

31 October 2024

Productivity Commission  
Level 8, Two Melbourne Quarter  
697 Collins Street  
Docklands Vic 3008, Australia

Dear Productivity Commission,

## Opportunities in the circular economy inquiry

Infrastructure Victoria is pleased to provide a submission to the Productivity Commission regarding opportunities in the circular economy.

Infrastructure Victoria is an independent advisory body established by the *Infrastructure Victoria Act 2015*, and is responsible for:

- preparing a 30-year infrastructure strategy for Victoria, which we review and update every 3 to 5 years
- advising the Victorian Government on specific infrastructure matters, and
- publishing research on infrastructure-related issues.

Infrastructure Victoria focuses on infrastructure policies, reforms and projects that address the economic, social, and environmental needs of all Victorians. Our evidence-based policy research and advice is also relevant to this inquiry.

A circular economy has both economic and environmental benefits.<sup>1</sup> Reducing waste, reusing materials and recycling resources conserves valuable virgin materials, increases economic productivity, and reduces pollution and greenhouse gas emissions.<sup>2</sup>

Infrastructure Victoria has completed research regarding the circular economy in our [Advice on recycling and resource recovery infrastructure](#). This submission uses this information along with its technical reports and other evidence base. We then provide a specific response to the four information request areas. In this submission, we highlight some significant findings that might be relevant at a national level.

Infrastructure Victoria also made recommendations to help achieve a more circular economy in [Victoria's Infrastructure Strategy 2021–2051](#). In [Opportunities to reduce greenhouse gas emissions of infrastructure: Advice to the Victorian Government](#) we made recommendations to reduce the carbon emissions associated with constructing infrastructure. This advice also found that using recycled materials can help reduce carbon emissions. In [Towards 2050: Gas infrastructure in a net zero emissions economy](#) we observed that biogas is a possible substitute for fossil gas in some circumstances. Biogas can be produced by waste and water processing facilities.

## Achieving a circular economy

In early 2020, the Victorian Government publicly committed to transitioning to a circular economy in its new policy framework *Recycling Victoria: A new economy*.<sup>3</sup> Victoria has made some progress towards a circular economy. It reformed kerbside waste collection, which standardised household waste collection into recyclables, general waste, glass and organics.<sup>4</sup>

Victoria also introduced a container deposit scheme to improve the way the waste industry collects applicable containers.

*Recycling Victoria: a new economy* includes the following targets:

- Divert 80% of waste from landfill by 2030, with an interim target of 72% by 2025.
- Halve the volume of organic material going to landfill between 2020 and 2030, with an interim target of 20% reduction by 2030.
- 100% of households have access to a separate food and organics recovery service or local composting by 2030.<sup>5</sup>

Victoria's recycling rates remain stubbornly low. For example, during 2021-22, Victorians only recycled 47% of organics. The next year, this only improved marginally, by 2%.<sup>6</sup> Similarly, in 2021-22, Victorians recycled 23% of plastics. This fell by 2% the following year, and the rest were sent landfill.<sup>7</sup>

Victoria agreed to a target to divert 72% of waste from landfill by 2025, and 80% by 2030, through the *National Waste Policy Action Plan*.<sup>8</sup> It must still make substantial improvements to reach these targets. For example, Victoria will need to substantially improve to divert half of organic waste materials from landfill. Many of Victoria's larger scale organics facilities are 'open windrow'. This means they are composted in the open air and can release pungent odours and volatiles into the environment. This can be incompatible with other sensitive land uses including for homes, schools, childcare, medical centres and aged care facilities.<sup>9</sup> Organics facilities require substantial buffer zones around them, and therefore finding new sites, or expanding existing sites, can be difficult.

Re-using, recycling, recovering energy and disposing of waste all incur economic and environmental costs. The most cost-effective way to manage waste is to create less in the first place. This is particularly true for plastics. Plastics are often low value and difficult to recycle. This can make them unviable for higher order processing in many instances.<sup>10</sup>

## Infrastructure Victoria's research regarding the circular economy

### Advice on Recycling and resource recovery infrastructure

In April 2020, we delivered our advice to the Victorian Government on the infrastructure required for, and the role of government in, supporting a more sustainable resource recovery and recycling sector. In this advice we considered some challenges of recycling in Victoria, including ways to boost resource recovery rates and promote use of recycled material.

