Closing the Loop in Net Zero: Exploring the Intersection of Circular Economy and Net Zero Policies in Australia

Akvan Gajanayake *

Posted Date: 15 February 2026

doi: 10.20944/preprints202602.1179.v1

Keywords: circular economy; net zero; renewable transition; decarbonization; policy coherence

 doi:10.20944/preprints202602.1179.v1

Article

Closing the Loop in Net Zero: Exploring the Intersection of Circular Economy and Net Zero Policies in Australia

Akvan Gajanayake

School of Property, Construction and Project Management, RMIT University, Melbourne, Australia; akvan.gajanayake@rmit.edu.au

Abstract

As Australia advances toward a net zero economy, system-wide transformations in the energy sector are becoming increasingly necessary. This transition entails the electrification of key sectors, the integration of renewable energy sources, and the decommissioning of aging infrastructure. However, alongside technological change, there is a growing need to manage emerging forms of waste such as solar panels and batteries and to embed circular economy principles into the transition framework. This paper presents findings from a qualitative study conducted to understand key stakeholder perspectives on policy coherence between net zero and circular economy policies in Australia. The study reveals that there is significant gap in conceptual understanding of both circular economy and net zero transitions and a lack of clear definitions within these policies leading to two classical systems traps: policy resistance and seeking the wrong goal. The focus on recycling and operational emissions within CE and net zero policies respectively, typically lead to suboptimal outcomes being pursued for both policies. These findings underscore the critical need for capacity building, clearer policy articulation, and targeted educational strategies to foster a socially informed, circular approach to decarbonization. By integrating the clean energy transition within broader social and institutional contexts, this paper contributes to a more inclusive and systemic understanding of Australia's net zero future.

Keywords: circular economy; net zero; renewable transition; decarbonization; policy coherence

1. Introduction

As Australia aims to reach net zero greenhouse gas emissions by 2050, the energy sector will play a critical role in this transition. A fundamental shift in energy sources are required to achieve net zero initiatives, as energy generation needs to transition away from fossil fuels to renewable sources [1]. This shift will necessitate energy consumers like households and businesses to move away from gas to more efficient electric equipment and invest in solar panels and batteries. Renewable energy generation cannot be considered as a silver bullet that fixes all environmental issues as the technologies have their own environmental impacts as most of them require non-renewable and scarce material such as lithium, cobalt and zinc, making these products hard to recycle. Australia is uniquely placed to take advantage of the global renewable energy transition as it has some of the world's largest reserves of these critical minerals [2].

The net zero transition will lead to an increase is newer waste types such as solar panels and batteries, which are hard to recycle in the current recycling system. It is expected that about 400,000 tons of solar panels and 150,000 tons of Electric Batteries will be disposed of in the next 10-15 years [3]. These waste materials have critical minerals and if not managed properly can be hazardous to humans and the environment. The disposal of end-of-life equipment and technology as Australia transitions to a net zero economy, will be influenced by government legislation, the recycling value chain and the energy sector. Managing these waste streams can be complex as it involves

 doi:10.20944/preprints202602.1179.v1

consideration of a wide range of stakeholders, user attitudes and behaviors, government legislation, the recycling value chain and wider socio-economic factors.

The circular economy (CE) approach has been adopted by various levels of government in Australia as it tries to deal with multiple types of waste generated within its borders. CE can be defined as "an economic system that targets zero waste and pollution throughout material lifecycles, from environment extraction to industrial transformation, and to final consumers" [4], where materials and products circulate at their highest value. However, the CE approach is commonly used in a retrospective manner to deal with materials that have already entered waste streams and are hard to recycle [5], although recycling and resource recovery are considered last resort options in CE frameworks [6]. If the different types of waste that will be generated in the future due to the renewable energy transition are to be managed efficiently, a proactive approach to managing such waste is required. Such an approach not only necessitates the planning and designing systems to deal with the waste material well in advance of its generation, but also to take a system wide view to understanding the problem. Given that waste systems are reliant on varied types of influential factors such as policies, business practices and social behavior, it is vital that driving forces within these factors are analyzed [7]. The complexity of the renewable energy transition also means that recycling of waste is influenced by actors such as the insurance sector, which is typically considered an unrelated to CE or net zero transitions [8]. Given this complexity, a holistic systems approach is needed if waste generated from the net zero transition is to be managed in a circular manner.

