

Product
Stewardship
Centre of
Excellence

Submission to the Productivity Commission Inquiry

*Opportunities in the
circular economy*

**Submission prepared by the
Product Stewardship Centre of Excellence Limited**

1 November 2024

TABLE OF CONTENTS

1. Summary of recommendations	3
1.1 Regulatory reform for producer responsibility across the product lifecycle	3
1.2 Financial incentives	3
1.3 A just transition	3
1.4 Priority opportunities to progress the circular economy	4
2. Why product stewardship is directly relevant to achieving a circular economy	5
2.1 Product stewardship operationalises circular economy principles	5
2.2 Characteristics of effective product stewardship that enable great circularity	6
3. Circular economy success stories and measures of success	8
3.1 Business success stories	8
3.2 Measuring success	9
3.3 Learning from the European Union	10
3.4 Global initiative on design for circularity	11
4. Priority opportunities to progress the circular economy	12
4.1 Closing loops	12
4.2 Slowing loops	13
4.3 Narrowing loops	14
4.4 Priority opportunities to progress the circular economy	14
5. Hurdles and barriers to a circular economy	15
5.1 Technological barriers	15
5.2 Economic barriers	16
5.3 Regulatory barriers	17
5.4 Cultural barriers	18
6. The role of governments in enabling a circular economy	20
6.1 Commonwealth government	20
6.2 State and territory government	22
6.3 Local government	23
7. Closing remarks	24
Reference List	25



ABOUT THE PRODUCT STEWARDSHIP CENTRE OF EXCELLENCE LIMITED

This submission is made on behalf of the Product Stewardship Centre of Excellence (the Centre), an independent not-for-profit registered charity. The Centre exists to facilitate the avoidance and reduction of waste and create positive environmental and social outcomes through sustainable design, resource conservation reuse, repair, and recycling. The Centre helps businesses, industries, associations and product stewardship organisations to adopt a strong lifecycle approach to deliver their ESG and circular economy objectives.

Email: info@stewardshipexcellence.com.au
Web: www.stewardshipexcellence.com.au
PO Box 7052, Berrima NSW 2577

© Product Stewardship Centre of Excellence – 1 November 2024

1. Summary of recommendations

The Product Stewardship Centre of Excellence's submission in response to the Productivity Commission's Inquiry into the Circular Economy outlines how regulated producer responsibility across the product and material lifecycle is the most effective way to deliver the Australian Government's circular economy ambitions and policies.

The focus on materials alone without considering an explicit 'product' focus is a constraining lens. It inhibits a more fulsome approach to identifying key points of government intervention that can deliver more preventative and positive benefits as opposed to ameliorative end-of-life resource recovery solutions.

An essential requirement of the transition to a circular economy is to maximise opportunities in the top half of the waste management hierarchy to focus on prevention and avoidance through design for durability and reuse as well as increased levels of repair activity. These interventions highlight the relevance and importance of ensuring a strong product focus, in addition to considering singular material streams in isolation.

This submission provides examples of success domestically and internationally, industry and regulatory based opportunities to progress the circular economy, barriers to these opportunities and the expected role of governments in responding to these challenges. It also recommends the next steps that the Commission should prioritise to support and inform the development of Australia's circular economy.

In summary the Centre's recommendations fall into three categories: producer responsibility regulatory reform, financial incentivisation and a just transition. These recommendations, together with the key learnings highlighted in the success stories, the identified priority opportunities, and the solutions to hurdles and barriers, should be considered collectively to guide the role of governments at all levels.

1.1 Regulatory reform for producer responsibility across the product lifecycle

Establishing regulations and expectations that extend a producer's responsibility beyond product safety and consumer rights to also include responsibility for the environmental and human health impacts of their products and the materials across the entire product life cycle is essential to achieve a circular economy. Policy makers should focus attention on the following priority areas:

- Establish regulatory requirements on producers to design out waste and prevent pollution through durability, reparability, materials used i.e. renewable/recovered, and extended warranty.
- Clearly assign responsibilities and roles throughout the supply chain to ensure high level of industry participation and investment and minimise 'free-riders'.

- Improving producer and retailer product recovery practices through buy-back schemes and easily accessible collection and recycling facilities.

Broader regulatory and legislative solutions should also be considered by the Commission to structurally enable circularity throughout Australia. These recommendations address existing regulatory gaps and policy initiatives that reinforce linear supply chain strategies. State and federal agencies should prioritise:

- Mandating nation-wide strict, ambitious and achievable environmental and social targets that align with planetary boundaries, incorporating reporting guidelines to track progress.
- Incorporating circular design into domestic product manufacturing and importation quality control standards.
- Government procurement strategies that preference eco-designed products in line with the European Eco-design Sustainable Product Regulation.

1.2 Financial incentives

Producers are most likely to adjust their procurement and supply chain strategies when it becomes financially appropriate to do so. Appealing to profit driven decision making through financial adjustments to support circularity should be recognised as an efficient method of affecting change. The profitability of environmentally and socially harmful linear practices can be addressed through the following actions:

- Develop pricing mechanisms to deter environmental and social externalities associated with linear supply chains;
- Provide increased industry specific public sector funding through grants and subsidies that; and,
- Eliminate state and federal critical mineral exploration and extraction grants and subsidies.

1.3 A just transition

The transition to a circular economy should also consider how workers and SME's will be impacted. Ensuring workers in linear industries are not left behind is in both economically and socially crucial. Incorporating just transition principles in the circular transformation can be supported by the following recommendations:

- Consult with industry leaders to better understand specific requirements, ensuring linear business models can adapt to strengthened regulation.
- Support private sector retraining and upskilling programs, alongside integration into traditional education curriculums.

1.4 Priority opportunities to progress the circular economy

Specific industries and/or product categories that represent opportunities for circular economy action include all the products on the Federal Environment Minister's Priority List for Product Stewardship action:

- Clothing textiles
- Tyres
- Plastics in health-care products in hospitals
- Mattresses
- Child car safety seats

As well as:

- Commercial and office furniture
- Household furniture
- Manufactured products used in building and construction
- Large household appliances such as whitegoods
- Small household appliances such as toasters, kettles, irons, microwave ovens
- Other consumer electronics such as cameras, audio equipment and smart devices
- Power tools
- Floorcoverings such as modular carpet tiles and broadloom carpet
- Passenger vehicles
- Batteries of all types, format and scale

Regulated producer responsibility across the lifecycle is the most effective way to deliver the Australian Government's circular economy ambitions and policies. It unlocks significant private sector investment into product stewardship actions that significantly minimise the environmental and human health impacts of products and their materials across the entire lifecycle. It also provides a practical pathway for businesses and governments to deliver systemic change necessary to achieve a low-carbon circular economy that conserves resources, is restorative, regenerative and free of unsafe chemicals.

2. Why product stewardship is directly relevant to achieving a circular economy

The way Australia produces, imports and consumes materials and products currently is unsustainable. This is evidenced by climate change, bio-diversity loss, waste and pollution, recently described as a 'triple planetary crisis'. Significantly, the main driver of the triple planetary crisis is the way we extract, grow, process and use materials, including fossil fuels, minerals, and biomass.¹

The core elements of a circular economy are reflected in the three principles:²

- Design out waste and pollution
- Keep products in circulation with maximum value
- Regenerate natural and social systems

A circular economy presents a system-wide solution to more sustainable consumption and production. It encourages us to rethink of the way we design, manufacture, use and manage products and materials, across the entire lifecycle, including at the end of life. Reducing resource use, increasing resource efficiency, eliminating unsafe chemicals, and enabling circular material flows are at the core of a circular economy. A fair and equitable circular economy will also address inequalities, assuming higher responsibility for high-income countries that consume more resources.

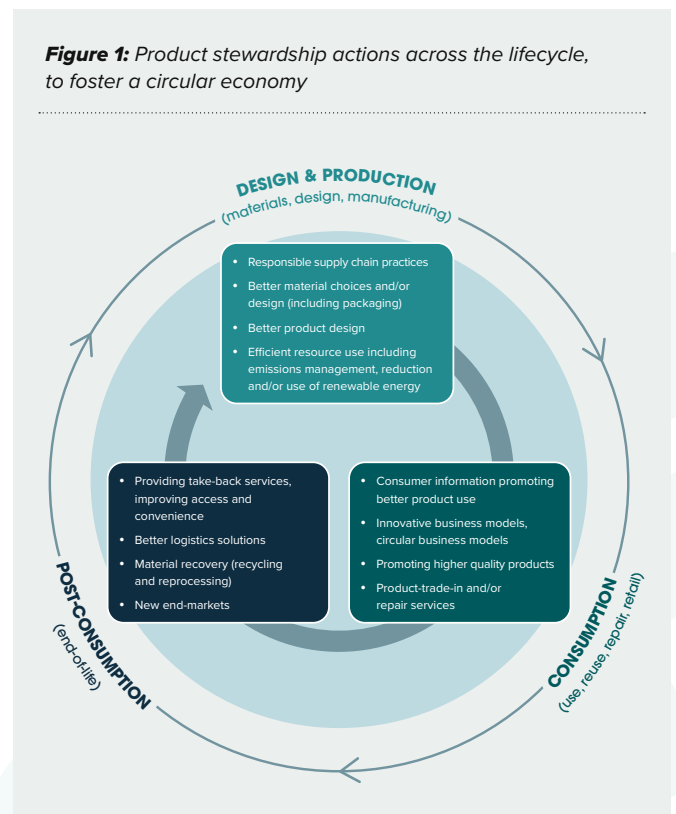
2.1 Product stewardship operationalises circular economy principles

Authentic product stewardship squarely places responsibility and accountability for the environmental and social impacts of products across their entire lifecycle on the producers and brands. It is not this diluted notion of shared roles, which often fails to delineate who owns these impacts, be they solid and hazardous wastes at end of life, carbon emissions, or the specification of unsafe chemicals, finite resources or non-renewable inputs at the design and production stage.

Product stewardship is producer responsibility across the entire product lifecycle including end of life. Where responsibility for the environmental and human health impacts of products their materials are assigned solely to the producers, manufacturers, brands, importers and retailers placing products on the market. Product stewardship also provides an obvious step by step pathway for businesses and governments to operationalise the circular economy.

Systemic change across the product lifecycle is essential for the circular economy transition. Figure 1 outlines the product stewardship actions businesses and governments can implement to deliver circular economy outcomes across the three product lifecycle stages: design and production, consumption and post-consumption. These actions can drive significant positive environmental and social benefits.³

Figure 1: Product stewardship actions across the lifecycle, to foster a circular economy



1 Bruyninckx, H., et. al (2024) Global Resources Outlook 2024: Bend the trend – Pathways to a livable planet as resource use spikes.

