First edition

Australian standard for waste and resource recovery data and reporting

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Author	Joe Pickin
Reviewer(s)	Christine Wardle, Kyle O'Farrell (Envisage Works)
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Blue Environment Pty Ltd
ABN 78 118 663 997
Suite 209, 838 Collins St, Docklands Vic 3008
Email: blue@blueenvironment.com.au
Web: www.blueenvironment.com.au
Phone: +61 3 9081 0440 / +61 3 5426 3536

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Abbreviations

ANZSIC	Australia and New Zealand Standard Industrial Classification
C&D	construction and demolition
C&I	commercial and industrial
the Department	the Australian Government Department of Agriculture, Water and the Environment
MSW	municipal solid waste
RDF	refuse derived fuel
WRR	waste and resource recovery

1. Introduction

1.1 Context

This document (the standard) was developed on commission to the Australian Government's Department of Agriculture, Water and the Environment (the Department) and establishes a national standard for data and reporting on waste and resource recovery (WRR).

National waste reporting relies on data from industry, states and territories and the Australian Government. The standard is intended to provide guidance to each of these sources.

Primary responsibility for waste regulation and policy rests with the states and territories. To a significant extent, state and territory data systems have developed independently – each has its own set of classifications, terminology and reporting systems that may be embedded in legislation, policy, regulation and licences. Differences between these systems increase costs and uncertainty for national waste businesses, make it harder to align state and territory policies, and increase the difficulty in compiling national reports and data sets.

There is a national drive for alignment and harmonisation of waste data systems. The National Waste Policy Action Plan (Commonwealth of Australia 2019) sets a national target (#7) to: 'make comprehensive, economy-wide and timely data publicly available to support better consumer, investment and policy decisions'. Many of the 80 items in the Action Plan relate to achieving better, more nationally-harmonised, waste definitions, classifications, data and reporting, including:

#3.8 Explore how to better align reporting systems to agreed national classifications and definitions for data and reporting, to improve sharing of information, by 2020

#7.2 Implement agreed national data and reporting improvements, harmonised data classifications and definitions for reporting, and sharing arrangements across jurisdictions, by 2022.

State and territory waste data and policy specialists have broadly agreed that national standardisation of data and reporting is a worthy long-term goal, while recognising the time, cost and other difficulties in implementation.

1.2 Role and target audience

The standard targets those who generate, collect, collate, transform and report data from waste-receiving facilities, including:

- the Commonwealth
- states and territories
- industry bodies that collect and use waste data
- regional waste management groups
- municipal councils
- waste auditors
- consultants, academics and analysts.

The states and territories are major stakeholders. The standard is intended to be a reference for their opportunistic and voluntary adoption when convenient. This builds on experience with the *Australian Hazardous Waste Data and Reporting Standard*, which was established in 2017[1].

[1] The current version of this document is BE and AWE (2019). It provides detail on hazardous waste data and reporting. However, because hazardous waste is included in core waste, it is also covered in this document, albeit at a lesser level of detail.

The standard is intended to drive reporting at all levels of the waste hierarchy, from waste avoidance through to disposal. This first iteration has little focus on the higher levels of the hierarchy. This is expected to develop over time, encompassing circular economy measures and issues.

The standard is not intended to instruct primary data providers (WRR facilities). Regulation of these facilities is a matter for the states and territories.

1.3 Objectives of the standard

The objectives of the standard are:

1. to promote timely, efficient, coordinated, high quality, accurate, consistent and comprehensive measurement and reporting of waste generation and management in Australia
2. to improve national waste data and reporting
3. to guide reporting requirements under government funding or grant programs
4. to promote the convergence of state and territory data systems over time
5. to provide guidance to industry, auditors and analysts
6. to maximise the return of value to data providers.

Achieving these objectives will:

- better inform governments, the community and the market
- contribute to the development and harmonisation of policy and regulation.

1.4 About this document

This first edition is a revision of the discussion draft released for state and territory comment in April 2021. It includes sections on definitions, scope, classifications, cross-boundary flows, data tasks and processes, and data management. Appendices are provided on how this document was developed (Appendix A), the history of national waste reporting (Appendix B), typical compositions of various product and mixed material loads (Appendix C), how waste is considered in export and import codes (Appendix D), and densities and weights of some common wastes and recovered materials (Appendix E).

It is assumed here that hazardous waste data will be managed noting the content of the *Australian Hazardous Waste Data and Reporting Standard*.

2. Definitions

Item 1 Definitions

The standard needs to contain definitions sufficient to ensure it is understood and to clarify actual or potential ambiguity in national conversations on waste data. The definitions do not comprehensively cover all waste terminology. They were developed following reviews of pre-existing standards and literature[2], with input from industry and government. The list may be enhanced over time. Definitions of infrastructure types are given in Table 5.

In any regulatory context, these definitions are subservient to those in the relevant legislation or regulation.

Table 1 Definitions

Term	Definition
Alternative fuels and raw materials	Non-traditional fuels and raw materials that are co-processed in cement kilns or other thermal facilities, potentially including refuse derived fuels, solid recovered fuels, spent catalysts, waste solvents and others.
Biosolids	Stabilised organic solids produced by wastewater treatment processes.
Bulky waste	See 'hard waste'.
By-product	Incidental or secondary product made in the manufacture of another product.
Certified compostable plastics	Plastics that are suitable for microbial treatment in either (a) commercial composting or anaerobic digestion facilities as evidenced by conformity with Australian Standard AS 4736:2006, or (b) home composting as evidenced by conformity with AS 5810-2010.
Circular economy	Looking beyond the current take-make-waste extractive industrial model, a circular economy aims to redefine growth, focusing on positive society-wide benefits. It entails gradually decoupling economic activity from the consumption of finite resources, and designing waste and pollution out of the system. Underpinned by a transition to renewable energy sources, the circular model builds economic, natural, and social capital. It is based on three principles: design out waste and pollution; keep products and materials in use (ideally at their highest and best value); and regenerate natural systems.
Collection efficiency	The weight of discarded materials collected for recovery divided by the weight of waste generated.
Combustible waste	Waste that can readily catch fire and burn, including, but not limited to, organic waste, paper and cardboard, plastics, textiles, rubber, leather, some hazardous wastes and some composite wastes.

[2] Including AS/NZS 3831:1998 *Waste management – glossary of terms*; ISO 14021 *Environmental labels and declarations*; AS/NZS 5377:2013 *Collection, storage, transport and treatment of end-of-life electrical and electronic equipment*; Hyder Consulting (2011) National *waste and recycling reporting: A more uniform approach to data*, prepared for the Department; Randell Environmental Consulting (2015) *National Waste Data Classification and Reporting System supporting documentation: standard operating procedures, reporting tool user guide, and reporting guidance*, prepared for the Department; Blue Environment (2018) *Improving national waste data and reporting*; Equilibrium (2013) *A stock-take of waste-related standards, specifications and guidelines*; SRU (Sustainable Resource Use 2012) *Australian Waste Definitions : Defining Waste Related Terms by Jurisdiction in Australia*; the Association of Victorian Regional Waste Management Groups (2013) *Data Collection and Reporting Guidelines*; the *System of Environmental-Economic Accounting central framework* chapter 3 (physical flow accounts); the OECD reporting framework; and the *EU waste legislation 2018*.

Term	Definition
Commercial and industrial (C&I) waste	Waste that is produced by institutions and businesses, including offices, schools, restaurants, retail and wholesale businesses, and industries such as manufacturing. Also includes waste from primary and secondary production, such as mining and minerals processing. Encompasses waste from all Australia and New Zealand Standard Industrial Classification (ANZSIC) codes except Division E and Group 753.
Compostable	A characteristic of a material that allows it to biodegrade, generating a relatively homogenous and stable humic-like substance.
Construction and demolition (C&D) waste	Waste produced by demolition and building activities, including road and rail construction and maintenance and excavation of land associated with construction activities. Consistent with ANZSIC Division E.
Core waste	Waste that is generally managed by the WRR sector, comprising solid waste and liquid hazardous waste, and generated in the municipal, construction and demolition, and commercial and industrial sectors, and including biosolids. Generally excludes, to the extent they can be identified, wastes from primary production.
Disaster waste	Debris and other waste resulting from disaster events including floods, bushfires and cyclones.
Disposal	Processes through which wastes are collected and processed or placed in an approved facility without deriving significant productive use. Includes deposit in landfill and incineration. For data reporting purposes, the quantity of waste allocated to the fate 'disposal': • *includes* residuals that are sent to landfill or otherwise disposed of • *includes* waste used for landfill cover or capping[3] • *excludes* landfill cover or capping materials that are not waste[4] • *excludes* soil used for landfill construction • *excludes* building and demolition waste used for on-site roads to the extent this material is not subject to a waste levy • *may exclude* (and does exclude from national reporting) landfill waste that produces methane gas used for energy recovery estimated using standard greenhouse gas measurement methods • is reported as wet weight.
Energy recovery	Processes through which wastes are collected, sorted and processed to recover energy in usable form, for example process heat, steam or in electricity generation. For data reporting purposes, the quantity of waste allocated to the fate 'energy recovery': • *excludes* residuals from energy from waste facilities that are recycled or sent to landfill or otherwise disposed of • *may include* (and does include in national reporting) landfill waste that produces methane gas used for energy recovery estimated based on standard formulas used in greenhouse gas reporting • is reported as wet weight.
Energy recovery rate	The weight of materials used for energy recovery (excluding residuals) divided by the weight of waste generated.

[3] For example, contaminated soil, building and demolition wastes, any cover material for which a gate fee was paid, or waste-derived materials for which no option other than landfill is available.

[4] For example, soil excavated on-site or purchased.

