



WATER SERVICES
ASSOCIATION OF AUSTRALIA

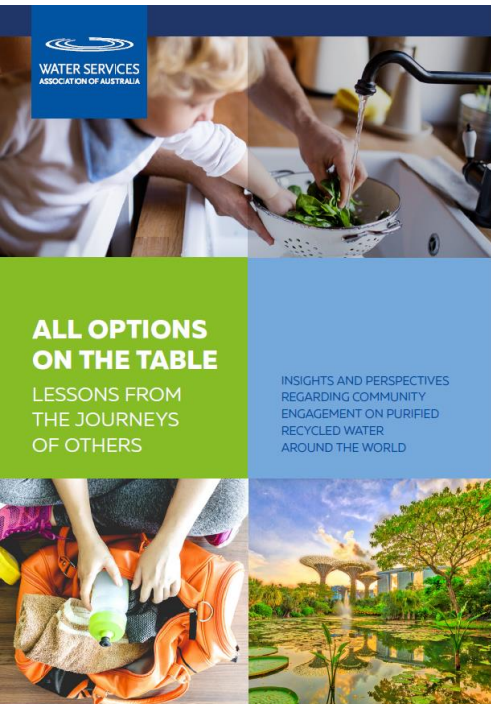
All options on the table

What are demonstration plants?



WSAA's “All options on the table” program

Best practice water planning involves seeking a diversified water supply, with all options on the table. Not ‘picking winners’ in advance – options, not decisions.



[\(2020\) All Options on the Table: Urban Water Supply Options](#) (cost & other data about all options)

[\(2019\) All Options on the Table: Lessons From the Journeys of Others](#) (community engagement on purified recycled water)



**Purified recycled water for drinking:
What are demonstration plants?**

Demonstration plants

RECOMMENDATION 5.4: ENGAGE ON WATER RECYCLING

Coordinate with state owned water corporations and local water utilities to develop and implement a public engagement program for purified recycled water for drinking.

Work with utilities to explore investment in demonstration plants to help NSW communities to understand the water cycle and build trust in purification technology.

NSW Productivity Commission 2021 White Paper, [*Rebooting the Economy*](#)

Lessons from the journeys of others

1

It can be done

Communities around the world have implemented purified recycled water schemes for decades. It could be successfully implemented in Australia, if circumstances warrant.

The three 'T's:

Trust • Transparency • Time

2

Trust is critical for securing support for purified recycled water

Transparency and open information sharing will help to develop and maintain this trust.

3

Establishing purified recycled water is complex and takes time

It takes time – up to a decade. People need to be taken on a journey to be comfortable with it. Rushing or imposing deadlines increases the risk of rejection or backlash.

4

Seeing is believing

Investing in a demonstration plant, visitor centre and tour program for 'place based learning' will greatly improve community understanding and support. It can showcase and prove the reliability of the technology, and pre-empt stigma reactions through calm, engaging learning environments.

The experience should be carefully crafted with sequenced messaging to build overall awareness and understanding, and may include sampling the water.

5

Wording and imagery are critical

This will be somewhat specific for each community, so local research is important. Choose words and branding that resonate and do not alienate. Technical jargon confuses people and doesn't build trust.

6

News media coverage has a profound impact on public acceptance

It can make or break a scheme. Proactively engaging key influencers and the media, leveraging social media, and using expert testimony and third party advocacy can help build trust and transparency.

7

Political support is essential

Political cycles can polarise an issue, and force people to take a side. Good engagement across the full political spectrum, to gain and keep support, is critical.

8

Grass roots education and engagement

Can be more effective than high profile marketing activity or 'above the line' presence.

'Water should be judged by its quality and not its history'

LUCAS VAN VUUREN, SOUTH AFRICA

9

General education around the urban water cycle and context

Will help prevent stigma and encourage acceptance. Provide information on the range of long-term supply options, climate trends and cost.

10

Regulators play a powerful role

They will lead government and community perception, and have the authority to determine whether purified recycled water can proceed. It is their role to take a conservative approach to risk management, so it may take a long time for them to become comfortable and produce a regulatory framework. Good regulatory engagement, and high transparency, are essential.

What are demonstration plants?

A small, operating treatment plant, built as an early prototype, for a larger plant being considered.

Aim to scientifically *demonstrate* that the water treatment system works, and *demonstrate* it to the public and stakeholders.

Needs to be of sufficient size/capacity to test a range of aspects – the precise size will vary.

May test 1 or 2 different treatment trains with different technologies.

Will produce purified water, though initially it's not consumed (until approved).

Often feature a visitor centre or experience.

May be Stage 1 of ultimate plant, or a separate temporary plant.

