retail, consumption and disposal.[105] Australia has a profitable and productive agrifood sector that encompasses agriculture, food and beverage manufacturing, aquaculture and fisheries. The sector accounts for 14% of Australia's goods and services exported and 2.7% of GDP and employs hundreds of thousands of Australians, particularly in rural and regional areas.[106] The food and beverage manufacturing sector also plays a critical role in transforming Australian agricultural commodities into high-quality products, generating approximately AUD31.8 billion in gross value added in 2022–23.[107] Given its substantial economic impact and the size of the system, Australia's food system will play a vital role when considering circular economy opportunities.

Food waste in Australia

Australia's current food system is both economically and environmentally wasteful. Each year, approximately 7.6 million tonnes of food is wasted, costing the economy an estimated AUD36.6 billion annually. Food is wasted at every point along the food supply chain:[108]

- Primary production 22%
- Distribution 3%
- Manufacturing 17%
- Hospitality 16%
- Institutions 3%
- Wholesale and retail 7%
- Households 32%.

Reducing food waste across the supply chain is the critical circular economy opportunity in our food system, as this waste also represents lost economic opportunity, wasted agricultural land and avoidable greenhouse gas emissions.

Biotechnology: an emerging innovation opportunity

As the global population grows, so will the demand for more sustainable sources of protein. By 2035, alternative proteins are expected to make up 11% to 22% of the world's protein market.[109] Precision fermentation, a cutting-edge biotechnology, can transform agri-waste into value-added products by using engineered microorganisms like yeast, bacteria or fungi to convert by-products into high-value proteins, enzymes and other compounds. These innovations enable the creation of alternative proteins, bio-based materials and sustainable food ingredients, turning waste streams into economic opportunities. Australia is uniquely positioned to lead in this space, drawing on strong capabilities in biotechnology.[110]

Areas of focus

There are several opportunities to build circular food systems to minimise waste and emissions, increase resource efficiency and regenerate natural systems impacted by food production. This requires rethinking how food is produced, consumed and managed at end of life. Circular approaches can also enhance the value of our agriculture and food and beverage manufacturing sectors, strengthening Australia's economy and supporting jobs in our urban and regional communities.[111]

Our advice is that Australia's circular economy in food systems and agriculture should focus on the following:

1. **Diversifying and value adding in food production using agricultural by-products:** Food waste valorisation presents a significant economic and circular economy opportunity for Australia by transforming discarded food and by-products into high-value resources. Instead of being sent to landfill, food waste can be repurposed into bioenergy, fertilisers, animal feed and innovative bioproducts like bioplastics and nutraceuticals. This shift not only reduces greenhouse gas emissions from organic waste decomposition but also creates new industries and jobs in sustainable manufacturing and bioeconomy sectors. By capturing value from food waste, Australia can enhance resource efficiency, support local economies and contribute to global leadership in sustainable innovation (see example case studies).
2. **Leveraging circularity to reduce emissions across the food supply chain:** Scope 3 emissions are the indirect emissions generated across a company's value chain. They are estimated to account for approximately 88% of a food retailer's total emissions. For instance, Woolworths has reported that its scope 3 emissions are 15 times higher than its combined scopes 1 and 2 emissions.[112] These emissions largely stem from the materials and processes involved in the food supply chain. Circular economy measures – such as sustainable sourcing of raw materials, improving manufacturing efficiency, reducing waste and redesigning products – will play a critical role in reducing these emissions. Achieving meaningful change requires collective action, including adopting a common reporting framework to drive transparency and alignment. As a result of their commitment to regular sustainability reporting, retailers must responsibly use their influence over suppliers to lead transformative efforts in reducing scope 3 emissions and driving circular practices across the food system.
3. **Supporting small to medium enterprises to adopt greater circularity:** Supporting small to medium enterprises (SMEs) in the food sector to transition to a circular economy is crucial for Australia's economic and environmental goals. SMEs make up the large majority of businesses in the food sector, including agriculture, food manufacturing and hospitality. It is estimated that 98% of businesses in the food and agribusiness sector are SMEs.[113] These businesses are integral to local economies and often serve as innovation hubs, yet they may face challenges in accessing the knowledge, technology and resources needed to adopt circular practices. Enabling SMEs to participate in the circular economy will not only help reduce food waste and emissions but also create new economic opportunities, enhance resilience and strengthen Australia's leadership in sustainable food systems.

Examples of circular economy initiatives that value add in the food supply chain

AquaBotanical – water recycling in the beverage industry

When fruit and vegetable juices are concentrated for export and shelf-stable production, the extracted water becomes a surplus by-product. Typically, processors discharge this surplus water. However, AquaBotanical filters this water to partially demineralise and pasteurise this wastewater to meet drinking standards, packaging it as a premium water product called AquaBotanical, which is now served in fine dining restaurants across Australia and internationally.

Fresh Select

Australian primary producer Fresh Select has developed processing technologies that transform 'not-to-spec' vegetables into nutrient-rich chips and powders under the Nutri-V brand. Through collaboration with CSIRO, Nutri-V has successfully commercialised patented technologies into products that reduce fresh produce waste.

Supporting recommendations

Several of our core recommendations already directly support circularity in the food system, including recommendations focused on providing better information to consumers (Chapter 10). The following recommendations complement these.

Leverage existing food and agricultural programs to support circularity

Existing government programs, such as Climate-Smart Agriculture, the Future Drought Fund, the Nature Repair Market and the National Reconstruction Fund, are well positioned to support circular practices in the agrifood sector, given their focus on sustainability and achieving net zero emissions. Additionally, policies addressing healthy eating, food security and market competition can further benefit from incorporating circular economy principles. We recommend the Australian Government integrate circular economy priorities into these programs and policies to enhance resource efficiency, reduce waste and

drive innovation across the food system. This recommendation supports core Recommendation 2 by embedding circularity into the foundational frameworks guiding Australia's agrifood sector.

