GOVERNMENT OF WESTERN AUSTRALIA

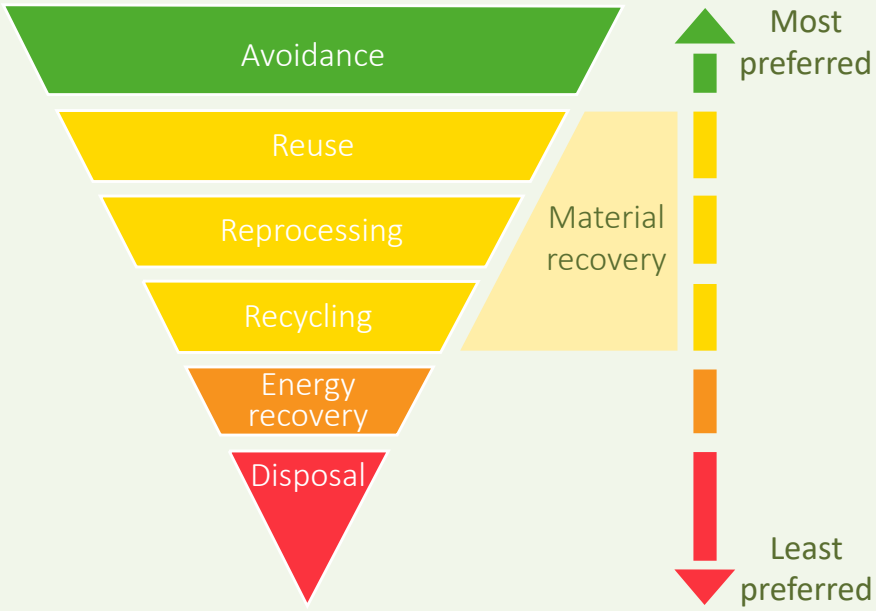
WASTE AUTHORITY
WA...TOO GOOD TO WASTE

WasteSorted
A Waste Authority Program

Position statement on the waste hierarchy

Getting our WasteSorted

September 2020



Waste Authority
C/O Department of Water and Environmental Regulation
Prime House, 8 Davidson Terrace
Joondalup Western Australia 6027
www.wasteauthority.wa.gov.au.

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Statutory context
The Waste Authority is charged with promoting better waste management practices in Western Australia under the *Waste Avoidance and Resources Recovery Act 2007*. One of the Authority's functions under the Act is to draft, for the Minister for Environment's approval, a long term waste strategy for the whole of the State for continuous improvement of waste services, waste avoidance and resource recovery, benchmarked against best practice and targets for waste reduction, resource recovery and the diversion of waste from landfill disposal. The *Waste avoidance and resource recovery strategy 2030* was released on 10 February 2019. The Waste Authority publishes position statements from time to time. Position statements formalise the views of the Waste Authority and may be used to inform decisions relevant to the Waste Authority's role in implementing the strategy.

Background

In 2013, the Waste Authority released a *Communication on the waste hierarchy* to explain the waste hierarchy and how it would be applied in the Waste Authority's decision-making as it delivered Western Australia's first waste strategy, *Creating the right environment*.

In 2019, the *Waste avoidance and resource recovery strategy 2030* (waste strategy) replaced the first strategy. The waste strategy contains a vision for Western Australia (WA) to become a sustainable, low-waste, circular economy in which human health and the environment are protected from the impacts of waste. The waste strategy includes objectives and targets to **avoid** waste, **recover** more value and resources from waste, and **protect** the environment by managing waste responsibly.

A key feature of the waste strategy is the inclusion of material recovery targets to support the move towards a more circular economy.

This *Position statement on the waste hierarchy* replaces the earlier communication, and has been updated to align with WA's new waste strategy.

Legislation and policy

The waste hierarchy is enshrined in section 5(1)(c) of the *Waste Avoidance and Resource Recovery Act 2007* (WARR Act):

5. Objects of this Act

(1) The primary objects of this Act are to contribute to sustainability, and the protection of human health and the environment, in Western Australia and the move towards a waste-free society by:

(a) promoting the most efficient use of resources, including resource recovery and waste avoidance; and

(b) reducing environmental harm, including pollution through waste; and

(c) the consideration of resource management options against the following hierarchy —

(i) avoidance of unnecessary resource consumption;

(ii) resource recovery (including reuse, reprocessing, recycling and energy recovery);

(iii) disposal.

The WARR Act establishes the Waste Authority and its functions, including a requirement to prepare a waste strategy for WA.