2 <https://www.ellenmacarthurfoundation.org/the-circular-economy-in-detail-deep-dive>

3 Evaluating product stewardship benefits and effectiveness – Summary Report <https://stewardshipexcellence.com.au/resources/#toggle-id-23>

Product stewardship not only shifts the economic burden of the environmental and human health impacts of products away from governments and the broader community to the producer and user. It significantly increases the investment by the private sector driving systemic changes to prevent and reduce waste efficiently and cost effectively. As currently illustrated by Australia's National Television and Computer Recycling Scheme and Used Oil Product Stewardship Scheme as well as the state-based Container Deposit/Return Schemes. With the introduction of government regulations producers are now investing tens to hundreds of millions of dollars per annum to address environmental and human health impacts by collecting and recycling products at end-of-life to keep materials circulating in the environment as well as creating economic and social benefits.

But product stewardship and the circular economy is much more than recycling. Producer action at just the end of a product's life does not avoid and design out waste or optimise the circulating of products and materials in the economy or restore the environment. Action, investment and innovation are required urgently in the first two phases of the product lifecycle – Design & Production (materials, design, manufacturing) and Consumption (use, reuse, repair, retail) to deliver achieve a circular economy and the objectives of the Australian Government's Recycling and Waste Reduction Act 2020 (RAWR Act).

Producers are an essential partner with government in driving and investing in systemic changes as they will do it efficiently and cost effectively. To enable this Australia must reform its current government policies, regulations, procurement and investment so that they better incentivise and reward positive circular and regenerative actions and penalise unsustainable consumption of resources, energy and destruction of nature.

The Centre's extensive experience across industries and sectors, as well as our applied research findings underscore the relevance and role of product stewardship. Policy-makers and some industries are realising that an effective product stewardship approach on-the-ground, needs to place environmental and human health objectives at the centre of how we develop, implement and monitor initiatives and schemes. When executed well, product stewardship delivers a wide variety of benefits and positive impacts including:

- Environmental – eliminating hazardous materials, conserving resources and materials, preventing and reducing waste, and reducing greenhouse gas emissions
- Social – improving workers' health and safety across the supply chain, and increasing accessibility to repair services and collection points for recycling
- Economic – job creation, upskilling, reskilling, and creating new markets for recovered materials

2.2 Characteristics of effective product stewardship that enable greater circularity

Recent research by UTS Institute for Sustainable Futures and the Product Stewardship Centre of Excellence, on the effectiveness and benefits of product stewardship⁴ identified the following **five essential characteristics to effective stewardship**.

1. High levels of industry or business investment and participation where regulation is the best solution for ensuring high levels of industry investment and participation.
2. Clearly defined objectives – Measurable environmental, social, and economic performance indicators demonstrate benefits and allow for continual assessment of the effectiveness.
3. Good governance – This includes well-defined roles and responsibilities and ensures transparency through public reporting.
4. Use of financial incentives – to drive behaviour change of businesses, consumers, repairers, collectors, sorters, and recyclers.
5. Effective marketing and communications – leading to high awareness and increased user participation.

The research project represents a landmark study of the benefits and effectiveness of product stewardship in Australia and includes six distinct reports available at www.stewardshipexcellence.com.au.

They provide an important and timely evidence base as governments, businesses and the community place greater emphasis on creating a sustainable future. The six reports are:

- a. *Evaluating Stewardship Benefits and Effectiveness, Summary Report* provides an overview of the research findings including extent of product stewardship activity, benefits, levels of engagement, challenges and future opportunities.
- b. *Product stewardship benefits assessment 2022: General population report* based on a survey of 1,000 Australians to measure awareness and understanding of product stewardship. A key finding was that product durability and longevity are key purchase considerations for consumers.
- c. *Product stewardship benefits assessment 2022: Business report* based on interviews with 600 Australian businesses found that businesses are most engaged with product stewardship activities that relate to the production stage of the lifecycle, especially consideration of improved material choices and responsible supply chain practices.

4 <https://stewardshipexcellence.com.au/resources/#benefits>

- d. *Product stewardship benefits assessment 2022: Local Government report* based on a survey of 89 local government staff to assess awareness and understanding of product stewardship among staff and assess the nature of their engagement with product stewardship initiatives.
- e. *Effectiveness and Benefits of Product Stewardship: Themes from 60 Qualitative Interviews with Stewardship Actors and Experts*. This report found the key environmental performance indicators reported ranged from diverting materials from landfill (e.g. material recovery, product repair and reuse, recycled content in products); preventing waste (e.g. making products more durable, dematerialising packaging); reducing greenhouse gas emissions (e.g. powering supply chains with renewable energy); and conserving natural resources (e.g. substituting virgin materials with recycled materials, using less water and energy).
- f. *Environmental, social and economic benefits of product stewardship initiatives in Australia*: A survey of publicly reported environmental, social and economic performance data for 106 product stewardship collective schemes and individual business initiatives which provides insights into what makes product stewardship schemes successful. This data is made available on the **Product Stewardship Gateway**, a detailed database of existing and emerging product stewardship initiatives run by industry sectors and businesses in Australia.

3. Circular economy success stories and measures of success

The following are examples of individual producers creating a circular supply chain, increasing economic efficiency and reducing environmental externalities by taking responsibility for the environmental and human health impacts of their products across their entire lifecycle. However, examples like these are few and far between due to lack of appropriate government regulation.

3.1 Business success stories

3.1.1 Bata PVC Recycling program

Bata's Gumboot Recycling Program aims to divert all worn PVC gumboots away from landfill, finding new life for the material in their supply chain.⁵ Employing circular supply chain strategies, Bata's recycling program focuses on five key operational areas: collection, sorting, granulating, processing and manufacturing.⁶ A critical step in establishing circularity is used product recovery. Bata's utilisation of product recovery tactics, including worksite collection bins, has significantly contributed to the program's success.⁶ In the program's first year of operation, Bata was able to produce 300,000 pairs of gumboots using 50% recycled PVC.⁷ The company was also able to adopt more ownership of their carbon footprint, saving 2 kilograms of CO₂ for every 1 kilogram of recycled PVC used.⁸ These environmental successes are complemented by notable business benefits, redirecting waste from expensive disposal options and decreasing waste management costs.⁹

Bata case-study learnings to be drawn on for future circular supply chain initiatives:

- *Product recovery through consumer participation plays a crucial role in closed loop supply chains and should be prioritised by producers.*
- *Incorporating waste and carbon emission reduction calculations into circular economy success metrics should become commonplace to better understand an initiative's environmental impact.*
- *Recognising the financial benefits associated with circular solutions should guide producers' adoption of these practices.*

3.1.2 Cultivated – Circular furniture

The Cultivated program seeks to keep authentic furniture out of landfill, support local manufacturing by contracting workshops to refurbish pieces that are resold and ensure recyclable material is handled appropriately using waste management partners.¹⁰ The program is focused on recirculating finite resources, reducing waste to landfill, preventing and avoiding unnecessary pollution and reducing emissions associated with the furniture industry's production process.¹¹ Cultivated facilitates a buy-back program that incentivises consumers to participate in the furniture industry's product recovery strategy.¹² The program's recovery and distribution of 110 refurbished chairs is indicative of the potential success of buy-back programs.¹³ The company has also recently trialled a 'digital product passport' which provides consumers with an in-depth account of the product's history and refurbishment details.¹⁴

Cultivated case-study learnings:

- *Utilise buy-back schemes to financially incentivise consumer participation in the product recovery phase of a closed loop supply chain.*
- *Provide provenance information, generating greater consumer appreciation for the role of the circular economy.*

5 Bata PVC Recycling Program, Case Study (2021) Product Stewardship Centre of Excellence, p. 2.

6 ibid

7 ibid

8 ibid

9 ibid, p. 3

10 Cultivated | Best Small Medium Enterprise Business Product Stewardship Award Winner 2023, Case Study (2023) Product Stewardship Centre of Excellence, p. 2.

11 ibid

12 ibid

13 ibid, p. 3

14 ibid

3.1.3 HMD Nokia smartphone product stewardship

HMD's sustainability efforts within Nokia's product portfolio are demonstrative of the ability of producers to independently adopt producer responsibility for their manufactured goods. The company has placed increased importance on the role of virgin material reduction, as well as product reuse, repair and recycling.¹⁵ After conducting research into the most common factors influencing new phone purchases, HMD determined that increasing the durability of Nokia's batteries and screens would reduce consumers' desire to frequently upgrade.¹⁶

Additionally, self-repair is encouraged by the company, with warranties being honoured for up to 3 years, including devices that have undergone self-repair aligned with industry standards.¹⁷ HMD's partnership with iFixit has also influenced reparability standards, with the companies collaborating on a self-repair kit that empowers consumers to solve hardware issues with their products.¹⁸

HMD's industry leading reparability programs provide three key learnings that should be leveraged throughout the consumer electronics industry:

HMD case-study learnings:

- *Identify product deficiencies and prioritise durability in the design of these electronics goods.*
- *Honour extended warranties and increase flexibility for consumers who seek alternative routes to repairing their products.*
- *Encourage self-repair through industry partnerships and educational communications.*

3.2 Measuring success

Integrating product stewardship metrics into wider circular economy standards should be considered common practice as producers adopt responsibility for the products they distribute in the market. The following metrics have been drawn from the Centre's Data and Reporting Guidelines for product stewardship.¹⁹

Governance – Integrating governance approaches into circular economy data and reporting standards ensures producers can develop consistent practices across industry and provide increased transparency to public and private sector stakeholders. These metrics include market and membership share; product class and type; funding models; compliance; regulatory compliance; reporting periods; and targets.²⁰

Environmental – Environmental standards are essential in supporting the development of a circular economy. These metrics include materials used in products; circular design practices; product durability; repair and reuse; collection; recycling; stockpiling; and landfill.²¹

Social – Recognition of the social benefits of circular transformation should also be measured. These indicators offer a way for cross sectoral stakeholders to ensure they are participating in and contributing to a just transition. These metrics include accessibility; human health and safety; job creation; and consumer awareness and behaviour change.²²

15 Self-repair with HMD, Case Study (2024) Product Stewardship Centre of Excellence, p. 3.

16 ibid

17 ibid

18 ibid, p. 4

19 <https://stewardshipexcellence.com.au/product/data-and-reporting-guidelines-for-product-stewardship-schemes/>

20 Florin, N., Talwar, S., & Read, R. (2024) 'Data and reporting guidelines for product stewardship schemes', Product Stewardship Centre of Excellence, p. 7.

21 ibid, p. 8

22 ibid, pp. 9-10

3.3 Learning from the European Union

The European Union (EU) has demonstrated leadership in the circular transformation, enacting the Circular Economy Action Plan that is supported by a wide range of member state and city initiatives. The following case studies are applicable to Australia's economy and learnings should be considered in our country's delivery of circularity and waste reduction policies.

