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Desalination vs. Recycling

A comparison

The following is a comparison between a recycling project (Eastern Treatment Plant) and a desalination project (Wonthaggi) both designed to deliver a similar volume of potable water to the city of Melbourne, Australia.

Indirect Potable Reuse (IPR)	Desalination
Project Infrastructure: $1.86 billion ✓	Project Infrastructure: $3.1 billion ✗
Treatment energy cost: 10% of desalination ✓	Treatment energy cost: 10 x recycling ✗
Water quality produced: Potable* ✓	Water quality produced: Potable* ✓
Environment: Low CO2 equivalent gas emission ✓	Environment: High CO2 equivalent gas emission ✗
End of ocean outfall discharge ✓	Brine & chemical outfall to ocean ✗

** Recycled wastewater and desalinated water are impossible to tell apart if both have been treated using the same reverse osmosis method. Recycling requires up to 10 times less energy to create exactly the same product.*

Source of figures

Project Infrastructure: 'Water Smart 'Water Supply - Demand Strategy for Melbourne' (Water Substitution) April 2006. City West Water, South East Water, Melbourne Water and Yarra Valley Water

Treatment energy cost: Developing alternative urban water supplies, Greg Leslie, UNESCO Centre for Membrane Science, UNSW, Kensington NSW, October 2007

Water quality produced: Associate Professor Sandra Kentish, University of Melbourne Department of Chemical and Bio-Molecular Engineering, reverse osmosis technology team leader, 2008

Co2 emission: Developing alternative urban water supplies, Greg Leslie, UNESCO Centre for Membrane Science, UNSW, Kensington NSW, October 2007

Brine & chemical outfall: Sabine Lattemann, of the Institute for Chemistry and Biology of the Marine Environment at the University of Oldenburg Germany, Chair World Health Organisation WHO committee -environmental impact assessment studies of desalination plants

Addendum

The definitive economic figures rest with the Victorian Government in the report Water Supply - Demand Strategy for Melbourne' (Water Substitution), April 2006, written by GHD for WaterSmart, a joint project team of City West Water, South East Water, Melbourne Water and Yarra Valley Water.

This is not currently a public document.

The Clean Ocean Foundation was refused access following a Freedom of Information request in July 2008.

Further case study information:

Green house gas emissions

The proposed Wonthaggi desalination plant in Victoria would be the largest in the Southern Hemisphere generating at least 924,990 tonnes of CO2 equivalent gas per year. This is equivalent to having 205,553 more cars on the road.

	Desalination	Recycling
Power kWh/m3	4	1.2
Emissions kgCO2/m3	**6.52**	1.95

Source: Developing alternative urban water supplies, Greg Leslie, UNESCO Centre for Membrane Science, UNSW, Kensington NSW, October 2007

Polluting chemicals discharged to marine environment by desalination 'brine stream'

Heavy metals, Chlorine, Antiscalants Chlorine, Coagulants, Oxygen Scavengers, Sodium Bisulfite, Acidified Solutions, Detergents, Oxidants, Complexing agents and Biocides.

Source. Sabine Lattemann, Institute for Chemistry and Biology of the Marine Environment (ICBM) University of Oldenburg, Germany

Marine ecosystem

Every year an estimated 30,000 – 60,000 tonnes of living and organic matter (fish, plankton, seaweed, eggs. etc.) will be sucked into the Wonthaggi desalination plant inflow as waste and sent to land fill.

Source: John Gunston, YWYS.ORG

Economic

If the desalination plant is built for $3.1 billion, then the promoter will want a 10 per cent return on its investment in addition to costs, likely to amount to about $200 million a year. Total running costs are up to $300 million a year and the eventual costs of carbon emissions under a carbon trading scheme may add another $30 million to the bill each year. The Victorian taxpayer could be handcuffed to payments of $500 million or more every year for the purpose of buying environmentally dirty water that it doesn't need due to planned water conservation, efficiency and recycling improvements across the state.

Source: 'The Business Age', Melbourne, 16th August 2007

Climate change

The plant will consume enough electricity to run a town and produce an estimated 1 million tonnes of atmospheric carbon each year. It will be declared 'green' by the State Government by robbing every KW of wind energy now produced in Victoria.

Source: *Tony Cutcliffe, director of policy forum and consultancy The Eureka Project.*

Political

There is no democratic mandate to proceed with desalination.

The Victorian Government won the 2006 state election on a 'no desalination' policy. Labor criticised the Liberal's desalination policy, saying its high dependence on energy would be counterproductive to solving climate change.

THE ALTERNATIVE

Recycling water, at a point close to the city or town that produces and re-uses it, is cheaper and more energy-efficient, and has proven its worth overseas. Recycling uses less than half the energy of desalination. Because it does not require an ocean outlet to discharge brine wastes, the plant can be much closer to the city it supplies.

Recycling would end the pollution from ocean outfalls discharging partially treated sewage from Melbourne's Eastern and Western treatment plants — the amount of water flowing from the Gunnamatta outfall is roughly the same as the desalination plant will produce.

Melbourne Wastewater Discharges 2006-2007

	Eastern Treatment Plant (Carrum)	Western Treatment Plant (Werribee)
Annual outflow volume (ML = 1,000,000 litres)	110,452 ML	90,303 ML
Discharge Point	Gunnamatta Beach, Mornington Peninsula	Port Philip Bay, Lake Borrie & Murtcaim Main Drain

Source: Melbourne Water Sustainability Report 2006/07

Regional Experience - Australasia

The initial plan to meet Singapore's water needs called for large scale desalination. This was considered far too expensive, energy intensive and environmentally damaging.

Singapore 1996 Water Plan	Singapore Infrastructure 2005
6 desalination plants: • Tuas (x2) • Changi • Pulau Tekong • Jurong Island • Pulau Busing	**4 Recycling plants:** • Bedok • Kranji • Seletar • Ulu Pandan **1 Desal Plant:** • Tuas

Potable Water Treatment

This year Brisbane will become the first capital in Australia to use indirect potable reuse: purified waste water is fed into the city catchment where it mixes with damn water and is filtered by natural river systems, then it is treated once again at the drinking water treatment plant before entering the normal water supply system.

A recent poll in The Australian Newspaper found 69% of Australians are willing to drink recycled water.

Source: Majority would drink recycled sewage, The Australian, December 26, 2006

Public/employment Future

Recycling will still provide large scale infrastructure work for private industry and union members: building the required treatment, pipelines and additional plumbing, yet the burden on the Victorian people from the soaring costs and long term environmental damage of desalination will be avoided.

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Clean Ocean Foundation is a tax-exempt environmental organisation dedicated to the closure of all ocean outfalls, especially Gunnamatta.