

Opportunities in the Circular Economy

Productivity Commission

Recognising the economic, societal and circular value in repair, reuse and repurposing, and creating opportunities for its growth through knowledge and legislation.

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Introduction

It is undeniable that Australia must take steps to fast-track its movement towards a Circular Economy. In 2022, Australia was identified as the 7th highest resource consuming nation per capita, out of over 220 nations and regions assessed by the United Nations Environment Programme (1). As a nation we currently consume approximately 3.9 times as many resources as earth can sustainably provide (2).

Despite recycling being understood to be one of the least circular forms of waste prevention (3), it continues to represent the majority of Australia's actions in the circular economy space (4). While it is noted that downcycling activities, such as converting hard-to-recycle plastic and glass waste into road-base, have increased in popularity in recent years, higher value retention activities which retain far greater resource value within the circular economy have seen far less attention from the government and from industry. These higher value retention activities, or higher order R values, include reduction, reuse, repair, refurbishment, remanufacture and repurposing of existing goods. They are activities which keep goods in use for as long as possible, with as little new resource consumption as possible.

In the below submission I wish to bring to the Productivity Commission's attention the additional commercial, societal and circularity benefits and opportunities represented by higher order Rs within the Circular Economy such as those mentioned above. I also seek to provide direction toward implementable actions that could facilitate substantial growth in this sector, notable job and economic opportunities, and considerable progress toward Australia becoming a more sustainable and Circular Economy.

The first section of this submission acknowledges the potential in focus areas put forward by the Productivity Commission in the "Opportunities in the Circular Economy" press release, and provides guidance as to areas within that release which may benefit from reconsideration. Section two provides a background to the Circular Economy Rs and sets out how Australia could benefit from a greater focus on higher value Rs such as reuse, repair and repurposing to build a stronger and more circular economy. The third section of this submission identifies current challenges and barriers which the government has the power to impact, which may be holding back the uptake of these higher value Rs at a commercial scale today. Finally, the fourth section lays out actions which the government could undertake to fast-track circularity in the Australian Economy.

1. Response to the “Opportunities in the Circular Economy” Media Release

While I applaud the Productivity Commission for wanting to investigate the design of longer lasting products, I believe there are a couple of substantial factors that need to be taken into consideration when undertaking policy work in this space. The first is that many goods we purchase right now are not breaking before we dispose of them. 24% of Australians have thrown out clothing after a single wear (5). Nationally, we have an estimated 22.3 million excess mobile phones stored in our homes (6) because they have upgraded for reasons other than product failure. These practices are not restricted to fashion and consumer electronics either, there are similar examples across all categories of consumption. Increasing a product's durability will not necessarily increase the amount of time it is used. Without additional change it risks simply creating more durable waste. To get the most out of products we need to ensure that people are using them for as long as possible now, and create an economy which engages in repair, reuse and repurposing of those same items when they are no longer fit for their original purpose.

If the government chooses to invest in supporting the design of longer lasting products, then we need to recognise that additional durability cannot come at the expense of ease of repair or repurposing at the end of a product's initial life. True longevity maintains the use of a product through multiple iterations, not just in the hands of its first owner.

We also need to recognise that Australia is a country which imports the majority of its consumer products, and is a country with a population smaller than some states in the USA. We are unlikely to be in a position to strongly influence the actions of multinational manufacturers in product design when we make up a small fraction of their overall market. Instead, it seems most sensible to investigate replicating best practice policies globally, such as those within the EU's Circular Economy Action Plan (7), and integrating their circular economy product policies with our own. This will allow us to build a stronger and more influential block, and reduce the chance of companies pulling out of supplying our market instead of providing a suitable product, which could occur if we were to set policy which was substantially different to those of the majority of the manufacturer's market.

