Environment Protection Authority

Pilot Generator Site-based Audit Commercial and Industrial Waste Stream in the Metropolitan Levy Area of New South Wales

Overview

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This overview outlines the key findings of a Pilot Generator-Site Audit (GSA), undertaken by the EPA in the Sydney Metropolitan Area (SMA) and the Extended Regulated Area (ERA) of New South Wales.

The main aims of the Pilot Generator-Site Audit (GSA)

- Inform decisions made under the *Waste Less, Recycle More* program and recycling programs of the NSW Government.
- Inform the waste and resource recovery industry, and businesses in general, about the composition of general waste and recyclables generated and collection systems in use at different sized businesses from select Australian and New Zealand Standard Industrial Classification (ANZSIC) industry divisions.
- Help to identify opportunities to plan and implement systems to improve the quality and quantity of recycling at business premises.

The GSA was commissioned by the $60-million Waste and Recycling Infrastructure Fund, as part of two comprehensive commercial and industrial (C&I) waste-stream audits – the first of which includes the GSA and a disposal-based audit (DBA). The second audit will be undertaken in 2017 to help assess the funding and the programs' impact on resource recovery in the regulated areas.

The GSA examined waste and recycling containers at 197 industrial premises within the SMA and the ERA, between August and October 2014. The audits included:

- visual assessment of the composition of waste and recyclables
- an analysis of current landfill diversion actions and identification of opportunities for improvement
- collation of data to establish benchmarks on waste generation and management.

A report on the key findings of the GSA, *Pilot Generator Site-based Audit of the Commercial and Industrial Waste Stream in the Metropolitan Levy Area of New South Wales*, has been published online.

In the DBA, C&I loads delivered to select landfills and transfer stations within the regulated areas were visually assessed to determine the composition of landfill-disposed waste. The key findings are available online in a report titled, *Disposal Based Audit of the Commercial and Industrial Waste Stream in the Regulated Areas of New South Wales*.

Key findings of the garbage bag audit undertaken to inform the DBA are contained in a report titled *Disposal-based Audit Commercial and Industrial Waste Stream in the Regulated Areas of New South Wales - Garbage Bag Report.*

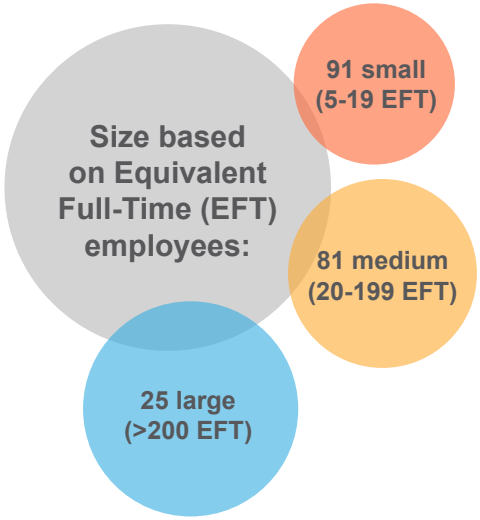
Together, they will help to inform the infrastructure-funding program and the Government's various business recycling programs, with the aim of assisting the waste industry and the business sector in identifying further recycling opportunities.

The fund is part of the five-year, $465.7-million *Waste Less, Recycle More* initiative, announced in February 2013 by the NSW Government.

Full versions of all reports can be accessed at: www.epa.nsw.gov.au/wastetools/surveys.htm.

The participating organisations

- 197 organisations across 13 targeted ANZSIC divisions
- majority of audited organisations were in manufacturing, followed by retail and wholesale, and offices
- 143 in SMA (73 per cent)
- 54 in ERA (27 per cent)
- data analysed according to local council boundaries



Australian and New Zealand Standard Industrial Classification (ANZSIC) divisions

The selection of businesses for auditing was based on type, size and location (SMA or ERA) within selected ANZSIC industry divisions and sub-divisions.

