Thrive to 45

TACKLING THE FORGOTTEN 45 PER CENT OF GLOBAL EMISSIONS WITH CIRCULAR STRATEGIES

PLANET ARK | KPMG

Acknowledgements

This project is a collaboration between Planet Ark's Australian Circular Economy Hub (ACE Hub) and KPMG.

Planet Ark Environmental Foundation is an Australian not-for-profit organisation with a mission to enable positive environmental change by bringing individuals, communities, businesses and governments together. Planet Ark is one of Australia's leading environmental behaviour change organisations, having focused on working collaboratively and positively for over 30 years.

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ACKNOWLEDGEMENT OF COUNTRY

Planet Ark and KPMG acknowledge the Traditional Custodians of Country throughout Australia. One of the most important lessons we can learn from the oldest enduring culture on earth is how to live and even thrive within nature's limits. We recognise and respect the enduring relationships they have with their land, sea, and community, and pay our respects to Elders past and present.

Foreword

Decarbonising our economy demands more than just a shift to renewable energy. With 45 per cent of global emissions stemming from how we make, use, and manage materials, products and food, circular economy strategies are essential for closing the gap. *Thrive to 45*, a collaboration between Planet Ark's Australian Circular Economy Hub and KPMG, explores how circularity can drive emissions reductions in the built environment and fast-moving consumer goods sectors – two of Australia's most resource-intensive industries.

At KPMG, we help organisations navigate complex ESG challenges and unlock long-term value through integrated climate, carbon, and circular economy strategies. Our collaboration with Planet Ark's ACE Hub reflects our commitment to supporting clients in accelerating their transition to a low-carbon, regenerative future.

This report provides practical insights, case studies, and tools to support action. It reinforces that circularity is not peripheral — it is a critical enabler of net zero and a more resilient, resource-efficient economy.

Sophie Degagny

SOPHIE DEGAGNY
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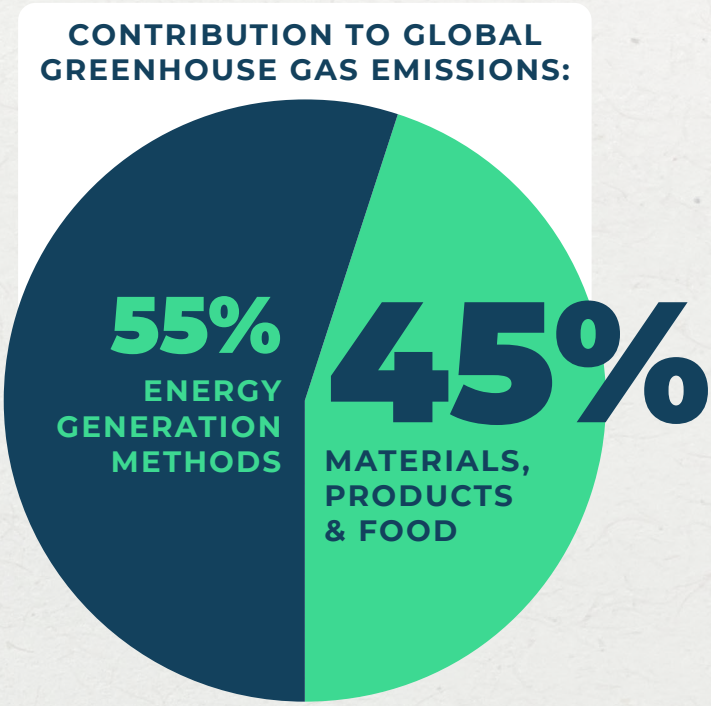
Report summary

Although the transition to renewable energy is crucial, it is not enough to meet global climate goals. **This is because 45 per cent of global greenhouse gas emissions come from the way we make, use and manage materials, products and food.**[1]



A circular economy is an innovative model for rethinking our approach to products and services. **The three principles of a circular economy are:**[2]

1

DESIGN OUT WASTE & POLLUTION

2

CIRCULATE PRODUCTS AND MATERIALS
(at their highest value and for as long as possible)

3

REGENERATE NATURAL SYSTEMS

By **embracing a circular economy**, companies can begin to address the 45 per cent of global emissions not captured by the energy transition.

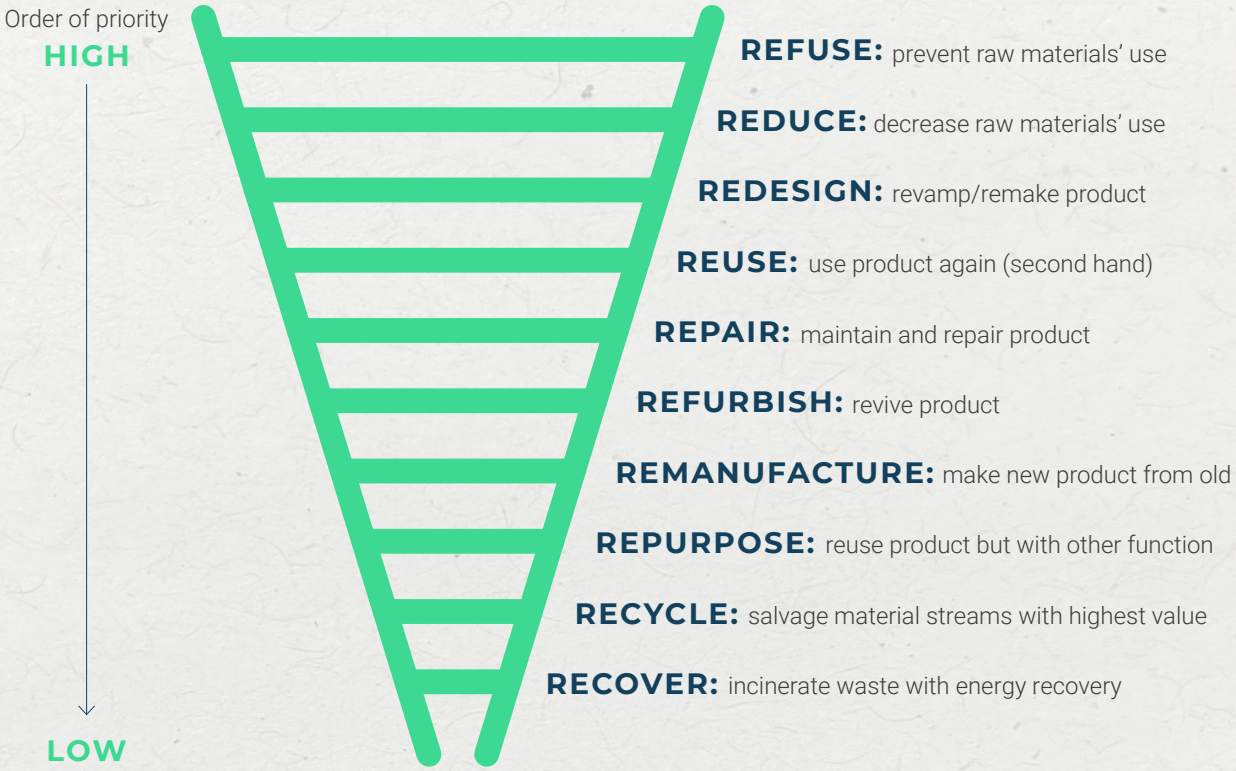
Reducing waste and pollution and keeping products and materials in circulation at their highest value for as long as possible has the **potential to reduce emissions across the entire supply chain**.[3]

Taking a circular economy approach also has the **potential for other business benefits**, including cost savings from improved material efficiencies, development of new revenue streams and aligning with customer expectations.

1. Ellen Macarthur Foundation, 'Completing the Picture: How the Circular Economy Tackles Climate Change'
2. Ellen Macarthur Foundation, 'What is a circular economy?'
3. Ellen Macarthur Foundation (2021), 'Completing the picture: How the circular economy tackles climate change'

Circular economy strategies can be represented in terms of impact by the 'ladder of circularity'.[4]

THE LADDER OF CIRCULARITY



Strategies higher on the ladder (such as refuse, reduce, redesign and reuse) are more circular than those lower on the ladder (such as recycle and recover). Higher order R strategies typically address the earlier stages of a project or product life cycle, resulting in reduced virgin material consumption and retaining more of the embodied carbon within existing products and materials.

PROJECT OBJECTIVES

This project was a collaboration between **Planet Ark's Australian Circular Economy Hub (ACE Hub) and KPMG**. Research focused on two sectors — the built environment and fast-moving consumer goods (FMCG). The project objectives were to:

1. Explore **the link between adoption of circular strategies and decarbonisation** in the built environment and FMCG sectors.
2. Highlight some **key examples** of emissions reductions associated with circular strategies.
3. Identify current **challenges and potential solutions** to circular strategy adoption.

4. The ladder of material circularity and 10 R's adapted from Cramer 2017. Note, the ladder of circularity is not an exhaustive representation of circularity.

A desktop literature review was conducted in early 2025 and informed a discussion paper, which was circulated to key stakeholders from the built environment and FMCG sectors. These stakeholders were also invited to complete a survey and attend an online roundtable session to share their experience and provide deeper insights into circular strategy adoption and emissions reductions. The project team sincerely thanks all participants who contributed.

SURVEYS

16 participants from the built environment and 13 from FMCG.

ROUNDTABLES

11 participants from the built environment and 5 from FMCG.

Transitioning to a more circular economy requires all industries to collaborate and work together. The learnings and insights shared in this report can inform and benefit other sectors.

KEY FINDINGS

Organisations from the built environment and FMCG sectors have identified **a range of opportunities to reduce emissions.**

62 per cent of survey participants reported their organisation had **already considered adopting circular strategies to reduce emissions.**

Participants from the built environment reported **rethink, redesign, reuse and repurpose strategies as having the strongest potential for reducing emissions,** followed by reduce, repair, refurbish and regeneration strategies.

Participants from the FMCG sector reported **redesign, recycle, reuse and reduce strategies as having the strongest potential for reducing emissions,** followed by refuse and regeneration strategies.

KEY FINDINGS

CASE STUDIES

Sections 3.2. (built environment) and 4.2. (FMCG) highlight **case studies** where adoption of circular strategies resulted in quantified emissions reductions.

The current challenges to adopting circular strategies and potential solutions listed below are discussed in more detail in sections 3.3. (built environment) and 4.3. (FMCG).

Challenges	Solutions
BUILT ENVIRONMENT	
1. Lack of understanding of circular strategies.	Communicate circularity in terms that make sense to key stakeholders within the sector.
2. Circularity not currently a priority in decision making.	Tighter government regulation, targeted education for business decision makers and improved board level buy-in.
3. Increased cost and higher risk when adopting circular strategies.	Improved understanding of the business benefits of adopting circular strategies and cultivating a longer-term vision around ROI.
4. Time constraints and lack of data to support decision making.	Circular supplier list and marketplace for salvaged materials, improved collaboration and data sharing.
FMCG SECTOR	
1. Lack of knowledge and incentive to shift from business as usual.	Knowledge sharing and case studies which showcase the business benefits of circular strategies.
2. Fragmented policies and lack of harmonisation in waste management across the country.	Well-designed and consistent government regulation that addresses the full lifecycle of products and packaging.
3. Infrastructure and logistical challenges.	Government action that addresses the full lifecycle of products and packaging, investment in trials of reuse models (including targeted consumer education to improve success).
4. High upfront costs and increased risk for first movers.	Government regulation, increased funding and better collaboration between industry and government.
5. Difficulty accessing reliable data for quantifying emissions.	Collaboration and data sharing across supply chains.

KEY FINDINGS

Despite the challenges identified, participants also acknowledged the **importance of not letting the desire for perfection get in the way of acting now.** In line with this, sections 4.4. (built environment) and 5.4. (FMCG) provide a list of **tools and resources**, and section 6.1. highlights some **key next steps** for organisations looking to start (or progress) the journey towards improved circularity.

> **A circular economy consistently leverages resources for maximum value, ultimately leading to regenerative outcomes.**
>
> SURVEY PARTICIPANT

> **Don't let the perfect get in the way of the good.**
>
> ROUNDTABLE PARTICIPANT

Contents

1 Background

Transitioning to 100 per cent renewable energy and improving energy efficiency is crucial to meeting global climate targets. However, this will only contribute to delivering 55 per cent of the greenhouse gas (GHG) emissions reductions required.[5] The remaining 45 per cent of global emissions come from the way we make, use and manage materials, products and food (Figure 1). By embracing a circular economy, and adopting circular strategies and business models, companies can begin to address these remaining emissions.