3.3.1 The EU's Circular Economy Action Plan

The EU's broader European Green Deal is supported by their administration of the Circular Economy Action Plan (CEAP). This proposal includes 54 actions alongside four legislative recommendations on waste.²³ These recommendations established targets for landfill, reuse and recycling, noting the need to achieve these goals between 2030 and 2035.²⁴ This proposal allocated over \$10 billion (EUR) in funding to support innovation and transformation throughout European industry.²⁵ By 2019, all 54 actions were either adopted or implemented, marking the EU as a leader in the circular transformation.²⁶ The implementation of this plan has resulted in a 6% increase in circular economy jobs across Europe between 2012-2016 and has inspired at least 14 Member States, eight regions, and 11 cities to put forward circular economy strategies.²⁷ Strengthening product stewardship within this action plan, the EU has recently entered into force the Ecodesign for Sustainable Products Regulation, aiming to "significantly improve the circularity, energy performance and other environmental sustainability aspects of products placed on the EU market".²⁸ Australia should leverage learnings from the EU's successful implementation of strong circular economy legislative recommendations and actions.

Key learnings from the EU:

- *Administering strict, ambitious and achievable targets through policy reform.*
- *Provide significant investment in circular transformation to incentivise producer engagement.*
- *Facilitate collaboration between the public and private sector to define achievable and ambitious targets.*

3.3.2 The City of Amsterdam

The City of Amsterdam announced its target of becoming a 100% circular economy by 2050, alongside interim goals to halve its use of virgin materials by 2030.²⁹ The city focuses its attention on food and organic waste streams, consumer goods and the built environment.³⁰ Within Amsterdam's consumer goods strategy, three key approaches have been established to promote circular transformation.

The first approach incorporates a target of achieving 100% circular procurement by 2025 for the City of Amsterdam.³¹ This component of the strategy targets the procurement of consumables, furnishings and public real estate. Green public procurement offers an efficient and cost-effective way to ensure taxpayer money is responsibly utilised by governments.³² Amsterdam's consumer goods strategy also provides support to citizens and the private sector to ensure products are durable and easy to recirculate.³³

In addition to this, a Circular Monitor has been developed to provide citizens with access to information about how materials flow through the city.³⁴ Amsterdam's ambitious targets and well-designed strategies should inform Australia's national support of a circular transformation and provide insight into the role of product stewardship in enabling this shift.

Key learnings from the City of Amsterdam:

- *Leverage green public procurement strategies to both reduce the government's consumption externalities and support emerging solutions.*
- *Educate citizens on increasing product longevity, paired with improved access to recycling and product return facilities.*
- *Engage the citizenry and private sector through live material flow digital tools, demonstrating the environmental and economic impact of circular economies.*

23 A new Circular Economy Action Plan For a cleaner and more competitive Europe (2020) *European Union*.

24 *ibid*

25 The EU's Circular Economy Action Plan (2022) Ellen MacArthur Foundation. Available at: <https://www.ellenmacarthurfoundation.org/circular-examples/the-eu-circular-economy-action-plan>

26 Circular economy action plan (2023) European Commission. Available at: https://environment.ec.europa.eu/strategy/circular-economy-action-plan_en

27 *ibid*

28 Ecodesign for Sustainable Products Regulation (2024) European Commission. Available at: https://commission.europa.eu/energy-climate-change-environment/standards-tools-and-labels/products-labelling-rules-and-requirements/ecodesign-sustainable-products-regulation_en

29 Circular Economy Programme: Lessons and Recommendations 2020-2021 (2021) *City of Amsterdam*, p. 4.

30 *ibid*, p. 6

31 *ibid*, p. 37

32 Rainville, A. (2017) 'Standards in Green Public Procurement – A framework to enhance innovation', *Journal of Cleaner Production*, 167, p. 1029.

33 Circular Economy Programme: Lessons and Recommendations 2020-2021 (2021) *City of Amsterdam*.

34 *ibid*, p. 38

3.3.3 ReLondon | Business Transformation

ReLondon's Business Transformation program is designed to support established SMEs and newly founded circular economy businesses to achieve their circularity goals. The program distributes this support in the form of advice, grants, matchmaking and community services.³⁵ The ReLondon program has either generated or protected ~600 jobs in the circular economy industry, while providing advisory and matchmaking services to over 350 SME's.³⁶ The initiative has also facilitated the launch of more than 80 new circular products for London based businesses, demonstrating the program's focus on innovation.³⁷ To track the initiative's progress, ReLondon has expanded their success indicators to consider waste and greenhouse gas emission reduction alongside commonly assessed economic indicators such as job creation, products, services and processes introduced, and self-reported commercial and operational benefits.³⁸ The learnings from the ReLondon program are applicable to our domestic economy, with 98% of Australia's 2.6 million businesses being classified as SMEs.³⁹

Key learnings from ReLondon:

- *Work with established businesses and circular economy start-ups to ensure linear dependent businesses are not left behind in the circular transition.*
- *Ensure private sector consultations form an integral part of the program's design and implementation.*
- *Prioritise data collection and analysis to transfer learnings within and across industries.*

3.4 Global initiative on design for circularity

A landmark initiative recently published by the Circular Electronics Partnership and Accenture focuses on circularity for electronics, and features detailed guidance, perspectives, methods and case studies that aims to 'facilitate the electronic industry in its journey toward achieving a system transformation essential to enable (scalable) circularity'. The *Circular Electronics Design Guide* represents a significant business-oriented approach to the role that design-led thinking approach that enables system-wide redesign.⁴⁰

The learnings and insights from this Guide have been co-created, reviewed and presented by 60 experts from 25 organisations that understand the opportunities and challenges, including the need to think and act outside the box when it comes to harnessing the positive role of design. The Guide underscores the view that the definition of design goes beyond the creation of products and requires a broader design-led thinking approach that enables system-wide redesign.

Key learnings from the Circular Electronics Partnership:

- *Circular innovation requires a shift in mindset among consumers, designers and investors. Design plays a crucial role in the transition; adopting a "design thinking" mindset can serve as an effective problem-solving tool for all stakeholders, not just designers. Thereby helping to create this mindset shift.*

35 Supporting circular economy business: ReLondon's business transformation (2024) ReLondon. Available at: <https://reondon.gov.uk/business/>

36 Circular Business Support Programme for SMEs in London (2021) Ellen MacArthur Foundation. Available at: <https://www.ellenmacarthurfoundation.org/circular-examples/advance-london-circular-economy-sme-business-support-programme-london>

37 ibid

38 ibid

39 Small business (2022) Australian Banking Association. Available at: <https://www.ausbanking.org.au/small-business/>

40 Circular Electronics Design Guide (2024), Circular Electronics Partnership. Available at: <https://cep2030.org/resources/circular-electronics-design-guide/>

4. Priority opportunities to progress the circular economy

Opportunities in a circular economy are diverse and many hold great potential. They demand a strong and explicit systems-view to operationalise the principles and objectives of circularity. The opportunities need to be assessed against the feasibility and likelihood of implementation, and how these may differ or vary across different industries and sectors. In other words, what may be an opportunity in the furniture industry maybe very different to what can be adopted and achieve change in the textiles industry, or in ICT products, and so on.

Many of the technical solutions and approaches are outlined below, however these need to be enabled and facilitated in a timely manner through specific policy settings and regulatory instruments. This should include regulated product stewardship and procurement requirements that mandate producer responsibility across the product lifecycle and across supply chains.

Similarly, import bans should be introduced to prohibit environmentally inferior or non-circular products entering the Australian market in the first place. This talks directly to the first principle of achieving a circular economy i.e. designing-out waste and pollution. We need to remove environmentally problematic products and materials further upstream in the supply chain as these directly and negatively impact product durability, repairability and recyclability, which then also pose a threat to safety and costs effective disassembly and recycling of end-of-life products. Environmentally inferior products and materials entering the market can also negatively impact the quality of recovered materials or recycle that can be used in the manufacture of new goods.

Closing, slowing and narrowing loops constitute the core resource efficiency opportunities in developing a circular economy. The Circularity Gap Report indicates that policy reform, economic enablement, and training and upskilling present the most effective avenues to closing, slowing and narrowing resource loops.⁴¹ Utilising government policies and regulations to mandate producer responsibility throughout the supply (not just end-of-life) chain will improve efficiencies and effectiveness in designing products for circularity. Case studies and existing research will help to assess these opportunities based on their environmental, social and economic benefits.

4.1 Closing loops

Of the listed opportunities, closed loop supply chain transformations offer the most effective response to resource scarcity, waste production and economic inefficiencies.

The core goal of closed loop supply chains is to maximise resource productivity by eliminating waste and ensuring materials are perpetually recycled through product lifecycles.

4.1.1 Used oil product stewardship

Established under the Product Stewardship (Oil) Act 2000 this mandatory product stewardship scheme for used oils collect and re-refines 50% to 60% of waste oil products for reuse. The environmental, economic and social benefits are substantial including, reduced production of new oil, reduction of total energy consumption, reduced greenhouse gas emissions and the prevention of environmental damage caused by contamination and/or the incorrect disposal of oil⁴², creation of over 600 jobs in collection, recycling and re-refining and over 40 small enterprises employing an estimated 170 people⁴³.

4.1.2 Priority industries

A closed loop supply chain should be incorporated into all producers' long term supply chain strategies. However, production processes in some industries are more suitable for circular transformation in the near term than others. The primary considerations for closed-loop suitability in the short term should be ease of product recovery. In particular, the fashion and food and beverage (F&B) industries are well suited to circular infrastructure. Organic by-product recovery in the F&B industry and unwanted items in the fashion industry are becoming increasingly easy for individuals to responsibly dispose of through council programs.⁴⁴

These are uniquely promising industries to build circular capacity in as the recovery and recirculation of materials acquired through closed loop supply chains are likely to re-enter the industry. In the case of recovered food waste, the opportunity pertains to agricultural use of compost and fertiliser,⁴⁵ while reclaimed fashion materials are likely to find a renewed lifecycle in the textile industry.⁴⁶ Closing the supply chain loops for F&B and textiles addresses both the vast environmental externalities perpetuated by these industries as well as the economic inefficiencies inherent in their over reliance on take-make-waste product cycles.

41 ⁴ Fraser, M. et al. (2024) 'The Circularity Gap Report 2024', Circle Economy Foundation.

42 <https://www.dcceew.gov.au/sites/default/files/documents/fourth-product-stewardship-oil-act-review.pdf>

43 <https://stewardshipexcellence.com.au/resources/#toggle-id-9>

44 State of the Environment Report, 2017-2021 (2021) Randwick City Council.

45 Hu, S. (2020) Composting 101, National Resource Defense Council. Available at: <https://www.nrdc.org/stories/composting-101>

46 Allan, P., et al. (2023) Roadmap to Clothing Circularity, Australian Fashion Council, p. 9.

4.1.3 Implementation

Implementing closed loop supply chains across industry requires significant private sector engagement, which can be achieved through regulatory incentives. Fully operational closed loop initiatives are currently viewed as experimental and unscalable due to the requirement of significant investment in R&D as well as reimagined manufacturing and processing facilities. More details on closed loop infrastructure development issues are addressed in the Hurdles and Barriers section of this submission.