Although government plans to achieve net zero targets and to achieve a CE are championed by the environmental departments at each level of government, there is a lack of policy overlap between these objectives [9]. With increased government funding to build Australia's solar PV manufacturing capabilities, the need to incorporate CE principles at the design stage becomes a necessity. If countries like Australia are to deal with the imminent challenge of dealing with waste that will be generated from the renewable energy transition it is vital that CE principles are adopted to deal with such waste well in advance of the waste being generated. The importance of such an approach is highlighted by the CE Ministerial Advisory Group [10], which has identified the need for research on CE to manage net zero transition waste and to develop an assessment on how the circular economy can be adopted to maximize the recovery of valuable resources that will help to deliver the net zero transition. This provides an opportunity for circular economy principles to be adopted to capture value of these critical minerals throughout their life cycle, reducing pollution and increasing economic benefits.

The aim of this paper is to present the current state of practice to understand how CE aspects are considered in the net zero transitions and what knowledge gaps exist in incorporating CE with net zero actions. This study provides the first in-depth qualitative assessment of how Australian government and industry actors understand and operationalize CE within net zero policy frameworks. This paper extends previous research conducted to understand how CE has been conducted within the national net zero policy framework in Australia [11] and sets the foundation for more detailed research opportunities overlapping the CE and net zero transitions.

2. Net Zero and Circular Economy Policy Intersection

Resource use and carbon emissions are two of the three major environmental challenges faced by humanity currently, and CE and net zero goals aim to tackle this problem at national levels. However, the complexity of natural and socio-economic systems, together with the multiple interdependencies within them, gives no clear indication that a CE (in its current form of implementation) will invariably lead to net zero emissions or vice versa. While some researchers have pointed out that material efficiency strategies can contribute towards lower carbon emissions [12], others have shown that material efficiency can lead to higher carbon emissions [13,14].

The built environment sector plays a crucial role in achieving CE and net zero targets at national level. Circular economy strategies in the residential buildings sector can reduce the 2020–2050 cumulative emissions by 49%, while most of this relies on the transition to renewable material like wood in construction [15]. Adoption of "strong CE" strategies such as avoiding further expansion of

 doi:10.20944/preprints202602.1179.v1

buildings and roads on unbuilt land can help achieve both CE and net zero policy objectives in the building and transport sectors [16]. This in turn reduces absolute demand for electricity, which includes renewable electricity further facilitating decarbonization and wider health benefits. "Strong CE" strategies also complement decarbonization as it reduces emissions from extraction through to waste recycling, while minimizing its direct emission from landfills [17].

The integration of CE principles into net zero transitions has been increasingly recognized as essential for achieving sustainable, systemic change. Bioenergy, for instance, presents an opportunity to align circular economy goals with renewable energy generation by producing valuable bioresources from organic waste [18]. Involving the agricultural sector as a key stakeholder could further extend the role of bioenergy beyond waste-to-energy solutions, toward the creation of multiple resource loops. However, the safe adoption of bioresources requires robust monitoring and auditing systems, emphasizing the need for both technological and governance innovations.

While technological advancements are often the focus in discussions about accelerating the circular economy, scholars argue that broader ecosystem, financing, and behavioral dimensions remain underexplored [19]. In practice, circular economy applications have predominantly been implemented at the industrial scale, whereas integration in the agriculture, water, and energy sectors is still nascent. In the case of electric vehicle (EV) batteries, a critical technology for net zero pathways, systemic challenges such as ethical concerns around raw material extraction, insufficient policy frameworks, and infrastructure gaps for end-of-life management have been identified [20]. A closed-loop business model that considers circularity governance, environmental protection, and financial issues is increasingly seen as necessary to ensure a sustainable EV transition.

In developing economies, environmental concerns and the pursuit of a green corporate image have emerged as key drivers for circular economy adoption among small and medium-sized enterprises (SMEs) [21]. However, successful implementation remains highly dependent on supportive government policies and regulatory frameworks. Studies also indicate that while renewable energy deployment is often framed as inherently circular, the extraction of critical materials for renewable technologies continues to reinforce linear resource use patterns [22]. Efforts to design products for recycling and reuse are complicated by the use of new, complex materials and composites. However, it is argued that a circular economy approach can enable greater renewable energy uptake and transitioning [23], as by definition a CE is powered by renewable energy.

Recent literature consistently highlights the strong conceptual linkage between circular economy and net zero transitions [19,20,24] However, this relationship is still not systematically reflected in current policy measures. In Australia, as in other contexts, net zero targets are often articulated independently of circular economy strategies. Reports by the Ellen MacArthur Foundation [25] and analyses of European and UK policy frameworks [1,20] reveal a persistent gap between climate action plans and CE integration, with issues such as waste elimination and natural regeneration receiving limited attention. This could be due to long term policies that include net zero targets, which have overlooked short term actions [1]. In order to overcome this issue operational silos between energy and waste at policy, regulatory, and technological adoption levels must be addressed [18], while policy makers should take a holistic approach to developing and implementing related sustainability policies [24].