Aside from enabling emissions reductions, adopting circular strategies has many additional benefits.[6] For businesses, these include cost savings from improved material efficiencies and reusing and recycling materials instead of using virgin materials, new revenue streams from embracing circular products and business models, and aligning with consumer expectations around sustainability and waste minimisation.[7,8]

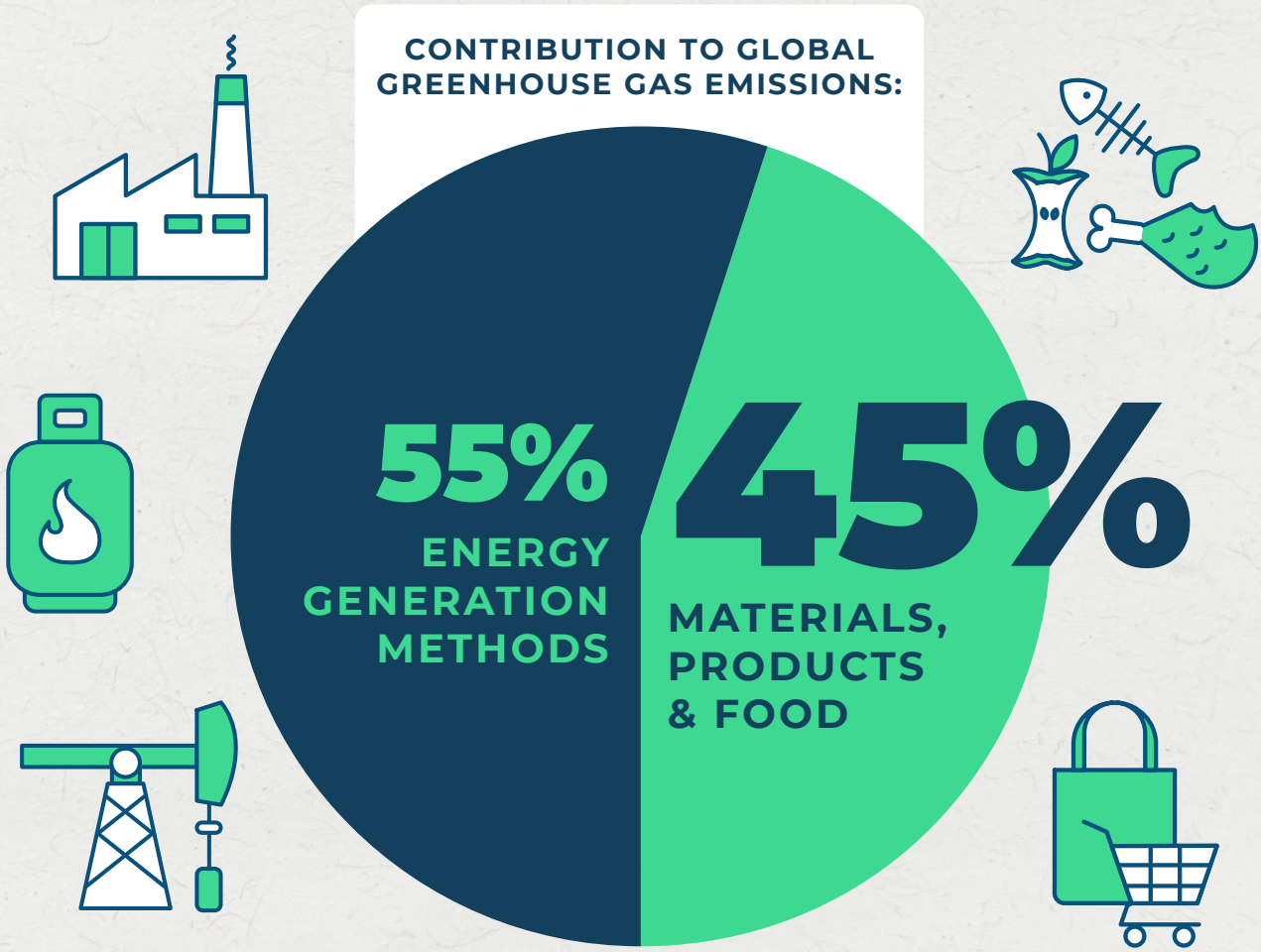


Figure 1: A circular economy can help address the 45 per cent of global greenhouse gas emissions that come from the way we make, use and manage materials, products and food.

5. Ellen Macarthur Foundation, 'Completing the Picture: How the Circular Economy Tackles Climate Change'
6. Productivity Commission (2025), 'Australia's circular economy: Unlocking the opportunities, Interim report'
7. ACE Hub (2023), 'Circularity in Australian Business 2023: Perceptions, Knowledge and Actions Beyond Recycling'
8. Commonwealth Bank of Australia (2022), 'Circular Economy: The impact of business-led action for future consumers'

1.1 PURPOSE AND OBJECTIVES

Thrive to 45 is a collaboration between Planet Ark's ACE Hub and KPMG. The project aims to better understand how adopting circular economy strategies can progress decarbonisation efforts in two focus sectors, the built environment and fast-moving consumer goods (FMCG), whilst also exploring current barriers to circular strategy adoption.

The built environment was chosen as a focus sector as it accounts for a significant portion of global material consumption (almost half of all raw materials extracted each year)[9] and greenhouse gas emissions (over 35 per cent of global emissions).[10] Stakeholders across the sector are also highly engaged on the need to improve circularity and reduce greenhouse gas emissions from their activities. Although greenhouse gas emissions associated with the FMCG sector may be less obvious than those from the built environment, the sector remains a significant contributor globally. As the FMCG sector engages with the Australian public daily, it is an important focus area that requires evidence-based behaviour change interventions to achieve circular outcomes.

Despite the two-sector focus of this report, transitioning to a more circular economy will require all industries to collaborate and work together. Therefore, the learnings and insights shared through this project are applicable to other sectors.

PROJECT OBJECTIVES:

1. Explore **the link between adoption of circular strategies and decarbonisation** in the built environment and FMCG sectors.
2. Highlight some **key examples** of emissions reductions associated with circular strategies.
3. Identify current **challenges and potential solutions** to circular strategy adoption.

1.2 PROJECT METHODOLOGY

A desktop literature review was conducted in early 2025. This initial review informed a discussion paper, which was circulated to key stakeholders within the built environment and FMCG sectors in August 2025 (including those from government, industry and academic institutions) along with a survey to capture feedback and additional insights. The key characteristics of the two survey samples are summarised in section 1.3. below.

9. Ellen Macarthur Foundation (2021), 'Completing the picture: How the circular economy tackles climate change'
10. United Nations Environment Programme (2023), 'Building Materials and the Climate: Constructing a New Future'

Survey participants were also invited to contribute to a 1.5-hour online discussion in early September 2025 (one roundtable was held for each sector). There were 11 participants for the built environment roundtable and five for the FMCG roundtable.

The data and insights collected from the surveys and online discussions helped inform this report. However, it is important to note that the data provided via the surveys and roundtables is not a complete representation of industry knowledge and experience. The surveys and roundtables did, however, provide crucial real-world experience and feedback that could not be captured via desktop research alone.

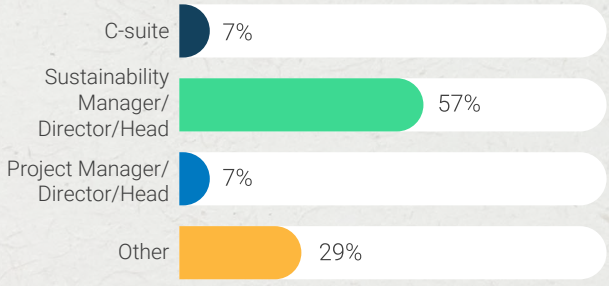
> **Transitioning to a more circular economy will require all industries to collaborate and work together.**

1.3 OVERVIEW OF SURVEY SAMPLES

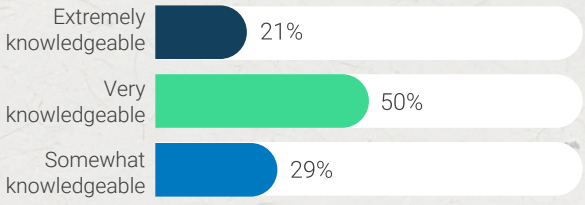
There were 16 survey respondents from the built environment and 13 from FMCG. The key characteristics of each sample are displayed below.

BUILT ENVIRONMENT

Role/position

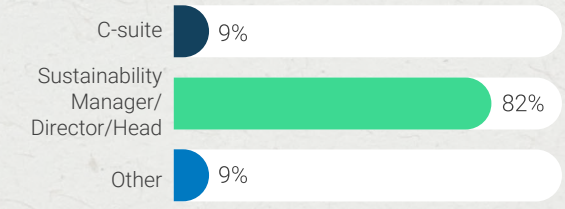


Self-reported knowledge of the circular economy

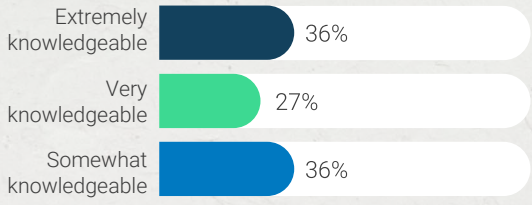


FMCG SECTOR

Role/position



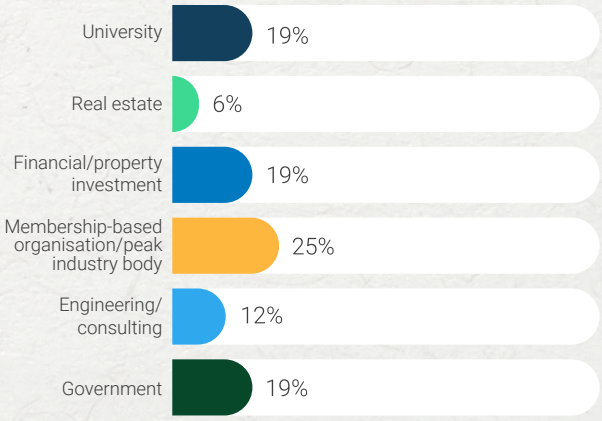
Self-reported knowledge of the circular economy



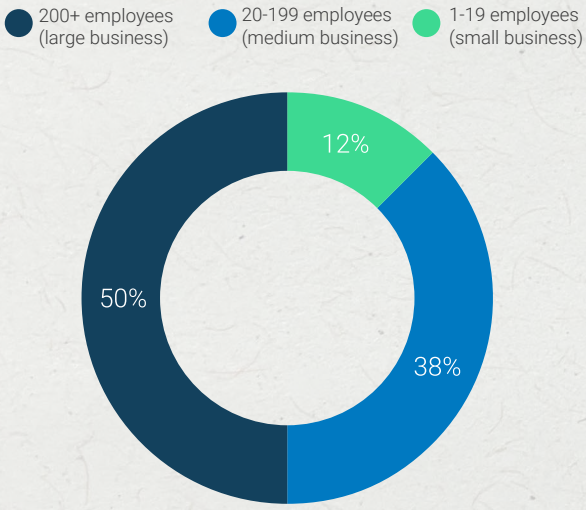
Note: percentages have been rounded

BUILT ENVIRONMENT

Type of organisation

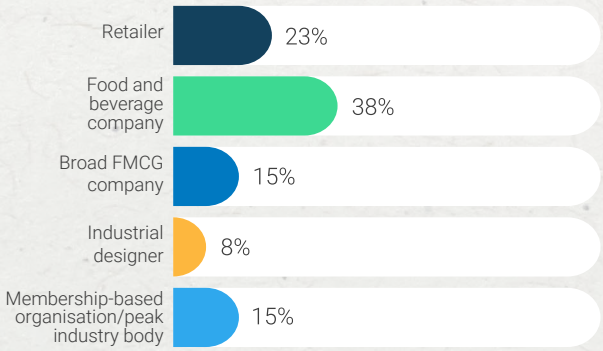


Organisation size



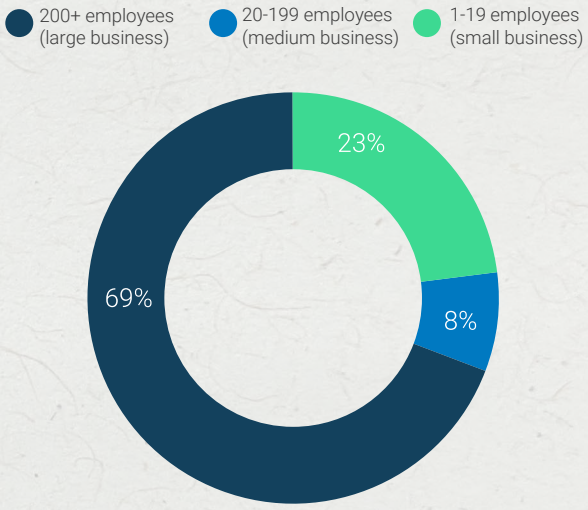
FMCG SECTOR

Type of organisation



Note: percentages have been rounded

Organisation size



Note: percentages have been rounded

1.4 LINKING CIRCULAR ECONOMY WITH DECARBONISATION

Under the United Nations Framework Convention on Climate Change (UNFCCC) and the associated Paris Agreement, the global community continues to strive to hold the global average temperature to well below 2°C above pre-industrial levels by the end of the century.[11] However, recent evidence suggests an outcome of 3°C warming is likely if business as usual is continued.[12]

In line with its obligations under the Paris Agreement, the Australian Government has committed to reducing greenhouse gas emissions to net zero by 2050 and recently announced a 2035 emissions reduction target of 62-70 per cent below 2005 levels.[13] Businesses are also setting ambitious science-based emissions reductions targets.[14] Australia has

11. United Nations Climate Change, 'The Paris Agreement'
12. Boston Consulting Group (2025), 'Why investing in climate action makes good sense'
13. Department of Climate Change, Energy, the Environment and Water (2025), 'International climate action'
14. Science Based Targets Initiative (2025), 'Companies Taking Action'

implemented mandatory climate-related financial disclosures for reporting periods commencing 1 January 2025 for certain large companies.[15,16] More than 80 per cent of all survey participants (82 per cent for the built environment and 80 per cent for FMCG) reported their organisations have made public commitments or set targets for reducing emissions (Figure 2).