The waste hierarchy

Overview

The waste hierarchy is a guiding concept in the waste strategy. It ranks waste management options in order of their general environmental desirability, from avoidance as the most preferred option, through various resource recovery options, to the least preferred option of disposal.

Various adaptations of the waste hierarchy have been used in Australia and internationally. The waste hierarchy set out in the WARR Act is generally consistent with these versions of the waste hierarchy.

The waste hierarchy is recognised as providing important guidance on environmental impacts and is enshrined in legislation in Australian jurisdictions and internationally. The hierarchy is not intended as a standalone assessment tool; rather, it should be used alongside other tools to assess broader environmental, economic and social impacts of waste management options.

The waste hierarchy is based on life-cycle assessment that considers the total environmental impacts of different management options, including the direct and indirect impacts of material use, and water and energy consumption. Options higher up the hierarchy avoid or minimise the generation of waste. This in turn minimises the overall environmental impacts of resource use and waste management.

Resource recovery options, in the middle of the hierarchy, recover materials or energy from the waste stream, thereby offsetting the environmental impacts of extracting and processing raw materials. Recovery options reduce the amount of waste that requires disposal.

Material recovery options (reuse, reprocessing, recycling) form a subset of resource recovery and more closely align with WA's move towards a more circular economy. A circular economy presents opportunities for increased local recycling to support local jobs and investment and minimises the costs and impacts of unnecessary transport and extraction of raw materials. It is estimated that for each 10,000 tonnes of waste recycled, 9.2 full-time equivalent jobs are created compared to 2.8 jobs for landfill (Access Economics, 2009). Material recovery generates material that can be used in the economy, thereby reducing the demands on virgin raw materials, as well as lessening the environmental impacts of their extraction.

The objectives and targets in the waste strategy reflect WA's transition to a more circular economy. The waste strategy includes a target to increase material recovery to 75 per cent by 2030.

Energy recovery options primarily recover energy as solid, liquid or gaseous fuels, or as heat, rather than as materials from the waste stream. Energy recovery options are less preferred than material recovery options as they don't maximise the value of circulating materials in the economy. Energy recovery is preferred over disposal for genuine residual waste from which materials cannot be feasibly recovered. Energy recovery supports energy generation, which can offset some energy generation from fossil fuels, and reduce the volume and instability of waste which remains for disposal to landfill.

Please refer to the 2020 Waste Authority *Position statement on waste to energy* for more information on the Waste Authority's position on waste to energy technologies, including their application to residual waste.

Disposal to landfill is generally the least preferred waste management option because landfills recover the least value from the waste stream, generally deliver the lowest environmental benefit and do least to support the circulation of materials. Waste disposed of to landfill can also have direct impacts on the environment – including groundwater contamination (from leachate) and greenhouse gas emissions (primarily methane) – and can present risks to community health and amenity.

The Waste Authority acknowledges that remote and rural communities may face increased challenges, including those associated with economies of scale and distance to recycling markets, which limit the range of options that can feasibly be applied to the management of waste.

The Waste Authority encourages options further up the hierarchy, favouring the avoidance and recovery of materials over the recovery of energy, wherever technically, environmentally and economically practicable.

The waste hierarchy is intended to be used alongside other tools to inform decision-making. No single waste management approach is suitable for managing all waste streams in all circumstances. To meet the objectives and targets in the waste strategy, a number of approaches, processes and technologies along different points of the waste hierarchy need to be used.

Emergence and use

A form of the waste hierarchy was introduced in Article 3 of the 1975 European Council Directive on waste. Extensive life-cycle analysis into the environmental impacts of different waste management options has since strengthened support for the hierarchy. Life-cycle analysis considers the direct and indirect impacts of waste management on air, land and water throughout the life of a product or material.

The US Environmental Protection Agency compared the net, per-ton energy impacts for source reduction, recycling, combustion and landfilling of 40 different materials and groups of materials and found that managing waste in accord with the waste hierarchy saves energy in nearly all circumstances.

Source: EPA (USA) 2006

The waste hierarchy has been adopted in policy and legislation internationally and by all Australian jurisdictions, and is referenced by other organisations. Key examples are highlighted below.

International

Europe

Several European nations include a waste hierarchy in legislative and policy documents, including Germany, the Netherlands, Sweden and the United Kingdom. A waste hierarchy is incorporated into the European Parliament and Council's Directive 2008/98/EC on waste, for example.

USA

Numerous US states have a waste hierarchy within their statutes – US Environmental Protection Agency policy documents refer to the waste hierarchy.