Term	Definition
E-waste	Electrical or electronic waste, comprising any equipment, device or thing that is no longer wanted or working and was in some way dependent on, or designed for the generation, transfer or measurement of, an electric current and/or an electromagnetic field and designed for a supply voltage not exceeding 1000 volts for alternating current and 1500 volts for direct current.
Fate	The ultimate destination of a waste. The possible fates are waste reuse, recycling, energy recovery, disposal and long-term storage.
Hard waste	Bulky household waste that is too large to fit in kerbside bins. May also include recyclable material not accepted in household recycling bins. Sometimes called 'bulky waste'.
Hazardous waste	Waste that, by its characteristics, poses a threat or risk to public health, safety or to the environment. Comprises wastes that cannot be imported to or exported from Australia without a permit under the *Hazardous Waste (Regulation of Exports and Imports) Act 1989*, and wastes within an Australian jurisdiction that are regulated within that jurisdiction as requiring particularly high levels of control.
Inert	A substance that has little or no chemical reactivity. Thus 'inert waste' is waste that has few or no putrescible materials.
Landfill rate	The weight of waste materials disposed of in landfill (excluding cover, construction and capping materials) divided by the weight of waste generated.
Local recycled material utilisation rate	The weight of recycled material used locally divided by the total weight of recycled material. 'Local' can refer to a region, state, or the whole country.
Management type	A classification of a waste management process based on the fate of most wastes that pass through it, for example, a recycling fate.
Material flow analysis	An analytical method to quantify flows and stocks of materials within a system.
Municipal solid waste (MSW)	Waste produced by households or collected by, or on behalf of, a municipal council. Includes waste from: • street bins • street sweeping • litter and dumping clean ups • aquatic litter traps • municipal parks and gardens • street tree prunings • council facility operations (consistent with ANZSIC Group 753) • transfer stations (other than waste readily identifiable as arising from commercial operations). Excludes waste: • collected by, or on behalf of, a municipal council from businesses • from road works undertaken by, or on behalf of, a municipal council.
Organic waste	Waste that is derived from biotic processes. Includes food, garden organics, wood and biosolids. Typically excludes paper and cardboard, textiles, natural latex-based rubber, leather and nappies but may include them under some circumstances (for example, when considering methane emissions from landfills). Excludes plastics and synthetic rubber.
Packaging	Material that is used to protect or contain a product during transportation, storage, marketing or use. Packaging can also be an item that is physically attached to, or included with, a product or its container for the purpose of marketing the product or communicating information about the product.

Term	Definition
Post-consumer waste	Material generated by households or by commercial, industrial and institutional facilities in their role as end-users of products which can no longer be used for their intended purpose. This includes returns of material from the distribution chain.
Primary production	The conversion of natural resources into primary products, usually for use as raw materials by other industries.
Putrescible	Liable to decay and decompose.
Recovered materials	Waste materials separated, sorted or processed for the purposes of waste reuse, recycling or energy recovery.
Recovery	An abbreviation of 'resource recovery'.
Recovery rate	An abbreviation of 'resource recovery rate'.
Recyclable	A characteristic of a product, packaging or associated component that can be diverted from the waste stream through available processes and programs and can be collected, processed and returned to productive use in the form of raw materials or products, excluding those used for producing energy.
Recyclables	Wastes suitable for recycling.
Recycled content rate	The weight of recycled material in a product or material divided by total weight of the product or material.
Recycling	Activities through which wastes are collected, sorted, reprocessed (including through composting), and/or converted into raw materials for use in a production system, excluding for energy. For data reporting purposes, the mass of material allocated to the fate 'recycling': • *includes* all materials received by a reprocessing facility that are processed to the point of being suitable for remanufacturing or return to productive use, whether immediately used or stored for later sale or use • *includes* weight losses to the atmosphere during the processing of wastes (for example, moisture, carbon dioxide from organics degradation) • *excludes* residuals that are sent to landfill or otherwise disposed of • *excludes* materials received at a recycling facility but not yet processed • is reported as wet weight.
Recycling facility	A facility that forms part of a system to produce raw materials from waste, excluding for energy. Includes facilities that sort, clean, grade and reprocess.
Recycling rate	The weight of materials allocated to the fate recycling divided by the weight of waste generated. Can be applied to specific materials, source streams, communities or industries, in which case the 'waste generated' component is restricted to those materials, streams, communities or industries.
Refuse derived fuel (RDF)	A fuel derived from solid waste not produced to a specification.
Remanufacturing	Processing of secondary materials to make new products.
Reprocessing	Processing of recovered materials to make raw materials for use in making new products or direct use. May also be called 'secondary processing'.
Reprocessing efficiency	The weight of materials recovered through a reprocessing operation divided by the weight of materials entering he reprocessing operation.
Residual waste	Waste determined by its owner to be unsuitable for recovery.

Term	Definition
Resource recovery	Activities through which wastes are collected, sorted, processed (including through composting), and/or converted into raw materials for use in a production system. For data reporting purposes, the quantity of waste allocated to the fate 'resource recovery' is the sum of the quantities allocated to waste reuse, recycling and energy recovery.
Resource recovery rate	The weight of materials allocated to the fates waste reuse, recycling or energy recovery divided by the weight of waste generated. Can be applied to specific materials, source streams, communities or industries, in which case the 'waste generated' component is restricted to those materials, streams, communities or industries.
Return to productive use	Use of recovered materials for a beneficial purpose, including energy recovery. For data reporting purposes, the quantity of material recorded as 'returned to productive use' comprises secondary materials that have entered into a remanufacturing operation, an energy from waste facility, or have been directly used.
Reuse	Reallocation of products or materials to a new owner or purpose without reprocessing or remanufacture, but potentially with some repair (for example, repair of pallets for resale, tyre retreading).
Scrap materials	A generic term used to describe unprocessed waste materials that are anticipated to be mostly recycled.
Secondary materials	A term applied to recovered materials that have been processed to the point of being suitable for remanufacturing or other return to productive use.
Secondary material utilisation rate	The weight of secondary material in a production or consumption system divided by total weight of all material in the production or consumption system.
Solid recovered fuel	A fuel derived from solid waste produced to meet a specification.
Solid waste	Waste that: can have an angle of repose of greater than 5 degrees above horizontal; or does not become free-flowing at or below 60°C or when it is transported; or is generally capable of being picked up by a spade or shovel.
Sorting efficiency	The weight of materials sent from a sorting process to reprocessing divided by the weight of materials collected for sorting.
Source separation	Sorting of waste materials at the point of waste generation prior to transfer to a WRR facility.
Source stream	Either municipal solid waste (MSW), commercial and industrial (C&I) waste or construction and demolition (C&D) waste.
Stock	An aggregation of material in a process or in use.
Waste	Materials or products that are unwanted, surplus, discarded, rejected, abandoned or left over, including those materials or products intended for or managed by reuse, recycling, energy recovery, treatment, storage and disposal. Waste-derived materials cease to be waste and transition to being 'secondary materials' when the following conditions are met: • they are to be used for a specific purpose • a market or demand exists • they fulfil the technical requirements for the specific purposes and meet the existing legislation and standards applicable to products • their use will not lead to overall adverse environmental or human health impacts.

Term	Definition
	The transition from waste to secondary materials is generally deemed to occur at the out-going gate of a reprocessing facility when the outputs require no further processing prior to being returned to productive use.
Waste and resource recovery (WRR) facility	A site at which the primary function is waste management.
Waste and resource recovery (WRR) sector	Businesses that undertake collection, storage and/or management of wastes, excluding the wastewater treatment industry.
Waste avoidance	Activities to avoid or minimise waste generation, including reuse, repair, product sharing systems, substitution of services for products and preferential purchasing.
Waste category	A primary classification of wastes and recovered materials.
Waste generation	The process of producing waste. For data reporting purposes, the quantity of waste generated is the sum of the quantities of materials allocated to waste reuse, recycling, energy recovery, disposal, stockpiles and treatment.
Waste infrastructure	A collective term for WRR facilities.
Waste infrastructure type	A category of waste infrastructure based on materials received and primary processing methods.
Waste management	Processes through which wastes are collected, handled, sorted, processed, transformed or placed, including for disposal, storage or resource recovery.
Waste reuse	Reuse of a product or material that has entered a WRR facility (for example, the sale of goods from a reuse shop).
Waste stockpile	An accumulation of waste, whether or not reprocessed and whether or not in infrastructure approved for this purpose
Waste storage	An accumulation of waste in infrastructure approved for that purpose for a limited time, such that materials are readily retrievable.
Waste storage (long-term)	Waste storage where there is a plan and a reasonable expectation that wastes will be stored for more than 10 years.
Waste storage (short-term)	Waste storage where there is a plan or a reasonable expectation that wastes will be stored for less than 10 years.
Waste sorting	The process of separating mixed wastes into more homogenous material types.
Waste sub-type	A tertiary classification of wastes and recovered materials.
Waste treatment	The removal, reduction or immobilisation of hazardous characteristics to enable the waste to be sent to its final fate or further treatment.
Waste type	A secondary classification of wastes and recovered materials.
Wet weight	The weight including naturally occurring moisture at a given measurement point, without data manipulation to exclude moisture.

3. Scope

To the extent practicable, states, territories and other data providers should seek to collect and report data covering the full scope included in this standard, consistent with national reporting.

Item 2 Geographical scope

Data should be collected and collated covering waste:

- generated in all states and territories of Australia excluding Norfolk Island and the Australian Antarctic Territory (except to the extent they send materials to the mainland or Tasmania)
- imported into Australia.

Imports are to be reported separately, and not included in waste generation. Exports are included in waste generation. For national reporting, waste will be attributed to the state or territory where it was generated to the extent practicable.

Item 3 Temporal scope

Data should be collected at least annually and reported by financial year (1 July to 30 June). Waste should be attributed to the year it was generated.

Item 4 Fate scope

State, territory and national waste and resource recovery reporting should encompass at a minimum:

- waste disposal
- energy recovery
- recycling
- waste reuse.

Item 5 Materials scope

The national scope of waste reporting is 'core waste' plus ash. Core waste is defined in Table 1. Its component categories are itemised in Table 3, and include hazardous wastes. For clarity, core waste excludes, to the extent these can be readily distinguished:

1. liquid non-hazardous wastes
2. soil used for landfill cover or capping that was purchased or excavated onsite[5]
3. soil-based wastes from mining and mineral processing
4. pre-consumer waste that is recycled on-site as part of a manufacturing process
5. wastes from agriculture, forestry and fisheries (primary production)[6]
6. waste used for producing energy on the same site where more than 50% of the waste was generated.

Data on non-core waste will be included in national data sets as enabled by data availability, data methods, stakeholder demand and budget, with the expectation reporting will expand and improve over

[5] See Table 1 definition of 'disposal' for more detail.

[6] For organic materials, it is not always straightforward to distinguish wastes from natural residues. Case-by-case decisions may need to be made and should be justified.

time. Non-core waste will be reported separately from the headline data. Reporting of non-core waste may cover part or all of wastes 1 to 6 as listed above.

National data will also cover wastes and recovered materials that are targeted by specific programs or of specific stakeholder interest, exercising caution to avoid double counting in primary data sets. These wastes and recovered materials will include:

- materials generated from container deposit systems
- packaging, e-waste and other products subject to product stewardship programs
- household hazardous waste collections.

4. Classifications for WRR data and reporting

The set of standard national classifications is a central component of this standard. National classifications have been developed on waste source streams, materials and infrastructure. These are presented and further developed here. Additional classifications are presented on mixed material loads, geographical destinations and productive uses.

Adoption of standardised classifications over time should help to ensure the compatibility of data collected and reported in different jurisdictions and processes. However, it is recognised that amendments to pre-existing state and territory classifications are costly and difficult, potentially affecting licences, policies and historical trends. Standardisation will take time.