Achieving net zero and genuine decarbonisation requires organisations to address scope 1, 2 and 3 emissions. Scope 1 emissions are *direct* emissions released from sources owned or controlled by an organisation (such as from company vehicles or industrial processes). Scope 2 emissions are *indirect* emissions released outside of an organisation's boundary from electricity generation. Scope 3 emissions are other *indirect* emissions and include emissions released both upstream (e.g. from raw material extraction) and downstream (e.g. from transportation of products) from an organisation's operations.

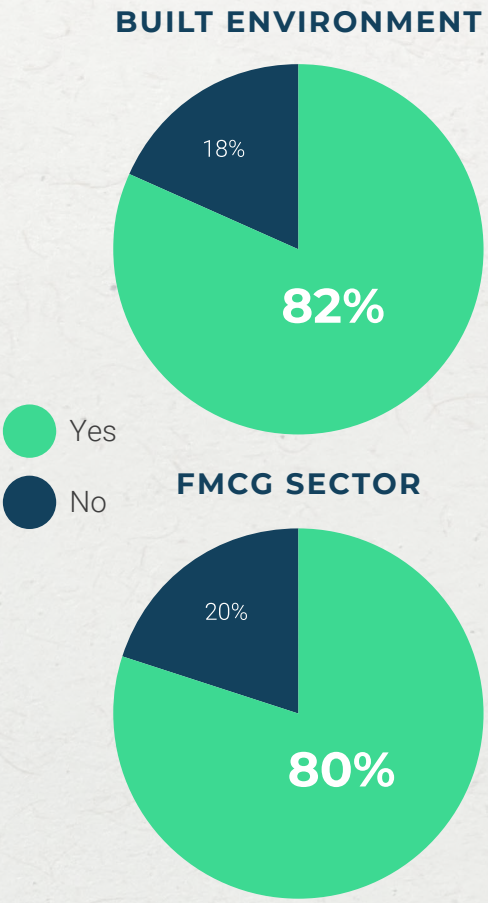


Figure 2: Proportion of survey respondents from businesses that have made public commitments or targets for reducing emissions (Note: sample size (n) = 11 for the built environment and 10 for FMCG).

> **More than 80%... reported their organisations have set targets for reducing emissions.**

A large majority of survey participants from both the built environment and FMCG sectors reported their organisation is already quantifying scope 1 and 2 emissions (Figure 3). Fewer organisations have started quantifying scope 3 emissions, which is an area where circular economy approaches can help. Embracing circularity can, for example, reduce scope 3 emissions by keeping existing materials and products in use for as long as possible and reducing the need for virgin material consumption (and new production). This is explored further in the next section.

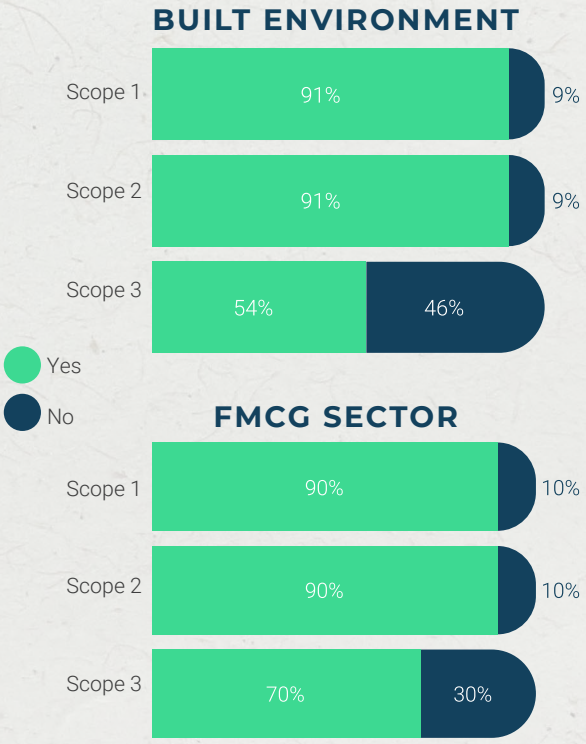


Figure 3. Proportion of survey respondents from businesses that have already started quantifying scope 1, 2 and 3 greenhouse gas emissions (Note: sample size (n) = 11 for the built environment and 10 for FMCG).

15. Department of Climate Change, Energy, the Environment and Water, 'Australia's climate change action'
16. Australian Government, Australian Sustainability Reporting Standard AASB S2

2 An introduction to circular economy

There is no doubt that to meet global climate targets, a shift away from business as usual is urgently required in both government policy and the commercial sector. To date, the focus has predominately been on transforming the energy sector and switching to renewables. However, the global community must also rethink supply chains to examine where else emissions can be reduced while enabling financial benefits and reducing supply risks. This is where a circular economy comes in.

A circular economy is an innovative model for rethinking our approach to products and services that can also help to reduce biodiversity loss and the impacts of climate change.[17] The three principles[18] of a circular economy are:

1. **DESIGN OUT WASTE & POLLUTION**
2. **CIRCULATE PRODUCTS AND MATERIALS** (at their highest value and for as long as possible)
3. **REGENERATE NATURAL SYSTEMS**

> **"Since a circular economy is focused on using materials and products more efficiently across their full life cycle, there is potential for a range of economic, environmental and social benefits.**

Whereas the current approach to production and consumption (known as the linear economy) follows a take-make-use-dispose approach, a circular economy aims to retain the value and energy embedded within materials and products for as long as possible and at highest value, rather than these being lost from the system as waste.[19]

Since a circular economy is focused on using materials and products more efficiently across their full life cycle, there is potential for a range of economic, environmental and social benefits.[20] For example, it has been projected that adopting circular strategies could boost Australia's GDP by $210 billion and create 17,000 jobs by 2050.[21] Australian businesses have also reported direct benefits from adopting circular strategies, such as improved efficiencies and cost savings.[22]

17. Ellen Macarthur Foundation, 'Completing the Picture: How the Circular Economy Tackles Climate Change'
18, 19. Ellen Macarthur Foundation, 'What is a circular economy?'
20. Productivity Commission (2025), 'Australia's circular economy: Unlocking the opportunities, Interim report'
21. KPMG (2020), 'Potential economic pay-off of a circular economy'
22. ACE Hub (2023), 'Circularity in Australian Business 2023: Perceptions, Knowledge and Actions Beyond Recycling'

2.2 CIRCULAR STRATEGIES: THE LADDER OF CIRCULARITY

For some, the circular economy is a complex concept that is difficult to visualise. While not an exhaustive representation of circularity, the 'ladder of circularity' (Figure 4) serves as a practical depiction of circular economy strategies.[23] Though there are variations of the ladder, perhaps the most commonly cited option shows the ten 'R strategies' that businesses can adopt to improve the circularity of their activities and operations. In alignment with circular economy principles, R strategies are focused on reducing raw material consumption, redesigning materials, products and business models, and keeping valuable materials in circulation. Adopting these strategies may also enable greenhouse gas emissions reductions through greater resource efficiency and reduced waste.

Strategies higher on the ladder of circularity (such as refuse, reduce, redesign and reuse) are more impactful than those lower on the ladder (such as recycle and recover). Higher order R strategies typically address the earlier stages of a project or product life cycle, resulting in reduced virgin material consumption and retaining more of the embodied carbon within existing products and materials.

Although R strategies are useful to guide decision making towards improved circularity, one survey participant from the built environment noted that there may sometimes be limitations with this approach. For example, accessing data on how different spaces within buildings are used in order to guide the optimisation of heating and cooling systems is one circular approach that does not fit neatly into a single R strategy.

The ladder of circularity is clearly a simplification of the complex system within which organisations operate and make decisions, however it no doubt provides a valuable starting point to drive innovative and circular thinking.

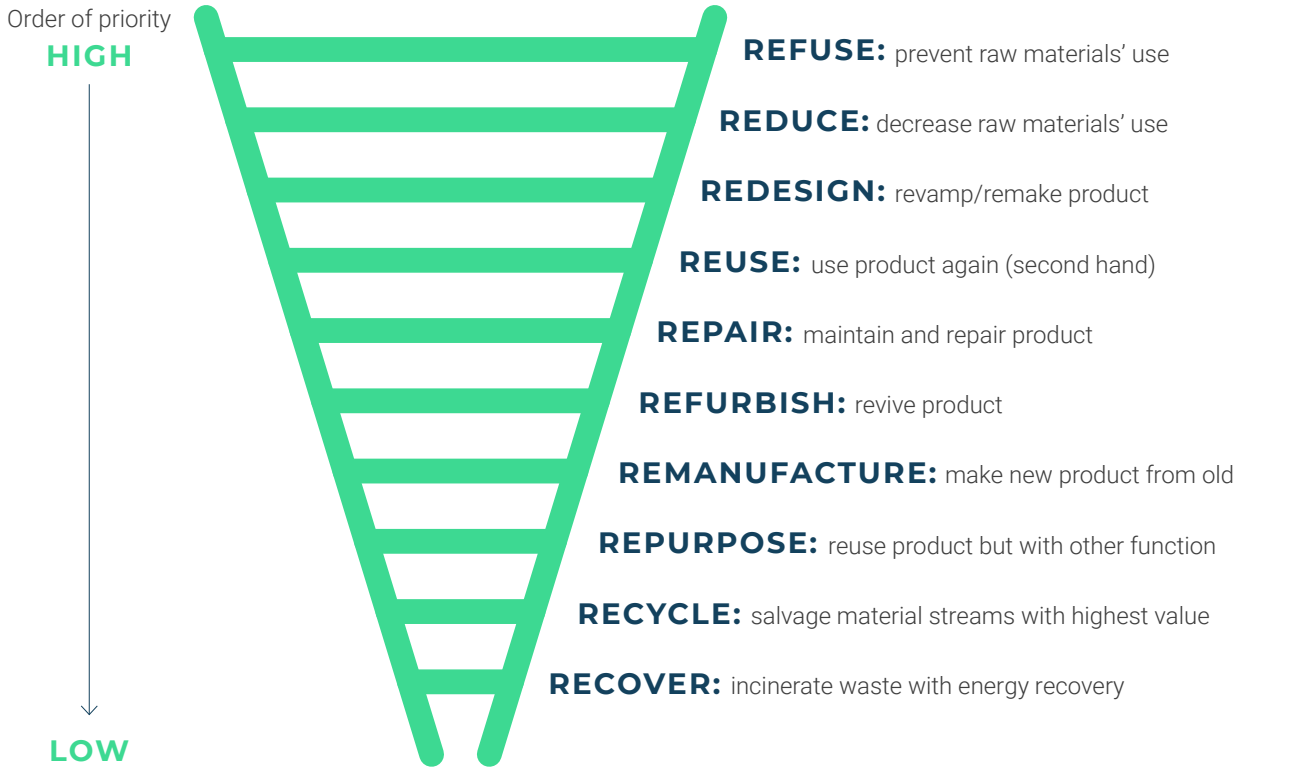


Figure 4. Ladder of circularity

23. The ladder of material circularity and 10 R's adapted from Cramer 2017

2.3 THE ROLE OF A CIRCULAR ECONOMY IN DECARBONISATION

As mentioned above, a significant chunk of global GHG emissions (45 per cent) come from the way materials, products and food are made, used, and managed.[24] Therefore, meeting global climate goals and truly decarbonising requires a transformation in the way materials and products are made and used.

Materials management accounts for two thirds of Australia's GHG emissions.[25] The materials selected for use in projects and products are determined during the design phase, yet material sourcing often sits within a long and complex supply chain. Up to 90 per cent of total business-related emissions are scope 3 emissions, however due to the complexity of many supply chains, these emissions are often the hardest to track and reduce.[26] Circular strategies provide an opportunity for companies to address these supply chain emissions by identifying materials, products and practices that can help reduce them.[27]

Reducing waste and pollution and keeping products and materials in circulation at their highest value for as long as possible (which are core principles of a circular economy) are approaches that have the potential to reduce GHG emissions across the entire supply chain.[28] Some examples of how this might be achieved are highlighted below:

Encouragingly, 62 per cent of survey participants reported their organisation has already considered adopting circular strategies to reduce their emissions. This included 70 per cent of participants from the FMCG sector and 55 per cent from the built environment (Figure 5).

The next sections of the report explore the built environment (section 3) and FMCG (section 4) sectors in more detail.

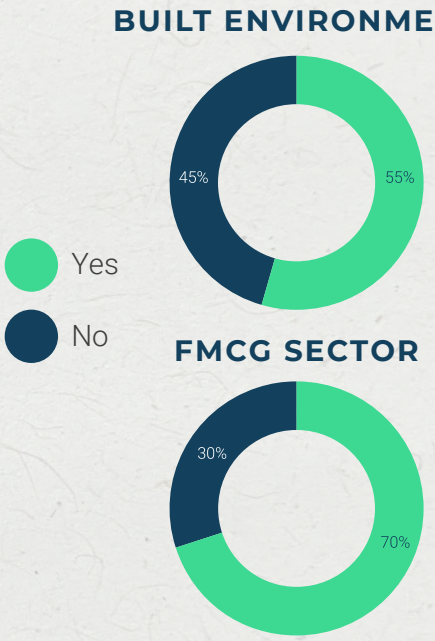


Figure 5. Proportion of survey respondents from businesses that have considered adopting circular strategies to reduce emissions (Note: sample size (n) = 11 for the built environment and 10 for FMCG).

IMPROVED MATERIAL EFFICIENCY

which means less material is used (and less material is wasted) during production processes.