We found that recovering and re-using resources is more productive and higher value than disposing them. Some major findings include:

- The priority materials for the recycling and resource recovery sector to manage are plastic, paper and cardboard, organics, e-waste, glass, tyres.

- If Victoria could substantially lift recycling rates for these materials, it could recycle up to 90% of its waste.
- This could also employ over 5,000 people by 2039, and many of those workers would be employed in regional Victoria.
- We found that 9.2 workers are employed to recycle every 10,000 tonnes of waste, compared to only 2.8 workers if waste is disposed in landfill.
- Demand has not always matched the supply of recycled materials, which means stimulating demand might induce greater recycling.<sup>11</sup>

## Victoria's infrastructure strategy 2021-2051

Our 2021 infrastructure strategy included 4 recommendations on increasing recycling and achieving a circular economy. They are:

- Recommendation 28: Facilitate improved recycling infrastructure for priority materials

In the next year, focus efforts to increase and upgrade waste processing infrastructure on six priority materials. Facilitate increased recovery and reprocessing capacity and capability for paper and card, plastics, and organics by 2025. Revisit funding mechanisms and align recycling infrastructure with land use settings.

- Recommendation 29: Strengthen end markets for recycled materials

Continue to deliver market development for recycled materials by updating standards and specifications to be performance-based rather than material-based, and explicitly require the Victorian public sector to use recycled products where feasible. In the next five years, support research, development and demonstrations to build confidence and demand for recycled products.

- Recommendation 30: Address barriers to recycling and reducing waste

In the next year, reduce recyclable material contamination by supporting greater consistency in kerbside and commercial collection and separation of glass, paper, cardboard and organic materials. In the next year, design and implement behaviour change programs to reduce contamination, and consistently maintain further behaviour change programs in the next 30 years.

- Recommendation 31: Minimise waste and improve residual waste infrastructure planning.<sup>12</sup>

In the next two years, improve infrastructure planning for managing residual waste, and further clarify the role of waste-to-energy facilities. Over the next 30 years, consistently invest in waste avoidance through behaviour change programs, pricing, regulation and other incentives.

Some progress has been made to implement these recommendations. But governments will need to take further action to implement them in full.

## Opportunities to reduce greenhouse gas emissions of infrastructure: advice to the Victorian Government

In this advice, we researched different opportunities to decarbonise infrastructure. We found that using recycled materials can reduce demand for new materials and avoid the associated carbon emissions from extracting and processing them. For example, we found that crushed recycled

concrete recovered from demolition sites produces 65% fewer embodied carbon emissions than quarried materials.<sup>13</sup>

Our research estimated that, based on current technology and standards, about 27% of conventional road construction materials can be replaced with recycled alternatives.<sup>14</sup> We estimate that this could increase to between 43% and 59% using technological advancements and by updating the standards for road materials and road construction methods. Similarly, the National Transport Research Organisation found that most recycled material applications in road and rail infrastructure have significant environmental benefits. Most applications reduced greenhouse gas emissions by between 47% and 98%.<sup>15</sup>

Victoria's *Recycled First Policy* has increased the use of recycled content in Victorian government construction projects. This policy requires bidders on transport projects to optimise their use of reused and recycled materials.<sup>16</sup> This has meant Victoria's 'Big Build' transport infrastructure projects have used more recycled materials.<sup>17</sup> But this process requires that specifications and standards on how to use recycled content are available to contractors.<sup>18</sup>

Our advice recommended that creating more certification standards on the use of recycled content, and platforms for developing those standards, can increase the use of recycled materials in infrastructure projects. It can also help provide more information and certainty about the quality of recycled products and an indicator of quality.<sup>19</sup>

## Towards 2050: Gas infrastructure in a net zero emissions economy

Producing biogas can help reduce the amount of waste buried in landfill, if that waste cannot otherwise be reduced, reused or recycled. Our research found producing biogas can reduce emissions in many sectors – including energy, waste, water and agriculture. But we observe that producers would also need to manage and account for the fugitive methane emissions released by biogas.<sup>20</sup>

