

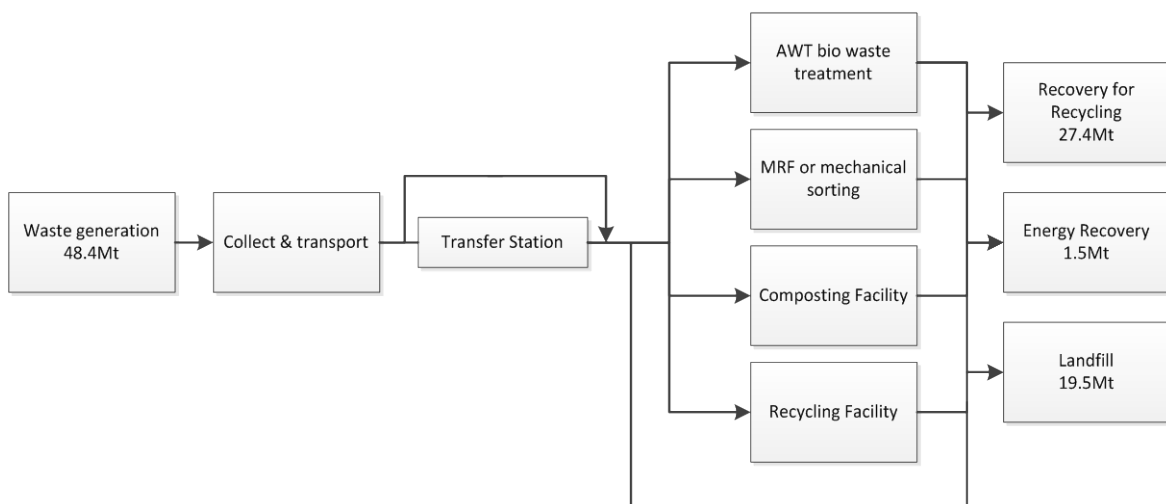
National Waste Reporting 2013

FACTSHEET - AUSTRALIA'S WASTE MANAGEMENT AND RESOURCE RECOVERY INFRASTRUCTURE

The 48 million tonnes of solid waste materials generated each year in Australia's material-intensive economy are handled through a diverse set of waste management facilities. This factsheet describes the infrastructure and technologies available to convert solid waste materials to resources and dispose of residual waste.

The waste management industry is central to the chain of activities triggered when waste is produced by households, businesses and government agencies. Discarded materials are collected from the point of waste generation using purpose-designed vehicles able to efficiently carry loads over moderate distances for disposal or recovery. At this point the waste is discharged—usually either for direct on-site disposal to landfill or for beneficial processing at a resource recovery facility. For a significant proportion of waste, this first stop in the logistics chain is a transfer station where the waste is loaded to long-haul road or rail vehicles for transport to a remote processing or disposal site. The waste logistics and value creation chain is illustrated at Figure 1 below.

Figure 1 Waste Logistics and Value Creation Chain



The main infrastructure and facilities classes in waste management are:

- transfer stations, where waste is consolidated or potential resources for recycling are collated, and bulk materials are loaded to long-haul transport vehicles.
- resource recovery facilities, where waste is sorted and collated to material types, or processed using biological or thermal transforming technologies.
- landfills, where waste is deposited in voids and covered to promote gradual biodegradation.

There are around 2846 waste management facilities across Australia, as shown at Table 1. To see the location of these facilities in each state and territory, please visit the interactive mapping tool.

Table 1 Estimated number and distribution of Australia's waste management infrastructure

Jurisdiction	Type of Infrastructure/Facility			Total facilities in each jurisdiction
	Landfill	Resource Recovery Facility	Transfer Station	
NSW	369	121	166	656
Victoria	92	233	239	564
Queensland	265	88	236	589
Western Australia	187	86	26	299
South Australia	117	247 ¹	133	497
Tasmania	19	14	67	100
Northern Territory	118	10	4	132
ACT	1	6	1	8
Total Facilities	1168	806	872	2846

Source: Compiled by Rawtec/WCS based on jurisdictions' inputs to National Waste Report.

Note: Includes 153 container deposit recycling depots in SA.