I also applaud the commission's intention to look into improved labelling, but would like to highlight that, in order for this labelling to truly highlight a product's sustainability, it needs to not only reflect durability, but also repairability, manufacturing and end of life costs, and resource consumption during the product's operational life. It is worth recognising that some of our existing rating schemes are not meeting their intended purposes and are in need of substantial upgrade before new schemes can be added alongside them. As an example, energy and water efficiency of water heaters is measured across Energy Star Rating, WELS and MEPS, yet no water heater is rated across all 3 schemes, and some water heater technologies are not rated at all. Bringing existing standards up to scratch to provide accurate ratings across all products in a given category needs to be undertaken to create a foundation for further work into sustainability ratings, which may include full lifecycle energy and resource consumption, durability and repairability alongside power and water consumption.

Finally, I would like to recognise the value in the commission's focus on greater efficiency in raw material use, a critical concept in sustainability, especially in a country where resource extraction makes up a large portion of the economy. I do want to highlight however that resource extraction is a linear activity, not a part of the circular economy. Reducing resource extraction is a method of moving towards circularity, but work in raw materials, not a part of a circular economy. A circular action toward resource efficiency would be an action that looks at resource retention. This means maintaining resources within the economy at their highest value, and recovering or reusing resources once they can no longer be maintained at that level. One extreme example of the resources we can recover through rethinking end of life practices comes from the mining of landfill sites, where several papers and experiments have shown the potential commercial viability of extracting rare earth metals from landfill sites (8). This is not to say that we should necessarily be mining our old landfills, more-so that we should be looking more carefully at ways to extract resources more efficiently from end-of-life products, where careful investment may provide solutions which are more circular and more economically sound than linear resource extraction. Going further, extending the life of products through extended use, reuse, repair and repurposing, can provide great reduction in demand for linear resource extraction and great energy savings.

2. Understanding Value Retention in the Circular Economy

The 10 Rs of the Circular Economy

Recycling has been at the forefront of Australia's sustainability actions for decades. As awareness and policy around the Circular Economy has evolved, recycling, an industry which is well established, and has been a part of our conscience for over a century, has found itself at the forefront of Australian Circular Economy policy. This is despite the fact that recycling is commonly understood to be one of the least desirable Circular Economy activities, due to its high rate of embodied energy loss and high rate of energy consumption required during processing (3).

Circular Economy waste reduction activities have in recent years been commonly understood to be represented by 10 activities, or Rs (9). Below, these Rs are shown in order from most to least circular. As can be seen, recycling ranks very low, at 8th of 9 activities.

- R0 - Refuse
- R1 - Rethink
- R2 - Reduce
- R3 - Reuse
- R4 - Repair
- R5 - Refurbish
- R6 - Remanufacture
- R7 - Repurpose
- R8 - Recycle
- R9 - Recover

Reducing our consumption has undoubtedly the greatest impact in moving toward a Circular Economy. Reusing what we already have consumes more energy than reduction, but is still substantially less energy intensive than Recycling, as it maintains goods largely in their existing forms. With recycling, the energy put into creating the original item is lost from the Circular Economy when a product is broken down into its individual materials. Further energy is then expended in the creation of the new product from the recycled material. In this way, while Recycling is substantially more circular than linear material extraction, as it retains physical resources within the Circular Economy, it is substantially less circular than Reducing and Reusing, as it requires substantially greater energy resources to be consumed in order to maintain use of the physical resources.

This distinction between degrees of circularity appears to be largely ignored or unrecognised in Australian sustainability and Circular Economy policy to date. Government policy appears to largely consider all forms of non linear disposal (landfill avoidance) of equal value. This decision not to distinguish between forms of waste avoidance opens the door to large established entities in the recycling sector to remain the dominant form of Circular Economy entity in the Australian economy, with investigation into alternatives to recycling funded only for resources where recycling is not seen as straightforward.

In the Victorian context, this can be seen in past grant funding. Of the 36 completed grant funding rounds visible on the Sustainability Victoria website (10) 12 directly mention Circular Economy in their title, two directly mention recycling and one mentions reuse. Of the 12 mentioning Circular Economy in their title, 5 directly mention recycling as the main target activity within their one sentence description. Reuse, repair, refurbishment and remanufacture go unmentioned.