For this advice, we prepared scenario modelling. It showed using bioenergy to generate electricity can avoid around 11 million tonnes of carbon dioxide equivalent emissions each year. But several barriers inhibit developing bioenergy at a larger scale, which include:

- Projects typically have higher capital and operating costs compared to natural gas.<sup>21</sup> They can be challenging to coordinate and attract investment because of the multiple parties involved in both feedstock supply and biogas use.
- Under carbon accounting rules, facilities that receive waste or recover materials record the associated emissions, rather than the waste producers. This can make waste facilities look like net emissions producers, even if they reduce total emissions compared with alternatives. This is especially the case if the timing of benefits from offsets do not align with accounting for the costs of emissions production.
- Government funding could help overcome some cost barriers. But grants programs for waste to energy typically require a connection to the electricity grid (for instance the Victorian Government's Energy Innovation Fund).<sup>22</sup> Some biogas and biomethane projects might be more suitable for generating electricity for use at an individual industrial site.
- The Victorian Government has set limits on amount of residual waste that thermal waste-to-energy facilities can use,<sup>23</sup> which can constrain the market potential for bioenergy.
- Current regulations classify anaerobic digestate as a reportable priority waste.<sup>24</sup> This creates extra obligations on producers and means they cannot reuse waste as fertiliser or upgrade their facility to produce biochar (charcoal produced from biomass). Biochar can also store carbon.<sup>25</sup>

## Land use planning to support a circular economy

Land use planning can help facilitate a more circular economy. A circular economy typically encourages local supply chains and access to sustainable materials.<sup>26</sup> Governments can plan for enough available and suitable sites that having the appropriate zones and buffers for recycling and waste management facilities. Planning must factor in the flow of different materials between councils as well as their individual capacity needs to ensure they have adequate access to waste and recycling infrastructure. Leaving this up to the market has sometimes led to poor community outcomes for Victoria in the past.<sup>27</sup>

Waste management companies can have difficulty finding suitable locations for waste and recycling facilities. The sites are typically on land zoned for industrial uses. They must accord with Environment Protection Authority regulations, and be located away from sensitive uses, such as homes, schools and hospitals.<sup>28</sup> But if they are too far away from waste sources, the cost of transporting waste can make them expensive to run.<sup>29</sup>

Governments can identify suitable places for new waste and recycling facilities in Melbourne and regional Victoria. They can co-locate this infrastructure near other industrial land uses and use existing planning buffers to protect residential and other sensitive areas. This can facilitate industrial synergies. But without the right zoning and buffers in place, on sites near major transport routes, waste companies might hesitate to invest in building new facilities.<sup>30</sup>

## Information requests

The following items respond to the commission's information requests.

### Information request 1 – Circular economy success stories and measures of success

Some other Victorian case studies that aim to facilitate a circular economy include the following:

- Eaglehawk landfill site City of Greater Bendigo<sup>31</sup>
- Ballarat West employment Precinct<sup>32</sup>
- Kensington's Circular Economy Precinct.<sup>33</sup>

### Information request 2 – Priority opportunities to progress the circular economy

#### Greater circularity for specific materials

Our recycling advice highlighted an opportunity to divert more organic waste from landfills. During 2022-23, only 49% of organics were recovered, and the rest was sent to landfill. Recycling Victoria's *Circular Economy Market Report 2024* proposed that the following materials needed more recycling facilities:

- Aggregates masonry and soils
- Organics
- Soft plastics
- Paper and cardboard

- Tyres (rubber)
- E-waste (batteries, solar panels and wind turbines)
- Textiles (clothing).<sup>34</sup>

### Increase e-waste recycling

E-waste is the fastest growing stream globally.<sup>35</sup> Victoria's transition to renewable energy will generate more e-waste from used batteries, solar panels and wind turbines.<sup>36</sup> We understand that the Australian Government is developing a mandatory product stewardship scheme to reduce the amount of e-waste going to landfill.<sup>37</sup> For example, currently only the aluminium and junction box of solar panels are recycled, but the glass and silicon is not. This means only 17% of end-of-life solar panels are recycled.<sup>38</sup> Government and industry can invest in research to find cost-effective ways to recycle these materials, and in facilities to do so.

