

Environment Protection Authority

Disposal-based Audit Commercial and Industrial Waste Stream in the Regulated Areas of New South Wales

Overview

The main aims of the Disposal-based Audit (DBA)

- Inform infrastructure and other investment decisions made under the NSW Government's *Waste Less, Recycle More* initiative.
 - Inform regional and sub-regional waste and resource recovery planning.
 - Provide baseline data to assess the impact of the infrastructure funding program on resource recovery in the period 2013/14 to 2016/17 and beyond.
 - Inform the waste and resource recovery industry and businesses from the key industry sectors about C&I waste composition, particularly information on recyclable materials.
 - Inform the government, waste industry and businesses on the trends in the composition of the C&I waste stream in SMA for the period from 2003 to 2008 and 2014.
 - Assist NSW EPA in developing business recycling programs to divert more materials away from landfills.
 - Characterise the various streams or transport modes that enter landfills and transfer stations.
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This overview outlines the key findings of a Disposal-based Audit (DBA), undertaken by the EPA in the Sydney Metropolitan Area (SMA), the Extended Regulated Area (ERA) and the Regional Regulated Area (RRA) of New South Wales.

The DBA, completed in 2014, was commissioned by the \$60-million Waste and Recycling Infrastructure Fund (WRIF), as part of two comprehensive commercial and industrial (C&I) waste-stream audits – the first of which includes the DBA and a pilot generator-site audit (GSA).

In the DBA, C&I loads delivered to select landfills and transfer stations within the regulated areas were visually assessed (including weight-based sorting of materials in garbage bags) to determine the composition of landfill-disposed waste. The report on the key findings of this audit has been published online, *Disposal-based Audit Commercial and Industrial Waste Stream in the Regulated Areas of New South Wales*.

The key findings of the GSA are available online in a report titled *Pilot Generator Site-based Audit Commercial and Industrial Waste Stream in the Metropolitan Levy Area of New South Wales*. It covered 197 business premises in the SMA and the ERA, from select Australian and New Zealand Standard Industrial Classification divisions.

The key findings of the garbage bag audit which were incorporated into the DBA report are available online in a separate report titled *Disposal-based Audit Commercial and Industrial Waste Stream in the Regulated Areas of New South Wales Garbage bag report*.

Together, the DBA and the GSA will help to inform the WRIF and other NSW Government programs, with the aim of assisting the waste industry and the business sector in identifying further recycling opportunities.

The second audit of the C&I waste stream in the regulated areas of NSW will be undertaken in 2017 to help assess the funding and the programs' impact on resource recovery in the regulated areas.

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

Accuracy

A statistical analysis – the first time one has been undertaken on a C&I audit project of this size – indicates that overall, the results appear remarkably robust.

This is due partly to the large sample size (2,000 C&I loads visually assessed) and to the comparatively low variance of material distributions.

As the 90 per cent confidence intervals for most materials were low (the highest for any individual material was 1.1 per cent, for wood treated/painted), the data contained in the audit should form the basis of very accurate estimates of material distributions in the C&I waste stream.

NSW Regulated areas audited

- Regional Regulated Area (RRA)
- Sydney Metropolitan Area (SMA)
- Extended Regulated Area (ERA)



Ballina, Gloucester, Nambucca, Bellingen, Great Lakes, Port Macquarie-Hastings, Blue Mountains, Greater Taree, Richmond Valley, Byron, Kempsey, Singleton, Clarence Valley, Kyogle, Tweed, Coffs Harbour, Lismore, Upper Hunter, Dungog, Muswellbrook, Wollondilly



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



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 were also reported for smaller regional groupings of local council areas listed below:

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)	Hornsby, 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 inc	Cessnock, Dungog, Lake Macquarie, Maitland, Muswellbrook, Newcastle, Port Stephens, Singleton, Upper Hunter
North East Waste (NEWaste)	Ballina, Byron, Clarence Valley, Lismore, Kyogle, Richmond Valley, Tweed
MIDWASTE	Great Lakes, Gloucester, Greater Taree, Port Macquarie, Hastings, Kempsey, Nambucca, Bellingen, Coffs Harbour

The field survey

The survey took place at 10 landfills and four transfer stations over 33 consecutive days during July and August 2014. It included:

- a visual assessment of the composition of 2,000 C&I loads (19.5 million litres, weighing 3,950 tonnes)
- a gatehouse survey of customers to identify the source of waste delivered and the industry sectors
- sampling and sorting the contents of more than 3010 garbage bags into 85 categories.