Further, these grants have appeared to favour supporting large organisations to make incremental steps toward circularity, rather than providing opportunity to smaller newer players who may be capable of offering far more innovative and progressive circular outcomes.

On a national level, the focus on recycling, to the detriment of all higher value Rs, is equally apparent. A quick review of the Federal Government's Department of Climate Change, Energy, The Environment and Water website (11) shows no mention of reuse, repair, refurbish, remanufacture or repurpose within 'Climate Change' or within its subcategories such as 'Emissions reduction', 'Net Zero' or 'Australia's climate change strategies'. Under 'Environment', the only related topic is 'Waste and recycling', which offers a \$1 billion 'Recycling Modernisation Fund', policies for increasing the uptake of recycled materials, a great deal of information on how to export waste, a list of 11 active product stewardship schemes (all of which are based around recycling), and a 'National Framework for Recycled Content Traceability'. 'Transitioning to a more circular economy' mentions remanufacture and reuse, but provides no further exploration, and 'ReMade in Australia' mentions reuse as a goal but the policy content provided only covers labelling of recycled content.

Reducing has been seen in a limited number of recent policies such as single use plastics bans, but even then scope has been limited to very specific single use plastics and expanded polystyrene products (12), the enforcement has been patchy, and the focus has been on the restriction of a narrow range of products, rather than the provision of an alternative to the problem.

Conversion of hard to recycle resources such as ink cartridges and certain waste glass into road base and road surface components has been promoted as a substantial circularity achievement, and is undoubtedly an example of resource reduction, in reducing the number of virgin materials required to construct a new road. It is however, also a potentially linear activity. Unless the road surface is recycled into new road surface when it reaches the end of its life, the road surface becomes a linear product and as such the resources embodied in the glass and ink cartridges are removed from the Circular Economy.

While such activity provides an alternative to landfill for difficult to recycle materials, the reuse or repurposing of such materials would be a far more circular solution. Refilling an ink cartridge, for example, eliminates the need to recycle it, and retains all of the energy embodied in the cartridge from its construction, where turning it into road-base at best retains some of its material properties only. The Rs in-between Reduce and Recycle, such as Reuse, Repair and Repurpose, have largely been ignored in Government action to date,

and this may well have led to missed opportunities to uncover and support more circular solutions.

In order to maximise value in investments and policy support for Australia's transition toward a Circular Economy, it is important that Australian governments at all levels recognise the limitations on advancement that they have caused through their historic and ongoing focus on supporting recycling above and beyond all other circular activities.

Retaining the Maximum Value in our Existing Resources

In order to retain the maximum resource value in goods and materials already within our economy, we first need to fully appreciate the breadth of resources embodied in our goods. It is easy to think of the resources that are within a product as solely being the base physical materials that went into the product's construction. The plastics, metals, glass and other materials which individually have assignable monetary value per gram are easy to identify and define as a material value, but to do so without consideration to the energy resources used to process, form and assemble those materials, and the physical properties embodied by their finished form, is to ignore a large amount of the product's embodied resources. This simplification is one of the reasons that the recycling industry thrives, but it is not a form of understanding resource value that stands up to scrutiny within a Circular Economy.

A metal ball bearing has not just popped into existence as a finished product. Energy, water and other resources have been expended to dig iron ore from the ground. Further energy has been expended to extract the iron from the ore, to process it and to form the ball bearing. To consider it purely as a metal by weight is to ignore all of those energy resources that went into the production of the finished product. To recycle that ball bearing into another metal object disposes of the energy used to transform a piece of raw steel into a ball bearing, as well as requiring additional energy to transform the ball bearing into a raw steel, then further energy still to transform that steel into something new. Repairing the ball bearing may require energy to resurface the bearing, but the majority of the original energy embodied from the creation is retained. To reuse the ball bearing in another product retains all of the embodied energy and requires no new energy to be added.