Item 6 Classification of source streams

Waste should be reported as arising from one or more of the following source streams, which are defined in Table 1:

- municipal solid waste (MSW)
- commercial and industrial (C&I) waste
- construction and demolition (C&D) waste.

Materials retain their source stream classification during and after processing. For example, a materials recovery facility that receives only MSW would report residuals delivered to a landfill as MSW.

States and territories should establish systems for requiring waste receiving facilities to classify and report the source streams of the wastes they receive based on its primary origins and its contents as set out in Table 2.

Notwithstanding the prescriptions in Table 2, when reporting aggregated data, effort should be made to estimate the portions of MSW collected as part of the C&I stream, and of C&I waste reported in the MSW stream.

To the extent practicable, reported C&I waste should be partitioned:

- by subdivision for ANZSIC divisions C and D
- by division for other ANZSIC divisions.

Table 2 Classifying waste loads by source stream

Waste characteristics	Source stream
95% or more of the materials originate from a commercial construction or demolition operation, including: • construction or demolition of a dwelling • road works, including those undertaken for or on behalf of a municipal council	C&D
95% or more of the materials originate from households (excluding commercial construction or demolition of a dwelling)	MSW
95% or more of the materials originate from the operations of a municipal council or its contractors, excluding road works	MSW
95% or more of the materials originate from the operations of businesses, institutions or governments (other than a municipal council)	C&I
Less than 95% of the materials originate within a particular source stream	To the extent possible, classify by percentage in each stream. If not possible, classify as originating in the largest source stream.
Contains mostly building and demolition waste of uncertain origin	C&D
Contains mostly materials of uncertain origin that are not building and demolition wastes and are delivered by a commercial operation	C&I
Contains mostly materials of uncertain origin delivered by a private citizen	MSW
Container deposit system returns	MSW, except where there is strong evidence they originate from commercial sources (for example, offices or events), in which case C&I
Disaster waste that cannot be readily partitioned by source stream	C&D

Item 7 Classification of materials

Data on core waste and ash materials should be classified in accordance with the framework set out in Table 3. Types and sub-types may be further divided so long as these further divisions can be grouped to those shown in the table. For clarity, core waste includes hazardous wastes and excludes the wastes listed in points 1 to 6 in Item 5 (page 9).

Attributes of waste materials may be recorded and reported where appropriate. Attributes may encompass:

- container deposit system eligibility
- packaging or not
- combustibility
- source application
- destination application
- pre- or post-consumer
- synthetic or natural fibre
- recyclable via kerbside systems or not
- banned from landfill
- potentially hazardous.

Table 3 Classification of core waste and ash materials

Category	Type	Sub-type
1. Building and demolition materials[7]	Asphalt	
	Bricks, concrete and pavers	Brick rubble
		Whole bricks
		Concrete
		Pavers
	Ceramics, tiles and pottery	Ceramics
		Tiles
		Pottery
	Plasterboard & cement sheeting	Plasterboard
		Cement sheeting
	Soil, sand and rock not contaminated above any threshold requiring classification as contaminated soils (N120)	Virgin excavated natural material
		Other soil
		Foundry sand
		Other sand
		Rock or stone
	Rubble	Rubble comprising <10% soil
		Rubble comprising >10% soil
2. Metals	Iron and steel	
	Aluminium	
	Non-ferrous metals (ex. aluminium)	Copper
		Non-ferrous metals (ex. aluminium and copper)
	Mixed metals	
3. Organics	Food organics[8]	
	Garden organics[8]	
	Timber	Packaging and pallets
		Other
	Sawdust	
	Biosolids (non-contaminated)	
	Other organics	
	Mixed organics	
4. Paper & cardboard	Cardboard	Waxed
		Not waxed
	Polymer coated paperboard	Aseptic
		Gable top
		Hot cup and cold cup
		Other
	Newsprint & magazines	Newsprint
		Magazines
	Office paper	
	Mixed paper and cardboard	
5. Plastics	Polyethylene terephthalate (PET) (1)	
	High density polyethylene (HDPE) (2)	
	Polyvinyl chloride (PVC) (3)	
	Low density polyethylene (LDPE) (4)	
	Polypropylene (PP) (5)	
	Polystyrene (PS) (6)	
	Certified compostable plastics	

[7] Contrasts with 'construction and demolition', which refers to a source stream rather than a set of material types.

[8] For mixed food organics and garden organics (FOGO) collections, the proportions of each component should be reported based on measurements or estimates.

Category	Type	Sub-type
	Other plastics (7)	
	Mixed plastics	
6. Glass	Glass from food and beverage containers[9]	Amber glass packaging
		Flint glass packaging
		Green glass packaging
		Glass fines
		Other and mixed glass packaging
	Other glass	Window glass
		Glass fibre insulation
		Other glass
7. Textiles, leather & rubber (excl. tyres)	Textiles	Wearable clothing[10]
		Unwearable clothing[10]
		Carpet
		Other and mixed textiles
	Leather & rubber (excl. tyres)	Leather
		Rubber (excl. tyres)
8. Ash	Ash	Fly ash from coal-fired power stations
		Bottom ash from coal-fired power stations
		Bottom ash[11] from thermal waste processing
9. Hazardous wastes	Plating and heat treatment (A)	Sub-types as listed in Schedule A of the National Environment Protection (Movement of Controlled Waste Between States and Territories) Measure, including liquid hazardous wastes, reported in accordance with the *Australian hazardous waste data and reporting standard*.
	Acids (B)	
	Alkalis (C)	
	Inorganic chemicals (D)	
	Reactive chemicals (E)	
	Paints, resins, inks, organic sludges (F)	
	Organic solvents (G)	
	Pesticides (H)	
	Oils (J)	
	Food-derived haz. wastes (K100, K110)	
	Other haz. organic wastes (K140, K190)	
	Organic chemicals (M)	
	Contaminated soils (N120)	
	Asbestos (N220)	
	Other soil/sludges (other N)	Sub-types as described above
	Clinical and pharmaceutical (R)	
	Tyres (T140)	
	Other miscellaneous (other T)	Sub-types as described above
10. Unclassified materials		

Waste products

Data on product wastes may sometimes be needed (for example, for product stewardship programs) or may sometimes be collected because it is easier to classify by product than directly allocating to material types. Quantities of product wastes may be allocated to the material types listed in Table 3 using known or typical composition values (see Appendix C).

[9] Not all glass containers are recyclable, e.g. many perfume bottles.

[10] 'Wearable' clothing is, at the time of disposal, suitable for reuse or resale. 'Unwearable' clothing is soiled, torn or otherwise damaged and not suitable for reuse or resale.

[11] Fly ash from sources other than coal-fired power stations is classified as hazardous and should be reported under type 'Other soil/sludges (other N)' and sub-type 'N150 Fly ash, excluding fly ash generated from Australian coal fired power stations'.

Examples of product types for which data may need to be separately collected include:

- end-of-life vehicles
- e-waste
  - televisions and computers
  - mobile phones
  - white goods and other large appliances
  - batteries other than used lead acid batteries
  - cables
  - other
- used lead acid batteries
- fluorescent light globes/tubes
- paint
- nappies
- mattresses
- carbon fibre goods
- fibreglass goods.

Item 8 Classification of mixed material loads

Many vehicles presenting at WRR facilities carry loads of mixed materials. Mixed material loads should be classified in accordance with the list presented below. Tonnages may be allocated to the material types listed in Table 3 using known or typical composition values (see Appendix C).

Table 4 Classification of mixed loads

Primary source stream	Mixed material load type
MSW	1. Domestic commingled recyclables (no CDS, glass included)
	2. Domestic commingled recyclables (no CDS, glass separate)
	3. Domestic commingled recyclables (CDS, glass included)
	4. Domestic commingled recyclables (CDS, glass separate)
	5. Mixed domestic MSW kerbside residuals (organics service)
	6. Mixed domestic MSW kerbside residuals (no organics service)
	7. Garden organics
	8. Food and garden organics
	9. Mixed domestic hard waste
	10. Street litter bins
	11. Street cleaning waste
	12. Residuals from materials recovery facilities
	13. Residuals from mechanical biological treatment
C&I	14. C&I commingled recyclables
	15. Mixed C&I waste residuals
	16. Residuals from C&I sorting operations
	17. Quarantine waste
C&D	18. Mixed building and demolition wastes for recycling
	19. Mixed building and demolition residuals
	20. Residuals from C&D recycling facilities
	21. Disaster waste, where not readily reportable by material type or classified as hazardous
Varied	22. Residuals from metals recovery facilities (shredder floc)
	23. Residuals from pulping of recycled paper and cardboard
	24. Unclassified materials

Item 9 Reallocating product wastes and mixed loads to material classes

WRR data and reporting should aim for comprehensive coverage within the material classes presented in Table 3. To facilitate this, recorded tonnes of product wastes and mixed material loads should be reallocated to materials using measured composition values. Where the composition of a particular flow has not been measured, typical composition values may be used.

Appendix C of this standard provides a set of typical compositions for some types of product waste and mixed material loads. This appendix should be further developed over time. Contributions based on reputable sources and measurements are invited.

States and territories should undertake regular composition audits of key mixed waste streams with the aim of maintaining representative composition data to allow allocation of mixed loads to the materials in Table 3. This may include bin audits for MSW and landfill audits for C&I and C&D wastes.

Item 10 Classification of destinations

Waste and recovered materials leaving a WRR facility should be classified by geographical destination type as follows, with reference to the WRR facility from which the materials are leaving:

- same jurisdiction – capital city
- same jurisdiction – regional (region should be specified)
- another Australian jurisdiction (should be specified)
- export overseas.

Item 11 Classification of productive uses

Secondary materials leaving a WRR facility for return to productive use should have these uses be classified as follows:

- reuse
- civil construction
- soil improvement, land rehabilitation and mulch
- manufacture of new products similar to those from which the recovered material was derived
- manufacture of other products
- fuel.

Item 12 Classification of infrastructure

Non-hazardous waste infrastructure should be classified according to the framework set out in Table 5. Where more than one type of waste infrastructure is present at a site, it may be classified as distinct facilities.

'Primary management type' refers to the management applicable to most of the material that passes through a facility.

A classification of hazardous waste infrastructure is given in the *Australian hazardous waste data and reporting standard*.