Regulated areas assessed

	RRA	SMA	ERA	Total
Tonnes	260	2,740	950	3,950
Vehicles	169	1,424	407	2,000
Landfills	3	4	3	10
Transfer Stations	0	4	0	4

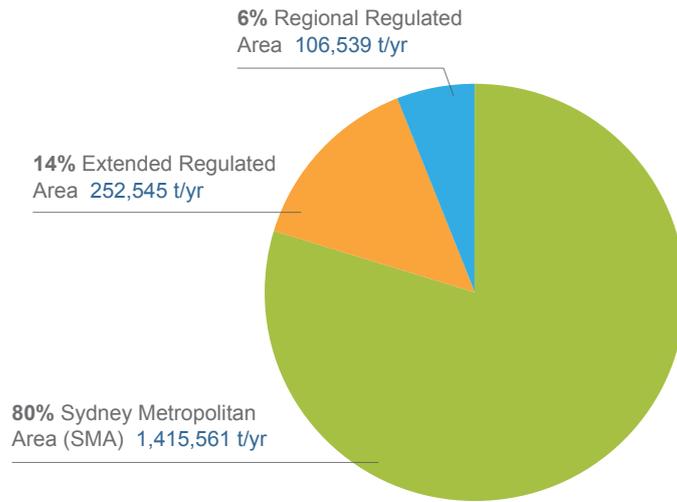
Types of waste facility assessed

	Tonnes	Vehicles	Mixed loads	Single material loads
Landfills	2,670	1,014	739	275
Transfer Stations	1,280	986	722	264

Key Findings

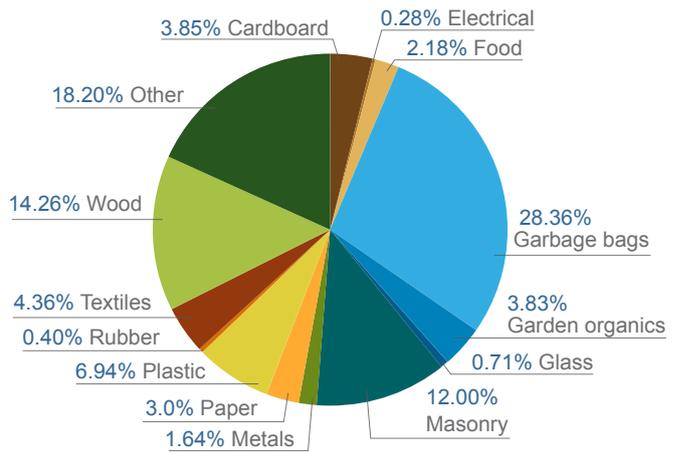
C&I waste sent to landfill

In 2013/14, almost 1.8 million tonnes of waste was sent to landfill from C&I businesses in the regulated area (80 per cent from the SMA).



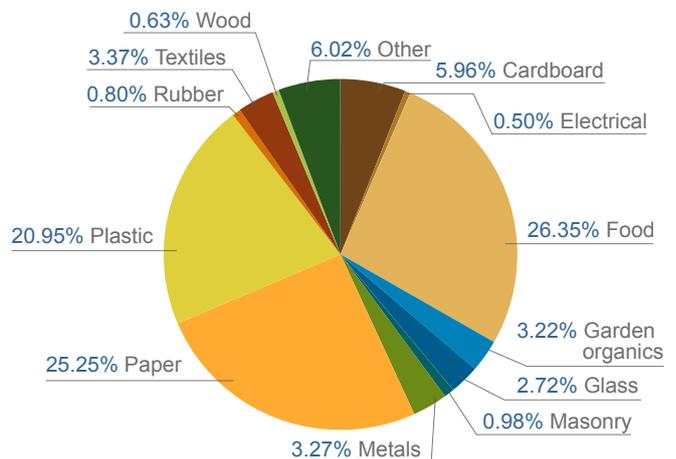
General content of C&I waste

By weight, C&I waste in the regulated areas consists of garbage bags, other materials (including from waste processing, shredder floc and pulp), wood (mainly treated timber), masonry materials (including soil) and plastic (of which almost half is plastic film). It also contains food, cardboard, vegetation, paper, textiles, metals, and small amounts of glass, rubber and electrical items.



Content of garbage bags

Garbage bags in C&I waste contain (by weight) mainly food, paper and plastic, as well as cardboard, textiles, garden organics, metals, glass, and small amounts of masonry, rubber and wood.



Which industry sectors generate most garbage bags?

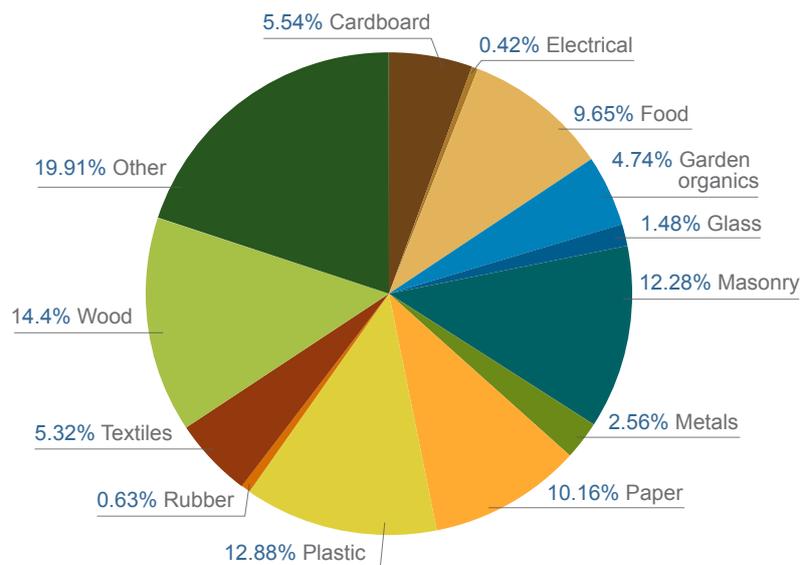
The retail sector is responsible for 23 per cent of all garbage bags disposed, closely followed by the manufacturing sector (22 per cent). Mixed small businesses and accommodation/food services each account for 11 per cent. Healthcare/social assistance, education/training and shopping centres are also large contributors.

