



Recycling and resource recovery infrastructure

Evidence base report
October 2019

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Aboriginal acknowledgment

Infrastructure Victoria acknowledges the traditional owners of country in Victoria and pays respect to their elders past and present, as well as elders of other Aboriginal communities. We recognise that the state's infrastructure is built on land that has been managed by Aboriginal people for millennia.

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1. Executive summary

Almost any time we consume something, it generates waste. Managing this waste is a global issue. A global shift in recycling and resource recovery policy means places all over the world are taking different approaches to minimising and recycling waste including infrastructure investment, regulation, pricing, or behavioural changes – in some cases a combination of all of these. Victoria has an opportunity to learn from the experience of other jurisdictions both internationally and in Australia, and significantly enhance the resilience and sustainability of our recycling and resource recovery sector.

Victoria's waste challenges are well known. The amount of waste generated in Victoria is increasing, there has been significant disruption to how our recycling is processed and we're missing opportunities to get more out of our recycling and organic waste. This disruption has prompted a thorough reassessment of how the industry operates to identify where improvements can be made. This has meant all hands on deck.

The Department of Environment, Land, Water and Planning's forthcoming Circular Economy Policy will set the overarching policy to reduce environmental impacts of production and consumption and get more out of our natural resources. Sustainability Victoria is continuing its role of supporting the industry through education and the Environment Protection Authority is working hard to regulate an industry that is in transition. We can also draw from the work of the Victorian Auditor General and the Victorian Parliamentary Inquiry into recycling and waste management.

Infrastructure Victoria's role has been to look at the sector through an infrastructure lens. We've examined how the industry as a whole has been operating, what has been working and what hasn't, and will advise how infrastructure and government action can create a better recycling sector.

In April 2020 we will deliver advice to government on the infrastructure required to improve the performance of Victoria's recycling and resource recovery sector. This evidence base report sets out our work and key findings to date.

We've examined the state of Victoria's waste sector, looked at what works across the country and around the world. We've undertaken technical analysis. We've consulted with state and local government, industry, business groups and the community to understand the barriers and opportunities of the sector, and region specific perspectives.

Our work shows there are good options available to create a strong, sustainable recycling and resource recovery industry. Overall, we've found that high-performing resource recovery sectors across the world have succeeded because of a proactive approach by government, with a clear strategic direction supported by a long-term commitment and investment. A range of policy approaches working in parallel over an extended period are key to improved performance.

It is too early for us to make detailed recommendations but our evidence to date shows strong potential for the implementation of a range of policy approaches that could work in Victoria.

Supporting our reprocessing sector is key. Our community research shows that nearly 90% of Victorians we surveyed are open to changing how they sort their waste. We should harness this willingness to change. Greater separation of waste in homes and businesses can reduce contamination and improve the quality of our recycling. Better education will be critical to achieving this.

Establishing viable end markets will be essential to get the most out of our recyclable glass, plastic and paper, and this should be a focus for future government policy and investment.

Food makes up around 35% of household waste going to landfill, creating environmental problems and wasting a chance to use this type of organic material. There are success stories across Victoria of the take up of food and garden organic collection. We could learn from these, promote food-waste reduction activities, and develop a consistent approach for the collection of organics to minimise this waste going into landfill.

Finally, the waste-to-energy sector is likely to have a place in Victoria, but is an industry in need of a clear policy to guide the types of infrastructure required and to provide certainty to investors.

There is no silver-bullet in improving Victoria's recycling and resource recovery. It is going to take a range of approaches, clear strategic targets, policy certainty and a united, persistent effort.

We are now seeking feedback on the options and issues set out in this report so that we can develop our final recommendations to government and ultimately help create a strong, sustainable recycling and resource recovery sector for Victoria.

2. Terms of reference

In April 2019 the Special Minister of State requested Infrastructure Victoria provide advice on the infrastructure required to improve the performance of Victoria's recycling and resource recovery sector

The Government requested advice on the infrastructure required and the role of Government to:

- Develop Victoria's re-processing sector for recycled material, particularly those that currently rely heavily on overseas markets such as plastics.
- Enable the use of products containing recycled materials in a variety of Victorian industries, such as manufacturing, construction and agriculture.
- Support a waste-to-energy sector that prioritises the extraction of recyclable material and recovers energy only from residual waste.
- Support high levels of resource recovery for organics, particularly food organics.

Infrastructure Victoria was asked to undertake comprehensive engagement with industry, the community, government, local government and other key stakeholders, drawn on international comparators and research, and develop its own modelling and analysis to inform the advice.

The advice was requested in two parts:

1. An interim report, within six months of the request, setting out key early findings, significant risks or opportunities, and the proposed strategic direction of the final advice.
2. A final report, supported by evidence and analysis, detailing potential infrastructure requirements for the recycling and resource recovery sector. The final advice will also give consideration to the regulatory, policy and market settings that underpin the recycling and resource recovery sector, and identify potential timing of infrastructure delivery.

The full terms of reference are on our website.

This evidence base report presents the evidence that will underpin our final advice and outlines the key early findings for the recycling and resource recovery sector in Victoria. Feedback on the evidence and analysis presented in this report will be considered before we provide our final advice to the Minister in April 2020.

2.1 Relationship to other Victorian Government work

There is considerable work already underway across Victoria in response to recent global developments in the waste and resource recovery sector, and the opportunities and challenges these have brought to the sector in Victoria. The Department of Environment, Land Water and Planning (DELWP), the Environment Protection Authority (EPA) the Waste and Resource Recovery Groups (WRRGs) and Sustainability Victoria (SV) together act as the core policy, regulatory, advisory, research and planning agencies in the waste and resource recovery sector in Victoria, as well as planning infrastructure investments on behalf of the Victorian Government.

The work of DELWP, the EPA and SV is complemented by a considerable body of global and local work on best-practice resource recovery and recycling. A review of the landfill levy is also underway to make sure it can achieve the Government's vision for the waste and resource recovery system. At the same time the Victorian Parliament is undertaking an inquiry into recycling and waste management. Our role is provide further analysis and advice to support work to enhance the sustainability and resilience of the recycling and resource recovery sector in Victoria now, and help Victoria's long-term transition toward a circular economy.

A note on terminology

The words 'recycling' and 'recovery' are often used interchangeably in different jurisdictions around the world when referring to recycling. In practice, however, they can have very different meanings. For the purposes of this advice we will be using the following definitions:

- **Recovery** is the process of recovering resource from waste for reuse or reprocessing. This includes collection, sorting and aggregation of materials
- **Recycling** is the process of converting waste into reusable material.

3. Our approach

3.1 Our methodology in brief

We have engaged extensively with stakeholders to build our understanding of the opportunities and challenges facing the recycling and resource recovery sector in Victoria. We have examined approaches in other jurisdictions, both internationally and interstate, and have investigated potential market design solutions, infrastructure gaps, and new pathways for recyclable materials.

The evidence we have gathered so far is presented in this report. We are inviting feedback in response to this evidence base and our analysis. All submissions received will be considered as we develop our final advice to the Victorian Government, which will be delivered in April 2020.

Our recommendations will reflect our assessment of international best practice for the role of government in the recycling and resource recovery sector, include the potential timing of infrastructure delivery and consider implications for regional Victoria.



3.1.1 Technical packages

Technical work was undertaken on priority issues and to fill gaps in the available information. The full versions of all of these reports are available on our website.

Inter-jurisdictional analysis

We commissioned an assessment of recycling and resource recovery practices, technologies and markets in other jurisdictions to understand the potential for the Victorian Government to adopt and adapt similar practices, technologies and associated policies. The full report is available on our website.

Sector mapping and market design

We worked with the Centre for Market Design at the University of Melbourne to undertake analysis of the Victorian recycling and resource recovery sector to identify major decision or transaction points in the cycle, those involved at each point, where markets are missing or failing and what the drivers of this are. We looked at the incentives influencing

each transaction, including the availability of information, the effect of regulatory settings and the role of price signals, and applied market design principles to identify potential approaches to build resilience in the sector in Victoria.

Materials flow analysis

This work presents a current benchmark of waste flows, material market values, value add opportunities and fates of materials in the Victorian waste and resource recovery sector. It identifies opportunities to increase recovery rates and improve material outcomes to realise a circular economy in Victoria. This analysis shows where materials could go if subject to improved processing or end market development.

Infrastructure analysis

The infrastructure analysis identifies and explores technologies and processes for waste and resource recovery. It considers the context for the planning, funding, construction and operation of the identified infrastructure under different policy and investment scenarios. This enables us to understand the potential for the Victorian Government to adopt specific approaches to resource recovery and recycling through policy, regulation, market design, support of new infrastructure proposals and/or the potential to attract new operators to Victoria to develop the market further.

Legislative and regulatory settings

We examined the legislative and regulatory settings in place in the sector as well as any existing plans or strategies that act as barriers or enablers to enhancing the sector in Victoria. The intention of this work was to understand the authorising environment that exists for waste and resource recovery, such as the barriers to using recycled materials in a range of applications and the regulatory requirements for resource recovery facilities (including planning and land use settings).

Community polling

Using a representative sample of 1,000 Victorian households, we undertook a quantitative online survey in July 2019 to better understand community attitudes and perceptions on recycling and resource recovery. The survey covered attitudes and perceptions towards waste sorting practices, people's willingness to change their behaviour and people's perception of product packaging.

3.1.2 Stakeholder consultation

Infrastructure Victoria is committed to meaningful consultation and creating recommendations through an open, evidence-based and transparent process. The consultation program for this advice includes two main phases.

The first phase of consultation ran from April to August 2019. During this time we met with and heard from more than 150 organisations and individuals from across the waste sector, business, industry and government who provided valuable input and helped us to refine the scope of our research and analysis.

Our engagement activities consisted of:

- online feedback/submissions collected via Infrastructure Victoria's consultation website from 23 May to 28 June
- an initial stakeholder workshop in Melbourne on 13 June
- a series of local government and industry workshops in Melbourne, Ballarat, Shepparton and Traralgon in August 2019
- one-on-one meetings with stakeholders.

A summary of outcomes from the first phase of consultation is available at our website.

The second phase of consultation to help inform our advice to government is to seek stakeholder views on the evidence presented in this evidence base report. We welcome responses from stakeholders to specific questions identified throughout this report and on any of the content in our technical reports. The final date for submissions is 6 December 2019.

For more information on our consultation program or to get involved, visit our website.

3.1.3 What's out of scope and why

The focus of the request for advice is for infrastructure to support recycling and resource recovery, and to improve the resilience of the resource recovery sector in Victoria. To deliver on these requirements, we will be focusing on elements of the waste hierarchy (see Figure 1) from avoidance through to recovery of energy. Issues relating to treatment, containment and disposal, including landfill and other waste disposal approaches, are not the focus of this advice.