Provide business support and training for small to medium enterprises

To address the unique challenges faced by SMEs in accessing support, programs should prioritise helping these businesses adopt circular practices, ensuring the entire agrifood sector can benefit. Compared to larger businesses in this sector, SMEs often lack the necessary support to identify and implement strategies on circularity in their business models. This can make it challenging for SMEs to compete or participate in government funding programs and to engage in necessary research and development activities.[114]

Government and industry programs, policies and investment that support circularity in Australia's food system need to shift to accommodate the variation in size, need and capability of businesses, rather than adopting a 'one-size-fits-all' approach.[115] Grant and loan opportunities could be tiered to the size of a business, and structured education opportunities could be offered to SMEs to ensure they are well versed in circularity, giving them the confidence to develop and implement circular approaches in their business models. Our recommendations about challenged-based investments (Chapter 6) also support greater SME participation by crowding together multiple partners.

Leverage environmental, social and governance (ESG) reporting to drive circularity and cut emissions in food supply chains

Greater ESG reporting on scope 3 emissions by food retailers will create strong incentives for adopting circular practices down food supply chains. Transparent reporting of ESG goals and emissions provides the foundation for businesses to improve their environmental performance through actions like local sourcing, partnerships with renewable energy providers, and the use of sustainable or recovered materials. Circular economy measures such as designing out waste, optimising resource use and recovering materials can significantly reduce scope 3 emissions, enabling food businesses to achieve substantial carbon footprint reductions.

The Australian Government has an opportunity to collaborate with food retailers to embed circular economy principles into their ESG frameworks, particularly for reporting on scope 3 emissions. This could include developing consistent and standardised data reporting approaches that capture the full impact of emissions-reducing circular actions. The government can also play an advisory role, disseminating knowledge on effective circular economy initiatives that lower emissions and improve supply chain resilience. These efforts align with core Recommendations 9 and 11, supporting the connection of innovators and ensuring that Commonwealth programs provide businesses with practical advice and pathways to implement circular practices effectively.

Sundrop Farms – benefits of circular economy for food retailers

Located at Port Augusta in South Australia, Sundrop Farms uses modern growing technology – a AUD200 million facility consisting of 4 5-hectare greenhouses built on flat, arid land that now produces 13,500 tonnes of tomatoes a year. Sundrop Farms has revolutionised traditional farming by integrating renewable energy, water recycling, and waste minimisation into its operations, significantly cutting emissions and resource use:

- Water recycling and desalination: Sundrop Farms uses desalinated seawater to irrigate its crops, reducing reliance on scarce freshwater resources in South Australia's arid environment. The facility's closed-loop water system ensures minimal waste, conserving resources while enabling year-round farming.
- Efficient resource use: The farm operates without soil, using a hydroponic system that minimises land degradation and optimises nutrient use. Organic waste from crops is composted or repurposed, reducing landfill contributions and closing the resource loop.
- Reduced food miles: By producing large volumes of fresh produce locally, Sundrop Farms reduces reliance on imported goods, cutting transportation emissions and supporting regional food security.

The approach at Sundrop Farms is good for the environment and for business. Because of the predictable supply, the farm can support genuine long-term partnerships with retailers. The farm has also eliminated the volatility of electrical, fuel and water costs because it controls most of its inputs.

CHAPTER

13

Resources

FAST FACTS

Mining is responsible for the production of 79% of Australia's waste (both solid and liquid) and 20% of scope 1 greenhouse gas emissions.

The demand for critical minerals like cobalt, lithium and nickel is expected to increase sixfold by 2050 to support the transition to renewable energy and electric vehicles.

Geoscience Australia has identified 1,050 possible sites where critical minerals could be extracted from the waste of existing projects, including mine tailings, waste rock, smelter residues and related mine waste materials.

Implementing circular economy strategies, such as **recycling, reusing and re-manufacturing, could reduce cumulative mineral demand by 58% between 2022 and 2050** compared to a business-as-usual scenario.

Overview

Australia has a world-leading mining industry, and we are one of the largest exporters of resources. Our mining sector is expanding beyond traditional minerals such as iron, coal and gold to supply the nation and global partners with critical and strategic mineral commodities needed for modern economies and the transition to net zero. By embracing circular economy principles, Australia's resources sector can enhance its competitiveness in this rapidly changing global landscape while contributing to environmental sustainability. Australia is well placed to seize this opportunity with already strong sustainability credentials recognised globally and as leaders in innovative, high-tech mining. Strengthening domestic processing capabilities and fostering sustainable practices will be key for Australia to remain competitive and meet the growing demand for responsible resource management.

Internationally, the circular economy is being adopted as a mechanism to build domestic minerals security (for example, requirements in the European Union (EU) to source secondary minerals in battery manufacturing). Strategically, the circular economy will play a different role for Australia as a minerals exporter and holds value because of its potential to:

- **reduce the size of Australia's material footprint** – even small improvements in extraction efficiency and reducing waste generation will have a significant impact due to the material size of our resources sector
- **lift our material productivity and recycling rate** – activities like extracting new critical minerals from mining tailings and waste and repurposing mining waste for other uses like construction and fertilisers will all result in more economic value created per tonne of material use and a higher recycling rate
- **regenerate natural systems** – retiring assets responsibly and considering the post-mining transition from the beginning of a site can all help reduce the impact on nature and support better rehabilitation

- **attract talent and investment to the sector** – for example, by improving the green credentials of the industry and leveraging local sustainability talent
- **generate innovation spillover for other parts of the economy** – being a world leader in circular mining innovation will deliver benefits to other sectors; for example, extracting minerals from tailings could have a spillover effect to other waste streams or new chemical processes elsewhere in our economy.

Circularity challenges

Australia's resources sector is relatively unique in its structure and challenges. Mining operations are often located in remote regions, making it impractical to transport mining waste for recycling. In addition, Australia primarily exports raw materials and has limited capability for mid-stream mineral processing. Without this processing capability, Australia does not have the infrastructure required to capture the circular economy opportunities from reprocessing critical minerals recovered through recycling electronics. Enhancing mid-stream processing will help create more local industry opportunities and reduce reliance on overseas processing, which in turn could help diversify Australia's economic base and improve resilience in global markets.