Transfer stations

Transfer stations are consolidation points in the waste logistics chain, where collected waste can be aggregated, sometimes compacted, and loaded to special purpose long-haul vehicles or freight containers for transport to distant disposal sites. The additional handling step involved is cost-effective when the travel time/distance from collection to disposal would take short-haul collection vehicles out of action for excessive periods; highly relevant for municipal waste logistics in major cities, or recycling collections in regional and remote areas.

This logistics-efficiency role for transfer stations is supplemented by the capacity to receive small loads of privately delivered waste and provide for collation of recyclable materials.

As shown in Table 1, Australia has some 872 transfer stations in operation. These vary in scale and complexity. Many small scale facilities have been established in regional/remote areas, often in lieu of a small landfill, where local communities without waste collection services can consolidate waste for bulk collection. Large-scale facilities in major cities are equipped to compress and ram waste loads into long-haul vehicles to maximise transport efficiency.

Resource recovery facilities

The Waste Hierarchy gives prominence to the recovery and recycling of resources as both a conservation measure and an environment protection measure, resulting from reduced dependence on landfill. Resource recovery facilities are designed to sort and process discarded materials using a variety of mechanical, biological and thermal technologies.

Investment in resource recovery technologies has increased substantially over the last decade so that by 2010-11, some 60 per cent of waste generated was recovered and recycled¹.

The main types of resource recovery infrastructure are:

- Alternative Waste Treatment Facilities (AWT)
- Garden Organics Processing Facilities
- Thermal Waste Technologies
- Material Recovery Facilities (MRF)
- Recycling Facilities.

The deployment of Australia's resource recovery infrastructure is shown at Table 2 and the various types of facilities are described at Box 1.

Table 2 Estimated number of resource recovery facilities by jurisdiction

Jurisdiction	Type of Facility					Total Number
	AWT facilities; bio waste processing (a)	Garden Organics processing	Thermal waste technologies	MRF and mechanical sorting facilities	Recycling facilities	
NSW	7	55	-	34	25	121
Victoria	-	22	1	25	186	233
Queensland	1	46	1	20	20	88
Western Australia	4	13	-	16	53	86
South Australia	1	16	1	8	221 ^(b)	247
Tasmania	-	4	-	6	4	14
Northern Territory	-	-	-	1	9	10
ACT	-	-	-	4	2	6
Total Number	13	156	3	114	520	806

Source: Compiled by Rawtec/WCS based on interpretation of jurisdictions' inputs to National Waste Reports.

Notes: (a) includes MBT, Aerobic, Anaerobic

(b) includes 153 container deposit recycling depots in SA.

¹ Blue Environment and Randell Environmental Consulting, *Waste generation and resource recovery in Australia* (2013)

Box 1 Brief descriptions of the main resource recovery facilities

Material Recovery Facilities (MRF) – in which mixed waste and/or recyclable materials are sorted and collated by material type using mechanical separation technologies. Aggregated bulk materials of each type are then sent to recycling facilities for further processing.

The technologies used for material sorting in MRFs vary from small, bucket-equipped loaders to sophisticated and fully automated mechanical screening and optical sorting systems.

Alternative Waste Treatment (AWT) Facilities – essentially designed to accelerate the biological degradation of organic wastes and produce compost/soil conditioner (aerobic composting) or methane-rich gas suitable for energy production (anaerobic digestion). Input waste sorting (or streaming) is usually undertaken to ensure that feedstock is free of non-organic material. Post-treatment separation of non-organic material may also be carried out to refine the end-product.

The AWT market is at an early stage of development; technology complexities and performance are not yet well understood but the idea of gaining value from organic waste is highly regarded.

Recycling Facilities – shred, dismantle and sort to material type complex products such as e-waste, and materials suitable for reprocessing, such as plastics, metals, timber, glass and paper/cardboard.

Garden Organics Processing Facilities – shred and compost organic waste in open aerobic conditions to produce a stable product suitable for soil conditioning.

Thermal Waste Technologies – usually involve mass combustion of residual waste (after extraction of recyclable material) and can produce heat and steam for electricity generation. Waste may also be used to prepare fuel suitable for use as a supplementary feedstock for combustion in thermal infrastructure used for wider purposes (eg, cement kilns).