4.2 Slowing loops

There are 1,168 operational landfills in Australia, receiving around 20 million tonnes of waste each year.⁴⁷ The country's consumption habits are incompatible with a sustainable future and can in part be addressed by slowing the resource consumption loop. **Slowing resource loops involves “extending a product's useful life in order to slow down the overall flow of resources”.**⁴⁸ This approach supports the core circular economy principle of “keeping products in circulation with maximum value”.⁴⁹

4.2.1 Good 360

Good 360's waste diversion strategy aims to address the \$2.5 billion worth of brand-new excess goods that are wasted or landfilled in Australia every year.⁵⁰ The charity has facilitated the donation of over 34 million brand new items to Australians in need, covering product categories such as clothes, electronics, toiletries, hygiene and personal care items, education supplies, furniture and more.⁵¹ Partnering with major brands including Big W, LEGO and Colgate, Good 360 estimates they have contributed to the diversion of over 6,500 tonnes of waste to landfill since 2015.⁵² A co-benefit of Good 360's work is their promotion of social equity, focusing attention on disaster support, closing the digital divide and restoring dignity for recipients of donated products.⁵³ At scale, this presents an opportunity to operationalise the Centre's call to ban the destruction of unsold durable goods,⁵⁴ slowing the resource consumption loop of new products by diverting goods to those in need. Notably, this initiative is dependent on voluntary Extended Producer Responsibility, encouraging private sector stakeholders to assume increased ownership of their products' waste streams. Good 360's work demonstrates the environmental and social benefits of extending a product's lifecycle through charitable corporate activity.

4.2.2 Priority industries

Increased product durability, repairability and upgradability are core strategies that will slow the resource consumption loop and are particularly relevant to the consumer electronics industry. By 2030, Australia's total e-waste generation is projected to rise by nearly 30%, to 657,000 tonnes, with only a third of the total value of the materials currently being recovered for recirculation.⁵⁵ The industry is inhibited by internal practices that incorporate planned obsolescence into product design, limit consumer access to individual parts and unsuitable warranty terms.⁵⁶ Producer responsibility in the consumer electronics industry through more prescriptive policy and regulation covering all consumer electronics will address these consumer facing inefficiencies. There is a significant waste reduction opportunity associated with slowing resource consumption loops in the electronics industry through increasing durability and repairability standards as well as prohibiting disposal of new viable functional electronics. France has already introduced laws that ban the destruction and disposal of new, unsold manufactured goods. The law seeks to ensure that products are not scrapped with a view maximising reuse and redistribution.⁵⁷

4.2.3 Implementation

Modernised regulation plays a valuable role in slowing resource consumption loops. Legislating recommendations proposed in the Productivity Commission's Right to Repair report may result in extended product lifecycles and should be recognised as an important contribution to the development of Australia's circular economy. Additionally, creating more strict regulation around both software and hardware durability should be prioritised to reduce strain on virgin material extraction (more detail is provided in this report's Role of Governments section). Finally, supporting initiatives such as Good 360 provides a way for industry, government and civil society to collaboratively reduce and eliminate the volume of new and functional materials directed to landfill.

47 Australia's waste and Resource Recovery Infrastructure (2021) *Department of Climate Change, Energy, the Environment and Water*. Available at: <https://www.dcceew.gov.au/environment/protection/waste/publications/national-waste-reports/2013/infrastructure>

48 4.2.1 slowing, closing and narrowing resource loops (2022) *TU Delft OCW*. Available at: <https://ocw.tudelft.nl/course-readings/4-2-1-slowng-closing-and-narrowing-resource-loops/>

49 Florin, N. & Talwar, S. (2024) Circular economy and product stewardship: Connections and actions, *Product Stewardship Centre of Excellence*, p. 2.

50 Good360 Australia, Case Study (2023) *Product Stewardship Centre of Excellence*, p. 2.

51 *ibid*

52 *ibid*, p. 3

53 *ibid*, p. 5

54 Florin, N. & Talwar, S. (2024) Circular economy and product stewardship: Connections and actions, *Product Stewardship Centre of Excellence*, p. 4.

55 E-waste (2024) *Clean Up Australia*. Available at: <https://www.cleanup.org.au/e-waste>

56 Right to Repair Inquiry Report – Overview and Recommendations (2021) *Productivity Commission* (97).

57 *French law bans disposal of unsold goods*, Futures Centre, 24/2/2024. Available at: <https://www.thefuturescentre.org/signal/signal-of-change-french-law-bans-disposal-of-unsold-goods/>

4.3 Narrowing loops

Narrowing resource loops involves the reduction of materials used in the production of manufactured goods.⁵⁸

This strategy is generally adhered to by producers given the economic incentives attached to increased resource efficiency.⁵⁹ Narrowed resource loops are critically distinct from closed and slowed strategies, as it does “not influence the speed of the flow of products and does not involve any service loops (i.e. repair)”.⁶⁰ However, narrow loop resource efficiency strategies “can be used in conjunction with both product-life extension and recycling within a circular system” to achieve positive economic and environmental outcomes.⁶¹

Overreliance on ‘narrowing’ resource loops within the private sector should be discouraged, given the strategy’s inability to address the time dimension of resource flows, which “can easily lead to further speeding up of linear resource flows (selling more of a more efficient product), resulting in very little overall savings”.⁶² Given its broad adoption in the private sector and relatively inconsequential independent impact on circular transformation, exploring implementation opportunities and priority industries relating to narrowing resource loops will not provide useful insights into Australia’s circular opportunities.

4.4 Priority opportunities to progress the circular economy

Specific industries and product categories that represent opportunities for circular economy action include all the products on the Federal Environment Minister’s Priority List for Product Stewardship action:

- Clothing textiles
- Tyres
- Plastics in health-care products in hospitals
- Mattresses
- Child car safety seats

Other product categories that the Centre has identified as requiring improved circular outcomes through regulatory intervention include:

- Commercial and office furniture
- Household furniture
- Manufactured products used in building and construction
- Large household appliances such as whitegoods
- Small household appliances such as toasters, kettles, irons, microwave ovens
- Other consumer electronics such as cameras, audio equipment and smart devices
- Power tools
- Floorcoverings such as modular carpet tiles and broadloom carpet
- Passenger vehicles
- Batteries of all types, format and scale

58 4.2.1 slowing, closing and narrowing resource loops (2022) *TU Delft OCW*. Available at: <https://ocw.tudelft.nl/course-readings/4-2-1-slowing-closing-and-narrowing-resource-loops/>

59 *ibid*

60 Bocken, N.M. et al. (2016) ‘Product design and business model strategies for a circular economy’, *Journal of Industrial and Production Engineering*, 33(5), p. 310.

61 *ibid*

62 *ibid*

5. Hurdles and barriers to a circular economy

The main reason why businesses have not adopted circular economy practices to date.

5.1 Technological barriers

5.1.1 Designing for circularity

The technological misalignment between product design and closed loop infrastructure limits producers' ability to effectively implement circular initiatives.

Designing products for circularity is framed as a technological issue by circular economy specialists surveyed in Grafström and Aasma's review of implementation barriers.⁶³ Vague policy directives, low virgin material costs and limited material recovery infrastructure results in the perception that circular design is not technologically or operationally viable.

Without clear regulatory leadership on circular design standards, producers are not incentivised to detach from linear supply chain approaches. Masi et al. also note the logistical concerns surrounding 'eco-design' practices.⁶⁴ Internal efforts are generally expected to be easier to implement and more successful, however, success rates begin to vary when external supply chain partners are required to deliver circular initiatives.⁶⁵ This difficulty is attributed to a misalignment between product design practices and the corresponding supply chain configurations that producers are crucially dependent upon.⁶⁶ Uneven policy playing fields for producers, lack of financial incentives, and limited producer and consumer knowledge further contribute to private sector inaction.⁶⁷

RMIT's paper "Enabling Design for Environmental Good" highlights several likely outcomes of government investment in innovative technology, research and manufacturing environments.⁶⁸ These benefits include job growth, financial multiplier effects, reduced waste to landfill and developing an internationally competitive workforce.⁶⁹ Government oversight of circular product design standards should aim to increase producer responsibility for their products' material recovery and secondary procurement, while also facilitating

more investment in circular infrastructure to enable the aforementioned outcomes.

5.1.2 Training and upskilling

Improving technological capacity in the circular economy is dependent on expanding technical competence throughout the workforce. The Circularity Gap Report (CGR) highlights the importance of building circular expertise and skills as part of a broader just transition.⁷⁰ By extension, Sumter et al. identify nine core competencies that should be required of circular design professionals, including:⁷¹

- Circular Systems Thinking;
- Design for Recovery;
- Design for Multiple Use Cycles;
- Circular Business Propositions;
- Circular User Engagement;
- Circular Materials and Manufacturing;
- Circular Impact Assessment;
- Circular Economy Collaboration; and
- Circular Economy Storytelling.

The Circular Economy Ministerial Advisory Group's (CEMAG) interim report identifies the skills gap as a key discussion topic, noting the need to better understand "Australia's current circular skills capabilities, where there are gaps and how to deepen our capabilities."⁷² The CEMAG acknowledges that core industries including repair, recycling and recovery will not necessarily require high education and can be sufficiently addressed through upskilling and retraining initiatives.⁷³ Correspondingly, the European Commission's guidance on green employment considers circular skills from a product lens, suggesting mandated professional training for workers involved in product design, repair and manufacturing to technologically enable effective closed loop supply chain initiatives.⁷⁴ Developing cohesive industry specific circular core competencies and leveraging educational platforms for

63 Grafström, J. & Aasma, S. (2021) 'Breaking circular economy barriers', *Journal of Cleaner Production*, 292.

64 Masi, D. et al. (2018) 'Towards a more circular economy: Exploring the awareness, practices, and barriers from a focal firm perspective', *Production Planning & Control*, 29(6), p. 546.

65 ibid

66 ibid

67 Florin, N., Talwar, S., & Read, R. (2023) Evaluating product stewardship benefits and effectiveness, *Product Stewardship Centre of Excellence*.

68 Lockrey, S. et al. (2022) Enabling Design for Environmental Good, *Royal Melbourne Institute of Technology*, p. 87.

69 ibid, p. 88

70 Fraser, M. et al. (2024) 'The Circularity Gap Report 2024', *Circle Economy Foundation*, p. 45.

71 Sumter, D. et al. (2021) 'Key competencies for design in a circular economy: Exploring gaps in design knowledge and skills for a circular economy', *Sustainability*, 13(2), p. 12.

72 Interim Report (2024) *Circular Economy Ministerial Advisory Group*, p. 29.

73 ibid

74 The Green Employment and Skills Transformation: Insights from a European Green Deal skills forecast scenario (2021) *CEDEFOP*.

the delivery of training aligned with these competencies offers an effective route to overcoming barriers associated with circular skill gaps.

Technological solutions:

- Determine industry specific guidance on circular design competencies and mandate their integration into producer practices.
- Support internal retraining and upskilling schemes, alongside integration into traditional education curriculums.