Areas of focus

There are several opportunities for a uniquely Australian approach to driving the circular economy in our minerals industry:

- **Secondary material recovery and diversion of viable by-products:** Mining tailings and waste represent an underutilised resource that can create new value in the industry without requiring new extraction activities. Mining tailings often contain residual minerals, including valuable critical minerals, not targeted or fully extracted during the initial mining process. For example, indium (used in touch screens, flatscreen TVs and solar panels) can be extracted from lead and zinc tailings. Gallium (used in electronic circuits, semiconductors and light-emitting diodes) is now largely produced through extraction from by-products of aluminium refining. This secondary material recovery is now seen as a major pathway to extract much-needed critical minerals while reducing waste and generating additional revenue streams. The development of viable by-products from mining is rapidly gaining global momentum. Some companies are already leading the way – for example, Novum Energy, BHP and Anglo American are recycling discarded dump-truck tyres into oils and steel. Similarly, Rio Tinto has developed blueberry fertiliser from waste aluminium, diverting over 70,000 tonnes of waste annually.[116] These innovations not only enhance circularity by reducing waste but also generate significant economic, environmental and social benefits.
- **Co-extraction and resource sharing:** Realising the opportunity to extract multiple materials from a single ore or material source will often require collaboration and sharing of resources between mining operators. For example, a larger mining operator may focus on primary extraction of the ore while smaller enterprises focus on specialised secondary co-extraction activities. Success depends on the availability of shared infrastructure to reduce transport costs and shifting investment priorities to consider cross-supply chain benefits. Environmental, social and governance (ESG) frameworks and risk-sharing mechanisms are key to supporting these efforts.

As Australia strengthens its minerals processing capabilities to align with the global push for net zero emissions, incorporating circular economy principles into the planning and operation of processing hubs is critical. By doing so, these hubs can optimise resource use, minimise waste and create a more sustainable framework for growth in this essential sector.

- **Leveraging research and development (R&D) expertise:** Australia's resources sector is a leader in innovation and has a highly skilled workforce. We should have a competitive advantage in circular economy in mining, but a lack of coordinated vision and sustainable mining goals hampers our progress. Compounding this challenge is an emerging skills gap, driven by declining interest in the sector among young professionals. This trend poses a significant risk to maintaining our leadership in innovation, particularly in critical fields such as chemical engineering, which are essential for advancing circularity in mining.

Examples of circular economy initiatives in the resources sector

Gallium extraction at the alumina refinery in Gladstone

At the alumina refinery in Gladstone, Queensland, a circular economy approach has transformed bauxite residue, which is a by-product of alumina production, into a source of gallium – a valuable metal used in electronics and semiconductors. Traditionally disposed of as waste, this residue can now be processed to recover trace amounts of gallium, turning a former disposal cost into a profitable revenue stream. The extracted gallium is sold to manufacturers for high-tech applications, supporting local industry and critical global supply chains.

Greenbushes

Mining in Greenbushes began in 1888, and today it is recognised as Western Australia's oldest continuously operating mine. Initially mining and processing tin, it later transitioned to tantalum and now focuses on lithium as the primary mineral, produced as an intermediate spodumene concentrate. The Greenbushes Lithium Operation is among the world's largest and highest grade hard rock lithium producers, mining and processing spodumene containing pegmatite ore body while generating by-products such as pegmatite (spodumene host rock) tailings and non-mineralised waste rock. Rather than treating these by-products as waste, the mine has implemented innovative repurposing strategies. Non-mineralised waste rock is utilised as onsite road base, while historical tailings from tin and tantalum processing are reprocessed at a purpose-built tailings retreatment plant. Additionally, the mine utilises a closed water circuit, recycling and reusing water in its processing operations, thereby eliminating the need for groundwater consumption. This circular approach not only minimises waste but also reflects its commitment to responsible mining through targeted sustainable resource management.

Kwinana precinct

The Kwinana Industrial Area in Western Australia has embraced a circular economy approach by fostering industrial symbiosis among its diverse industries, including those involved in chemicals, refining and minerals processing. With over 170 exchanges taking place, companies in the precinct share resources and by-products, creating a closed-loop system that reduces waste and maximises resource efficiency. For example, carbon dioxide produced by one facility is captured and used by another for industrial processes, while waste heat and water are also reused across operations.
This collaborative model has led to significant environmental benefits, such as reductions in greenhouse gas emissions and waste sent to landfill, while also lowering operational costs for businesses involved. It has made the Kwinana area a world leader in the field of industrial symbiosis.

Supporting recommendations

Several of our core recommendations already directly support circularity in the resources sector, including recommendations focused on setting a national coordinated vision (Recommendation 1) and accelerating innovation (Recommendation 7).

Provide pre-competitive information supporting secondary processing and second life

One of the barriers to greater secondary extraction of critical minerals from mining tailings is the market's volatility and limited availability of economic analysis, both of which hinder investment. Regularly updated pre-competitive information on the profile of waste stockpiles would help reveal the economic viability of re-extraction opportunities and account for the value of latent minerals change, and technology improvements.

Geoscience Australia's Atlas of Mine Waste identifies 1,050 possible sites where critical minerals could be extracted from the waste of existing projects, including mine tailings, waste rock, smelter residues and related mine waste materials.[117] We recommend expanding this analysis to include market analysis of high-priority secondary minerals with strong economic potential or those critical to sovereign capability. Opportunities should encompass both mining tailings and secondary resources like e-waste. Providing pre-competitive information to the market will enable industry stakeholders to make informed investment decisions and unlock the value of these secondary resources.

Embed circular economy into environmental, social and governance (ESG) frameworks

ESG frameworks that explicitly capture circular economy principles – such as resource efficiency, waste valorisation and life cycle management – would provide a competitive edge to Australia's mining industry. By embedding circularity within ESG criteria, these frameworks would highlight the sector's strengths in innovation and environmental stewardship, making Australian mining operations more attractive to global investors and premium markets. They would also provide the stimulus needed for further circular economy innovation in the industry – including co-extraction activities. Co-extraction viability depends on industries reallocating funds, usually set aside for facility upgrades and maintenance, towards extracting secondary minerals that are not their main source of income. ESG settings and risk-sharing have significant influence on these business decisions.

Increase research capability and coordination

Strengthening research and development in mining requires building robust partnerships across science agencies and recruiting highly skilled talent. The Australian Government should collaborate with industry, its value chain and leading research institutes to set clear priorities for advancing circularity, including enhancing secondary processing capabilities. By improving R&D coordination and addressing critical skills gaps, particularly in chemical engineering and circular economy innovation, Australia can retain a global competitive edge in the transition to more sustainable use of minerals.

CHAPTER

14

Water

FAST FACTS

Australia's Water Efficiency Labelling Scheme is estimated to have saved 172 gigalitres of water and AUD1.6 billion to the national economy in 2024 through reduced utility bills; and prevented 2.39 million metric tonnes of emissions.