Landfills

Landfills dominate the waste infrastructure stock and receive some 40 per cent of Australia's waste. They are the favoured destination for mixed waste, essentially due to the availability and capacity of existing facilities, and the moderate cost of landfilling in comparison with options to recover more resources. Australia's 1168 operational (licensed and unlicensed) landfills (see the interactive mapping tool) receive around 20 million tonnes of waste each year. The amount of waste sent each year to landfill has declined slightly over the last decade despite annual growth in waste generated and discarded either for recycling or disposal. The increased waste production has therefore been taken up by substantial growth in the demand for recycling and consequent growth in Australia's stock of resource recovery infrastructure.

Landfill Classification

Landfill classification definitions vary greatly between jurisdictions; some are based on types of waste permitted for acceptance, some on the engineering design characteristics and others on landfill size². Corresponding waste type classifications and licensing requirements also vary between jurisdictions. In the absence of classification uniformity, it is not feasible to present a consistent, repeatable landfill classification schedule.

² Wright Corporate Strategy, *Application of Landfill Standards* (2009).

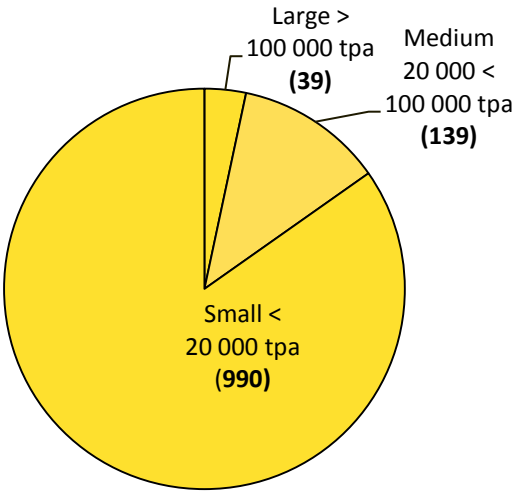
In broad terms, however, three primary landfill and waste type classifications exist across Australia:

- 1. Putrescible waste landfills – which accept all solid wastes, including non-putrescible or inert wastes, and excluding industrial hazardous wastes. These are the dominant landfill types and are deployed to service most cities and towns.
- 2. Non-putrescible waste landfills – which accept all solid wastes, excluding industrial hazardous wastes, MSW, C&I and C&D biodegradable wastes, hazardous household wastes, and e-wastes. These are specialised facilities designed to receive only dry (mostly C&D) wastes.
- 3. Hazardous waste landfills – which accept hazardous industrial and household wastes.

Landfills vary in size from small trench-based facilities which receive less than 1000 tonnes/year, to large, engineered facilities able to receive more than 100 000 tonnes/year. The recent *Analysis of Landfill Survey Data* by the Waste Management Association of Australia (WMAA) found that, based on survey returns, some 75 per cent of overall waste disposal takes place at large landfills (which receive more than 100 000 tonnes/year).

Drawing on jurisdiction data for landfill numbers and the WMAA survey results for indicative size distribution, Rawtec/WCS have estimated the number of landfills by size, as illustrated below at Figure 2.

Figure 2 Estimated landfill stock by size



Source: Estimated by Rawtec/WCS based on jurisdiction input to National Waste Reports and WMAA Landfill Survey results³.

³ Blue Environment for the Waste Management Association of Australia, *Analysis of Landfill Survey Data* (2013)

Small landfills are deployed in rural and remote areas to service small towns and villages. WCS studied the performance of landfills in meeting jurisdiction guidelines⁴, and found that:

“...small landfill sites are the last to gain the benefit of good-practice design, construction and operating measures and are least likely to perform in accordance with modern, expected practice.”

Large landfills, on the other hand, are more likely to be well-designed, constructed and operated, with liners, leachate capture and landfill gas management systems.

A majority of landfill operators undertake pre-disposal resource recovery activities, particularly in the form of garden organics composting, C&D waste sorting and recycling, and collation of household recyclable materials. Pre-disposal resource recovery is becoming commonplace and several jurisdictions count the practice as a condition of approval for landfill facilities.

