Investor Group on Climate Change

Regenerate & Restore

A circular economy discussion paper for investors

About the Investor Group on Climate Change

IGCC is a collaboration of Australian and New Zealand institutional investors focused on the impact of climate change on investments.

IGCC represents investors with total funds under management of over A$3 trillion in Australia and New Zealand and A$33 trillion worldwide. IGCC members cover over 7.5 million people in Australia and New Zealand.

igcc.org.au

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1 EXECUTIVE SUMMARY

In what has been called the decisive decade for climate action, investors are increasingly exploring systemic approaches that have the potential to reduce emissions while simultaneously addressing other important environmental and social goals.

One such approach is to adopt a circular economy model, which aims to decouple economic activity from the consumption of finite resources. It is based on three key principles:

1. designing waste and pollution out of the system
2. keeping products and materials in use and at the highest value for as long as possible
3. regenerating natural and social systems.

While transitioning the energy system to renewable generation is intrinsic to circular economic activity and can address around 55 per cent of global emissions, addressing the remaining 45 per cent requires us to reduce the emissions profile of industry, agriculture, forestry and other land use; essentially our economies' current modes of production and consumption.

Advocates for a circular economy contrast the approach with the currently dominant linear approach, which relies on vast quantities of apparently cheap resources, energy, materials, labour and capital. The linear model also does not account for the waste and pollution (including carbon and methane emissions) that are by-products of many economic activities, nor does it account for the loss of biodiversity or environmental resilience.

Climate Mitigation and Resilience

The fundamental links between circular economy ideas and emissions reductions are in our energy systems and how our current economy makes and uses products and food.

Current energy systems produce the majority of global emissions; however, circular practices also bring significant opportunities to mitigate climate risk from industry and agriculture, forestry and other land use.

- Within agriculture and the global food system, there are potential emissions reductions of 49 per cent below the baseline sector-wide 2050 scenario.
- Eliminating waste, re-using products and recirculating cement, steel, plastic and aluminium may reduce emissions by 40 per cent (or 3.7 billion tonnes) below the baseline 2050 scenario.
- A more circular scenario for the built environment may find 2 billion of the 3.7 billion tonnes of potential emissions reductions identified in the circulation of key materials.

The Investment Opportunity

A circular economy may present a considerable opportunity for institutional investors in financial returns, climate solutions and emissions reductions, and other parts of their environmental, social and governance (ESG) considerations.

In 2021, PWC valued the circular economy's potential in Australia at A$2 trillion over the next 20 years. A circular economy could abate 165 million tonnes of carbon pollution each year in Australia.

In Europe, circular initiatives throughout the construction, food and transport sectors are predicted to yield annual benefits of up to €1.8 trillion (US$2.1 trillion) by 2030.

Less than 9 per cent of the resources in the global economy are managed along circular principles, which suggests approximately 90 per cent of resources may be under-utilised.

Australia may have a particular economic opportunity. The country extracts and uses primary resources at double the OECD benchmark but generates only half the value of the OECD benchmark per kilogram of natural resources.

There are five readily identifiable circular business models that investors might watch for:

- **Circular supplies**
  replacing traditional material inputs with bio-based, renewable or recovered materials
- **Resource recovery**
  leveraging technology to recover and re-use resource outputs
- **Product life extension**
  extending the life cycle of products and assets
- **Sharing platforms**
  sharing under-utilised products and materials
- **Product to service**
  offering products through a lease or pay-for-use arrangement instead of ownership.

In scanning for opportunities, an additional useful lens might be the higher the resource intensity and lower the resource utilisation, the greater the opportunity there could be for progress in the circular economy.

Policy and Regulatory Support

Although policy in Australia remains inconsistent, the Australian Government has helped create the Australian Circular Economy Hub (ACE Hub), and the CSIRO has published a Circular Economy Roadmap for key sectors.

In Aotearoa, New Zealand, the Sustainability Business Network has released a 'Going Full Circle' report with Auckland as the case study. In 2020, Tātaki Auckland Unlimited partnered with Circularity to design and deliver XLabs, New Zealand's first circular economy lab, in partnership with The Ministry for the Environment Manatū Mō Te Taiao.

The European Union (EU) provides stronger support for circular practices. It has targeted a material footprint reduction of 50 per cent by 2030, 75 per cent by 2050 and an increase in the material re-use rate to at least 25 per cent by 2030. EU climate taxonomy regulation is expected to expand to incentivise a transition to a more circular economy.

Next Steps and Recommendations

Investors have an important potential role in driving progress towards a more circular economy, which would help reduce emissions and climate risk, restore resilience and protect the long-term financial interests of beneficiaries.

Embed Circular Economy Considerations Within Existing Frameworks

IGCC and its global peers recommend adopting a 'four P's' approach to climate-aligned investing: Plan, Pledge, Progress and Publish. This is also highly relevant to circular economy activities.

Investors can incorporate circular economy practices within the Taskforce on Climate-Related Financial Disclosures (TCFD); the Paris Aligned Investment Initiative (PAII's) Net Zero Investment Framework, Investor Climate Action Plans and Climate Action 100+ engagement expectations, among others.

To start, investors can begin building their organisational capability with four stages:

- **Governance**
  build an understanding of circular economics across internal teams and key decision-makers
- **Integration**
  consider adding new circular economy analysis within company and portfolio risk and emissions assessments
- **Allocation**
  monitor existing exposures to companies delivering circular economy solutions and consider new mandates targeting emerging circular economy solutions, especially in private markets
- **Engagement**
  consider integrating circular economy questions in existing engagement activities, particularly where companies have exposure to diversified mining, steel, cement, food and beverage, aviation and construction. Also, consider engagement with policymakers and regulators.

Appendix A of this report provides investors with resources and engagement questions relevant to some sectors and industries with significant circular potential.

2 INTRODUCTION

The 2020s are the Decisive Decade

Investors are at a crucial point in what has been called the decisive decade for climate change mitigation. It is widely acknowledged that climate change is a severe risk to portfolios and to beneficiary returns and that the trillions of dollars under institutional investors' management represent a significant potential resource to capitalise climate solutions.

In this context, some in the investor community are investigating fresh approaches to improving climate-related economic factors. These include:

- reducing emissions and resource intensity
- valuing and utilising materials
- restoring and regenerating the natural systems that support societal prosperity.

Although many investors have focused on emissions reductions, whether through engaging business and policymakers or managing their portfolios, some leaders are urging a more systemic view, whereby their approach to decarbonisation is integrated with broader environmental and social goals. This intellectual approach is viewed as more complete, reflecting the complexity and interconnectedness of this decade's challenges and solutions.

The circular economy model is, therefore, particularly current.

The Purpose of This Discussion Paper

This discussion paper provides the investment industry and its stakeholders with a broad understanding of the circular economy and the potential that circular economy practices and frameworks may have to meet investors' climate goals.

It suggests a set of intellectual tools investors may use, showcases examples of where circular practices are already being implemented in relevant contexts and outlines potential next steps for implementing circular economy practices and principles in their portfolios.

We hope and expect this paper will also trigger further industry discussions on the circular economy and help investors apply the concept to their pressing emissions reductions goals and the resilience of their whole portfolios.

We trust that this research will open new perspectives and prompt investors to ask new, useful questions. We look forward to hearing your reactions and seeing the developments to come.

3 A CIRCULAR ECONOMY DEFINITION AND PRIMER

Contrasting Circular and Linear Economic Models

A circular economic approach is based on three key principles:

1. designing waste and pollution out from economic activity
2. keeping products and their materials in use and at their highest value for as long as possible, and
3. regenerating natural and social systems.

Advocates for a circular economy contrast this approach with the currently-dominant linear economic approach that, they say, 'takes, makes, and wastes'. They note that, although the living standards of millions have improved markedly over the past 150 years, to deliver mass production and feed mass consumption most advanced economies rely on extracting vast quantities of apparently cheap resources, energy, materials, and are also fuelled by cheap labour and cheap capital.

Waste created at each stage of that linear process is not adequately accounted for under the linear model. However, that waste should be recognised as a collective cost and is now visible in the growing list of connected systemic problems, including climate change, air and water pollution and biodiversity loss.[1] Therefore, the overall cost of the linear model is a looming cumulative debt payable by the natural environment and current and future generations.

The global economy currently uses 74 per cent more biological resources than what the planet's ecosystems can regenerate on an annual basis.[2] Less than 9 per cent of the resources in the global economy are managed along circular principles. According to some calculations, this suggests around 90 per cent of extracted resources are being under-utilised or wasted.[3] Australia may have a particular economic opportunity. Australia extracts and uses 38 tonnes of primary resources per capita each year, double the OECD benchmark. Yet the country generates only US$1.28 of output for every kilogram of material consumed, less than half the OECD benchmark.[4]

The shocks of climate-related natural disasters, the war in Ukraine's impact on energy supplies, and the pandemic have also highlighted the weaknesses of understanding and shaping economies with a linear model.

There is growing awareness of the benefits of moving to a less linear economy. In June 2020, during the first wave of the COVID-19 pandemic, more than 50 chief executives and global leaders endorsed the circular economic model as a solution to 'build back better', facilitating a greener, sustainable economic recovery.[5]

Figure 1: Linear, recycling and circular economies' waste production, or lack thereof. *Figure Source: Coreo*

Comparatively, circular economy advocates aim to gradually decouple economic activity from the consumption of finite resources and the emission of pollution. Crucially, in a circular model, energy production also comes from renewable sources.

Examples Of Circular Economy Practices in Business

- The electronics company Phillips, a major supplier of healthcare appliances, has committed to generating 25 per cent of its revenue from circular products, services and solutions.