Composition of C&I waste, including content of garbage bags

When the contents of the garbage bags are distributed into material categories, the C&I waste consists (by weight) of miscellaneous 'other' materials (such as fines, shredder floc and pulp), wood, plastics, masonry, paper and food.

Around 51 per cent of the total is degradable organic material, such as wood, paper, cardboard, food, textiles, vegetation, and nappies.

Packaging material, including packaging made from plastic, paper, cardboard, glass and metal, make up 19 per cent of C&I waste.



Transportation to disposal point

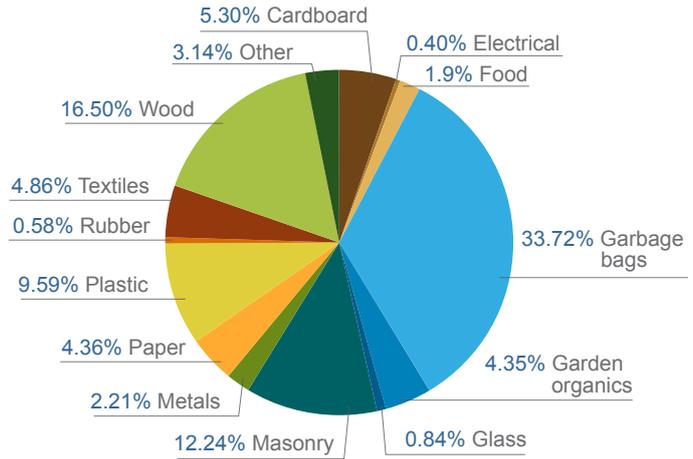
More than two-thirds of C&I waste (68 per cent of total weight) arrives at landfills and transfer stations in mixed loads; the remainder (32 per cent) are single-material loads. Single-material load means that 90 per cent of the load is of one material category.

Front-lift trucks deliver the most, followed by roll-on roll-off trucks, rear-lift trucks and trailers.

Composition of mixed loads

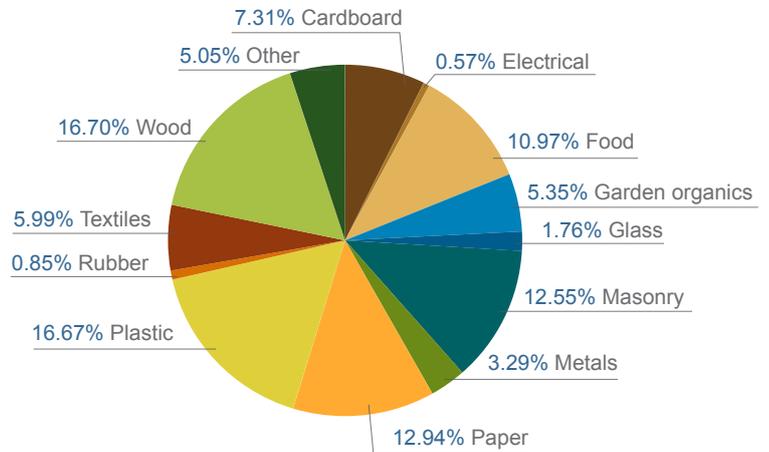
Mixed loads of C&I waste contain (by weight) mainly garbage bags (34 per cent), wood (17 per cent), masonry (12 per cent) plastics (10 per cent).

They also contain cardboard and textiles (5 per cent), garden organics and paper (4 per cent) and metals (2 per cent).



Composition of mixed loads, including content of garbage bags

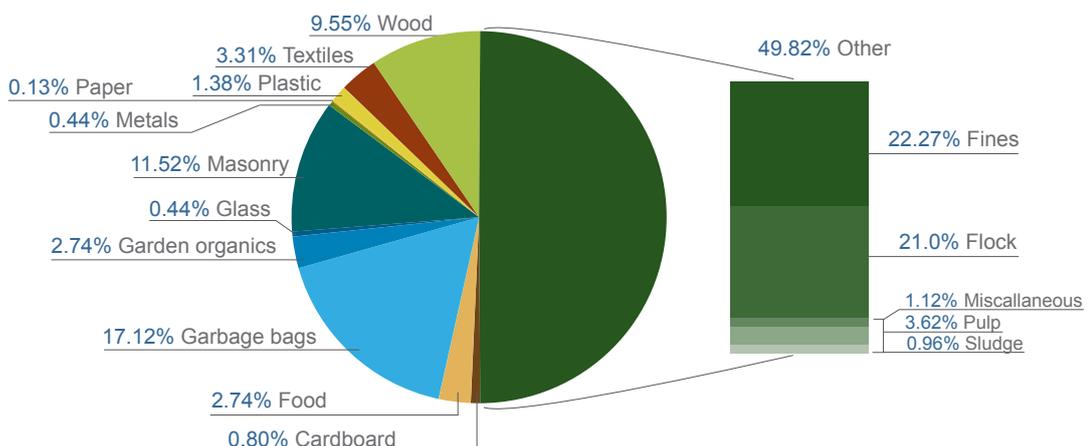
When the contents of the garbage bags are distributed, mixed C&I waste comprises of wood and plastic (both 17 per cent), paper and masonry materials (both 13 per cent), and food (11 per cent).