Landfill gas collection is also becoming more widely practised. The WMAA survey report noted that 42 landfills were (at the time of the survey) equipped with landfill gas collection systems⁵ designed to recover gas and convert it to energy or enable flaring of the landfill gas to render it harmless. The report showed that gas collection systems were most commonly deployed at large landfills (61 per cent of respondents) followed by medium sites (24 per cent of respondents). The report suggests that the uptake of gas recovery systems at large and medium landfills may have increased since the 2008 and 2010 WMAA surveys in response to the carbon pricing mechanism. If so, the deployment of gas collection systems is likely to favour large landfills and the larger medium facilities – in line with jurisdiction landfill guidelines and system economics.

Hazardous waste

Industrial hazardous wastes are treated or destroyed using specialised infrastructure. This infrastructure treats a large variety of solid (and liquid) hazardous waste streams that are produced by industry and the community. The main processes available use chemical or thermal technologies. Limited published information is available on hazardous waste infrastructure in Australia. Table 3 below provides some examples of hazardous waste streams and the typical treatment facilities used for their treatment.

Table 3 Examples of hazardous waste streams and typical treatment facility infrastructure

Hazardous waste stream	Typical treatment facility infrastructure
Medical wastes	Incineration, Autoclave
Arsenic pesticides	Chemical fixation and solidification technologies
PCBs, Organochlorine pesticides	Plasma arc destruction facility
Waste liquid acids/alkalis	Liquid treatment plant
Waste solvents	Distillation facility or blending facility for energy recovery

⁴ Wright Corporate Strategy. *Op. Cit.*

⁵ Blue Environment. *Op Cit.* pp14.

Future waste technology investment requirements

The waste management and resource recovery market is changing to a more sustainable footing. National waste data for 2010-11 indicate an overall resource recovery level of about 60 per cent of waste generated (see Table 4 below) compared with around 51 per cent resource recovery in 2006-07⁶ and 46 per cent in 2002-03⁷.

Table 4 National waste data 2010-11

Waste Stream	Waste Generated (mt)	Resource Recovery		Disposal	
		(mt)	Percentage	(mt)	Percentage
MSW	14.4	7.5	52.1	6.9	47.9
C&I	15.4	9.1	59.1	6.3	40.9
C&D	18.6	12.3	66.1	6.3	33.9
Total	48.4	28.9	59.7	19.5	40.3

Source: *Waste generation and resource recovery in Australia* (2013)

Note. Waste generated equals resource recovery plus disposal. Rounding has caused some discrepancies.

Community and business attitudes about resource conservation are among the key forces leading to impressive improvements in resource recovery performance over the last decade. Other drivers include the ambitious recycling and resource recovery targets and waste management policies and strategies of Australian jurisdictions, and the increasing availability of commercially viable waste processing technologies.

Despite the high level of resource recovery performance already achieved, established jurisdiction targets for future delivery set the scene for a further increase in resource recovery. If all existing targets were hit by 2020 (with pro-rata achievement of those with horizons beyond 2020 and business as usual performance for those without resource recovery targets), the indicative aggregate all-jurisdiction resource recovery rate would amount to around 72 per cent of waste generated; a 12 percentage point increase on the 60 per cent resource recovery level achieved in 2010-11.

The scale of this future recycling gap is compounded by the seemingly inevitable growth in waste generated each year and available for recovery and recycling. Despite efforts by jurisdictions in Australia (and across other OECD nations), waste generation amounts have tended to increase year on year.

Australia generated 32.4 million tonnes of solid waste in 2002-03⁸ and 48.4 million tonnes (including fly ash) in 2010-11— an almost 49 per cent increase (representing average annual growth of around 6 per cent). The rate of waste generation increase may have slowed in recent years, with *Waste generation and resource recovery in Australia* demonstrating a 9.25 per cent increase between 2006-07 and 2010-11 (representing average annual growth of 2.3 per cent) exceeding population growth by around 1 percentage point.