  They offer trade-in on all professional medical equipment, taking responsibility for repurposing, refurbishment, repair and remanufacturing. These activities gradually decouple the need to extract new materials and resources from economic production.

  Phillips is also aiming to send zero waste to landfill and has requested that at least 5 per cent of its suppliers commit to CO_2 emissions reductions by 2025. Phillips says that decarbonising their supply chain will have a potential impact seven times greater than reducing CO_2 emissions in their own operations.[6]

- Steel company ArcelorMittal has recognised that steel can be a permanent, highly transformable material and has adopted circular principles in trialling two circular business models;

  ArcelorMittal offers short-to-medium term leases of steel piling sheets (used to retain earth on construction sites), allowing building contractors to access only the amount of sheets needed for each specific project, thus reducing steel consumption and their working capital requirement.

  ArcelorMittal also offers a sale and buyback program. At the end of a construction project, contractors can either keep the sheet piles for another project or return them to the manufacturer at a pre-negotiated price.[7]

- Rio Tinto applies circular principles in its Nuton™ copper heap leaching technology. The technology combines tailings and bacteria to extract copper from low-grade ores (material that would otherwise be waste). According to Rio Tinto, the process recovers up to 80 per cent of the copper in the ores, is more efficient in its water usage and produces copper with lower carbon intensity.[8] The process does more with less, turns an environmental and financial liability (the ores) into an asset, has helped make it economically feasible to properly remediate a mine site and reduces economic pressure to extract more finite resources.

More detailed circular economy case studies can be found on pages 16, 21, 24, 25, and 29.

Materials and Circularity

Technical and Biological Materials

The circular economic model distinguishes between technical and biological materials. Biological materials like cotton, food and wood can be returned to regenerate our natural systems (i.e., soil), providing renewable resources for economic activity. Technical materials (i.e., steel and oil-based plastics) are treated as hard durables that should be recovered and restored through strategies like re-use, repair, remanufacture or, as a last resort, recycling.

An important observation that informs circular economy thinking is that materials never leave the biosphere; they simply change form depending on how they are valued.

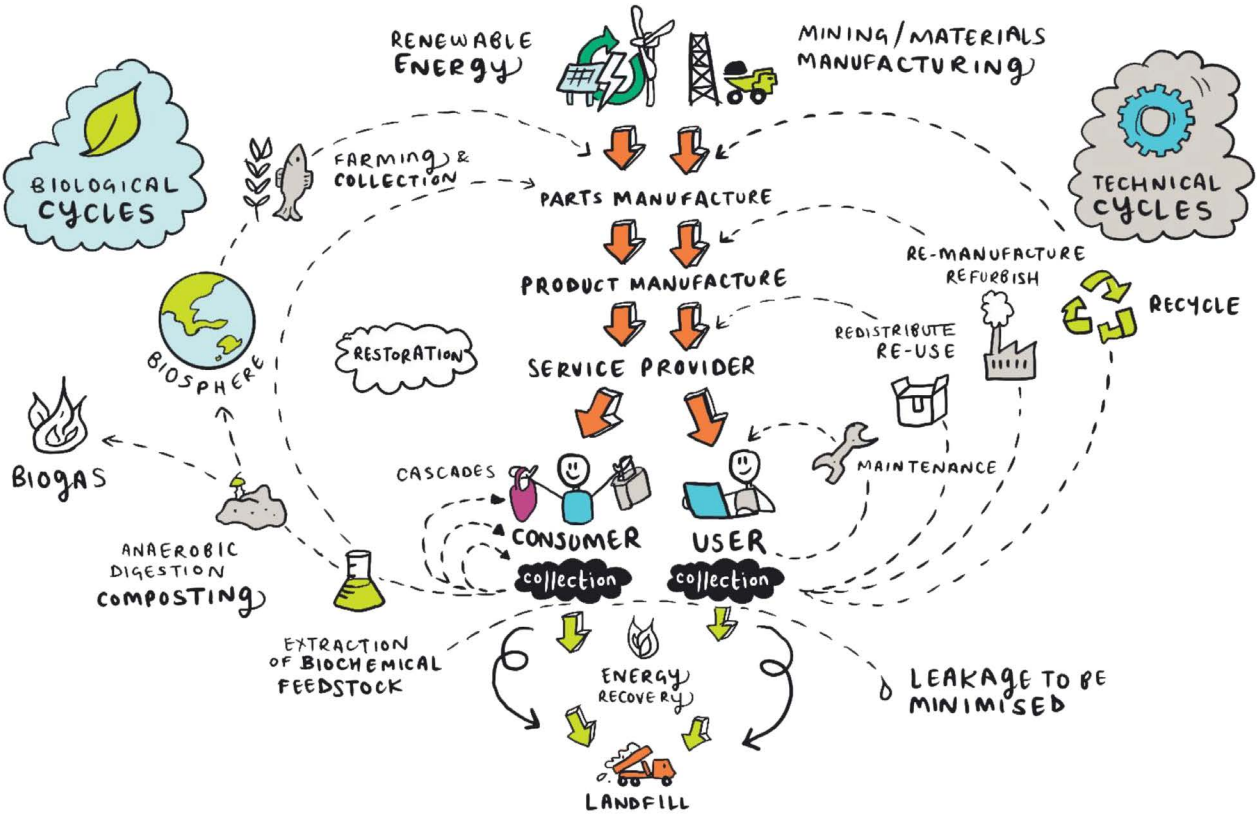


Figure 2: Cycles for technical and biological materials. *Figure Source: Coreo*

Efficiency, Effectiveness, Resilience and De-Risking

In theory, businesses or networks adopting a circular model can reduce their use of materials from external sources, potentially reducing energy and waste management costs. Given the greater control over supply chains (or loops), circular practices may also mitigate exposure to market risks such as commodity price fluctuations and extended linear supply chain risks while enhancing responsiveness to regulatory and consumer changes.

An economy comprising many loops rather than branching supply lines may provide more effective feedback and synergies. It can operate effectively for stakeholders at different scales, from individuals to organisations, small businesses and large businesses and from localities to global economies. Local circular economies with more self-sufficiency may provide more overall resilience, quickly scale up or down and be replicated. Advocates point to the need to balance lean efficiency with the resilience that comes with duplication.

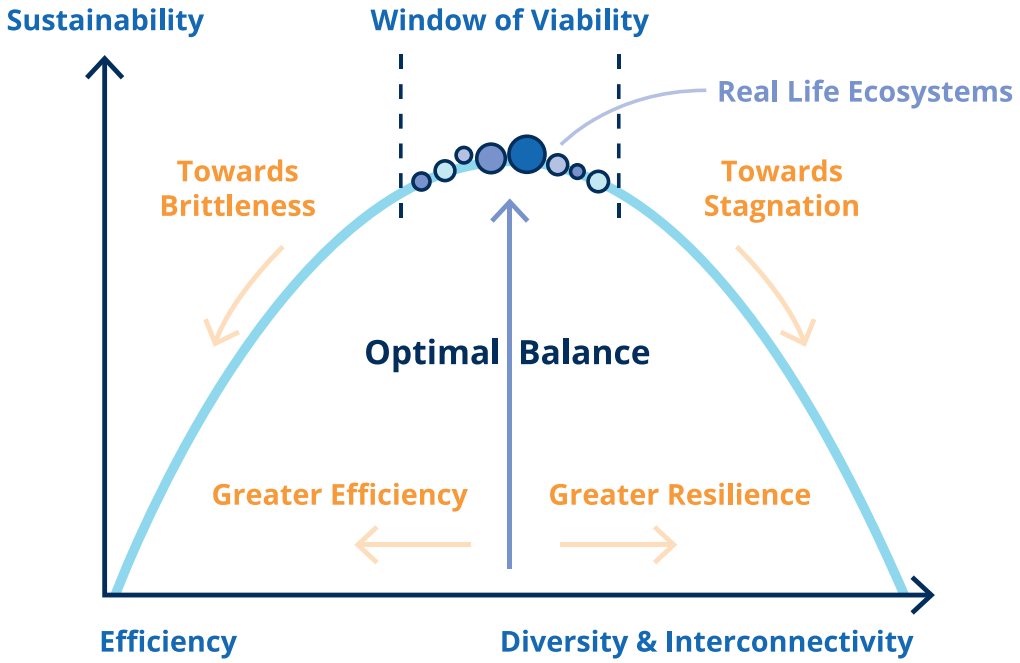


Figure 3: Effective systems as a dynamic between resilience and efficiency. There is an interplay between an emphasis on flow (fewer nodes and more connections) and exchange (more nodes and connections).
Figure Source: Sally J. Goerner, Bernard Lietaer and Robert E. Ulanowicz. 'Quantifying economic sustainability: Implications for free-enterprise theory, policy and practice'

Historical Precedents

There are many precedents for the concept of circular economies. Indigenous peoples, including those of Australia and North America, have lived in indefinitely sustainable modes for tens of thousands of years. Natural systems that do not produce waste or operate in silos provide inspiration for some circular economists.

More formal precedents include systems theory articulated by Donella Meadows,[9] regenerative design articulated by John T Lyle,[10] Walter Stahel's performance economy,[11] cradle-to-cradle design,[12] industrial ecology, biomimicry,[13] the marine-focused 'blue economy' concept and permaculture.[14]

The Circular Economy as a Systemic Approach

A key driver for the increasing interest in the circular economy model is that it is inherently aligned with systems theory and thinking. Although this paper does not seek to cover systems theory in depth, readers should understand that it provides intellectual tools and practices to work with highly complex phenomena and involve the interactions and integrations of many causes and effects.* Systems theory has become highly relevant to climate challenges and solutions. As part of that, applying circular economy thinking may potentially achieve benefits on many fronts, alongside emissions reductions.