5.2 Economic barriers

5.2.1 Low virgin material costs

Financially incentivising secondary material procurement in product manufacturing processes is essential to the development of a circular economy.

The Australian economy's rate of circularity is only half the global average, sitting at 3.7%.⁷⁵ Despite falling well under the global average, Australia continues to heavily rely on virgin materials, with a significant portion of these commodities being shipped abroad for economic benefit.⁷⁶ The broader global reliance on virgin materials has been attributed to easy access and existing manufacturing infrastructure which result in low-cost goods.⁷⁷

The manufacturing industry remains dependent on linear supply chains due to “the fact that externalities are not internalised through taxes or economic incentives”.⁷⁸ Further, lock-in-effects into current linear infrastructure can create friction for producers who are attempting to close their supply chain loop.⁷⁹ Aluminium cans offer an insight into how economic dynamics can incentivise supply chain stakeholders to break free of this linear infrastructure. In the UK “producers are willing to pay £1,200 per ton for cans... which is sufficient to provide value for all the participants in the chain”, resulting in a 75% rate of recirculation.⁸⁰

However, in Australia, the closure of aluminium remelting facilities has forced local recyclers to export more than 95% of scrap aluminium for overseas processing.⁸¹ The example from the UK indicates recycled aluminium can achieve price equilibrium through free market forces, implying that a focus on domestic infrastructure can further promote secondary material procurement within Australia. The for-profit model that dominates the consumer product manufacturing industry is inherently favourable to the lowest cost resources in the absence of any economic or regulatory incentives to reimagine their procurement strategies.

5.2.2 Corporate short-termism

Producers are disincentivised by the high capital expenditure attached to the development of circular infrastructure, fuelled by a corporate culture of short-termism that is uninspired by promised long-term financial returns.⁸² Despite the de-risking and material value creation qualities of circular strategies, “shareholders with short-term agenda[s] dominate corporate governance”,⁸³ softening private sector interest in major circular investment. Masi et al.'s survey found that over 70% of respondents perceived circular practices to incur a “major up-front investment”, demonstrating an aversion to voluntary expenses that may not produce a short-term financial gain.⁸⁴ These claims are supported by Knott's analysis of corporate short-termism, determining that internal R&D departments have become the victim of short-sighted strategies to increase profits.⁸⁵

75 Australian material flow analysis to progress to a circular economy – Summary Report (2024) CSIRO, p. 6.

76 *ibid*, p. 2

77 Grafström, J. & Aasma, S. (2021) 'Breaking circular economy barriers', *Journal of Cleaner Production*, 292, p. 6.

78 *ibid*

79 *ibid*

80 Soufani, K. and Loch, C. (2023) Circular supply chains are more sustainable. why are they so rare?, *Harvard Business Review*. Available at: <https://hbr.org/2021/06/circular-supply-chains-are-more-sustainable-why-are-they-so-rare>

81 Recycling (2024) *The Australian Aluminium Council*. Available at: <https://aluminium.org.au/sustainability-main/recycling/>

82 Grafström, J. & Aasma, S. (2021) 'Breaking circular economy barriers', *Journal of Cleaner Production*, 292.

83 Masi, D. et al. (2018) 'Towards a more circular economy: Exploring the awareness, practices, and barriers from a focal firm perspective', *Production Planning & Control*, 29(6), p. 542.

84 *ibid*

85 Knott, A.M. (2017) The real reasons companies are so focused on the short term, *Harvard Business Review*. Available at: <https://hbr.org/2017/12/the-real-reasons-companies-are-so-focused-on-the-short-term>

The impact of such decision making is a 40-65% decrease in research quotient, negatively impacting long term revenue, profit and market share.⁸⁶ With limited regulatory oversight on extended producer responsibility, the perceived economic disadvantages of circular investment provide corporations with an implied governmental approval to continue pursuing environmentally and financially irresponsible supply chain strategies.

The intersection between the financial culture of immediacy and the inconceivability of infrastructural investment that produces non-financial benefits is arguably responsible for the perceived economic barriers to the implementation of a circular economy.

Economic solutions:

- Support price equilibrium achievement for secondary material procurement through quality assurance standards.
- Establish circular infrastructure grant programs and mandate double materiality reporting requirements for circular investment opportunities.

5.3 Regulatory barriers

5.3.1 Pricing virgin resource use

One of the leading regulatory barriers to the implementation of a circular economy is a lack of pricing guidelines for virgin material consumption and disposal.

In the context of product stewardship, economically incentivising use of recovered materials for manufacturing new products presents a major opportunity for circular transformation. However, Australia's subsidy and taxation policy surrounding resource consumption currently locks producers into linear procurement strategies. Raw materials are priced at the "macro level where supply and demand will determine a market price,"⁸⁷ leaving the private sector and consumers responsible for low demand for high-cost circular products. Two domestic regulatory barriers emerge when considering the development of resource consumption pricing. The first pertains to Australia's tendency to subsidise activities that encourage virgin material extraction and distribution. As an economy that is heavily reliant on mining and exportation, the government's intervention in the market continues to reward environmentally degrading practices.

Grant programs and tax incentives administered at both the state and federal level currently motivate critical mineral exploration and extraction, designed to "actively encourage and support industry investment in Australia's mineral resources sector."⁸⁸ This instils a cultural connection between Australians and material extraction, which reinforces the nation's economic reliance on raw resource consumption. Preston states "for the market to respond effectively, subsidies that encourage excessive use of resources will need to be removed";⁸⁹ supporting the idea that circular supply chains are regulatorily inhibited by economic incentives. To enable a circular solution, it is imperative to eliminate linear subsidies.

The second regulatory barrier further engrains a reliance on virgin resource consumption by limiting deterrents on environmentally degrading extraction practices. Without strict and clear pricing mechanisms in place, the Government provides an implicit endorsement of existing supply chain structures. The inability to develop "effective taxation policy... is widely recognised as a significant barrier in the uptake of environmental investments".⁹⁰ However, when resource consumption pricing internalises these externalities, a circular economy becomes more probable.⁹¹ Australia's current resource extraction incentives are designed to encourage virgin material use throughout the global supply chain denoting a cultural and institutional barrier whose solution requires governmental reflexivity.

5.3.2 Recycled product standardisation

Inconsistent quality assurance standards are prohibitive to the widespread procurement of secondary materials. This concern extends to consumers, who perceive recycled products as having lower or inconsistent quality. The lack of adequate information, inferior materials performance and unreliable supply of feedstock volume are all barriers in relation to designers and engineers specifying recycled content with confidence in higher quality manufactured durables. In other words, in the absence of standards that can drive improved recycled materials performance, recycle will continue to be characterised by downcycling and, for example, its use in garden edging, artificial lumber and a component of masonry or construction. While downcycling of recycled content may have a place in the transition to greater circularity, it falls short of reflecting core circular economy principles related to being regenerative, restorative and environmentally positive as opposed to 'less bad' or less harm.

86 ibid

87 Grafström, J. & Aasma, S. (2021) 'Breaking circular economy barriers', *Journal of Cleaner Production*, 292, p. 3.

88 Government initiatives (2023) *Australia Minerals*. Available at: <https://www.australiaminerals.gov.au/initiatives>

89 Preston, F. (2012) *A Global Redesign? Shaping the Circular Economy*, Chatham House, p. 14.

90 Rizos, V., et al. (2015) *The Circular Economy: Barriers and Opportunities for SMEs*, *Centre for European Policy Studies*, (412), p. 4.

91 ibid, p. 2

The Australian Government's administration of the National Framework for Recycled Content Traceability demonstrates interest in the need to increase supply chain transparency with specific references to improving the traceability of recycled content quality.⁹² While this initiative promotes information sharing and supply chain accountability, it fails to explicitly address the need to materially improve the quality of recycled goods. Circular products and solutions tend to be 'priced out' when the "perceived quality of recycled materials makes the price-performance ratio insufficiently beneficial to switch to CE operations".⁹³ The free market will not independently explore impactful circular solutions to standardisation concerns given the current profitability of virgin material use. Responding to this concern, Western Australia's Roads to Reuse (RtR) program, administered through the state's Waste Authority has demonstrated the impact of recycling accreditation and standardisation in the construction and demolition waste industry.

The Waste Authority's comprehensive product specification guidelines communicate clear compliance standards that producers must adhere to in order to participate in the initiative.⁹⁴ To regulate this compliance, the Authority requires producers to obtain RtR accreditation, with funding available to encourage industry participation.⁹⁵ The provision of strict guidance on quality assurance standards has led to an improvement in "[delivery] time, labour and water savings during construction on top of the significant environmental benefits".⁹⁶ Using principles from the RtR initiative to guide circular transformation in industries similarly concerned with human and environmental safety offers a response to the current regulatory barriers pertaining to quality assurance standards. Without adequate governmental guidance that leverages existing product specification and accreditation practices, consumers will continue to perceive recycled goods as insufficient while producers will lack incentive to explore secondary material procurement in their products.

Regulatory solutions:

- Remove or decrease state and federal critical mineral exploration and extraction grants and tax subsidies.
- Engage industry leaders to develop recycling product standardisation and accreditation initiatives.

5.4 Cultural barriers

5.4.1 Customer preference for new products

A major cognitive-cultural barrier that prevents market adoption of circular products is the consumer preference for new products.⁹⁷ Although consumers are increasingly being persuaded by eco-conscious purchasing choices, a culturally engrained bias towards new, updated and refreshed goods continues to dominate consumption behaviour. This is further bolstered by aggressive sales and marketing strategies employed by brands and retailers. Despite being presented with identical products, consumers will gravitate towards the 'new' option.⁹⁸ Reinforcing this trend, consumers were willing to pay more for the 'new' product despite not demonstrating an ability to discern any functional distinctions between the products.⁹⁹ This infers a cultural aversion to 'reuse', creating a significant handbrake on widespread circular product adoption.

The electronics industry is both a proponent and victim of this consumer dynamic. Electronics producers and brands typically rely on innovation and improved quality for advertising purposes, cementing consumer attachments to the inflated perceived value of 'new' products. Although recovery programs like Apple's trade-in scheme are gradually increasing in popularity, consumer participation is insufficient to disassemble products and repurpose the secondary materials at scale.¹⁰⁰ As electronics producers train consumers to become more receptive to new products, their ability to market secondary products is diminished. This feedback loop will inevitably make it more difficult for consumers to dissociate 'new' from 'preferable', while producers take insignificant steps towards product reclamation and material recirculation infrastructure.

92 A national framework for recycled content traceability (2023) *Department of Climate Change, Energy, the Environment and Water*.

93 Grafström, J. & Aasma, S. (2021) 'Breaking circular economy barriers', *Journal of Cleaner Production*, 292, p. 6.

94 Roads to Reuse – Product Specification (2021) *Western Australian Waste Authority*.

95 *ibid*

96 Roads to reuse (2024) *Waste Authority WA*. Available at: <https://www.wasteauthority.wa.gov.au/programs/view/roads-to-reuse>

97 Ranta, V. et al. (2018) 'Exploring institutional drivers and barriers of the circular economy: A cross-regional comparison of China, the US, and Europe', *Resources, Conservation and Recycling*, 135, pp. 70–82.