⁶ Environment Protection & Heritage Council, *National Waste Report 2010*

⁷ Productivity Commission, *Waste Management – Productivity Commission Inquiry Report* (2006)

⁸ *Ibid.* Taken directly from report. Note this does not include Tasmania and Northern Territory data nor are data available that have been revised for the new data compilation method. It is estimated by Rawtec/WCS that the appropriate adjustments might add approximately 1 million to 2 million tonnes to waste generated for 2002-03. This would reduce average annual waste generation growth to around 5%.

A forecast of the broad waste management and resource recovery task is set out at Table 5 below using a conservative estimate of waste generation increase in keeping with the more recent period. This table indicates that, to achieve the aggregate national goal, resource recovery effort must step up by 54 per cent to 44.5 million tonnes in 2019-20 from the 28.9 million tonnes recorded in 2010–11⁹.

Table 5 Forecasted national waste position in 2019–20 based on jurisdiction targets

Waste stream	Waste generated ¹ (mt)	Resource recovery ² (mt)	Disposal (mt)
MSW	17.8	11.7	6.2
C&I	19.9	13.9	6.0
C&D	24.1	18.9	5.2
Total	61.8	44.5	17.4

Source: Forecast by Rawtec/WCS based on jurisdiction targets and waste generation rates described in Note 1 below.

Note 1: Waste generation forecasts based on:

- MSW; average annual projected population growth by jurisdiction plus 1%
- C&I; average annual projected Gross State Product growth by jurisdiction.
- C&D; average annual projected Gross State Product growth by jurisdiction.

Note 2: Waste generated equals resource recovery plus disposal. Rounding has caused some discrepancies.

The gaps in the forecasted physical recycling levels for the main waste streams are set out at Table 6. This table indicates that a considerable increase in recovery of MSW, C&I and C&I waste will be necessary if the indicative aggregate all-jurisdiction resource recovery rate is to be achieved. On the other hand, demand for landfill disposal would be reduced.

Table 6 Forecasted waste management and resource recovery gaps 2010–11 to 2019–20 based on jurisdiction targets

Waste stream	Additional waste generated (mt)	Additional resource recovery		Additional disposal (mt)
		(mt)	(Percentage increase over 2010/11 level)	
MSW	3.5	4.2	56	- 0.7
C&I	4.5	4.8	53	- 0.3
C&D	5.5	6.6	53	- 1.1
Total	13.4	15.6	54	- 2.1

Source: Derived from differences between Tables 5 and 4.

Note: Waste generated equals resource recovery plus disposal. Rounding has caused some discrepancies.

⁹ The bases for estimates and assumptions for this analysis are described at Appendix A.

How much and what types of resource recovery infrastructure will be required to support bridging the gap between today's resource recovery level and the 2020 aggregate target?

The answer depends on the mix of waste processing technologies and practices actually adopted over the upcoming period for each of the waste streams. State and Territory governments endeavour to influence resource recovery *outcomes*—most using policies and strategies which favour a market-based approach through application of waste disposal levies. But, the future mix of new waste processing technologies and practices actually rolled out is largely the outcome of commercial infrastructure investment decisions made by private sector waste contractors in the context of government policies. This particularly applies in relation to C&I and C&D resource recovery, where the waste arises from private sector production and is managed by private sector waste contractors. Infrastructure decisions in relation to MSW (which is initially under local government control) are also strongly influenced by commercial interests.

If the gap from 60 per cent resource recovery to the indicative 72 per cent is to be bridged, then increased investment in AWTs, MRFs/mechanical sorting facilities, recycling facilities, and thermal technologies will most certainly be required. What is less certain is the relative mix of technology types that will prevail. With knowledge, however, of the forecast amounts of each of the three waste streams, it is entirely feasible to develop informed estimates of the technologies and practices that would do the job.

One scenario for the infrastructure mix to bridge the resource recovery gap is discussed below and illustrated at Table 6. The scenario postulated is intended to provide a broad-brush, indicative estimate of the investment landscape to 2020. This scenario is based on the necessarily high uptake of the specific technologies and practices appropriate for each waste stream, and in broad accordance with jurisdiction policies to provide for:

- AWTs (of all varieties) for MSW mixed putrescible waste, and food waste from the C&I and municipal sectors
- MRFs and sorting devices (of all varieties) for municipal recyclable wastes, C&I dry waste and C&D waste
- thermal technologies to recover embodied energy in residues arising from waste treatment in AWTs and MRFs.