Australia's urban water systems have become more efficient, with major cities like **Melbourne and Sydney reducing water consumption per capita by over 40% from 2000 to 2020**.

Recycled water is extensively used in agriculture, industry and urban areas for irrigation and industrial processes and replenishing groundwater. **Perth has committed to a target of 35% wastewater recycling by 2035**.[118]

In Australia, **about 350,000 dry tonnes of biosolids are produced per annum**. Of this, on average 75% is reused in agriculture, 12% is stockpiled and 3% is sent to landfill.

Overview

Australia is a recognised leader in water management. As a result of its decades of experience in water reform, it has increased the efficiency of service provision; introduced better systems for allocating water between competing users, including market-based measures; and introduced a wide range of management tools, with the aim of achieving sustainable water use.

Countries and organisations worldwide are adopting circular economy strategies to address water scarcity, enhance water security and cut emissions amid climate change. Israel recycles about 85% of its wastewater for agriculture; Singapore's NEWater initiative meets 40% of the nation's water demand by transforming wastewater into potable water; the EU Circular Economy Action Plan emphasises water efficiency and reuse; and the Netherlands integrates rainwater harvesting, greywater reuse and industry-wide wastewater treatment in its circular water management approach.

Water presents an opportunity to both showcase an area of Australian strength and consider opportunities to take circularity further to support our water security, reduce emissions and better support our economy.

Water resource management is a shared responsibility

States and territories have primary responsibility for management of water resources, providing water quality monitoring, regulation and reporting and overseeing the development of water infrastructure. The Commonwealth provides overarching policy guidance, regulation and support to ensure these efforts are coordinated and consistent with other water management approaches across Australia and, where possible, international best practice.

Water is heritage for First Nations people

For First Nations people, water is a sacred source of life. The natural flow of water sustains aquatic ecosystems that are central to spirituality, social and cultural economy and wellbeing. First Nations people have rights and a moral obligation to care for water under their law and customs. These obligations connect

across communities and language groups, extending to downstream communities, throughout catchments and over connected aquifer and groundwater systems.[119]

Areas of focus

Our advice is that Australia's circular economy should focus on the following:

1. **Lifting water reuse and recycling across Australia:** Water reuse is an effective method for improving water security and creating a stable water supply. It is also more cost-effective and less emissions intensive than desalination. About 35 cities globally, including Perth, use water reuse as part of their base load supply, and this number is growing.[120] Australia has a mature water recycling sector for purposes such as irrigation and horticulture. There is a significant opportunity to expand the reuse of water for other purposes, including industry and drinking water.

   A Productivity Commission report noted that there are impediments to this type of integrated water management, including from policy and regulation settings and in service delivery.[121]

2. **Greater action on biosolids and biochar:** The water industry also covers biosolids from sewerage waste management. Biosolids are a greenhouse gas producing waste. Conversion to biochar creates a source of carbon sequestration and converts this waste product into something beneficial for agriculture, construction and forestry. It is estimated that biochar could help reduce Australia's national carbon footprint by 10–15%.[122] Biosolids and biochar also represent a source of phosphate that is beneficial for soil health and reduces Australia's reliance on imports.

3. **Water sensitive urban and industrial precinct design for climate resilience:** New industrial and urban precincts can incorporate integrated water cycle management into their planning and design. The Bradfield precinct in Western Sydney exemplifies this approach, planning drinking water, recycled water, stormwater and wastewater systems as a unified whole to enhance efficiency and resilience.[123] Onsite water recycling for water-intensive industries can also lower costs and emissions. For instance, a poultry processing facility achieved a 15.2% reduction in energy use, a 24.3% decrease in water consumption and a 6.5% cut in greenhouse gas emissions through internal water recycling, recovering 90% of water used – all while reducing overall costs.[124] The Productivity Commission has noted that, while there are significant benefits to integrated water management approaches, there are a number of impediments hindering change from the status quo, including unclear roles and responsibilities and restrictions and mandates preventing all options from being put on the table.[125]

These opportunities will help significantly lift water circularity and efficiency as well as contribute to greater material circularity through actions on biosolids and biochar.

Case study: City of Logan and biochar

The City of Logan partnered with Downer to build an Australian first project applying gasification technologies to transform biosolids from sewage treatment processes into renewable energy and biochar. The City of Logan's largest wastewater treatment plant produces 34,000 tonnes of biosolids annually. Prior to the construction of the gasification facility, 6 truckloads of biosolids were being transported 300 kilometres every day to be used as a soil additive in agriculture. A full-scale gasification facility was constructed and opened in April 2022. Its operational cost saving to the City of Logan is AUD1 million per year and the production of biochar delivers a new revenue stream. It also reduces carbon emissions by 6,000 tonnes a year.

Supporting recommendations

Several of our core recommendations support greater circularity in our water systems, particularly those like Recommendation 5 relating to working with states and territories on harmonising rules. These supporting recommendations expand on the relevant core recommendations and illustrate how they can apply to water.

'All options on the table' in the National Water Initiative

The National Water Initiative (NWI) is a shared commitment by the Australian Government and state and territory governments to increase the efficiency of Australia's water use, provide investment confidence, supply security for rural and urban communities and provide greater certainty for the environment.[126]

There is an opportunity to consider how circular economy actions in water, such as water efficiency and reuse, can support climate change and water security outcomes and hence be included in the NWI. In addition, the Australian Government should review other policies relating to water, like the Healthy Drinking Guidelines, to ensure they are water source agnostic, further supporting this approach.

Including water reuse as an option in urban water planning would support greater uptake of the approach and allow better consideration of the trade-offs between different water supply options. It would also help destigmatise water reuse in the broader community.

Reduce barriers for markets for biochar and other organic materials

Australia lacks a stable market for biochar, with limited incentives to scale operations. Similar to other waste products outlined in Chapter 5, biochar faces barriers such as uncertain demand and outdated definitions of 'waste', which undermine its competitiveness. Recognising biochar as a resource rather than a waste product under state and territory regulations is a crucial first step towards developing its market. Biochar should be prioritised as an early opportunity under core Recommendation 5, highlighting its potential as a productivity driver for the economy.