Composition of single-material loads

Nearly half (by weight) of all C&I waste delivered in single-material load is materials such as residual and fines from waste treatment, shredder floc, pulp and sludge (50 per cent). Almost all of the remaining loads are of garbage bags, masonry and wood.

Vegetation, glass, metals, paper, cardboard, plastic and textiles also arrive in these loads in lesser amounts.



What are the trends?

Despite increased economic activity, the amount of C&I waste disposed to landfill within the SMA between 2008 and 2014 has reduced by 800,000 tonnes. Investment in resource recovery facilities, the expansion of existing facilities, resource recovery programs by NSW Government for business waste avoidance and recycling, and the increase in the landfill levy have all contributed to this fall.

The decline of cardboard and masonry as a percentage of total C&I waste since 2003 may be a result of greater efforts to the increase recycling of the former and, driven by the rise in the landfill levy, more recovery of the latter.

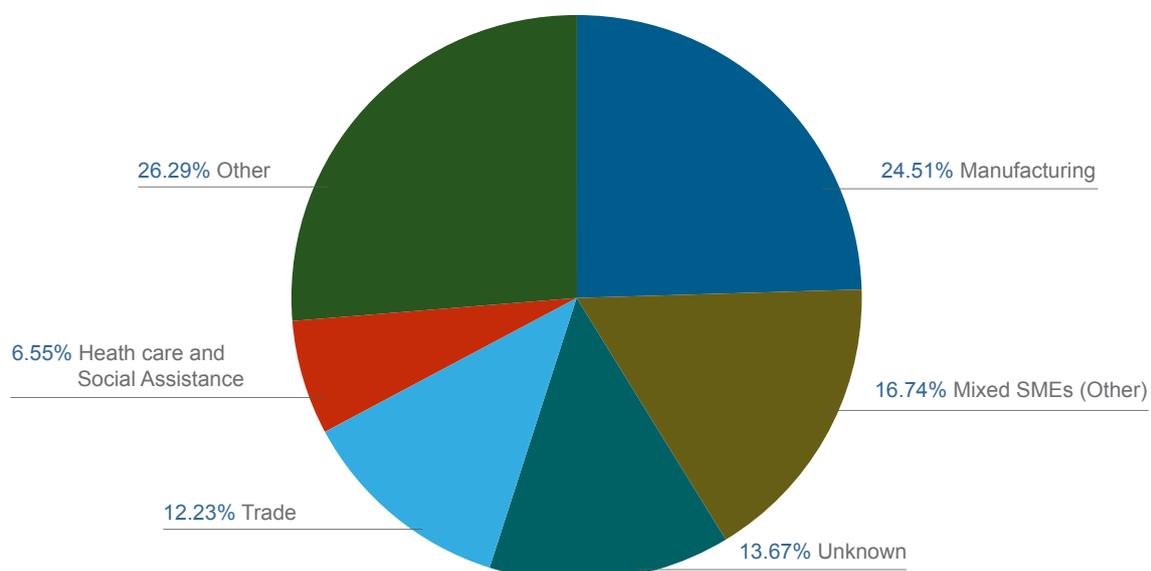
Food waste has also reduced, possibly due to the introduction of new organic waste-processing facilities, the introduction of food waste collections at commercial premises, and support for charitable organisations such as Oz Harvest and Foodbank, which collect food waste from the commercial sector. A product-destruction facility for food waste opened in 2008.

Wood, plastic and textiles have remained static as a percentage of the C&I waste stream by weight in the SMA. The large percentage of 'other' materials is partly as a result of increased processing of mixed-waste at alternative waste treatment (AWT) facilities and in co-mingled recycling, both of which generate residuals and fines.

Generators of C&I waste

A quarter (by weight) of all C&I waste disposed is produced by the manufacturing sector. Other major contributors are mixed small businesses, and the retail and healthcare/social assistance sectors.

Almost one-third of loads arriving at landfills are from the manufacturing sector, while the same proportion of loads arriving at transfer stations are from mixed small businesses.



Types of C&I waste generated by the key business sectors

Almost one-third of waste generated by manufacturing is processing residuals (such as fines, shredder floc, pulp and sludge). The other materials are plastic, wood, paper and food.