Goals

- a) **Water quality samples – collect for analysis**
- b) **Regulatory standards – show that the system can meet a range of parameters, set by health regulators, to confirm the system produces a safe drinking water**
- c) **Engineering aspects – refine the system design**
- d) **Operations – train operators to use it**
- e) **R&D – trial new treatment or monitoring systems, compare performance and cost**
- f) **Public engagement – provide information to the community, allow them to see it in action and learn.**



Mobile demo/pilot plants

- **US examples – all pilot size**
 - Different treatment trains
 - Can travel between towns, ~ 4-6 months each
- **Great for community engagement**
- **But can't easily achieve the goals of a demo plant**

The Pure Water Wagon (Portland) toured shows & events and led craft brew competition showcasing purified recycled water



One Water Nevada



Mobile demo/pilot plants



Pure Water Arizona mobile demonstration unit



Connects to the town wastewater treatment plant to take effluent and produce purified recycled water using a small (but real) treatment train

'Good understanding of water purification' – 56% before, 95% after



Some different global examples

Singapore

Demonstration plant 2000 – 2002

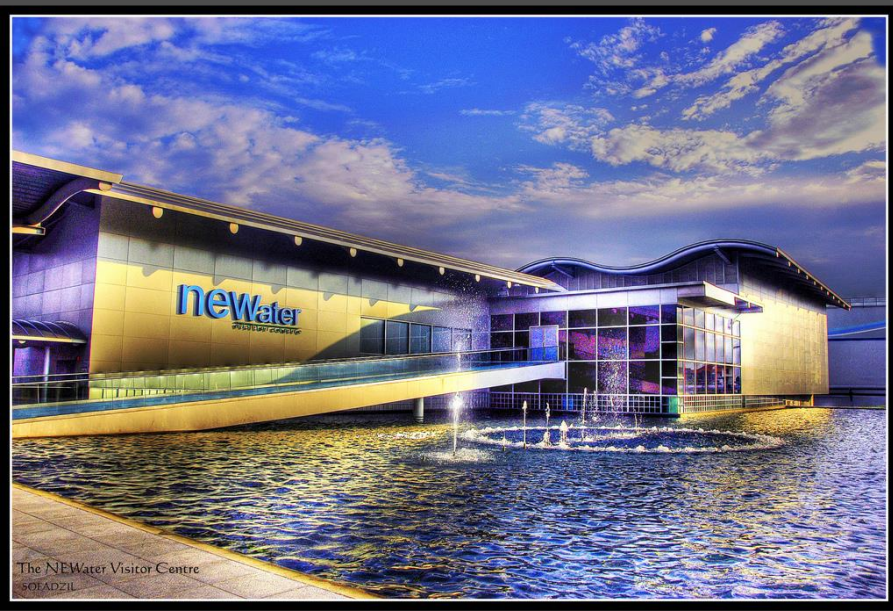
Approvals for full scale NEWater project development after 2-3 years of successful monitoring



From humble beginnings....

Global flagship visitor centre opened 2003

Built over the plant (not beside), to showcase each step of the treatment train



NEWater visitor centre – 6 sequenced zones



Entrance

120 Seat Auditorium: Introductory Video



Message: Water is critical to life. Water is scarce in Singapore. NEWater is vital to Singapore's future.

Technique:
Video presentation

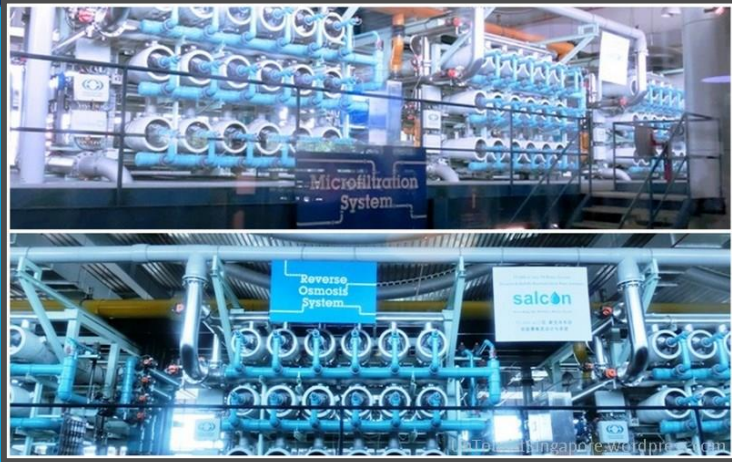
Theatre



Central exhibit hall

Walk on NEWater





Process Explorer

Taste some final
NEWater



Not an 'imposed' decision

Innovation hub
Knowledge economy
Singapore Water Week



Singaporeans, led by government officials, toast the success of NEWater on National Day & milestones

San Diego

2011 – today

1-year official testing program (maintained for education after)