In addition to its market potential, biochar offers significant emissions reduction and carbon sequestration benefits that remain untapped. The Australian Government should invest in research to establish a framework for accounting for biochar's carbon sequestration potential in the National Inventory. Notably, New Zealand has already identified biochar as a research priority for its 2023–24 Greenhouse Gas Inventory Research Fund.[127]

Build integrated water cycle management into Australian Government precinct policies

The Australian Government has a number of policies supporting industrial precincts, including the Net Zero Economy Precincts and Hydrogen Hubs. These policies should factor in circularity requirements, including opportunities to reduce water use and lift water efficiency, through mechanisms like recycling water onsite.

Glossary

ITEM	DESCRIPTION
Anaerobic digestion	Anaerobic digestion is a process that uses microorganisms to break down organic materials without oxygen to produce biogas and compost.
Blockchain technology	Blockchain technology is a structure that stores transactional records, also known as the 'block', of the public in several databases, known as the 'chain', in a network connected through peer-to-peer nodes.
Biochar	Biochar is charcoal, sometimes modified, that is intended for organic use, as in soil.
Circular economy	Circular economy is an economic model that promotes sustainable and efficient use of resources as a way to support environmental, economic and social outcomes. It shifts away from the current linear 'take, make, dispose' consumption approach to one that maintains a circular flow of materials by recovering, retaining or adding to their value.
Circularity	Circularity is a property of products that all materials used in a product can be recycled several times and kept in almost closed loops. In economics, circularity means a product, service or resource is renewed or regenerated, rather than wasted. Circularity uses creativity and systems thinking to eliminate waste and extend the life of important natural resources.
Circularity rate	A circularity rate is a unit of measurement used to define a percentage of total material use. A higher circularity rate means more secondary materials are substituting primary raw materials, which reduces the environmental impacts of extracting primary materials.
Compound annual growth rate (CAGR)	The compound annual growth rate is the rate of return that an investment would need to have every year in order to grow from its beginning balance to its ending balance, over a given time interval.
Conference of the Parties (COP)	The COP is an international climate summit held annually. At COPs, world leaders gather to work together on solutions to tackle climate change.
Ecolabelling	Ecolabelling is a voluntary method of environmental performance certification and labelling used globally. An ecolabel identifies products or services that are environmentally preferable against a science-based standard.
Economic Complexity Index (ECI)	The ECI and Product Complexity Index (PCI) are measures of economic activity that have been shown to provide useful insights into the types of activities that distinguish prosperous from less prosperous places.
Environmental, social and governance (ESG)	ESG frameworks include a mix of platforms, standards and recommendations that guide companies through the ESG reporting process and shape the reports they produce. Various frameworks are available, each with its own set of key performance indicators and reporting requirements or guidelines.

GLOSSARY

ITEM	DESCRIPTION
Feedstock	A feedstock, also known as a raw material, unprocessed material or primary commodity, is a basic material that is used to produce goods, finished goods, energy or intermediate materials that are feedstock for future finished products.
Financial framework	A financial framework is a system, including policies, procedures, regulations and standing orders, that guides and supports the structure and operations of all financial matters for a business.
Gangue	Gangue is a commercially valueless material in which ore is found.
Green bonds	Green bonds are bonds that are used to finance new and existing projects that offer climate change and environmental benefits.
Green chemistry	Green chemistry is a science-based approach to chemical design and processes that aims to make them more sustainable and less hazardous. It is applied throughout a chemical's life cycle, from its creation to its disposal.
Greenwashing	Greenwashing is when a company makes misleading claims about the environmental benefits of its products.
Industrial symbiosis	Industrial symbiosis is the association between industrial facilities or companies in which the waste or by-products of one become raw materials for another.
Indigenous Knowledge systems	Indigenous Knowledge systems are collections of knowledge that are unique to a particular culture or society. They are also known as traditional knowledge or traditional cultural expressions.
Intergovernmental Panel on Climate Change (IPCC)	The IPCC is an intergovernmental body of the United Nations. Its job is to advance scientific knowledge about climate change caused by human activities.
International Sustainability Standards Board (ISSB)	The ISSB was born from COP26 in Glasgow. It has developed standards and set a high-quality, comprehensive global baseline of sustainability disclosures focused on the needs of investors and the financial markets.
Linear economy	A linear economy is one in which finite resources are extracted to make products that are used – generally not to their full potential – and then thrown away ('take-make-waste').
Material footprint	Material footprint refers to the total amount of raw materials extracted to meet final consumption demands. It is one indication of the pressures placed on the environment to support economic growth and to satisfy the material needs of people.
Material productivity	Material productivity is the amount of economic output or value added generated per unit of materials consumed. Economic output is based on gross domestic product (GDP) and materials consumed is the total amount of material directly used in an economy, which is calculated as domestic material consumption (DMC).
Micro-credentials	Micro-credentials are short, focused courses that teach skills needed for jobs or community needs. They are recognised by employers and schools and can help you get a job or continue your education.
Minerals beneficiation	Mineral beneficiation is the science and art of separating valuable metallic and non-metallic minerals from unusable gangue minerals.

GLOSSARY

ITEM	DESCRIPTION
Nationally Determined Contributions (NDCs)	NDCs embody efforts by each country involved in the Paris Agreement to reduce national emissions and adapt to the impacts of climate change.
National Environment Protection Measure (NEPC)	The National Environment Protection (Used Packaging Materials) Measure is a measure under the Australian Government to minimise the overall environmental impacts of packaging in Australia.
Organisation for Economic Cooperation and Development (OECD)	The OECD is a forum where the governments of 37 democracies with market-based economies collaborate to develop policy standards to promote sustainable economic growth.
Polycrisis	The concept of polycrisis captures the complexity and interconnectedness of the challenges facing humanity in the 21st century.
Small to medium enterprises (SMEs)	SMEs are defined as businesses with fewer than 200 employees. This category includes micro-enterprises (1–4 employees), small businesses (5–19 employees), and medium-sized businesses (20–199 employees).
Sustainable Development Goals (SDGs)	The SDGs are a list agreed upon by 193 nations that help make the planet and communities stronger.
Sustainability	Sustainability depends on maintaining or enhancing the wellbeing of society over time, and therefore requires that the total economic, social and natural capital is maintained or improved for future generations.
Tailings	Tailings are the left-over materials from the processing of mined ore. They consist of ground rock, unrecoverable and uneconomic metals, chemicals, organic matter and effluent from the process used to extract the desired products from the ore.
Transition broker	Brokers connect businesses, government agencies, and other stakeholders. They identify opportunities for resource sharing, waste reduction and sustainable practices, helping to implement strategies that promote recycling, reuse and the efficient use of resources. A successful Australian transition will depend on place-based circular economy transition brokers.
United Nations Framework Convention on Climate Change (UNFCCC)	The UNFCCC started in 1994. With around 198 countries participating, the event has a near-universal membership with the goal to stabilise greenhouse gas concentration 'at a level that would prevent dangerous anthropogenic (human induced) interference with the climate system'.
Value chain	A value chain refers to the full life cycle of a product or process, including material sourcing, production, consumption and disposal/ recycling processes.
Valorising	Valorising is the act of thinking or stating that something has value or is valuable.
Virgin materials	Virgin materials are materials that have not yet been used in the economy. These include both finite materials (e.g. iron ore mined from the ground) and renewable resources (e.g. newly produced cotton).