98 Garcia-Rada, X., et al. (2019) "The Revised-Is-Quality Heuristic: Why Consumers Prefer Products Labelled as Revised." *Harvard Business School Working Paper*, No. 19-087.

99 *ibid*

100 Apple adds Earth Day donations to trade-in and Recycling Program (2024) *Apple Newsroom*. Available at: <https://www.apple.com/au/newsroom/2018/04/apple-adds-earth-day-donations-to-trade-in-and-recycling-program/>

5.4.2 Product versus material thinking

While material circularity plays an essential part in the development of closed loop supply chains, greater attention must be focused on the role of products. In 2023, the Australian Consumer Goods Retailing industry had a market size (measured by revenue) of \$249.1 billion,¹⁰¹ demonstrating the importance of product circularity. Framing circularity as a material issue is generally used to address natural resource depletion, human and environmental health concerns, economic efficiencies and to create visibility in an overwhelmingly invisible industry.¹⁰² However, overreliance on the material discourse risks neglecting lifecycle considerations of a manufactured product.¹⁰³ Consumers primarily purchase 'products' not 'materials', which is a very important factor that must not be overlooked or underestimated as changing producer and consumer behaviour is critical to creating circular economies.

Further the focus on materials alone and in the absence of a 'product' focus is a constraining lens. It inhibits a more sophisticated approach to identifying key points of product stewardship intervention that can deliver more preventative and positive benefits as opposed to ameliorative end-of-life resource recovery solutions. An essential requirement of the transition to a circular economy is to maximise opportunities in the top half of the waste management hierarchy to focus on prevention and avoidance through design for durability, reuse and increased levels of repair activity. These interventions highlight the relevance and importance of ensuring a strong product focus, in addition to considering singular materials in isolation.

Establishing more nuanced conversations around the distinction between product and material circularity may additionally create more clear assignments of responsibility. The CSIRO suggests that positive changes in consumer behaviour may be achieved through increasing consumer knowledge of product recyclability.¹⁰⁴ Conversely, material circularity is viewed as the responsibility of producers.¹⁰⁵

Overcoming this barrier requires a more thoughtful comparison of the merits of both material and product perspectives as part of a single holistic approach, potentially inspiring more effective and efficient solutions to closed loop supply chains.¹⁰⁶

Cultural solutions:

- Support internal circularity competencies for industries where buy-back or trade-in schemes are viable.
- Balance circular decisions by ensuring both material and product-oriented approaches to applying producer responsibility across the lifecycle, while limiting reliance on consumer behaviour as the dominant factor.

101 Consumer Goods Retailing in Australia – Market Size (2008–2030) (2023) *IBISWorld*. Available at: <https://www.ibisworld.com/au/market-size/consumer-goods-retailing>

102 Blomsma, F. and Tennant, M. (2020) 'Circular economy: Preserving materials or products? Introducing the Resource States Framework', *Resources, Conservation and Recycling*, 156, p. 3.

103 *ibid*

104 Circular economy roadmap for plastics, glass, paper and tyres (2021) *CSIRO*, p. 44.

105 *ibid*, p. 96

106 Blomsma, F. and Tennant, M. (2020) 'Circular economy: Preserving materials or products? Introducing the Resource States Framework', *Resources, Conservation and Recycling*, 156, p. 10.

6. The role of governments in enabling a circular economy

6.1 Commonwealth government

The greatest opportunity for circular transformation is to be found at the national level through the Commonwealth Government's roles and responsibilities. This includes better utilising existing levers, policies, legislation, regulations and programs to drive and mandate the widespread implementation of circular economy outcomes, from products and services, through to systems and alternative and more sustainable models of production and consumption.

Commonwealth departments and agencies across all portfolios should also prioritise their role, the programs and their grant funding (where relevant) in delivering financial incentives for circular innovation and creating a level policy playing field that does not reward producers, brands and suppliers that maintain a business-as-usual approach that is characterised by the linear and/or recycling economy models.

6.1.1 Financial incentives

“Tax things we want less of and subsidise things we want more of” – Richard Denniss.¹⁰⁷

The first part of Denniss' statement encourages the national implementation of financial disincentives for private sector actors who rely on virgin material procurement. Current government pricing mechanisms (or lack thereof) induce an overuse of virgin materials, leading to unmitigated environmental externalities and economic inefficiencies.¹⁰⁸ To address this, industry should be held accountable for the externalities associated with their procurement approaches through taxation policy. A federal tax on plastic packaging, for example, could raise nearly \$1.5 billion annually according to the Australia Institute.¹⁰⁹

The proposed tax would target businesses who manufacture or import plastics without sufficient recovery and recycling infrastructure in place.¹¹⁰ The research attached to this proposal found that 85% of Australians “support legislated waste reduction targets for producers, suppliers and retailers”,¹¹¹

demonstrating the political motivation for pricing initiatives. Strict private sector pricing mechanisms for virgin material use are validated by academic research, economic projections and individual enthusiasm.

Similar to the role of Australia's States and Territories, it is crucial for the Commonwealth Government to reduce and eliminate their subsidisation of natural resource extraction. In the 2024 Federal Budget, the Government announced its plan to provide over \$7 billion in financial support to the critical minerals sector through tax cuts and subsidies.¹¹² While the Future Made in Australia initiative incorporates net zero targets, it remains heavily reliant on mineral exploration and extraction.¹¹³ One notable deviation from the federal circular strategy is the upcoming implementation of the Critical Minerals Production Tax Incentive, which provides tax cuts for downstream mining functions without including reference to the importance of critical mineral recirculation in this process.¹¹⁴ These programs are not currently compatible with a circular economy and must be adjusted to support material extraction from existing products to be processed and refined.

To “subsidise things we want more of” requires an acknowledgement of the need to increase secondary material procurement in Australia's supply chain. Public subsidies, among other financial considerations, are found to have a positive effect in stimulating the implementation of circular economy initiatives in businesses.¹¹⁵ Considering the role of producer responsibility in advancing Australia's circular economy, it is important to identify areas of opportunity to financially support private sector stakeholders' lifecycle ownership of their products. The Product Stewardship for Oil Scheme provides strong financial incentive for producers to consider the lifecycle of the products they use.¹¹⁶ By setting a fair market price for recovered oil and in turn creating a market for the recirculated product, the Commonwealth Government has illustrated the effectiveness of product stewardship and its ability to advance circular transformation.

107 Redman, C. (2024) 5 key takeaways from Richard Denniss' National Press Club Address, *The Australia Institute*. Available at: <https://australiainstitute.org.au/post/key-takeaways-from-richard-denniss-national-press-club-address/>

108 Bruvoll, A. (1998) 'Taxing virgin materials: An approach to waste problems', *Resources, Conservation and Recycling*, 22(1–2), p. 16.

109 Redman, C. (2024) Plastic packaging waste tax could raise billions: Australia Institute, *The Australia Institute*. Available at: <https://australiainstitute.org.au/post/plastic-packaging-waste-tax-could-raise-billions/>

110 *ibid*

111 *ibid*

112 Critical minerals – funding initiatives & the 2024 federal budget (2024) *King & Wood Mallesons*. Available at: <https://www.kwm.com/au/en/insights/latest-thinking/funding-initiatives-and-the-2024-federal-budget.html>

113 *ibid*

114 Critical Minerals Production Tax Incentive – Consultation Paper (2024) *Department of the Treasury*.

115 Aranda-Usón, A. *et al.* (2019) 'Financial Resources for the circular economy: A perspective from businesses', *Sustainability*, 11(3), p. 888.

116 Product stewardship for oil (PSO) scheme (2023) *Department of Climate Change, Energy, the Environment and Water*. Available at: <https://www.dcceew.gov.au/environment/protection/used-oil-recycling/product-stewardship-oil-program>

6.1.2 Non-financial incentives

Pairing the above financial transformations with a suite of more prescriptive regulatory initiatives will help the Commonwealth Government inspire faster adoption of the circular economy throughout the public and private sector. Priority areas of government involvement include quality control standards for domestically manufactured and imported products, improving reparability and durability standards and assigning responsibility for circularity throughout the supply chain.

As established, procurement, supply chain and circular economy experts articulate a concern with the quality of recycled products.¹¹⁷ The Commonwealth’s directives on recycled content quality currently restricts the role of products to their inclusion of recycled materials, rather than broader circularity principles such as designing for disassembly.¹¹⁸ Adjusting this dynamic to regulate the recyclability of products addresses a crucial component of the circular economy: ensuring manufactured goods are fit for repurpose. **Australia’s importation of goods and services is currently 19.94% of GDP,¹¹⁹ contributing to our per capita generation of 2.95 tonnes of waste annually.¹²⁰**

Waste reduction can be significantly influenced by stricter durability, reparability and recyclability standards placed on imported products. Australia prides itself on its exportation of high-quality goods, and in turn the Australian population should have greater access to high-quality imported goods, defined by their suitability for circularity. Regulating this sentiment during the importation stage offers a way to address globally inconsistent manufacturing and recycling standards that continue to dissolve trust in recycled products.¹²¹ Extending this responsibility to domestic producers is also imperative and can be achieved through more prescriptive standards on circular design practices, which prioritise “designing for disassembly and recyclability”.¹²²

These initiatives should be complemented by strengthened reparability and durability standards for both domestically manufactured and imported products. The Productivity Commission’s recommendations for reparability offer a strong pathway to circularity, employing product-based thinking and increasing the responsibility of producers.¹²³ As part of a broader quality control initiative lead by the Commonwealth Government, further implementation and regulation of these recommendations is needed to achieve domestic circularity. Product durability also is addressed in the Right to Repair Inquiry Report, noting there is “limited specificity in the ACL as to what reasonable durability is for various product classes”, creating uncertainty for consumers when making purchase decisions.¹²⁴ The private sector has demonstrated an inability to guarantee product durability, and therefore cannot be expected to independently ensure the extended lifetime of their products. While a range of factors

external to government jurisdiction create difficulties in addressing these issues through regulation,¹²⁵ a collaborative effort between the public and private sector should be explored to create stronger durability and reparability standards closely aligned to the European Commission’s Ecodesign for Sustainable Products Regulation (ESPR) which came into force earlier this year.

In the absence of assigning responsibilities for implementing circular economy principles, objectives and outcomes, the pace and quality of transformation will be glacial, contested and avoided by those organisations that place products on the Australian market. The generally nebulous concept of shared product responsibility or shared product stewardship creates easy options to avoid taking action and achieving the change at scale that a circular economy requires. In short, a shared approach as is currently applied in Australia results in no single entity, industry or sector ‘owning’ impacts that need to be eliminated or managed as part of becoming a circular economy.

