WATER SERVICES
ASSOCIATION OF AUSTRALIA

Pathways to Concrete Research

Water Industry Perspective

Agenda

Water Industry Assets

Market Size

Recent Research

Decarbonisation Pathway Ideas

Key Issues

Asset Base

Water Industry

- $160 billion of buried infrastructure
- 200,000 km of water mains
- 155,000 km of sewer mains and channels
  - ~750,000 access chambers*
- 726 wastewater treatment plants
- 501 water treatment plants

Concrete

- Most frequently used in
  - Sewer pipes
  - Treatment plants
  - Access chambers

Notes:
Asset lengths from the Bureau of Meteorology's National Performance Report for Urban Water Utilities
*Assumes 1 ever 200m

Market Size: Water

Water Capex

Area	2018-19 (000s)	2019-20 (000s)	2020-21 (000s)
Network Renewals and maintenance	$768,759	$806,962	$976,546
Treatment Renewals and maintenance	$125,534	$155,179	$197,797
Compliance	$395,146	$477,109	$612,070
Growth	$711,026	$575,313	$850,609
Total	$2,000,465	$2,014,563	$2,637,022

Total capex has trended up ~ 15% p.a. (forecast shows this is expected to reduce)
Growth is ~30-35% of the total capex.
Renewals and maintenance is ~46-48%