Table 5 Classification of non-hazardous waste infrastructure

Waste infrastructure type	Activities	Primary management type
Aluminium reprocessing facility	Reprocesses recovered aluminium.	Recycling
Anaerobic digestion facility	Processes organic waste using anaerobic digestion technology.	Recycling[12]
C&D waste recycling facility	Sorts and/or reprocesses building and demolition materials.	Recycling
Container deposit scheme drop-off facility	Accepts beverage containers for refund under a container deposit scheme. Includes over-the-counter exchanges, reverse vending machines, automated depots and any other facility where deposits on eligible containers can be redeemed.	Recycling
E-waste drop-off facility	Accepts e-waste, which is subsequently transported offsite for further processing.	Recycling
E-waste recycling facility	Reprocesses e-waste for recycling.	Recycling
Glass beneficiation facility	Processes glass packaging by cleaning, sorting and making into furnace-ready cullet and mixed glass fines.	Recycling
Glass reprocessing facility	Reprocesses or remanufactures glass cullet into new glass products.	Recycling
Landfill – inert	Accepts inert waste for disposal to land.	**Disposal**
Landfill – putrescible	Accepts putrescible (or biodegradable) waste for disposal to land.	**Disposal**
Materials recovery facility (MRF)	Sorts, aggregates and bales mixed recovered materials (comprising mainly packaging) for further sorting or reprocessing. MRFs may be said to undertake primary sorting of these materials.	Recycling
Mattress recycling facility	Reprocesses waste mattresses.	Recycling
Mechanical biological treatment facility	Processes mixed putrescible waste and includes a biological treatment process.	**Disposal (NSW)** Recycling (other states)
Metals recovery facility	Sorts and prepares mixed recovered metals for reprocessing or remanufacturing (including scrap metal yards).	Recycling
Organics recycling facility	Processes food, garden and/or other organic wastes to manufacture beneficial products.	Recycling
Paper and cardboard recycling facility	Pulps and reprocesses recovered paper and cardboard.	Recycling
Plastics recovery facility	Sorts and prepares mixed or partially sorted recovered plastics for reprocessing or remanufacturing.	Recycling
Plastics reprocessing facility	Reprocesses or remanufactures recovered plastics.	Recycling
Refuse derived fuel facility	Produces fuel from recovered materials.	Energy from waste

[12] Anaerobic digestion could potentially be considered as both a form of energy recovery (as it generates methane usually used for its energy value) and a form of recycling (as it generates digestate usually used as an organic soil conditioner). It is understood that anaerobic digestion applied to solid organic wastes generally results in a mass of digestate that greatly exceeds the mass of methane generated. Accordingly, anaerobic digestion is classified here as a form of recycling, rather than energy recovery.

Waste infrastructure type	Activities	Primary management type
Reuse shop	Sells materials or products diverted from the waste stream. Sometimes referred to as a 'buy back centre', 'recycle market' or 'tip shop'.	Waste reuse
Rubber recycling facility	Reprocesses or remanufactures rubber.	Recycling
Steel reprocessing facility	Reprocesses or remanufactures recovered steel.	Recycling
Textile recycling facility	Reprocesses or remanufactures textiles.	Recycling
Thermal energy from waste facility	Generates energy from waste-derived materials using thermal technology, and has an energy efficiency of at least 0.65 calculated using the formulae and methods set out in EC (2011).	Energy from waste
Transfer station	Accepts waste and other materials, which are transported offsite for further processing and disposal.	Recycling (unless dedicated to residual waste only) **Disposal (if dedicated to residual waste only)**
Other metals reprocessing facility	Reprocesses or remanufactures recovered metals other than steel.	Recycling
Other recycling facility	Sorts, cleans, grades and/or reprocesses recovered materials and does not fit any of the definitions given above.	Recycling
Other waste facility	Accepts waste for reuse, recycling, energy recovery or disposal and does not fit any of the definitions given above.	Not classified (may vary)

5. Government recording of cross-boundary flows

Item 13 Inter-jurisdictional imports and exports

States and territories should measure or estimate, record and report:

- imports of waste and recovered materials into their jurisdiction from other Australian jurisdictions
- exports of waste and recovered materials out of their jurisdiction to other Australian jurisdictions.

Reporting should encompass, to the extent practicable:

- tonnes
- jurisdiction of origin or destination
- waste categories and types
- source streams.

Item 14 International imports (states and territories)

States and territories should measure or estimate, record and report data from the waste sector on imports of waste and recovered materials from overseas. To the extent practicable, reporting should encompass:

- tonnes
- jurisdiction of origin
- port of entry
- waste category and type
- source stream
- reason for import, using the categories – reuse, recycling, energy recovery, treatment (hazardous waste), disposal and long-term storage.

Item 15 International imports and exports (Australian Government)

The Australian Government will record and report flows of wastes and recovered materials into and out of Australia using the system for mapping trade codes to waste given in Appendix D of this standard and using the data categories tabulated below.

Table 6 Data categories for reporting exports and imports of waste and recovered materials

Export data categories	Import data categories
Australian Harmonized Export Commodity Classification (AHECC) code	Harmonized system (HS) code
Waste category (and type where practicable)	Waste category (and type where practicable)
Gross weight (tonnes)[13]	Gross weight (tonnes)
Value (free on board) ($AU)	Raw value (free on board) ($AU)
Financial year	Financial year
State or territory of origin	State or territory of final destination
Port of loading	Port of entry
Destination (country)	Country of origin

[13] Gross weight includes packaging. The Australian Bureau of Statistics can also provide quantity data excluding packaging but the units vary, including numbers of items and volume. Use of gross weight is therefore recommended.

Item 16 Waste flows spanning years

Some waste or recovered materials may be generated in one year but go to its fate in another year due to stockpiling. States and territories should take steps to measure, record and report flows of core wastes into and out of stockpiles, supplemented by reports on the total size of the stockpile (see details in Item 18).

Waste that has entered a stockpile in a particular year should be counted in the generation data for that year. When it is removed from the stockpile and taken to some fate, it should be retrospectively added to the fate data for the year it was generated (see Item 31).

6. Government data tasks and processes

Item 17 Defining and obtaining data from primary providers

States and territories should establish mandatory systems to collect and collate data from:

- WRR facilities and other facilities that received more than some threshold quantity of waste or recovered materials in the reporting year
- waste generators that manage waste via on-site storage above some threshold quantity.

Threshold quantities should be set at levels below which the waste quantity or flow is immaterial to a broad understanding of waste quantities or flows at the regional, state or national level.

Voluntary reporting systems should be established for:

- WRR facilities and other facilities that received less than the threshold quantity of waste or recovered materials in the reporting year
- *ad hoc* facilities (such as construction sites undertaking on-site processing for off-site use) where the waste quantities collectively managed exceed some threshold quantity.

Item 18 Data to be collected

States and territories should establish systems for WRR facilities and other facilities that received more than the relevant threshold quantity of waste, recovered materials or secondary materials to report data (at least aggregated, but load-by-load where appropriate) in relation to:

1. Each load of waste, recovered materials or secondary materials entering the facility
   - date
   - quantity, comprising
     - measured weight, if available
     - estimated weight, if a reliable site-specific density is known
     - volume, otherwise
     - confirmation that weight is estimated, where applicable
   - source stream, based on the classification set out in Item 6
   - jurisdiction of origin
   - waste category, consistent with Table 3
   - waste type, when the load is consistent with any of the types in Table 3
   - waste sub-type, when the load is consistent with any of the types in Table 3
   - productive use based on the classifications set out in Item 11 [14].
2. Each load of waste, recovered or secondary materials leaving the facility
   - date
   - quantity, comprising
     - measured weight, if available
     - estimated weight, if a reliable site-specific density is known
     - volume, otherwise
     - confirmation that weight is estimated, where applicable
   - waste category, consistent with Table 3
   - waste type, when the load is consistent with any of the types in Table 3
   - waste sub-type, when the load is consistent with any of the types in Table 3
   - geographical destination based on the classifications set out in Item 10

[14] Relevant only for secondary materials accepted for remanufacturing.

  - if the destination is a WRR facility
    - details sufficient to identify whether the material is to be disposed of or recovered
    - details sufficient to identify the destination
    - infrastructure type based on the classification set out in Table 5
  - if the load contains only materials leaving the facility for return to productive use, the type of productive use based on the classifications set out in Item 11.
3. On-site short-term stores or stockpiles exceeding 1,000 tonnes at the start or end of the reporting period, by waste category and type consistent with Table 3 (in tonnes or, if not known, cubic metres)
  - total size at the start of the reporting period
  - total size at the end of the reporting period
  - additions during the reporting period
  - removals during the reporting period.
4. Capacities (in tonnes or, if not known, cubic metres)
  - the maximum quantity of material that can be legally received at the facility per year in aggregate and by waste category and type consistent with Table 3
  - the maximum quantity of material that can be processed at the facility per year without substantial upgrade or amended approvals in aggregate and by waste category and type consistent with Table 3
  - for landfills only, the estimated remaining available airspace (net of liner and capping) over the whole of the site that has planning approval to accept waste (not just operational cells), calculated using the average site compaction density.

Reporters should undertake quality checks and data cleaning prior to reporting. The aggregated data reports should be based on records that are retained and are auditable.

Item 19 Collection frequency and reporting timeliness

States and territories should collect waste data at least annually but preferably quarterly or monthly.

States and territories should seek to continuously improve the timeliness of their reporting to the public and the Australian Government.

Item 20 Data collection mechanisms

Data collection mechanisms should involve as little manual handling as possible. States and territories should move towards fully automated data uploads.

Item 21 Current process for developing the National Waste Report

A process for producing a national waste report was established in REC and BE (2015) and agreed in a meeting of the national waste data working group in July 2015. The process has become more flexible and iterative since that time but the steps set out below have been adhered to.

1. The Australian Government will issue annual national waste reporting tools to the states and territories for data input within six months of the end of the data period. The national data component within the tool will be as up-to-date as possible prior to issue.
2. States and territories should enter data for the relevant period data into the national waste reporting tool, negotiating changes to the tool as needed. This process should be complete within 12 months of the end of the data period.

3. The Australian Government will collate draft data and complete trend analysis and issue to the states and territories for review.
4. The Australian Government will issue a draft National Waste Report within 15 months of the end of the data period and publish the final report within 18 months of the end of the data period.

Item 22 Review schedule for this standard

This standard will be reviewed at least once every two years following release of the National Waste Report.

7. Data management

Item 23 Data units

The primary unit for reporting waste and resource recovery is tonnes (wet weight). Where quantity data is recorded in volumetric units, it should be converted to wet weight using known or typical density values. Appendix E of this standard provides typical density values for some common types of waste and recovered materials. This appendix should be further developed over time. State and territory contributions are invited.

Item 24 Data measurement

To the extent practicable, data should be based on measurements taken on weighbridges maintained and calibrated in accordance with National Measurement Institute guidelines (currently NMI 2008). States and territories should use available mechanisms to encourage or require the use of weighbridges, especially on larger facilities. Weighbridge operators should be appropriately trained, including on how to identify and record categories consistent with this document. Where estimates are used, the sources and age of input values used for those estimates should be documented and reported.