DESIGN FOR LONGEVITY

which means designing materials and products to last as long as possible.

MATERIAL SUBSTITUTIONS

including switching to renewable materials when this offers a net GHG emissions benefit and/or adopting low carbon or second hand materials (or materials that can be easily reused or recycled at end-of life).

REUSE, REPAIR OR RECYCLING

of materials at end-of-life, which reduces the need for new production and reduces demand for virgin materials.

24. Ellen Macarthur Foundation (2021), 'Completing the picture: How the circular economy tackles climate change'
25. Bricout & McGarry (2023), 'Coming full circle: Decarbonisation and the circular economy'
26. Zaman et al. (2023), 'Development of the Circular Economy Design Guidelines for the Australian Built Environment Sector'
27. Mark Weick (2023), 'How circular strategies can be used to decarbonize Scope 3 GHG emissions', EY
28. Ellen Macarthur Foundation (2021), 'Completing the picture: How the circular economy tackles climate change'

3 Focus sector 1: the built environment

The built environment is the human-made elements of our surroundings, including buildings, infrastructure and public spaces. The construction, use, and maintenance of each of these elements consumes large amounts of raw materials and contributes significantly to global greenhouse gas emissions. The built environment is responsible for almost half of all raw materials extracted globally each year and around one-third of global waste generation.[29,30] In Australia, construction and demolition (C&D) waste makes up 39 per cent of total waste generated, which is more than any other sector.[31] Importantly, C&D alone does not account for the total impact of the built environment sector.

Buildings account for 30 to 40 per cent of global emissions,[32] which is why much of this section is focused on buildings and particularly the design and construction phases of buildings, which account for significant emissions generation. Regardless of this focus, the circular strategies and broader discussion within this section are relevant for all built environment projects.

The built environment contributes 31 per cent of Australia's total emissions.[33] **'Embodied carbon'** emissions from buildings and infrastructure are those emissions associated with the full life cycle of the structure, from raw material extraction, processing and production to construction and on-site activities, in-use stage maintenance and end-of-life.[34] These emissions contribute around 10 per cent of Australia's GHG emissions.[35]

> **Buildings account for 30 to 40 per cent of global emissions.**

'Upfront embodied carbon' makes up a significant portion (up to 80 per cent) of a building's embodied carbon emissions.[36] These upfront emissions are generated prior to a building being in use and come from raw materials, manufacturing, transport and construction. They make up around seven per cent of Australia's emissions and are locked in during project design and material selection.[37]

Emissions produced during the use of a building (from energy consumed for lighting, heating and cooling, for example) are known as **'operational carbon'**. As these emissions can be reduced via a transition to renewable energy and more efficient heating and cooling systems, embodied carbon will become even more of a focus for the built environment sector moving forwards. It is estimated that by 2050, embodied carbon will account for 85 per cent of emissions from Australia's built environment, compared to just 16 per cent in 2019.[38]

There is general agreement in the sector that there must be improvements in the way

29. Ellen Macarthur Foundation (2021), 'Completing the picture: How the circular economy tackles climate change'
30. Zaman et al. (2023), 'Development of the Circular Economy Design Guidelines for the Australian Built Environment Sector'
31. Blue Environment (2025) 'National waste and resource recovery report 2024'
32. World Resources Institute (2022), 'Circular economy as a climate strategy: current knowledge and calls-to-action'
33. Green Building Council Australia (2024), 'Our homes weigh a tonne'
34. UK Green Building Council (2023), 'Operational and embodied carbon: Explainer guide'
35. Australian Sustainable Built Environment Council (2025), 'Our Upfront Opportunity: Australia's policy roadmap to reduce upfront embodied carbon in the built environment'
36. Green Building Council of Australia (2022), 'An upfront conversation about upfront carbon'
37. Green Building Council Australia (2024), 'Our homes weigh a tonne'
38. Green Building Council of Australia and thinkstep-anz (2021), 'Embodied carbon and embodied energy in Australia's buildings'

buildings and infrastructure are designed, constructed, and used if climate targets are to be met.[39] Estimates from 2022 put annual scope 1 emissions from Australia's built environment at 28 million tonnes of CO_2 equivalent and put scope 2 emissions at 77 million tonnes of CO_2 equivalent.[40] Upfront embodied carbon emissions from Australia's built environment are estimated to track towards 56 million tonnes of CO_2 equivalent per year until 2027.[41] Infrastructure Australia suggests some 27.5 million tonnes of CO_2 equivalent is generated in materials manufacture alone,[42] reflecting the opportunity for deeper scope 3 analysis to understand opportunities for emissions reduction.

Survey participants reported several opportunities for organisations within the built environment to reduce emissions (Figure 6). Switching to renewable energy, improving energy efficiency and reducing waste were reported by more than 90 per cent of survey participants. Encouragingly, many survey participants also highlighted opportunities to engage with the supply chain (82 per cent) and use alternative low-carbon materials (64 per cent), which contribute meaningfully to improved circularity.

> **56 million tonnes of CO_2 equivalent is generated in materials manufacture alone.**

OPPORTUNITIES FOUND TO REDUCE EMISSIONS

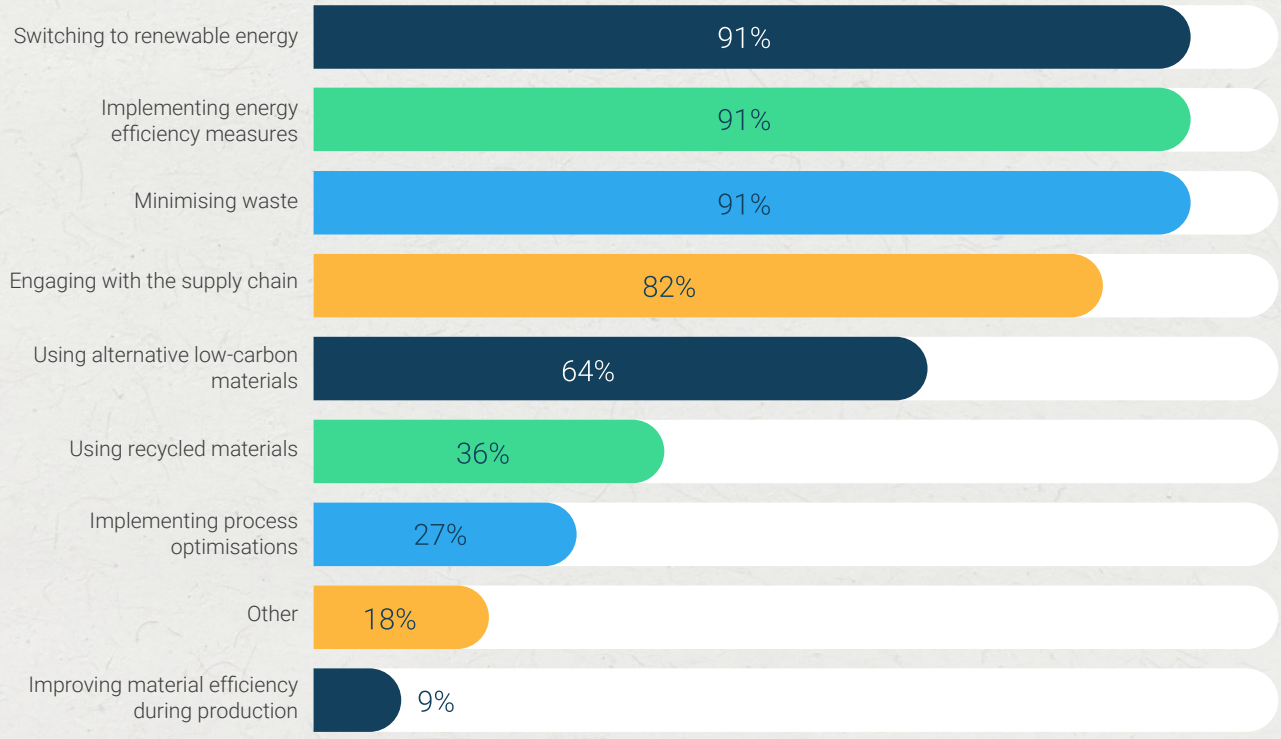


Figure 6. Opportunities organisations have found to reduce emissions (expressed as percentage of participants surveyed, n=11).

39. Arup & Enel Foundation (2022), 'Circular Cities: Impacts on Decarbonisation and Beyond'
40. Climate Change Authority (2024), 'Sector Pathways Review'
41, 42. Infrastructure Australia (2024), 'Embodied Carbon Projections for Australian Infrastructure and Buildings'

3.1 CIRCULAR STRATEGIES AND EMISSIONS REDUCTIONS

Analysis suggests that applying circular strategies to projects in Australia's built environment could reduce emissions by 3.6 million tonnes of CO_2 equivalent per year by 2040.[43] In support of this, survey participants reported most circular strategies as having either 'strong' or 'some' potential to reduce emissions (Figure 7).

Survey participants identified rethink, redesign, reuse and repurpose strategies as having the strongest potential for reducing emissions from the built environment. Reduce, repair, refurbish and regeneration strategies were also reported as having good potential for emissions reduction.

REPORTED POTENTIAL FOR REDUCING EMISSIONS

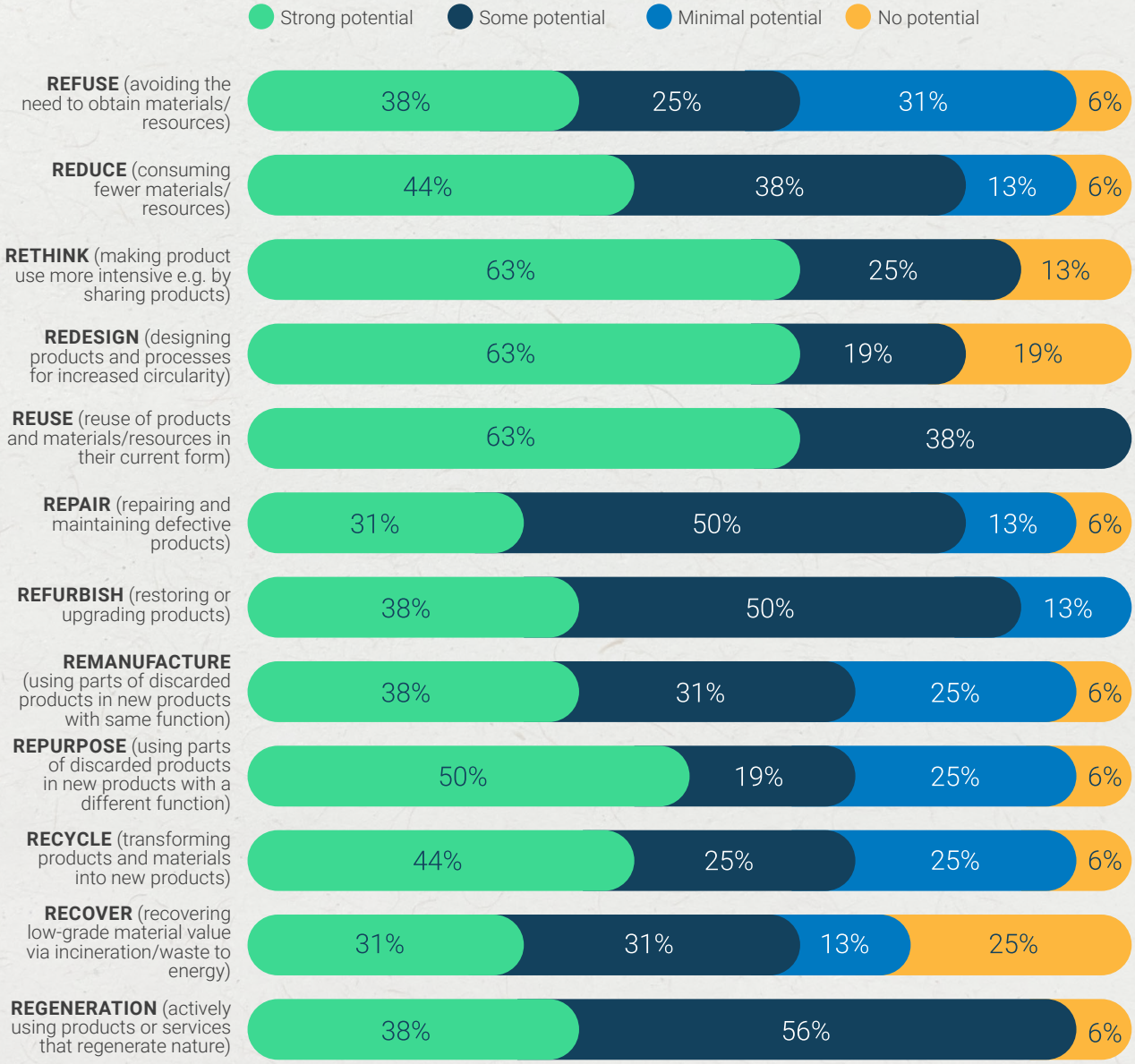


Figure 7. Reported potential for circular strategies to reduce emissions within the built environment sector (expressed as percentage of participants surveyed, n=16). Note: percentages have been rounded.

43. PwC (2021), 'Building a more circular Australia – The opportunity of transitioning to a circular economy'

3.2 APPLYING CIRCULAR STRATEGIES

Survey respondents reported their organisations have already implemented circular R strategies (Figure 8). Reduce (reported by 64 per cent of survey participants), as well as reuse and recycle (both 55 per cent) strategies, were the most commonly implemented strategies.