Globally, the articulation of net zero targets varies significantly across national contexts. The UK and China, for example, have announced net zero targets by 2050 and 2060 respectively [20,24], while Australia's national commitment aligns with a 2050 net zero emissions goal [10]. On the intersection of CE and net zero it has been found that combining resource efficiency and climate mitigation policies can off-set potential economic losses due to transitions [24]. Recent Australian government initiatives have prioritized investments in renewable energy manufacturing [10], yet research into how circular economy principles are embedded within these plans remains limited. The Australian Circular Economy Ministerial Advisory Group has underscored this gap, calling for greater integration of CE strategies into national climate policies.

 doi:10.20944/preprints202602.1179.v1

For a just transition to net zero, a systemic approach involving interdependent actions is required [26]. However as net zero pathways differ based on national priorities, the degree of CE integration will also differ depending on the pathways for each country. Scholars suggest that an initial approach to embedding circularity into net zero strategies could focus on refurbishment and reuse [27]. However, sector-specific differences in material composition, design complexity, and cost structures complicate the development of a standardized, nationwide plan. Therefore, a socio-economic approach that considers ecosystem perspectives, investment in innovation, and behavioral change toward circularity is critical for Australia's net zero transition [19]. Addressing these gaps will be essential to optimize resource use, manage emerging waste streams, and enable a more just and sustainable transition. While existing literature conceptually links CE and net zero, empirical evidence on stakeholder-level policy coherence within the Australian energy sector remains limited. To address these gaps, this study used a muti-stakeholder perspective to understand the current state of practice in integrating CE and net zero goals and how this integration can be optimized.

3. Data and Methods

This study adopted a qualitative research design to explore how CE principles are currently considered in net zero policy development in Australia. The aim was to capture stakeholder perspectives on existing practices, challenges, and knowledge gaps, and to identify opportunities for more integrated and systemic policy approaches.

A total of 14 participants were involved in the study, recruited through purposive sampling to ensure representation from key sectors engaged in renewable energy and sustainability transitions. Participants included representatives from industry and government bodies involved in net zero policy formulation, and academic researchers working across renewable energy and circular economy domains (see Table 1). Participants from these sectors were selected as they were identified as key influential actors in developing and implementing net zero and CE policies [28]. The face-to-face format was intentionally chosen to facilitate deeper engagement, identify areas of convergence and divergence in current thinking and practice and promote open dialogue across sectors. All participants provided informed consent prior to the sessions, and the study was approved by the Human Research Ethics Committee of the host institution.

Table 1. Details of participants of the focus group sessions.

Participant ID	Sector	Type of organization
P1	Consultancy	Private
P2	Sustainability Accreditation	Private
P3	Education	Public
P4	Consultancy	Private
P5	Consultancy	Public
P6	Renewable Energy	Government
P7	Research and Development	Public
P8	Research and Development	Public
P9	Research and Development	Public
P10	Research and Development	Public
P11	Research and Development	Government
P12	Research and Development	Public
P13	Research and Development	Public
P14	Research and Development	Public

A semi-structured format was used for the focus group session, which allowed for both targeted exploration and discussion of emergent topics. The focus groups were facilitated by the principal researcher, with support staff present to take detailed observational notes. The discussion guide covered four main topics: the extent to which CE considerations are currently reflected in net zero

 doi:10.20944/preprints202602.1179.v1

policy initiatives; institutional drivers and barriers to integration; perceived knowledge gaps and research needs; opportunities for cross-sectoral collaboration and educational interventions.

To facilitate collective thinking and idea generation, participants were encouraged to write responses on Post-it notes and contribute to flipchart discussions. The use of Post-it notes acts as a cognitive externalization of ideas and provides opportunities for individuals to express ideas divergent from group discussions [29]. The visualization of ideas also helped in the categorization of factors in the subsequent analysis. The visual aids were collected and triangulated with researchers' notes for analysis. At the conclusion of each session, a summary of key points was presented to participants for validation and feedback, enhancing the reliability of the findings.