Distribution of organisations by division/sub-division

ANZSIC Division	ERA	% ERA	SMA	% ERA
C - Manufacturing				
C11 - Food Product Manufacturing	5	25%	15	75%
Other Manufacturing	3	17%	15	83%
F - Wholesale Trade	8	42%	11	58%
G - Retail Trade				
G41 - Food Retailing	3	30%	7	70%
G42 - Other Store-Based Retailing	4	17%	20	83%
H - Accommodation				
H44 - Accommodation	3	33%	6	67%
H45 - Food and Beverage Services	4	44%	5	56%
I - Transport, Postal and Warehousing	4	21%	15	79%
J-O - Office Based Industries	6	20%	24	80%
P - Education and Training	2	18%	9	82%
Q - Health Care and Social Assistance	6	43%	8	57%
R - Arts and Recreation Services	6	43%	8	e
Total	54	27%	143	73%

Distribution and size of organisations by ANZSIC division

The distribution of businesses shown below was derived from data available from the Australian Bureau of Statistics (ABS cat. no. 8165.0, Counts of Australian Businesses including entries and exits – Businesses by Main State by Industry Class by Employment Size Ranges and ABS cat. no. 8155.0, Australian Industry – Australian industry by division).

ANZSIC Division	Employees					
	SMA			ERA		
	5-19	20-199	200+	5-19	20-199	200+
C - Manufacturing	762	277	12	163	40	0
F - Wholesale Trade	760	288	16	108	21	3
G - Retail Trade	1,279	317	12	269	69	3
H - Accommodation and Food Services	1,193	439	26	273	104	3
I - Transport, Postal and Warehousing	198	86	13	52	24	0
J - Information Media and Telecommunications	161	80	11	0	12	0
K - Financial and Insurance Services	610	219	61	81	15	0
L - Rental, Hiring and Real Estate Services	522	90	9	97	20	0
M - Professional, Scientific & Technical Services	2,272	676	50	281	54	3
N - Administrative and Support Services	775	463	49	119	42	3
O - Public Administration and Safety	74	37	6	3	6	0
P - Education and Training	238	147	15	40	19	0
Q - Health Care and Social Assistance	1,013	212	31	199	45	3
R - Arts and Recreation Services	106	59	6	25	18	0

Local council areas in the Metropolitan Levy Area of NSW

Sydney Metropolitan Area

Ashfield, Canterbury, Liverpool, Ryde, Auburn, Fairfield, Manly, Strathfield, Bankstown, Holroyd, Marrickville, Sutherland, Baulkham Hills, Hornsby, Mosman, Sydney, Blacktown, Hunters Hill, North Sydney, Warringah, Botany Bay, Hurstville, Parramatta, Waverley, Burwood, Kogarah, Penrith, Willoughby, Camden, Ku-ring-gai, Pittwater, Woollahra, Campbelltown, Lane Cove, Randwick, Canada Bay, Leichhardt, Rockdale

Extended Regulated Area

Cessnock, Lake Macquarie, Shellharbour, Wyong, Gosford, Maitland, Shoalhaven, Hawkesbury, Newcastle, Wingecarribee, Kiama, Port Stephens, Wollongong

Since the audit was conducted, the SMA and the ERA have been combined into what is now known as the Metropolitan Levy Area, and the RRA is now known as the Regional Levy Area.

Key findings are reported for the following regional groupings of local councils as well:

Southern Sydney Regional Organisation of Councils (SSROC)	**Ashfield, Botany Bay, Burwood, Canada Bay, Canterbury, Leichhardt, Marrickville, Randwick, Sydney, Waverley, Woollahra, Hurstville, Kogarah, Rockdale, Sutherland**
Western Sydney Regional Organisation of Councils (WSROC)	**Auburn, Bankstown, Blacktown, Blue Mountains, Fairfield, Hawkesbury, Holroyd, Liverpool, Parramatta, Penrith, The Hills**
Macarthur Regional Organisation of Councils (MACROC)	**Camden, Campbelltown, Wollondilly**
Northern Sydney regional Organisation of Councils (NSROC)	**Horsnby, Hunters Hill, Ku-ring-gai, Lane Cove, North Sydney, Ryde, Willoughby**
Shore Regional Organisation of Councils (SHOROC)	**Manly, Mosman, Pittwater, Warringah**
Southern Councils	**Kiama, Shellharbour, Shoalhaven, Wingecarribee, Wollongong**
Hunter Councils	**Cessnock, Dungog, Lake Macquarie, Maitland, Muswellbrook, Newcastle, Port Stephens, Singleton, Upper Hunter**

The key findings

The data collected by the visual assessment of containers was analysed to determine the composition of the waste and recyclables generated. The container size, the frequency of collection and the amount of materials present at the time were used to estimate the total quantities per annum.

In total, 78,947 tonnes of C&I waste was reported as being generated for all audited businesses within all areas. For the SMA and the ERA when combined, medium-sized businesses generated the majority of C&I waste (71 per cent), followed by the large businesses (27 per cent) and then small (2 per cent).

In the SMA, medium-sized businesses accounted for 77 per cent of C&I waste, while large businesses generated 73 per cent in the ERA.

Of the total waste annually generated by the audited businesses, 33.1 per cent goes to landfill, while 66.9 per cent is being diverted.

Waste diverted by ANZSIC divisions/sub-divisions (tonnes)

ANZSIC division	Landfilled		Diverted		Total
C - Manufacturing					
C11 - Food Product Manufacturing	7611.4	21.3%	28105.4	78.7%	35716.8
Other Manufacturing	432.7	24.7%	1316.5	75.3%	1749.2
F - Wholesale Trade	7458.8	30.5%	16989.8	69.5%	24448.6
G - Retail Trade					
G41 - Food Retailing	231.5	77.2%	68.6	22.8%	300.1
G42 - Other Store-Based Retailing	321.4	26.3%	899.4	73.7%	1220.8
H - Accommodation and Food Services					
H44 - Accommodation	3404.5	56.8%	2593.0	43.2%	5997.5
H45 - Food and Beverage Services	643.3	76.1%	202.4	23.9%	845.7
I - Transport, Postal and Warehousing	1044.9	51.9%	966.5	48.1%	2011.4
J-O - Office Based Industries	686.4	42.7%	921.0	57.3%	1607.4
P - Education and Training	271.9	75.8%	86.9	24.2%	358.8
Q - Health Care and Social Assistance	2466.7	85.7%	410.6	14.3%	2877.2
R - Arts and Recreation Services	1548.1	85.3%	265.8	14.7%	1813.9
Total	26121.5	33.1%	52825.9	66.9%	78947.4

Due to time limitations on conducting site assessments and difficulties in recruiting businesses to participate in the audit, only 80 per cent of the targeted sample size of 250 businesses was assessed. As a result, some ANZSIC divisions were under-represented, leading to limited statistical confidence in the data collected for them.

The highly variable nature of waste generation in the C&I sector, combined with inherent inaccuracies in visual assessment of waste in containers, means a very large sample size is required to achieve a high level of confidence in the accuracy of the collected data. The statistical analysis showed that, for at least some divisions, the number of businesses assessed was not sufficient to achieve an acceptable level of confidence. For this reason this audit is treated as a pilot.

While in the absence of other data this study can help to identify recycling opportunities. However careful consideration should be given in using this data as a sole source in developing resource recovery solutions for the under-represented business sizes and ANZSIC divisions.

Sizes of sites audited by region

The table below shows the distribution of businesses assessed across the established regional organisations of councils areas in numbers and percentage.