So, rather than thinking of the circular economy initiatives as competing with other priorities, applying circular economy thinking may offer a consistent principle to achieve multiple common targets, reduce emissions and natural resource impacts, as well as many other impacts captured by the United Nation's (UN) Sustainable Development Goals (SDGs). The interlinked nature of the SDGs is well articulated in the UN's 2030 Agenda, which notes the SDGs 'are integrated and indivisible and balance the three dimensions of sustainable development (economic, social, and environmental). The interlinkages and integrated nature of the SDGs are of crucial importance'.[15] The systems approach of the circular economy is also highly compatible with Kate Raworth's Doughnut Economics, which connects social wellbeing with staying within planetary boundaries.[16]

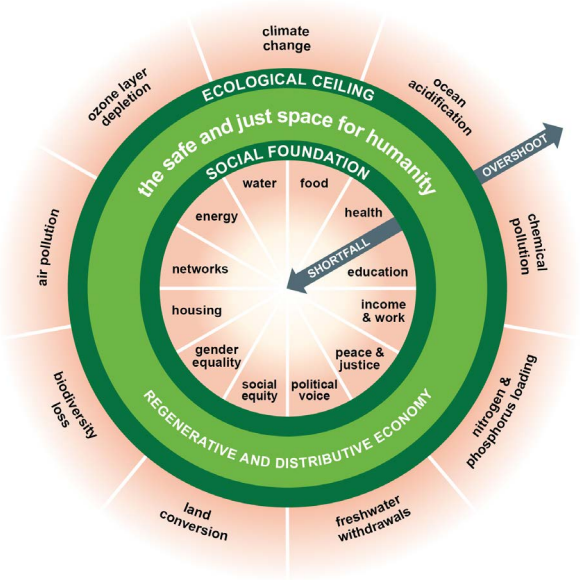


Figure 4: Kate Raworth's 'Doughnut Economy' notes a safe and just space for humanity must sit above a social foundation and within the ecological ceiling.

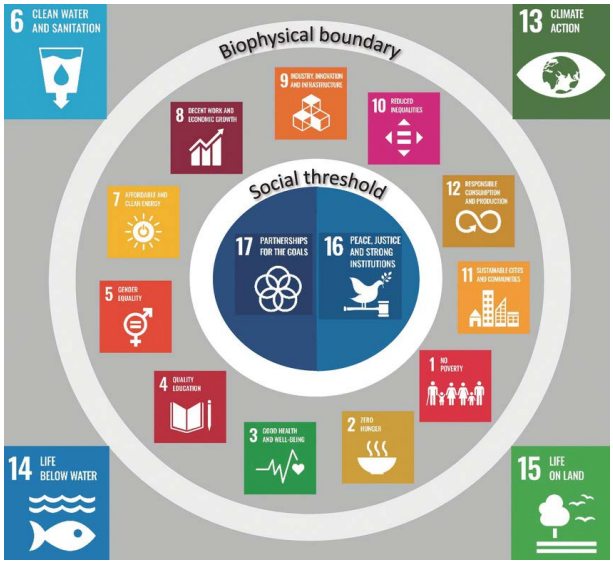


Figure 5: The UN SDGs arranged in a similar diagram, positioned in relation to a biophysical boundary and social foundation.

* 'Complexity' refers to systems with so many interactions that it is impossible to accurately predict outcomes by following singular chains of causes and effects. A crucial insight is that some systems move beyond 'complicated' (where it is difficult, but still feasible, to map chains of cause and effect) to 'complex'. The Earth is itself a complex system, with countless complex systems within it.

The UN's International Panel on Climate Change (IPCC) report on Impacts, Adaptation and Vulnerability included illustrations of the systemic interactions between climate, human society and ecosystems and the potential benefits of timely action.

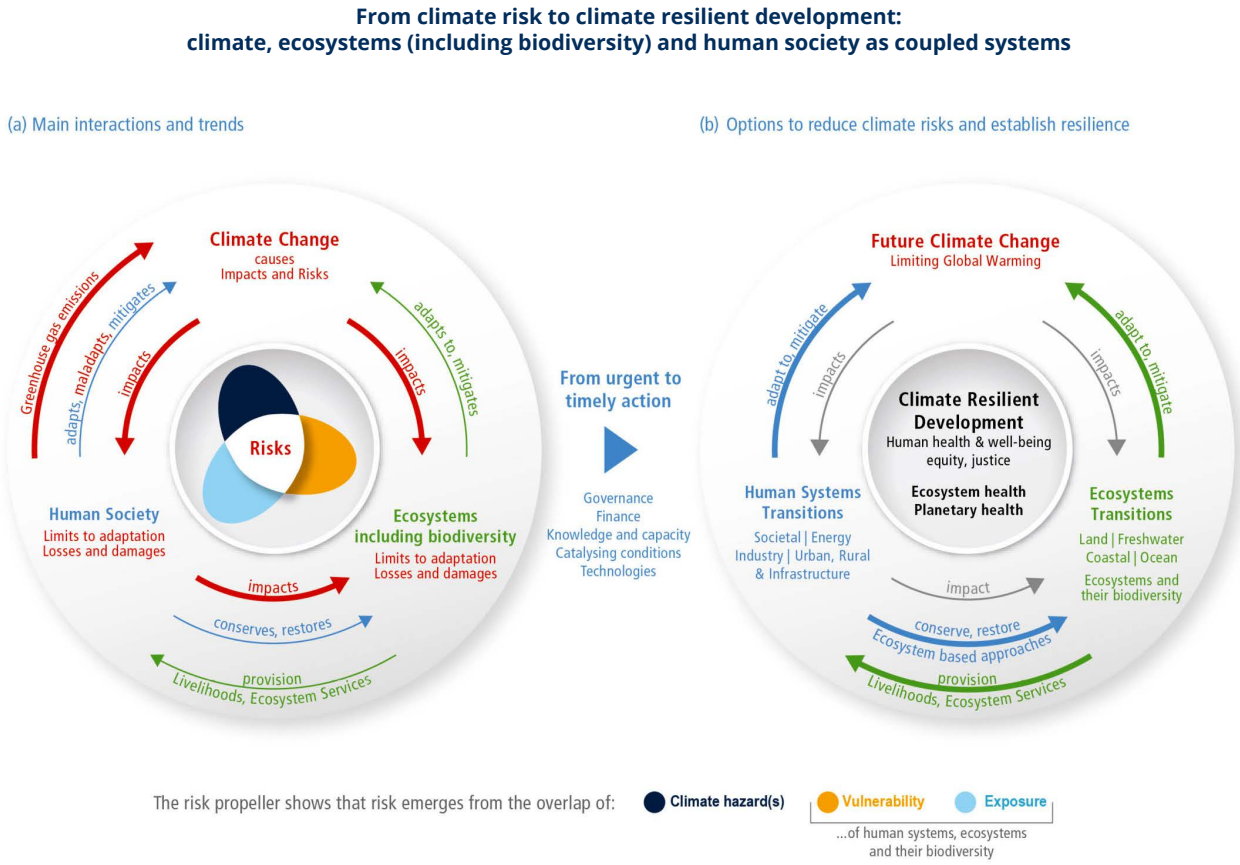


Figure 6: The IPCC's illustration of climate change in circular systemic relationships with human society and natural ecosystems. *Figure Source: IPCC Working Group II Report 2022.*

The IPCC's report 'recognises the interdependence between climate, ecosystems and biodiversity' and the 'concurrently unfolding non-climatic global trends e.g. biodiversity loss, overall unsustainable consumption of natural resources, land and ecosystem degradation' together with other social and economic issues.[17]

Specific examples of social and environmental benefits that may be simultaneously achieved by circular economy practices, alongside climate outcomes (narrowly defined), include the following:

- **Pollution and waste reduction**
  Circular strategies may play a critical role in addressing waste and pollution and the impacts of resource extraction and processing. Resource extraction, processing, waste, and pollution have been attributed as the causes of significant stress on our water resources and are responsible for 90 per cent of biodiversity loss.[18] Applying circular economy principles to plastic packaging, for example, could reduce the annual volume of plastics entering our oceans by 80 per cent, reduce GHG emissions by 25 per cent, generate savings of US$200 billion per year and create 700,000 additional jobs by 2040.[19]

- **Protection of Biodiversity**
  The climate risks and resource depletion that circular practices seek to reduce also have negative impacts on biodiversity. Conversely, improved biodiversity and ecosystem health are critical to achieving a stable climate and restoring adaptation resilience.[20] The feedback loops between climate, resources and biodiversity are a stark illustration of the relevance of systems thinking and the broad potential benefits of considering climate change through the lens of a circular economy.

- **Aligned Social, Economic and Environmental Incentives**
  Applying circular economy thinking to taxation may have significant, positive repercussions in many areas of society, as advocated by circular economy pioneer Dr Walter Stahel. By taxing materials, pollution and resources (which are finite) rather than people and labour, we could see improvements in employment markets. Stahel suggests taxing waste, resource consumption, and/or dataflows. He also suggests that wasted resources could be vastly reduced by applying the 'polluter pays' principle and placing an economic value on otherwise derelict objects.

- **Increased Innovation and Opportunity Creation**
  Circular economy approaches are catalysing innovation and transformation throughout entire industries. As some supply chains are being redesigned along circular principles, researchers see innovation and opportunities emerging. PwC predicted that the number of companies with plastics circularity initiatives would grow to more than 200 by 2025, that resale fashion would be worth double fast fashion by 2029 (US$80 billion) and the sharing economy is expected to increase twentyfold by 2025 to US$335 billion.

