Translating Australian Permitting, Design, and Construction Experience to the Texas Market

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Hurricane Harvey

• 1,000-year flood
• 50 inches of rainfall in some locations
• 20 trillion gallons of precipitation over duration of storm

Why pursue desalination in Texas?
Lessons from Australia

Important Issues
• Variable weather patterns
• Limited natural storage capacity
• Conventional infrastructure limitations

Value of Desalination
• Climate-proof water supply
• Flexible and transportable supply
• Creates robust water supply portfolio

Permitting and best practices in design, construction, and delivery can be leveraged to enable desalination, creating a robust water supply portfolio for a region.
Desalination in Australia

- **Gold Coast**: 133 MLD, 25 km pipeline
- **Sydney**: 250 MLD, 18 km pipeline
- **Melbourne**: 410 MLD, 84 km pipeline
- **Adelaide**: 300 MLD, 11 km pipeline
- **Perth 1**: 144 MLD, 11 km pipeline
- **Perth 2**: 275 MLD, 26+80 km pipeline
Variable weather patterns

**Millennium Drought**

Rainfall Deciles (AWA grids 1900-pres.)
1 April 1997 to 31 October 2009
Distribution Based on Gridded Data

**Millennium Wet**

Rainfall Deciles (AWA grids 1900-pres.)
1 January 2010 to 31 December 2011
Distribution Based on Gridded Data
Limited natural storage capacity

Source: Australian Government Department of Sustainability, Environment, Water, Population and Communities using data from Australian Hydrological Geospatial Fabric (GeoFabric) v1.0, Bureau of Meteorology

Image (right): Australian Government Geoscience Australia
Conventional infrastructure limitations

- Brisbane flooding, 2010 - 2012
- Traditional water treatment plants overwhelmed
- Inlet turbidity ~10,000 mg/L
- Nearly half of the region’s water treatment capacity temporarily eliminated during 2011 flood
Case Example: Gold Coast desalination

- Emergency-level operation assisted conventional plant shortfalls
- Reverse osmosis operating philosophy enabled quick ramp-up
- 25 km pipeline enabled widespread distribution while overcoming storage limitations
Variable weather patterns

Estimated Population in Drought Areas: 201,131

U.S. Drought Monitor 2017
Limited natural storage capacity

As of August 28, 2017

Key:
Red: overflowed
Orange: nearly overflowed
Gray: contained

Image: NYTimes and Harris County Flood Control District 2017
Limited natural storage capacity

Buffalo Bayou at Shepherd Drive

--- Provisional Data Subject to Revision ---

- Gage height
- Measured gage height
- NWS Flood Stage
Infrastructure limitations

As of August 28, 2017

Image: NYTimes and Harris County Flood Control District 2017
Implementing desalination in Texas

Lessons from Australia can be applied to the Texas market to develop desalination
Permitting

Permitting process affects project delivery timing and efficiency

• Keys:
  • Adherence to federal and state environmental regulations
  • Early and ongoing communication with regulators
  • Coordination with agencies and stakeholders
  • Public education
  • Time
Design and construction

Engineering best practices enable robust, sustainable facility development

- Keys:
  - Process design to address ramp-up and up-time requirements
  - Appropriate materials of construction for durability
  - Manufacturing quality control
  - Pumping and distribution system testing
  - Fouling management
Project delivery

Flexibility in delivery structure overcomes time and cost constraints

Sydney Desalination Plant
250 ML/day
Design-Build-Operate-Maintain Alliance

Victoria Desalination Plant
410 ML/day
Public Private Partnership

Perth Desalination Plant
144 + 275 ML/day
Competitive Alliances
Conclusion

• Australia and Texas share many similarities, including flood events.
• Lessons from Australia can be applied to the Texas market to develop desalination.
• Permitting processes can facilitate quick and efficient project delivery, but requires coordination, education, and patience.
• Engineering best practices will ensure robust, sustainable facility development.
• Flexibility in delivery structure can be applied to address time and cost constraints.