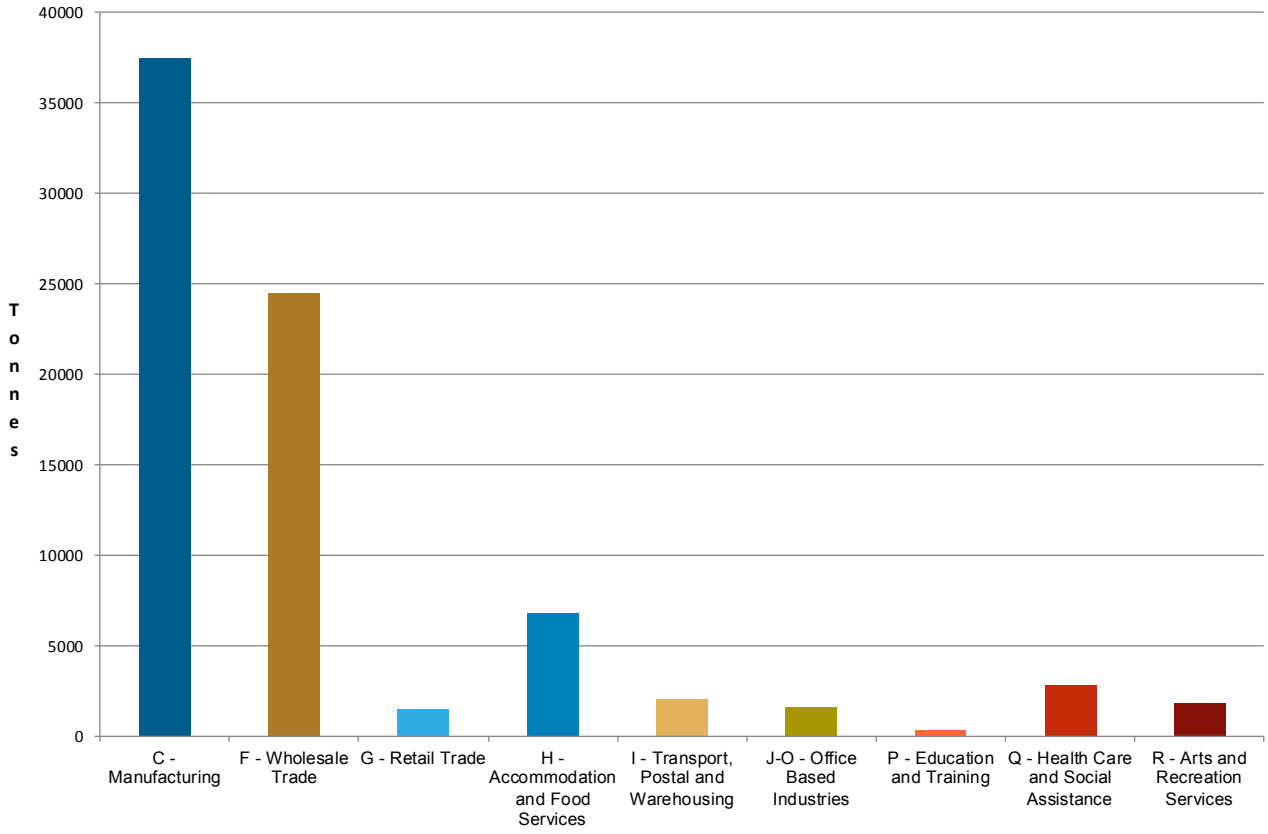
Regional Organisation of Councils (ROC)	Small (5 to 19 EFT)		Medium (20 to 199 EFT)		Large (200+ EFT)		Total
Hunter Council Groups	28	56%	18	36%	4	8%	50
Macarthur ROC (MACROC)	1	50%	1	50%	0	0%	2
Northern Sydney ROC (NSROC)	6	46%	3	23%	4	31%	13
Shore ROC (SHOROC)	0	0%	2	67%	1	33%	3
Southern Councils Group	2	67%	1	33%	0	0%	3
Southern Sydney ROC (SSROC)	42	48%	35	40%	10	11%	87
Western Sydney ROC (WSROC)	13	33%	19	49%	7	18%	39
Total	92	47%	79	40%	26	13%	197

