



# Desalination Technologies

## Technology Brief

The production of drinking water from seawater is one of the most important problems facing us in the near future. The market for large scale desalination is growing rapidly, fuelled by government and business alike. The United Nations has labelled this century "the century of ocean water desalination" with a desalination market for 2005-2015 generating expenditure in the region of \$95 billion. Around \$48 billion will be derived from new capacity, comprising \$30 billion of cap-ex and \$18 billion of op-ex, (2004 report "Desalination Markets 2005-2025", [www.idswater.com](http://www.idswater.com)).

There are 3 main technologies, reverse osmosis membrane technologies (RO), electrodialysis (ED) and thermal technologies for desalination of water, with RO and thermal technologies representing the 2 major technologies in the desalination markets. RO is mainly used in the municipal markets for delivery of drinking water as improvements in this technology have resulted in efficient energy recovery. Thermal technologies are mainly used in the oil and gas industry and power plants where they utilize waste heat.

Researcher at Murdoch University, Professor Richard Pashley has developed a novel improved thermal technology with advantages over existing thermal technologies as it is a single-stage process requiring no vacuum, is controllable and does not require boiling for vapour transfer. The technology is protected by provisional patent application and is undergoing laboratory proof-of-concept with pre-seed investment from the Murdoch Westscheme Enterprise Partnership Fund.

Professor Ric Pashley's group also have also been working on patent pending improvements to Electrodialysis (ED) and Reverse Osmosis (RO) desalination technologies. These improvements are focussed on a retrofit unit that pre-treats seawater by removing all dissolved gases. RO processes are improved by increasing water flow by up to 15% (experimental results) and ED efficiency is improved through improving electrical conductivity. Other research is focussing on further methods of pre-treatment to reduce the osmotic pressure (and hence cost) required in RO.

Next steps will be to raise further investment funds from investors and/or industry partners for pilot plant development and to continue proof of concept trials.

## IP Status

The Desalination suite of projects are the subject of several patents applications, ie

Thermal Desalination -  
Provisional 2008 900866 - Priority 22/2/08

Electrodialysis Improvements -  
PCT/AU/2005/001953 (WO2006/066345)  
- Priority 23/12/04

RO improvements - PCT/AU/2006/000694  
(WO2006/1285263) - Priority 25/5/05

Dilution of Saline Solutions -  
Provisional 2008902815 - Priority 3/6/08

## Research Team

Professor Ric Pashley is an eminent scientist who is extremely well published in the field of surface physics.

He has many accolades to his name, including the Pawsey Medal for physics from the Australian Academy of Science, and the Rennie Medal for chemistry from the Royal Australian Chemical Institute in 1985. In 2001 he was awarded a Citation Laureate Medal by the Institute of Scientific Information, Philadelphia, becoming one of only 33 Australian scientists to be internationally recognised for their exceptional contributions to research. Currently undertaking research at Murdoch University, Professor Pashley is a member of Western Australia's Science and Innovation Council and is also chair of a technical group advising the setup of of a Desalination Centre of Excellence in Western Australia. His current research interests are in water treatment and the applications of degassing.

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