



Water Recycling

Water recycling involves the recovery or reclamation of water from wastewater for potable (drinking) or non-potable use, which can be supplied back to the water system either directly or indirectly.

Long term water security and resilience

Australia needs to ensure water security in a drying and variable climate, particularly in urbanised and city areas where rainfall and runoff have declined significantly. Recycled water can provide a reliable, climate-resilient and economically sound source of water, which can be an important component of a robust and resilient water supply system.

Recycled Water Sources

Recycling water from wastewater

The outflow of water from any system, such as a sewer network, sewage treatment plant or industrial water.

Greywater from households

Water that has been used in the hand basin, shower, bath, spa bath, washing machine, laundry tub that is captured at the household, building or precinct level. It is not the water from the toilet, kitchen sink or dishwasher as this is generally too high in grease and oil to be reused successfully without significant treatment.

Stormwater harvesting

Rainwater that is collected or harvested from stormwater drainage systems. IN urban areas this includes the rainwater runoff from roads, buildings and open lands, usually carried away by drains.

Is recycled water safe?

Recycled water when produced and used according to Australian guidelines is considered safe to humans and the environment.

Risk management of recycled water

The [Australian Guidelines for Water Recycling](#) (AGWR) (2006) provides the reference for making and using recycled water in a safe way. AGWR 2006 uses a state-of-the-art risk management approach that adopts the Hazard Analysis and Critical Point (HACCP) system to manage risks, which requires producers and managers of recycled water to develop water production, operations and management systems to safeguard human and environmental health.

Validation of a water recycling schemes

The Australian Guidelines for Water Recycling (2006) require that a treatment technology or process be validated before the water recycling scheme is operational. [Validation](#) is the confirmation that the treatment technology meets the specified performance targets. Across Australia there is currently no consistent approach to validating treatment technologies against these guidelines. As a result validation of similar technologies is often replicated in multiple states/territories.

What can recycled water be used for?

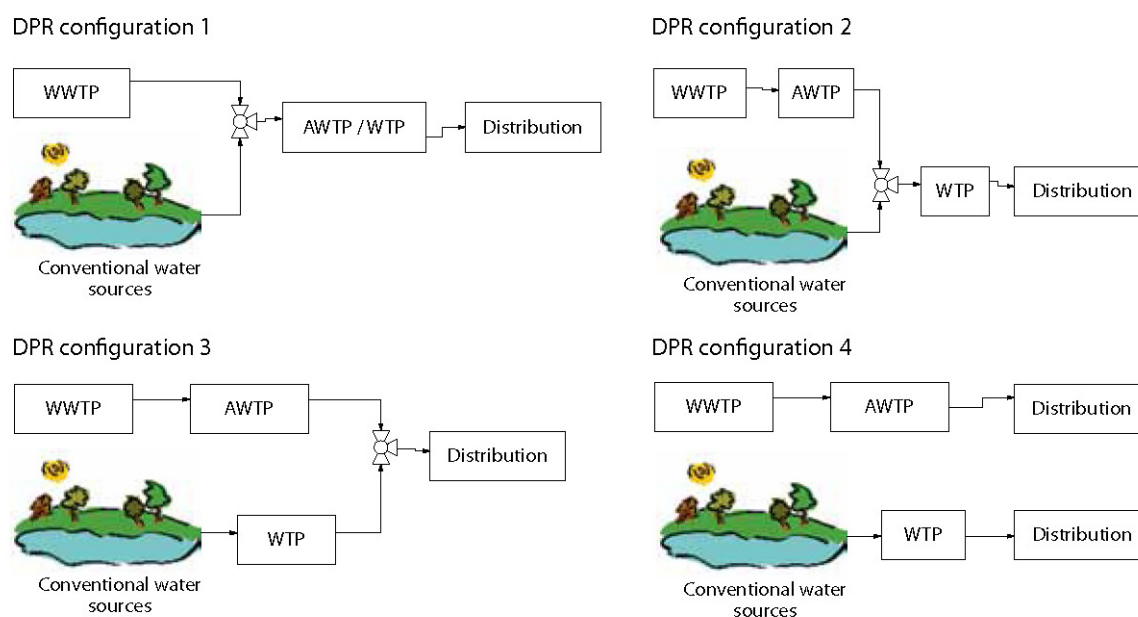
Recycled water can be used for the purpose it was made for. The cost of the treatment may mean that reclamation is uneconomical in some circumstances. Uses can include:

- Drinking (potable) water
- Non-drinking uses in households, watering golf courses and recreational parks
- Industrial uses such as washing and cooling in power stations and factories
- Agriculture, horticulture, forestry, pasture, flowers, viticulture and sugar cane growing
- Fire fighting
- Groundwater recharge
- Environmental flows and wetlands

Direct Potable Reuse (DPR)

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Figure 1: Direct Potable reuse: four configurations of water sources, treatment processes and blending



WWTP = Wastewater Treatment Plant

AWTP = Advanced Recycled Water Treatment Plant

WTP = Conventional Drinking Water Treatment Plant

Source: The Australian Academy of Technical Sciences and Engineering (ATSE), <http://www.australianwaterrecycling.com.au/research-publications.html>, 'Drinking Water through Recycling - Full Report'.

Indirect Potable Reuse (IPR)

Indirect potable reuse as a result of unintentional and historical development already happens in many parts of Australia but in an unplanned manner. The deliberate or planned water reuse for drinking is the intentional introduction of recycled water into a major water storage reservoir, a waterway feeding a storage reservoir or into a water supply aquifer or groundwater system ([Managed Aquifer Recharge or MAR](#)). In this instance, the processes of sunlight, detention time, filtration, and dilution of the water with existing flows are allowed to occur before use for drinking. There has been significant progress in the development and implementation of MAR schemes in Australia over the past 10 to 15 years.

How do I know where recycled water is used?

Your local water company or water retailer can inform you about the locations and areas that use recycled water.

Challenges of water recycling

The two most prominent barriers to the successful implementation of non-potable recycled water projects have been the relative [cost of recycled water](#) compared to other water sources and commercial risk, in particular demand risk.

Secondly, [community](#) attitudes to water recycling and social acceptance has also traditionally proved to be a challenge, however knowledge of and information about water recycling and where water comes from can increase public acceptance.

How much water is recycled in Australia?

Figure 2: Direct Potable reuse: four configurations of water sources, treatment processes and blending



Source: Marsden Jacobs, 'Progress against the national target of 30% of Australia's wastewater being recycled by 2015, pg 7, <http://www.environment.gov.au/system/files/resources/1602789a-dae0-49fe-9e6b-5d46691b9f64/files/recycled-water-target-final-report.pdf>

How much water is recycled in Australia?

When determining the suitability of water recycling all water source options should be assessed based on a cost-benefit analysis. Options include but are not limited to surface water (dams), groundwater, desalination and demand management (water conservation).