Data from the focus group sessions were analyzed using thematic analysis. Initial codes were generated manually from participants handwritten notes, flipcharts, and researchers' notes. These codes were then grouped into themes that reflected recurring patterns in the data related to CE integration in net zero planning, systemic barriers, and knowledge needs. Triangulation was achieved through the use of multiple data sources (facilitator notes, visual materials, and participant feedback) and the involvement of multiple researchers in coding and interpretation. This collaborative approach helped ensure analytical rigor and minimize individual researcher bias.

4. Results

The main themes arising from the thematic analysis are presented in this section.

4.1. Definitions and Scope of What Is Being Measured

Participants highlighted that the narrow definition of net zero was a major challenge in incorporating CE and other broader sustainability factors in policy objectives. Discussions revolved around how most net zero transitions revolve around reducing operational emissions and carbon accounting, with a lower focus on embodied carbon emissions. It was mentioned that *"we cannot reach Net Zero without considering embodied carbon in different sectors"*. This also means that other environmental concerns like waste from the net zero transition were not considered in most policy objectives. A move towards incorporating life cycle carbon accounting, which includes embodied carbon and carbon emissions from end-of-life activities could be an easy method for current policies to adopt a much broader sustainability focus. Although policy documents and academic literature have clear definitions of both CE and Net Zero this clarity was not evident in the participants' discussions. Such questions revolved around if nuclear energy could be part of a net zero transition and the methods of achieving net zero goals.

Similar discrepancies were evident in the discussions around CE policies, with some participants not understanding how renewable energy fits into overall CE policies. Although some participants mentioned that a CE by definitions needs to be powered by renewable energy, others tended to disregard this aspect with more focus being on material resources within the CE. Although it was identified that incorporating life cycle carbon could address some of the waste related CE issues, this would not consider the regeneration of nature, which is considered one of the three main principles of CE. Participants agreed that as with net zero policies, the focus of CE policies are too narrow with *"Net Zero side of CE is often forgotten"* and *"Environmental considerations of CE are often not taken into considerations"*. Even though such aspects were mentioned by participants they were not immediately spotted and had to be teased out by purposeful questioning. There was a tendency to accept the policy positions as given and that pursuing each policy goal in isolation may in the end result in better environmental outcomes.

4.2. Net Zero Is Considered as a Policy Compromise

Government sector participants were of the view that net zero goals were seen a necessary policy compromise to achieve environmental policy consensus within broader government institutions: *"Net Zero is a compromise to get policy agreement"*. Policy development within government was

 doi:10.20944/preprints202602.1179.v1

identified to be a long and tedious process, which needs to go through multiple hurdles and get sign-off from different departments and institutions. This process therefore has led to environmental agencies pushing for policies that will have lowest push back and will be easier to get approval, so that they could be leveraged to push for more ambitious targets and goals in the future. It was also noted that there are competing interests in the policy landscape with informal pecking order in policy development, where net zero falls behind other economic policies and CE falls behind net zero. A participant also noted that these policies are more often symbolic in nature and although some environmental agencies see the importance of it, it gets *"watered down as it goes through whole of government approvals"*. This highlights the complexities and negotiations involved in setting effective climate policies, and inherent policy trade-offs that occur, when environmental and climate are not at the forefront of the political landscape.

The increased focus on net zero emissions was not considered inherently as a negative issue, as it has influenced both government and industry to take concrete steps towards de-carbonization. Interestingly a participant mentioned that achieving net zero would not mean that the economy will have transitioned into 100% renewable energy, as emissions from non-renewable sources could be offset by carbon capture programs. Participants discussed the relationship between net zero and carbon accounting, and the fundamental limitations of transitioning away from non-renewable energy within the Australian context. There was a clear consensus that with increased focus of governments on net zero it dampened industries' work on other environmental issues, CE being one of it; *"an awful lot is not considered in Net Zero [targets]"*.

4.3. What Gets Measured, Gets Managed

Participants discussed the influence of measurable policy targets in achieving overall sustainability goals. It was identified that the quantifiable targets within net zero was one major reason for its acceptance across a broad range of government and industry actors. This was especially the case with decision makers in government departments such as economics and finance, which are typically more influential in contrast to environment departments, and the business sector, which tend to prefer quantifiable metrics.

Data availability and comparability was identified as a major barrier for the adoption and integration of CE within net zero policies. Although broader and holistic environmental data on products could be obtained through tools like product passports and Environmental Product Declarations (EPDs), they were considered difficult to obtain and compare due to a lack of standardization; *"it comes down to the amount of data available"*. It was also identified that better data availability would also increase transparency which is needed for certifications and accountability; *"product passports would make everything more transparent - it would also make data available"*. The need for standardization in language and boundaries is essential for clearer communication and implementation of CE principles across different sectors. Business and industry sector participants believed data driven policies at industry level can drive the inclusion of CE targets within net zero plans. However, for this to take effect, policies need to move further than focusing on reducing operational emissions by considering life cycle and scope 3 emissions of businesses. *"CE can inherently be promoted because suppliers need to take into account the life cycle or whole of life [impacts]"*. It was identified that if a broader scope for emissions calculations were not considered, businesses could still achieve emissions targets by outsourcing operations.