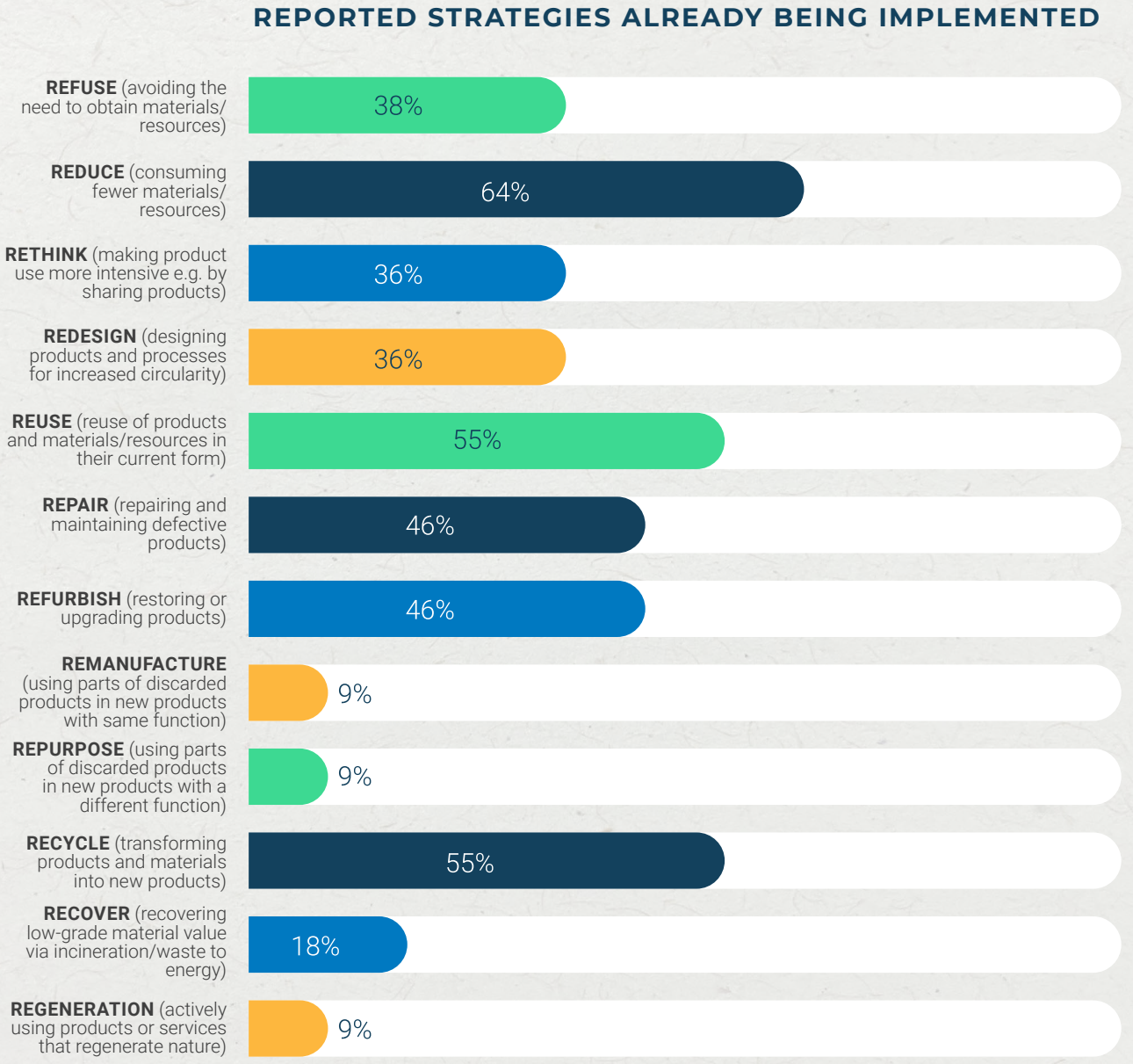


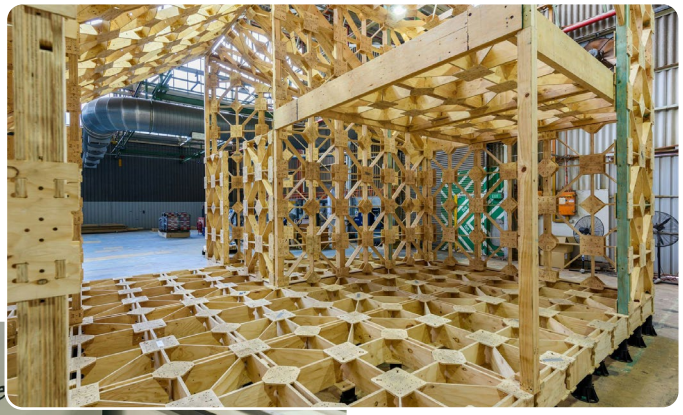
Figure 8. Reported circular R strategies already implemented within FMCG organisations (expressed as percentage of participants surveyed, n=11).

Building on the reported action already being taken within the sector, the below provides a brief overview of how circular R strategies may be implemented within the built environment and showcases some case studies of successful implementation. Note, the examples provided are just a guide and not a comprehensive overview of circular strategies for the built environment. Content within the case studies was sourced from publicly available information and this has been referenced.

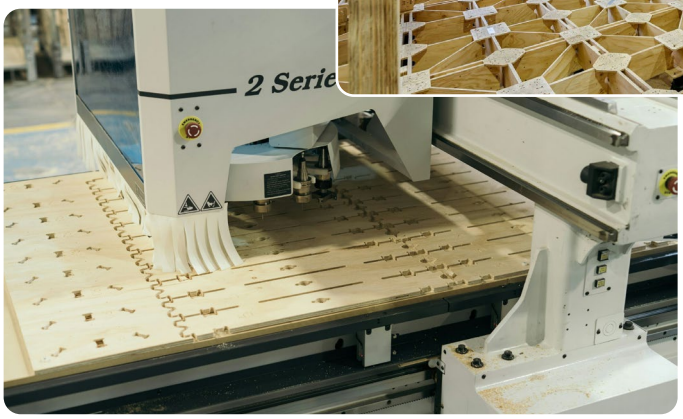
CIRCULAR STRATEGY: REDUCE

Reduce the amount of material used (and the amount of waste generated) during production and construction.

- **Improve material efficiency**, i.e. use less and waste less raw material.[44]
  - Estimates from the International Resources Panel suggest material efficiency strategies could reduce GHG emissions in the material cycle of residential buildings by 80-100 per cent in G7 countries by 2050.[45]
- **Explore industrialised construction processes** to reduce waste, such as offsite construction, prefabrication and modular construction (around 15 per cent of building materials are wasted in construction).[46]
- **Use less steel, cement and/or concrete,** which account for a large proportion of GHG emissions. Some options include optimising structural design to reduce the volume of concrete and steel required, using mass timber for structural elements and substituting Portland Cement with lower carbon alternatives.[47]



For example, the XFrame system is a circular construction technology formed from a modular 'kit-of-parts' that is completely detachable and reusable.



Manufacturing of the frames typically results in only five per cent waste from the materials used.

44. Office of Energy and Climate Change, NSW Treasury, 'Circular design guidelines for the built environment'
45. World Resources Institute (2022), 'Circular economy as a climate strategy: current knowledge and calls-to-action'
46. Ellen Macarthur Foundation (2021), 'Completing the picture: How the circular economy tackles climate change'
47. WWF-Australia (2020), 'The Time Is Now: Tackling Embodied Carbon in the Building and Construction Sector'

CIRCULAR STRATEGY:
REDESIGN

Redesign products to last longer, use less carbon intensive materials, reuse materials and design for disassembly, reuse or recycling at end-of-life.

- **Reduce overspecification** and encourage lightweight design where possible.[48]
- **Substitute carbon-intensive materials** with renewable or certified low carbon materials where appropriate.
- **Sustainably sourced new timber technologies** e.g. Cross-Laminated Timber (CLT) and glue laminated timber (Glulam), low carbon cement and recycled and recyclable materials are some options to explore.[49]
- **Consider prefabrication and modular and flexible designs** to enable increased utilisation and to produce less waste. Modular design also allows for easy reuse and repair to extend the usable lifespan of assets and components.[50]
- **Design for disassembly,** so valuable materials can be reused or recycled at end-of-life.[51]

CASE STUDY:
REDESIGN

25 King Street, QLD

- A 10-storey commercial office building by Lendlease, Impact Investment Group, Aurecon, Bates Smart and Woods Bagot.[52]
- Reduced upfront embodied carbon within Modules A1-A3 of an Environmental Product Declaration by **38.7 per cent** compared to a reference building with standard concrete/steel construction.
- Engineered timber (Cross Laminated Timber (CLT) and glue laminated timber (Glulam)) used instead of carbon-intensive concrete and steel for structural columns and beams.
- Design specified minimal internal finishes, with CLT cladding and flooring and no suspended ceiling systems.

48, 49. Arup & Enel Foundation (2022), 'Circular Cities: Impacts on Decarbonisation and Beyond'
50. Office of Energy and Climate Change, NSW Treasury (2023), 'Circular design guidelines for the built environment'
51. Built and Coreo (2024), 'How to write a Building Disassembly Plan'
52. Aurecon (2018), 'Sustainable timber building design putting people at the heart'

CASE STUDY:
REDESIGN

First Building, Bradfield City, NSW

- The First Building in Bradfield City is the foundational building in Australia's first new city to be built in 100 years, on the doorstep of Western Sydney International Airport. First Building houses stage 1 of the Advanced Manufacturing Readiness Facility.[53]
- Designed by Hassell and First Nations designers Djinjama, circular design principles are at the heart of the building, which features a biosolar green roof.
- Building uses engineered timber including Cross Laminated Timber (CLT) and glue laminated timber (Glulam) instead of carbon-intensive concrete and steel for structural columns and beams.
- Rainwater is collected from the green roof and reused in landscaping irrigation and greywater.
- Used low embodied carbon construction materials, including rammed earth walls, mass timber construction and 'green concrete' with 40 per cent less Portland Cement.
- Modular construction – rammed earth walls can be broken down and reused at end-of-life and mass timber prefabricated components can be disassembled and reused.

CIRCULAR STRATEGY:
REUSE

Use products or materials again in their existing form, without requiring them to be changed or reprocessed. This keeps building components in circulation and retains value and embodied carbon.

- **Design for disassembly**, which allows building materials to be reused at end-of-life, rather than sent to landfill where the embodied carbon is lost.
- **Banks of materials and digital material passports** are emerging as methods to keep a digital record of building components and materials so they can be more easily reused (or, at the very least, recycled) in the future.[54]

53. Bradfield Development Authority (2025), 'Bradfield City Centre First Building'
54. Bricout & McGarry (2023), 'Coming full circle: Decarbonisation and the circular economy'

CASE STUDY:

REDESIGN + REDUCE + REUSE

Burwood Brickworks Shopping Centre, VIC

- Retail centre by Frasers Property, NH Architecture, Russell & George and others.[55]
- Reduced upfront embodied carbon by **19,358 tonnes CO_2e**.
- The only retail centre in the world with 'Living Building Challenge' certification, which is regarded as the most rigorous standard for sustainable buildings.[56]
- Used more than **90 salvaged materials** (including walls, floors, hardwood, hardware) and materials with high recycled content.
- Used less material (by exposing the building structure) and reduced waste during construction.
- The flexible design allows for easy maintenance and future disassembly.

CASE STUDY:

REUSE + REDUCE

Quay Quarter Tower, NSW

- 49-storey retail and commercial building by AMP Capital, Multiplex, 3XN, BVN, Arup and others.[57]
- Reduced embodied carbon emissions by **12,000 tonnes of CO_2e**, reduced cost of construction by an estimated **$130 million** and reduced duration of construction by approximately **12 months**.
- Rather than demolishing the existing building, **66 per cent** of the original structure (existing columns, beams and slabs) and **95 per cent** of the original core was retained.

55. NH Architecture, 'Burwood Brickworks'
56. Frasers (2021), 'Burwood Brickworks recognised as the world's most sustainable shopping centre'
57. 3XN, 'Quay Quarter Tower'

CIRCULAR STRATEGY:
REFURBISH/REPURPOSE

Revive products and materials to a useful condition for the same or similar purpose or use them for a new purpose without extensive modification. This keeps materials in circulation, reduces consumption of raw materials and prevents waste.

- **Consider** whether assets need to be designed completely from scratch.
- **Explore refurbishment over a new build**, to leverage emissions embodied in existing materials.[58]
- **Prioritise retaining components** with the highest embodied carbon, such as the substructure, superstructure and envelope.[59]

CASE STUDY:
REFURBISH + REDUCE

500 Bourke Street, VIC

- 40-storey commercial building by ISPT, Aurecon, Fender Katsalidis, Alpha PCM and others.[60]
- Reduced upfront embodied carbon by **57,000 tonnes CO_2e** (40,000 tonnes saved from retaining the building structure).
- Refurbished the existing building, rather than demolishing and constructing a new carbon-intensive concrete and steel structure building.
- **40,000 tonnes** of avoided emissions came from retaining the existing structure.
- As part of the refurbishment, the building was converted to be fully electric and now operates via **100 per cent** renewable energy.

