6 Converting volumes to tonnes

This guidance note forms part of a series of resources to assist local governments with the collection and reporting of waste and recycling data. The remaining guidance notes and case studies can be downloaded from www.wasteauthority.wa.gov.au/publications/lg-resources.

It is standard practice to compare waste and recycling data in tonnages (weight) rather than by volume, since this is a more comparable unit of measure (volumes are subject to significant variation due to the level of compaction or amount of 'air space' in the waste).

It is not always possible to collect waste and recycling data by weight. Where landfills or other facilities do not operate weighbridges, conversion factors need to be applied to loads entering the site to provide an estimation of tonnages of material received.

Two tables for converting volumes to weight are provided in this guidance note. The first provides conversions based on the type of vehicle or load and is broken into two waste streams only: putrescible and inert. This may be useful when applied to material being received at a facility without a weighbridge. The second provides conversion factors based on the type of material. This is also available as conversion 'calculator' with the package of spreadsheets that accompany this guidance note. It can also be downloaded from the Waste Authority website: www.wasteauthority.wa.gov.au/publications/lg-resources.

Using Local Government-specific conversion factors

A local government (LG) may have specific conversion factors that apply to their waste or recycling, derived from audits or other sources which are thought to be more accurate to a specific LG than the Authority's generic figures. It is acceptable to apply local conversion factors where relevant. The key is to maintain good records of the calculations that have been made and the rationale for their use.

Wherever the calculations are saved (e.g. in electronic spreadsheets), it is good practice to keep notes in the same location or use links to more comprehensive notes (e.g. note a folder location in a cell within the spreadsheet) about where all conversion factors have come from and the rationale that forms the basis of the calculation approach.

Non-standard calculations

Sometimes there is not a standard conversion calculation for converting data into the correct format. In these cases, the most commonsense approach should be applied and careful notes made about the methods used that can be easily found and replicated in following years.

For instance, some data may be provided by calendar year rather than financial year, within sufficient breakdown to make a conversion. There are several ways to deal with this:

1. Try to find broad breakdowns to provide an idea of at least six monthly patterns and use this to estimate the latter half of one year and the first half of the following year (i.e. convert the information into a financial year estimate)
2. Simply report the previous calendar year as the financial year (e.g. report 2011 as the 2011/12 data).

Either approach is acceptable depending upon the information available and the opportunities to estimate financial year data.

Conversion table

It is standard practice to compare waste and recycling data in tonnages (weight) rather than by volume. Two tables are provided here: Table 1 provides conversion factors to apply to waste based upon vehicle size and is useful where landfills or other facilities do not operate weighbridges. Table 2 provides conversion factors based on material type. Table 2 is also available as an electronic spreadsheet calculator.

Table 1: Exemptions from the landfill levy for asbestos containing material LLFS No. 03

Transport Mode	Weight (Tonnes)		Assessed volume of waste (m^3)
	Putrescible	Inert (1.3 t / m^3)	Applicable only to metropolitan waste disposed in country landfills
Single axle trailer, ute, car and van	0.3	1.3	1
Tandem axle trailer	0.6	2.6	2
Open trucks, Gr wt <5t	0.9	3.9	3
Open trucks, Gr wt >5t, <12t	1.8	7.8	6
Open truck – 3 axles ("6 wheeler")	3	13	10
Open truck – 4 axles ("8 wheeler")	3.6	15.6	12
Open truck – 5 axles ("Bogy Semi" or "6 wheel pig trailer")	5.4	23.4	18
Open truck – 6 axles ("Tri-axle Semi")	6	26	20
Open truck – 8 axles	7.8	26	20
Open truck – 9 axles ("8 wheeler plus trailer")	9.6	41.6	32
Open truck – 11 axles ("Road Train")	12	52	40
Bins 2-4m^3	1.2	3.9	3
Bins 4-8m^3	2.4	7.8	6
Bins 8-12m^3	5	13	10
Bins 12-19m^3	6.5	20.15	15.5
Bins > 20m^3	8	22	20
Compactor trucks <8m^3	1.7	5.2	4
Compactor trucks 8-12m^3	4.25	13	10
Compactor trucks 12-18m^3	4.34	20.15	15.5
Compactor trucks 18-32m^3	10.6	32.5	25
Compactor trucks >32m^3	14.9	45.5	35

Conversion factors

The factors below are for uncompacted materials, unless specified otherwise. If factors other than those listed here are used, please indicate factor and reference under the comments column.

Converting number of items to weight:

Tyres	Motorcycles	4 kg	per tyre
	Passenger	8 kg	per tyre
	Light truck	16 kg	per tyre
	Truck	40 kg	per tyre
Mattress	Queen size	20 kg – 30 kg	dry weight
Appliances	Average of all	71 kg	each
	Air conditioner	30 kg – 90 kg	each
	Dishwasher	40 kg – 50 kg	each
	Dryer (clothes)	30 kg – 60 kg	each
	Freezer	30 kg – 90 kg	each
	Microwave oven	10 kg – 20 kg	each
	Refrigerator	30 kg – 121 kg	each
	Washing machine	60 kg – 80 kg	each
	Ovens	40 kg – 60 kg	each

Converting volume to weight:

To calculate tonnes from m^3, multiply the conversion factor by the volume (in m^3)

Material	Tonnes per m^3	Comments
Aluminium cans – whole	0.026	
Aluminium cans – flattened	0.087	
Aluminium cans – baled	0.154	
Car batteries	0.375	1 car battery = 5 kg 75 car batteries = $1m^3$
Carpets (uncompacted)	0.3	
Cement sheet (uncompacted)	0.5	
Ceramics (uncompacted)	1	
Cobbles/boulders	1.4	
Co-mingled containers (uncompacted plastic, glass, steel and aluminium cans)	0.063	
Garden/vegetation (uncompacted)	0.15	
Glass bottles – whole	0.174	
Glass bottles – semi-crushed	0.347	
Greenwaste processed	0.3	
Greenwaste unprocessed	0.15	
Greenwaste unprocessed compacted	0.26	
Inert (mixed) waste	1.3	
Metals – ferrous metal scrap	0.5	
Metals – steel, trimmings	1.2	
Other textils	0.15	
Putrescible (mixed) uncompacted waste	0.3	
Putrescible (mixed) compacted waste	0.425	
Paper/cardboard	0.1	
Plaster board	0.2	
Plastic containers – whole	0.01	
Plastic containers – whole, some flattened	0.013	
Plastic containers – baled	0.139	
Rubber	0.3	
Steel cans – whole	0.052	
Steel cans – flattened	0.13	
Steel cans – baled	0.226	
Wood/timber	0.3	
Waste oil	0.8	1000 l oil/paint = $1m^3$

Conversion factor sources:

Standing Council on Environment and Water
www.scew.gov.au/node/911

Sustainability - Victoria
http://www.sustainability.vic.gov.au/services-and-advice/business/smarter-resources-smarter-business/energy-and-materials/resources-and-tools/materials-efficiency

Department of Environment Regulation:
Resource Recovery Rebate Scheme Administration Report - Summary - Period 11 (1 July 2003 - 31 December 2003)
Waste Avoidance and Resource Recovery Levy Regulation Administration Policy 2009

Eastern Metropolitan Regional Council (mattresses)

United Nations University
http://ewasteguide.info/files/WEEE_final_report_unu_part1.pdf

US EPA
http://www.epa.gov/wastes/conserve/tools/recmeas/docs/guide_b.pdf