4.4. Economic Incentives Are a Necessary Requirement

The lack of CE considerations within net zero policies were primarily connected to the lack of incentives. There was broad consensus that economic and financial incentives would be an enabler to align net zero and CE objectives; *"economic incentives [are a must]"*. It was discussed that the current focus on CE initiatives revolve around efficiency and cost of resources and waste, especially from a business mindset. Carbon prices and markets were considered as a good mechanism for integrating such economic incentives; *"CE will make economic sense as carbon [pricing becomes more mainstream]"*.

 doi:10.20944/preprints202602.1179.v1

However, there was skepticism if carbon pricing would become more common, especially in the Australian context, where political appetite for carbon markets and carbon taxes have declined over time.

Mandatory carbon and climate related reporting within Australia was seen as a good incentive for businesses to initiate broader environmental reporting. Such reporting was identified as a first step towards incorporating CE and other socio-ecological impacts in business operation decisions.

4.5. Knowledge Gaps and Skill Requirements

A clear idea that resonated across participants was that even if CE and net zero policies were aligned, there were knowledge and skills gaps, which would be a barrier to achieving both aims simultaneously. The main reason for this was the fact that policy makers and practitioners being knowledgeable on specific work areas focusing either on emissions reduction or resource management. More holistic sustainability knowledge was seen as vital to bridge this gap. It was also identified that practitioners would require both technical as well as soft skills in implantation of these policies. The most common technical skill requirements that were identified were repairability skills, techniques for dismantling products for repair and reuse, and systems and industrial engineering skills. Specific skills on renewable energy technologies like solar PVs and EV batteries were also identified, which were around maintenance and repair of PV systems and better understanding of battery storage and repair.

The common soft skill requirements that were identified by participants were networking skills for building relationships across diverse disciplines and communication skills for presenting to diverse audiences. Participants were also asked on the best methods that such skills could be imparted on practitioners. The most common method proposed was challenge based learning, where learners work through real world challenges, while gamification, the use of games and simulations for skill building was also discussed. Industry participants mentioned that higher educational institutions needed to play a bigger role in equipping the future work force with these necessary skills.

5. Discussion

This study set out with the aim of gaining an initial understanding on the alignment of CE and net zero policies across government and industry. This study found that there was limited integration of these policies, while effort is being made to achieve these policy targets independently of each other. However, we found that major stakeholders in both CE and net zero areas believed that integrating policy goals would help achieve both policy outcomes with less barriers and stems from the hypothesis that efficient use of materials can contribute towards lower carbon emissions [12].

A major finding was that most participants were unclear on definitions and scope of what is and is not included in net zero and circular economy. There were discussions around if nuclear energy could be considered renewable and a clean source of energy. The debates around nuclear energy within Australia have a political connotation to it as discussions around nuclear energy are influenced by political ideology [30]. This aspect is further exacerbated by increased media attention to the nuclear debate during federal election cycles [31], even though no policy change has occurred in the past couple of decades. The political ideology of nuclear aside, it has been argued that nuclear energy can by no means be referred to as clean or ethical, due to radioactive emissions, which will endanger humans and the natural environment for over one million years and nuclear powers' innate connection with nuclear weapon proliferation [32]. This illustrates the importance of delineating political rhetoric from environmental arguments as they can cause confusion among non-technical actors.

Similarly, some participants were not clear about the connection between a CE and renewable energy. This was surprising as the most commonly cited definition of CE in public and private sectors mentions that a CE is underpinned by a transition to renewable energy [33]. However, a reason for the lack of understanding on this could be due to government policy on CE focusing on solid waste

 doi:10.20944/preprints202602.1179.v1

and recycling [9], which can skew common knowledge in this area. It has been found that if there is a lack of clear definitions, or if policy goals are defined inaccurately or misunderstood, the entire policy system can work towards producing a result which is unintended or unwanted [34]. It is therefore vital that policies be clear on the goals and scopes but more importantly communicate them to all relevant stakeholders, which ultimately will lead to policy coherence within the CE and net zero areas.