Appendices

Appendix A – Recommendations

Core recommendations

Recommendation 1	**Introducing a new National Circular Economy Policy Framework** Develop a new National Circular Economy Policy Framework for Australia that includes ambitious and achievable targets and clearly defined priorities, and highlights discrete market opportunities. The national policy framework should establish the pace and direction for Australia's transition, clearly outlining priorities for governments, industry, researchers and others to focus their efforts towards.
Recommendation 2	**Mainstreaming circular economy principles in policies and programs** Embed circular economy principles across Australian Government policies and programs, particularly: • net zero and climate policies – including Australia's Nationally Determined Contribution and Sustainable Finance Strategy – recognising the benefit of a circular economy to Australia's emissions reduction goals and a sustainable net zero transition • Australian Government policies and programs, including grants and procurements, that significantly influence materials production and use, or where incorporating circular economy principles advances the program's objectives • Australian Government corporate planning and reporting processes.
Recommendation 3	**Recognising First Nations peoples and Knowledge systems** A truly Australian circular economy must recognise the rights of First Nations peoples and integrate their Knowledge systems and practices into our transition by: a) Recognising the status of First Nations peoples, and their inherent rights as custodians of land, waters and Knowledge systems by adopting the principles of Indigenous self-determination and free prior and informed consent. Recognise also that First Nations peoples' Knowledge systems and practices implement a respectful relationship, with land, water and species, utilising design principles that align with circularity. b) Recognising and valuing First Nations peoples' Knowledge systems and practices, adopting them where permitted and possible, ensuring proper permissions, recognition, attribution and remuneration. This includes actively respecting and incorporating First Nations Cultural Land, Water, and Biodiversity Practices into Australia's transition to a circular economy.

Recommendation 4	**Legislating for a circular future: a Circular Economy Act** Introduce a Circular Economy Act that provides an overarching, integrated regulatory framework for the Circular Economy. The Act should equip the Australian Government with a streamlined, agile and proactive tool to regulate the environmental performance of materials and products, including imports, in line with the priorities of the National Circular Economy Policy Framework. Priorities include: • clear objectives and circular economy principles embedded into the purpose of the Act • a clear framework for setting design rules for products and labelling their performance, similar to the EU's Ecodesign for Sustainable Products Regulation. These design rules should allow the setting of circular economy requirements for products including on durability, repairability, recyclability and the presence of chemicals of concern • a regulatory framework for product stewardship that provides an enhanced focus on mandatory participation, reporting, measurement and governance principles • mandatory disclosure by relevant businesses relating to resource efficiency and waste, including disposal of unsold goods • mandatory product stewardship / extended producer responsibility for priority materials/streams as a priority • a proactive and transparent implementation approach that includes a forward workplan describing how priority products will be determined and regulated, including a more strategic and targeted approach to extended producer responsibility • more information for consumers about the environmental performance / circularity of products. An initial focus on durability and repairability including for consumer electronic products and appliances would be consistent with the recommendations of the Productivity Commission right to repair, with additional opportunities including the circularity performance of textiles and other priority products such as batteries and furniture. This needs to be adequately resourced to support implementation of workplans and effective monitoring and enforcement to ensure compliance. The regulatory framework could be achieved through a new Act or by amending the *Recycling and Waste Reduction Act 2020.*
Recommendation 5	**Harmonising circular economy rules to boost productivity** Develop, with states and territories, a new governance model to modernise and harmonise regulations, standards and specifications related to the circular economy, resource recovery and waste that will accelerate productivity and support industry to innovate and scale. This model should: • have a clear mandate and authority to coordinate and align standards across jurisdictions • have a time-bound delivery of results to ensure meaningful actions are achieved • have inclusive representation from all relevant sub-national entities • have an independent chair to facilitate impartial decision-making • have industry engagement and input into identifying the significant regulatory barriers and market opportunities.

Recommendation 6	**Using public procurement to grow and diversify markets** a) Leverage Commonwealth procurement power to drive uptake of circular goods and materials in the Australian economy – for example, by setting clear targets for recycled materials, prioritising product-as-a-service models and creating incentives for repairable, recyclable designs and for sharing resources. b) Include circularity requirements in all major agreements relating to procurement of materials, products and services – for example, the Federation Funding Agreements related to infrastructure and transport – and support adoption of circular economy requirements in state, territory and local government procurements.
Recommendation 7	**Partnering internationally** Develop supply chain partnerships for circular materials and green industries with strategic international partners, particularly in the region. These could be through bilateral agreements, regulatory cooperation, standards harmonisation (including mutual recognition agreements, and mirroring regulations with the European Union), and joint research and innovation programs. This will strengthen Australia's competitiveness in circular goods and services while closing supply chain loops.
Recommendation 8	**Unlocking Australia's competitive innovation edge through the circular economy** A more strategic approach to innovation funding and support will drive a higher proportion of market-disrupting innovations, including whole-of-supply-chain innovation: a) Integrate circular economy priorities into the investment foci and selection criteria of the government's innovation funding programs, guided by the overarching National Circular Economy Policy Framework. b) Prioritise venture capital funding and shared infrastructure access for startups aligned with circular economy goals, focusing on early-stage companies while also supporting growth-stage businesses with proven circular models ready to scale. This focus should be captured in the investment priorities of the Clean Energy Finance Corporation, National Reconstruction Fund and CSIRO venture capital funds. c) Consider a 'challenge-based' approach to innovation and research funding, which targets systemic circular economy barriers and aligns with national priorities. Challenge-based funding should be flexible in scale to support large-scale systemic change and agile targeted solutions. d) Support greater collaboration between Australian businesses to work together to innovate and progress Australia's circular economy transition, including through: • hosting regular circular economy showcases to bring together innovators, investors and policy decision-makers • establishing a network of Australian circular economy innovators to support the exchange of circular economy good practice and inform policy development and investment • empowering transition brokers in regions, precincts and sectors like the built environment to facilitate local transitions (see Recommendation 12) • getting competition settings right to ensure businesses can collaborate and coordinate across supply chains to develop circular economy solutions • supporting businesses to collaborate on sharing infrastructure and equipment that support circular economy activities.