Landfill is an important part of the Victorian waste management system, and is likely to continue to play a role for the foreseeable future. However a detailed examination on the role of landfills and infrastructure requirements for Victoria's landfill needs is out of scope.

4. Opportunities, challenges and risks – no time to waste

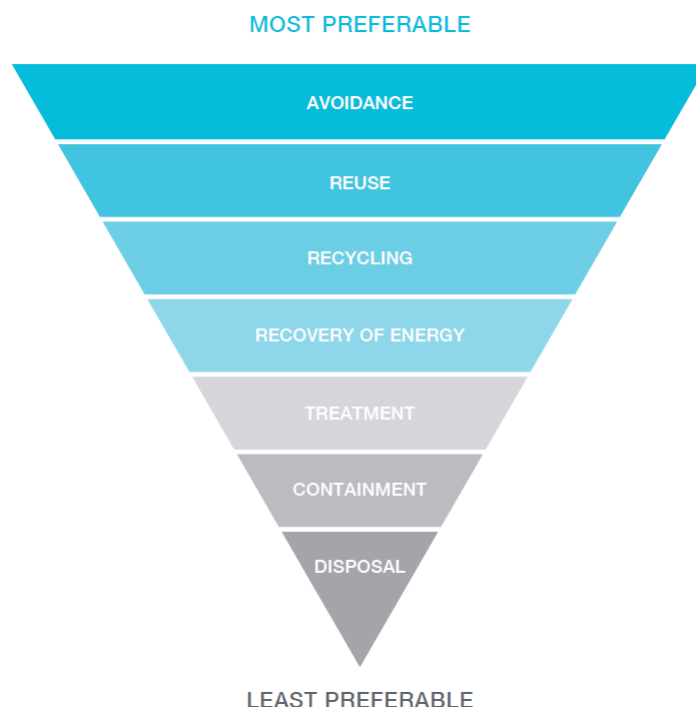
Waste has become a by-product of modern life. A growing population and increasing consumption means that the amount of waste we throw away is growing in line with our demand for goods and services.

Much of the waste Victorians throw away is disposed of in landfills. Landfills can pose risks to community health and safety associated with polluted water contaminating ground and surface water and producing methane, a flammable greenhouse gas with a global warming potency 25 times that of carbon dioxide.¹

In addition to being harmful to the environment when disposed of, many of the materials we currently throw away still have value. Rather than simply disposing of waste to landfill, where the value of the materials is lost and they can pose a risk to the environment and human health, governments have increasingly focussed on re-use, recycling and recovery to improve sustainability in resource use and reduce the environmental impacts of waste. Where these options are not possible, the energy from some of these materials can be recovered through waste-to-energy technologies, meaning only a relatively small amount of waste may need to go to landfill.

This shift is reflected in the principles identified in the waste hierarchy, which is enshrined in legislation in Victoria through the *Environment Protection Act 1970*.²

Figure 1: Waste hierarchy



¹ Department of Environment and Energy (2019) *National Greenhouse Accounts Factors August 2019*, available at <http://www.environment.gov.au/system/files/resources/cf13acc9-c660-445e-bd82-3490d74e9d09/files/national-greenhouse-accounts-factors-august-2019.pdf>

² *The Environment Protection Act* is anticipated to be replaced by the *Environment Protection Amendment Act 2018* on 1 July 2020.

The waste hierarchy identifies the preferred approaches to dealing with waste, with avoidance being the most preferable outcome. Reducing the amount of waste generated can deliver long-term benefits to human health and the environment by minimising the amount of potentially hazardous material that is disposed of in addition to promoting more sustainable use of resources.

The waste hierarchy is also reflected in a range of Victorian Government documents that aim to reduce reliance on landfills, and minimise the amount of waste going to landfill and waste management planning for Melbourne, which makes no provision for new landfills in the metropolitan area.^{3 4}

4.1 What's the problem?

Evidence from reports commissioned by Infrastructure Victoria and published by Sustainability Victoria (SV), the Australian Bureau of Statistics (ABS) and the Victorian Auditor General's Office (VAGO) shows that outcomes observed in the waste sector fall short of stated policy objectives to minimise waste disposal to landfill by encouraging the management of waste in accordance with the waste management hierarchy, promote waste reduction, resource recovery and resource efficiency, and minimise the impact on human health and the environment from waste generation and waste disposal.⁵

- **Total waste generation in Victoria has steadily increased over time.** Waste generation increased from 7.4 million tonnes in 2000, to 9.9 million tonnes in 2005 and to 13.4 million tonnes in 2017-18.⁶
- **While the rate of diversion from landfills appears to have improved over time, the ultimate fate of this waste is uncertain.** The diversion rate, or the rate at which waste is diverted from landfill for reuse or recycling, increased from 55% in 2005 to 65% in 2017-18⁷. However, data collected at present does not report on the movement of the materials that have been diverted from landfill, and there is uncertainty about the extent to which these materials are recycled. Concerns have been raised about the lack of data collected at present on other end-of-life fates (such as the nature and extent of stockpiles, permitted or otherwise, across the state).⁸ Further, recyclables are currently going to landfill, as there is insufficient local capacity to process them.
- **A significant proportion of waste was sent to landfill in 2017-18.** Around 35% of total waste generated, and more than half (63%) of all municipal solid waste (waste generated from households), was disposed to landfill in 2017-18.⁹
- **Some waste streams are still reliant on exports overseas.** Materials streams still reliant on overseas markets include paper/cardboard, metals, plastics, tyre and rubber, organics, glass and textiles.¹⁰ This is not a problem in and of itself if the market for these materials is operating effectively, but overseas markets for these materials are shrinking.
- **Waste stockpiling and illegal dumping have been identified as significant problems.** As mentioned above, data collected by SV at present does not report on the movement of the materials that have been diverted from landfill. However, VAGO has reported illegal dumping and stockpiling of waste, such as used tyres and hazardous wastes, to be a significant problem.¹¹ Work is underway across the Victorian Government to address this challenge.

The Victorian recycling industry is currently experiencing a period of volatility due to a range of market issues and import bans. Changes to recycling infrastructure, policy and market settings could improve industry resilience and realise local economic opportunities, including transition to a circular economy.

4.1.1 China National Sword unsheathed

Like many countries around the world, Victoria has been reliant on international markets for particular recovered material. In 2016/17, a significant amount of Victoria's waste export – nearly all plastic exports and 75% of paper and card – went to China until the introduction of *China National Sword*, which placed strict limits on the level of contamination of recovered materials China would accept.¹²

Prior to *China National Sword*, many MRFs were paying Victorian councils for recyclables, which subsidised the cost of collecting MSW. MRFs then sold these materials to China. After *China National Sword*, the global price for materials,

³ Metropolitan Waste and Resource Recovery Group (2016) *Metropolitan Waste and Resource Recovery Implementation Plan in 2016* available at <https://mwrrg.vic.gov.au/about-us/strategic-framework/the-metropolitan-waste-and-resource-recovery-implementation-plan/>

⁴ Sustainability Victoria (2018) *Statewide Waste and Resource Recovery Infrastructure Plan Victoria 2018*

⁵ *Environment Protection Amendment Act 2018* (Vic)

⁶ Blue Environment (2019) *Victorian Waste Flows*, report for Infrastructure Victoria

⁷ Blue Environment (2019) *Victorian Waste Flows*, report for Infrastructure Victoria

⁸ Victorian Auditor General's Office (2019) *Recovering and Reprocessing Resources from Waste*.

⁹ Blue Environment (2019) *Victorian Waste Flows*, report for Infrastructure Victoria

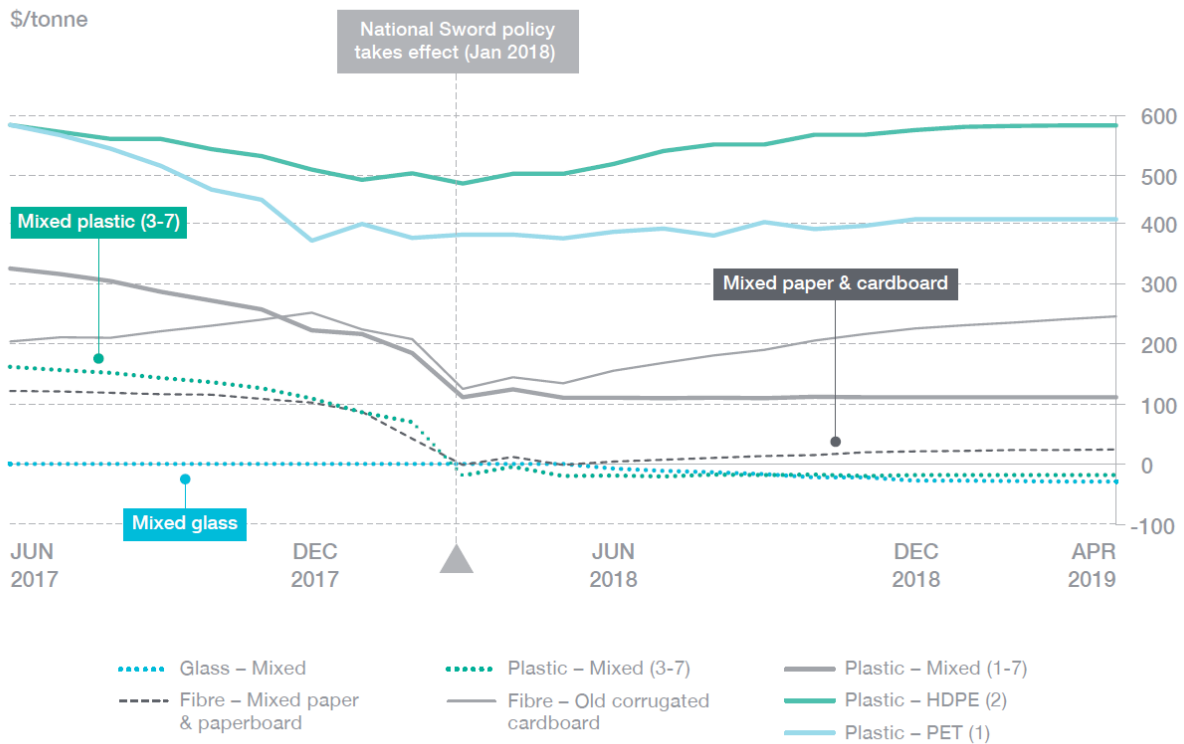
¹⁰ Sustainability Victoria (2018) *Statewide Waste and Resource Recovery Infrastructure Plan Victoria 2018*

¹¹ Victorian Auditor General's Office (2019) *Recovering and Reprocessing Resources from Waste*

¹² Victorian Auditor General's Office (2019) *Recovering and Reprocessing Resources from Waste*

particularly paper, card and plastics, plummeted, and Victorian operators scrambled to find new export destinations for these materials. This was repeated on a global scale, with developed economies looking to redirect collected recyclables to other waste markets throughout Asia. These countries then began to impose their own import restrictions. As Figure 2 shows, this drove the international price of materials down.