- **Technology Innovation**
  While the implications of the circular economy on digitisation are emerging, some scholars suggest the benefits of developing and applying big data, artificial intelligence, blockchain, the Internet of Things and cloud computing. They may help with predictive analytics, tracking and monitoring through products and materials' life cycle.[21]

CASE STUDY 1

STEWART INVESTORS – ADDRESSING PLASTIC POLLUTION IN INDIA

ASSET CLASS/SECTOR: EQUITIES/ASSET MANAGEMENT

THIS INITIATIVE IS PRIMARILY: DESIGNING OUT WASTE

In July 2018, Stewart Investors, in partnership with the Institute for Sustainable Futures at the University of Technology Sydney, hosted an interactive forum in Mumbai with 11 Indian consumer goods companies to discuss the challenges around plastic waste and how they could best work together to improve the situation in India.

The idea for this forum came from a meeting with senior management at Tata Global Beverages when Stewart Investors discussed the issue of plastic waste and the very real challenges in India. On top of the environmental challenges, there are the social challenges relating to waste pickers and the overall lack of recycling infrastructure.

Stewart Investors have invested in India for over 30 years. A key output that stemmed from the forum was the need for a new industry body to work with government and agree on industry wide targets.

Since the forum, Stewart Investors are delighted to have supported and part-funded WRAP, a global sustainability charity with experience rolling out Plastic Pacts globally. In collaboration with World Wildlife Fund India and CII, the India Plastics Pact launch took place in September 2021.

The Pact focuses on addressing the barriers to circularity in the plastic packaging sector. It aims to promote a circular economy for plastics by public–private collaboration that enables innovative ways to eliminate, re-use or recycle the plastic packaging across the plastics value chain and collectively achieve the long-term targets of the Pact. The four ambitions of the Pact are to:

- eliminate unnecessary and problematic plastic packaging through redesign and innovation
- make/design plastic packaging to be reusable, recyclable or compostable
- effectively recycle (or compost) plastic packaging
- incorporate recycled content across all plastic packaging.

Since the forum, four companies have become members of the Pact; and many have significantly increased their post-consumer waste collection and continue to increase their use of recycled and recyclable plastics in their packaging.

Further Reading

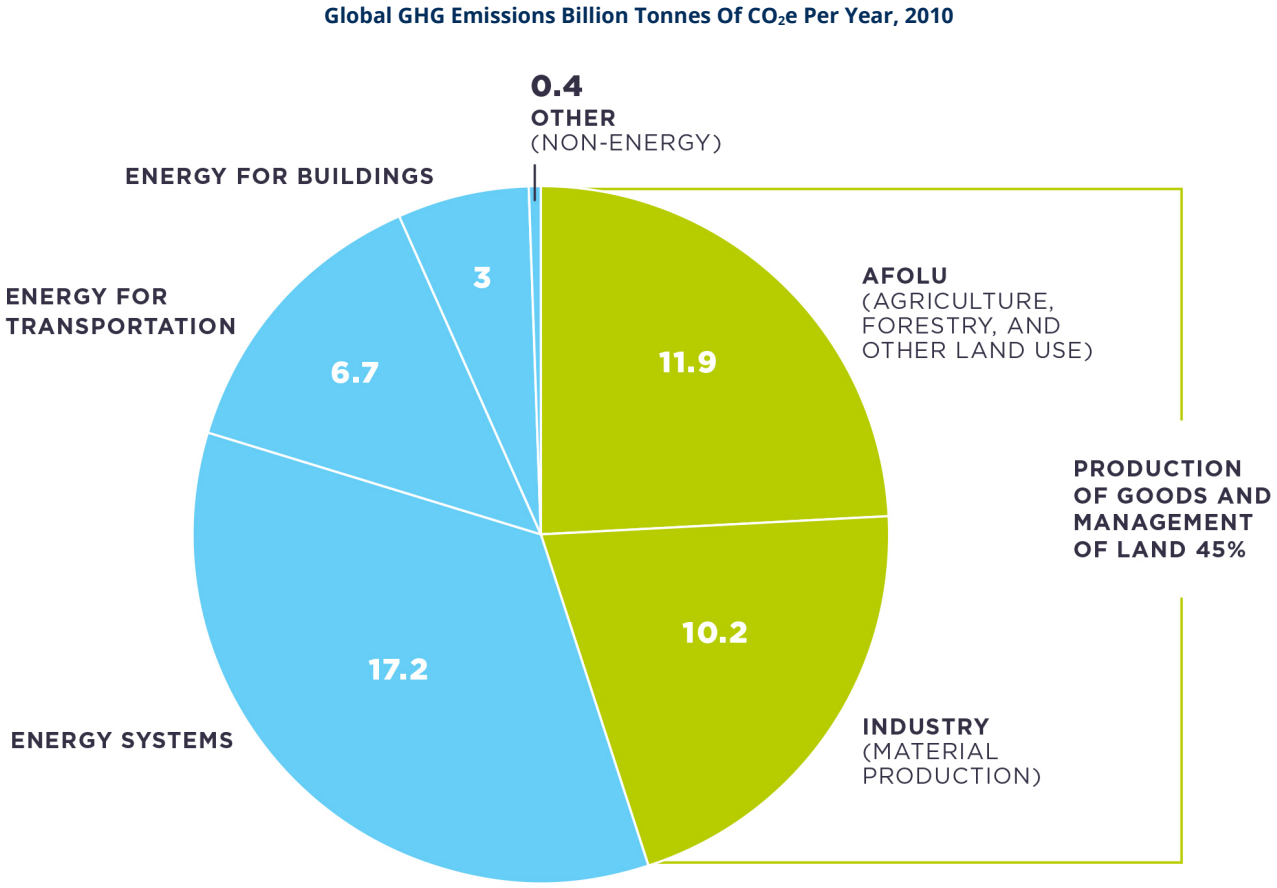
The briefing and output papers from this forum are available online:
https://www.uts.edu.au/isf/explore-research/projects/addressing-plastic-pollution-india

For more information on the India Plastics Pact, please visit the Pact's website:
https://www.indiaplasticspact.org/

4 THE CIRCULAR ECONOMY AND EMISSIONS REDUCTIONS

The fundamental links between circular economy ideas and emissions reductions are in our energy systems and how our current economy makes and uses products and food.

While transitioning the energy system to renewable generation is intrinsic to circular economic activity and can address around 55 per cent of global emissions, addressing the remaining 45 per cent requires us to reduce the emissions profile of industry, agriculture, forestry and other land use; essentially our economies' current modes of production and consumption.[22]



Note: 'Industry' and 'AFOLU' include their own energy-related emissions but not indirect emissions from electricity and heat production.
Data Source: IPCC, Fifth Assessment Report (AR5) and Material Economics analysis.

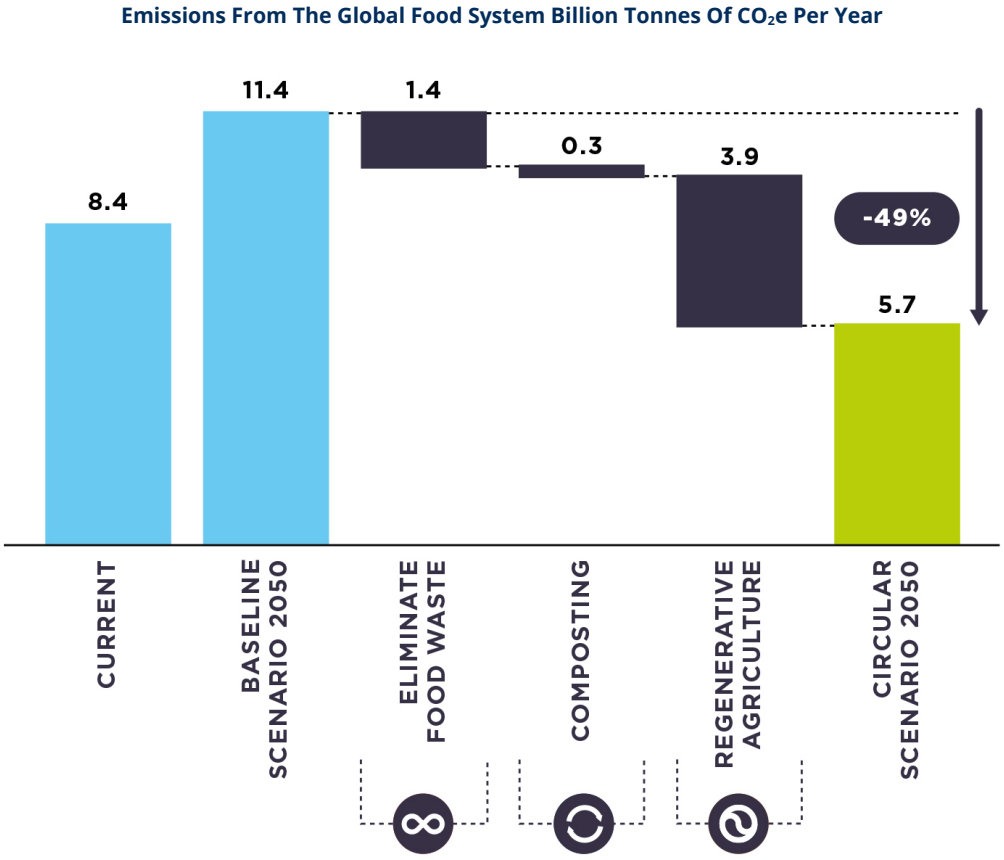
Figure 7: Approximately 55% of emissions are attributable to energy systems, leaving approximately 45% of emissions in agriculture, forestry and other land use, and industry.
Figure Source: Ellen MacArthur Foundation, 'Completing the Picture - How the circular economy tackles climate change'

The IPCC's Working Group III for the Sixth Assessment Report on climate called for 'coordinated action throughout value chains to promote all [climate] mitigation options, including demand management, energy and materials efficiency, circular material flows, as well as abatement technologies and transformational changes in production processes'.[23]

Although renewable energy and efficiency are fundamental elements of the circular economy, those solutions are more mature than the circular practices that address industry and food systems. Therefore, this paper will focus more on those latter topics, which are discussed below.