Quantity of waste diverted by region (tonnes and % of total in region)

ROC	Landfilled		Diverted		Total
Hunter Council Groups	3449	42.5%	4661.8	57.5%	8110.8
MACROC	15.6	18%	71.4	82%	87.0
NSROC	994.3	79.5%	256.7	20.5%	1251.0
SHOROC	109.2	35%	202.5	65%	311.7
Southern Councils Group	45.4	33.7%	89.1	66.3%	134.5
SSROC	7738.3	31.9%	16557.2	68.1%	24295.5
WSROC	13769.6	30.8%	30987.2	69.2%	44756.9
Total	26121.5	33.1%	52825.9	66.9%	78947.4

The biggest generators of waste

In all regulated areas, the ANZSIC division generating the most waste is manufacturing – and specifically food manufacturing – followed by wholesale trade, and accommodation and food services.



Waste management systems

The main systems in use, which varied between businesses of similar type and size in the SMA and the ERA, were:

- General waste: compactors, bins (ranging from 1.5 to 4.5m^3), 240-litre mobile garbage bins (MGB)
- Cardboard/paper: 3m^3 bins, compactors, balers
- Paper-only systems: 240-litre MGB
- Comingled: 240-litre MGB
- Glass: 240/120-litre MGB
- Organics: 120-litre MGB
- Metals: open bins (skips)
- Soft plastic: 240-litre MGB, balers

Benchmarking of generation rates

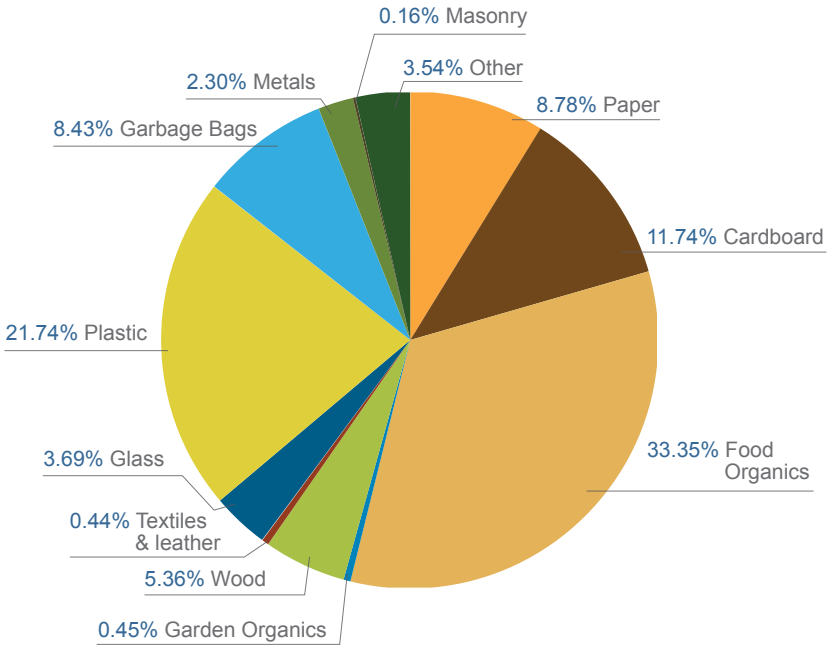
The tables below provide data on the average weight of C&I waste generated in each division, per square metre occupied, every day. The data for the education and training division is reported separately and sub-divided by type of institution, as it is most influenced by the number of staff and students.