Figure 2: Recovered kerbside materials commodity values, 2017-19



Source: alphaBeta

Within weeks of the *China National Sword* policy coming into effect, major MRF operators sought to renegotiate contract pricing with local councils.

China National Sword shone a spotlight on the fact that a number of Victoria’s major MRF operators were operating as recovery businesses rather than actual recyclers. The practice of aggregating materials (to realise economies of scale for recovery) lead to increasing stockpiles of combustible materials that posed significant fire risks to the Victorian community as the market for these materials dried up. Of three major fires relating to the recycling and resource recovery sector in Victoria since 2017, two of these were related to stockpiling of recyclable waste.¹³

Although *China National Sword* has led to a number of challenges in the Victorian recycling and resource recovery sector, it also presents an opportunity for the recycling and resource recovery sector in Victoria. It can lead to the development of local markets for materials processing and re-use where they may not have been able to before because they could not compete on price with international markets.

4.2 Strategic direction

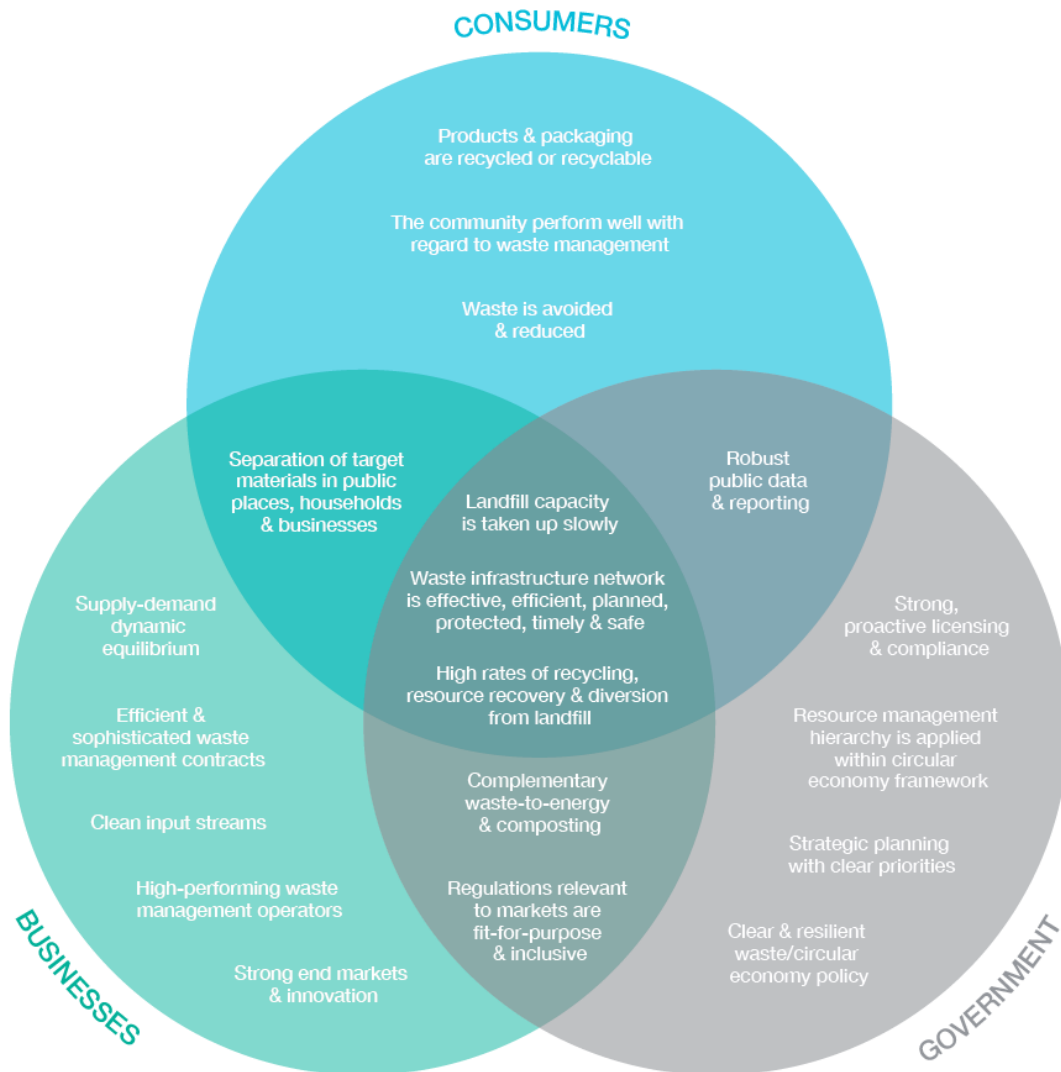
The overarching strategic objective for this advice is to reduce the amount of material going to landfill and increase the recovery and recycling rate of materials in Victoria. To achieve this objective, and respond to the challenges and opportunities in Victoria’s recycling and resource recovery sector it is important to know what success looks like. More importantly still, government, industry and the community need to understand and agree on this. There needs to be a shared vision on what the benefits of a sustainable and resilient resource recovery and recycling are. This will enable all the relevant players to work towards meeting these outcomes.

¹³ Parliament of Victoria Legislative Council (2019) *Environment and Planning Committee Inquiry into recycling and waste Management- interim report*

Based on the challenges and opportunities we have identified in the Victorian recycling and resource recovery sector, and what we heard from our extensive consultation with stakeholders across the State, we have developed a set of proposed outcomes for the sector, relevant to government, business and the community.

In the outcomes diagram (Figure 3) the location of a particular statement shows the group that the proposed outcome is most relevant to. For example, “The community perform well with regard to waste management” is most relevant to consumers while “Complementary waste-to-energy and composting” is most relevant to business and government (as it will be dependent on both policy and markets/investment).

Figure 3: Potential outcomes for the Victorian recycling and resource recovery sector



Once these outcomes are agreed, progress toward meeting them should be monitored and reported against by the Victorian Government. They should be regularly reviewed for relevance and updated as necessary. Where appropriate, quantitative measures and targets should be applied. For example, waste generation, community participation in recycling, and contamination rates could be used to measure “The community perform well with regard to waste management”.

We are intending to use these proposed outcomes to guide the development of recommendations in our final advice to the Government. We would appreciate feedback on these outcomes from the community and stakeholders. We will continue to refine these based on stakeholder feedback in the process of developing our final advice.

5. Key early findings – potential actions

Building on the proposed outcomes we presented in the previous section, we have identified a number of potential interventions for the sector. In this section, we have grouped these interventions in line with the priority areas as outlined in the terms of reference for this advice, specifically:

- Developing Victoria's re-processing sector for recycled material, particularly those that currently rely heavily on overseas markets such as plastics
- Enabling the use of products containing recycled materials in a variety of Victorian industries, such as manufacturing, construction and agriculture
- Supporting a waste-to-energy sector that prioritised the extraction of recyclable material and recovers energy only from residual waste
- Supporting high levels of resource recovery for organics, particularly food organics.

To achieve these four priorities, we have identified some key actions the Victorian Government could take to improve the sector-wide performance, based on both the examples from best practice jurisdictions around the world, and consistent feedback from stakeholders here in Victoria.

These actions will be subject to further refinement. For the final advice, we will be doing more technical analysis and consultation with stakeholders to develop a set of final recommendations for the Victorian Government. These recommendations will likely be a mix of both the interventions identified here (more fully developed) and newly identified recommendations arising from the further technical work and consultation process.

Consideration of waste infrastructure investment needs to be undertaken in the context of policy settings across the waste chain that drive behaviour change and support the development of end markets for recycled materials. It is important to note that government intervention can be costly and introduce its own distortions to the way markets operate. It should only be considered when the economic, social and environmental benefits are likely to be greater than the costs involved.

In the longer-term, minimising the amount of waste generated in Victoria is likely to be the single most important driver of a more resilient recycling and resource recovery sector. All of the proposed actions outlined below should be considered in that context.

5.1 Sector-wide improvements

There are some core actions that could have a lasting impact for the recycling and resource recovery sector in Victoria. These reflect what is considered best practice around the world, and common stakeholder feedback.

- An overarching policy framework for waste, recycling and resource recovery, supported by specific targets for recycling is the foundation of performance in high-performing jurisdictions. Traditionally, targets have been weight-based, seeking to recycle increasing proportions of waste. However, weight-based targets can create perverse incentives in the system, and international jurisdictions are starting to consider other approaches to recycling targets, such as for specific materials or based on greenhouse gas emissions reduction. Further analysis is required regarding the most appropriate approach to setting targets for Victoria.
- There is strong support for recovery and recycling by Victorians but some confusion as how to do it properly. A consistent and ongoing education campaign would be beneficial to increase recycling and organics diversion from landfill and avoid contamination.
- The success of a statewide education program will be heavily influenced by the level of consistency in waste collection processes across local authorities. This may be achieved by supporting councils to implement best-practice approaches to sorting and collections, such as SV's *Optimising Kerbside Collection Systems*, and strengthening existing guidance around consistent bins as outlined in the Metropolitan Waste and Resource Recovery Group's *Bin Standardisation Guide*.

- The Metropolitan and Industrial Landfill Levy settings should be reviewed to ensure that the levy is incentivising behaviour that is in line with the Victorian Government's objectives for the recycling and resource recovery sector, and/or not incentivising negative outcomes for the sector.

5.2 Supporting the reprocessing sector

Victoria's reprocessing sector is made up of private firms, mostly sorting and processing waste. The reprocessing sector is reliant on stable end markets for recycled products for its ongoing sustainability. Strengthening the end markets for materials and improving the quality of feedstock for processors has the potential to deliver significant benefits.

- Reducing the contamination of glass, paper and plastic streams can reduce the cost and complexity of processing. Cleaner material streams can improve the performance of MRFs and support the development of end markets for recycled materials.
- A container deposit scheme (CDS) is a common and popular approach to improving the recyclable quality of beverage packaging, such as glass and plastic. It leads to cleaner material streams and higher recovery rates, by diverting these materials out of co-mingled recycling. Our preliminary view is that a CDS has promise but needs more analysis on how best to design an optimal scheme for Victoria, along with potential changes to kerbside collections.
- Infrastructure investment or support should be focussed on the development of a few end markets for problematic materials that have opportunity for greater recycling volume and long-term uses as inputs to other products.
- The Government may choose to provide guidance on the types of infrastructure that align with its priorities, to provide clarity and certainty to the sector. Our final advice will provide information on the specific types of waste management and recycling infrastructure needed in each region, with prioritisation.
- Initiatives to disincentivise the use of virgin materials in production, or promote the procurement of products made from recycled materials, have the potential to support the reprocessing sector by creating a stronger end market for recycled materials.