The analysis has been developed separately for each waste stream, with judgements made about the amount of waste assigned to each facility type. The actual outcome might feature less investment in one technology type and more of another, but the scenario is feasible and internally consistent. Estimates and assumptions used in this analysis are set out at Appendix A.

Using this scenario basis, Table 7 indicates that some 208 new resource recovery facilities, at a cost in the order of \$3.6 billion, will be required by 2019-20. Of particular note is the need for a further:

- 27 AWTs to process MSW and C&I waste
- 29 further municipal recyclables MRFs
- 44 MRFs and consolidation facilities for C&I waste
- 31 further C&D MRFs and consolidation facilities.

Other feasible resource recovery infrastructure scenarios may be considered by adjusting the relative proportion of waste assigned to each facility type. Ultimately the actual investment scenario will be played out in the marketplace.

Table 7 Forecasted facility requirements to service resource recovery gap by 2019–20

Waste type	Investment category	AWT bio waste processing (a)	Garden organics processing facilities	Thermal facilities	MRFs, mechanical sorting, and consolidation facilities	Recycling facilities	Total for all facilities
MSW	Recovery scenario (mt)	1.3	0.8	0.2	1.5	0.4	4.2
	No. facilities required	13	17	1	29	21	81
	Est capex (\$m)	815	51	215	527	26	1635
C&I	Recovery scenario (mt)	1.4	0.5	0.2	2.2	0.5	4.8
	No. facilities required	15	10	2	44	24	94
	Est capex (\$m)	942	30	249	104	30	1355
C&D	Recovery scenario (mt)	N/A	N/A	0.3	6.2	N/A	6.6
	No. facilities required			2	31		33
	Est capex (\$m)			337	299		636
Total all sectors	Recovery scenario (mt)	2.7	1.3	0.8	9.9	0.9	15.6
	No. facilities required	27	27	5	104	45	208
	Est capex (\$m)	1757	81	801	930	57	3625

Source: Forecast by Rawtec/WCS based on analysis of resource recovery gap to 2020 and assignment of a proportion of the resource recovery task outlined in Table 5 to each facility type.

Note: (a) including MBT, Aerobic, and Anaerobic facilities

Rounding has caused some discrepancies.

Incentives and Barriers for Increased Resource Recovery

As noted above, State and Territory waste policies and strategies are among the principal drivers of the uptake of resource recovery infrastructure and the diversion of waste from landfill over the last decade. Landfill levies, for instance, are intended to provide a financial incentive for waste generators and their contractors to embrace recycling solutions over landfill.

A number of Australian jurisdictions have recognised that, despite the market signal provided by waste disposal levies, overall landfill gate pricing remains broadly lower than the alternative resource recovery gate pricing. Some of the principal reasons for this position include artificially low landfill gate pricing resulting from competition between landfill operators in areas where numbers of facilities are located within close proximity; and waste disposal levies not sufficiently high to pitch the overall landfill gate pricing at or above the alternative resource recovery gate pricing.

There is also reluctance by some waste generators to invest in systems to stream recyclable materials separate from waste at source – and reluctance by some waste management contractors to adopt separate recycling and waste collection practices. Although this issue is being addressed by jurisdictions through policies, strategies and on-ground local action programs, with considerable success for improved resource recovery, commercial imperatives cannot always be satisfied.

As a result of the price balance in favour of landfill and a variety of costs and impediments in changing production processes and collection/disposal practices, many resource recovery infrastructure projects are at (or below) the margin of commercial viability. Some jurisdictions (including NSW, Victoria and SA) have established infrastructure investment co-funding grant schemes to support projects that would not proceed without financial assistance. Project merit is determined on a contestable basis and proposals are subjected to formal application and commercial assessment. Funding choice can be aligned with agency-identified material types for which resource recovery is sub-optimal and/or for which opportunities for resource recovery can be identified in the supply chain. These types of funding arrangements have been successful in supporting infrastructure enhancements and new projects and make an important contribution to Australia's resource recovery infrastructure.