This embodied energy, and the energy required to transform an object for reuse, needs to be considered as part of the object when assessing the most appropriate manner of retaining value in an item within the Circular Economy. Even as we transition toward ever increasing portions of renewable energy in our energy mix, there remains a resource cost in the production of energy utilised in the transformation of an item, and recycling is the most energy intensive transformation process within the Circular Economy's Rs.

It is from this foundation that we can see that the current focus on recycling of existing objects misses opportunities for greater resource retention and greater circularity. If transition toward a Circular Economy is truly a policy of importance for the government, then there needs to be a transition in the way that we treat resources within our economy. Identifying the most ideal method of retaining value from end-of-life goods needs to be

undertaken by filtering those goods through the Rs, looking first at how we can reuse, repair or repurpose those resources, before considering options such as recycling.

The Economics of Higher Value R activities

How materials are handled at the end of their initial life is not only of environmental importance, it is of economic importance too. For every 10,000 tonnes of material incinerated, one job is created. Six are created if the same material volume is landfilled, 36 if it is recycled and up to 296 if it is refurbished and reused (13). Not only does the retention of materials in their highest value form reduce material and energy consumption and increase circularity, it also creates jobs and opportunities.

Importantly, repair, repurposing and reuse also keep resources within the Australian economy for longer. In the linear economy, Australia's primary roles are resource mining, and product consumption. We take critical resources from our environment, ship them overseas as raw materials, and buy them back as finished products. Up until China banned waste imports from Australia and other countries in 2017 we also shipped a large portion of our domestic goods offshore for processing when they reached the end of their initial life. While reduced, this export model still makes up part of our end-of-life processing mix, especially with products such as textiles, where 105,000 tonnes of waste is exported annually (14). Not only does this remove resources from the Australian circular economy, it is also energy intensive, with international shipping accounting for 2% to global energy related CO2 emissions (15).

Bringing reuse and repair back into the Australian economy in a substantial and commercially viable way not only provides employment and economic opportunities, it is critical to resource retention within a future circular economy. While initial steps have been undertaken by some major players in the Australian consumer retail market, such as IKEA's As-is market (16) and Officework's investment in the currently in liquidation Circonomy (17), transition has been slow. Most existing circular economy activity at a commercial scale, outside of recycling, involves the resale of goods in as-received condition, such as op-shops and pawnbrokers. Goods that require any form of preparation for resale are generally ignored and become part of our linear waste streams.

The automotive sector is one of the only market sectors where a degree of repair and has until recently been a substantial component of the secondhand/reuse market, but even in their cost inefficiencies of repairing goods on a case by case basis has seen major changes to the industry. Many new car dealers are substantially reducing or eliminating their secondhand car sales, preferring to auction off received trade-ins to secondhand specific dealers, many of whom now put off investment in repair of vehicles until a buyer has been found in order to delay repair costs.

The tech sector is another rare exception, with larger outfits such as Reebelo and NuMobile and smaller firms such as In-The-Click offering near-new buying experiences for tested and serviced second-hand electronics, making the most of a sector where devices have enough

consistency and volume, and are often disposed of early enough in their lives, to be commercially straightforward to refurbish and resell.

Food is another sector where there is a degree of reuse, with organisations such as Oz-Harvest and Feed Me redistributing as-found end of life food and repurposing it into meals. In both electronics and food, however, it is important to note that only a small portion of the overall waste is currently being captured in these circular economy activities. Outside of these sectors, repair and repurposing exists only at a much more grass roots level, however this does not have to be the case.

3. Opportunities for Greater Value Retention and Circularity

Technology products are far from the only non-food product that could be reused, repaired or repurposed on a commercial scale in Australia. At best, they are the lowest hanging fruit, but there are plenty of other fruits that could be within reach with a few simple actions.