5.3 Better enable use of products containing recycled materials

Enabling the use of products containing recycled materials supports the development of end markets, and can improve the sustainability and resilience of the entire sector. Regulatory and legislative settings can be both a barrier and an enabler to using recycled materials, and are prime opportunities for government influence. Victoria already performs well in this regard – VicRoads is a national leader in the use of recycled products in pavement construction – but that does not mean we can't do more.

- A regular review of design and building standards for roads and other infrastructure projects should help enable use of recycled materials where appropriate. This should be an ongoing process, with regular review of technologies and construction methods, including international best-practice, to determine if the current standards are fit for purpose or if they are acting as a barrier to innovation. For example, recycling by-products from waste-to-energy processes (such as incinerator ash) is common in Europe, but there is no clear pathway to do so in Victoria at the moment.
- Updating Australian, Victorian and local Government procurement guidelines to include sustainability and recycled content requirements needs to be prioritised and accelerated. The Government could also consider pre-approval or certification of recycled products for appropriate uses.

5.4 Provide clarity to the waste-to-energy sector

The waste hierarchy identifies recovery of energy as preferable to disposal or containment of waste, because it recovers some value from the waste, reduces greenhouse gas emissions from organic waste and lessens the legacy impacts of landfills. Waste-to-energy remains less desirable than waste reduction, re-use and recycling. As a result, there are some risks associated with pursuing waste-to-energy infrastructure while also seeking to transition to a circular economy. Waste avoidance and increased recycling of materials can reduce the amount of feedstock for waste-to-energy infrastructure, particularly thermal waste-to-energy plants. Over-investment in waste-to-energy infrastructure could be a disincentive to transitioning to a circular economy.

However, waste-to-energy can play a role over the next 20-30 years, as long as the waste hierarchy is pragmatically adhered to and waste avoidance, re-use and recycling remain the priority over recovery of energy.

- Clarity and stability around policy settings is an essential precondition for businesses to invest in infrastructure. Victoria does not currently have a clear policy direction on waste-to-energy. A waste-to-energy policy that is pragmatic, recognising that waste-to-energy is preferable to landfill, should be considered. Among other things, a clear policy approach would provide the necessary certainty to support local planning and environmental approvals for waste-to-energy plants.

- Landfill levy settings can impact the viability of some waste infrastructure, such as waste-to-energy. Reviewing the landfill levy rates could incentivise infrastructure further up the waste hierarchy.
- Providing guidance on the types of waste-to-energy infrastructure the Victorian Government would like to see in Victoria can ensure that the policy objectives of the Government are met, while still providing certainty to the private sector.

5.5 Support high levels of recovery for organics, particularly food organics

Increasing diversion from landfill of organics, especially food organics, is a big opportunity for Victoria. Bin audits conducted in Victoria have found that food makes up around 35% of the weight in household garbage bins going to landfill.¹⁴

- Separating organic material from residual waste is an essential element of improving recovery. A consistent approach to organics collection by local councils, such as 'kitchen caddies' and/or food and garden organics (FOGO) collection for both municipal solid waste (MSW) and commercial and industrial waste (C&I) supported by a statewide education campaign about organics recycling has the potential to lift recovery rates significantly.
- Increased separation and processing of organic materials would require supporting processing infrastructure to enable value added product and viable end market for organics. Current infrastructure is likely to be insufficient.
- Supporting processing infrastructure closer to the source of waste or end market for recycled materials is likely to be important, particularly for food organics. High transport costs are often cited as a barrier to greater recovery and recycling of organics.
- Product disclosure (such as standards, specifications and eco-labelling) for recycled organic materials can support a stronger end market for these materials. Consumers of recycled organics currently have limited information about the nutrient content and, therefore, true value of recycled organic material.
- Revisiting food safety standards to potentially enable the use of recycled organic material, such as compost or digestate from anaerobic digestion, in agricultural applications could provide an end market for these materials and encourage investment in the relevant infrastructure.

¹⁴ Sustainability Victoria (2013) *Victorian Statewide Garbage Bin Audits: Food, Household Chemicals and Recyclables 2013*

6. Our view on the opportunities and challenges in the sector

This section of the report provides an overview of our findings to date on the opportunities and risks facing the sector and the drivers of these.

6.1 Challenges and opportunities in Victoria

Understanding the role of government is one thing, but appropriately targeting government interventions is another. Through our analysis of the Victorian recycling and resource recovery sector and discussions with stakeholders from the sector, we have further developed our understanding of the opportunities and challenges specific to Victoria, which will help us develop specific recommendations in our final advice. Our findings so far are outlined below.

6.1.1 Uneconomical waste

Economic efficiency is a concept used to examine whether resources are employed in a way that maximizes welfare across the community. A process is 'efficient' if no changes can be made in either the resources used, the level of consumption, or the matching of individual producers and consumers that would lead to a higher level of community wellbeing.

Conversely, a 'market failure' is where markets do not achieve the best outcomes for the community, because the market is not allocating resources efficiently. The outcomes observed in the Victorian recycling and resource recovery sector fall short of a sector operating efficiently and are reflective of market failures.

We worked with the Centre for Market Design (CMD) at the University of Melbourne to identify the market failures, economic inefficiencies or 'complexities' that are contributing to the challenges in the recycling and resource recovery sector in Victoria. We found the Victorian recycling and resource recovery sector is highly decentralised. In other words, the activities and decisions that determine the amount and type of waste materials that are produced, consumed, sorted, collected, recycled and disposed are made by multiple individual, businesses or governments. Many of these activities or decisions are delegated to the private sector because it has the skills, information and specialised capital needed to provide waste services at low cost.¹⁵

In a decentralised sector such as this, market failures can contribute to a situation where the actual outcomes seen in the sector may not align with public policy objectives because the motivations of businesses and households do not align with those of government. This is because each individual makes the correct decision for themselves, but those may be the wrong decisions for the group. For example, businesses do not currently face the full cost of the materials they use in production, or of waste created by packaging and product obsolescence, which can hinder the use of recycled materials in production and lead to over-production of waste. Households do not face all the costs of their waste consumption, sorting and disposal, which can lead to over-consumption and contamination of material streams. This, in turn, can lower the market value of materials streams further down the waste lifecycle and deter investment in re-processing and recycling infrastructure.

At the same time, there are significant market power challenges in Victoria, particularly in the processing sector for MSW. Victoria's reliance on a relatively small number of MRFs to date has implications for the resilience of the materials

¹⁵ Centre for Market Design (2019) *Opportunities to improve infrastructure investment in the Victorian waste economy*, report for Infrastructure Victoria

processing sector, creating problems if one player exits the industry. This lack of competition has also likely stifled innovation and investment in true recycling over materials sorting, further contributing to the lack of resilience and ability to respond to changing conditions in the global market for recovered materials.

A full discussion of the complexities in the Victorian recycling and resource recovery sector can be found in CMD's report on our website.

6.1.2 Co-mingled messages

Recycling services differ across Victoria's 79 local councils. Processors have different standards for materials, resulting in councils accepting different materials in recycling collections. There are also multiple approaches to organics collection, including combining food and garden organics in some councils, while bin lid colours differ in colour and meaning across council areas. Differences between council approaches can lead to confusion and contamination of material streams. In some councils, there is no separate organics collection at all, representing a significant missed opportunity.

A common theme in our stakeholder feedback is that these differences are acting as a handbrake on Victoria improving its performance in recycling and resource recovery, because it is difficult to provide a consistent message to the community on what can and cannot be recycled. These points were also supported by the recent VAGO report *Recovering and Reprocessing Resources from Waste*.

Jurisdictions that have high rates of resource recovery from MSW tend to have a more consistent approach to sorting and collection, supported by ongoing education programs. Wales is an example of this, where the Collections Blueprint promotes consistency in collections approaches across local authorities supported by community education and engagement programs that are led by local authorities but supported by a national agency.

What does the community think about recycling?

We surveyed 1,000 Victorians to understand their attitudes and perceptions of how they sort their waste at home, and their willingness to change their behaviour. We found the majority of Victorians feel it is important to reduce landfill waste (93%), and they consistently recycle when provided with a kerbside recycling bin (85%).

Mistrust in the system acts as a barrier to people recycling, with some people thinking their recycling goes to landfill anyway (25%). People also cite confusion around what can go in the recycling bin as another main barrier. Excess product packaging is increasingly a frustration for Victorians, with the majority of people trying to buy products with recycled packaging or without excess packaging.

Overall, people are willing to change the way their households sort their waste, and showed theoretical support for more significant policy changes such as bans on single use plastic items or recyclables being thrown into the general waste bin.

This research is a useful insight into Victorians' attitudes to some of the approaches taken by high-performing jurisdictions. At the same time, Victorians' generally positive attitude toward recycling presents an opportunity for the Victorian Government to take action to improve the resilience and sustainability of the recycling and resource recovery sector in Victoria and deliver better outcomes for Victorians. You can find the full results of this polling on our website.

6.1.3 Measure it, manage it

Waste data collection is a shared responsibility of SV, EPA, local councils and the waste and resource recovery groups. SV has overall responsibility for oversight, coordination and reporting of data. In its 2019 audit, VAGO highlighted a number of issues with the incompleteness and unreliability of current Victorian waste data, including its impact on the ability of DELWP and SV to interrogate the actual performance of the sector. Without a full understanding of how the recycling and resource recovery sector is performing, it is difficult to appropriately target a government response. Some issues that VAGO highlighted include:

- Lack of data collection regarding where recovered materials go and what the demand for recovered materials is.
- Data reported is largely based on estimates across the MSW, C&I and C&D streams, not actual data.
- Data collection methods are incomplete and potentially inaccurate.
- Data is subject to only limited quality assurance.

The availability (and use) of timely and accurate data will be a key element of improving Victoria's recycling and resource recovery performance. Better data collection can help monitor improvements in performance and identify problems sooner. For example, waste generators could be subject to mandatory reporting via a data portal through legislative or regulatory settings. Further data collection on the fate of waste that is currently diverted from landfill (to assess whether this is actually recycled, or reaches some other end-of-life fate) would help monitor outcomes in the Victorian recycling

and resource recovery sector. There may also be value in some further effort to validate data that is currently collected to confirm its accuracy.

A clearer understanding of the volume and flows of materials through the system will support both the Government and private sector to plan and invest in infrastructure to collect, sort, aggregate and process materials effectively and efficiently in a way that could, ultimately strengthen the end markets for these materials and lead to greater recycling and re-use.

6.1.4 Recovering resources in the regions

Part of Infrastructure Victoria's work in identifying challenges and opportunities for Victoria's regional and rural areas involved a program of stakeholder engagement to seek feedback from local regional councils and industry.