Another finding of the focus group session was that there was a tendency to accept the multiple policy positions set out and that all policy outcomes could be achieved by pursuing each policy in isolation. However, this may not materialize as different policies may pull the system in different directions, leading to suboptimal policy outcomes. It is therefore vital that a comprehensive policy framework is developed to ensure that efforts to achieve one sustainability outcome do not undermine efforts to achieve another [35]. The definitions and inclusion/exclusion criteria for policy play a major role in such cases. For instance, if emissions targets focus only on operational emissions, there can be a push to use material that reduces operational emissions but are not very circular. It has also been found that the lack or incompleteness of data and calculation formulas can result in some CE strategies not being accounted for in terms of emissions reductions [36]. This highlights the need for government actors to consider policy coherence, at least across environmental sustainability related policies, in order to avoid the classic systems trap of policy resistance [34].

The focus group sessions highlighted that net zero policies tend to take priority within government and industry, with increased socio-political focus on climate change impacts. However, this attitude could lead to carbon tunnel vision syndrome [37], where carbon emissions are seen as the be-all and end-all of environmental sustainability indicators. Focusing solely on achieving net zero carbon emissions without acknowledging the potential negative impacts of renewable energy technologies risk creating unintended and potentially harmful consequences [38]. Paradoxically, efforts aimed at enhancing sustainability could end up undermining it. Policy makers therefore must adopt a more integrated and holistic approach that considers the full range of impacts, rather than addressing one issue in isolation. Such interventions require a departure from prevailing focus on technical solutions, political priorities, economic incentives, cultural traditions and ethical judgments [39].

Policy priorities also need to move beyond the narrow focus of relying on easily quantifiable metrics and targets to assess policy outcomes. Although having an easily quantifiable target helps in assessing if the target has been met, it can result in other complex but as important factors not being considered. Another aspect that needs to be considered is focus on one single overarching metric to measure the broad sustainability outcomes. The use of a single metric, although easy to assess and monitor, has the potential risk of overlooking other aspects. This could be seen in the broadly used metric of GDP, where other socio-economic aspects have been overlooked due to a single-minded focus of governments to increase GDP growth.

Quantifiability or even monetization of targets could also lead to creative methods to show the achievement of a target. Accrediting carbon offsets are a key part of the government's plan for Australia to reach net-zero emissions by 2050. However, evidence suggests that the carbon offset system is compromised by questionable reforestation initiatives and inconsistent accounting practices [40]. A significant portion of offsets are allocated to forestry projects, particularly in regional Australia, including schemes that offer credits for avoiding deforestation on land that was not under imminent threat of clearing. Such approaches do not constitute genuine emissions reductions. True mitigation would require a measurable decline in emissions at their source, such as the decommissioning of coal-fired power stations.

The findings suggest that policymakers and practitioners often operate within distinct disciplinary silos, with expertise concentrated either in emissions reduction or in CE. This fragmentation underscores the need for educational institutions to adopt more integrated curricula that bridge traditional disciplinary boundaries. Furthermore, soft skills, particularly networking and communication, emerged as critical for fostering collaboration across diverse stakeholder groups.

 doi:10.20944/preprints202602.1179.v1

Given that professionals working on net zero and those engaged in CE initiatives often come from different disciplinary and professional backgrounds, effective communication and cross-sector collaboration are essential for aligning efforts and achieving systemic sustainability outcomes.

6. Conclusions

This study explored the interconnections and integration challenges between CE and Net Zero policies within Australian government and industry contexts. Through focus group discussions with key stakeholders, the findings reveal a persistent siloed approach, where emissions reduction and circular economy are pursued in parallel rather than as integrated sustainability strategies. Despite increasing interest in both policy agendas, participants identified that unclear definitions, knowledge gaps, and systemic barriers hinder their cohesive implementation. Notably, the prioritization of net zero goals, driven by their quantifiable nature and political traction, often sidelines broader environmental objectives inherent to CE, including embodied carbon, waste reduction, and regeneration of nature.

The focus on operational emissions and carbon off sets in net zero policy frameworks limits the consideration of life cycle impacts, which are essential for capturing the full environmental impacts of materials and technologies. Similarly, the lack of standardized data, tools, and language around CE impedes its adoption in policy and business circles. Economic incentives and mandatory reporting frameworks were recognized as critical enablers for more holistic and inclusive policy integration. However, participants also emphasized that without addressing skills gaps practical implementation will remain limited. The findings reinforce calls for a systemic shift toward environmental policy coherence across different government agencies. Policymakers must move beyond the comfort of narrow metrics and engage with the complexity of environmental sustainability through inclusive, adaptive, and cross-disciplinary approaches.