Item 25 Data validation

Reporters should undertake quality checks and cleaning prior to reporting or transfer to states and territories, which should do likewise before transfer to the Australian Government. The checks should consider completeness, accuracy, consistency and reasonableness. In particular, checks should look for:

- unit errors (such as mistaking kilograms for tonnes)
- inconsistent categorisation of wastes from the same company or of the same type
- major gaps
- major differences from previous years (for example, in the quantity of a particular waste category).

Significant errors should be identified and removed. Suspect data should be identified.

Item 26 Data gaps

National reporting requires comprehensive coverage. Unless and until data collection and collation is comprehensive and mandatory, data gaps may occur. Significant data gaps should be filled through research and best estimates based on transparent logic, applied consistently over time, and documented. To the extent possible, margins of error should be estimated as gaps are filled. Where there are gaps in state or territory data provided for national reporting, they may be filled by the Australian Government or its representatives.

Methods for filling significant data gaps may be developed and documented in this standard to ensure jurisdictions use similar approaches.

Item 27 Amendments to historical data

To the extent practicable, the historical data record should be maintained by updating historical methods to take into account any methodological changes. Changes to historical data back to 2006-07 should be reported to the Australian Government.

Item 28 Data quality and uncertainty

States and territories should maintain programs to continually improve the quality of their waste and resource recovery data. Annual reports should report on data quality from throughout the collection and collation process, including, but not limited to:

- numbers of facilities missing from the data
- gaps that have been filled through estimation
- past errors corrected
- the proportion of reported waste generation derived from
  - weighbridge measurements
  - mandatory reporting.

Waste data collators should attempt to capture, record and report the degree of uncertainty associated with the captured data, including the estimated error margin. It is recommended that the following default error margins are assumed:

- weighbridge ± 0.5% (Davis et al. 2010)
- volumetric estimate – case-by-case estimate
- conversion of volume to weight using site-specific density factors ± 15%
- conversion of volume to weight using default density factors ± 25%.

Audits commissioned with the intention of providing a representative compositional understanding of a waste stream and fate should apply waste categories that aim to ensure the proportion of materials in the category 'other' (or similar) represent less than 5% of the total.

Item 29 Metadata

Waste data collators should record with their data:

- the applicable data period
- the date of receipt
- the name, position and organisation of the provider
- the method(s) of measurement
- any assumptions made in deriving the recorded values
- validation checks undertaken
- estimated uncertainty.

Item 30 Data confidentiality

Noting the intention of target seven the National Waste Policy Action Plan (Commonwealth of Australia 2019) for publicly available data to support better consumer, investment and policy decisions, the Australian Government may consider waste and resource recovery data commercial-in-confidence if either:

- a state or territory specifically advises the Australian Government to that effect and provides supporting information, or
- in the Australian Government's view, each of the following apply
  - public release of that data could reasonably be expected to have significant adverse impacts on the commercial interests of one or more of the original providers of that information
  - the damage to those commercial interests outweighs the public interest in publication of that information
  - the information is not available elsewhere in the public domain.

Item 31 Indicators and metrics

The primary performance indicators of waste management and materials recovery are set out in Table 7. For national reporting, these indicators and metrics will be calculated to cover:

- a whole financial year
- the combined sum of core wastes and recovered materials plus ash
- each category of core waste.

Additional indicators and metrics may be developed over time to better capture progress towards a circular economy.

Table 7 Measures of waste management performance

Indicator	Unit	Application	Definition
Waste generation per person	kg per capita	1. Each category of core waste and recovered material. 2. The combined sum of core wastes and recovered materials plus ash.	The quantity of waste generated in the reference year *divided by* the jurisdictional population in December of that year.
Recycling rate	%		The quantity of waste to the fate 'recycling' in the reference year that was generated in that year[15] *divided by* the quantity of waste generated in the reference year.
Recovery rate	%		The quantity of waste to the fates 'recycling' and 'energy recovery' in the reference year that was generated in that year[15] *divided by* the quantity of waste generated in the reference year.
Return to productive use	tonnes	1. Each category of core waste and recovered material. 2. The combined sum of core wastes and recovered materials plus ash.	The quantity of secondary materials that have entered into a remanufacturing operation, an energy from waste facility, or were directly used in the reference year.
Local recycling rate	%	1. Each category of core waste and recovered material. 2. The combined sum of core wastes and recovered materials plus ash.	The quantity of waste to the fate 'recycling' in the reference year that was not exported and was generated in that year[15] *divided by* the quantity of waste generated in the reference year.
Local recovery rate	%		The quantity of waste to the fates 'recycling' and 'energy recovery' in the reference year that was not exported and was generated in that year[15] *divided by* the quantity of waste generated in the reference year.
Secondary material utilisation rate	%	Categories and types of core recovered materials that can be readily associated with consumption and for which data is available[16].	The quantity of a secondary material consumed in Australia in the reference year *divided by* the total quantity of the material consumed in the reference year.
		The combined sum of core wastes and recovered materials plus ash[17].	The quantity of secondary material consumed in Australia in the reference year *divided by* the total quantity of all materials consumed in Australia in the reference year excluding those not relevant to flows of core waste[18].

[15] The definitions of recycling and recovery rates take into account that some materials may be generated and stored in one year, then released from storage for recycling (or energy recovery) in a different year. The implication of this definition is that previously published recycling or recovery rates may need to be subsequently revised when the fate of stored materials is resolved.

[16] The Australian Government published Australian secondary material utilisation rates for 2018-19 for glass, metals, paper and cardboard, plastics and tyres. Potentially, similar measures could also be calculated for asphalt, iron and steel, aluminium, non-ferrous metals (ex. aluminium) and other materials. This is more difficult on the sub-national scale.

[17] This has not yet been attempted but may become possible at the national scale in the future.

[18] Non-relevant flows may include fossil fuels, agricultural by-products, soil and rock.

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Appendix A How this document was developed

Appendix A How this document was developed

The Department commissioned Blue Environment, supported by Envisage Works, to develop this document in late 2019. In early 2020, the consultants notified the states and territories and peak industry bodies that the work would be undertaken and invited ideas for scope and content.

The consultants and the Department prepared workshop papers covering the rationale for a standard, the literature review, the target audience, and the agenda for workshops with the states and territories, and diagrams showing state and territory data systems as understood through national reporting.

In November and December 2020, three forums were held, with participation from the Department, all states and territories and the Australian Bureau of Statistics. The meetings addressed:

1. *State of play*, which aimed to understand the state of waste data and reporting across the nation from a range of perspectives.
2. *Role and scope*, which discussed the role, uses, objectives and scope, including a draft table of contents.
3. *Detailed content*, which considered a number of proposed elements of the standard selected for their importance, complexity, uncertainty and chance of covering them in a short period of time.

An outline document was then released for comment by states and territories, peak industry bodies and major companies. The document was further developed based on feedback and additional research and analysis, leading to a full draft.

A fourth government forum was held in May 2021 to discuss the draft. Written comments were requested and received from the Department, ACT, NSW, Vic, WA and the Australian Bureau of Statistics. The consultants then revised the draft to produce this version.

It is understood that this document will be further revised over time as required.

Appendix B A history of national waste reporting

Appendix B A history of national waste reporting

National waste reporting was first attempted in the mid-1990s to measure progress in implementing the 1992 *National Waste Minimisation and Recycling Strategy.* This first attempt had little success, mainly because the scope, categories and comprehensiveness of the data collected by each state and territory did not match the proposed system and there was little appetite to change.

During the 2000s, the Department commissioned several snapshots of national waste quantities titled *Waste and Recycling in Australia*. Data quality and comprehensiveness improved over time, but differences between these reports meant trends could not be readily compiled. There were concerns from the states and territories about the transparency of the data transformations used to create a common national platform.

Following the 2009 *National Waste Policy*, the Department released the first National Waste Report in 2010 using 2006-07 data. It subsequently commissioned a 'method report' (Hyder Consulting 2011) to describe what data would be collected and how it would be transformed. This was applied in the *National Waste Report 2013* (using 2010-11 data), which was released with a calculation workbook so states and territories could track how their data had been transformed. Subsequently, a procedural document was released describing the whole process and setting out a slightly revised method (REC and BE 2015). This was agreed to by all states and territories in mid-2015. Accompanying the document was a Microsoft Excel tool established to implement the agreed method, into which states and territories would enter their data and in which it would be transformed to standardised output tables and charts.

On completion of the agreed method, process and tool, the available historical data was revisited and transformed for consistency with the agreed approach, producing, in four separate tools, a historical record back to 2006-07. Data for 2007-08, 2011-12 and 2012-13 are absent from this record. It was initially intended that the Department would develop a national waste data system for storing and querying the national data record over time, but this did not proceed.

The *National Waste Reports* for 2016, 2018 and 2020 were produced by consultants. Each incorporated an additional two data years and presented trends back to 2006-07. A National Waste Database was developed to house data for all years.

Detailed reporting and analysis of hazardous waste was undertaken in separate *Hazardous Waste in Australia* reports in 2015, 2017 and 2019.

A national consultation on improving Australia's waste data and reporting took place in late 2017 and early 2018, culminating in an 'improvements' report (BE et al. 2018). This informed subsequent reporting changes and the 2019 *National Waste Policy Action Plan*.

Appendix C Typical compositions of waste products and mixed material loads

Appendix C Typical compositions of waste products and mixed material loads

In accordance with Item 9, the following composition factors can be applied to allocate quantities of waste products and mixed waste loads to the material categories in Table 3. These values are provided based on best available estimates but compositions may vary widely depending on particular circumstances. Specific data should be used when available.

At the time of writing, composition data are available for only a fraction of the listed product wastes and mixed material loads. This table may be updated from time-to-time. Contributions based on reputable sources and measurements are invited.