Australia

The waste hierarchy is central to the *National Waste Policy: Less waste, more resources* (2018). All Australian states and territories include a waste hierarchy in their environment or waste legislation and/or in their principal waste policy documents.

Other organisations

Organisation for Economic Cooperation and Development

The Organisation for Economic Cooperation and Development's (OECD) *Recommendation of the Council on resource productivity* includes a waste hierarchy.

Western Australian Local Government Association

The WA Local Government Association (WALGA) has advocated for managing waste according to a waste hierarchy in a policy statement. WALGA also references the waste hierarchy in some of its submissions related to waste and recycling.

Waste Management and Resource Recovery Association Australia

The Waste Management and Resource Recovery Association Australia (WMRR) advocates on behalf of the waste and resource recovery industry and supports waste management according to a waste hierarchy.

Ellen MacArthur Foundation

The Ellen MacArthur Foundation's focus on a circular economy builds on existing environmental policy concepts including the waste hierarchy. The waste hierarchy is referenced in some of the foundation's publications.

Waste hierarchy options

The waste hierarchy is presented in Figure 1. This section explains each option in the waste hierarchy with references to the waste strategy.

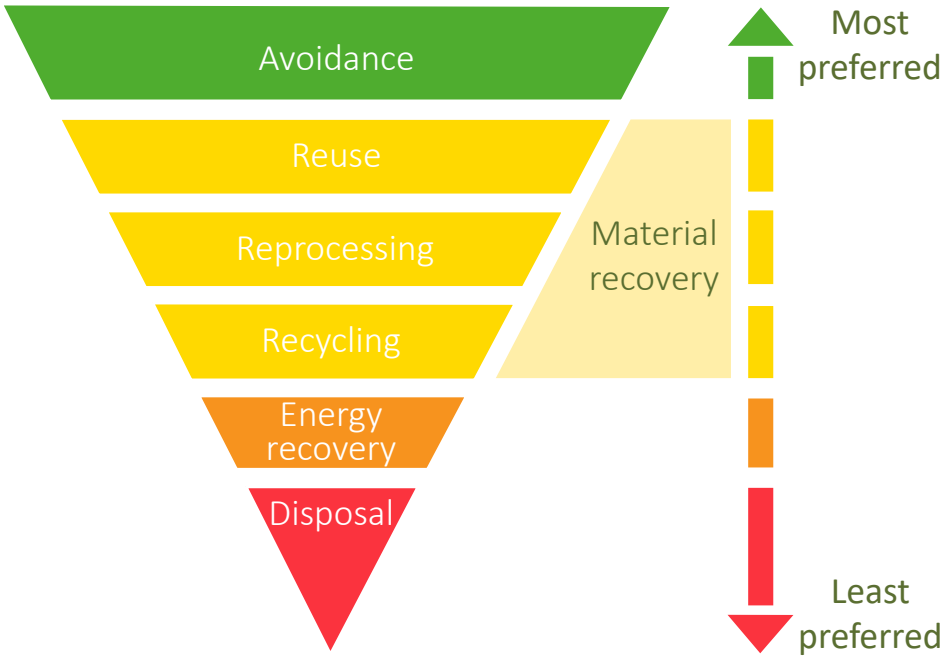
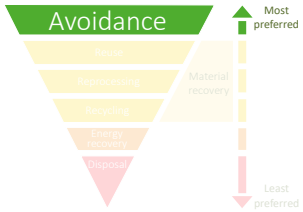


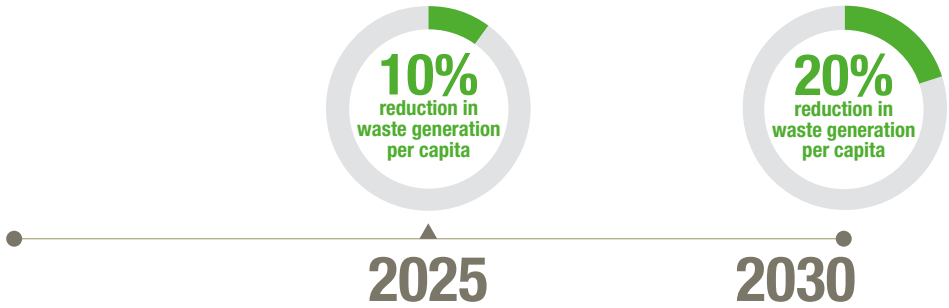
Figure 1: The waste hierarchy

Avoidance



The waste strategy contains objectives and targets for waste avoidance.