The Food System

Within the global food system, there are potential emissions reductions from a 2050 baseline scenario of 49 per cent, equal to 5.7 billion tonnes, according to the Ellen MacArthur Foundation.



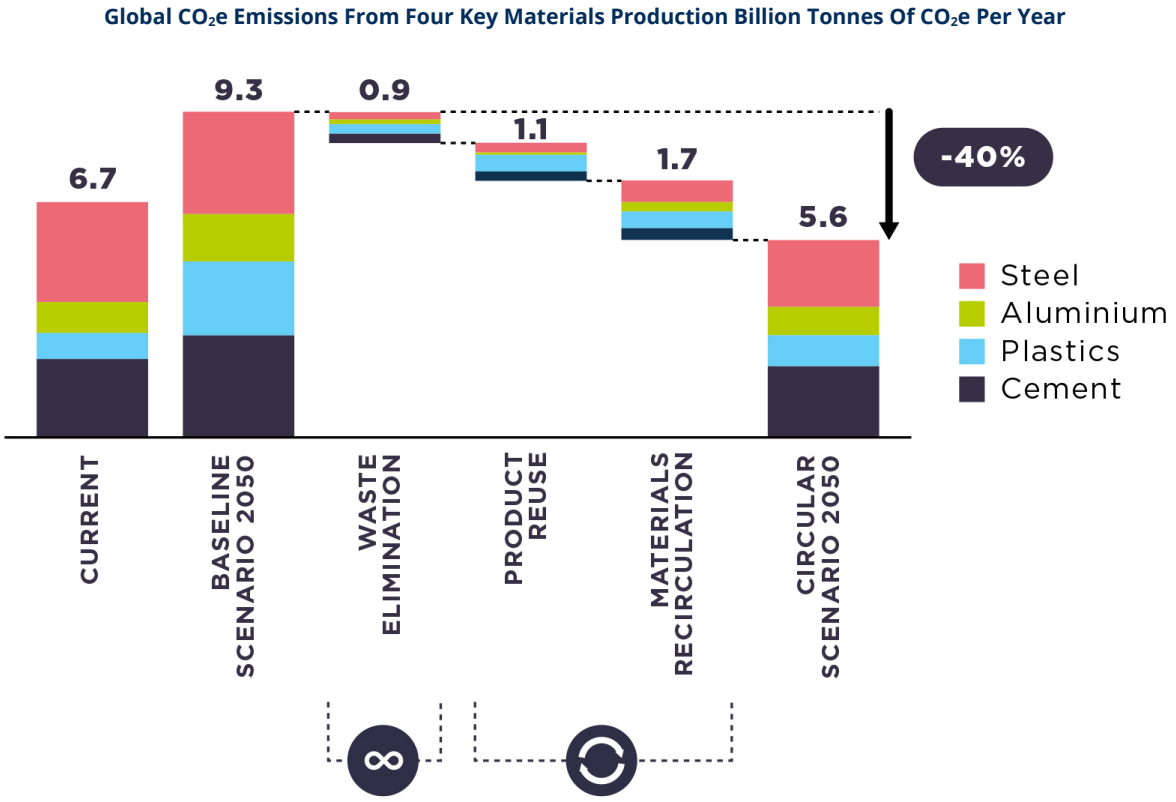
Note: Numbers do not sum due to rounding.
Data Source: Ellen MacArthur Foundation, Adapted from Ellen MacArthur Foundation, Cities and Circular Economy for Food (2019)

Figure 8: A circular economy has the potential to reduce annual CO2-e emissions in the food system by 49%, or 5.7 billion tonnes in 2050. ***Figure Source: Ellen MacArthur Foundation, 'Completing the Picture - How the circular economy tackles climate change'***

The IPCC report on climate mitigation said that carbon sequestration benefits and greenhouse gas (GHG) emissions reduction options for Agriculture, Forestry and Other Land Use (AFOLU) 'have both co-benefits and risks in terms of biodiversity and ecosystem conservation, food and water security, wood supply, livelihoods, land tenure, and land-use rights'.

Key Materials: Cement, Steel, Plastic, Aluminium

According to research by the Ellen MacArthur Foundation, eliminating waste, re-using products and recirculating cement, steel, plastic and aluminium may have the potential to reduce emissions by 40 per cent (or 3.7 billion tonnes) from a 2050 baseline scenario.[24]

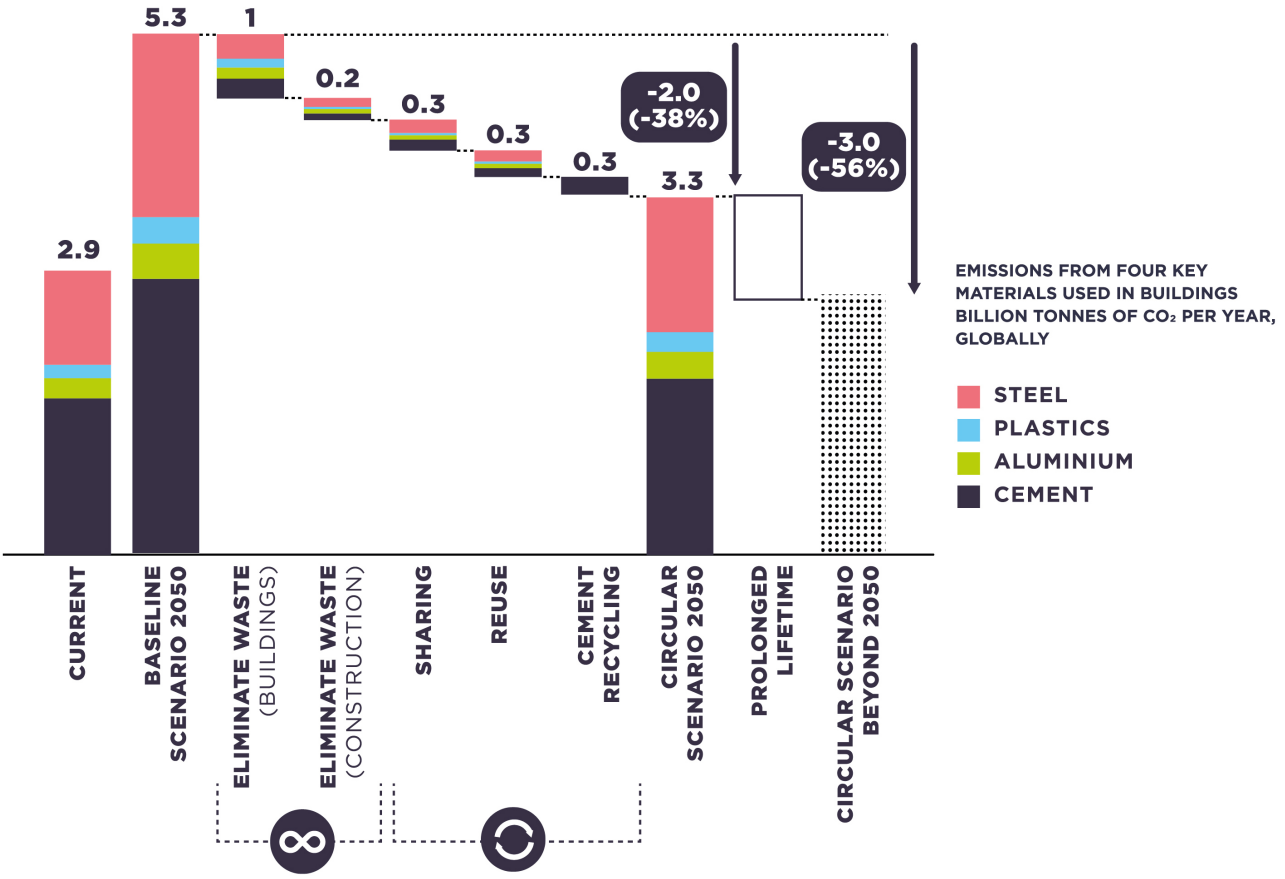


Data Source: Ellen MacArthur Foundation, Adapted from Material Economics analysis for the Energy Transition Commission, Mission Possible - Reaching net-zero carbon emissions from harderto-abate sectors by mid-century (2018).

Figure 9: A circular economy has the potential to reduce annual global CO2-e emissions from key industry materials by 40%, or 3.7 billion tonnes, in 2050. ***Figure Source: Ellen MacArthur Foundation, 'Completing the Picture - How the circular economy tackles climate change'***

Property, Construction and Real Estate

The built environment is a significant factor in the global economy using the key materials identified above. As such, within the 3.7 billion tonnes of potential emissions reductions identified in the circulation of key materials, 2 billion tonnes of reductions could be found in a more circular scenario for the built environment, suggests the Ellen MacArthur Foundation.



Note: Numbers do not sum due to rounding.
Data Source: Ellen MacArthur Foundation, adapted from Material Economics, The Circular Economy – A Powerful Force for Climate Mitigation (2018).

Figure 10: More circular practices in the built environment may hold potential for 2 billion tonnes of emissions reductions from a 2050 baseline scenario. ***Figure Source: Ellen MacArthur Foundation, 'Completing the Picture - How the circular economy tackles climate change'.***

CASE STUDY 2

ETHICAL PARTNERS FUNDS MANAGEMENT – ENGAGEMENT ACROSS THE ASX ON FOOD WASTE

ASSET CLASS/SECTOR: AUSTRALIAN EQUITIES

THIS INITIATIVE IS PRIMARILY: DESIGNING OUT WASTE

Ethical Partners undertakes regular engagements with ASX 300 companies regarding their circular economy initiatives and targets, recognising the crucial importance of adopting a circular mindset in how their portfolio companies approach sustainability.