Recommendation 9	**Embedding circularity in sustainable finance and corporate strategies** a) Expand the scope of Australia's sustainable finance taxonomy and Green Bond Framework to capture a broad range of circular practices and metrics, particularly in relation to its benefits in abating scope 3 emissions, in line with international best practice. At a minimum, include 'do no significant harm' requirements for the circular economy in the taxonomy. b) Support businesses to reflect emissions reductions associated with circular economy practices in newly mandated climate disclosure requirements and transition planning. c) Encourage broader, voluntary sustainability reporting aligned with the materials/resource-focused aspects of International Financial Reporting Standards (IFRS) S1 and eventually mandate disclosure of sustainability-related risks and opportunities. d) Explore opportunities to raise the profile of circular economy activities in directors' duties.
Recommendation 10	**Giving industry a front door to circular economy expertise** Ensure industry front-door services in government have access to circular economy expertise and can support businesses to collaborate up and down supply chains. These services should be capable of supporting small to medium enterprises as well as larger organisations, recognising the different business needs and level of support required.
Recommendation 11	**Defining and building skills in the existing and emerging workforce** a) Define and track circular economy jobs and skills, including workforce needs, potentially as part of Jobs and Skills Australia's regular reporting. Focus areas should align with the priorities outlined in the National Circular Economy Policy Framework. b) Support development of micro-credentials that help professionals build expertise in circular practices and thinking, enabling them to contribute effectively to a more sustainable and resilient economy. c) Support a challenge-based undergraduate competition to drive circular economy innovation and equip the emerging workforce with essential skills in systems thinking, cross-disciplinary collaboration, and problem-solving, aligned with the future emerging technology and skills needs required by industry.

Recommendation 12	**Supporting place-based transformation: regions, remote, precincts and regeneration** a) **Regions:** Include 'circular economy' as a priority in the Regional Development Australia charter – supporting more place-based circular economy transition brokers. Support the development of a common approach to collecting regional circular economy data. Empower local transition brokers through guidance and support including connecting transition brokers through a 'community of practice' b) **Remote Australia:** Provide grant funding to support circularity in remote and very remote Australia, including supporting waste collection and recycling as well as re-processing and re-manufacturing. c) **Precincts:** Ensure supports for precincts (e.g. regional hydrogen hubs, net zero and advanced manufacturing precincts) encourage adoption of circular economy principles into the precinct design and operation. d) **Regeneration:** Across all these place-based interventions, the circular economy transition should include consideration of the need for restorative practices to support natural systems and improve resource cycles reflecting the practices of First Nations peoples. In addition, regional and remote transition activities provide opportunities to engage with First Nations peoples and businesses.
Recommendation 13	**Partnering with First Nations enterprises, people and communities** First Nations communities and enterprises will play a critical role in Australia's circular economy transition and should be engaged early and on an ongoing basis. To ensure this, we recommend: a) Prioritising early and comprehensive engagement with First Nations Peoples' and communities in circular economy initiatives to ensure their Knowledge systems, values and priorities shape Australia's transition. This includes ensuring initiatives are informed by and harmonise with First Nations led research and development and community and business projects and prioritise circular economy opportunities for First Nations peoples in clean energy strategies, net zero and renewable energy strategies and initiatives. b) Identifying new opportunities for partnership where First Nations peoples Knowledge systems and practices will contribute to circular economy outcomes, ensuring these Knowledge systems, practices and contributions are properly recognised, remunerated and protected where necessary. c) Facilitating and supporting First Nations community and business opportunities to lead, engage and partner in the circular economy by providing information, building expertise, and supporting Indigenous led research and development, as well as public and private investment in circular economy and related initiatives. Raise the profile of the circular economy as an opportunity for First Nations enterprises, by highlighting businesses already engaging in the circular economy and supporting organisations that build capacity for First Nations enterprises to engage in Australia's transition.
Recommendation 14	**Empowering consumers and communities by building circular economy literacy** Ensure new programs and reforms support consumer and community participation in the circular economy. This should include, for instance, implementing packaging disclosure requirements for online retailers, prioritising product durability information in regulatory disclosures (as outlined in Chapter 4), and establishing repairability ratings to guide consumers towards sustainable choices. It should also include building literacy and capacity for the community to engage in the circular economy.

Supporting recommendations

The built environment

a) Develop a national built environment circular economy strategy

A national circular economy strategy for the built environment – developed in collaboration by government and industry – would provide a unified framework for aligning stakeholders on goals, standards and practices, facilitating greater collaboration and accelerating progress.

b) Include circular economy and 'design for end of life' in the National Construction Code

The Australian Building Codes Board should update the National Construction Code to address, in new buildings and fit-outs, embodied carbon and circular practices that better account for end of life for buildings, such as designing for disassembly, reuse and recycling. The board should consider more generally how to support the circular economy through their decision-making – for example, how the code can support record keeping of materials across the life of buildings to support reuse at end of life.

c) Support uptake of low-carbon, circular materials through certification and standards

In Australia, the lack of streamlined standards, certification and specifications for recycled materials is a major barrier to circular and low-carbon construction of buildings and infrastructure. Certification processes for recycled materials are often lengthy and complex, causing project delays and discouraging the use of sustainable materials. We recommend these issues be considered as part of our recommendation to harmonise waste and recycling rules (see Recommendation 4).