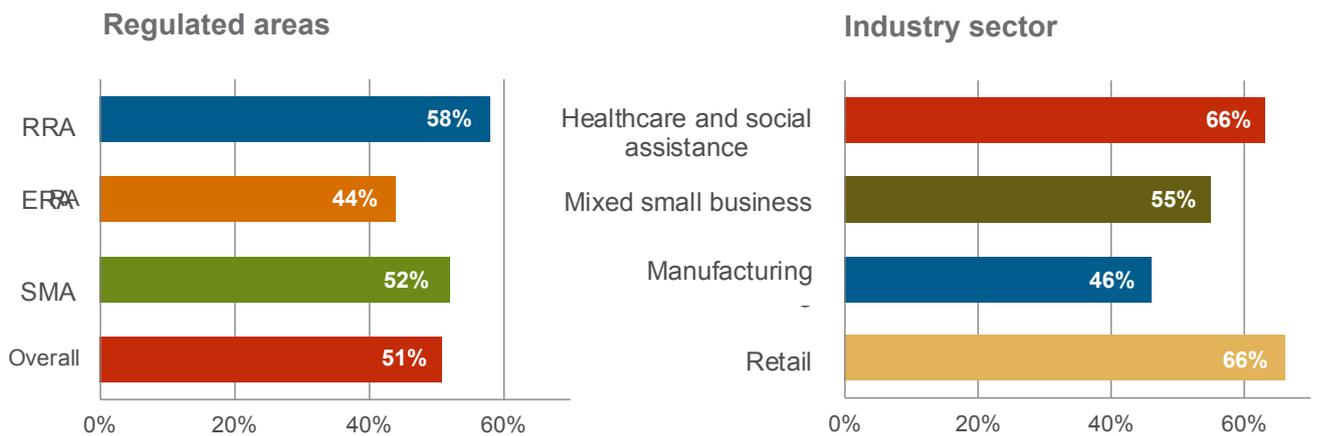
Half of the waste from mixed small businesses is masonry materials and wood, and the other materials include plastic and textiles.

The retail sector generates mostly plastic, paper, food and wood, while the healthcare and social assistance sector also has significant textile waste.

Degradable organic material

51 per cent of C&I waste is degradable organic material – such as wood, paper, cardboard, food, textiles, vegetation and other items, such as nappies – which produces greenhouse gases when disposed in landfill, but can be recycled into quality compost and related products if collected separately.

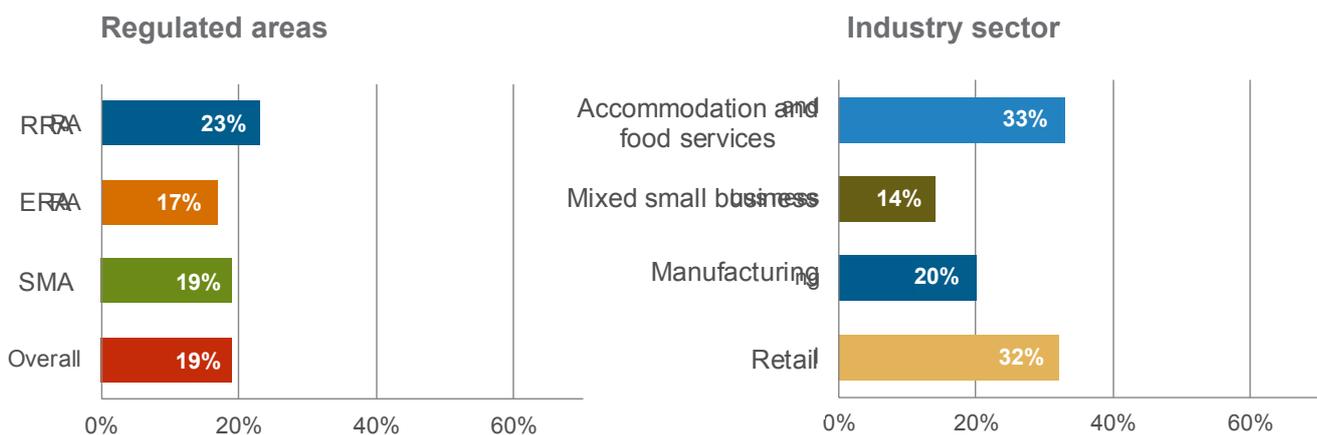
Percentage of C&I waste:



Packaging

19 per cent of C&I waste is packaging material, including packaging made from plastic, paper, cardboard, glass and metal.

Percentage of C&I waste:



Food waste

Food waste releases greenhouse gases in landfill, and is a priority material in the NSW EPA's Waste Avoidance and Resource Recovery Strategy 2013-2021.

Shopping centres, accommodation/food services, retail and manufacturing are the largest contributors of food waste to the C&I waste stream. In the regional groupings of councils, the proportion of food waste ranged from five per cent in the Hunter Councils Inc region, to 11 per cent in the MIDWASTE region.