As part of the level policy playing field that the Circularity Gap Report advocates for within ‘Shift’ countries (including Australia), specific mention is made of the need to develop legislation that mandates ambitious producer responsibility schemes.¹²⁶ Assigning responsibility to producers ensures that those who profit from environmental externalities are regulatorily incentivised to abandon take-make-waste supply chain approaches, while alleviating pressure on consumers who have limited access to environmentally sustainable alternatives. Prescriptive policy will create the additional advantage of reducing supply chain ‘free riders’, that “benefit from a product stewardship activity without contributing to its implementation or operation”.¹²⁷ Assigning responsibility using regulated producer responsibility will create both equity between producers and consumers, as well as establishing clear expectations for supply chain stakeholders.

Commonwealth government solutions:

- *Legislatively assign private sector responsibility for a product’s lifecycle.*
- *Expand federal grant and subsidy programs for product circularity initiatives.*
- *Incorporate durability, reparability and recyclability requirements into domestic product manufacturing and importation quality control standards.*
- *Replace critical mineral exploration and extraction subsidies with disincentivising taxes or incentives to recover critical minerals from used products.*

117 Grafström, J. & Aasma, S. (2021) ‘Breaking circular economy barriers’, *Journal of Cleaner Production*, 292, p. 6.

118 Review of standards and specifications for recycled content products (2019) *Equilibrium*, p. v.

119 *Australia trade statistics (2022) World Integrated Trade Solution*, World Bank. Available at: <https://wits.worldbank.org/CountryProfile/en/AUS>

120 National Waste Report 2022 (2022) *Department of Climate Change, Energy, the Environment and Water*, p. 16.

121 Grafström, J. & Aasma, S. (2021) ‘Breaking circular economy barriers’, *Journal of Cleaner Production*, 292, p. 6.

122 Florin, N., & Talwar, S. (2024) ‘Circular economy and product stewardship: Connections and actions’, *Product Stewardship Centre of Excellence*, p. 5.

123 Right to Repair Inquiry Report – Overview and Recommendations (2021) *Productivity Commission* (97).

124 *ibid*, p. 6

125 *ibid*

126 Fraser, M. et al. (2024) ‘The Circularity Gap Report 2024’, *Circle Economy Foundation*, p. 45.

127 Brydges, T., & Florin, N. (2021) ‘Overcoming industry free riders: Strategies to maximise industry participation’, *Product Stewardship Centre of Excellence*, p. 3.

6.2 State and territory governments

State and territory governments are in a unique position to reduce Australia's dependence on linear economies and promote the economic and social value of circular solutions. There are five key opportunity areas for the increased role of states/territories in advancing the circular economy in Australia:

- supporting local governments;
- engaging producers, brands, retailers, repairers, recyclers to implement practical circular economy products and services;
- informing and supporting Commonwealth policies and regulations that can be applied nationwide and horizontally;
- harnessing procurement to drive the supply of circular economy products and services; and
- disincentivising upstream virgin material extraction and environmentally damaging reuse, repair and recycling practices.

New South Wales has demonstrated leadership in this area, allocating \$356 million in grant funding for waste reduction and circular infrastructure development.¹²⁸ This program provides financial support for local government and broader industry stakeholders to achieve their food waste, plastics and landfill reduction targets.¹²⁹ Addressing these strategically important subcategories of waste reduction provides a useful starting point for State engagement in the circular economy. The State is excelling in support for local governments with 11 out of 14 open and closed grants targeting local government and council initiatives.¹³⁰

However, while the NSW Waste and Materials Strategy 2041 (WMS 2041) outlines policy objectives and opportunities for industry,¹³¹ this should be paired with expanded industry specific funding to incentivise private sector action. Offering funding through programs like the WMS 2041 for industry specific funding in research and development can expedite circular solutions by financially incentivising industry engagement and leveraging specialised private sector expertise. Placing an increased focus on the role of industry responsibility through State grant programs offers a pathway to embedding and improving product circularity and extended producer responsibility, creating balance across product and material solutions.

To create lasting change in state and territory supported circularity programs, funding should also be redirected away from projects that reinforce linear supply chain systems. As discussed in this submission's Hurdles and Barriers section, all Australian states currently provide funding for crucial mineral exploration and extraction.¹³² While this approach may offer tactical advancements for Australia's economy, its promotion of virgin material dependence is short sighted. Western Australia's Battery and Critical Minerals Strategy 2024-2030 weakens Australia's circular innovation, allocating over \$700 million to the State's continued exploration and extraction of critical minerals.¹³³ Not only does this Strategy omit upstream circular solutions, but it also provides limited guidance on downstream infrastructure innovation,¹³⁴ financially incentivising take-make-waste supply chain iterations. Aligning circularity objectives across States is crucial and should begin with a reduction in funding for projects that reinforce linear consumption habits.

State and territory government solutions:

- *Engaging producers, brands and suppliers to implement practical circular economy products and services.*
- *Informing and supporting Commonwealth policies and regulations that can be applied nationwide and horizontally.*
- *Harnessing procurement to drive the supply of circular economy products and services.*
- *Disincentivising upstream virgin material extraction.*
- *Supporting local government in their circular transformation.*
- *Redirect funding from counter-productive subsidies that reinforce or 'lock-in' linear consumption trends.*

128 Grants (2024) NSW Environment Protection Authority, Available at: <https://www.epa.nsw.gov.au/working-together/grants>

129 ibid

130 ibid

131 NSW Waste and Sustainable Materials Strategy 2041 (2021) NSW Environmental Protection Authority.

132 Government Initiatives (2024) Australia Minerals. Available at: <https://www.australiaminerals.gov.au/initiatives>

133 Critical minerals – funding initiatives & the 2024 federal budget (2024) King & Wood Mallesons. Available at: <https://www.kwm.com/au/en/insights/latest-thinking/funding-initiatives-and-the-2024-federal-budget.html>

134 ibid

6.3 Local government

Given their role at the forefront of community waste collection and treatment, local government has both an opportunity and responsibility to demonstrate leadership throughout Australia creating circular economies at the local level, and more specifically on the development of circular supply chains.

It is also important to note that not all waste products and materials are managed by local government, and therefore their sphere of influence and impact in contributing to more circular outcomes needs to be considered in relation to products and materials typically consumed at the domestic or household level e.g. packaging, furniture, consumer electronics, appliances, clothing, textiles and building products.

The Australian Local Government Association (ALGA) has called for a \$100 million yearly investment over a four-year term to support local government's ability to process and repurpose secondary commodities.¹³⁵ ALGA projects that this funding will create 797 jobs alongside a 36% return on investment annually.¹³⁶ Particular attention should be paid to the needs of rural, regional and remote communities, whose infrastructure requires significant advancement considering the operational and logistical issues associated with these area's isolation.¹³⁷

Financially supporting local governments' ability to reuse, repair and repurpose products and waste materials is an essential step in establishing Australia's circular economy and will be strengthened by focusing on facilities' capacity to receive, process, disassemble and recirculate materials extracted from discarded products. While local government should not be exclusively responsible for these processes, developing reuse, repair and recycling infrastructure at a local council level to address consumer trends are necessary for an Australia-wide implementation of circular supply chains. Randwick City Council has demonstrated initial steps towards addressing a product's end of lifecycle, advertising their intake of whitegoods, electronics, clothing and other goods.¹³⁸ Leveraging learnings from this program to guide ALGA's funding request will ensure local governments are developing effective initiatives while recognising the important distinction between product and material circularity. Local government currently relies on individuals' knowledge of reuse, repair and recycling programs, ability to access these programs and a willingness to participate in them.

As the development of infrastructure and precinct-based solutions to support a circular economy progresses, it is important that local government is supported financially by producers, state and federal governments to maintain effective and consistent communications campaigns that educate, promote and encourage individuals' participation. The role of local government essentially is to be an agent for producers, state and federal governments to build capacity for product disassembly and material recirculation and community engagement locally. This of course must be funded by producers, state and federal governments and not rate payers.

Local government solutions:

- *Manage and operate infrastructure and proactively support reuse and repair activities that extend product life and divert products and materials from landfill. Repair cafes in every local government across the nation would be transformative.*
- *Manage and operate public recycling infrastructure that prioritises disassembly and recirculation of discarded products specific to local consumption trends.*
- *Educate, inspire and enthuse individuals and community-based organisations on the benefits of product reuse, repair, recovery and recycling and their role in creating a circular economy.*

135 Circular waste innovation (2022) Australian Local Government Association. Available at: <https://alga.com.au/circular-waste-innovation-2/>

136 ibid

137 Unlocking the circular economy (2022) Australian Local Government Association. Available at: <https://alga.com.au/unlocking-the-circular-economy/>

138 About the Randwick Recycling Centre (2024) Randwick City Council. Available at: <https://www.randwick.nsw.gov.au/services/rubbish-and-recycling/recycling-centre/about-recycling-centre>

7. Closing remarks

Regulated producer responsibility across the lifecycle is the most effective way to deliver the Australian Government's circular economy ambitions and policies. It unlocks significant private sector investment into product stewardship actions that will significantly minimise the environmental and human health impacts of products across the entire lifecycle. Regulated producer responsibility across the product lifecycle also provides a practical pathway for businesses and governments to deliver the systemic change necessary to achieve a circular economy at scale by 2030 and beyond.

The Recycling and Waste Reduction RAWR Act (2020) is the primary existing national regulation mechanism to implement mandatory, co-regulatory and voluntary product stewardship in Australia. Since its inception in 2011 Australian governments have failed to leverage this Act. This is disappointing, and the lack of action translates into a policy vacuum on a range of environmental concerns. Only one co-regulatory scheme (NCRS in 2011) has been established and 10 voluntary product stewardship schemes accredited. No mandatory schemes have been created under the Act. Of the fifteen priority products listed by the Minister no national regulatory intervention has been implemented.¹³⁹

In its current form, the Act appears to be politically challenging for governments, and too complex for policy makers to implement in a timely and effective manner. The Act should be revised with great urgency to include specific powers and mandatory rules directly aligned with the European Commission's Ecodesign Sustainable Products Regulation (ESPR), as well as several other EPR directives.

Consistent with ESPR, any revisions should specifically include detailed circularity requirements related to:

- durability and reliability of products
- ease of repair and maintenance of products
- ease of upgrading, reuse, remanufacturing and refurbishment
- ease and quality of recycling including the use of easily recyclable materials
- the avoidance of unsafe chemicals and destructive processes which impair straightforward disassembly, reuse and/or recycling of products, components and materials
- the avoidance of technical solutions detrimental to reuse, upgrading, repair, maintenance, refurbishment, remanufacturing and recycling of products

- use or content of recycled materials
- weight and volume of the product and its packaging, and the product-to-packaging ratio
- incorporation of used components
- quantity, characteristics and availability of consumables needed for proper use and maintenance
- the environmental footprint of the product including its carbon footprint
- microplastic release
- emissions to air, water or soil released in one or more life stages of the product
- amounts of waste generated, including plastic waste and packaging waste and their ease of re-use, and amounts of hazardous waste generated

Revisions to the current Act should also incorporate specific consumer labeling recommendations related to a 'Repair Star Rating' as proposed in the Productivity Commission's report on a Right to Repair for Australia.