ANZSIC division	Average kg/m^2/day		
	Total waste	General waste	Recycling
C - Manufacturing	0.54	0.09	0.45
F - Wholesale Trade	0.11	0.02	0.08
G - Retail Trade	0.05	0.01	0.04
H - Accommodation and Food Services	0.50	0.23	0.26
I - Transport, Postal and Warehousing	0.04	0.02	0.02
J-O - Office Based Industries	0.02	0.01	0.01
Q - Health Care and Social Assistance	0.23	0.08	0.15

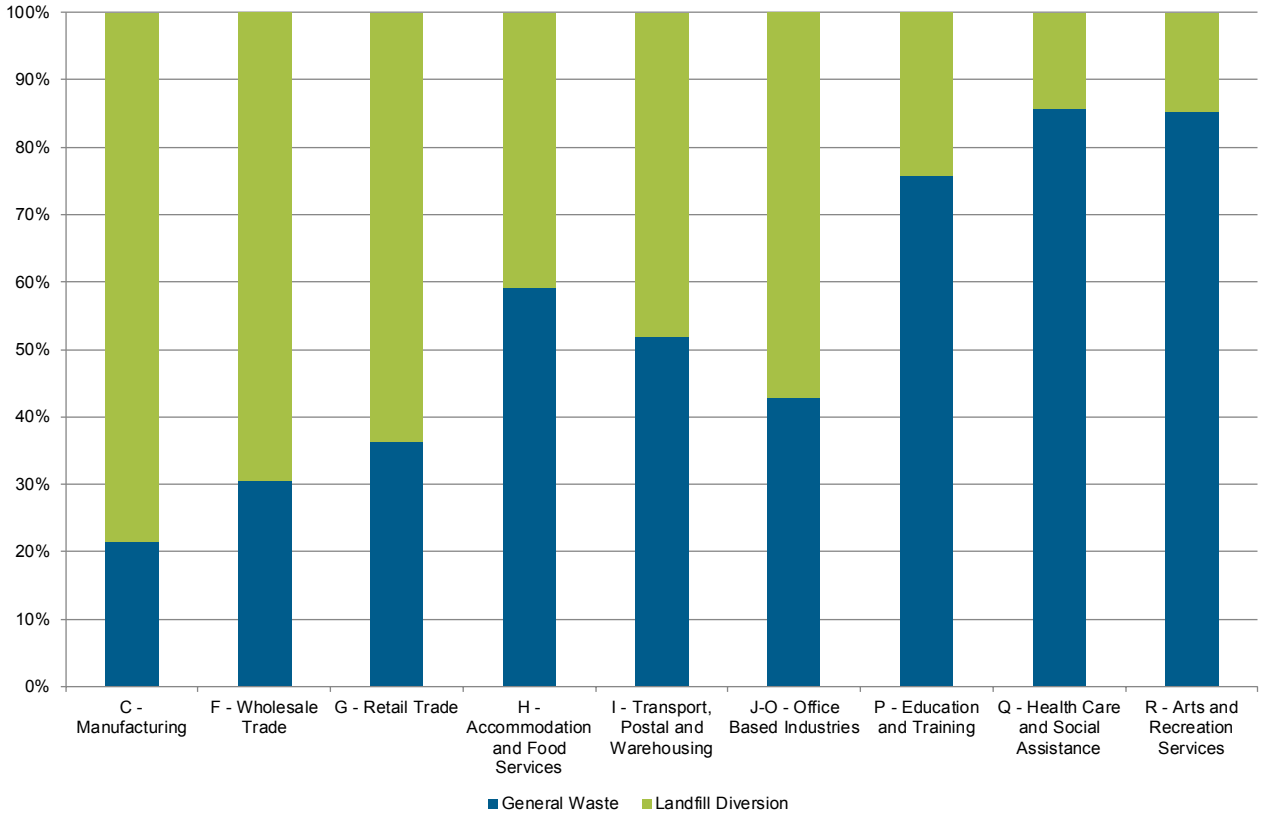
P - Education and Training (types of institution)	Average kg/student/day		
	Total waste	General waste	Recycling
University A – 2800 students	0.12	0.110	0.015
University B – 4000 students	0.05	0.038	0.010
Primary School A – 115 students	0.03	0.024	0.003
Primary School B – 235 students	0.02	0.007	0.016
Child Care Centre A – 60 children	0.004	0.003	0.001

Materials in the general waste stream

The main types of materials (by weight) in the general waste stream, across SMA and ERA and all industrial divisions audited. This is waste found in the containers only, with garbage bags present slit open for assessment.