In June 2019 we received submissions from several regional stakeholders on the key issues and factors Infrastructure Victoria needs to consider in its work. To gain more comprehensive feedback on the barriers and opportunities in the regions, Infrastructure Victoria held three regional workshops in August in Shepparton, Ballarat and Traralgon and one in Melbourne. The workshops were an opportunity for local councils, industry and other regional stakeholders to discuss the barriers and opportunities for the recycling and resource recovery sector specific to their region.

In general, regional stakeholders identified high transportation costs as being a barrier for improved recycling and resource recovery due to long distances. Most stakeholders consider that it is more economical to use landfill instead of using recycling or reuse processes. At the same time, stakeholders from across regional Victoria stated that there is a lack of local MRFs and processing capacity in the regions, and that more investment in MRFs and processors would create opportunities for lower transport costs, lower emissions, more jobs in the regions and a more circular local economy. More detail on the key messages we heard from stakeholders – particularly for stakeholders in regional Victoria – can be found in our consultation report on our website

6.2 Material flows and infrastructure needs

6.2.1 Go with the flow – materials in Victoria's recycling and resource recovery sector

Victoria's recycling and resource recovery sector manages an increasingly large volume of waste from across three waste sectors:

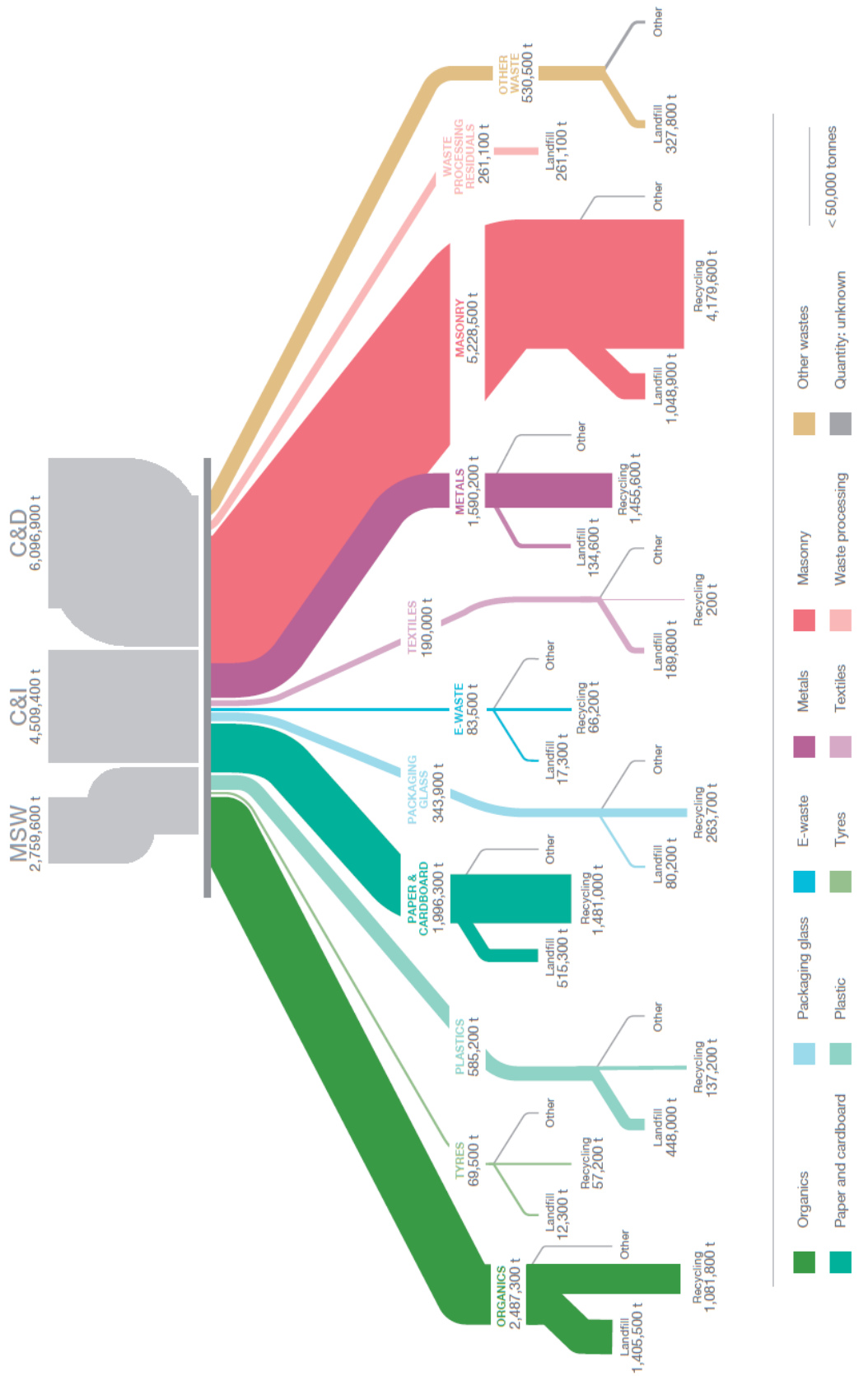
- Municipal Solid Waste (MSW) – domestic and other waste generated or managed by local government
- Commercial and Industrial Waste (C&I) – waste generated by business and industry
- Construction and Demolition Waste (C&D) – waste from building and development activities

Across all three sectors, a total of 13.4 million tonnes is estimated to enter the waste pathway, in which 8.7 million tonnes is recovered and 4.4 million tonnes is landfilled. This is equal to a recovery rate of about 65%.¹⁶ The recovery rate masks considerable variation in the individual recovery rates for different materials, as shown in Figure 4. For example, the recovery rate for metals is 96%, while for textiles it is only 2%. Meanwhile, materials that are particularly problematic for the environment and human health, such as organic matter and plastics, have relatively low recovery rates of 43% and 24% respectively, meaning a significant proportion of these materials are still going to landfill.¹⁷ More detailed analysis of Victoria's the amount and fate of waste generated in Victoria can be found in the Blue Environment report on our website.

¹⁶ Blue Environment (2019) *Victorian Waste Flows*, report for Infrastructure Victoria

¹⁷ Sustainability Victoria *Waste Data Portal*, available at <https://www.sustainability.vic.gov.au/Government/Victorian-Waste-data-portal>

Figure 4: Waste flows in Victoria by material 2018/19



Source: Blue Environment (2019)

6.2.2 Beyond the bin – recycling infrastructure for Victoria's future

There is a strong desire from the Victorian Government and the community to improve resource recovery across all material streams. However, the interdependencies and economics of the waste supply chain make it difficult for individual players or technology proposals to develop a sound business case for investments to improve resource recovery in Victoria. Infrastructure Victoria is considering the types of intervention that may be needed, conscious that further broad government and industry collaboration is required.

The data we have gathered on material flows in Victoria in 2017-18 shows that Victoria has a range of infrastructure needs to enhance resource recovery and transition to a circular economy. Currently, Victoria's processing sector is characterised by a high dependence on Materials Recovery Facilities (MRFs), yet some recycling/processing facilities are either outdated or inefficient. On top of this, MRFs are concentrated around metropolitan Melbourne. There is limited processing capacity in regional areas, imposing significant transportation costs. There is a lack of suitable reprocessing capacity in Victoria, particularly for paper and card, plastics and organics. These challenges are likely to be exacerbated in future as the volume of waste generated in Victoria continues to grow.¹⁸

Arup developed a range of possible scenarios for waste materials in future, to demonstrate the potential impact of different policy and investment levers on the performance of the Victorian recycling and resource recovery sector, specifically how much waste is recovered or landfilled under different approaches. Each of these scenarios will lead to differing levels of recovery across different materials streams, with flow on implications for what infrastructure will be needed. Figure 5 provides a more detailed overview of the different elements of each of these scenarios. The scenarios are:

Out of Sorts – continued investment in current areas of focus for resource recovery initiatives in Victoria without any major policy reform. It involves continued reliance on landfill disposal of residual waste. This is effectively the 'base case' against which the performance of other scenarios can be compared.

FOGO FOMO – recovery of food organics is prioritised with a ban on food waste to landfill, mandatory food collection services for household and food-related businesses. Energy from Waste is deployed for unsaleable recyclables and household waste.

Closing the Floodgates – the export of waste generated in Australia is banned so improved recovery and recycling is prioritised and is complemented by a growth in domestic use of recycled products. Waste-to-energy is deployed for unsaleable recyclables and household waste.

Circular Stewards – Victoria's circular economy policy sees government, industry and the community working together with improved coordination of policy, technology, behaviour, product stewardship and economic prosperity. This sees avoidance of waste generation, introduction of a CDS, household FOGO collections and expansion of small scale reprocessing.

Packaging Crackdown – international import restrictions require a domestic focus on recovering and recycling packaging waste, a widely scoped CDS and eliminating the use of single-use plastic items.

High energy – large-scale waste-to-energy is deployed using well-proven technologies and industrial sites. A range of waste streams including household, commercial and industrial wastes and residual wastes (including unsaleable recyclables) are accepted.

¹⁸ Blue Environment (2019) *Victorian Waste Flows*, report for Infrastructure Victoria

Figure 5: Summary of future waste scenarios

Intervention components	SCENARIO DEVELOPMENT					
	Out of Sorts	FOGO FOMO	Closing the Floodgates	Circular Stewards	Packaging Crackdown	High Energy
Recovery of dry recyclables 	Medium Restricted materials and high residual	Low Restricted materials acceptance	Medium	Medium Value focus, fewer materials, higher residual	High Reduced throughput, reduced contamination	Low Restricted materials acceptance and throughput
CDS in Victoria 	No	No	No	Yes	Yes Expanded to include all glass packaging	No
Energy from Waste 	Low	High Accepts unsaleable recyclables and MSW	High	Low	Low	High
Organics separation 	Medium	High Mandatory for councils (households) and food businesses	Medium C&I focus	Medium Household and C&I organics focus	High C&I focus	Medium C&I focus, mixed adoption by councils for households
Large reprocessing infrastructure 	High Focus on plastics and glass	High Focus on organics	High Use of domestic recycled content increases	Medium Use of domestic recycled content increases	Medium Use of domestic recycled content increases	Medium
Small scale reprocessing 	Medium Focus on priority waste streams	High Organics valorisation focus	Medium	High Expands significantly	Low Bio-based replacements for plastics	High Focus on priority waste streams
Export focus 	Medium Unprocessed waste not accepted. Restricted materials and tonnage	Medium Unprocessed waste not accepted. With very restricted tonnage	Low Only clean, value-added inished products/ processed materials allowed for export	Medium For finished products and Refuse Derived Fuel. Low for unprocessed recycle	Medium Unprocessed waste not accepted. Recyclate material quality improved	Low Due to quality issues

Source: adapted from Arup Recycling & Resource Recovery Infrastructure Analysis

Each scenario will have implications for the amount and type of infrastructure required, ranging from kerbside collections, sorting processing and recycling. The common purpose is for facilities which allow for aggregation, sorting and decontamination of large amounts of different materials with a focus on how to improve recovery of challenging materials, and produce market-ready products for re-use. Key needs include:

Waste supply chain	Kerbside and C&I materials	Organics	E-waste	Waste-to-Energy
Collection	<p>Increase in household and commercial bins</p> <p>Drop off and take-back points for product stewardship and extended producer responsibility including reverse vending machines</p> <p>Multi-Unit Development (high density) separation</p> <p>Sensor based smart bins that monitor and alert capacity for collection</p> <p>Apps and software to optimise collection services</p>	<p>FOGO caddies</p> <p>Commercial kitchen separation supported by precinct hubs concept</p> <p>Multi-Unit Development (high density) separation</p> <p>Optimised resource recovery centres across Victoria for hub and spokes model</p>	<p>Drop off points for product stewardship and EPR</p> <p>Collection units that separate e-waste product types e.g. batteries, notepads, mobile phones, etc.</p> <p>Optimised resource recovery centres across Victoria for hub and spokes model</p>	<p>Pre-sorting via improvements to kerbside co-mingled and FOGO caddies</p>
Sorting	<p>Upgraded MRFs with improved optical sorting, ability to sort greater range of plastics (rigid and soft)</p>	<p>Processing and bulk haul infrastructure in regional Victoria</p>	<p>Mechanical and optical sorting lines at reprocessors</p>	<p>Pre-sort via MRF to maximise recovery of recyclables</p>
Reprocessing	<p>Plastics sorting and flaking plants that recover plastics 1 to 7 to high quality (re-manufacturing, food-grade, export specifications)</p> <p>Glass beneficiation plant upgrades to improve sorting to capture small glass fragments and remove contaminants</p> <p>Paper recycling upgrades for improved pulping to meet local demand for cardboard and moulded fibre packaging and export markets.</p>	<p>Compost processing including open windrow technology and in-vessel technology</p> <p>Mulch processing for garden and timber wastes</p> <p>Biochar for boutique applications</p>	<p>Mechanical processing to separate metals, plastics, glass.</p> <p>Target high value printed circuit boards to recover precious metals and rare earth elements</p> <p>Battery reprocessing to recovery lithium, cobalt, nickel, manganese.</p> <p>Thermal e-waste treatment</p> <p>Silicon solar photovoltaic panel recycling</p>	<p>Anaerobic digestion for organics</p> <p>Combustion</p> <p>Refuse Derived Fuel/Process Engineered Fuels for C&I and C&D wastes to export specifications</p>

Further information about the potential infrastructure needs and different types of waste infrastructure technology can be found in the Arup and Blue Environment reports on our website.

The amount and location of the infrastructure discussed in this section will vary according to the waste scenario that eventuates. A key element of developing our final advice is further analysis and stakeholder engagement regarding the different waste scenarios to determine which scenario is most likely to lead to and/or most closely aligned with the desired outcomes for the Victorian recycling and resource recovery sector. Understanding the preferred/most likely waste scenario will then be used to inform the policy approaches available to the Victorian Government to achieve these outcomes.

6.3 The importance of government action

Addressing market failures is one of the key reasons why governments intervene in markets, either through policy development, regulation, taxation, investing in infrastructure and services or providing services directly. Different levels of government have different roles and responsibilities when it comes to the recycling and resource recovery sector.

In our research, we asked the consultancy alphaBeta to look at a range of jurisdictions to identify potential lessons for Victoria. Across the jurisdictions included in this analysis – Wales, South Korea, Germany, the United Kingdom and the

Netherlands, South Australia and New South Wales – there were some common lessons for Victoria, underpinned by one clear theme: a proactive government. These are:

- **Long-term commitment** – most jurisdictions have taken at least 10 years to improve their recycling and resource recovery performance, some as long as 20 years.
- **A range of evolving policies** – there is no silver bullet to improving resource recovery; most top performers have used a range of policies and scaled these up or down over time.
- **Coordination and collaboration** – waste is always a split responsibility between levels of government and the private sector, so effective collaboration is critical.
- **Government’s mandating role** – in all of the high-performing jurisdictions, the Government has imposed mandatory measures to drive performance.
- **Complementary interventions across the value chain** – policy interventions across the value chain work together, even though some high-performing jurisdictions still have underdeveloped end- markets for some materials.

More detailed analysis of the other jurisdictions’ recycling and resource recovery performance can be found in the alphaBeta report, available on our website.

Wales in focus

Waste management powers were devolved to the Welsh Government from the UK Government in 1999. Since then, the Welsh Government has taken a proactive approach to improving their recycling and resource recovery performance. The Welsh Government has used a broad range of policy tools including mandatory performance targets, fines, incentives and financing to get to its current position.

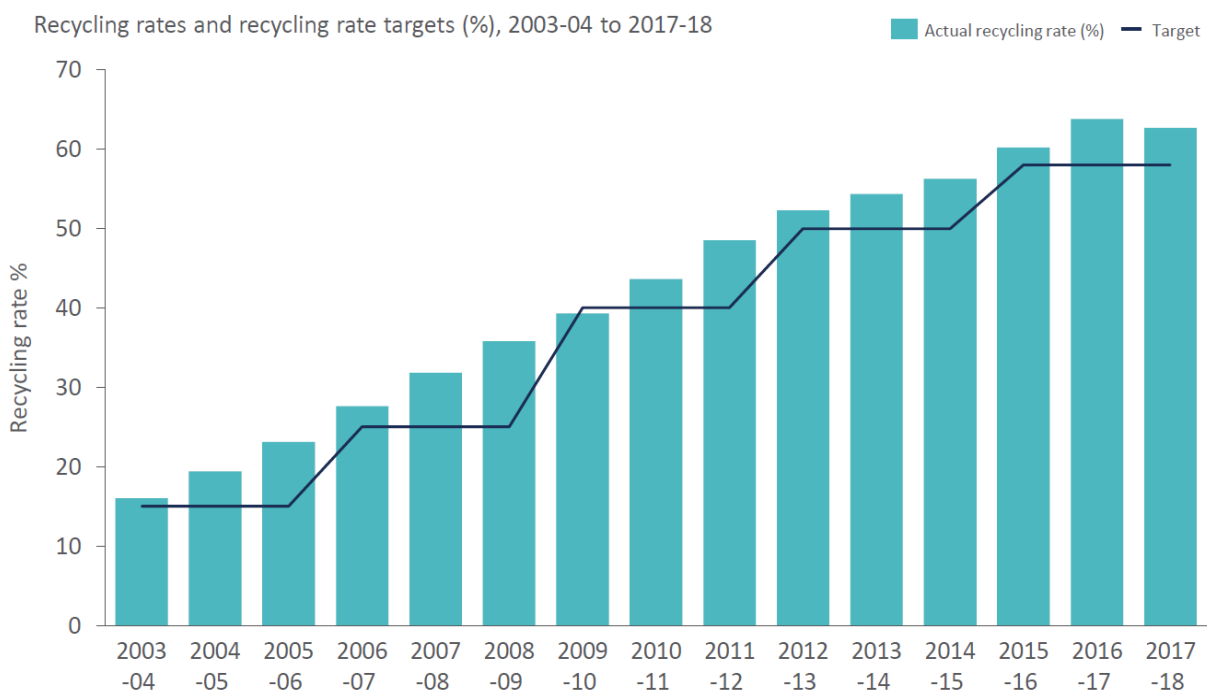
Local authorities are subject to mandatory reporting on waste collection, including the end destination for materials. Fines can be applied to local authorities for inaccurate data reporting. The Welsh Government has taken a collaborative approach to working with local authorities to help them meet their recycling and reporting requirements, providing both funding and practical support.

Wales' first step on the road toward best-practice recycling and resource recovery started with the introduction of *Wise about Waste* in 2002, which was developed partly in response to the 1999 European Union Landfill Directive, which imposed limits on biodegradable waste going to landfill. *Wise about Waste* set targets for Welsh local authorities to reach 40% recycling of MSW by 2009/10, including at least 15% composting. Local authorities were supported to achieve these targets through infrastructure grants from the Welsh Government.

In 2010, a new waste strategy – *Towards Zero Waste* – was introduced, with new targets that apply to all waste streams and an aspiration to reach 100% recycling rate by 2050. For MSW, these targets are statutory. Local authorities that fail to meet their recycling targets can be fined £200 per tonne.

Wales' recycling and resource recovery performance has improved dramatically since the targets were first introduced. As shown in Figure 6: MSW recycling rates in Wales.

Figure 6: MSW recycling rates in Wales



A range of initiatives working together has enabled Wales' performance in recycling and resource recovery. The *Towards Zero Waste Strategy*, underpinned by statutory recycling targets, has been supplemented by the introduction of a Collections Blueprint, which promotes a consistent approach to MSW collections across local authorities. Councils have been supported to adopt the Collections Blueprint through the Collaborative Change Programme, which includes practical implementation and funding support for councils to adopt the Blueprint.

Like many other countries, Wales still faces challenges with underdeveloped end markets for some materials, particularly plastic. However, the potent mix of statutory targets, financial incentives, infrastructure grants and practical guidance have underpinned Wales' steady evolution into a best-practice jurisdiction, with some clear lessons for Victoria.

We have undertaken a review of the legislative and regulatory settings relevant to the recycling and resource recovery sector in Victoria, to better understand the roles and responsibilities of different levels of government in Australia. Table 1

presents a summary of these roles and responsibilities, and the relevant legislative instruments. Our full report is available on our website.

Table 1: division of Government responsibilities in waste management and resource recovery

Area of Influence	Australian Government Role	Victorian Government Role	Local Government Role
Influence by/over other levels of Government	No constitutional authority National leadership and coordination by way of agreement Ensuring compliance with International treaties and national environmental policies	Primary responsibility for environmental protection and management, and regulating domestic waste management Valid Australian (Commonwealth) laws will prevail if in conflict with Victorian law	Local Government responsibilities can be varied by state legislation <i>Local Government Act 1989 (Vic)</i> <i>Constitution Act 1975 (Vic)</i>
Environment (general)	National leadership and coordination by way of agreement Ensuring compliance with international treaties and national environmental policies Intergovernmental Agreement on the Environment <i>Environment Protection and Biodiversity Conservation Act 1999 (Cth)</i>	Key role in environmental protection and management <i>Environment Protection Act 1970 (Vic)</i> and <i>Environment Protection Act 2017 (Vic)</i>	Local environmental issues Education and awareness programs
Waste collection, disposal, treatment	National leadership and coordination by way of agreement Ensuring compliance with International treaties and national environmental policies National Waste Policy	Regulating domestic waste management (Including regulating the operation of landfill facilities, imposition of landfill levies)	Provides and procures MSW waste and recycling collection services to households Litter infrastructure – waste collection in public places <i>Local Government Act 1989</i>
Planning and land use	<i>Environment Protection and Biodiversity Conservation Act 1999 (Cth)</i> , if triggered Does not play a significant role	Planning laws and land use Makes some planning decisions <i>Planning and Environment Act 1987 (Vic)</i>	Determination of most planning decisions and local planning laws, including most approvals for waste infrastructure
Packaging and goods	Australian Packaging Covenant	State government procurement policies Possible scope for container deposit scheme (implemented by other states and territories)	Local initiatives and local government procurement policies

6.3.1 The role of the Victorian Government

The Victorian Government influences the recycling and resource recovery sector through legislation and regulation, enforcement, incentives, grants and programs and education, setting strategic direction for the sector and supporting local government in its service delivery role.