Food and agriculture

a) Leverage existing food and agricultural programs to support circularity

Achieving a circular economy in Australia's food and agriculture sectors will require alignment of existing government policies and programs with circular economy approaches, including those related to food waste reduction but also more broadly to our agriculture and food supply chains. We recommend the Australian Government embed circular principles and criteria into existing agricultural and food programs, aligning to core Recommendation 2.

b) Provide business support and training for small to medium enterprises (SMEs)

Government and industry programs, policies and investment that support circularity in Australia's food system need to shift to accommodate the variation in size, need and capability of businesses, rather than adopting a 'one-size-fits-all' approach. Grant and loan opportunities could be tiered to the size of a business and structured education opportunities could be offered to small to medium enterprises to ensure they are well versed in circularity, giving them the confidence to develop and implement circular approaches in their business models.

c) Leverage environmental, social and governance (ESG) reporting to drive circularity and cut emissions in food supply chains

The Australian Government has an opportunity to collaborate with food retailers to embed circular economy principles and activities into their ESG frameworks, particularly for reporting on scope 3 emissions. This could include developing consistent and standardised data reporting approaches that capture the full impact of emissions-reducing circular actions. The government can also play an advisory role, disseminating knowledge on effective circular economy initiatives that lower emissions and improve supply chain resilience.

Resources

a) Provide pre-competitive information supporting secondary processing and second life

We recommend expanding on Geoscience Australia's Atlas of Mine Waste to include market analysis of high-priority secondary minerals with strong economic potential or those critical to sovereign capability. Significant opportunities exist for extracting critical minerals from mining tailings and secondary resources like e-waste, but limited economic analysis and market volatility hinder investment decisions. Providing pre-competitive information on waste stockpiles and market dynamics will help industry stakeholders assess economic viability, adapt to evolving technologies and unlock the value of these resources.

b) Embed circular economy into environmental, social and governance (ESG) frameworks

We recommend embedding circular economy principles into ESG frameworks to enhance Australia's mining industry's competitive edge and encourage further innovation. Australian mining companies include leaders in innovation and ESG practices, resource efficiency, waste valorisation and advanced technologies that improve operational efficiency and reduce mine waste. Incorporating circularity into ESG criteria would not only strengthen the sector's appeal to global investors and premium markets but also drive further innovation, such as co-extraction activities.

c) Increase research capability and coordination

Australia's resources sector has shown strong innovation, but its research and development capabilities fall short of what is needed to advance a circular economy at the required scale and pace. A lack of coordinated vision and sustainable mining goals hampers progress, while an emerging skills gap – exacerbated by declining interest among young professionals – further restricts research and development growth. The Australian Government should collaborate with the sector, its value chain and leading research institutes to establish clear priorities for advancing circularity, including enhancing secondary processing capabilities.

Water

a) 'All options on the table' in the National Water Initiative

Including water reuse as an option in urban water planning would support greater uptake of the approach and allow better consideration in the trade-offs between different water supply options. It would also help destigmatise water reuse in the broader community. There is an opportunity to consider how circular economy actions in water, such as water efficiency and reuse, can support climate change and water security outcomes and hence be included in the National Water Initiative. In addition, the Australian Government should review other policies relating to water, like the Healthy Drinking Guidelines, to ensure they are water source agnostic, further supporting this approach.

b) Reduce barriers for markets for biochar and other organic materials

There is currently no stable market in Australia for biochar or other organic materials from wastewater treatment, and a lack of incentives to scale operations. The issues faced by biochar are similar to the barriers outlined in Chapter 5 for waste products generally: uncertain demand and outdated definitions of 'waste' that reduce competitiveness. It is recommended biochar and these other organic materials be one of the early opportunities considered under core Recommendation 4 as a potential productivity lifter for our economy.

c) Build integrated water cycle management into Australian Government precinct policies

The Australian Government has a number of policies supporting industrial precincts, including the Net Zero Economy Precincts and Hydrogen Hubs. These policies should factor in circularity requirements, including opportunities to reduce water use and lift water efficiency, through mechanisms like recycling water onsite.

Appendix B – Advisory Group members, meetings and engagements

Professor John Thwaites (Chair)

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Australia's Chief Scientist

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Board of Australian Sustainable Finance Institute

Michael Jackson

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Samantha Read FRACI GAICD

CEO, Chemistry Australia

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Founding Director, Factory of the Future at Tonsley Innovation District

Paul Klymenko

Co-founder, Planet Ark

John Gertsakis

Director, Product Stewardship Centre of Excellence

Dr Dominique Hes

Chair, Board of Greenfleet

Meetings and engagement

Date	Meeting/action	Ministerial attendance	Stakeholder engagement
20 Feb 2023	***Develop work plan***	Minister for the Environment and Water, the Hon Tanya Plibersek MP Minister for Industry and Science, the Hon Ed Husic MP	N/A
2 May 2023	***Circular design and consumption of products***	Minister for the Environment and Water, the Hon Tanya Plibersek MP Minister for Trade and Tourism, Senator the Hon Don Farrell	• Design roundtable (1 Jul 2024)
14 Aug 2023	***Built environment and net zero***	Minister for the Environment and Water, the Hon Tanya Plibersek MP Minister for Climate Change and Energy, the Hon Chris Bowen MP	• Construction sector industry survey (April/May 2023) • Built environment roundtable (25 May 2023)
9 Oct 2023	***Economics and indicators***	Minister for the Environment and Water, the Hon Tanya Plibersek MP Treasurer, the Hon Dr Jim Chalmers MP	• Superannuation roundtable (25 Sep 2023)
12 Mar 2024	***Innovation and skills***	Minister for the Environment and Water, the Hon Tanya Plibersek MP Minister for Skills and Training, the Hon Brendan O'Connor MP Minister for Education, the Hon Jason Clare MP	• Plastics industry survey (Feb/March 2024) • Plastics innovation roundtable (1 Mar 2024)
Apr 2024	***Interim report***		
29 Apr 2024	***Food and agriculture, resources***	Minister for the Environment and Water, the Hon Tanya Plibersek MP Minister for Resources and Northern Australia, the Hon Madeleine King MP Minister for Agriculture, Fisheries and Forestry, Senator the Hon Murray Watt	• Food system roundtable (9 Apr 2024)
5 Aug 2024	***Place-based, First Nations and water***	Minister for the Environment and Water, the Hon Tanya Plibersek MP Minister for Regional Development, Local Government and Territories, the Hon Kristy McBain MP	• First Nations roundtable (5 Jul 2024)
6 Aug 2024	***Recommendations development***	N/A	N/A
End of 2024	***Final report***		

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