Over the past few years, a particular focus of these engagements has been reducing food waste. Food waste is a serious issue for Australia, where an estimated 40 per cent of all food grown and manufactured in Australia is wasted. This wasted food also uses an estimated 2,600 gigalitres of water in its production and equates to around 3 per cent of our annual GHG emissions. Meanwhile, 1 in 6 Australians experiences severe food insecurity.

Ethical Partners' engagements with companies have focused on:

- how they are embracing a circular mindset of reducing and designing out waste rather than simply managing it after it is made
- reconsidering how we produce and consume
- keeping products and materials in use
- creating new forms of value
- life cycle assessments and regenerating natural systems.

Ethical Partners also focus on how these companies are sourcing or growing food in a regenerative manner, designing for more sustainable (and preferably healthier) food products and then making the most of food and its by-products.

Engagements are also underpinned by the message that embracing this circular mindset concerning food waste can help companies simultaneously address many of the urgent yet complex and interrelated sustainability issues they face, like climate change and emissions reduction, but also natural capital and biodiversity loss, their impacts on land and water usage, the SDGs, food insecurity, hunger, health, poverty and inequality.

They also reflect Ethical Partners' belief that by shifting from our current extractive, linear, inefficient and wasteful mindsets to a regenerative and circular one, companies can not only positively address their impact on multiple interlinked sustainability issues, but they can also harness innovation, opportunity creation (creating new value from food waste products), address challenges of resource availability, meet increasing customer demand and create higher returns for shareholders.

Ethical Partners has held multiple engagements with Woolworths and Coles about their initiatives, targets and disclosures regarding food waste. These engagements have focused on the progress, targets and expansion of programs such as:

- redirecting products that will not be sold into other value-added products (i.e., turning broccoli and cauliflower into rice, zucchini into noodles, sweet potatoes into chips, bananas into muffins or bread into pet food)
- the Coles 'I'm Perfect' or Woolworths 'Odd Bunch' fruit and vegetables program
- donating to the RSPCA or wildlife parks
- composting food waste for use by parks or by farmers as feed stock
- redistributing unused food to community partners such as OzHarvest, Fareshare, Food Rescue Alliance, Food Bank or Second Bite
- focusing on factors such as transport and handling to decrease food waste and ordering practices.

Ethical Partners have undertaken other food waste engagements: engaging with Graincorp on repurposing used cooking oil into biodiesel, engaging with Bega Cheese on how they can work with farm suppliers to reduce food wastage and their wider regenerative agriculture programs and engaging with Maggie Beer on re-using food by-products within other products lines. They are also currently engaging with Brickworks about their feasibility studies on renewable biogas generation at two sites as part of their carbon reduction program, targeting waste sources from commercial and industrial food waste.

5 THE CIRCULAR ECONOMY AND INVESTMENT

The Investment Opportunity

A circular economy may present a considerable opportunity for institutional investors, in financial returns, climate solutions, emissions reductions, and other important parts of their ESG considerations. The opportunity appears to cross portfolios, asset classes and economic sectors.

The 2017 *Better Business, Better World* report calculated the circular economy annual opportunity to 2030 at more than US$1 trillion globally.[25] In 2021, PWC valued the circular economy in Australia at A$2 trillion dollars over the next 20 years.[26] A circular economy could abate 165 million tonnes of carbon pollution each year in Australia,[27] equivalent to two return trips between Sydney and New York annually per person.

Analysis by Bocconi University of 200+ listed European companies across 14 industries suggests that the more circular a company is, the lower its risk of defaulting on debt and the higher the risk-adjusted returns of its stock.[28] The research included companies in resource-intensive industries headquartered in the EU-15 area, with the original sample including 1,100+ companies between 2013–2018, although disclosure gaps reduced the final assessment sample. The analysis included one-year lags and compared circularity with 10 other variables to confirm causality.

Research by the Ellen MacArthur Foundation suggests businesses at all levels are taking circular economy opportunities. They say that multinationals, small and medium-sized enterprises and start-ups have shown increased economic benefits and savings when compared to the continued trajectory of a linear economy:

- In Europe, circular initiatives throughout the construction, food and transport sectors are predicted to yield annual benefits of up to €1.8 trillion (US$2.1 trillion) by 2030, double that of the linear development path.[29]
- In India, circular development is on track to see economic benefits equivalent to 30 per cent of India's 2015 gross domestic product (GDP) by 2050, alongside decreasing emissions and pollution.[30]
- In China, circular economy opportunities in the built environment, transport, nutrition, textiles and electronics sectors could lower the cost of access to goods and services—leading to business and household savings of around CNY70 trillion (US$10 trillion, or 16 per cent of China's projected GDP) by 2040.[31]

Private markets are more likely to provide exposure to new companies with new circular economy solutions. Across the spectrum of private investing, from early-stage funding to deal sourcing to public offering, governmental legislation pushes investors to factor ESG metrics into investment analysis. At the same time, clients pull investors forward to take their preferences into account.[34] Relative to the public markets, private markets allow investors to require these outcomes and let them track the impact their money is creating.

Recently, there has been steep growth in funds to invest in circular economy activities via the private markets, including venture capital, private equity and private debt. In public markets, opportunities to get circular economy exposure increased sixfold during an 18-month period, from US$0.3 billion in January 2020 to over US$2 billion in June 2021, with broadly positive financial performance results (ongoing performance is, of course, not assured).[35]

CASE STUDY 3

MIRVAC – 55 PITT STREET

ASSET CLASS/SECTOR: PROPERTY

THIS INITIATIVE IS PRIMARILY: DESIGNING OUT WASTE

Mirvac is an Australian property group with a clearly defined purpose to reimagine urban life. By creating beautiful homes, inspiring workplace precincts and thriving shopping centres, Mirvac aims to positively contribute to our cities and communities.

Mirvac is cognisant of the impact that extracting raw materials has on the planet and the construction industry's carbon footprint.

Globally, 92 billion tonnes of materials are extracted every year, and buildings are responsible for half of that material. The industry has a very big footprint and a big opportunity to do something about it.

In 2020, Mirvac set a target to send zero waste to landfill by 2030. This requires Mirvac to move to a circular model, initially by cutting waste in half and ensuring 25 per cent of materials it buys have been recycled.

Since setting this target, one of Mirvac's most successful initiatives is its circular economy pilot, rolled out at their 55 Pitt Street development in Sydney in late 2021.

This saw approximately 900 cubic metres of furniture and fit-out materials diverted from landfill, with more than 1,740 items from the site relocated, re-used or recycled by local charities, businesses and homes.

What worked particularly well was that Mirvac had already established strong relationships with several charity partners, who took receipt of the re-used items and assisted in their removal and distribution (Mates on the Move).

Further Reading

https://www.mirvac.com/sustainability/case-studies/mirvac-wheels-into-the-circular-economy-to-help-meet-zero-waste-target

CASE STUDY 4

MERCER PRIVATE MARKETS AND CIRCULARITY CAPITAL – GROWTH COMPANIES ACROSS ALL FIVE BUSINESS MODELS

ASSET CLASS/SECTOR: PRIVATE EQUITY

THIS INITIATIVE IS PRIMARILY: DESIGNING OUT WASTE AND MAINTAINING MATERIALS AT THE HIGHEST VALUE

Mercer's Alternatives team construct private market funds by appointing combinations of specialist investment managers. Previous fund vintages have included a Sustainable Opportunities sleeve, and the current fund builds upon that with a Global Impact sleeve. Strategies appointed are targeting opportunities across themes and asset classes.

Circularity Capital, a private equity strategy, was appointed last year. The idea generation for the entire firm is centred on the opportunities in a circular economy. They have mapped more than 2,000 European circular companies, up from just over 1,000 a few years ago, with an end-market in multiple sectors.

The strategy targets a diversified range of growth companies in Europe across all five business models. Their Fund I includes a number of strong financial outcomes and impact metrics from companies that:

- deliver consumer technology as a service, extending asset life and enhancing utilisation
- provide logistics to ensure retail returns are restocked and sold
- convert 'waste' laminate glass into high-margin recycled polymers in the plastics sector
- create fully compostable packaging
- reduce food waste in commercial kitchens.

Other private markets firms have also adopted a sole focus on circular economy as their thesis, and Mercer will continue to research these to support growing interest. For others, the circular economy is one part of a multi-theme strategy. Mercer's Global Impact sleeve investment guidelines include circular economy as an explicit theme and recognise the intersection and overlap with others, providing an exciting opportunity set.

Further Reading

https://circularitycapital.com/

Investors Frameworks and Tools for the Circular Economy

Circular Business Models

Investors' understanding of the opportunities for circularity may be enhanced by analysing company portfolios and identifying opportunities where companies might adopt the following strategies.

- **Circular supplies**
  replacing traditional material inputs with bio-based, renewable or recovered materials, which may be expected to reduce demand for virgin resource extraction in the long run
- **Resource recovery**
  leveraging technology to recover and re-use resource outputs, aiming to eliminate material leakage and maximise economic value
- **Product life extension**
  extending the life cycle of products and assets to ensure they remain economically useful
- **Sharing platforms**
  sharing under-utilised products can reduce the demand for new products and their embedded raw materials
- **Product to service**
  providing customers with the opportunity to use products through a lease or pay-for-use arrangement versus a conventional approach to ownership.

Resource Intensity and Utilisation

A simple additional lens can be used to give a rough guide as to the opportunity for circular economic practices:

resource intensity / resource utilisation = opportunity for progress

The higher the resource intensity and lower the resource utilisation, the greater the opportunity there may be for progress on the circular economy.

