

Waste Brief – International Supply Chain Benchmarking Sectoral Assessment

Report for the Department of Infrastructure, Transport, Regional Development and Communications

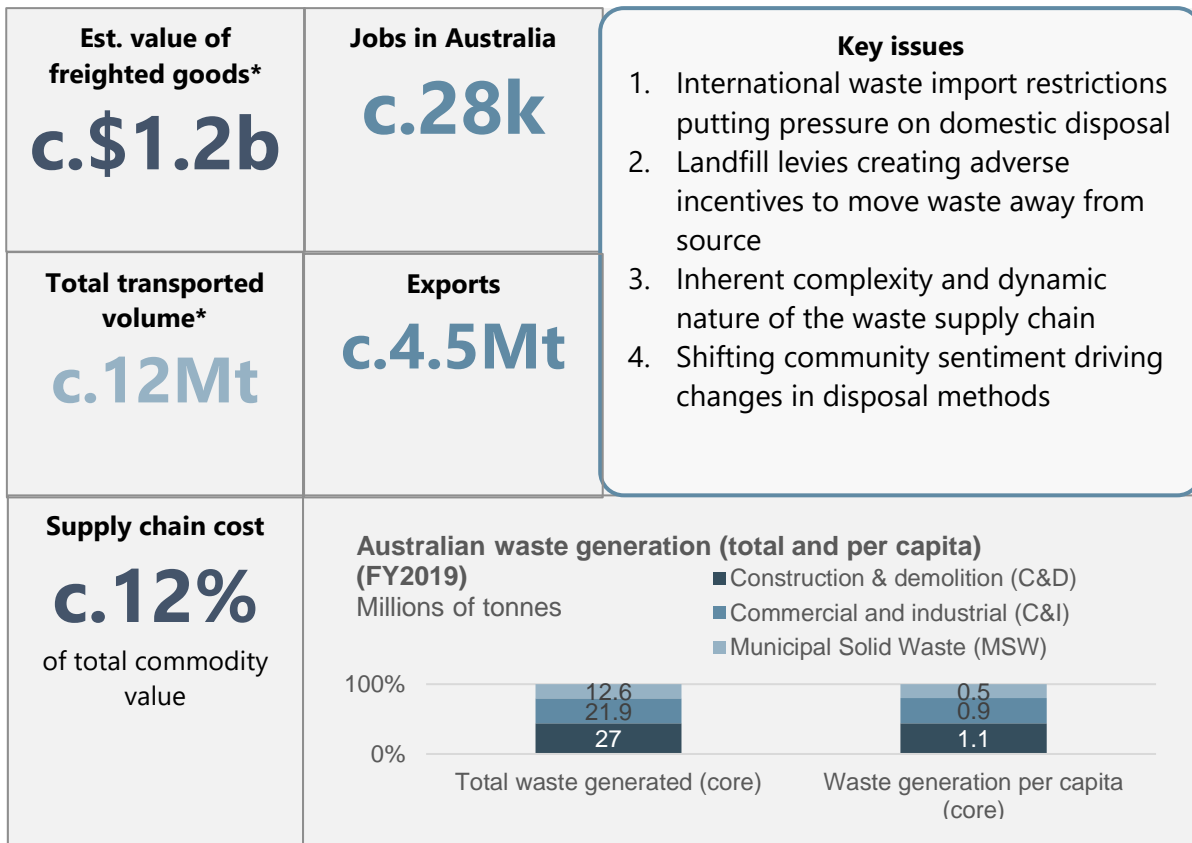
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Executive Summary



* Volume and value Includes municipal household waste (MSW) only

The waste supply chain is a complex and important supply chain for Australia. The supply chain is defined by three major waste generation sources, a significant collection and consolidation logistics task and many disposal and re-use options. Due to the relatively high ratio between the value of the transported good (i.e. waste) and the cost of transport, the waste supply chain consists of many 'local' markets where limiting the distance between collection and disposal/recycling is an economic decision.

Countries that achieve the best outcomes with their waste supply chains, such as Norway and Denmark, reduce waste generation, reducing the need for waste handling and collection. These countries also focus on 'source separation' of materials into types early in the supply chain (i.e. in the home or on site) to decrease material handling and waste collection costs. Once generated, the percentage of waste diverted from landfill is a critical indicator, with a higher diversion rate representing a more sustainable and efficient supply chain.