Landfill diversion by ANZSIC division



Summary of potential barriers to overcome

The GSA found diversion of waste from landfill being affected by various issues associated with the systems, management approaches and materials, including (not in any order):

- While many personnel had good knowledge of waste management systems (in terms of what materials could be diverted and what other businesses are doing), they often were restricted by production issues, operational concerns, cost factors and the constraints due to the business' location.

- There was some innovation in terms of types of systems being implemented (e.g. organics systems) and, for some sites in the ERA, material exchanges had been organised that resulted in decreased levels of waste to landfill.

- For small and medium sized businesses, cost is an important consideration in the adoption of collection systems for increased recycling.

- The management systems (i.e. container types and sizes) used for similar materials varied within the divisions. Though not an issue in itself, it indicates that systems need to meet the specific requirements of individual businesses.

- There is a lack of some type of recycling systems in the ERA, along with higher costs associated with transport.

- Materials for which cost-effective recycling services can be obtained in the SMA, but with difficulty in the ERA, include soft plastics, polystyrene and mattresses.

- Though there is willingness to separate and transport compacted materials (e.g. polystyrene) to improve diversion rates, provision of necessary infrastructure could be cost-prohibitive and not practical.

- In the wholesale division, recyclable materials such as cardboard and soft plastic are being placed into general waste containers, due to lack of space for a recycling bin, or commitment of staff and management to recycling.

- A lack of information provided to staff on correct segregation is leading to contamination. This could be due to non-existent or wrong signage, or inaccurate colour-coding of bins.

- Small businesses often lack knowledge of the types and quantities of materials being generated and the pathways for recycling. There is often a reliance on cleaners to manage the segregation of material for recycling and general waste.

Conclusions

Analysis of collected data and discussions with on-site personnel during field work has yielded the following conclusions on improving resource recovery:

- Overall, businesses are supportive of implementing opportunities for improved recycling, but require access to cost-effective services and to information on implementation strategies.

- Management is generally enthusiastic about implementing effective waste management systems to increase recycling, but cost is a dominant issue of concern.

- While cost is often cited as a barrier to implementing recycling systems, a close examination of the collection fees suggests it is not a substantive issue in the SMA.

- Cost of implementing and lack of availability of recycling systems are major inhibitors of increased recycling in the ERA.

- During field work for the audit, requests were received from businesses on a daily basis for access to information on disposing of materials that are generated intermittently (e.g. mattresses from accommodation premises).

- Many medium-size businesses indicate lack of affordability as a limiting factor to installing new recycling systems (e.g. balers or shredders). For example, without a baler there would be insufficient space to store soft plastic on site for storage and to reduce the cost of transport.

- Staff are generally positive about achieving improved recycling on site. However, when changes to existing systems have perceived cost implications, there is a lack of enthusiasm from management.

- Across all divisions/sub-divisions in every local government area/regional grouping in the SMA and the ERA, there is substantial opportunity to increase landfill diversion for a variety of materials.

- For sites with multiple tenants and property managers, the usual approach to waste is disposal, instead of implementing a collection system to maximise landfill diversion. This is largely due to space limitations, as well as existing cleaning contracts that would require increased fees for managing such a system.

- Opportunities for improvement are varied across divisions/sub-divisions, regulated areas and sizes of business. There is no single area that should be targeted for actions to improve landfill diversion.

- Many materials are not being diverted due to businesses not viewing waste management as a core activity and not having resources (particularly time) to investigate alternative approaches.

- For many businesses (particularly small and medium), the availability of space is a significant limitation on installing a variety of recycling systems.

- Businesses/organisations with multiple sites tend to have good signage in relation to advising correct segregation of wastes, but those with a single premises often have minimal signage, if at all.

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