Table 8 Typical compositions of waste products and mixed material loads

Waste product or mixed material load	building and demolition materials	Metals	Organics	Paper & cardboard	Plastics	Glass	Textiles, rubber & leather	Other	Sources and notes
Batteries		85%		5%	10%				Internet searches
Cables		40%			60%				Pita and Castilho (2018). May vary widely by cable type
Carbon fibre					10%			90%	Internet searches
Domestic commingled recyclables (CDS, glass included)		3%		49%	8%	28%		11%	Population-weighted average of NSW and SA municipal council surveys
Domestic commingled recyclables (no CDS, glass included)		3%		48%	9%	28%		12%	Population-weighted average of Vic and WA municipal council surveys
Fibreglass					50%	50%			Internet searches
Lead acid batteries		70%			10%			20%	Industry sources. The metals are lead compounds and the 'other' is acid (hazardous waste sub-types D220 and B100 respectively).
Mattresses		45%	5%	1%	27%		20%	2%	Derived from information kindly provided by Soft Landing

Waste product or mixed material load	building and demolition materials	Metals	Organics	Paper & cardboard	Plastics	Glass	Textiles, rubber & leather	Other	Sources and notes
Mixed domestic MSW kerbside residuals (no organics service)	4%	4%	57%	13%	15%	5%	3%		National waste reporting tool 2018-19 (based on landfill audits and the National Greenhouse and Energy Reporting (Measurement) Determination
Nappies			90%		10%				Internet searches
Residuals from materials recovery facilities		6%	2%	10%	10%	30%	2%	40%	APC (2014)
Residuals from metals recycling facilities (shredder floc)		10%			45%		25%	20%	Sustainability Victoria market summary report on shredder floc
Televisions and computers		56%			27%	10%		7%	Collated data from National Television and Computer Recycling Scheme co-regulatory arrangements
Vehicle (light duty)		80%			9%	3%	6%	2%	Dai et al. (2016). Metals are iron and steel (64%), aluminium (11%) and non-ferrous (5%).
White goods and other large appliances		60%			20%	10%		10%	Blue Environment estimate

Appendix D Waste in export and import codes

Appendix D Waste in export and import codes

This table maps Harmonised System (HS) codes (which apply to exports and imports), and Australian Harmonized Export Commodity Classification (AHECC) codes (which apply to exports only) to waste categories and types. This map is referred to in Item 14 of this standard, and was developed over several years based on research and analysis. Exports are best analysed through AHECC codes. Imports can be analysed through HS codes only[19]. The list is up-to-date at the time of writing, taking into account recent AHECC code changes for waste glass and waste plastics. Further changes may be required as new codes are developed to provide for the bans on export of paper and cardboard or tyres.

Table 9 Map from trade codes to categories and types of waste or recovered material

HS Code	AHECC code	AHECC description	Link to waste or recovered materials		% waste or recovered materials	
			Category	Type	Exports	Imports
050690	5069000	Bones and horn-cores, unworked, defatted, simply prepared, treated with acid or degelatinised and powder and waste of these products (excl. those cut to shape; and ossein and bones treated with acid)	Organics	Agricultural organics	50%	50%
051199	05119942	Animal products not elsewhere specified or included (incl. horsehair and waste thereof and natural sponges); and dead animals of Chapter 01, unfit for human consumption (exc. blood meal)	Organics	Agricultural organics	100%	100%
180200	18020000	Cocoa shells, husks, skins and other cocoa waste	Organics	Agricultural organics	100%	100%
230210	23021000	Bran, sharps and other residues, whether or not in the form of pellets, derived from the sifting, milling or other working of maize (corn)	Organics	Agricultural organics	100%	100%
230230	23023000	Bran, sharps and other residues, whether or not in the form of pellets, derived from the sifting, milling or other working of wheat	Organics	Agricultural organics	100%	100%
230240	23024020	Brans, sharps and other residues, whether or not in the form of pellets, derived from the sifting, milling or other working of cereals (excl. those of maize (corn) or of wheat)	Organics	Agricultural organics	100%	100%
230250	23025000	Bran, sharps and other residues, whether or not in the form of pellets, derived from the sifting, milling or other working of leguminous plants	Organics	Agricultural organics	100%	100%
230310	23031000	Residues of starch manufacture and similar residues, whether or not in the form of pellets	Organics	Agricultural organics	100%	100%
230320	23032000	Beet-pulp, bagasse and other waste of sugar manufacture, whether or not in the form of pellets	Organics	Agricultural organics	100%	100%
230330	23033000	Brewing or distilling dregs and waste, whether or not in the form of pellets	Organics	Agricultural organics	100%	100%
230400	23040000	Oil-cake and other solid residues, resulting from the extraction of soya-bean oil, whether or not ground or in the form of pellets	Organics	Agricultural organics	100%	100%
230500	23050000	Oil-cake and other solid residues, resulting from the extraction of ground-nut (incl. peanut) oil, whether or not ground or in the form of pellets	Organics	Agricultural organics	100%	100%
230610	23061000	Oil-cake and other solid residues of cotton seeds, resulting from the extraction of fats or oils, whether or not ground or in the form of pellets	Organics	Agricultural organics	100%	100%

[19] Imports are further classified by 10-digit HTISC codes. No HS codes have been identified that include both HTISC codes containing waste and HTISC codes not containing waste.

HS Code	AHECC code	AHECC description	Link to waste or recovered materials		% waste or recovered materials	
			Category	Type	Exports	Imports
230620	23062000	Oil-cake and other solid residues of linseed, resulting from the extraction of fats or oils, whether or not ground or in the form of pellets	Organics	Agricultural organics	100%	100%
230630	23063000	Oil-cake and other solid residues of sunflower seeds, resulting from the extraction of fats or oils, whether or not ground or in the form of pellets	Organics	Agricultural organics	100%	100%
230641	23064100	Oil-cake and other solid residues of low erucic acid rape or colza seeds, resulting from the extraction of fats or oils, whether or not ground or in the form of pellets	Organics	Agricultural organics	100%	100%
230649	23064900	Oil-cake and other solid residues of rape or colza seeds (excl. low erucic acid rape or colza seeds), resulting from the extraction of fats or oils, whether or not ground or in the form of pellets	Organics	Agricultural organics	100%	100%
230650	23065000	Oil-cake and other solid residues of coconut or copra, resulting from the extraction of fats or oils, whether or not ground or in the form of pellets	Organics	Agricultural organics	100%	100%
230660	23066000	Oil-cake and other solid residues of palm nuts or kernels, resulting from the extraction of fats or oils, whether or not ground or in the form of pellets	Organics	Agricultural organics	100%	100%
230690	23069010	Oil-cake & other solid residues, resulting from the extraction of vegetable fats or oils, whether or not ground or in pellets (excl. of cotton, sunflower, rape or colza seeds; linseed; coconut; copra; palm nuts or kernels; HS 2304 or 2305)	Organics	Agricultural organics	100%	100%
230800	23080000	Vegetable materials, vegetable waste, vegetable residues and by-products, whether or not in the form of pellets, of a kind used in animal feeding (excl. goods which are included in any other more specific heading), not elsewhere specified	Organics	Agricultural organics	100%	100%
251720	25172000	Macadam of slag, dross or similar industrial waste, whether or not incorporating pebbles, gravel or broken or crushed stone cited in HS 251710	Other	Other unclassified materials	100%	100%
252530	25253000	Mica waste	Other	Other unclassified materials	100%	100%
261800	26180000	Granulated slag (slag sand) from the manufacture of iron or steel	Other	Other unclassified materials	100%	100%
261900	26190000	Slag, dross (excl. granulated slag), scalings and other waste from the manufacture of iron or steel	Other	Other unclassified materials	100%	100%
262011	26201100	Hard zinc spelter (excl. that obtained from the manufacture of iron or steel; and those of HS 2618, HS 2619 and HS 7112)	Metals	Non-ferrous metals (excl. aluminium)	100%	100%
262019	26201900	Slag, ash and residues containing mainly zinc (excl. hard zinc spelter; those obtained from the manufacture of iron or steel; and those of HS 2618, HS 2619 and HS 7112)	Hazardous (excl. tyres)	NEPM D230	100%	100%
262021	26202100	Leaded gasoline sludges and leaded anti-knock compound sludges	Hazardous (excl. tyres)	NEPM D220	100%	100%
262029	26202900	Slag, ash and residues containing mainly lead (excl. leaded gasoline sludges and leaded anti-knock compound sludges; those from the manufacture of iron or steel; and those of HS 2618, HS 2619 and HS 7112)	Hazardous (excl. tyres)	NEPM D220 or D300	100%	100%
262030	26203000	Slag, ash and residues containing mainly copper (excl. those from the manufacture of iron or steel; and those of HS 2618, HS 2619 and HS 7112)	Hazardous (excl. tyres)	NEPM D190 or D300	100%	100%
262040	26204000	Slag, ash and residues containing mainly aluminium (excl. those from the manufacture of iron or steel; and those of HS 2618, HS 2619 and HS 7112)	Hazardous (excl. tyres)	NEPM D300	100%	100%

HS Code	AHECC code	AHECC description	Link to waste or recovered materials		% waste or recovered materials	
			Category	Type	Exports	Imports
262060	26206000	Slag, ash & residues containing arsenic, mercury, thallium or their mixtures, for the extraction of arsenic or those metals or for manufacture of their chemical compounds (excl. from the manufacture of iron or steel; HS 2618, 2619 & 7112)	Hazardous (excl. tyres)	NEPM D130 (arsenic) or D120 (mercury) or D180 (thallium) or D300 (if contaminant not clear)	100%	100%
262091	26209100	Slag, ash and residues containing antimony, beryllium, cadmium, chromium or their mixtures (excl. those from the manufacture of iron and steel; and those of HS 2618, HS 2619 and HS 7112)	Hazardous (excl. tyres)	NEPM D170 (antimony) or D160 (berylium) or D150 (cadmium) or D140 (chromium) or D300 (if contaminant not clear)	100%	100%
262099	26209900	Slag, ash and residues containing metals, arsenic or their compounds (excl. those of HS 262011 to HS 262091; those from the manufacture of iron and steel; and those of HS 2618, HS 2619 and HS 7112)	Hazardous (excl. tyres)	NEPM D130 (arsenic), range of D possibilities for other metals or D300 (if contaminant not clear)	100%	100%
262110	26211000	Ash and residues from the incineration of municipal waste (excl. those of HS 2618, HS 2619 or HS 2620)	Hazardous (excl. tyres)	N150 (fly ash); D300 or other types of D wastes (bottom ash)	100%	100%
262190	26219000	Slag and ash, not elsewhere specified (incl. seaweed ash (kelp)) (excl. ash and residues from the incineration of municipal waste and those of HS 2618, HS 2619 or HS 2620)	Ash	Ash	100%	100%
271091	27109100	Waste oils containing mainly petroleum oils and oils obtained from bituminous minerals and also containing polychlorinated biphenyls (PCBs), polychlorinated terphenyls (PCTs) or polybrominated biphenyls (PBBs)	Hazardous (excl. tyres)	NEPM M100	100%	100%
271099	27109900	Waste oils containing mainly petroleum oils and oils obtained from bituminous minerals (excl. waste containing polychlorinated biphenyls (PCBs), polychlorinated terphenyls (PCTs) or polybrominated biphenyls (PBBs))	Hazardous (excl. tyres)	NEPM J100	100%	100%
300692	30069206	Waste pharmaceuticals	Hazardous (excl. tyres)	NEPM R120	100%	100%
380400	38040000	Residual lyes from the manufacture of wood pulp, whether or not concentrated, desugared or chemically treated (incl. lignin sulphonamides) (excl. tall oil, sodium hydroxide and sulphate pitch (tall oil pitch))	Hazardous (excl. tyres)	NEPM C100	100%	100%
382510	38251000	Municipal waste, as specified in Note 4 to this chapter	Hazardous (excl. tyres)	Y46 hazardous waste (Basel code)	100%	100%
382520	38252000	Sewage sludge, that is, sludge arising from urban effluent treatment plant (incl. pre-treatment waste, scourings and unstabilised sludge) (excl. stabilised sludge suitable for use as a fertiliser of Chapter 31)	Hazardous (excl. tyres)	NEPM N205	100%	100%
382530	38253000	Clinical waste, that is, contaminated waste from medical research, diagnosis, treatment or other medical, surgical, dental or vet procedures, often containing pathogens, pharmaceutical substance & body fluids and require special disposal	Hazardous (excl. tyres)	NEPM R100	100%	100%