A limitation of this research is the small number of participants involved in the study. However, as this was an exploratory study and complimented a previous policy review [11], the study helped to identify initial areas of policy incoherence from a stakeholder perspective. Further research in this area can focus on comparative studies examining successful integration of CE and net zero in other national contexts. Such studies could inform the development of a cohesive policy landscape to achieve broader sustainability outcomes in Australia. Research can also focus on the effectiveness of economic instruments (e.g., subsidies, natural resource taxes) in fostering CE outcomes alongside decarbonization. From a systems thinking perspective research should investigate tools and methodologies that support holistic policy development and assessment. This includes the use of systems dynamics decision support systems to simulate outcomes and consequences of specific policies and using co-design principles to develop and implement policy coherence.

Funding: This research was funded by RMIT University's School of Property, Construction and Project Management research activity fund. .

Institutional Review Board Statement: The study was conducted in accordance with the Declaration of Helsinki, and approved by the College Human Ethics Advisory Network of the College of Design and Social Context, RMIT University (2024-24765-25616).

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: The data presented in this study are available on request from the corresponding author in line with human ethics approval obtained for the study.

Acknowledgments: The author would like to acknowledge funding received from RMIT University's School of Property, Construction and Project Management, Alston Furtado for research assistance and Prof. Usha Iyer Raniga for mentoring and feedback during the project. During the preparation of this manuscript, the author used RMIT University's Val for the purposes of refining writing and sentence flow. The author has reviewed and edited the output and takes full responsibility for the content of this publication.

 doi:10.20944/preprints202602.1179.v1

Conflicts of Interest: The authors declare no conflicts of interest. The funders had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript; or in the decision to publish the results.

Abbreviations

The following abbreviations are used in this manuscript:

CE Circular Economy

References

1. Fankhauser, S., et al., The meaning of net zero and how to get it right. Nature climate change, 2022. 12(1): p. 15-21.
2. The Treasury, Future Made in Australia: National Interest Framework, T. Treasury, Editor. 2024, Australian Government.
3. King, S. and N.J. Boxall, Lithium battery recycling in Australia: defining the status and identifying opportunities for the development of a new industry. Journal of cleaner production, 2019. 215: p. 1279-1287.
4. Nobre, G.C. and E. Tavares, The quest for a circular economy final definition: A scientific perspective. Journal of Cleaner Production, 2021. 314: p. 127973.
5. Ho, O.T.-K., A. Gajanayake, and U. Iyer-Raniga, Transitioning to a state-wide circular economy: Major stakeholder interviews. Resources, Conservation & Recycling Advances, 2023. 19: p. 200163.
6. Potting, J., et al., Circular economy: measuring innovation in the product chain. Planbureau voor de Leefomgeving, 2017(2544).
7. Gajanayake, A. and U. Iyer-Raniga, If there is waste, there is a system: Understanding Victoria's circular economy transition from a systems thinking perspective. Ecological Economics, 2025. 227: p. 108395.
8. Furtado, A., et al., Investigating context-specific factors for the development of circular business models for end-of-life electric vehicle lithium batteries in Australia. Journal of Cleaner Production, 2024. 481: p. 144037.
9. Iyer-Raniga, U., A. Gajanayake, and O.T.-K. Ho, The transition to a circular built environment in Australia: an analysis of the jurisdictional policy framework. Environmental Policy and Law, 2023. 53(4): p. 233-246.
10. DCCEEW, Circular Economy Ministerial Advisory Group: Final report, E. Department of Climate Change, the Environment and Water, Editor. 2024, Commonwealth of Australia: John Gorton Building, Parkes ACT 2600.
11. Gajanayake, A., A. Furtado, and U. Iyer-Raniga, Understanding the Circular Economy Implications of Net Zero Policies in the Built Environment, in 47th Australasian Universities Building Education Association (AUBEA2024). 2024: Melbourne, Victoria.
12. Hertwich, E., Resource efficiency and climate change: Material efficiency strategies for a low-carbon future. 2020.
13. Lu, Y. and H. Schandl, Do sectoral material efficiency improvements add up to greenhouse gas emissions reduction on an economy-wide level? Journal of Industrial Ecology, 2021. 25(2): p. 523-536.
14. Plank, B., N. Eisenmenger, and A. Schaffartzik, Do material efficiency improvements backfire?: Insights from an index decomposition analysis about the link between CO2 emissions and material use for Austria. Journal of Industrial Ecology, 2021. 25(2): p. 511-522.
15. Vélez-Henao, J.A. and S. Pauliuk, Pathways to a net zero building sector in Colombia: Insights from a circular economy perspective. Resources, Conservation and Recycling, 2025. 212: p. 107971.
16. Haas, W., et al., How decarbonization and the circular economy interact: Benefits and trade-offs in the case of the buildings, transport, and electricity sectors in Austria. Journal of Industrial Ecology, 2024.
17. Kurniawan, T.A., et al., Unlocking synergies between waste management and climate change mitigation to accelerate decarbonization through circular-economy digitalization in Indonesia. Sustainable Production and Consumption, 2024. 46: p. 522-542.
18. Arsic, M., et al., Beyond waste-to-energy: bioenergy can drive sustainable Australian agriculture by integrating circular economy with net zero ambitions. Detritus, 2023(23): p. 28.