1MGD, full scale will be 30 MGD

Led to regulatory approvals – now building a full-scale scheme

Buildings linked by walkway, tastings

Thousands of tours

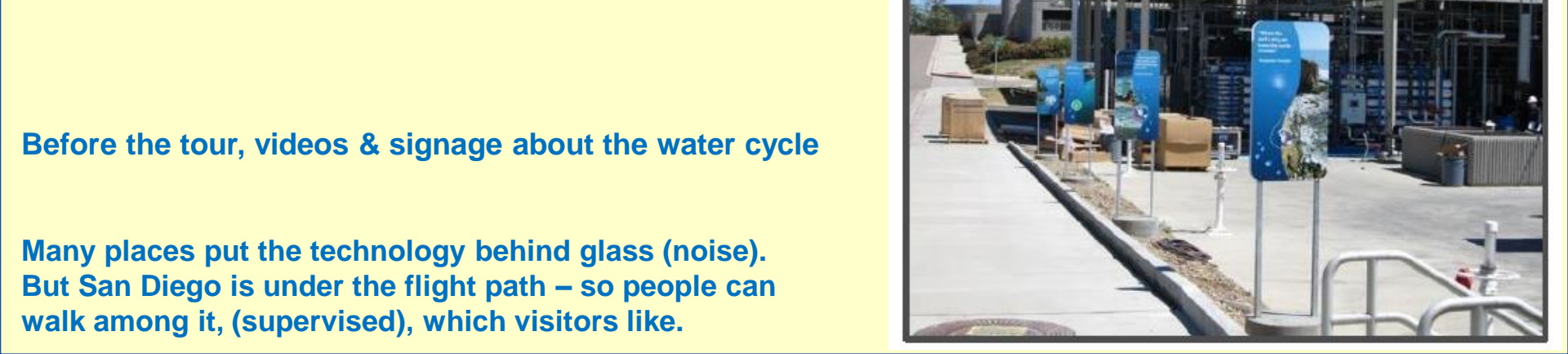


1990s: Considered reuse but rejected - community backlash + 'toilet to tap' campaigning

Built demonstration plant

Community support for reuse: 26% in 2004, 73% in 2012, 79% in 2019

Pure Water San Diego will supply 33-50% of their water by 2035.



Before the tour, videos & signage about the water cycle

Many places put the technology behind glass (noise). But San Diego is under the flight path – so people can walk among it, (supervised), which visitors like.

DP tour shows multiple barriers

Starting point: recycled water from conventional wastewater treatment plant

Already heard messages about water cycle



1. Ozonation - ozone reacts, binds & breaks down pathogens / organic matter



2. Biological Activated Carbon Filters – Good bacteria eat organic matter



3. Membrane filtration: Filters out particles, bacteria, protozoa



4. Reverse osmosis: Removes any remaining dissolved salts, compounds through tightly bound membranes



5. Ultraviolet disinfection with advanced oxidation: concentrated sunlight destroys anything left

**Full virtual
tour [here](#)
(10 mins)**



...does everyone do tastings?

Final product – purified recycled water

Perth



Visitor
tour area

Demo
plant

Actual
GWRS
plant

Perth

2010-12 – Groundwater Replenishment Trial

1.5GL / year (the final Stage 1 plant produces 14gl/year)

In 2013 the state government approved Groundwater Replenishment as the next new water source.

Water Corp maintained high trust ratings throughout

Visitor experience – separate buildings linked by walkways



Viewing platform to see into demonstration facility. An open roller door houses a viewing platform, this avoided the need for visitors to wear full PPE

Perth's Beenyup visitor centre for its Groundwater Replenishment Scheme





Support before tour average 74%, after 93%



Cape Town

Faure New Water Scheme

**Not planned as a demo –
temporary emergency scheme
built in during height of
Day Zero crisis
(10ML/day RO temporary plant)**



January 2018

“Day Zero” for the City
of Cape Town predicted
for the 12th April 2018.
Level 6 Water
Restrictions – 50 l/p/d.



All images courtesy of Zutari

Cape Town

But, drought broke – re-purposed as demo plant for the future permanent scheme (detailed design stage now)



Direct potable (inlet of water treatment plant for diverse distribution)



WHY A DEMONSTRATION PLANT

High quality water meeting international standards

Technical training and testing in advanced technologies

Develop protocols

Establish local laboratory capacity

Develop and demonstrate City's capacity

Stakeholder outreach and education

Establish partnerships for future

Cape Town



Southern California



Compare the size of a demonstration plant, to the mobile trucks we saw earlier (which were probably 3 car lengths)



Hampton Roads, East Virginia USA

'Research centre' (2018)

Aquifer recharge – nutrient driver

Pilot (elsewhere) – Research Centre demo – key learnings

Now have approval to build several full scale facilities.

Will supply 450 mL/day by 2030

The visitor centre adjoins - a common wall forms a single viewing gallery



On WWTP site

**SWIFT Research Center at HRSD Nansemond
Treatment Plant (120 MLD)**





Visitor
centre
(blue)

Plant
(grey)

Lobby with interpretive elements



The vertical lift shaft has been used to create a graphic of the deep drilling processes



Mezzanine with interpretive kiosks



Glass viewing gallery demonstrates the technology in action, each window with its own kiosk

Plant view



Opportunity to taste SWIFT water



3 minute video celebrating the opening
of the centre (2018)

<https://youtu.be/IO9t1ijr6tw>



Water tasting

Virginia, USA

NEWater, Singapore

Orange County Water District



Thank you