58. Arup & Enel Foundation (2022), 'Circular Cities: Impacts on Decarbonisation and Beyond'
59. Green Building Council Australia (2023), 'A practical guide to upfront carbon reductions'
60. ISPT (2024), 'ISPT officially celebrates the launch of 500 Bourke Street'

3.3 CURRENT CHALLENGES AND SOLUTIONS

Stakeholders within the built environment are engaged and want to improve circularity within their activities and operations and the case studies highlighted above suggest progress is already being made. The sector also understands the need for collaboration among all stakeholders and across the full life cycle of projects and assets if true impact is to be made.

However, both survey and roundtable participants highlighted some current challenges which must be addressed for circular strategies to move into the mainstream. Some of the key challenges, and potential solutions identified to help overcome them are outlined below.

Challenges

Solutions

LACK OF UNDERSTANDING OF CIRCULAR 'R' STRATEGIES

Participants raised concern that there is still work to be done in terms of improving understanding of circular strategies within the built environment sector. Participants agreed most stakeholders are familiar with recycling, but they are less familiar with higher order (and more circular) R strategies and how these strategies fit into the project life cycle.

→

CLEAR COMMUNICATION WITH STAKEHOLDERS

Participants highlighted the benefit of communicating circular strategies in a way that makes sense to the stakeholders you are engaging with throughout the different stages of a project. One example provided was related to the demolition stage of a redevelopment project, where 'refuse' and 'reduce' strategies were considered but, to improve understanding, were communicated to the relevant stakeholders in terms of their impact on the pre-demolition audit and procurement stages (i.e. retaining some of the structure reduced the need to buy new materials for the rebuild).

CIRCULARITY IS NOT CURRENTLY A PRIORITY IN DECISION MAKING

Tenders and contracts do not currently prioritise circularity and decisions are often based on lowest price, rather than whole-of-life value (which includes both carbon and financial considerations). However, as rightly pointed out by roundtable participants, the greatest impact in terms of improved circularity and emissions reductions is made during the design phase, making this the most important stage for prioritising circular principles in decision making.

→

GOVERNMENT MANDATES, PRIORITISATION & EDUCATION

Multiple participants called for tighter government regulation, with mandates that provide clear and consistent demand signals. Improved board level 'buy in' on circularity was also suggested to prioritise circularity in both procurement and operational activities. This is where targeted education for decision makers would be valuable.

Challenges

Solutions

INCREASED COST AND HIGHER RISK WHEN ADOPTING CIRCULAR STRATEGIES

There is often a higher upfront cost associated with circular design decisions. One participant shared that circular design is often 'value engineered out' during the later stages of project design and approvals due to pushback around increased cost and risk associated with using a new product or supplier.

Participants also highlighted that the relatively low cost of sending products and materials to landfill, rather than reusing, repurposing or recycling them, is often a disincentive for the sector to adopt circular strategies. Additionally, one survey participant mentioned that securing warrantees or insurance for reused or remanufactured components is often difficult.

→

MAKE THE BENEFITS CLEAR AND ESTABLISH A LONGER-TERM VISION

Improved knowledge and understanding of the business benefits of adopting circular strategies (for example, via education and training or sharing successful case studies) and having a longer-term vision around return on investment (ROI) were suggested as potential solutions to help overcome these challenges.

TIME CONSTRAINTS AND LACK OF DATA TO SUPPORT DECISION MAKING

Participants raised concerns around the extra time and effort required to source alternative (more circular and lower carbon) products and materials for projects. The patchiness of supplier data and Environmental Product Declarations (EPDs) coverage was also raised as a concern.

→

CIRCULAR SUPPLIER LISTS, IMPROVE COLLABORATION & DATA SHARING

Participants suggested a circular supplier list and marketplace for salvaged materials would be useful to encourage uptake of circular strategies. Additionally, improved collaboration and data sharing among stakeholders (and across supply chains) was raised as an important enabler of transparent and efficient decision making when it comes to adopting circular strategies.

3.4 TOOLS TO GUIDE IMPLEMENTATION OF CIRCULAR STRATEGIES

Adopting circular strategies to reduce GHG emissions within the built environment requires the entire project team (including designers, engineers, contractors, sub-contractors, suppliers and clients) to have a clear vision and agreed set of objectives for the project from the outset.[61]

Some tools that can help guide decision making are listed below.

TOOLS TO ASSESS POTENTIAL FOR R STRATEGY ADOPTION

- The Green Building Council of Australia's guide to circular procurement
- NSW Government Circular Design Guidelines for the built environment

TOOLS TO ASSESS PRODUCT CIRCULARITY

- International Standards Organization ISO 59020 Standard
- Circular Transition Indicators (CTI) tool
- Material Circularity Indicator (MCI)
- Planet Price

TOOLS TO ASSESS BUILDING CIRCULARITY

- The Circular Buildings Toolkit
- Built and Coreo Design for Disassembly
- Infrastructure Sustainability Council IS Rating Scheme

TOOLS TO ASSESS EMBODIED CARBON

- Life Cycle Assessment (LCA)[62]
- Environmental Product Declarations (EPDs)[63]
- The Green Building Council of Australia's guide to upfront carbon reductions (and calculator)
- NABERS Embodied Carbon rating tool and national emission factors database

OTHER RESOURCES

- Australian Sustainable Built Environment Council (ASBEC) Issues paper: Embodied carbon emissions in Australia's built environment
- Australia's waste[d] Opportunity 2025, report by Coreo in partnership with the Green Building Council of Australia (GBCA)
- Nature Design Guide (a collaborative industry-led resource for nature positive design)
- Material and Embodied Carbon Leaders Alliance (MECLA)
- Global Circularity Protocol for Business

61. thinkstep-anz (2023), 'Embodied Carbon and Circular Economy review: Summary Report 2023'
62. A cradle-to-grave LCA is the most comprehensive as it covers the entire life cycle (including raw materials, production, use and end-of-life). Despite their ability to provide entire life cycle embodied carbon measures, an LCA is only as comprehensive as its study area scope boundaries allow it to be. Scope boundaries need to be clearly defined and maintained from design to operations to ensure their effectiveness.
63. A cradle-to-grave EPD is the most comprehensive as it covers the full life cycle, from raw materials extraction to end-of-life. Product EPDs should comply with EN15804 and be verified against ISO14025.

4 Focus sector 2: fast moving consumer goods

Fast-moving consumer goods (FMCG) are low-cost, high-demand products that are consumed frequently. Noting that fast fashion items are sometimes included as FMCG, for this project FMCG were defined as food and beverages, cosmetics, toiletries and household products (such as cleaning supplies).

These products are generally designed for single or limited use, but their production is resource intensive in terms of both materials and energy consumed.[64] Therefore, there is a clear disparity between the lifespan of FMCG and their environmental impact. Compared to durable goods with a longer lifespan, it has been suggested that high turnover FMCG products demand less investment from both manufacturers and consumers, which may lead to a more casual attitude toward their environmental impact.[65]

In terms of action to date, much focus (including consumer demand) has been placed on improving packaging design for increased sustainability. However, the majority of greenhouse gas emissions associated with the FMCG sector come from the raw materials and ingredients that are used during manufacturing rather than the packaging (this includes emissions from farming, processing and transportation).[66,67]

Packaging for FMCG products is commonly made from virgin materials and the appropriate recovery systems are often not in place to ensure these materials can remain in circulation. The result is that valuable materials regularly end up as waste in landfill.[68]

“
Compared to durable goods with a longer lifespan, it has been suggested that high turnover FMCG products demand less investment from both manufacturers and consumers, which may lead to a more casual attitude toward their environmental impact.

64. Muranko et al. (2021), ‘Characterisation and Environmental Value Proposition of Reuse Models for Fast-Moving Consumer Goods: Reusable Packaging and Products’
65. Kuzmina et al. (2018), ‘Future scenarios for Fast-Moving Consumer Goods in a circular economy’
66. Unilever, ‘We’re working to reduce emissions across our value chain’
67. Coca-Cola Europacific Partners, ‘2024 Annual Report and Form’
68. Bocken et al. (2022): ‘Circular business models for the fastmoving consumer goods industry: Desirability, feasibility, and viability’

4.1 CIRCULAR STRATEGIES AND EMISSIONS REDUCTIONS

FMCG companies are most likely to improve circularity by recycling waste, switching to renewable energy, and improving operational efficiencies.[69] This claim was supported by the survey participants, who all reported their organisation had identified energy efficiency measures and waste minimisation as opportunities to reduce emissions (Figure 9). Additionally, many survey participants reported switching to renewable energy (90 per cent) and implementing process optimisations (80 per cent) as opportunities to reduce emissions.

However, to truly embrace circularity and the associated emissions reductions, companies are encouraged to adopt higher order R strategies such as reduce, redesign and reuse. The surveys indicated companies are also aware of the importance of adopting higher order R strategies, with a high proportion of participants reporting opportunities for their organisation to reduce emissions via engaging with the supply chain (70 per cent) and using recycled materials (70 per cent). Half of the participants surveyed reported opportunities to reduce emissions via improving material efficiency during production and using alternative low-carbon materials (both reported by 50 per cent of survey participants).

> **“**
> **… companies are encouraged to adopt higher order R strategies such as reduce, redesign and reuse.**

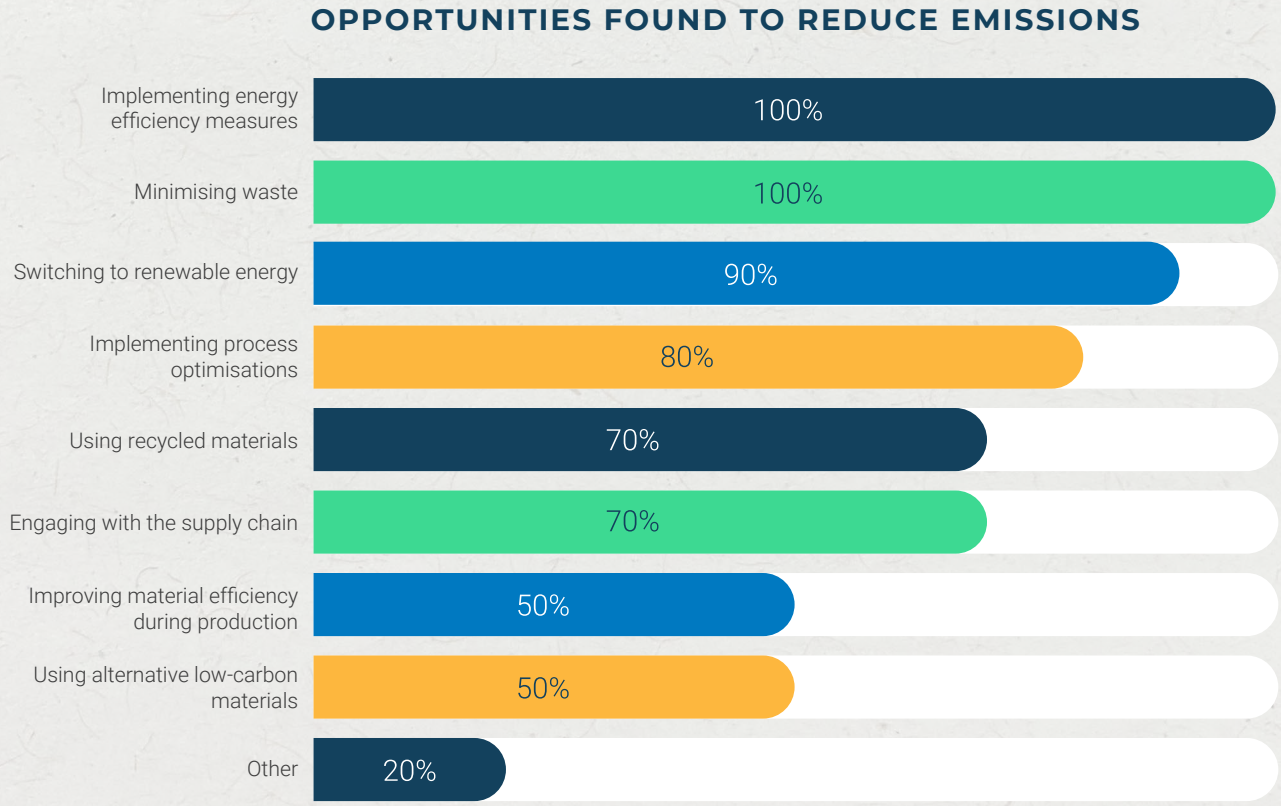


Figure 9. Reported opportunities in FMCG organisations to reduce emissions (expressed as percentage of participants surveyed, n=10).

69. Bocken et al. (2022): 'Circular business models for the fastmoving consumer goods industry: Desirability, feasibility, and viability'

Encouragingly, when asked about R strategies already being implemented, all survey participants reported their organisation had already adopted reduce strategies (this was also the case for recycle strategies), followed by refuse, redesign (both reported by 90 per cent of participants) and reuse strategies (80 per cent) (Figure 10).

As a significant proportion of emissions come from raw materials and ingredients, it was also encouraging that 70 per cent of survey participants reported having adopted regeneration strategies. Whilst regeneration was not explored in depth, roundtable discussions indicated application of this strategy involves sourcing raw materials and ingredients through regenerative agricultural practices.