Percentage of C&I waste:



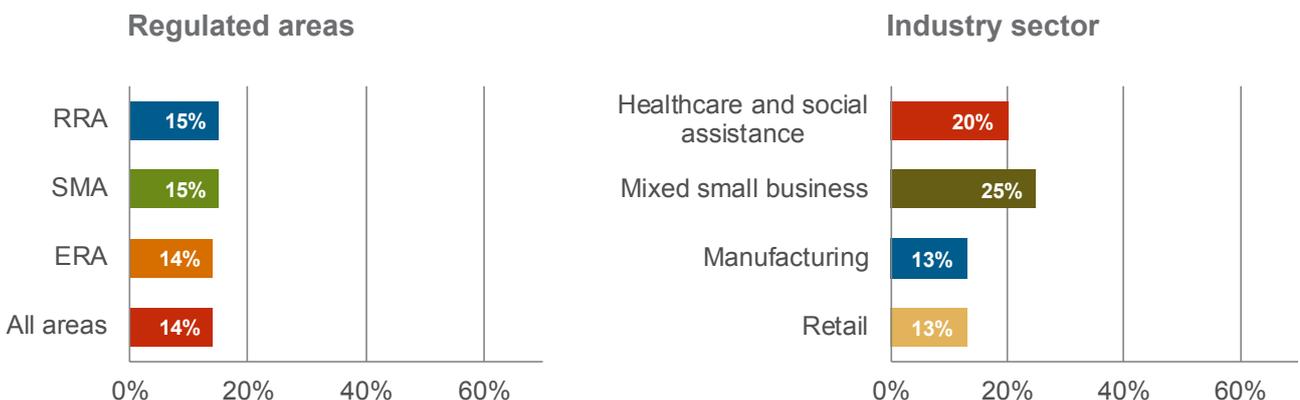
Wood

Wood/timber is a priority material in the NSW EPA's Waste Avoidance and Resource Recovery Strategy 2013-2021.

Wood makes up 14 per cent of C&I waste. Mixed small businesses, healthcare/social assistance, manufacturing and retail are the biggest contributors of wood to the C&I waste stream.

The proportion of wood waste ranged from 15 per cent in the South Sydney Regional Organisation of Councils (SSROC) region, to 35 per cent in the Northern Sydney regional Organisation of Councils (NSROC).

Percentage of C&I waste:



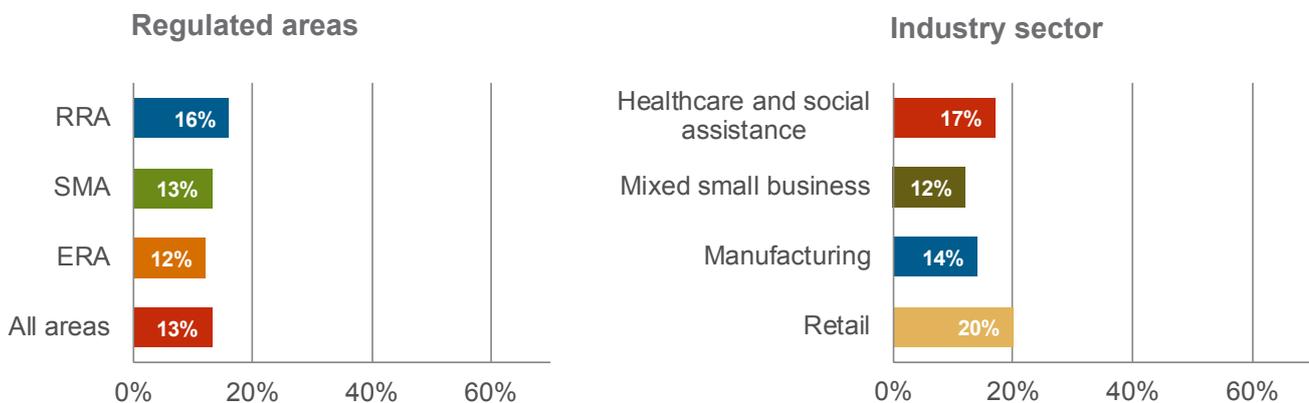
Plastic

Plastic is a priority material in the NSW EPA's Waste Avoidance and Resource Recovery Strategy 2013-2021.

Plastic makes up 13 per cent of C&I waste. Retail, healthcare/social assistance, manufacturing and mixed small business are the largest contributors of plastic to the C&I waste stream.

The proportion of plastic waste ranged from 13 per cent in the SSROC and NSROC regions, to 28 per cent in the Hunter Councils Inc region.

Percentage of C&I waste:



Paper and cardboard

Paper/cardboard is a priority material in the NSW EPA's Waste Avoidance and Resource Recovery Strategy 2013-2021.

Paper and cardboard make up 16 per cent of C&I waste. Accommodation/food services, retail, manufacturing and mixed small business are the largest contributors of paper and cardboard to the C&I waste stream.

The proportion of paper and cardboard waste ranged from nine per cent in the NSROC region, to 16 per cent in the SSROC and WSROC regions.

