Water Reuse in the US & Australia: Obstacles & Solutions

Australia’s journey towards integrated urban water management: Past achievements and future prospects for water reuse.
Today's Agenda

Today we explore two perspectives on the adoption of water reuse as a policy option for ensuring urban water security in Australia.

Perspective 1 – The evolution of solutions to technical and institutional barriers
Perspective 2 - The challenges of geography, demographics and uncertainty

Today we will look at:

• Milestones in the growth of water reuse in Australia
• Typical concerns around water reuse: Water quality risks, financial risks & acceptance
• Climate change (effects & mitigation)
• Alternative supply options
• Flexibility (avoid policy conflicts)
Why Australia needs to develop alternative urban water supplies

- 90% population within 80km of coast
- Coastal cities supplied by surface water from inland catchments
- A 10% decrease in rainfall results in a 30% reduction in run-off

South-West (Perth, Serpentine)
Perspective 1: Technical and institutional solutions for water reuse

COAG & Water Reform Begins
1st Guidelines for Water Reuse (NSW)
Membrane technology takes off
National Guidelines

Growth in recycled water as percent of total demand in all Capital Cities


3% 8% 11% 14% 20% 30%

Western Corridor & Murrumba Downs, Brisbane Qld
Groundwater Recharge demonstration, Perth WA
Stormwater Recycling, Orange NSW
Gippsland Water Factory & Altona WRP, Vic
Replacement Flows & Camelia Gardens, NSW
Willungia Basin & Adelaide Parklands, SA
Toowoomba – Ackland Coal, Qld
Epsom Spring Gulley, Coliban Vic
Kwinana WRP, Perth WA
Bluescope Steel, Woollongong, NSW
Mawson Lakes, SA
Sydney Olympic Park, NSW
Rouse Hill Dual Pipe, NSW
Erraring Power Station, NSW

Drought proofing Nth & South Adelaide complete, SA
Perth Groundwater Replenishment, WA
Pimpama Coomera at Capacity, SE Q

Perspective 1: Technical and institutional solutions for water reuse
Perspective 1: Build on existing infrastructure: proven technology: national guidelines

Sewage → Primary Sedimentation → Bioreactor → Secondary Sedimentation → Effluent → MF/UF → Reverse Osmosis → Brine → UV/AOP → Purified Recycled Water
Perspective 2: The challenges of geography, demographics and uncertainty

1. The emphasis on how water is used and the value of water
2. Structural changes in economy (closure of refineries and other industrial water users)
3. Indirect potable reuse verse direct potable reuse (Public acceptance)
4. Alternative supplies (Desalination)
5. How are cities designed (Stormwater)
Perspective 2: The challenges of geography, demographics and uncertainty

Desalination capacity in Australia grew from 5 GLA before 2004 to over 500 GLA by 2012.

Total capacity 1.2 Billion Litres day$^{-1}$ Total Power 260 MW (at current capacity)

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- **Tugun (Gold Coast)**
  - Capacity: 125,000m³/day
  - Power: 25 MW

- **Sydney**
  - Capacity: 250,000m³/day
  - Power: 60 MW

- **Melbourne**
  - Capacity: 400,000m³/day
  - Power: 90 MW

- **Adelaide**
  - Capacity: 150,000m³/day
  - Power: 40 MW

- **Perth 1**
  - Capacity: 140,000m³/day
  - Power: 24 MW

- **Perth 2**
  - Capacity: 140,000m³/day
  - Power: 24 MW

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Total capacity 1.2 Billion Litres day$^{-1}$ Total Power 260 MW (at current capacity)
Maximise use of existing infrastructure has merit

Recycling decreases the volume of water required by community because it builds on existing infrastructure!

Singapore’s Water Situation (Dominic Nathan Straits Times, 2006)

1996 Water Plan

- 6 desalination plants
  - Tuas (x2)
  - Changi
  - Pulau Tekong
  - Jurong Island
  - Pulau Busing

By 2005

- 4 Recycling plants
  - Bedok
  - Kranji
  - Seletar
  - Ulu Pandan
- 1 Desalination Plant
  - Tuas
Maximising stormwater capture has merit
What is the role of stormwater capture

- Aquifer recharge
- Drainage
- 1024 m$^2$
- Percolation rate 900L/m$^2$/h
- Storage 1.5 ML
- Water recovered through groundwater
What is the greenhouse component of each option (kgCO₂/m³)

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Conclusions: Urban water reform is still a work in progress

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6 Recommendations Planning for Uncertainty & Managing Uncertainty

1. Risk based planning to build optimum portfolio for each city
2. Strengthening incentives through pricing and property rights
3. Build community trust by understanding community aspirations, values & concern
4. Encouraging investment in strategic opportunities
   A) by targeting research on urban water issues
   B) by establishing a network of demonstration projects of alternative water supply systems and use the network to provide comparative data
5. Upskilling to build capacity for industry development
6. Driving innovation
   A) By reducing fragmentation and enhancing communication between relevant regulatory authorities.
   B) By establishing a set of mandatory minimum standards for water efficiency
Policy achievements to date:

# 3 Community & Trust

# 4 Strategic Investments

# 6 Development
# 6 Fragmentation
Thank you