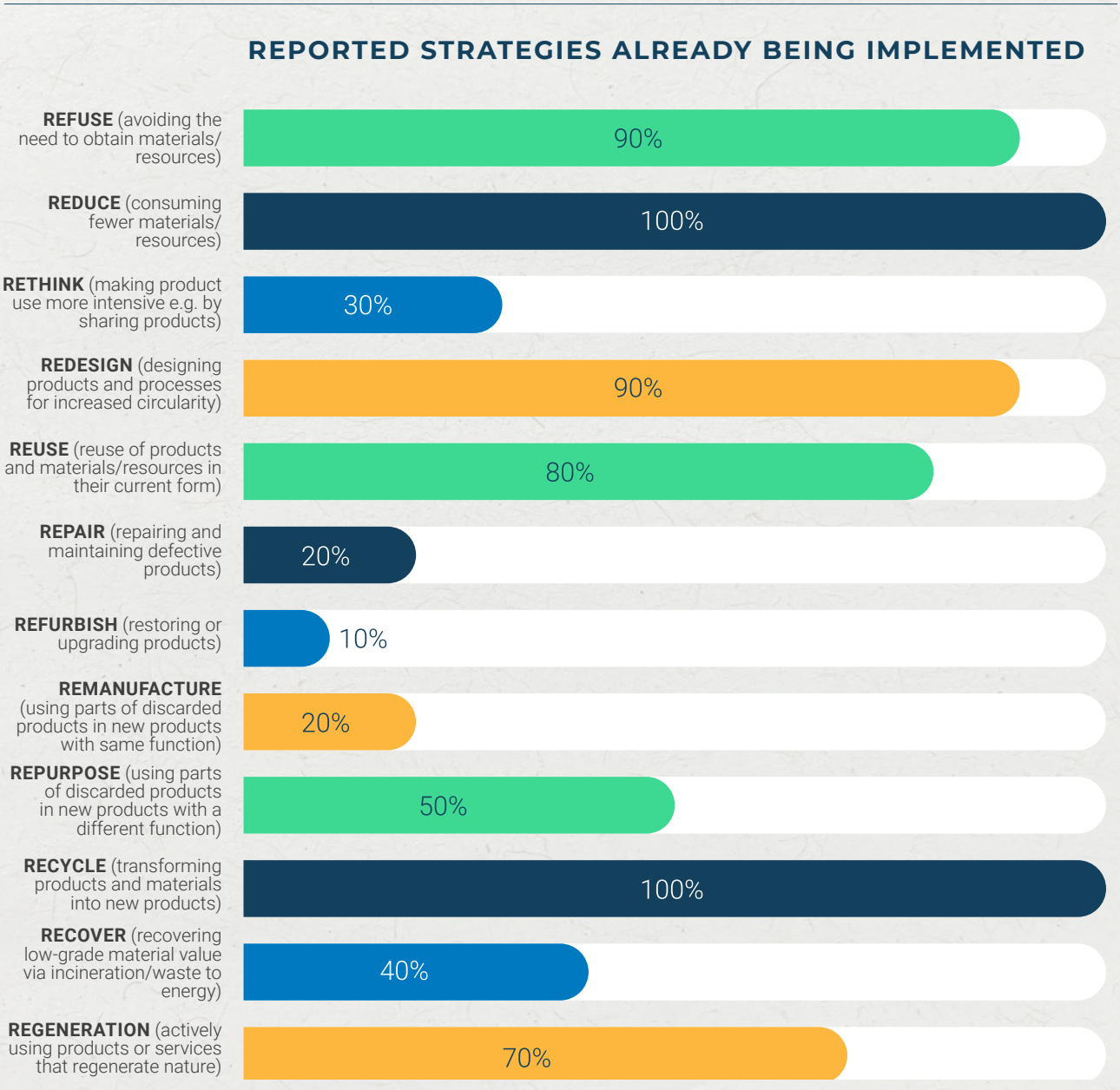


Figure 10. Reported circular R strategies already implemented within FMCG organisations (expressed as percentage of participants surveyed, n=10).

4.2 APPLYING CIRCULAR STRATEGIES

The survey data and roundtable suggest that organisations within the FMCG sector are aware of circular strategies, have already started implementing them and understand the benefits of doing so (including the opportunities to reduce organisational emissions). So, which strategies are perceived as most impactful when it comes to reducing emissions?

Survey participants reported redesign (77 per cent reported strong potential), recycle (69 per cent), reuse (62 per cent) and reduce (62 per cent) strategies as having the strongest potential for reducing emissions (Figure 11). Participants also considered refuse and regeneration strategies as having high potential for reducing emissions (when both the 'strong potential' and 'some potential' categories are combined).

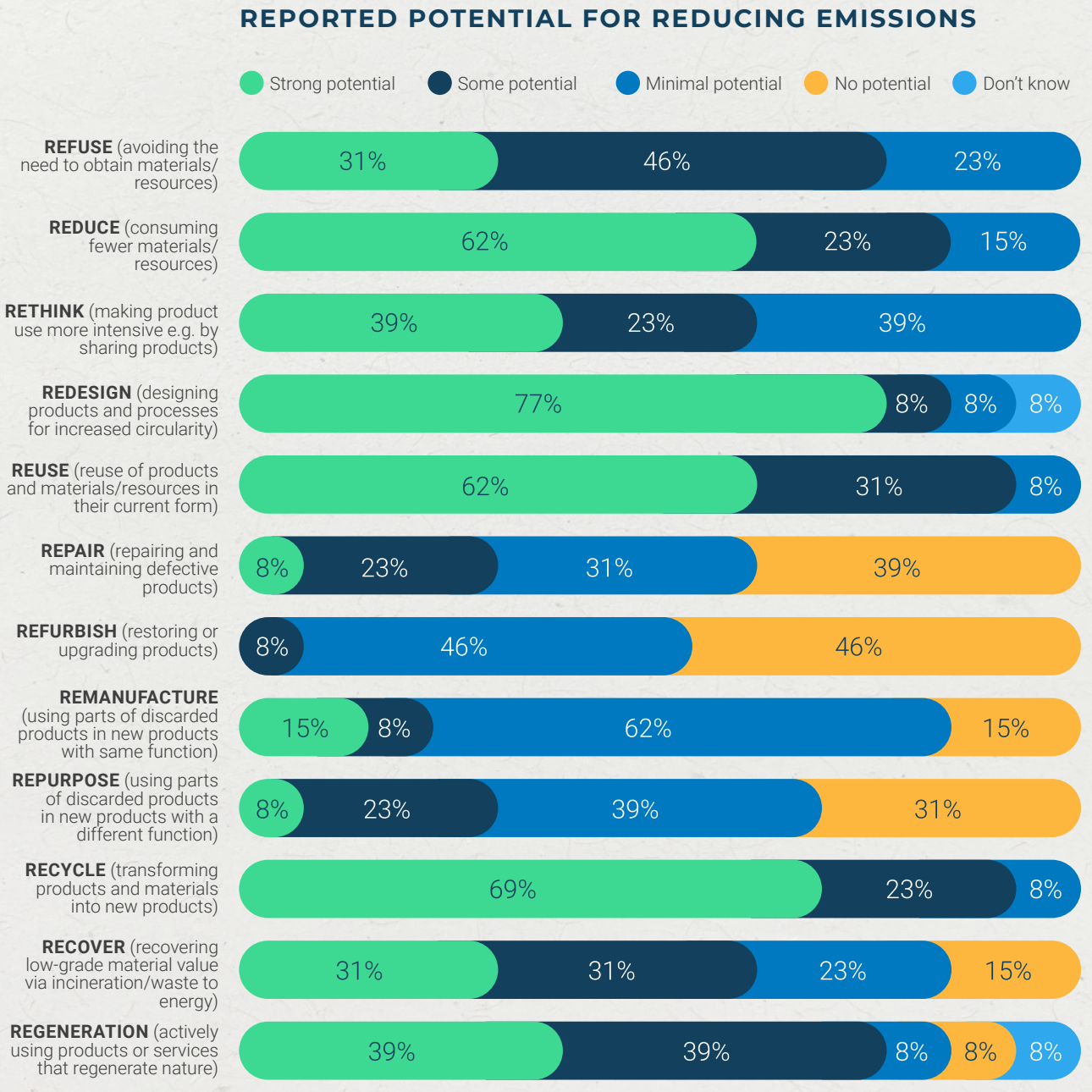


Figure 11. Reported potential for circular strategies to reduce emissions within the FMCG sector (expressed as percentage of participants surveyed, n=13). Note: percentages have been rounded.

Below is a brief overview of how those R strategies perceived by survey participants as having the strongest potential for emissions reductions (i.e. reduce, redesign, reuse and recycle) may be implemented within the FMCG sector. Also showcased are some case studies for additional inspiration. Note, the examples provided are just a guide and not a comprehensive overview of circular strategies relevant to the sector. Content within the case studies was sourced from publicly available information and this has been referenced.

CIRCULAR STRATEGY: REDUCE

Reduce the amount of material used in products and the amount of waste generated during production processes.

- **Improve material efficiency**, i.e. use less and waste less raw material, which reduces demand for virgin materials.[70]
- **Use less packaging material** via lightweight design, which reduces production and transport-related emissions.[71]
- **Reduce waste generation** via more efficient production processes.

CASE STUDY: REDUCE

Unilever

- Reduced the amount of plastic used in their range of roll-on deodorants through lightweighting (Sure, Rexona and Dove) by **22 per cent**. This process has reduced use of virgin plastic (and associated emissions) and reduced emissions associated with transport on a per product basis.[72]
- Between 2022 and 2023, Unilever reported GHG emissions from packaging had been reduced by **4 per cent** through increased use of recycled plastic and lightweighting of packaging, as well as reduced product volumes.[73]
- Overall, Unilever have reduced the use of virgin plastic in their packaging by **29 per cent** since 2019. In 2025, use of recycled content in plastic packaging was **25 per cent**.[74]

70. Bocken et al. (2022): 'Circular business models for the fastmoving consumer goods industry: Desirability, feasibility, and viability'
71. Muranko et al. (2021), 'Characterisation and Environmental Value Proposition of Reuse Models for Fast-Moving Consumer Goods: Reusable Packaging and Products'
72. Unilever, 'Our new roll-on packs are now here!'
73. Unilever (2024), 'Unilever Annual Report and Accounts 2023'
74. Unilever (2026), 'Unilever Annual Report and Accounts 2025'

CASE STUDY: REDUCE

Coca-Cola

- Reduced the weight of PET soft drink bottles sold in the USA and Canada to **18.5 grams** (down from 27 grams ten years ago).
- This lightweighting is projected to reduce virgin plastic consumption by the equivalent of approximately **800 million bottles** in 2025 compared to 2024.
- In terms of the impact on GHG emissions (projected 2025 emissions compared to 2024 emissions), the company reports this change is equivalent to taking more than **17,000 cars** off the road for one year.[75]

CIRCULAR STRATEGY: REDESIGN

Redesign existing products to use less material, use reusable or recyclable packaging, incorporate recycled content, and use raw materials and ingredients from sustainable and regenerative sources.

- **Choose packaging materials that are renewable**, low carbon and sustainably sourced.[76]
- **Reduce use of virgin packaging materials** and increase use of recycled content, where possible.
- **Design packaging for easy recovery of materials** (i.e. design for recyclability).
- **Procure ingredients and raw materials from certified sustainable sources**, such as deforestation-free and regenerative agriculture. Regenerative farming practices improve soil health, carbon sequestration and ecosystem function (this also falls under a regeneration strategy).[77]
- **Where appropriate, choose bio-based over fossil fuel-based chemicals** in cleaning and laundry products.

75. The Coca-Cola Company, 'Coca-Cola North America Debuts New Lightweight PET Bottle Designs'
76. Bocken et al. (2022): 'Circular business models for the fastmoving consumer goods industry: Desirability, feasibility, and viability'
77. NSW Government Local Land Services, 'Regenerative Agriculture'

CASE STUDY:

REDESIGN

Unilever

- In collaboration with partners, suppliers and farmers, Unilever piloted four regenerative farming projects which showcased GHG emissions reduction potential (as well as other environmental and efficiency benefits).[78]
- For example, in Spain, the use of sensors and soil probes allowed farmers to closely monitor tomato crops and provide water more precisely and efficiently (this meant farmers reduced energy and water use from irrigation).
- Farmers also applied less fertiliser, which reduced GHG emissions and resulted in cost savings. Some farmers planted a wildflower border to improve biodiversity.
- The project resulted in a **37 per cent** reduction in GHG emissions (kg of CO_2e) per kg of tomatoes produced. Additionally, soil organic matter increased from one per cent in 2020 to **1.27 per cent** in 2022. This is an important indicator of the ability of soil to capture carbon. Pollinators increased by **173 per cent** when a wildflower border was planted.[79]

CASE STUDY:

REDESIGN

Stone & Wood

Graphic from Stone & Wood used with permission.

- In collaboration with supply chain partners (Visy, Novelis and Rio Tinto), Stone & Wood are trialling a new specially marked beer can with higher recycled aluminium content and lower carbon virgin aluminium.[80]
- The redesigned cans contain an average of **83 per cent** recycled aluminium and are estimated to generate **59 per cent** less carbon emissions than the original cans.

78, 79.. Unilever (2023), 'Impact results from Unilever's first set of regenerative agriculture projects'
80. Stone & Wood (2025), 'Together we can: an industry alliance with a can-do attitude for a better future'

CASE STUDY:
REDESIGN

Coca-Cola

- Replaced their green PET plastic Sprite bottles with clear plastic (PET), which increases the likelihood of the bottles being recycled into new bottles within Australia.[81]
- Clear PET can be recycled into high quality food grade plastic, whereas green PET cannot be recycled into new bottles and is generally downcycled.
- This simple redesign increases the quantity of rPET for use in the Australian market, which reduces emissions associated with the production of virgin plastics.