Avoid: Western Australians generate less waste

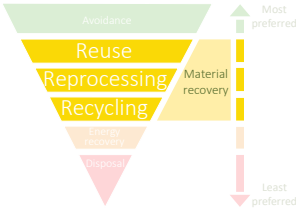


'Avoidance' refers to the prevention or reduction of either waste generation or the environmental impacts of waste generation, such as toxicity. Waste avoidance prevents substances, materials or products from becoming waste. It is the most preferred option in the waste hierarchy.

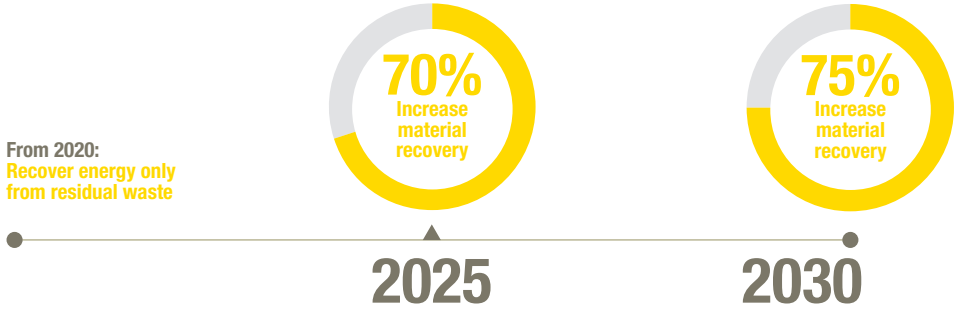
Avoidance	Example
Preventing/reducing waste generation.	Designing packaging to eliminate or reduce avoidable product waste.
Substituting a product or raw material with a more environmentally friendly product or raw material.	The move away from the use of hazardous materials in electronic products.

Material recovery

The waste strategy contains objectives and targets for recovery, including material recovery and energy recovery.

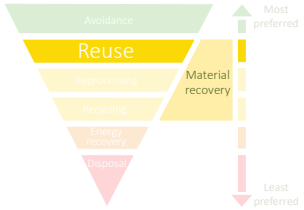


Recover: Western Australians recover more value and resources from waste



'Recovery' refers to options that recover materials, energy or a combination of the two from the waste stream. Options that primarily aim to recover **materials** (reuse, reprocessing, recycling) are preferred to those that primarily aim to recover **energy** (via thermal waste to energy technologies, for example). The recovery process produces energy outputs and/or products such as heat, steam, synthetic gas, pyrolysis oil or char.

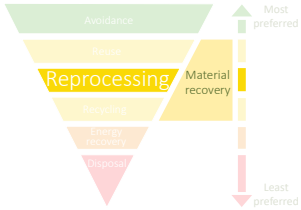
Reuse



'Reuse' refers to using a material or item again. It is the most preferable form of recovery because it requires no (or minimal) resources and therefore has no (or minimal) environmental impact.

Reuse	Example
Reusing an item in its original form for its original purpose.	Using second-hand items.
Reusing an item for a new purpose (also referred to as 'repurposing').	Using storage crates or pallets to make furniture or shelving.

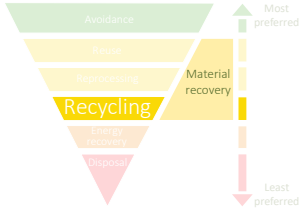
Reprocessing



'Reprocessing' refers to using an item or material that might otherwise become waste during the manufacturing or remanufacturing process.

Reuse	Example
Using materials that would otherwise become waste during the production process.	Capturing off-cuts of materials in the production process (such as paper or plasterboard) to reprocess and redirect them back into the production process.

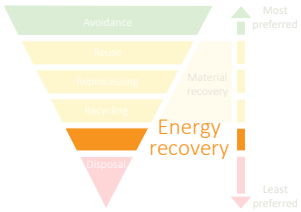
Recycling



'Recycling' refers to the use of recovered waste materials as substitutes for extracted raw materials. It involves taking waste materials or products and reconstituting them into items that have a market value.

Recycling	Example
Converting waste materials back into raw materials for use in new products.	Using materials collected from recycling bins such as plastic or steel packaging for sorting and sale to commodities markets as inputs for new products.