HS Code	AHECC code	AHECC description	Link to waste or recovered materials		% waste or recovered materials	
			Category	Type	Exports	Imports
382541	38254100	Waste halogenated organic solvents, that is, wastes containing mainly halogenated organic solvents, not fit for further use as presented as primary products, whether or not intended for recovery of the solvents	Hazardous (excl. tyres)	NEPM G150	100%	100%
382549	38254900	Waste organic solvents, that is, wastes containing mainly organic solvents, not fit for further use as presented as primary products, whether or not intended for recovery of the solvents (excl. waste halogenated organic solvents)	Hazardous (excl. tyres)	NEPM G110	100%	100%
382550	38255000	Wastes of metal pickling liquors, hydraulic fluids, brake fluids and anti-freeze fluids, not fit for further use as presented as primary products, as specified in Note 6 to this chapter	Hazardous (excl. tyres)	NEPM J120 (hydraulic, brake and anti-freeze fluids); B100 (pickling liquors)	100%	100%
382561	38256100	Wastes from chemical or allied industries mainly containing organic constituents (excl. HS 382510 to HS 382550), as specified in Note 6 to this chapter, not elsewhere specified or included	Hazardous (excl. tyres)	Not classifiable	100%	100%
382569	38256900	Wastes from chemical or allied industries (excl. those mainly containing organic constituents; and HS 382510 to HS 382550), as specified in Note 6 to this chapter, not elsewhere specified or included	Hazardous (excl. tyres)	Not classifiable	100%	100%
391510	39151001	Waste, parings and scrap of polymers of ethylene with a specific gravity of <0.94 (excluding those of a single thermoplastic material, transformed into primary forms)	Plastics	Low density polyethylene (LDPE, LLDPE) (4)	100%	100%
391510	39151002	Waste, parings and scrap of polymers of ethylene with a specific gravity of >0.94 (excluding those of a single thermoplastic material, transformed into primary forms)	Plastics	High density polyethylene (HDPE) (2)	100%	100%
391520	39152001	Waste, parings and scrap of polymers of styrene expanded (excluding those of a single thermoplastic material, transformed into primary forms)	Plastics	Expanded polystyrene (EPS) (6)	100%	100%
391520	39152002	Waste, parings and scrap of polymers of styrene (excluding of polymers of styrene expanded and those of a single thermoplastic material, transformed into primary forms)	Plastics	Polystyrene (PS), extruded polystyrene (XPS), rigid polystyrene and other polystyrenes (6)	100%	100%
391530	39153001	Waste, parings and scrap of polymers of vinyl chloride unplasticised (excluding single thermoplastic material, transformed into primary forms)	Plastics	Unplasticised polyvinyl chloride (uPVC) (3)	100%	100%
391530	39153002	Waste, parings and scrap of polymers of vinyl chloride (excluding those of polymers of vinyl chloride unplasticised and of a single thermoplastic material, transformed into primary forms)	Plastics	Plasticised polyvinyl chloride (pPVC) (3)	100%	100%
391590	39159093	Waste, parings and scrap of polymers of ethylene terephthalate (excluding those of a single thermoplastic material, transformed into primary forms)	Plastics	Polyethylene terephthalate (PET) (1)	100%	100%
391590	39159094	Waste, parings and scrap of polymers of propylene (excluding those of a single thermoplastic material, transformed into primary forms)	Plastics	Polypropylene (PP) (5)	100%	100%
391590	39159095	Waste, parings and scrap of plastics (excluding those of polymers of ethylene, styrene, vinyl chloride, ethylene terephthalate or propylene; and those of a single thermoplastic material, transformed into primary forms)	Plastics	Other (7)	100%	100%

HS Code	AHECC code	AHECC description	Link to waste or recovered materials		% waste or recovered materials	
			Category	Type	Exports	Imports
400300	40030000	Reclaimed rubber, in primary forms or in plates, sheets or strip, whether or not mixed with virgin rubber or other added substances, provided that the product has the essential character of reclaimed rubber	Textiles, leather & rubber	Leather & rubber (excl. tyres)	100%	100%
400400	40040000	Waste, parings and scrap of rubber (excl. of hard rubber (HS 4017)) and powders and granules obtained therefrom	Tyres	Tyres	100%	100%
401211	40121100	Retreaded pneumatic rubber tyres, of a kind used on motor cars (incl. station wagons and racing cars)	Tyres	Tyres	100%	100%
401212	40121200	Retreaded pneumatic rubber tyres, of a kind used on buses or lorries	Tyres	Tyres	100%	100%
401213	40121300	Retreaded pneumatic rubber tyres, of a kind used on aircraft	Tyres	Tyres	100%	100%
401219	40121900	Retreaded pneumatic rubber tyres (excl. those of a kind used on motor cars (incl. station wagons and racing cars), buses, lorries and aircraft)	Tyres	Tyres	100%	100%
401220	40122000	Used pneumatic rubber tyres, whether or not subject to recutting or regrooving	Tyres	Tyres	100%	100%
401290	40129000	Solid or cushion rubber tyres, rubber tyre treads (incl. interchangeable tyre treads) and rubber tyre flaps	Tyres	Tyres	100%	100%
401700	40170000	Hard rubber (e.g. ebonite) in all forms (incl. cellular variety, waste & scrap); articles of hard rubber not specified in other chapters (incl. vats; troughs; knife handles & knobs, grip-handles and the like; sanitary and hygienic articles)	Textiles, leather & rubber	Leather & rubber (excl. tyres)	10%	10%
411520	41152000	Parings and other waste of leather or of composition leather (excl. old footwear (HS 6309) and parings and waste of raw hides or skins (HS 0511)), not suitable for the manufacture of leather articles; and leather dust, powder and flour	Textiles, leather & rubber	Leather & rubber (excl. tyres)	100%	100%
440131	44013100	Sawdust and wood waste and scrap, in the form of pellets	Organics	Timber	100%	100%
440139	44013901	Sawdust and wood waste and scrap, agglomerated, in logs, briquettes or similar forms (excluding in the form of pellets)	Organics	Timber	100%	100%
440140	44014090	Sawdust and wood waste and scrap, not agglomerated, excluding sandalwood	Organics	Timber	100%	100%
450190	45019000	Waste cork and crushed, granulated or ground cork (excl. agglomerated cork of HS 4504)	Organics	Other organics	100%	100%
470620	47062000	Pulps of fibres derived from recovered (waste and scrap) paper or paperboard	Paper & cardboard	*Not a waste type*	100%	100%
470710	47071000	Recovered (waste and scrap), unbleached, kraft paper or paperboard or corrugated paper or paperboard	Paper & cardboard	Cardboard	100%	100%
470720	47072000	Recovered (waste and scrap) paper or paperboard, made mainly of bleached chemical pulp, not coloured in the mass	Paper & cardboard	Office paper	100%	100%
470730	47073000	Recovered (waste and scrap) paper or paperboard, made mainly of mechanical pulp (for example, newspapers, journals and similar printed matter)	Paper & cardboard	Newsprint & magazines	100%	100%
470790	47079000	Waste and scrap paper or paperboard (incl. unsorted waste & scrap) (excl. unbleached kraft or corrugated (470710); that made mainly from bleached chemical pulp, not coloured in the mass (470720); or made mainly of mechanical pulp (470730))	Paper & cardboard	More than one type	100%	100%
510310	51031000	Noils of wool or of fine animal hair	Textiles, leather & rubber	Other organics	100%	100%

HS Code	AHECC code	AHECC description	Link to waste or recovered materials		% waste or recovered materials	
			Category	Type	Exports	Imports
510320	51032000	Waste of wool or of fine animal hair (incl. yarn waste, but excl. garnetted stock and noils of wool or of fine animal hair)	Textiles, leather & rubber	Other organics	100%	100%
510330	51033000	Waste of coarse animal hair (incl. yarn waste but excl. garnetted stock)	Textiles, leather & rubber	Other organics	100%	100%
510400	51040000	Garnetted stock of wool or of fine or coarse animal hair	Textiles, leather & rubber	Other organics	100%	100%
520210	52021000	Cotton yarn waste (incl. thread waste)	Textiles, leather & rubber	Textiles	100%	100%
520291	52029100	Cotton garnetted stock	Textiles, leather & rubber	Textiles	100%	100%
520299	52029900	Cotton waste (excl. yarn waste, thread waste and garnetted stock)	Textiles, leather & rubber	Textiles	100%	100%
550510	55051000	Synthetic fibre waste (including noils, yarn waste and garnetted stock) of man-made fibres	Textiles, leather & rubber	Textiles	100%	100%
550520	55052000	Artificial fibre waste (including noils, yarn waste and garnetted stock) of man-made fibres	Textiles, leather & rubber	Textiles	100%	100%
630900	63090020	Worn clothing and other worn textile articles	Textiles, leather & rubber	Textiles	100%	100%
631090	63109000	Used or new rags, scrap twine, cordage, ropes and cables and worn out articles of twine, cordage, rope or cables, of textile materials, sorted	Textiles, leather & rubber	Textiles	50%	50%
700100	70010001	Glass in the mass, other waste and scrap of glass, processed into furnace-ready fines and/or cullet	Glass	Glass	100%	100%
700100	70010002	Glass in the mass, other waste and scrap of glass, processed into non-furnace-ready fines and/or cullet	Glass	Glass	100%	100%
700100	70010091	Glass in the mass, cullet and other waste and scrap of glass, not elsewhere specified	Glass	Glass	100%	100%
711230	71123000	Ash containing precious metal or precious metal compounds of a kind used principally for the recovery of precious metal	Ash	Ash	100%	100%
711292	71129200	Waste and scrap of platinum, metal clad with platinum and other waste and scrap used principally for the recovery of platinum (excl. ash and sweepings containing other precious metals)	Metals	Non-ferrous metals (excl. aluminium)	100%	100%
711299	71129900	Waste and scrap of precious metals and metals clad with precious metals (excl. gold and platinum); other waste and scrap containing these precious metals of a kind used principally for the recovery of these metals (excl. ash)	Metals	Non-ferrous metals (excl. aluminium)	100%	100%
720410	72041000	Waste and scrap of cast iron	Metals	Steel	100%	100%
720421	72042101	Waste and scrap of stainless steel	Metals	Steel	100%	100%
720429	72042912	Ferrous waste and scrap, and remelting ingots of iron and steel (excl. waste and scarp of cast iron and alloy steel)	Metals	Steel	100%	100%
720430	72043001	Waste and scrap of tinned iron or steel	Metals	Steel	100%	100%