For reuse, repair and repurposing to be economically attractive to undertake at scale it needs to be as attractive to business as linear economy products. If it is more expensive, more unpredictable, or higher risk, there is no incentive to invest. While there are stick-based measures such as product stewardship schemes which have the potential to greatly improve ease of repair/reuse/repurposing if correctly implemented, there are also big steps that can be undertaken to make repair, reuse and repurposing more commercially attractive.

Understanding Our Resource Streams

We know that Australia disposes of 511,000 tonnes of e-waste (18), 3 million tonnes of textile waste (19), and 14 mega tonnes of municipal solid waste (a staggering 545kg per capita) (20) every year, but we don't know what is in those broad waste bundles, and that is a problem.

20 tonnes of working LED televisions has a lot more commercial value than 20 tonnes of broken plasma or CRT screens. At present we count e-waste as a single entity, and as a result we treat it as a single entity - waste. A European study showed 58% of people replaced an old television with a new one when the old one was still considered to be working well (21). This implies that up to 58% of televisions being disposed of could be in good working order. If we knew what proportion of e-waste was made up of working electronics, we would start to get a picture of what proportion could be redirected for circular reuse, perhaps by charities. If we knew what proportion was in perfect working order, less than 10 years old, and made by a high value brand, we would know what portion could be reused through commercial resale. The more that we know about our waste streams at a micro level, the easier it will be to identify opportunities to adjust our waste processing to maximise commercial value and circularity.

Commercially reselling a 5 year old television offers the same work opportunities as commercially selling a new one. It takes away no manufacturing jobs from our economy, as televisions are imported products. It retains resources within our circular economy and avoids the need to bring new resources in. It even has the opportunity to create employment opportunities in refurbishment. The potential viability of this has been proven by the refurbished phone and IT resellers mentioned earlier in this submission.

Televisions, mobile phones and computers are certainly not the only electronic devices where this sort of opportunity exists, and electronics is certainly not the only waste category where valuable resources can be found either. If we could break down clothing, sporting goods, furniture and other waste streams by quality, condition, and age, we would undoubtedly find other types of goods where there are adequate volumes and value retention to make reuse, repair or repurposing commercially viable. Once these resource streams are identified within our waste streams, the next step is to separate them from waste streams and collect them in a manner which retains their value.

Separating Goods of Value

Once a material stream has been identified as being of a scale and quality that is commercially viable for reuse, repair or repurposing, the next step is to separate that stream in a way that retains its value and brings the resources into an accessible location, so that they can be accessed cost effectively at commercial volumes. Here, like in resource stream identification, Australia has a long way to go.

Using e-waste as an example again, I recently visited a landfill site which offered a specific drop off point for televisions. They had a specific wire crate into which all televisions were to be put. Unfortunately this resulted in televisions being dropped on other televisions, and all televisions becoming e-waste. The smallest steps could be taken here to drastically improve recovery. A two crate system where 1 crate was for broken televisions and 1 for working televisions would allow the working televisions to be easily identified and protected from damage, drastically improving the opportunity for reuse. A 3 crate system where the 3rd crate was for televisions with only a minor fault (which the disposer could perhaps put a sticky note on listing the fault) could allow appliance repairers to assess opportunities to repair and resell select televisions where there was potential commercial viability. These 2 steps would allow as much as 85% resource recovery based on the percentage of new televisions purchased to replace working or partially working existing televisions (21).

Going a step further, a council run (or even commercially run) electronics collection truck which picked up all working electronics, or all working electronics within a set of criteria (perhaps age, type, or even brand) would allow for simple collection without damage, and commercial scale sorting and preparation for resale. It would substantially reduce the risk of damage due to transport methods and due to potential water ingress which currently occurs in conventional hard waste collection. Brands could potentially be tasked with collecting their items at the end of their life as part of their product stewardship, and investing in such transport arrangements.

Again, these examples, while focused on the e-waste sector, are applicable to a broad range of domestic waste categories.