The Environment Protection Act 1970 is the primary legislation that defines the public policy objectives, regulatory framework for individuals and private organisations, and the specific tasks to be performed by government. The Victorian Government also supports the recycling and resource recovery sector through programs and grants such as the Research, Development and Demonstration Grants Program, and the Resource Recovery Infrastructure Fund. Since

2017, the Victorian Government has committed over \$110 million across a range of initiatives, including recycling industry transition support, delivering the recycling industry strategic plan, supporting councils to manage e-waste and cleaning up waste stockpiles.^{19, 20, 21, 22} However, the sector still faces long-term resilience and sustainability challenges.

A proactive approach from government, with a clear strategic direction for the recycling and resource recovery sector supported by a long-term commitment and investment are important elements of a high-performing resource recovery sector. Long-term clarity can provide the certainty private sector operators desire to invest in infrastructure and lead to the development of stronger end markets. At the same time, setting clear performance targets for local authorities to achieve, supported by financial incentives to meet these targets, can be powerful tools in driving improved performance. One example of this could be to promote a more consistent approach to sorting and collection of materials, which is particularly important for MSW. Recovery rates in MSW are very low, particularly for problematic materials like plastics and organics. Our research and consistent feedback from stakeholders indicates that clean, separated materials streams are essential to improved recovery and recycling rates.

6.3.2 The role of Victorian local governments

There are 79 Local Government Areas (LGAs) in Victoria. They are generally responsible for locally-specific issues, such as making local planning policies and planning decisions (which can affect where and how resource recovery sites can operate), and also for the direct provision of waste and recycling collection services.

The Local Government Act 1989 establishes the powers and functions of local governments in Victoria. It broadly enables the function of councils to plan, provide and maintain services and infrastructure for the local community, as well as undertaking strategic and land use planning. Under this Act, a council can pass local laws that reinforce land use planning and municipal recycling and resource recovery strategies.

Given their responsibility for providing collection services for waste and recycling, councils can have the potential to be highly influential in the performance of the recycling and resource recovery sector in Victoria, through the procurement of recycling and resource recovery services and through educating households on recycling practice. The *Constitution Act 1975* provides the Victorian Government the authority to require compliance with initiatives via legislation and subordinate instruments. This will be relevant if the state wants local governments to roll out consistent approaches to recycling and resource recovery, including in relation to bins, source separation and collection as well as targets.²³

6.3.3 The role of the Australian Government

The Australian Government can directly influence the performance of the recycling and resource recovery sector in Victoria through co-ordinating policy at a national level, to support harmonisation of laws and regulations, and eliminating some of the market failures that exist in the sector. For example, packaging and product design standards could be established by the Australian Government to ensure consistency across jurisdictions, reducing complexity for households and providing a more stable, homogenous material stream for processors. Currently, the Australian Packaging Covenant Organisation (APCO) performs this function through a voluntary, co-regulatory scheme. The Australian Government has the potential to significantly enhance consistency across jurisdictions by imposing a mandatory scheme that reflects global best practice.

The Australian Government also holds taxation powers that could be used to provide greater incentives for producers to reduce the amount of waste designed in to products they create, such as taxes on virgin materials. Nationally consistent action to price externalities from production that are not currently priced appropriately could support the development of end markets for recycled materials.

The Victorian Government has a role to play here too, however, in advocating to the Australian Government on behalf of Victorians to ensure the right policy settings are in place to deliver the best outcomes for Victorians and the Victorian recycling and resource recovery sector.

¹⁹ Premier of Victoria (2018) *Helping Councils Manage e-waste* [Press Release] 26 April 2018. Available at <https://www.premier.vic.gov.au/helping-councils-manage-e-waste/>

²⁰ Premier of Victoria (2018) *Stepping in to support industry and councils with recycling* [Press Release] 23 February 2018. Available at <https://www.premier.vic.gov.au/stepping-in-to-support-industry-and-councils-with-recycling/>

²¹ Premier of Victoria (2018) *Delivering a new plan for the future of recycling* [Press Release] 3 July 2018. Available at <https://www.premier.vic.gov.au/delivering-a-new-plan-for-the-future-of-recycling/>

²² Premier of Victoria (2019) *More support for Victoria's recycling sector* [Press Release] 27 August 2019. Available at <https://www.premier.vic.gov.au/more-support-for-victorias-recycling-sector/>

²³ *The Constitution Act 1975* (Vic)

6.4 What options are available to the Victorian Government?

The Victorian Government has identified three key objectives for the waste sector in Victoria²⁴:

- Minimise litter and waste disposal by encouraging the management of waste in accordance with the waste management hierarchy
- Promote waste reduction, resource recovery and resource efficiency
- Minimise the impact on human health and the environment from waste generation and waste disposal. Based on the current performance of the sector in Victoria.

These objectives are not being fully met due to a mix of market failures, extraordinary external drivers, lack of data, and a lack of clear policy direction. The Victorian Government has responded with a mix of direct investment in recycling infrastructure, a renewed focus on policy development and taking a stronger approach to regulatory compliance through the activities of the EPA, including the implementation of changes to the Environment Protection Act due to take effect in July 2020.

In addition to this work already underway, Infrastructure Victoria has identified a number of potential policy levers the Victorian Government could consider to maximise the likelihood that its objectives for the sector are met. Examples of these include:

- Target setting can be used to incentivise performance. In our review of best-performing jurisdictions, targets on rates of recycling and diversion of waste from landfill have been used to incentivise intended outcomes. While the setting of aspirational targets can be used to motivate intended behaviours, it would also be important to ensure that such targets have net benefits and are not unnecessarily onerous.
- Direct investment in services or infrastructure where market failures prevent services or infrastructure being delivered.
- Pricing mechanisms, such as levies or subsidies, could be used to incentivise different behaviours. For example, the introduction of a levy on polluting virgin materials and residual waste production could provide incentives to avoid waste production, and subsidies for products that can be recycled would create greater incentives for consumers to purchase these products over non-recyclable alternatives.
- Legislation is also a powerful lever to motivate changes in behaviour, such as bans on certain types of waste going to landfill or mandating source separation of materials.
- Greater transparency can help overcome information asymmetries. For example, information about the environmental characteristics and recyclability of a product could be required on product labels.

In the majority of cases of market failure, a combination of policy levers and remedies is most likely to succeed. In the context of the decentralised waste management model in Victoria, where market failures are observed across the different stages of the waste lifecycle, single and centralised solutions are unlikely to be effective.

The successful implementation of the policy levers described above would require support from the Australian Government, and co-ordination with local governments and other state governments. For example, certain policy levers such as taxes and levies may be more efficiently introduced by the Australian Government, to ensure consistency across states. Other levers such as education campaigns would require careful co-ordination with local governments to be properly tailored to account for potential regional differences in awareness about and attitudes to recycling.

In addition to the levers identified above, we have identified the following three example policy levers available to the Government, that could deliver benefits to the recycling and resource recovery sector in Victoria.

6.4.1 The Municipal and Industrial Landfill Levy

The landfill levy is a powerful policy lever that has been used by the Victorian Government since 1999. It creates incentives to reduce the disposal of municipal and industrial wastes (MILL) and to prescribed hazardous wastes (PIWLL) to landfill. The Government's stated objective in introducing the MILL is to:

- Act as an incentive to minimise waste, encourage greater re-use and recycling of resources, and promoting investment in alternatives to waste disposal to landfill
- Provide funds for waste management infrastructure, support programs for industry, education programs and the resourcing of the bodies responsible for waste planning and management in Victoria.

The landfill levy has its benefits. It can create an incentive to reduce disposal of waste to landfills, and funds raised by the landfill levy can be used to support the recycling and resource recovery sector. However, the landfill levy also has some limitations.

²⁴ *Environment Protection Amendment Act 2018 (Vic)*

Firstly, the landfill levy is not providing sufficient incentive to minimise waste, encourage greater re-use and recycling and promote investment in alternatives to landfill. This is likely because the price signal sent by the landfill levy is not felt by producers of waste when they are manufacturing products, or directly by households as they are sorting and disposing of products.

Secondly, the landfill levy has a number of unintended consequences. In particular, it creates opportunities for strategic behaviour that is either legal but unwanted or illegal. An example of legal, but unwanted behaviour can be observed where wastes are stockpiled legally but this activity increases fire and other risks. An example of illegal behaviour is the disposal of waste to non-approved sites. Both of these actions happen mainly to avoid paying the cost of sending waste to landfill.²⁵ In addition, variability in landfill levy rates between jurisdictions can lead to waste moving across borders to where it can be disposed of cheaply. Victoria's current landfill levy rate is lower than South Australia and NSW, which can make landfilling waste in Victoria comparatively cheaper than other alternatives in some areas of South Australia and NSW.

Finally, feedback we have received from stakeholders throughout our consultation is that the landfill levy does not sufficiently achieve the objective of supporting investment in alternatives to landfill. Currently, landfill users pay a 'gate fee', which includes the landfill levy and other costs, to dispose of waste at landfill. Landfill gate fees in Melbourne region currently range between \$185-210/tonne (including the levy) and are generally marginally higher than gate fees in regional areas.²⁶ Feedback we have received suggests that the gate fee for landfill is lower than potential gate fees for waste-to-energy plants, making it difficult for waste-to-energy plants to compete with landfill for materials.

As a result, the landfill levy alone is not enough to achieve the Victorian Government's objectives for the recycling and resource recovery sector. This is clear from the current performance of the sector, and is also reflected in other jurisdictions where a landfill levy or landfill tax is only one part of a broader policy framework.

In the short term, the landfill levy should be supported by a range of other policy levers, spread across waste lifecycle to create incentives at all stages of the value chain. In particular, there is a need for policy levers that create incentives to minimise waste and measures to reduce opportunities for 'strategic' behaviours, such as illegal dumping, or stockpiling. While there is limited data available at present to demonstrate the extent of strategic behaviours such as stockpiling and illegal dumping, the 2019 VAGO report *Recovering and Reprocessing Resources from Waste* has highlighted these to be a significant concern. These activities impose environmental, safety and amenity costs but also create commercial risks for legitimate investments in waste infrastructure. Further research is needed to identify the best mechanism to mitigate such unintended outcomes in the long term.