HS Code	AHECC code	AHECC description	Link to waste or recovered materials		% waste or recovered materials	
			Category	Type	Exports	Imports
720441	72044100	Ferrous turnings, shavings, chips, milling waste, sawdust, filings, trimmings and stampings	Metals	Steel	100%	100%
720449	72044901	Ferrous waste and scrap (excluding waste and scrap of cast iron, alloy steel, stainless steel, in tin plate and tinned iron or steel)	Metals	Steel	100%	100%
740400	74040012	Refined copper waste and clean scrap (excl. copper waste and scrap of primary cells, primary batteries and electric accumulators)	Metals	Non-ferrous metals (excl. aluminium)	100%	100%
740400	74040018	Refined copper waste and scrap (excl. clean, and copper and waste scrap of primary cells, primary batteries and electric accumulators)	Metals	Non-ferrous metals (excl. aluminium)	100%	100%
740400	74040022	Waste and scrap of copper-zinc base alloys (brass) (excl. waste and scrap of primary cells, primary batteries and electric accumulators)	Metals	Non-ferrous metals (excl. aluminium)	100%	100%
740400	74040030	Waste and scrap of copper alloys (excl. copper-zinc base alloys (brass) and copper waste and scrap of primary cells, primary batteries and electric accumulators)	Metals	Non-ferrous metals (excl. aluminium)	100%	100%
750300	75030001	Nickel waste and scrap, excluding waste and scrap of primary cells, primary batteries and electric accumulators	Metals	Non-ferrous metals (excl. aluminium)	100%	100%
760200	76020010	Scrap beverage cans of aluminium	Metals	Aluminium	100%	100%
760200	76020090	Aluminium waste and scrap (excl. beverage cans)	Metals	Aluminium	100%	100%
780200	78020000	Lead waste and scrap; excluding waste and scrap of primary cells, primary batteries and electric accumulators	Hazardous (excl. tyres)	Non-ferrous metals (excl. aluminium), D220	100%	100%
790200	79020001	Zinc waste and scrap; excluding waste and scrap of primary cells, primary batteries and electric accumulators	Metals	Non-ferrous metals (excl. aluminium)	100%	100%
800200	80020000	Tin waste and scrap	Metals	Non-ferrous metals (excl. aluminium)	100%	100%
810197	81019700	Waste and scrap of tungsten (wolfram)	Metals	Non-ferrous metals (excl. aluminium)	100%	100%
810297	81029700	Molybdenum waste and scrap	Metals	Non-ferrous metals (excl. aluminium)	100%	100%
810330	81033000	Tantalum waste and scrap	Metals	Non-ferrous metals (excl. aluminium)	100%	100%
810420	81042000	Magnesium waste and scrap	Metals	Non-ferrous metals (excl. aluminium)	100%	100%
810530	81053000	Waste and scrap of cobalt	Metals	Non-ferrous metals (excl. aluminium)	100%	100%
810600	81060000	Bismuth and articles thereof (incl. waste and scrap)	Metals	Non-ferrous metals (excl. aluminium)	10%	0%
810730	81073000	Cadmium waste and scrap	Hazardous (excl. tyres)	NEPM D150	100%	100%
810830	81083000	Titanium waste and scrap	Metals	Non-ferrous metals (excl. aluminium)	100%	100%

HS Code	AHECC code	AHECC description	Link to waste or recovered materials		% waste or recovered materials	
			Category	Type	Exports	Imports
810930	81093000	Zirconium waste and scrap	Metals	Non-ferrous metals (excl. aluminium)	100%	100%
811020	81102000	Antimony waste and scrap	Hazardous (excl. tyres)	NEPM D170	100%	100%
811100	81110000	Manganese and articles thereof (incl. waste and scrap)	Metals	Non-ferrous metals (excl. aluminium)	10%	0%
811213	81121300	Beryllium waste and scrap	Hazardous (excl. tyres)	NEPM D160	100%	100%
811222	81122200	Chromium waste and scrap	Metals	Non-ferrous metals (excl. aluminium)	100%	100%
811252	81125200	Thallium waste and scrap	Hazardous (excl. tyres)	NEPM D180	100%	100%
811292	81129229	Germanium, vanadium, gallium, hafnium, indium, niobium (columbium) and rhenium, in unwrought or in powder forms or waste and scrap	Metals	Non-ferrous metals (excl. aluminium)	10%	0%
844331	84433105	Machines which perform two or more functions of printing, copying or facsimile transmission, capable of connecting to automatic data processing machine or a network (excl. printers of 84431)	Other	E-waste	Transactions having a reported value of less than $2500 per tonne	0%
844332	84433207	Printers, copying machines or facsimile machines, capable of connecting to an automatic data processing machine or to a network (excl. those which preform two or more functions of printing, copying or facsimile transmission and printers of 84431)	Other	E-waste		0%
844339	84433908	Printers, copying machines or fax machines (excl. those which perform two or more functions of printing, copying or fax & capable of connecting to an ADP machine or network, machines capable of connecting to an ADP machine or network & HS 84431)	Other	E-waste		0%
847130	84713011	Portable automatic data processing machines, weighing not more than 10 kg consisting of at least a central processing unit, a keyboard and a display.	Other	E-waste		0%
847141	84714121	Automatic data processing machines, comprising in the same housing at least a central processing unit and an input and output unit, whether or not combined, weighing more than 10 kg	Other	E-waste		0%
847149	84714930	Auto data processing machines, weighing more than 10 kg, presented in the form of systems, (excl. machines comprising in the same housing at least a central processing, input & output unit, whether or not combined)	Other	E-waste		0%
847150	84715040	Processing units (excl. those of 8471.41 or 8471.49), whether or not containing in the same housing one or two of the following types of unit: storage units, input units and output units	Other	E-waste		0%
847180	84718060	Units of automatic data processing machines (excl. processing units, input or output units and storage units) not elsewhere specified	Other	E-waste		0%
847290	84729003	Office machines, including typewriters and word-processing machines (excluding office machines of HS 847210, 847230, 8443, 8470, 8471 and office machines specified elsewhere in the AHECC)	Other	E-waste		0%

HS Code	AHECC code	AHECC description	Link to waste or recovered materials		% waste or recovered materials	
			Category	Type	Exports	Imports
852859	85285903	Monitors, not incorporating television reception apparatus (excluding capable of directly connecting to and designed for use with an automatic data processing machine of heading 8471 and cathode-ray tube monitors)	Other	E-waste		0%
854810	85481001	Waste and scrap of primary cells, primary batteries & electric accumulators, spent primary cells, spent primary batteries & spent electric accumulators	Hazardous (excl. tyres)	NEPM D (no. depends on major metal present)	100%	100%

Appendix E Densities and weights of common wastes

Appendix E Densities and weights of common wastes

In accordance with Item 23, Table 10 and Table 11 provide default density values for common materials and mixed waste loads, and Table 12 provides default weights for common product wastes.

Densities and weights may vary widely depending on load type and circumstances. Reporters should use their own density values where:

- sound evidence is available and can be cited
- their densities or weights are significantly different from those recorded below.

The values were compiled mainly from recommended values in documents provided by Qld, SA, Vic and WA (using averages where they varied), supported by other references[20] and industry knowledge. Additional or amended values may be provided over time. Users are requested to report anomalies or suggest better values based on reputable sources or measurements. Evidence should be provided.

[20] *https://www.epa.nsw.gov.au/your-environment/waste/classifying-waste/virgin-excavated-natural-material*
https://www.nabers.gov.au/file/2267/download?token=GY-n9HxK

Table 10 Densities of waste and recovered materials

Category	Type	Sub-type	Density (t/m3)
Building and demolition wastes	Asphalt		0.79
	Bricks, concrete and pavers	Bricks	1.20
		Concrete	1.50
	Ceramics, tiles and pottery	Ceramics	0.75
		Tiles	0.47
	Plasterboard and cement sheeting	Plasterboard	0.23
		Cement sheeting	0.50
	Soil, sand and rock	Soil	1.20
		Sand	1.60
		Rock or stone	1.58
	Rubble		1.36
	Mixed building waste		0.72
Metals	Ferrous metals	Mixed	0.50
		Steel cans	0.09
		Steel cans - baled	0.50
		Steel cans - flat	0.13
	Aluminium	Mixed	0.16
		Aluminium cans	0.03
		Aluminium cans - baled	0.22
		Aluminium cans - flat	0.09
	Non-ferrous metals		0.14
Organics	Food organics		0.46
	Garden organics	Garden organics - loose	0.15
		Garden organics - compacted	0.26
	Timber		0.21
	Sawdust		0.33
	Biosolids		0.72
	Other organics		0.30
Paper and cardboard	Paper	Loose	0.09
		Compacted	0.20
	Cardboard	Loose	0.04
		Compacted	0.11
	Polymer coated paperboard	Loose	0.04
Plastics	Plastic containers	Loose, whole	0.01
		Baled	0.14
Glass	Glass from food and beverage containers, whole		0.34
Textiles, leather and rubber (excl. tyres)	Textiles	Mixed textiles	0.15
		Clothing	0.10
		Carpet	0.80
	Leather and rubber (excl. tyres)	Leather	0.25
		Rubber (excl. tyres)	0.30

Table 11 Densities of mixed material loads

Mixed material load	Density (t/m3)
Domestic commingled recyclables	0.06
Mixed domestic MSW kerbside residuals	0.14
Mixed domestic hard waste	0.11
Street cleaning waste	0.70
Mixed C&D waste	1.23
Residuals from materials recovery facilities	0.31
Residuals from metals recycling facilities (shredder floc)	0.41
Residuals from pulping of recycled paper and cardboard	0.90
Disaster waste	0.72
Quarantine waste	0.30

Table 12 Mass per item of product wastes

Type	Sub-type	kg
E-waste	Mobile phone	0.14
	White goods and other large appliances	52
Mattress		35