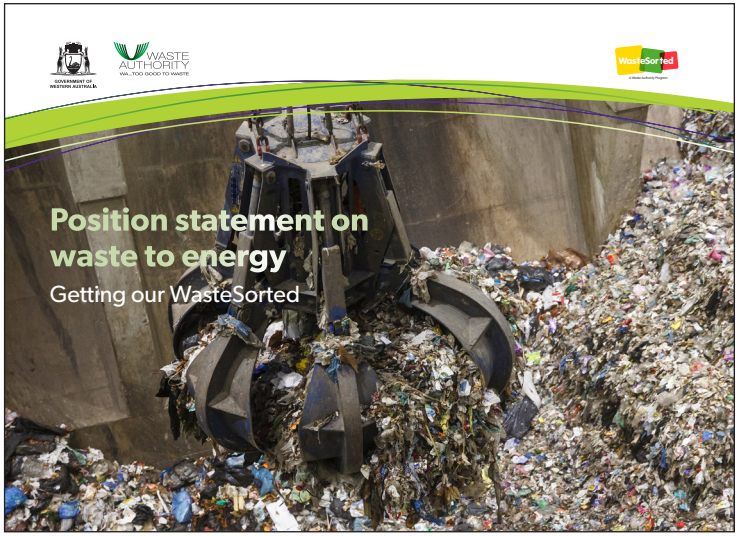
Energy recovery



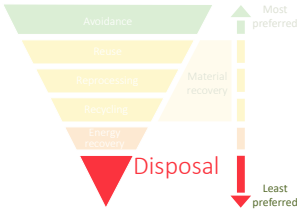
'Energy recovery' is the process of converting waste products into some form of energy, usually as solid, liquid or gaseous fuels, or as heat. Energy recovery options are normally referred to as 'waste to energy' (or energy from waste) and can include both thermal and non-thermal technologies.

The Waste Authority's *Position statement on waste to energy* contains more information on waste to energy technologies, and the Waste Authority's views with reference to the waste strategy. The waste strategy recognises the role of waste to energy as an alternative to disposal to landfill. It also recognises that, consistent with the waste hierarchy and achieving a circular economy, avoiding waste and then maximising material recovery is preferable to energy recovery. To maximise material recovery, energy recovery should only be used for genuine residual waste once better practice source-separation and recycling-system options have been exhausted.

Energy recovery	Example
Energy recovery: thermal treatment	Thermal treatments such as combustion, gasification, pyrolysis and plasma processing primarily convert waste into energy products such as heat, steam, synthetic gas, pyrolysis oil or char. These can be used directly or as inputs into electricity production or industrial processes.
Energy recovery: non-thermal treatment	An anaerobic digestion plant, which produces a methane-rich biogas used to generate electricity or heat (when combusted), is a form of energy recovery.



Disposal



The waste strategy contains objectives and targets to protect the environment, including targets to reduce the disposal of waste to landfill (Perth and Peel) and for waste to be managed/ disposed of at better-practice facilities.

Protect: Western Australians protect the environment by managing waste responsibly.

Disposal of waste is generally the least preferred waste management option in the waste hierarchy. In WA, 'disposal' primarily refers to material disposed of to landfill. However, disposal could also refer to treatment options that do not recover energy, or where energy recovery is minimal and therefore not recognised as genuine energy recovery.

Disposal options do not support WA's move towards a more circular economy. Disposal does not support the recovery of materials for use in the economy and makes a lower contribution to employment compared to recycling.

Disposal to landfill may be suitable or necessary for particular materials or locations if there is no feasible option further up the hierarchy. For example, waste asbestos currently has no viable recovery option. Waste asbestos should be properly wrapped, labelled and disposed of to a suitable landfill to ensure protection of human health and the environment. Disposal to landfill may also be the only feasible option in remote locations. It is important that all waste facilities, including landfills, adopt better-practice environmental protection to support the **protect** objectives and targets in the waste strategy.

Conclusion

The waste hierarchy ranks waste management options in order of their general environmental desirability.

The waste hierarchy is an important and internationally recognised tool to help understand waste management options. It is not intended as a standalone decision-making tool, and instead should be used alongside other tools to analyse the full impacts of waste management options.

A waste hierarchy is set out in WA's WARR Act. This position statement helps to explain the waste hierarchy, particularly in relation to resource recovery, in the context of WA's waste strategy and its objectives and targets to move towards a more circular economy.

The waste hierarchy will inform decisions relating to the implementation of the waste strategy.

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Address: Waste Authority

C/O Department of Water and Environmental Regulation
Prime House, 8 Davidson Terrace
Joondalup Western Australia 6027

Post: Locked Bag 10
Joondalup Western Australia 6919

Phone: 08 6364 6965

Web: www.wasteauthority.wa.gov.au
Email: info@wasteauthority.wa.gov.au

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