Percentage of C&I waste:



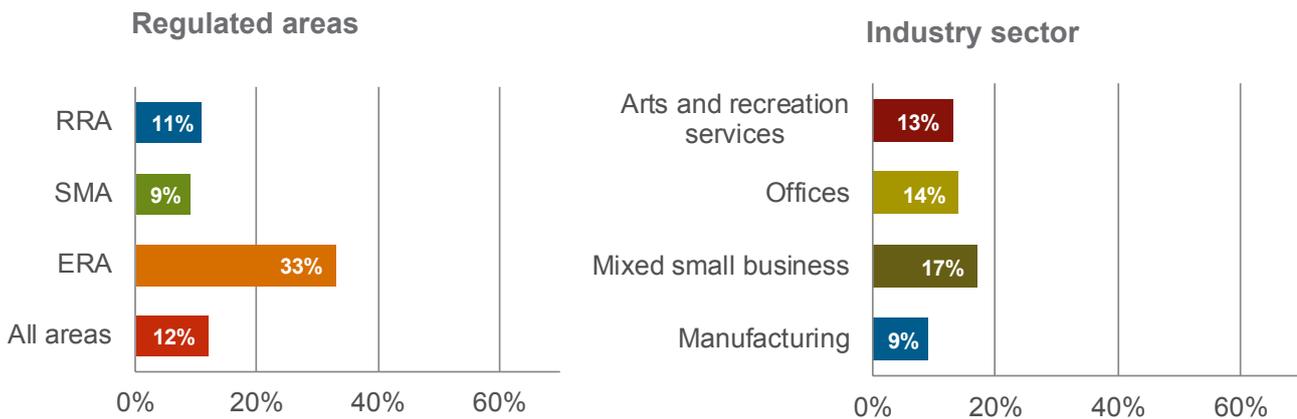
Masonry

Masonry materials, including concrete, bricks and dirt, make up 12 per cent of C&I waste.

Mixed small business, arts/recreation, offices and manufacturing are the largest contributors of masonry materials to the C&I waste stream.

The proportion of masonry waste materials ranged from eight per cent in the Hunter Councils Inc region, to 16 per cent in the SSROC and MIDWASTE regions.

Percentage of C&I waste:



Garbage bags

Garbage bags make up 28 per cent of C&I waste. Accommodation/food services, retail, manufacturing and mixed small business are the largest contributors of garbage bags to the C&I waste stream.

The proportion of garbage bags in C&I waste ranged from 19 per cent in the Hunter Councils Inc and NSROC regions, to 31 per cent in the Western Sydney Regional Organisation of Councils (WSROC) region.

Percentage of C&I waste:

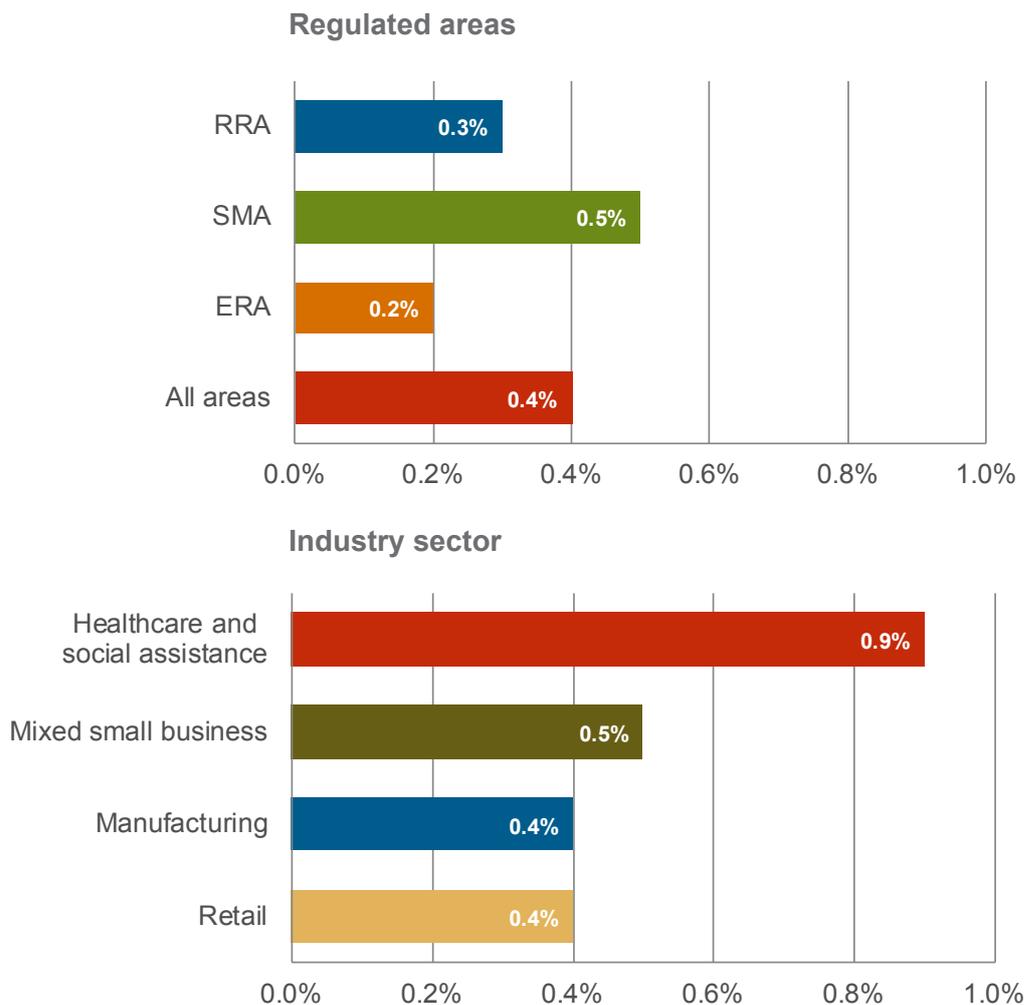


E-waste

Electronic waste (e-waste) can release hazardous substances when placed in landfill. E-waste makes up 0.4 per cent of C&I waste. Healthcare/social assistance, mixed small businesses, manufacturing and retail are the largest contributors of e-waste to the C&I waste stream.

The proportion of electrical items in C&I waste ranged from nothing in the Hunter Councils Inc and MIDWASTE regions, to one per cent in the other regions.

Percentage of C&I waste:



How much C&I waste currently disposed at landfill could be recycled?

With the use of existing technology for collection/ processing and markets available for recycled materials, 27 per cent is recyclable – mainly masonry materials, garden organics, plastic, paper and cardboard.

This recycling rate will increase to 50 per cent if the contents of garbage bags were also accessed for recoverable paper, plastic and food.

Opportunities for recycling C&I waste

The amount of each recyclable material immediately recoverable (not in garbage bags).

All figures in tonnes per year.

Masonry - bricks and concrete

• 145,144

Single material loads	58,566
Mixed loads	86, 578

Where to Target:

Mixed small business	43,000
Manufacturing	14,000
Offices	8,000

Food - unpackaged

• 20,000

Single material loads	1,616
Mixed loads	18,121

Where to Target:

Shopping centres	8,000
Manufacturing	2,000
Retail	3,000

Garden Organics

• 68,000

Single material loads	15,704
Mixed loads	52,262

Where to Target:

Mixed small business	12,000
Manufacturing	8,000
Retail	6,000

Plastic

• 58,000

Film packaging	45,000
Expanded polystyrene	7,000
Rigid packaging	6,000

Load Types

Single material loads	4,045
Mixed loads	53,730

Where to Target:

Mixed small business	11,000
Manufacturing	18,000
Retail	11,000

Wood

• 36,000

Untreated timber	24,000
Untreated pallets	12,000

Load Types

Single material loads	4,657
Mixed loads	31,558

Where to Target:

Mixed small business	11,000
Manufacturing	8,000
Offices	4,000

Metal

• 29,000

Ferrous packaging	7,000
Ferrous non - packaging	14,000
Non-ferrous packaging	3,000
Non-ferrous, non - packaging	6,000

Load Types

Single material loads	2,505
Mixed loads	26,527

Where to Target:

Mixed small business	7,000
Manufacturing	6,000
Offices	5,000

Paper and Cardboard

• 107,000

Dry, loose cardboard	27,000
Dry, compacted cardboard	27,000
Office paper	11,000
Paper packaging	27,000
Other paper	15,000

Load Types

Single material loads	3,809
Mixed loads	103,035

Where to Target:

Mixed small business	13,000
Manufacturing	35,000
Offices	17,000

What could be recycled in the future?

Excluding garbage bags and their contents, an additional 28 per cent of current C&I waste materials (such as textiles and treated wood) is likely to be recycled when new facilities and technologies become available – increasing the total amount potentially recoverable to 55 per cent.

If the contents of garbage bags can be accessed, then an additional 33 per cent – on top of the 50 per cent recoverable now – would be possible in the future, making a total of 83 per cent of C&I waste potentially recoverable.

Opportunities for the sectors that dispose the most waste

A potential 22 per cent more recycling of C&I waste currently disposed by the manufacturing sector could be achieved from paper, plastic, cardboard and masonry. A further 30 per cent could be recovered, with the main opportunities being treated wood, 'other' materials (such as sludge, insulation and pulp) and plastics, with the introduction of new technology. These figures exclude the contents of garbage bags.

For mixed small businesses, an extra 34 per cent more waste could be saved from masonry, garden organics and plastic. There is the prospect of another 45 per cent being recovered, through treated wood, other masonry materials, textiles and plastics.

The retail sector's biggest opportunities at present are in plastic, cardboard, paper and garden organics – a total of 24 per cent more recycling, with treated wood, plastics, textiles and masonry materials providing the potential for an extra 23 per cent in the future.

For waste from the healthcare/social assistance sector, 20 per cent more recycling could be gained from metal, masonry, garden organics and paper – and future opportunities for a further 34 per cent from the recovery of treated wood, textiles and extra plastics.

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