



NCEDA RESEARCH THEMES

The National Centre of Excellence in Desalination Australia has adopted a research framework based on the results of a technology roadmapping exercise undertaken in 2009 during the establishment of the Centre. The roadmap process identified potential technology improvement opportunities for the Centre to pursue. This task was the focus of collaborative effort and subsequently validated by industry experts and the Roadmap Advisory Group. Improvement opportunities are grouped into five research themes.

Pre-treatment

Pre-treatment plays a significant role in maximising the efficiency of the preferred desalting technology. The Centre is interested in funding research that improves understanding of the relationship between pre-treatment and treatment, and how novel pre-treatment technologies and improvements can reduce fouling and/or scaling of the coupled treatment process. The Centre has identified the following improvement opportunities in pre-treatment:

- Preheating using waste heat or renewable energy and the use of lower-pressure membranes
- Optimal use of chemicals
- Specific issues for pre-treatment in rural and remote areas relating to seasonal and location variability in feedwater composition
- Characterisation of groundwater and seawater sources and mapping those to best fit desalination technologies

RO desalting

Enormous advances in membrane technology have resulted in the maturation of brackish water and seawater reverse osmosis (BWRO and SWRO) to the point where it is considered the benchmark method for the industry. The Centre has identified the following improvement opportunities in RO desalting:

- Anti-fouling technologies
- New membrane materials that reduce operating pressure while maintaining or increasing flux rates
- Contaminant removal without the need for second-pass RO
- Direct use of renewable energy via kinetic, electrical, or thermal means
- Real-time monitoring and classification of potential foulants



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Novel desalting

Novel desalting can exploit the unique properties of water and saline solutions. The Centre is particularly interested in identifying and piloting novel technologies for Australia's rural and remote needs, against a benchmark of BWRO. The Centre has identified the following improvement opportunities in non-RO desalting:

- Novel technologies including for direct agricultural use
- Low-maintenance, reliable evaporative technologies using waste heat or renewable energy
- Coupling water production with renewable energy
- Piloting in real-world situations breakthrough near-commercial desalination technology

Concentrate management

Concentrate management represents the most pressing challenge of all desalination technologies with regard to disposal in a non-ocean environment, and is a key barrier to inland deployment. The Centre seeks to remove this barrier to desalination for inland Australia through effective reuse or disposal. The Centre has identified the following improvement opportunities in concentrate management:

- Novel zero liquid discharge processes
- Waste minimisation based on value adding
- New materials for lower-cost corrosion management
- Extraction of desalted water at source or concentrate injection

Social, economic and environmental issues

Widespread deployment of desalination, while dependent on improvements in critical system requirements, will also require attention to environmental impacts, social concerns, and other non-technical barriers. The Centre has identified the following opportunities for social and environmental barriers:

- Appropriate disposal or reuse of spent membrane cartridges
- Total life cycle analysis and sustainability assessment of desalination against other water sources
- Public perception analysis and improvement through education and communication
- Policy development to better understand energy-water interdependence
- Centralised understanding of national desalination deployment, performance, and lessons learnt