Easing the Legislative Burdens

With resource identification and separation discussed, the next most important area for discussion is in legislation, where a number of unintended barriers and grey areas currently exist to reuse, repair and repurposing. The most obvious areas requiring attention revolve around resource acquisition and liability.

On the acquisition side, at present in Victoria, the purchasing or receiving of secondhand goods with the intent to resell, with a few exceptions such as clothing, kitchenware, whitegoods (excluding microwave ovens), books and magazines, requires a second-hand dealer's licence (22). Not only is a licence required, but every non-exempt purchase needs to include the recording of the seller's full name and address and details of a photographic identity card and details of the goods received. These restrictions make it challenging for commercial enterprises to efficiently purchase goods from consumers for repair, repurposing and resale, as potential sellers of low value items may find such data collection unreasonable, inconvenient or an invasion of privacy. While there are practical reasons for such rules to exist, they also create substantial barriers to market and need to be reconsidered or updated to simplify transactions where a low risk of illegal activity exists.

Liability in secondhand goods provides a range of interesting challenges also. Providing a warranty when selling a secondhand item makes sense as a process of building trust with consumers, and building the costs of such an offering into retail pricing is achievable. Where the challenge increases, is with issues outside of general product faults. I am aware of car dealers being unwilling to purchase late model second-hand cars because there is an outstanding product recall on the model for which the manufacturer has yet to find a resolution. In these situations the dealer rejects the car as they would not be allowed to sell it until a fix is released, making it dead stock.

Liability is also a challenge where risks can be hidden. If a 6 month old electronic device causes a house fire due to a faulty lithium battery, it is most likely that the manufacturer will have a degree of liability, but not the reseller who sold it new. What about if the device is 5 years old though, perhaps it becomes more difficult to tell whether the failure is due to a fault in the product's design or manufacture, or in the way in which it was being used by the owner? Warranty periods help protect the manufacturer and the reseller in this situation. If an organisation sells a secondhand electrical item and 2 weeks later it causes a house fire, do they hold a liability risk, even though there may have been no practical way to identify a potential fault in the device prior to sale? If a piece of antique furniture has traces of lead paint remaining on it, is it allowed to be resold despite the outlawing of such paint? What if that piece of furniture has been cut up and transformed into a different piece of furniture? Since the lead paint was not applied during the transformation is it OK to sell, or does the transformed piece count as a new product and therefore need to be proven to be 100% free of lead paint, or asbestos, or other now illegal substances? If the fabric on an office chair is replaced before reselling it and the wheels collapse the following week, is the upholsterer liable for the failure as if it was a new good, or is it a secondhand item with the associated buyer risks?

Within the legislation I have read, products fall only into 2 categories, new or used. We think of a repaired secondhand car, no matter how much repair or restoration has been undertaken, as used. We think of a pen made from recycled plastic as new. If the motor is upgraded in an older car it generally has to meet some but not all current standards, however this middle ground is not legislated in other product categories. Where repurposing sits in general, we have no definitive answer at present. We do not define in any legislation I have seen whether an item not restored to its original form, but also not broken down to its raw materials for transformation into a new form, is recognised as new or used, and this lack of clarity has big potential impacts when large scale commercial entities are considering reuse and repurposing opportunities. Work needs to be done to clarify how we define goods that are not simply resold as received, and what liabilities and restrictions fall upon the reseller as a result.

4. Conclusion and Recommendations

Knowing the resources that we have available to us, collecting them in a way that retains their maximum value and allows them to be efficiently redistributed, and clarifying legislative grey areas are all tasks which, in combination, offer huge opportunities to grow reuse, repair and repurposing, and therefore the Circular Economy in Australia. These steps will open up opportunities for private sector investment, but, as stated earlier in this submission, much work can also be done in Government investment. Government investment needs to recognise the difference in circularity and economic value in different R actions, and needs to acknowledge this difference when evaluating potential investment opportunities and grant recipients. It also needs to look outside the large established entities seeking funding for incremental turns of slow moving ships and outside existing practices like recycling, and towards smaller, more innovative entities capable of more radical circular change when looking at where to provide economic assistance.