### Managing plastics

Australia and the European Union (EU) have banned many single-use plastics since 2021.<sup>39</sup> In 2020, the EU introduced a new 'plastic tax' on non-recycled plastic packaging waste. It aims to reduce plastics waste from entering the waste system. Each EU country implements the tax using domestic laws and regulations. For example, the UK's *Plastic Packaging Tax (General) Regulations 2022* came into force in April 2022. Spain and Italy have had a new plastics tax since January 2023.<sup>40</sup>

New research from the Australian Institute estimates that a European-style tax on plastic packaging could raise nearly \$1.5 billion a year.<sup>41</sup> The EU expects their tax to generate about €7 billion each year. Spain collects the charges from plastic producers and importers. If Australia applied a similar tax at the same rate, it could raise significant revenue.

### Support market development

Our advice recommended that governments can use multiple approaches to develop end markets for recycled materials. Interventions should be applied first to priority materials: glass, organics, plastics, paper and card, e-waste and tyres.

Our recommendations included:

- Support research and development in the use of recycled materials and products and conduct targeted research and demonstration activities for each priority material.
- Build on efforts to update standards and specifications more quickly to enable greater use of recycled materials.
- Performance-based specifications are less prescriptive when it comes to how materials are made, and the processing required to meet infrastructure performance criteria.
- Provide information and guidance to increase confidence in the use of recycled products.
- Procurement objectives can be tailored to prioritise more sustainable circular economy outcomes.
- The Victorian government can collaborate with federal officials to investigate the costs and benefits of taxes, levies and other incentives to increase competitiveness of recycled materials relative to virgin materials.<sup>42</sup>

### Extended producer responsibility

Many experts recommend 'extended producer responsibility' (EPR) to prompt producers to better manage their waste, such as by reducing packaging.<sup>43</sup> When designing their products and packaging,



this responsibility encourages producers to account for environmental impacts and recycling opportunities.<sup>44</sup>

As long as the costs of recovering materials is higher than price of recycled materials, EPR schemes can be a useful source of supplementary funding for recycling. They particularly assist in recycling materials that are currently difficult to recover for re-use in packaging, such as plastics.<sup>45</sup>

Also, product stewardship and EPR measures can facilitate the shared responsibility of manufacturers, retailers and consumers for the impact of products on the environment, public safety and human health.<sup>46</sup> Our recycling advice indicated that the most successful international examples of product stewardship are mandated.<sup>47</sup> Australia only has a few mandatory recycling schemes, and only for hazardous waste (such as used oil).<sup>48</sup>

In our recycling advice we recommended that Victorian Government:

- Collaborate with the Australian Government and the electronics industry to increase the scope of e-waste product stewardship covering a wider range of e-waste types, where justified based on the material value and environmental risks they present.
- Work with the Australian Government and industry groups to further develop product stewardship schemes under the *Product Stewardship Act 2011*, assessing the merits of voluntary, co-regulatory or mandatory schemes.
- Work with the Australian Government and industry groups to consider the key elements of successful international product stewardship schemes and their suitability in Australia. Key elements include: levies and deposit refunds, take-back requirements, advance disposal or recycling fees, product labelling requirements, product design and repair requirements, recycled content targets, and resource recovery rate targets.
- Work with the Australian Government to fast-track and prioritise the development of a national product stewardship approach for photovoltaic systems in the short-term.
- Work with the Battery Stewardship Council to include electric vehicle batteries, addressing the risks set out in Infrastructure Victoria's Advice on Automated and Zero Emissions Vehicles.<sup>49</sup>

### Information request 3 – Hurdles and barriers to a circular economy

Our research identified some of the main barriers to recycling. These are:

#### Contamination and a lack of understanding about correct recycling practices (waste and recycling education):

Our research found that many organisations and stakeholders do not agree upon, advise, or use the most appropriate waste management and recycling programs. This is particularly true for emerging streams like e-waste and organics.