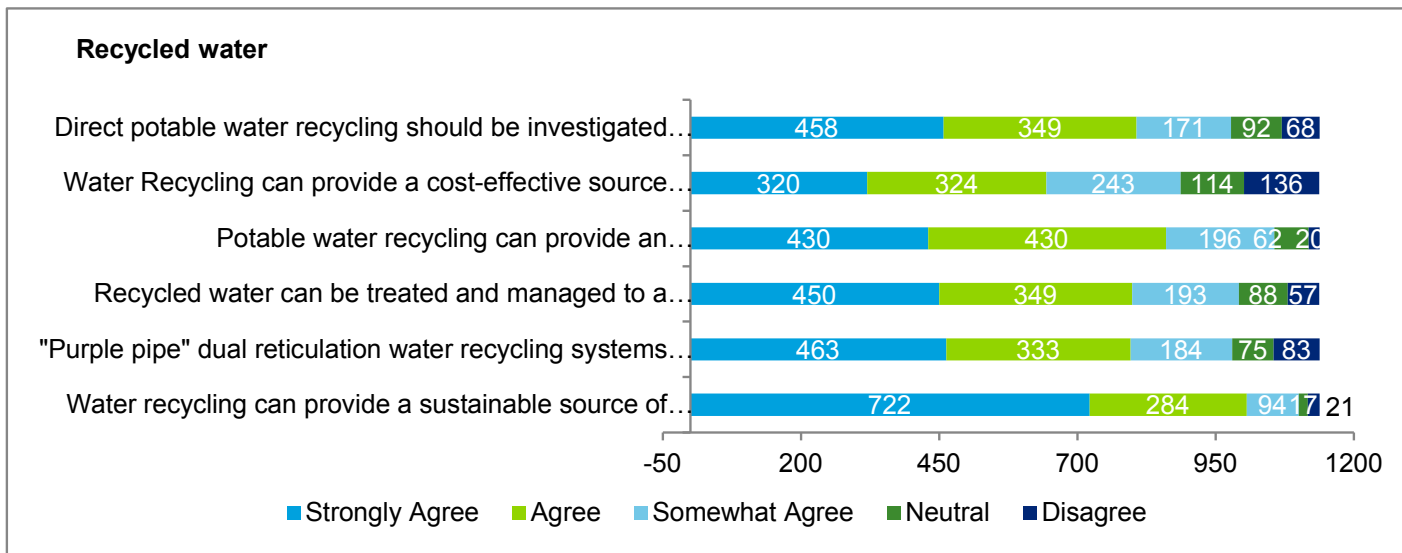
Examples of water recycling schemes in Australia

Source: Australian Water Recycling Centre of Excellence, <http://www.australianwaterrecycling.com.au/knowledge-hub/technology-and-treatment>, Presentation 'Future Directions for Water Recycling in Australia: Where will be in 2030?', Greg Oliver.

Benefits of adopting direct potable reuse may include:

- Lower energy use
- Lower greenhouse gas emissions
- Lower capital and operational costs
- More robust, climate-resilient water supply

In the [AWA/Deloitte State of the Water Sector Report 2014](#), water sector professionals were largely supportive of water recycling. 97% of respondents strongly agree, agreed or somewhat agreed that water recycling can provide a sustainable source of non-potable water for municipal and industrial use. This reduced only slightly to around 87% of respondents who agreed that recycled water can be treated and managed to a level that is sufficient for safe potable supply.



Source: AWA/Deloitte 2014 State of the Water Sector Report,
http://www.awa.asn.au/uploadedfiles/State_of_the_Water_Sector_Report_2014_FINAL.pdf

Water recycling around the world

Many other parts of the world are recycling water on a scale that dwarfs Australia. As a small island that doesn't have natural aquifers and lakes and with little land to collect rainwater, Singapore must maximise the water it can harvest. Singapore is leading the world's technology for water recycling. It has two separate systems to collect rainwater and used water. It collects rainwater through a comprehensive network of drains, canals, rivers and stormwater collection ponds which are then channelled to Singapore's 17 reservoirs for storage. This makes Singapore amongst only a handful of other countries who do large scale urban stormwater harvesting.

The [Singapore Water Reclamation Study](#) (NEWater Study) was initiated in 1998. Because of its high-grade quality, most of the NEWater are used for water fabrication processes, non-potable applications in manufacturing processes as well as air-con cooling towers in commercial buildings which have freed up large amounts of drinking water.

For more information on water recycling in Australia

Australian Water Recycling Centre of Excellence
<http://www.australianwaterrecycling.com.au/>

CSIRO
<http://www.csiro.au/Outcomes/Environment/Population-Sustainability/ARCWIS.aspx>

Singapore Government, PUB
<http://www.pub.gov.sg/water/Pages/LocalCatchment.aspx>