This would be followed, of course, by much deeper analysis.

A Maturity Curve in Implementing Circular Economy Practices

Businesses' progress towards a more mature circular business model can be thought of in four stages.

- **Isolated**
  reactive and isolated initiatives
- **Deliberate**
  intentional initiatives but without system linkages
- **Scalable**
  initiatives replicated across company locations or asset classes
- **Systemic**
  clear vision, strategy, targeted action and investment, with an approach to measurement.

Figure 11: An illustration based on the maturity curve developed by Coreo.

Existing Frameworks

Circular economy factors can be integrated with a range of existing investment frameworks designed to assess and act upon climate-related financial risks and opportunities throughout the investment process.

They include the TCFD, the PAII's Net Zero Investment Framework, Investor Climate Action Plans and Climate Action 100+ engagement expectations.

Investors may also find utility in existing frameworks and processes, such as life cycle assessment, which is widely used in design processes and built environment rating schemes, including those of the Green Building Council of Australia (GBCA), the International Living Future Institute and the National Australian Built Environment Rating System (NABERS).

Metrics, Targets & Tools

Suitable metrics and targets for circular practices aim to capture the resource inputs or procurement and the percentage attributable to recovered or renewable resources. They also aim to capture businesses' outputs and the percentage of those recovered and utilised. For example, a metric that captured only landfill would be silent on incinerated rather than repurposed resources.

Circular economy metrics that are useful for investors remain relatively immature, as are targets and benchmarks. Where companies have set targets, a common approach from companies is to set targets with formulas like these examples:

X% of revenue from circular products, services and solutions by Y date.

Z% of material outflows recreated as a new product or material. (Instead of reporting on diversion from landfill.)

The EU has adopted targets to reduce their economies' material footprint and increase circular products, services and solutions significantly over the next decade and out to 2050. They have targeted a material footprint reduction of 50 per cent by 2030 and 75 per cent by 2050 (compared to a 2015 baseline of 14 t/capita) and an increase in the rate of material re-use rate of to at least 25 per cent by 2030.[34]

Several companies and organisations have developed software and platforms to help organisations measure, monitor and communicate their progress. 'Circulytics' is a leading platform that is an open-source tool used by more than 1,250 companies and is increasingly integrated within global standards frameworks, including TCFD and International Sustainability Standards Board. Other software platforms include Boston Consulting Group's 'CIRCelligence' and the Dutch 'Ready2Loop'.[35]

Some key companies that aggregate data for investors are also working on new circular economy solutions, including sector-based risk and opportunity analysis, which may be available in the coming months. For example, Institutional Shareholder Services (ISS) ESG has established a task force to identify companies taking the lead in key sectors, which may present new return opportunities. ISS also intends to highlight companies directly contravening circularity.

CASE STUDY 5

NEW FORESTS – USING RENEWABLE RESOURCES TO REDUCE EMBODIED EMISSIONS IN THE BUILDING INDUSTRY

ASSET CLASS/SECTOR: FORESTRY

THIS INITIATIVE IS PRIMARILY: DESIGNING OUT WASTE AND MAINTAINING MATERIALS AT THE HIGHEST VALUE

A key component contributing to the bioeconomy is developing low-carbon or no-carbon products for a net-zero future. An example of this is mass timber, made from compressed layers of wood; examples include cross-laminated timber (CLT) and glue-laminated timber (GLT). Mass timber is low carbon and has the potential to replace steel and concrete.

Using mass timber for building construction would significantly reduce the embodied emissions of these buildings. Recent research shows that substituting steel or concrete with mass timber reduces the emissions associated with manufacturing, transporting and installing the building materials by 13 to 25 per cent.

To address the projected future demand for mass timber, Timberlink launched their new brand, NeXTimber®, which will manufacture CLT and GLT in South Australia. A new softwood processing and manufacturing plant for these projects, Australia's first combined CLT/GLT facility, will be constructed alongside Timberlink's existing facilities. Expanding production of mass timber supports the growing bioeconomy and emissions reduction objectives.

It is expected that the facility will open in 2023 and create 27 full-time jobs, increasing to 50 jobs at full output. The facility will reduce Australia's dependency on importing engineered timber and support economic recovery in the region following the COVID-19 pandemic.

Further Reading

https://online.fliphtml5.com/cjgnr/balf/

6 CHALLENGES

An overnight transition from a linear to a circular economy model on a global scale is not a realistic expectation. Current, more linear business and investment models and practices are thoroughly embedded in our economy and culture, including valuation models and the very fundamentals of economic language, such as defaulting to the metric of GDP as a key economic indicator.

That said, there are challenges that—while very significant—are more discrete, identifiable and addressable.

It is likely that substantial investment, potentially in conjunction with the public sector, will be required for:

- reskilling programs and new employment opportunities that are a critical part of ensuring that the circular economy transition is effective and inclusive
- research and innovation
- infrastructure, product and material innovation, regenerative food production innovations and new business models and technology
- secondary materials competing with virgin materials
- long-term material innovation.

Circular outcomes and creating closed loop systems rely on establishing new business relationships, terms, partnerships and collaborations. From supply chains to new business process implementation to life cycle assessments, stakeholders will be keenly focused on three key settings:

- acquisition of materials (right volumes and quality)
- reprocessing (more valuable/reasonable price)
- remarketing (identify markets).

New skill sets will be needed to consider products for their functional value (primary and any secondary functions) as well as their material value. These will include new skills and approaches to:

- product design
- building design
- sourcing practices.

The measurement and interpretation of risk may need to be adjusted to incentivise capital flow to the circular economy. More targeted data, frameworks and accounting rules capturing circular value and linear cost, both historically and into the future, will be key. Innovation upfront requires a shift in what metrics we gather and measure value. As we progress, risk analysis will be generated in ways that current instruments cannot yet encode. For example, an approach focused on flows and feedback loops must be developed.

7 POLICY & REGULATORY SUPPORT

This paper does not aim to capture a full landscape review of relevant regulations; however, circular economy principles and models are beginning to be supported by government policy in many markets. These changes will begin to have potentially material implications for some companies and sectors, particularly where costs have been previously counted as external to the company and will instead need to be internalised.

Although policy in Australia remains inconsistent, the Australian Government established an interjurisdictional working group in 2019,[36] and the CSIRO has published a Circular Economy Roadmap for key sectors. Each state and territory has issued at least one policy, strategy or roadmap or passed targeted legislation. Cities including Melbourne are also actively investigating how to apply circular models locally.[37] A selected list of relevant items is included in Appendix B

In Aotearoa, New Zealand, the Sustainability Business Network has also released its Going Full Circle report with Auckland as the case study. In 2020, Tātaki Auckland Unlimited partnered with Circularity to design and deliver XLabs, New Zealand's first circular economy lab. The 2021–2022 program is underway and available to all businesses—made possible in partnership with The Ministry for the Environment, Manatū Mō Te Taiao. [38]

There are developments in many other countries; however, Europe is already broadly leading. In the EU, The Platform on Sustainable Finance[39] was established to support the significant changes underway to execute the EU's Taxonomy Regulation and, ultimately, the European Green Deal. The Taxonomy Regulation defines six environmental objectives. To date, the Taxonomy's focus has been on climate change mitigation and adaptation; however, a March 2022 report outlined the emerging methodologies for the remaining four, including the transition to a circular economy.

8 NEXT STEPS FOR INVESTORS & RECOMMENDATIONS

Investors have a potential role in driving progress towards a more circular economy, which would help reduce emissions and climate risk, restore resilience and protect the long-term financial interests of beneficiaries.

Many investment teams are increasingly struggling to respond to the growing list of climate-related transition and physical damages considerations across multiple asset classes, regions, sectors, companies and timeframes while continuing to deliver on investment objectives.

However, adopting a circular economy lens and driving circular economy practices provides new ways to address multiple interconnected issues and their cumulative effects.

The authors make the following suggestions for initial steps that investors can take after familiarising themselves with the information in the earlier sections of this report.

Embed Circular Economy Considerations Within Existing Frameworks

IGCC and its global peers recommend adopting a 'four P's' approach: Plan, Pledge, Progress and Publish.

Investors can incorporate circular economy practices within the TCFD, the PAII's Net Zero Investment Framework, Investor Climate Action Plans and Climate Action 100+ engagement expectations, among others.