Infrastructure Victoria will conduct further research in the second phase of this advice project to identify suitable policy levers, including potential changes to landfill levy settings, that can be adopted to address the issues above.

6.4.2 Developing end markets for recycled materials

Developing end markets for recycled materials is a challenge for countries all over the world. Even countries that are considered to be best in the world for recycling and resource recovery with large manufacturing bases, such as South Korea, rely heavily on export markets for some materials, particularly plastic composites.²⁷ Fostering sustainable end markets for recyclable glass, plastic and paper is a medium-term solution to avoiding the stockpiling problems that Victoria has recently experienced. More importantly, developing strong end markets for materials has the potential to foster a sustainable resource recovery sector in Victoria, and to improve our resource recovery and recycling rates by encouraging investment in resource recovery and recycling infrastructure.

The development of end markets is partly reliant on the supply of uncontaminated recyclable materials, which reduces the cost and improves the quality of the end product. Government intervention is likely to be needed to support these end markets through:

- Improved source separation infrastructure. Victoria's current co-mingled system does not produce sufficiently clean streams to support end markets for recycled materials. Best practice jurisdictions separate at least five types of materials at source (organics, plastics, paper and card, glass, metals).
- Better education about what can and can't be recycled and the benefits of recycling. This will be most effective when there is a relatively consistent approach to recycling across local councils.
- Research and development on further end-uses for recyclable materials, particularly where end-markets are currently missing.

²⁵ Centre for Market Design (2019) *Opportunities to improve infrastructure investment in the Victorian waste economy*, report for Infrastructure Victoria

²⁶ Blue Environment (2019) *Victorian Waste Flows*, report for Infrastructure Victoria

²⁷ AlphaBeta (2019) *Recycling and resource recovery infrastructure in Victoria: International and Australian comparisons*, report for Infrastructure Victoria

- Removing barriers to government procurement of recyclables can contribute to the development of end markets for materials.

Policies that further improve the price competitiveness of recycled materials are also likely to play a significant role in supporting the development of end markets for materials. Strong end markets for recycled materials will, in turn, support improved recycling performance by making recovering and recycling materials commercially appealing. Because Victoria lacks a large manufacturing base to make use of recycled materials, a deliberate, targeted approach to specific materials streams with the highest end market potential is likely to be essential in the long term.

6.4.3 Waste-to-energy policy

‘Waste-to-energy’ is a term commonly used to describe the process of recovering energy, such as electricity, heat or fuels, from waste materials. We are assessing several waste-to-energy technologies deployed in Australia and throughout the world. These include:

- Thermal technologies
- Biomass technologies
- Refuse Derived Fuels/Process Engineered Fuels

More detail on these technologies can be found in Arup’s report on our website.

Waste-to-energy infrastructure has significant potential to divert waste from landfill, but needs to be carefully considered in the context of the waste hierarchy. Lessons we learned from our analysis of other jurisdictions show us that waste-to-energy facilities can provide a solution for residual waste, but that other solutions further up the waste hierarchy should be prioritised to minimise dependence on this technology.

Wales is a prime example of this. Wales has recently invested in thermal waste-to-energy technologies to help minimise their residual waste volumes. This investment has come after several years of explicitly prioritising meeting recycling and composting targets, including supporting investment in anaerobic digestion infrastructure as a means to meet recycling targets for organic materials.²⁸

Victoria currently has no waste-to-energy policy. This is acting as a barrier to investment from the private sector, due to a lack of certainty about the potential impact of future policy changes on their investment. To introduce a sustainable waste-to-energy sector in Victoria, policy clarity is required. Policy direction will provide certainty as to what role waste-to-energy will play in Victoria’s waste and resource recovery sector. Key considerations include:

- a clear decision-making framework to guide the planning and assessment of waste-to-energy proposals
- understanding which waste materials are encouraged or discouraged from energy recovery
- the confidence of regulators to understand different waste-to-energy facilities
- social licence for waste-to-energy in the Victorian community
- management of residual wastes

Developing a pragmatic waste-to-energy policy that reflects the principles of the waste management hierarchy (i.e. energy recovery is preferable to landfill) should be considered, particularly for residual waste and low value recyclables or organics. Among other things, a clear waste-to-energy policy could provide a conducive environment to investment from the private sector and the necessary certainty to support local planning and environmental approvals for waste-to-energy plants, without preventing Victoria’s transition to a circular economy.

These levers – the landfill levy, market development, and waste-to-energy policy – are just three potential opportunities we have identified so far, and cut across the key priority areas outlined in the terms of reference for this advice. We will be doing further work on developing these, and other actions identified in this report in developing the final advice to government.

²⁸ AlphaBeta (2019) *Recycling and resource recovery infrastructure in Victoria: International and Australian comparisons*, report for Infrastructure Victoria

7. Next steps

This report summarises the evidence we've gathered on recycling and resource recovery infrastructure. All the technical reports underpinning this evidence base can be found on our website.

7.1.1 Getting involved

We are now seeking feedback on the evidence set out in this report and potential actions identified.

We welcome feedback on all aspect of the report, but in particular we invite responses to these specific questions:

Have we identified the right outcomes for Victoria to aim for?

Have we identified the most effective potential actions for government to take?

Which, if any, of the initiatives implemented in Wales would you like to see applied in Victoria?

What do you think of the market design opportunities proposed to improve waste sector outcomes and efficiency?

Where do you think government should focus their efforts to increase recycling and resource recovery? (for example, through setting targets, promoting consistency or funding local councils?)

Which materials or infrastructure types present the most opportunity in your region?

What is a legislative barrier or enabler that you have encountered when trying to use recycled materials?

To make a submission visit infrastructurevictoria.com.au. We will accept submissions in response to the report and these questions via our website until Friday 13 December 2019.

Late submissions cannot be accepted.

7.1.2 Developing our advice

We intend to use the insights gained from this process to inform our final advice to the Special Minister of State, which we will deliver in April 2020.

Our findings and recommendations will also influence the next update of Victoria's 30-year infrastructure strategy in 2021.

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AlphaBeta (2019) *Recycling and resource recovery infrastructure in Victoria: International and Australian comparisons*, report for Infrastructure Victoria

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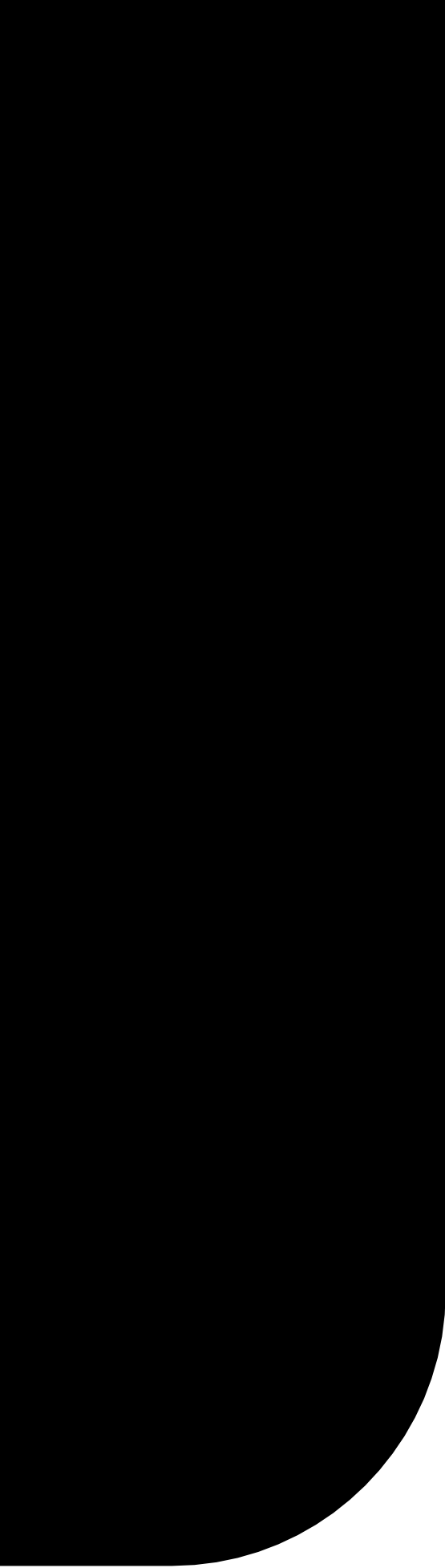
Environment Protection Amendment Act 2018 (Vic)

Sustainability Victoria *Waste Data Portal*, available at <https://www.sustainability.vic.gov.au/Government/Victorian-Waste-data-portal>

Sustainability Victoria (2013) *Victorian Statewide Garbage Bin Audits: Food, Household Chemicals and Recyclables 2013*

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Victorian Auditor General's Office (2019) *Recovering and Reprocessing Resources from Waste*



About us

Infrastructure Victoria is an independent advisory body, which began operating on 1 October 2015 under the *Infrastructure Victoria Act 2015*.

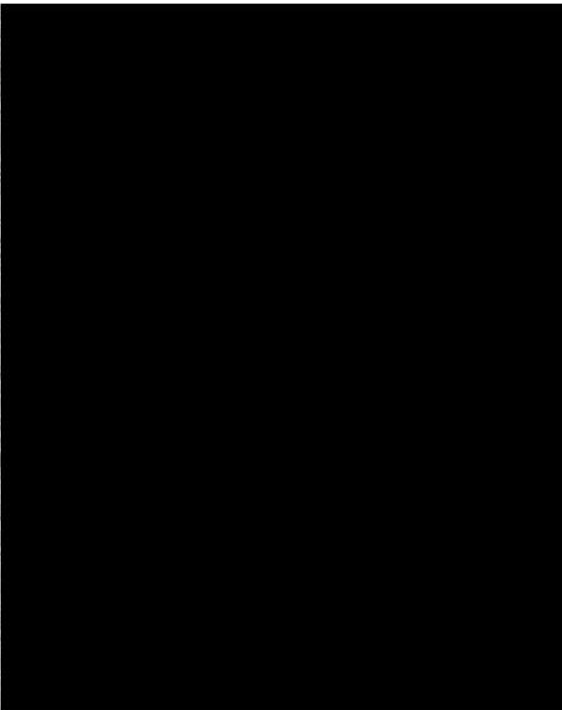
Infrastructure Victoria has three main functions:

- preparing a 30-year infrastructure strategy for Victoria, which is refreshed every three to five years
- providing written advice to government on specific infrastructure matters
- publishing original research on infrastructure-related issues

Infrastructure Victoria also supports the development of sectoral infrastructure plans by government departments and agencies.

The aim of Infrastructure Victoria is to take a long-term, evidence-based view of infrastructure planning and raise the level of community debate about infrastructure provision.

Infrastructure Victoria does not directly oversee or fund infrastructure projects.



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