Numerous other issues form barriers to increased resource recovery. Distance from many rural and remote areas to recovery facilities and materials markets, for instance, is an important factor limiting cost-effective recycling. Progress is being made in devising initiatives for local recovery and use of materials such as glass. While not necessarily classified as recycling, such initiatives can result in productive uses of materials which might otherwise be discarded. A related issue is the need for scale-economy for sophisticated, expensive infrastructure such as AWT and thermal technologies. This issue brings into focus the benefits of regional collaboration for sustainable waste management.

A further barrier to increased resource recovery is the difficulty of gaining planning approval for resource recovery infrastructure in urban and industrial settings. The case study below illustrates the sorts of planning horizons relevant to Australia and other OECD nations.

Case Study – Waste to Energy Facility - Bolzano, Italy

(Source: ISWA Waste to Energy Study Tour, June 2013)

A new Waste-to-Energy (WtE) facility was recently built in Bolzano, Italy, at a cost of €100 million (or about \$AUD 120 million). This facility generates 15 MW of electricity, and also produces 32 MW of thermal power for heating of nearby houses and offices. This energy is generated from 130 000 tonnes/year of municipal and commercial waste that would otherwise have been disposed to landfill.

This facility uses a Martin reverse acting grate in the main WtE combustion chamber. The technology is not new and has been in use in Europe from the 1960s. However, significant infrastructure has been installed for flue gas treatment to meet very strict EU emission standards. It took nearly 8–10 years of planning before the facility could be built. This lead time included a range of feasibility assessments and extensive consultation with local communities. A key outcome from community consultation was that architectural design of the facility should 'beautify' the local environment and surrounds.

Planning for the facility also needed to address a range of important commercial and environmental issues. This included certainty around the feed supply and quality, emission targets to be achieved, and the revenues that could be generated from Renewable Energy Certificates and rising landfill disposal restrictions and costs. In this respect, Europe has well developed and very stringent emission standards that apply to thermal waste treatment facilities as well as online emission monitoring and reporting requirements. There are also important policy and commercial settings in Europe which affect the commercial viability of WtE. For example, Austria introduced a ban on disposal of waste exceeding 5 per cent Total Organic Carbon in 1997 as well as a landfill tax which now sits at €87 per tonne.

This case study shows that developing a WtE facility for Australia could take up to 10 years and its feasibility is strongly influenced by Government policy settings which can vary between state & territory jurisdictions. It would need to involve the development of a strong business case to demonstrate viability along with extensive community consultation. Demonstrating that emissions will not harm the environment or community would be critical for addressing community concerns. Selecting an appropriate location and architectural design of external facades would also help facilitate community acceptance.

Appendix A. Resource Recovery Infrastructure Estimation Methodology

1. Projection of total waste generation (tonnes) in 2019–20

Waste generation was projected for 2019–20. These forecasts were based on:

- **MSW**; average annual projected jurisdiction population growth plus 1%
- **C&I**; average annual projected jurisdiction Gross State Product growth
- **C&D**; average annual projected jurisdiction Gross State Product growth.

2. Projection of resource recovery volumes (tonnes) in 2019–20

Resource recovery was projected for 2019–20 based on jurisdictions achieving their published landfill diversion (or resource recovery) targets. Where no target was set by a jurisdiction, its current landfill diversion performance was adopted for 2019–20. Where a target was set by a jurisdiction, but was not set for 2019–20, this target was extrapolated or interpolated to estimate a value for 2019–20.

3. Estimated capital costs of new resource recovery facilities

The following average capital expenditure values (\$/tonne) were adopted to estimate the expected capital investment required to meet projected waste volumes and jurisdictional resource recovery targets for 2019–20.

Table A1. Estimated average capital expenditure by facility by waste stream (MSW, C&I, C&D) - \$/tonne of capacity

	AWT bio waste treatment, inc MBT, Aerobic, Anaerobic	Garden organics processing	Thermal	MRF and mechanical sorting	Recycling facilities
MSW	\$500	\$60	\$1000	\$300	\$60
C&I	\$500	\$60	\$1000	\$200	\$60
C&D	N/A	N/A	\$1000	\$40	N/A

Source: industry estimates, Rawtec/WCS 2013