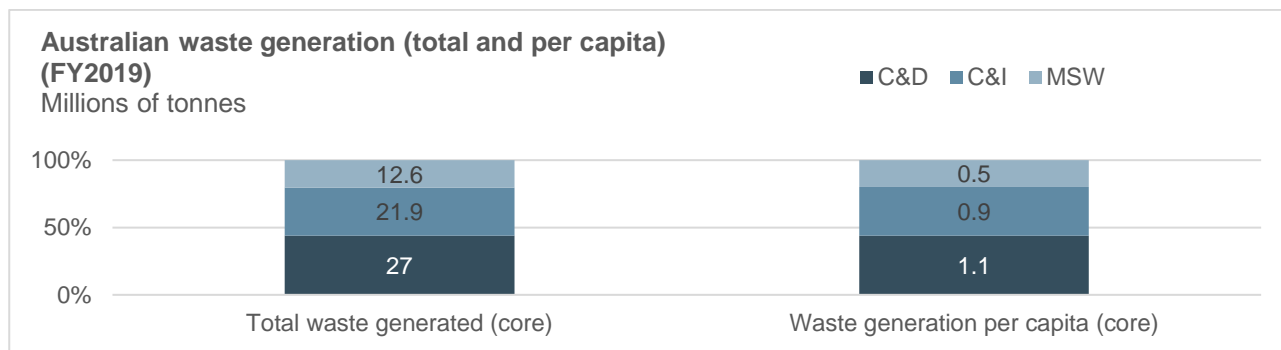
Further detail is available in L.E.K.'s pilot study. Available [here](#). In this study, L.E.K. focussed on municipal (i.e. household) waste in Metro markets. L.E.K.'s findings in the pilot study were that, despite many apparent inefficiencies, the freight component of the waste supply chain appears to be relatively efficient, so there appear to be limited opportunities for improving supply chain efficiency, but significant scope for improving environmental outcomes.

Waste Supply Chain in Australia

The waste supply chain includes waste that is generated by household (MSW), commercial & industrial (C&I) and construction & demolition (C&D) activities. The waste management process deals with materials such as plastics, organics, metals, paper, glass and liquids, as well as specialised waste (e.g. hazardous, medical, masonry materials). Collection trucks pick up the materials from their initial generation point (e.g. a house, factory or building site) and transport them to a transfer station to be collated and sorted. Materials that can

be recovered/recycled or converted to energy are transported to a materials recovery facility (MRF) or to a Waste to Energy (WtE) plant respectively. Residual waste is then transported to landfill.

The waste sector employs c.28,000 people in Australia. \$17bn was spent on waste services in FY2019.ⁱ Australia generated 74.1Mt of solid waste in FY2019 (c.62Mt of core waste).ⁱⁱ Of this, 36% was sent to landfill and 63% recycled. Exports account for c.6% of Australia's total waste.



Australia's waste supply chain faces a range of issues that impact efficiency and/or environmental outcomes:

1. China's waste import restrictions have increased the pressure on the waste supply chain since 2017. Previously exported waste must now be sorted, recovered, and disposed of domestically
2. A regulated and structural shift to disincentivise landfill use has resulted in the implementation of increasing "Landfill levies" at a state level to encourage collectors to divert waste away from capacity-constrained landfills. This (relatively) makes alternative waste options (e.g. recycling or waste to energy) more economically attractive for waste generators. However, inconsistent pricing between states has historically incentivised waste service providers to transport waste long distances between states to take advantage of lower levies to reduce overall disposal costs
3. The overall waste management supply chain is highly complex due to the number of different parties involved in the supply chain (from generation, collections to disposal), and the range of government stakeholders that have influence on parts of the supply chain
4. A continual shift of community sentiment and resultant changes to disposal/re-use options. Australia's 2018 National Waste Policy articulated Australia's aim to become a circular economy, with a focus on avoiding waste, improving resource recovery, and better managing material flows to benefit human health and the environment. As such, policymakers are likely to view cost of disposal / transport as an ancillary consideration to environmental and human factors when making decisions that affect the supply chain

International Supply Chain Comparison

Every country generates waste that must be exported or landfilled, recycled or converted to energy domestically. As such, the ordinary global competitive dynamics do not apply in the same way as with a commodity that is produced for sale and consumption or other use. Therefore, international supply chain analysis should focus on the internal generation and fate of a country's domestic waste. The relative differences across countries in desired environmental outcomes drive significant supply chain differences.