It is my recommendation to the commission that the government supports an immediate in-depth audit of the domestic waste streams entering local landfill sites and resource recovery centres. If we only measure used electronics as e-waste, as we do now, it will always be waste. If we know how many TVs under 5 years old, in full working order, are being thrown out each year, suddenly we know what resources we have. Assessing our waste streams at this level of detail will provide opportunity for government and industry to identify resource streams worthy of redirection to more sustainable pathways such as reuse, repair and repurposing. This is work I have been in discussion with multiple local councils about undertaking at a council level, but undertaking such research at the national level would provide a substantially more accurate picture of our overall resource landscape. This work will open the door to investigation of new large and small scale opportunities for resource diversion away from landfill in a manner which is commercially viable for councils and reuse entities.

Once an understanding of our resource landscape has been developed, I recommend a review of secondhand dealer licensing schemes to recognise the need for a less onerous method of purchasing or receiving low value low risk second-hand goods for repair, reuse or resale, which may otherwise end up in landfill. Additionally I recommend a look at definitions of new and used goods, and ways in which legislation can be updated to provide better clarity and support to sellers of secondhand, repaired and repurposed goods, while maintaining adequate protections for consumers.

Our reuse economy in Australia is far greater than most people realise, varying from the thousands of op-shops and pawnbrokers dotted across the nation, to second-hand car yards, upholsterers and white goods repairers, to home based upcycling microbusinesses. We have no overarching representative body nor even terminology to embrace this whole group of industries, who provide far more circular services than the better recognised recycling industry. For this reason, we have no easy way of identifying the scale or impact of the sector, its needs (training, funding, access to resources, exposure, or other) or its capacity for growth. Finding a way to identify the actors in the reuse economy, their needs

and their impacts is crucial to understanding how to support them and allow them to help the government achieve a far more circular future.

Finally, I recommend that when future funding such as grants is offered for Circular Economy projects, assessment of circularity is not simply calculated on the physical mass of resources redirected from landfill. Instead, the entire embodied energy and resources of the product being diverted are taken into consideration during the assessment. The Circular Economy Rs could be utilised to guide this process. Further to this, I suggest that a portion of circular economy grant funding allocations are set aside for newer, theoretically higher risk projects, where the project has the potential to create radical change in progress toward circularity. It is easy to allocate grant funding to small incremental steps of large entities with proven track records, but some of the biggest opportunities to advance Australia's Circular Economy could well be being missed at present through risk averse grant allocations that favour the known.