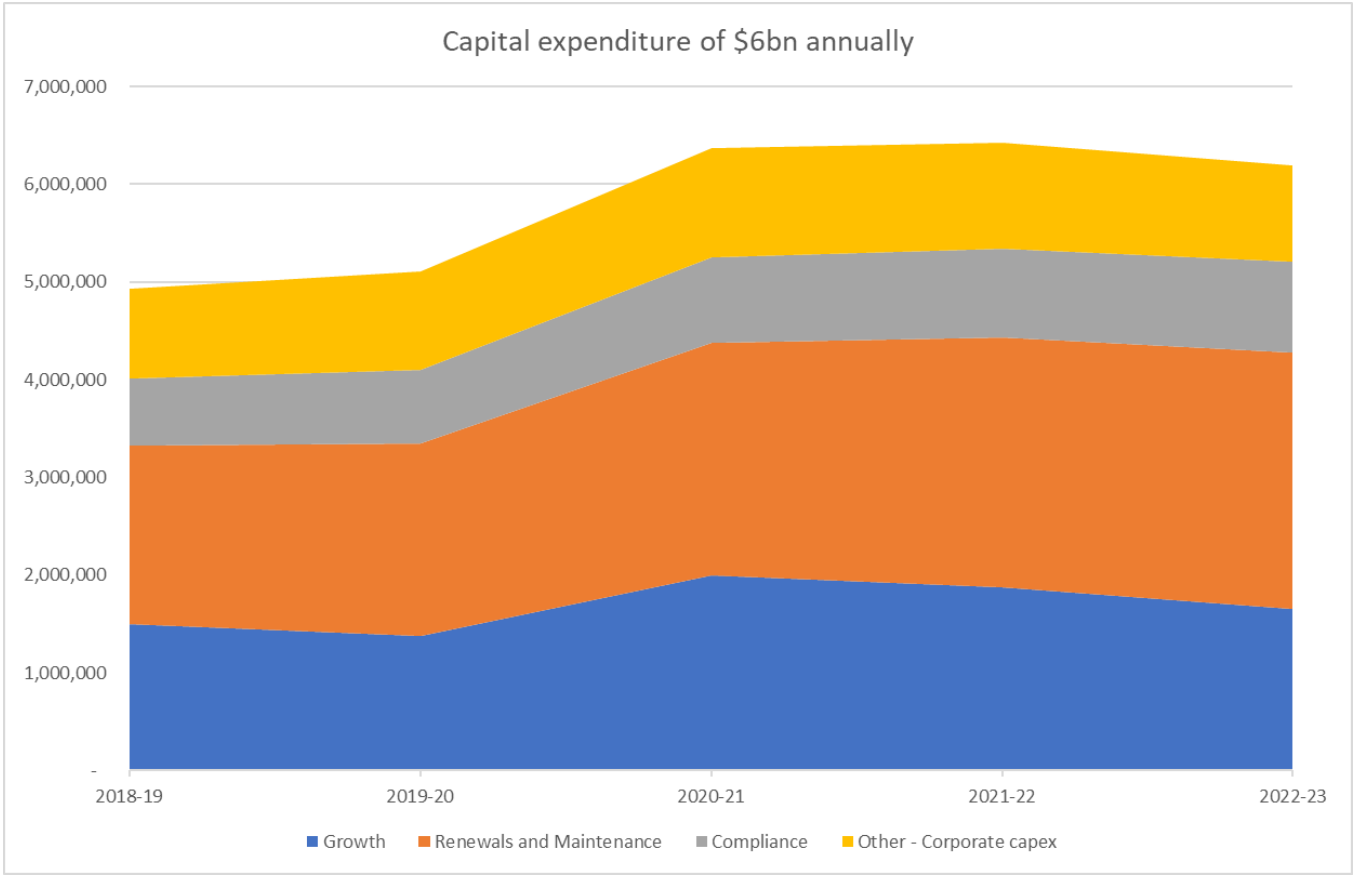
Market Size: Wastewater

Wastewater Capex

Area	2018-19 (000s)	2019-20 (000s)	2020-21 (000s)
Network Renewals and maintenance	$496,864	$522,313	$685,210
Treatment Renewals and maintenance	$432,039	$480,209	$527,265
Compliance	$292,929	$280,054	$261,272
Growth	$787,591	$806,817	$1,142,358
Total	$2,009,422	$2,089,392	$2,616,105

Total capex has trended up ~ 15% p.a. (forecast shows this is expected to reduce)
Growth is ~38-43% of the total capex.
Renewals and maintenance is ~46-48%

Market Size: Water + Wastewater (Capex)



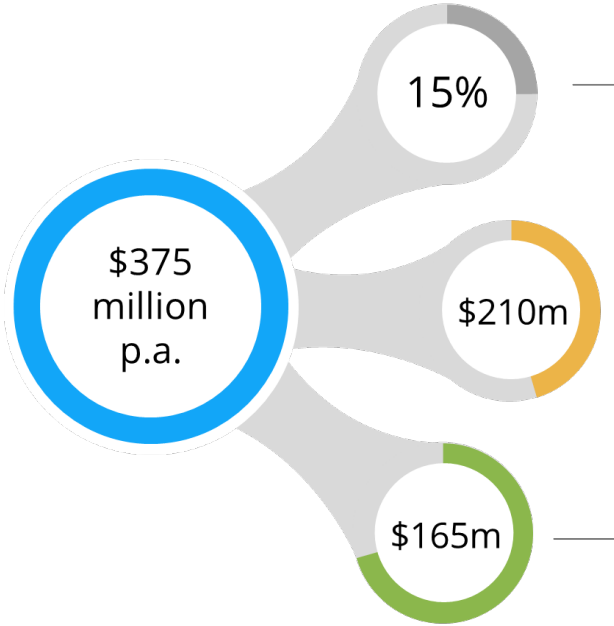
Market Size for Concrete

Existing Asset Repairs and Maintenance:

- Sewer Pipes + Access Chambers - $685 million
- Treatment Plants - $700 million

New Assets:

- Wastewater growth $1.1 billion per annum



15% of costs relate to concrete

- 30% for total material costs
- 50% of total materials as concrete

$225 million per annum

Concrete works for existing assets

$165 million per annum

Concrete Works for new assets

Key Issues

Emissions

- Water agencies looking for ways to reduce emissions.
- ‘Green’ concrete a definite area of interest.

Concrete Degradation

- Existing concrete structures are most often used in wastewater assets and are subject to corrosion.
- Cost of corrosion to the water industry is estimated at $982 million per annum*

*Australian Corrosion Association Report:Corrosion Challenges – Urban Water Industry by Greg Moore (2015)

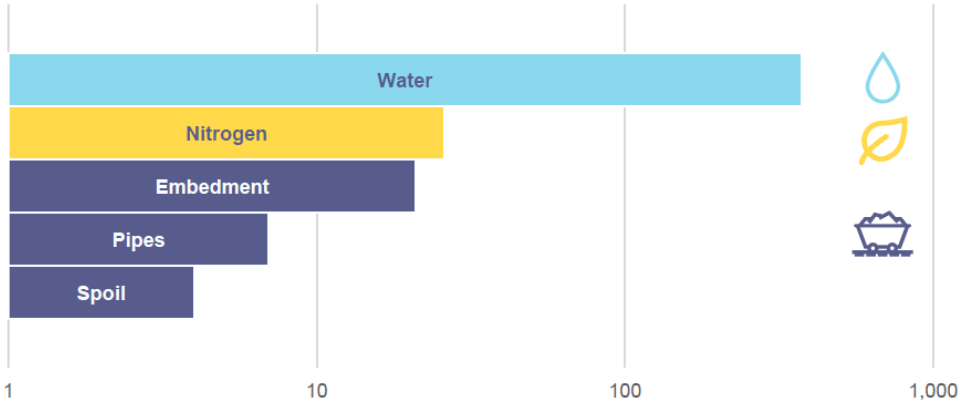
Decarbonisation Pathways

New Assets

- In pipelines excavation and bedding materials far outweigh pipe materials (approx. 1%).
- Pipe materials contribute more to GHG emissions than aggregates (per unit weight).
- Recycling materials is helpful, but has limited impact due to inputs required.