 doi:10.20944/preprints202602.1179.v1

19. Khalifa, A.A., et al., Accelerating the transition to a circular economy for net-zero emissions by 2050: a systematic review. Sustainability, 2022. 14(18): p. 11656.
20. Bonsu, N.O., Towards a circular and low-carbon economy: Insights from the transitioning to electric vehicles and net zero economy. Journal of Cleaner Production, 2020. 256: p. 120659.
21. Kumar, R., S. Gupta, and U. Ur Rehman, Circular economy a footstep toward net zero manufacturing: critical success factors analysis with case illustration. Sustainability, 2023. 15(20): p. 15071.
22. Mulvaney, D., et al., Progress towards a circular economy in materials to decarbonize electricity and mobility. Renewable and Sustainable Energy Reviews, 2021. 137: p. 110604.
23. Mutezo, G. and J. Mulopo, A review of Africa's transition from fossil fuels to renewable energy using circular economy principles. Renewable and Sustainable Energy Reviews, 2021. 137: p. 110609.
24. Lu, Y., et al., China's pathway towards a net zero and circular economy: A model-based scenario analysis. Resources, Conservation and Recycling, 2024. 204: p. 107514.
25. Henderson, P. The circular economy: a missing piece in city climate action plans? 2023.
26. Malcolm, Z., B. Macaulay, and M. Todd, Towards a circular economy and just transition to net-zero in rural Scotland: Resident perspectives on policy and practice. Journal of Rural Studies, 2024. 108: p. 103300.
27. Govindan, K., How digitalization transforms the traditional circular economy to a smart circular economy for achieving SDGs and net zero. Transportation Research Part E: Logistics and Transportation Review, 2023. 177: p. 103147.
28. Singh, J., et al., Drivers, barriers and practices of net zero economy: An exploratory knowledge based supply chain multi-stakeholder perspective framework. Operations management research, 2023. 16(3): p. 1059-1090.
29. Dove, G., et al., Grouping notes through nodes: The functions of post-it notes in design team cognition. Design Studies, 2018. 57: p. 112-134.
30. Clulow, Z., et al., Comparing public attitudes towards energy technologies in Australia and the UK: The role of political ideology. Global Environmental Change, 2021. 70: p. 102327.
31. McNolty, C., et al., Climate change reporting in the Australian media. Available at SSRN 4851963, 2024.
32. Ruff, T., Nuclear promises. Arena Magazine, 2019. 162: p. 19-22.
33. Ellen Macarthur Foundation. What is a circular economy? 2025; Available from: https://www.ellenmacarthurfoundation.org/topics/circular-economy-introduction/overview.
34. Meadows, D., Thinking in systems: A primer. 2008: chelsea green publishing.
35. Moglia, M., J. Hopkins, and A. Bardoel, Telework, hybrid work and the United Nation's Sustainable Development Goals: Towards policy coherence. Sustainability, 2021. 13(16): p. 9222.
36. Marini, M., et al., To what extent are circular economy strategies accounted in science-based targets for carbon emission reduction? Computers & Industrial Engineering, 2024. 197: p. 110594.
37. Dinesh, L.P., A. Gajanayake, and U. Iyer-Raniga, An exploration of drivers for small businesses to implement environmental actions in Victoria, Australia. Business Strategy & Development, 2024. 7(2): p. e361.
38. Tian, J., et al., Is renewable energy sustainable? Potential relationships between renewable energy production and the Sustainable Development Goals. npj Climate Action, 2024. 3(1): p. 35.
39. Næss, P., The dangerous climate of disciplinary tunnel vision, in Interdisciplinarity and climate change. 2010, Routledge. p. 68-98.
40. Eltham, B., National accounts: The whiff of corruption. Meanjin, 2022. 81(2): p. 1-7.