Countries with the most efficient waste supply chains reduce waste generation, reducing the need for waste handling and collection. These countries also focus on 'source separation' of materials into types early in the supply chain (i.e. at the place of generation) to decrease material handling and waste collection costs. Depending on the maturity of the 're-use' industry, or 'circular' economy, increased collection costs can be partially offset if landfill is reduced, producing usable materials at the end of the supply chain.






The waste supply chain can be heavily affected by domestic and international policy changes. For example, China has banned all imports of solid waste from 1 January 2021.ⁱⁱⁱ Other countries in Asia, such as India, Indonesia and Malaysia have changed their domestic policy and are rejecting previously imported waste from developed nations. This has caused increased strain on domestic infrastructure in countries that

previously exported large amounts of their waste. Other factors that can significantly disrupt the waste supply chain include environmental targets, land use regulation and planning decisions.

	Australia	U.S.	Denmark	UK	Canada	Germany	Norway
Estimated total waste volume (Mt)*	c.62	c.810	c.11	c.107	c.34	c.412	c.10
Estimated total MSW volume (Mt)*	c.13	c.258	c.4	c.32	c.25	c.51	c.2
Population (m)	26	331	6	68	38	84	5
Estimated MSW per capita (Mt)	c.0.5	c.0.8	c.0.7	c.0.5	c.0.7	c.0.6	c.0.4
Recycling rate*	c.63%	c.45%	c.69%	c.74%	c.27%	c.67%	c.41%
% sent to landfill*	c.36%	c.51%	c.4%	c.25%	c.73%	c.2%	c.22%
% waste to energy*	c.0%	c.4%	c.27%	c.2%	n/a	c.31%	c.38%

*Figures are from various years, depending on data availability

Benchmarking considerations

Intl benchmarking considerations	Importance	Waste supply chain
Size and growth		The waste supply chain employs c.28k people and moves c.62Mt of waste per year
Freight importance		Freight is a significant proportion of the cost to the waste industry. Improving freight performance will have a sizable impact on the industry
Export importance		Export of waste is not an important supply chain element, given recent geopolitical bans on imports.
Geographic scope		Waste is important to every region of Australia
Known efficiency / public interest		Significant public interest exists surrounding waste outcomes from an environmental perspective

The supply chain for waste is large enough to warrant investment or reform, as it is an employer of c.28,000 people and moves c.62Mt of waste each year. Freight is a significant proportion of total waste removal costs, highlighting the importance of logistics in the area. Australia's waste exports are expected to fall to <1% of total waste produced by 2022, and domestically produced waste must be dealt with internally, implying that supply chain efficiency will only become more critical. Finally, as environmental concerns grow across the developed world and the public become more conscious of the waste they produce and dispose of, waste is expected to become an increasingly scrutinised industry.

In the pilot study, L.E.K. focussed on municipal (i.e. household) waste in Metro markets. L.E.K's findings in the pilot study were that, despite many apparent inefficiencies, the freight component of the waste supply chain appears to be relatively efficient, so there appear to be limited opportunities for improving supply chain efficiency, but significant scope for improving environmental outcomes.

Similarly, the CSIRO Transit tool models the movement of municipal waste around Australia, and further work is planned to include other waste streams such as Construction and Demolition, and Commercial and Industrial. Potential exists for international benchmarking of these separate waste streams, as they represent a substantial share of the total waste and have a range of supply chain performance issues.

The U.S., Denmark, the UK, Canada, Germany and Norway offer good comparisons as they are urbanised, wealthy, developed nations with similar waste generation and collection patterns. Recycling rates are broadly similar in Australia and Europe, however, Denmark and Germany divert substantially more waste from landfill than Australia due to a significant use of waste to energy. Denmark and Germany therefore offer good comparisons for Australia, demonstrating a supply chain that prioritises environmental outcomes and a 'circular' economy. Data availability is strong in Denmark, in particular.

References

ⁱ Australian Bureau of Statistics, Waste Accounts Australia Experimental Estimates, FY2018-19

ⁱⁱ Blue Environment Pty Ltd, National Waste Report, 2020. Note: Core waste excludes ash

ⁱⁱⁱ Waste Management Review (Article), China to ban all solid waste imports from Jan 2021, December 1, 2020