Existing Assets

- Corrosion prevention and repair
- Keeping assets working longer



Flow in GHG emissions (tonnes CO_{2e})+

+Report: Circular economy analysis and opportunities for Yarra Valley Water

Challenges

- New technologies come to market.
- Performance is often unproven over long time periods – the water industry is typically interested in 20+ years and often 50+ years.
- Choices must be made about what to pursue with individual utilities having final say.

W-Lab

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Corrosion Research

SCORe (2008-2015)

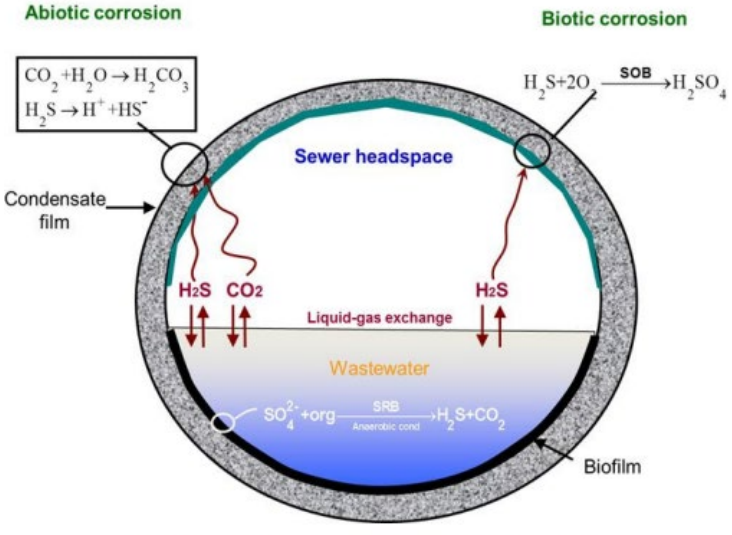


Figure 1. Schematic of sewer processes driving corrosion.

CRC-P Smart Linings (2018-2021)

SCORe Project

Key Areas of Research

- Understanding and predicting corrosion
- Gas-phase technologies
- Liquid-phase technologies
- Decision support and knowledge management
- Studied epoxy and CAC coatings.

Key Findings

- In concrete pipes corrosion takes 2 years to commence.
- Corrosion is low when humidity is <85%.
- Forced ventilation is most useful in gas-phase
- Developed SeweX Model – a powerful tool for planning

For more information visit the project website.

Smart Linings Project Overview

Sub-Project 1

Codes

Standards

Decision Tools

Sub-Project 2

Field Trials

Lab Testing

Research

Sub-Project 3

QC

Sensing

Robotics

Sub-Project 4

Education

Training

Information

https://water360.com.au/projects/smart-linings/

Lining Benefits

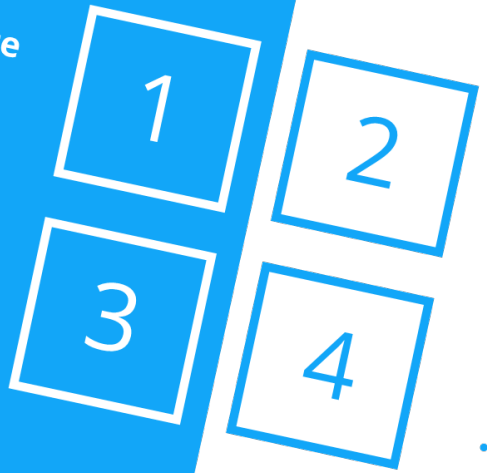
Concrete in the water industry

Expected expenditure on concrete

in the order of $375 per annum

Decarbonisation Pathway Ideas

- Pipe materials
- Embedment materials



Key areas of focus

- Reducing GHG emissions
- Prolonging the life of existing assets

Recent Research

- Why concrete corrodes
- How to slow it down
- Keeping assets working longer

QUESTIONS?

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Additional Information:

- **https://waterportal.com.au/smartlinings/**
- **https://water360.com.au/projects/sewer-corrosion-and-odour-research-score-project/**