Governments can reduce this barrier by introducing ongoing statewide and locally tailored education and behaviour change programs. Programs can disseminate the best recycling methods and help encourage people to reduce contamination in different waste streams. They can also introduce waste minimisation initiatives. For example, Sustainability Victoria conducted education and behaviour change research in 2021. The research indicated that 83% of people surveyed did not have access to or had never used a soft plastics return point, and 75% of people indicated that they did not have access to or had never used a council refuse station to dispose of e-waste. The research also indicated that 88% of people claimed they did not have access to or had never used e-waste drop off points, like Officeworks or IKEA.<sup>50</sup> Managing and transporting e-waste also presents a fire risk.

### Weak end markets

The extent of material collection, and the investment in materials processing sites, has historically been higher than the demand from end markets.<sup>51</sup> If waste management companies do not have sufficient demand for their recycled materials, they can stockpile waste products, which can have detrimental environmental or economic consequences.<sup>52</sup> To earn a commercial return on recycling, waste management companies need viable end markets, especially for difficult-to-recycle materials like organics, rubber, soft plastics and e-waste. Developing stronger demand from end markets can also help to stimulate more recycling of materials that have high overall volumes, like aggregates and masonry.<sup>53</sup>

### Lack of certainty for Waste to Energy proposals

Recycling and recovering materials more effectively achieves a circular economy. But when these approaches are impossible, using waste to generate energy extracts more value than disposing it in landfill. During our research, stakeholders identified practical barriers to establishing waste-to-energy infrastructure in Victoria. These include:

- the lack of policy clarity around the waste-to-energy framework in Victoria,
- the lack of an end market for residual waste to energy by products, and
- the role of the landfill levy in influencing the competitiveness of waste-to-energy.<sup>54</sup>

The price of alternative waste management solutions affects the competitiveness of waste-to-energy facilities. For example, the cost of landfill. The Victorian Government charges a levy on waste disposed in landfills. Increasing this levy, and making landfill disposal more expensive, can make it more cost-effective for waste producers to pay to send their waste to a waste-to-energy facility instead.<sup>55</sup> The Victorian Government has recently undertaken public consultation on the *Waste to Energy Regulatory Impact statement* for Victoria that provides more clarity on the waste to energy cap and cap licensing.<sup>56</sup>

### Difficulties in recycling from multi-unit developments

Recycling systems in multi-unit developments can be more complicated than the waste collection arrangements for detached dwellings.<sup>57</sup> Space for storage and collection of materials is often limited or hard to access.<sup>58</sup> For example, the City of Melbourne has a high concentration of high-rise residential buildings, restaurants and cafes. City of Melbourne residents recycle only 25% of their waste, which is below the Victorian average of 45%.<sup>59</sup> This reflects the higher barriers and lower rates of recycling in multi-unit developments. Especially in older buildings, some have minimal recycling practices and certainly do not plan for waste streams like organics and e-waste.

### Inefficient transport of materials

The further waste producers must transport materials, the greater the cost to recycle them.<sup>60</sup> Efficient transport of waste and materials can help improve the viability of recycling facilities, and consequently, recycling rates. Processing facilities located close to the source of the waste are more cost-effective to recycle.

E-waste materials can be a fire hazard, including lithium-ion batteries. This creates extra logistics and costs to manage and transport them.<sup>61</sup> Numerous recent fires indicate that better, safer management of e-waste can reduce the hazards to people and property.<sup>62 63</sup>



## Information request 4 – Government’s role in the circular economy

Our advice indicates that governments could have a greater role in the following areas:

- Provide greater clarity of roles and responsibilities of bodies involved in recycling and waste management.
- Fund education and behaviour change programs to provide more clarity on correct recycling processes, and
- Ensure land use planning aligns with waste and recycling planning to facilitate circular economy outcomes.<sup>64</sup>

Infrastructure Victoria would be happy to assist the commission with any further information. If you would like to discuss any of the information in Infrastructure Victoria’s submission, please contact Llewellyn Reynders, Director of Research and Policy

Your sincerely,

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