References

1. Our World in Data, *Domestic material consumption per capita*, accessed 22 October 2024, Global Change Data Lab, <<https://ourworldindata.org/grapher/domestic-material-consumption-per-capita>>
2. Earth Overshoot Day, 2024, *Country Overshoot Days 2024*, accessed 22 October 2024, Global Footprint Network, <<https://overshoot.footprintnetwork.org/newsroom/country-overshoot-days/>>
3. Marco D'Urzo, Cristian Campagnaro, Design-led repair & reuse: An approach for an equitable, bottom-up, innovation-driven circular economy, *Journal of Cleaner Production*, Volume 387, 2023, 135724, <https://doi.org/10.1016/j.jclepro.2022.135724>.
4. Halog, A., Balanay, R., Anieke, S. et al. Circular Economy across Australia: Taking Stock of Progress and Lessons. *Circ.Econ.Sust.* 1, 283–301 (2021). <https://doi.org/10.1007/s43615-021-00020-5>
5. YouGov, 2017, *Fast fashion: Three in ten Aussies have thrown away clothing after wearing it just once*, accessed 22 October 2024, YouGov PLC, <<https://au.yougov.com/society/articles/19819-fast-fashion>>
6. Tech Guide, 2023, *Only one per cent of Australian are recycling their old mobile devices*, accessed 22 October 2024, Tech Guide, <<https://www.techguide.com.au/news/mobiles-news/only-one-per-cent-of-australian-are-recycling-their-old-mobile-devices/>>
7. European Commission, 2024, *Circular economy action plan*, accessed 22 October 2024, European Commission, <https://environment.ec.europa.eu/strategy/circular-economy-action-plan_en>
8. Travis P. Wagner, Tom Raymond, Landfill mining: Case study of a successful metals recovery project, *Waste Management*, Volume 45, 2015, Pages 448-457, ISSN 0956-053X, <https://doi.org/10.1016/j.wasman.2015.06.034>
9. Kirchherr J., Reike D., Hekkert M., Conceptualizing the circular economy: An analysis of 114 definitions, *Resources, Conservation and Recycling*, Volume 127, 2017, Pages 221-232, ISSN 0921-3449, <https://doi.org/10.1016/j.resconrec.2017.09.005>
10. Sustainability Victoria, 2024, *Funded projects*, accessed 22 October 2024, Sustainability Victoria, <<https://www.sustainability.vic.gov.au/grants-funding-and-investment/funded-projects>>
11. Department of Climate Change, Energy, The Environment and Water, 2024, *Various Pages*, accessed 22 October 2024, Australian Government, <<https://www.dceew.gov.au/>>
12. State Government of Victoria, 2024, *Reducing plastic pollution starts with us*, *Various Pages*, accessed 22 October 2024, State Government of Victoria, <<https://www.vic.gov.au/single-use-plastics>>
13. Reuse and Recycling EU Social Enterprises network, Briefing on job creation potential in the re-use sector, September 2015, <https://www.rreuse.org/wp-content/uploads/Final-briefing-on-reuse-jobs-website-2.pdf>
14. Gbor N., Chollet O., Textiles waste in Australia, May 2024, The Australia Institute, <https://australiainstitute.org.au/wp-content/uploads/2024/05/The-Australia-Institute-Textiles-Waste-In-Australia-Web.pdf>

15. International Energy Agency, 2024, *International Shipping*, accessed October 22 2024, International Energy Agency, <<https://www.iea.org/energy-system/transport/international-shipping>>
16. Ikea, 2024, *Buy-back estimator tool*, accessed October 23 2024, Inter IKEA Systems B.V., <<https://www.ikea.com/au/en/customer-service/services/buy-back-quote/>>
17. Circonomy, 2022, *Officeworks acquires stake in WBGS*, accessed October 23 2024, Circonomy, <https://circonomy.com.au/blogs/news/officeworks-acquires-stake-in-wbgs?srsId=AfmBOoqQwnoLvLoO9uQZZD0u3G5SRfYHaW_8KrRpcXwqoJCHSqFuQoqW>
18. Department of Climate Change, Energy, the Environment and Water, *E-Stewardship in Australia*, 2023, accessed October 23 2024, Australian Government, <<https://www.dcceew.gov.au/environment/protection/waste/e-waste>>
19. Khan M.I., Wang L., Padhye R., *Textile waste management in Australia: A review*, Resources, Conservation & Recycling Advances, Volume 18, 2023, 200154, ISSN 2667-3789, <https://doi.org/10.1016/j.rcradv.2023.200154>
20. Blue Environment Pty Ltd, *National Waste Report 2022*, 2023, The Department of Climate Change, Energy, the Environment and Water, <https://www.dcceew.gov.au/sites/default/files/documents/national-waste-report-2022.pdf>
21. Magnier L., Mugge R., *Replaced too soon? An exploration of Western European consumers' replacement of electronic products*, Resources, Conservation and Recycling, Volume 185, 2022, 106448, ISSN 0921-3449, <https://doi.org/10.1016/j.resconrec.2022.106448>
22. Consumer Affairs Victoria, *Second-hand dealers and pawnbrokers*, 2024, Accessed October 23 2024, State Government Victoria, <<https://www.consumer.vic.gov.au/licensing-and-registration/second-hand-dealers-and-pawnbrokers>>