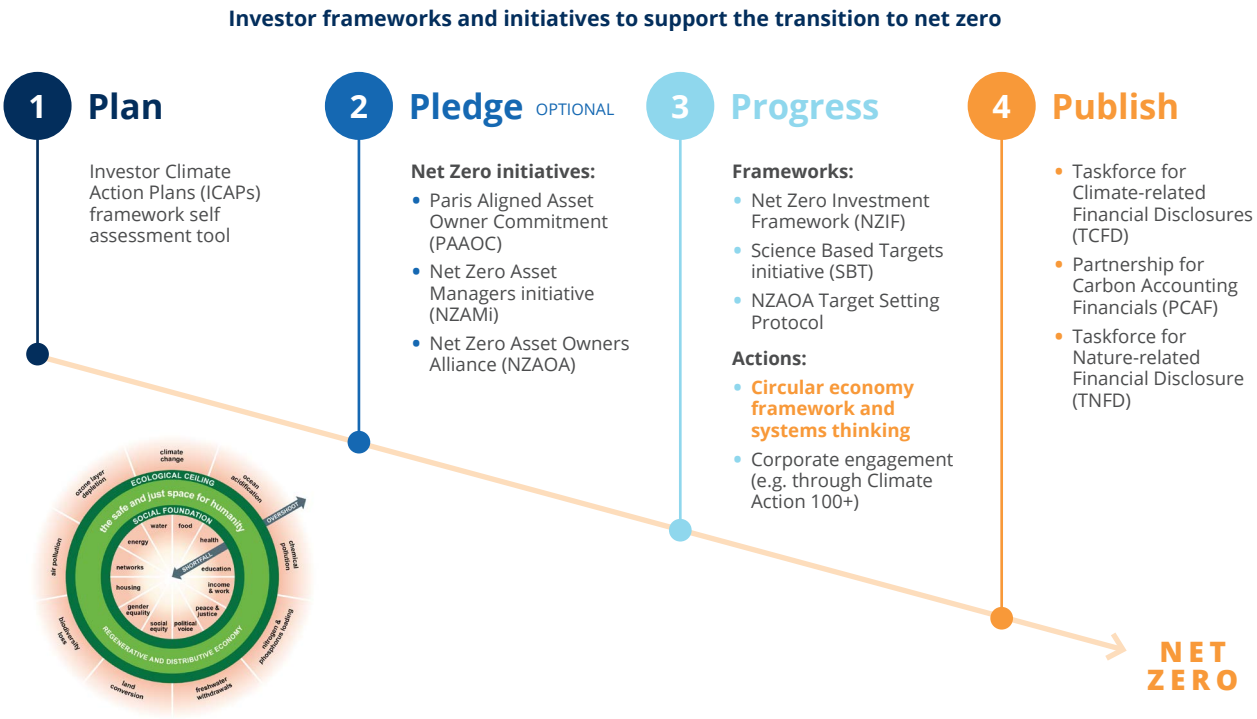


Figure 12. Investor frameworks and initiatives. *Figure Source: IGCC, incorporating Kate Raworth's Doughnut Economics diagram.*

Investors may be able to monitor their progress along a simple expectations ladder, similar to the Investor Climate Action Plan processes adopted by many investor members of IGCC and its international peers.

Organisational Capability

Investors can improve their capabilities in these four key areas:

Governance

- build the circular economy understanding across internal teams and key decision-makers—this paper and the resources and further reading on the following page should provide helpful starting points
- document circular economy views and expectations within beliefs and policies.

Integration

- ask new questions that can provide circular economy insights within company and portfolio risk and emissions assessments, across asset classes and large and small cap exposures—focus on key materials, real estate connections and agriculture-related sectors
- investigate quantitative metrics available and monitor new metrics and measurement capabilities that may emerge from different providers in the near future as they tap into the new company disclosures and aggregate data into beneficial formats for investors to utilise—likely to increase as the EU Taxonomy on the circular economy gains momentum.

Allocation

- review methodology to monitor existing exposures to companies delivering circular economy solutions and the potential return opportunities
- consider explicit new mandates, particularly in private markets, where new companies are active across a range of circular economy approaches and sectors.

Engagement

- review existing engagement activities and initiatives and how circular economy expectations can be adopted, particularly regarding resource intensity, utilisation and the maturity curve. Key sectors may include diversified mining, steel, cement, food and beverage, aviation and construction—this engagement may be within the Climate Action 100+ program (refer to Appendix A for suggested engagement questions)
- consider joining additional collaborative initiatives, such as the PRI's Plastics Investor Working Group[41]
- consider engagement with policymakers and regulators.

A APPENDIX A

Resources and Engagement Guidance For Investors

The following table provides a set of existing initiatives and resources investors may find useful across investments in certain materials and sectors. It also draws on IGCC's corporate engagement experience to suggest questions investors may now ask companies in their portfolios to explore opportunities for progress.

Investment Area	Existing Initiatives and Resources	Sector and Company Questions
Aluminium	Diversified Miners Dialogues co-convened by IGCC and IIGCC Aluminium Stewardship Initiative European Circular Aluminium Action Plan World Economic Forum's Aluminium for Climate	Investors can ask aluminium-producer companies to: • eliminate scope 2 emissions from electricity use in aluminium smelters, accounting for approximately half of CO2-e emissions arising from the smelting process—such emissions are abatable in the short-to-medium term via purchasing green power • set targets to reduce emissions from the shipping and transportation of aluminium Investors can ask aluminium-user companies to: • make commitments to recycling end-of-life aluminium (post-consumer scrap)—recycling uses around 5 per cent of the energy used to produce the original metal
Steel	CA100+: Investor interventions to accelerate net zero steel	Investors can ask steel producing companies to: • set targets to increase the proportion of steel produced by the scrap–EAF process (e.g., recycled steel) • set targets to increase the material efficiency of steel products to limit steel demand growth • invest in low-emission DRI–EAF capacity (including hydrogen-based) for primary steelmaking • eliminate scope 2 emissions from electricity, while a relatively small proportion of sector emissions, these are abatable in the short-to-medium term via purchasing green power

Investment Area	Existing Initiatives and Resources	Sector and Company Questions
Cement	IIGCC Investor Expectations in the Construction Materials Sector Decarbonisation Pathways for the Cement and Concrete Sector	Investors can ask cement-producing companies to: • eliminate scope 2 emissions from electricity, while a relatively small proportion of sector emissions, these are abatable in the short-to-medium term via purchasing green power • set targets to increase the use of alternative fuels like refuse-derived fuel in producing concrete • set targets to increase the use of supplementary cementitious materials (i.e., waste inputs from other industries) • explore options for enforced carbonisation of recycled concrete
Construction	Driving a circular economy—GBCA Circular economy—GBCA	Investors can ask construction companies for the following: • diversion of construction waste from landfill • design for effective operational waste management • low water use • use of low or non-toxic materials • responsible procurement of products and services for best practice environmental and social principles in building structure, envelope, systems and finishes—reduced upfront carbon emissions and other emissions (refrigerants and others), low energy consumption and energy sourced from renewables • low environmental impacts from resource use over the building's lifespan, shown through comparative lifecycle assessment • movement and place—encouraging active, low-carbon and mass transport options Investors can ask that construction companies consider circularity interventions over: • material source (virgin or recovered) • supply chain distance • complexity of product/material • design for disassembly and re-use • product lifespan • recovery potential

Investment Area	Existing Initiatives and Resources	Sector and Company Questions
Food	CA100+: Recommended Investor Expectations for Food and Beverage	Investors can ask food and beverage companies to: • eliminate scope 2 emissions from electricity and set targets to phase out hydrofluorocarbons in refrigeration • prioritise expenditures that reduce emissions and improve resilience (i.e., infrastructure to improve food storage and avoid food loss) or anaerobic digesters along the supply chain to convert food waste, inedible food by-products and livestock manure into energy, fertiliser or compostable materials • embed key climate-related indicators, metrics and environmental performance within procurement strategies and policies • achieve supply chain traceability to a level that allows for targeted interventions and assessments • embed a commitment to a no-deforestation and no-conversion supply chain within corporate procurement policies across all business functions • set targets to increase alternative product offerings with lower life cycle emissions • increase the proportion of suppliers using regenerative agriculture • set targets to increase recycling and use of recyclable materials in the supply chain • set targets to eliminate single-use and/or unnecessary plastics in the supply chain (more detail below)
Plastics	PRI: Engaging on Plastic Packaging PRI Plastics Series (and Plastics Investor Working Group) Hermes EOS: Investor expectations for global plastics challenges	For all plastic users: • disclose the proportion of procured single-use and/or unnecessary plastics • disclose the proportion of current reusable, recyclable or compostable plastic packaging • set a time-bound target to eliminate single-use and/or unnecessary plastic packaging • set a time-bound target for all your plastic packaging to be reusable, recyclable or compostable • set a target related to the use of post-consumer recycled content in plastic packaging

B APPENDIX B

Selected Australian Policy, Strategies, Plans and Roadmaps

National

- 2019 Australian Government Circular formed Economy Interjurisdictional Working Group
- 2019 Australian Government invests in National Circular Economy Hub
- 2019 CSIRO published a Circular Economy Roadmap for plastics, glass, paper and tyres
- 2022 National Circularity Conference led by ACE Hub (upcoming)
- 2022 Product Stewardship Centre of Excellence launched

QLD

- 2019 Queensland releases a position statement on the circular economy
- 2019/2020 Circular Economy Lab and Transition to Action—a program was launched focusing on circular economy opportunities in regional Queensland communities
- 2022 South East Queensland City Deal announced with A$105 million allocated towards circularity

VIC

- 2019 Victorian Government released their Circular Economy Policy
- 2020 The Recycled First Policy enacted—all bidders on major transport projects must demonstrate how they will use recycled or re-used Victorian materials
- 2022 Sustainability Victoria published 'SV2030: A Decade of Action', highlighting the state's transition to circularity

NSW

- 2019 NSW publishes Circular Economy Policy Statement, 'Too Good to Waste'
- 2019 NSW Circular Innovation Network launched by the Office of the Chief Scientist
- 2020 City of Sydney published 'Building a strong green and circular economy for Sydney'
- 2021 City of Sydney established its environmental strategy 2021–2025, supporting the growth of the city's circular economy

SA

- 2020 Single-use and Other Plastic Products (Waste Avoidance) Act 2020
- 2020 South Australia's Waste Strategy 2020–2025

ACT

- 2011 ACT Waste Management Strategy 2011–2025, aiming to achieve full resource recovery
- 2019 Commissioner for Sustainability and the Environment release Issues Paper: Unlocking the Potential of a Circular Economy in the ACT

WA

- 2019 Waste Avoidance and Resource Recovery Action Plan (updated in 2021)
- 2021 The Eastern Metropolitan Regional Council ran the first Circular Economy Masterclass in WA

NT

- 2022 NT Circular Economy Strategy 2022–2027, expected for 2022 release
- 2022 Australian and NT Governments announced an A$11 million investment in new recycling infrastructure

C APPENDIX C

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