CIRCULAR STRATEGY:
REUSE

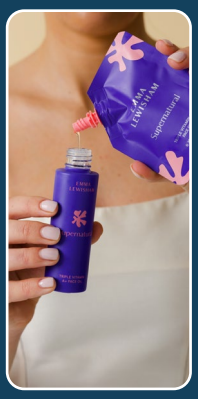
Use a product or packaging again in its existing form, without the need for it to be changed or reprocessed.

- **Extend the lifetime of packaging materials** through reusable/refillable models.[82]
- As an example of potential impact, the Ellen Macarthur Foundation estimates that **adopting refillable designs** and business models for beauty/personal care and home cleaning products could reduce GHG emissions by 80 to 85 per cent, compared to single use plastic packaging.[83]

CASE STUDY:
REUSE

Emma Lewisham

- As part of the Beauty Circle program, customers can purchase refills for all Emma Lewisham beauty products.
- Containers have been designed so the inner component can be removed and replaced with a refill pod. Customers can return their empty pods for sterilisation, refilling and reuse (and, ultimately, recycling when the pods are no longer usable).
- By purchasing only a refill pod, rather than an entirely new product/container, Emma Lewisham reports carbon emissions are reduced by **70 per cent** (based on LCA comparing emissions associated with producing a refill pod versus an entirely new product/container).[84]



81. Coca-Cola Europacific Partners (2023), 'Sprite's iconic green bottles go clear in Australia, making them easier to recycle in local PET recycling plants'
82. Muranko et al. (2021), 'Characterisation and Environmental Value Proposition of Reuse Models for Fast-Moving Consumer Goods: Reusable Packaging and Products'
83. Ellen Macarthur Foundation (2021), 'Completing the picture: How the circular economy tackles climate change'
84. Emma Lewisham, 'Beauty Circle'

CIRCULAR STRATEGY:

RECYCLE

Convert products and packaging into secondary materials for use in manufacturing through material processing (does not include reuse).

- Where reduce and reuse options are not feasible, **design packaging for recyclability** so valuable materials can remain in circulation rather than end up in landfill.[85]
- As an example of emissions reductions benefits from recycling versus consumption of virgin materials, **every tonne of PET plastic recycled by businesses saves 1.18 tonnes of CO_2e**.[86]

4.3 CURRENT CHALLENGES AND SOLUTIONS

The survey and roundtable participants highlighted some current challenges which must be addressed for circular strategies to be successfully implemented at scale within the FMCG sector. Some of the key challenges identified and potential solutions to help overcome them are outlined below.

Challenges

LACK OF KNOWLEDGE AND INCENTIVE TO SHIFT FROM BUSINESS AS USUAL

Business decision makers, particularly those from smaller businesses, often lack the knowledge required for systemic change. Additionally, upfront cost is often the primary driver of procurement and finance decisions.

Solutions

BETTER BUY-IN, KNOWLEDGE SHARING AND MANDATORY CLIMATE REPORTING

There is a need for circular economy 'buy-in' all the way up to the CEO level. One survey participant suggested knowledge sharing and case studies are also crucial to showcase the business benefits of shifting towards improved circularity. Additionally, mandatory climate reporting (as per Australian Sustainability Reporting Standards) provides an important opportunity to better understand the benefits of circular initiatives and may provide the impetus for decision makers to explore alternatives to a business-as-usual approach.

85. Bocken et al. (2022): 'Circular business models for the fastmoving consumer goods industry: Desirability, feasibility, and viability'
86. Calculated from the NSW EPA's 'Recyculator'

Challenges

Solutions

FRAGMENTED POLICIES AND NO HARMONISATION IN WASTE MANAGEMENT CREATES CONFUSION

Inconsistent and changing national and state policies and regulations create an uncertain environment for decision makers within the FMCG sector. This is further compounded by a lack of harmonisation in kerbside recycling collections across jurisdictions, which complicates consumer messaging as well as collection and sorting processes.

→

CONSISTENT GOVERNMENT REGULATION THAT ADDRESSES THE FULL LIFECYCLE OF PRODUCTS AND PACKAGING

The current environment makes it difficult, expensive and risky for organisations to explore, design and implement successful circular solutions, as they require long-term planning and certainty. Well designed and consistent government regulation that addresses the full lifecycle of products and packaging (from the initial design phase through to end-of-life management) is crucial.

THERE ARE SIGNIFICANT INFRASTRUCTURE AND LOGISTICAL CHALLENGES

Participants reported there are currently no end-of-life recovery options for many packaging categories and access to advanced recycling infrastructure is currently limited within Australia. Additionally, options for sourcing adequate quantities of recycled content, or sourcing recycled content at a reasonable price are currently limited.

In terms of considering alternatives to single use packaging, participants highlighted that reuse systems have been trialled within Australia on multiple occasions with limited success. In Australia, large distances and a low population density make reuse a difficult and expensive option.

→

GOVERNMENT ACTION AND INVESTMENT, TRIALS AND EDUCATION

Participants stressed they are eagerly awaiting government action, including improved investment into recycling/ processing infrastructure.

Participants suggested continued trials and consumer behaviour change education is required to improve the success of reuse models.

HIGH UPFRONT COSTS AND INCREASED RISK FOR FIRST MOVERS

Many survey and roundtable participants expressed financial challenges as a key barrier to adopting circular strategies. Currently, opting for alternative materials (such as regenerative, low carbon alternatives) is more expensive than using virgin materials. Improved circularity requires high upfront investment with longer timeframes for financial returns.

→

GOVERNMENT REGULATION, INCREASED FUNDING AND COLLABORATION

Participants suggested well designed government regulation, increased funding, and better collaboration between industry and government is required to make circular initiatives more competitive and financially viable over current business as usual models.

Challenges

CONSUMERS ARE INTERESTED BUT NOT COMMITTED TO CIRCULAR PRODUCTS IF THEY COST MORE

Participants suggested data often indicates there is demand for FMCG companies to create more sustainable and circular products and packaging. However, given the current cost of living pressures, consumers are not willing to follow up on this commitment if choosing a more sustainable product is more expensive.

Roundtable participants also highlighted multiple consumer misconceptions, which impact the success of circular initiatives. For example, many consumers are pushing for reduced plastic packaging but are less interested in supporting (or are unaware of) more impactful changes, such as purchasing products and packaging with recycled content.

Solutions

→ TARGETED BEHAVIOUR CHANGE CAMPAIGNS

Planet Ark suggests targeted behaviour change campaigns are required to educate and motivate consumers on the positive environmental actions they can take to contribute to a circular economy.

DIFFICULTY ACCESSING RELIABLE DATA FOR QUANTIFYING EMISSIONS

To assess the potential emissions savings from adopting circular strategies and to help decision makers make appropriate changes, organisations need accurate emissions data. Roundtable participants suggested it can be difficult to quantify emissions across supply chains and highlighted that third-party emission factors are often a 'blind spot', particularly if they are not appropriate for the Australian products and locations.

→ COLLABORATION AND DATA SHARING ACROSS SUPPLY CHAINS

Participants suggested collaboration and data sharing across supply chains is crucial to obtain accurate information for decision making.

4.4 TOOLS TO GUIDE IMPLEMENTATION OF CIRCULAR STRATEGIES

Capitalising on circular strategies and the associated emissions reductions requires informed decision making across the full product life cycle, especially during the design phase.

Some tools which can assist with this process are listed below.

TOOLS TO ASSESS PRODUCT CIRCULARITY

- Circular Transition Indicators (CTI) tool
- Material Circularity Indicator (MCI)

TOOLS TO ASSESS GREENHOUSE GAS EMISSIONS

- Life Cycle Assessment (LCA)[87]

OTHER TOOLS AND RESOURCES

- Packaging Recyclability Evaluation Portal (PREP)
- Material Flow Analysis (MFA)[88]
- Design Council (UK) - Skills for Planet
- Global Circularity Protocol for Business

87. A cradle-to-grave LCA is the most comprehensive as it covers the entire life cycle (including raw materials, production, use and end-of-life). Despite their ability to provide entire life cycle embodied carbon measures, an LCA is only as comprehensive as its study area scope boundaries allow it to be. Scope boundaries need to be clearly defined and maintained from design to operations to ensure their effectiveness.
88. MFA can help quantify material flows, identify hotspots for waste generation and resource depletion, and inform strategies for a more circular economy. MFAs can also assist in identifying opportunities for material reuse and recycling.

5 Conclusion and next steps

Making the switch to renewable energy is crucial to meet global climate goals. However, to achieve a truly low carbon economy, the remaining 45 per cent of global emissions that result from land use, natural resource consumption, and the production, use and disposal of products must also be addressed. As showcased in this report, the good news is many organisations are aware of this and are already adopting circular strategies and achieving emissions reductions (along with other important business benefits).

Despite the interest and momentum shown, the surveys and roundtable discussions also highlighted some key challenges to overcome if circular strategies are to become mainstream. Common to discussions in both the built environment and FMCG sectors was the call for stronger government regulation to de-risk circular decision making and incentivise greater adoption of circular strategies.

Additionally, participants from both sectors suggested data sharing and knowledge building is required to increase awareness across senior decision makers and encourage action (this includes procurement and finance teams).

Although this report has focused on the built environment and FMCG, all sectors within the economy have a role to play and can be informed by this research. Keeping global temperatures to well below 2°C above pre-industrial levels by the end of the century requires every organisation to transition away from the current linear approach to production and consumption and adopt circular strategies.

> **“Keeping global temperatures to well below 2°C above pre-industrial levels by the end of the century requires every organisation to transition away from the current linear approach to production and consumption and adopt circular strategies.**

5.1 CALL TO ACTION

Despite the current challenges identified, the participants also stressed the importance of not letting the desire for perfection get in the way of acting now. In line with this, below are some next steps for organisations looking to start (or progress) their journey towards improved circularity.

1 IMPROVE YOUR KNOWLEDGE AND UNDERSTAND THE BENEFITS

- The Ellen Macarthur Foundation is a great place to start.
- The Australian Institute of Company Directors' primer for Australian directors offers a great introduction to circular economy tailored to Australian boards.
- The ACE Hub provides research into different areas of the circular economy and case studies of successful circular strategy implementation.

2 START A CONVERSATION AND COLLABORATE WITH YOUR NETWORK

- Attend a circular economy event near you.
- Connect with like-minded organisations.

3 ENGAGE WITH CIRCULAR ECONOMY EXPERTS AND MAXIMISE SUCCESS

- Get in touch with technical experts.
- Take a circular economy course.

5.2 FUTURE RESEARCH DIRECTIONS

The research that underpins this report provides a great baseline understanding of the link between circular economy and decarbonisation and briefly explores some of the current challenges organisations face when looking to adopt circular strategies. Government, industry, academia and not-for-profits all have a role to play in finding solutions to these challenges and facilitating the transition to a more circular economy.

In particular, there is an opportunity to showcase more real-world examples that demonstrate how circular strategy adoption can drive measurable emissions reductions (and other business benefits).

Some other future research topics are listed on the next page.[89]

89. Some of these topics were adapted from suggestions made by research participants.

Future research topics

- An analysis of Australian and global government policies relevant to circular strategy adoption.
- If (and how) circular initiatives can be integrated into current climate reporting requirements.
- The best approach (and the best tools) to integrate the measurement of both circularity and emissions reductions to streamline business decision making.
- The role that circular strategies can play in the operational phase of buildings (including during the use, maintenance and repair of existing buildings).
- Quantifying and comparing the emissions from packaging versus products/ ingredients to help guide decisions in the FMCG sector towards maximum impact.
- What can improve the success of packaging reuse models in the Australian context.
- Evaluating the decarbonisation potential of the circular economy's third principle – regenerating natural systems – and its impact on supply chains.
- Quantifying the differences between a supply chain and value chain, and how each contributes to business performance and circular economy outcomes.

"Government, industry, academia and not-for-profits all have a role to play in finding solutions to these challenges and facilitating the transition to a more circular economy.

Glossary

TERM	DEFINITION
CO_2 equivalent emissions	GHG emissions expressed as CO_2 equivalents, based on Global Warming Potential (GWP).
Global Warming Potential (GWP)	A measure used to compare the relative radiative forcing of different gases without directly calculating the changes in atmospheric concentrations. GWP is calculated as the ratio of the radiative forcing that would result from the emissions of one kilogram of a greenhouse gas to that from the emission of one kilogram of carbon dioxide over a period of time (usually 100 years).[90]
'Pre-industrial' period	The period before human activities began to significantly influence global temperatures (as a result of human-induced greenhouse gas emissions). This period is generally defined as 1850-1900.
Scope 1 greenhouse gas emissions	Emissions released as a *direct* result of an organisation's activities, i.e. emissions released from activities at your own facilities.
Scope 2 greenhouse gas emissions	Emissions released outside an organisation's boundary from electricity generation, i.e. emissions released from electricity used to power an organisation's activities. These are *indirect* emissions.
Scope 3 greenhouse gas emissions	Other *indirect* emissions, including emissions released both upstream (e.g. from extraction of raw materials) and downstream (e.g. transport of products) from an organisation's operations.

90. UNFCCC

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