In addition to the above specific revisions, government accreditation of voluntary product stewardship should be made more accessible to individual businesses, includes SMEs.

The Centre would welcome the opportunity to present to Productivity Commission inquiry if appropriate.

139 Product Stewardship Centre of Excellence Annual Report 2023 Page 13 <https://stewardshipexcellence.com.au/wp-content/uploads/2024/01/PSCoE-Annual-Report-2023-web.pdf>

REFERENCE LIST

- A national framework for recycled content traceability (2023) Department of Climate Change, Energy, the Environment and Water.
- A new Circular Economy Action Plan For a cleaner and more competitive Europe (2020) European Union.
- About the Randwick Recycling Centre (2024) Randwick City Council. Available at: <https://www.randwick.nsw.gov.au/services/rubbish-and-recycling/recycling-centre/about-recycling-centre>
- Allan, P., et al. (2023) Roadmap to Clothing Circularity, Australian Fashion Council.
- Apple adds Earth Day donations to trade-in and Recycling Program (2024) Apple Newsroom. Available at: <https://www.apple.com/au/newsroom/2018/04/apple-adds-earth-day-donations-to-trade-in-and-recycling-program/>
- Aranda-Usón, A. et al. (2019) 'Financial Resources for the circular economy: A perspective from businesses', Sustainability, 11(3).
- Australia trade statistics (2022) World Integrated Trade Solution, World Bank. Available at: <https://wits.worldbank.org/CountryProfile/en/AUS>
- Australia's waste and Resource Recovery Infrastructure (2021) Department of Climate Change, Energy, the Environment and Water. Available at: <https://www.dcceew.gov.au/environment/protection/waste/publications/national-waste-reports/2013/infrastructure>
- Australian material flow analysis to progress to a circular economy – Summary Report (2024) CSIRO.
- Bata PVC Recycling Program, Case Study (2021) Product Stewardship Centre of Excellence.
- Blomsma, F. and Tennant, M. (2020) 'Circular economy: Preserving materials or products? Introducing the Resource States Framework', Resources, Conservation and Recycling, 156.
- Bocken, N.M. et al. (2016) 'Product design and business model strategies for a circular economy', Journal of Industrial and Production Engineering, 33(5).
- Bruvoll, A. (1998) 'Taxing virgin materials: An approach to waste problems', Resources, Conservation and Recycling, 22(1–2).
- Bruyninckx, H., et. al (2024) Global Resources Outlook 2024: Bend the trend – Pathways to a livable planet as resource use spikes.
- Brydges, T., & Florin, N. (2021) 'Overcoming industry free riders: Strategies to maximise industry participation', Product Stewardship Centre of Excellence.
- Circular Business Support Programme for SMEs in London (2021) Ellen MacArthur Foundation. Available at: <https://www.ellenmacarthurfoundation.org/circular-examples/advance-london-circular-economy-sme-business-support-programme-london>
- Circular economy action plan (2023) European Commission. Available at: https://environment.ec.europa.eu/strategy/circular-economy-action-plan_en
- Circular Economy Programme: Lessons and Recommendations 2020–2021 (2021) City of Amsterdam.
- Circular economy roadmap for plastics, glass, paper and tyres (2021) CSIRO.
- Circular waste innovation (2022) Australian Local Government Association. Available at: <https://alga.com.au/circular-waste-innovation-2/>
- Consumer Goods Retailing in Australia – Market Size (2008–2030) (2023) IBISWorld. Available at: <https://www.ibisworld.com/au/market-size/consumer-goods-retailing>
- Critical minerals – funding initiatives & the 2024 federal budget (2024) King & Wood Mallesons. Available at: <https://www.kwm.com/au/en/insights/latest-thinking/funding-initiatives-and-the-2024-federal-budget.html>
- Critical Minerals Production Tax Incentive – Consultation Paper (2024) Department of the Treasury.
- Cultivated | Best Small Medium Enterprise Business Product Stewardship Award Winner 2023, Case Study (2023) Product Stewardship Centre of Excellence.
- E-waste (2024) Clean Up Australia. Available at: <https://www.cleanup.org.au/e-waste>
- Ecodesign for Sustainable Products Regulation (2024) European Commission. Available at: https://commission.europa.eu/energy-climate-change-environment/standards-tools-and-labels/products-labelling-rules-and-requirements/ecodesign-sustainable-products-regulation_en
- Evaluating product stewardship benefits and effectiveness – Summary Report <https://stewardshipexcellence.com.au/resources/#toggle-id-23>
- Florin, N. & Talwar, S. (2024) Circular economy and product stewardship: Connections and actions, Product Stewardship Centre of Excellence.
- Florin, N., Talwar, S., & Read, R. (2023) Evaluating product stewardship benefits and effectiveness, Product Stewardship Centre of Excellence.
- Florin, N., Talwar, S., & Read, R. (2024) Data and reporting guidelines for product stewardship schemes, Product Stewardship Centre of Excellence.
- Fourth Product Stewardship (Oil) Act 2000 review – Final report (2024) Department Agriculture, Water and the Environment, available at: <https://www.dcceew.gov.au/sites/default/files/documents/fourth-product-stewardship-oil-act-review.pdf>
- Fraser, M. et al. (2024) 'The Circularity Gap Report 2024', Circle Economy Foundation.
- French law bans disposal of unsold goods, Futures Centre, 24/2/2024. Available at: <https://www.thefuturescentre.org/signal/signal-of-change-french-law-bans-disposal-of-unsold-goods/>
- Garcia-Rada, X., et al. (2019) "The Revised-Is-Quality Heuristic: Why Consumers Prefer Products Labelled as Revised." Harvard Business School Working Paper, No. 19-087.

- Good360 Australia, Case Study (2023) Product Stewardship Centre of Excellence.
- Government Initiatives (2024) Australia Minerals. Available at: <https://www.australiaminerals.gov.au/initiatives>
- Grafström, J. & Aasma, S. (2021) 'Breaking circular economy barriers', Journal of Cleaner Production, 292.
- Grants (2024) NSW Environment Protection Authority, Available at: <https://www.epa.nsw.gov.au/working-together/grants>
- Hu, S. (2020) Composting 101, National Resource Defense Council. Available at: <https://www.nrdc.org/stories/composting-101>
- Interim Report (2024) Circular Economy Ministerial Advisory Group.
- Knott, A.M. (2017) The real reasons companies are so focused on the short term, Harvard Business Review. Available at: <https://hbr.org/2017/12/the-real-reasons-companies-are-so-focused-on-the-short-term>
- Lockrey, S. et al. (2022) Enabling Design for Environmental Good, Royal Melbourne Institute of Technology.
- Mandated Product Stewardship: The case of used oil, Case Study (2023) Product Stewardship Centre of Excellence.
- Masi, D. et al. (2018) 'Towards a more circular economy: Exploring the awareness, practices, and barriers from a focal firm perspective', Production Planning & Control, 29(6).
- National Waste Report 2022 (2022) Department of Climate Change, Energy, the Environment and Water.
- NSW Waste and Sustainable Materials Strategy 2041 (2021) NSW Environmental Protection Authority.
- Preston, F. (2012) A Global Redesign? Shaping the Circular Economy, Chatham House.
- Product Stewardship Centre of Excellence Annual Report 2023 Page 13 <https://stewardshipexcellence.com.au/wp-content/uploads/2024/01/PSCoE-Annual-Report-2023-web.pdf>
- Product stewardship for oil (PSO) scheme (2023) Department of Climate Change, Energy, the Environment and Water. Available at: <https://www.dcceew.gov.au/environment/protection/used-oil-recycling/product-stewardship-oil-program>
- Rainville, A. (2017) 'Standards in Green Public Procurement – A framework to enhance innovation', Journal of Cleaner Production, 167.
- Ranta, V. et al. (2018) 'Exploring institutional drivers and barriers of the circular economy: A cross-regional comparison of China, the US, and Europe', Resources, Conservation and Recycling, 135.
- Recycling (2024) The Australian Aluminium Council. Available at: <https://aluminium.org.au/sustainability-main/recycling/>
- Redman, C. (2024) 5 key takeaways from Richard Denniss' National Press Club Address, The Australia Institute. Available at: <https://australiainstitute.org.au/post/key-takeaways-from-richard-denniss-national-press-club-address/>
- Redman, C. (2024) Plastic packaging waste tax could raise billions: Australia Institute, The Australia Institute. Available at: <https://australiainstitute.org.au/post/plastic-packaging-waste-tax-could-raise-billions/>
- Review of standards and specifications for recycled content products (2019) Equilibrium.
- Right to Repair Inquiry Report – Overview and Recommendations (2021) Productivity Commission.
- Rizos, V., et al. (2015) The Circular Economy: Barriers and Opportunities for SMEs, Centre for European Policy Studies, (412).
- Roads to Reuse – Product Specification (2021) Western Australian Waste Authority.
- Roads to reuse (2024) Waste Authority WA. Available at: <https://www.wasteauthority.wa.gov.au/programs/view/roads-to-reuse>
- Self-repair with HMD, Case Study (2024) Product Stewardship Centre of Excellence.
- Slowing, closing and narrowing resource loops (2022) TU Delft OCV. Available at: <https://ocw.tudelft.nl/course-readings/4-2-1-slowng-closing-and-narrowing-resource-loops/>
- Small business (2022) Australian Banking Association. Available at: <https://www.ausbanking.org.au/small-business/>
- Soufani, K. and Loch, C. (2023) Circular supply chains are more sustainable. why are they so rare?, Harvard Business Review. Available at: <https://hbr.org/2021/06/circular-supply-chains-are-more-sustainable-why-are-they-so-rare>
- State of the Environment Report, 2017-2021 (2021) Randwick City Council.
- Sumter, D. et al. (2021) 'Key competencies for design in a circular economy: Exploring gaps in design knowledge and skills for a circular economy', Sustainability, 13(2).
- Supporting circular economy business: ReLondon's business transformation (2024) ReLondon. Available at: <https://reondon.gov.uk/business/>
- The circular economy in detail (2019) The Ellen MacArthur Foundation, available at <https://www.ellenmacarthurfoundation.org/the-circular-economy-in-detail-deep-dive>
- The EU's Circular Economy Action Plan (2022) Ellen MacArthur Foundation. Available at: <https://www.ellenmacarthurfoundation.org/circular-examples/the-eus-circular-economy-action-plan>
- The Green Employment and Skills Transformation: Insights from a European Green Deal skills forecast scenario (2021) CEDEFOP.
- Unlocking the circular economy (2022) Australian Local Government Association. Available at: <https://alga.com.au/unlocking-the-circular-economy/>



**Product
Stewardship
Centre of
Excellence**