Business Case for Satellite Onsite Reuse Systems: Bridging the Gaps

WateReuse Association NorCal Chapter Meeting
AUGUST 23, 2019

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Agenda

“For utilities and developers, ONWS can be a ***means of complying with new regulations while maximizing the social, environmental, and economic benefits*** *of each project.”*

– US Water Alliance, Making the Utility Case for Onsite Non-Potable Water Systems

1. The ONWS Opportunity
2. Project Delivery Considerations
3. Critical Nature of Project Timing
4. Business Case Studies
5. What’s Next for the Industry?

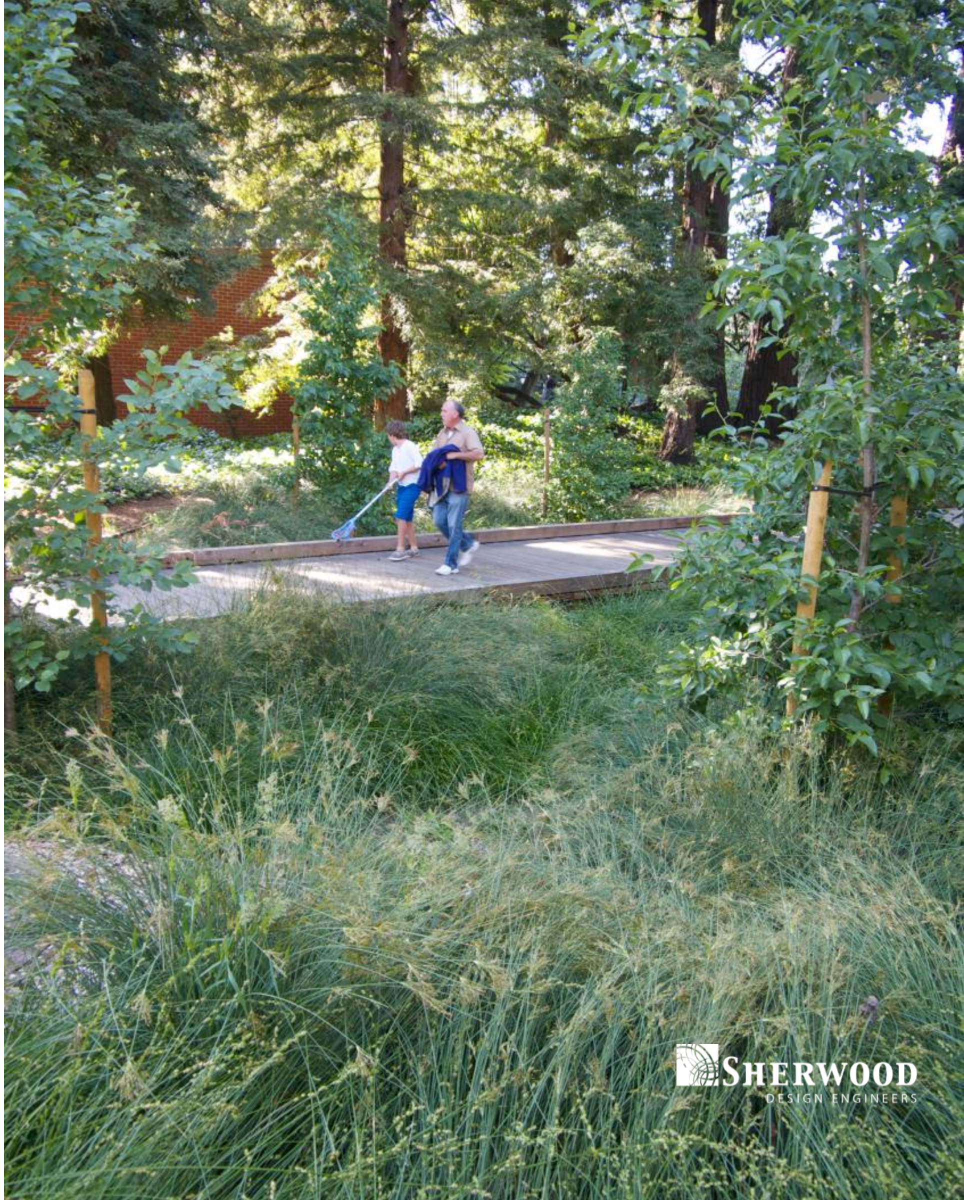
1: THE ONWS OPPORTUNITY

Food for Thought...

1. **On-site non-potable water systems can be a transformative opportunity**
   ...but there is a risk that the benefits may not be realized, so...

2. **Consider all driving forces**
   ...because a one-size-fts-all approach does not work!

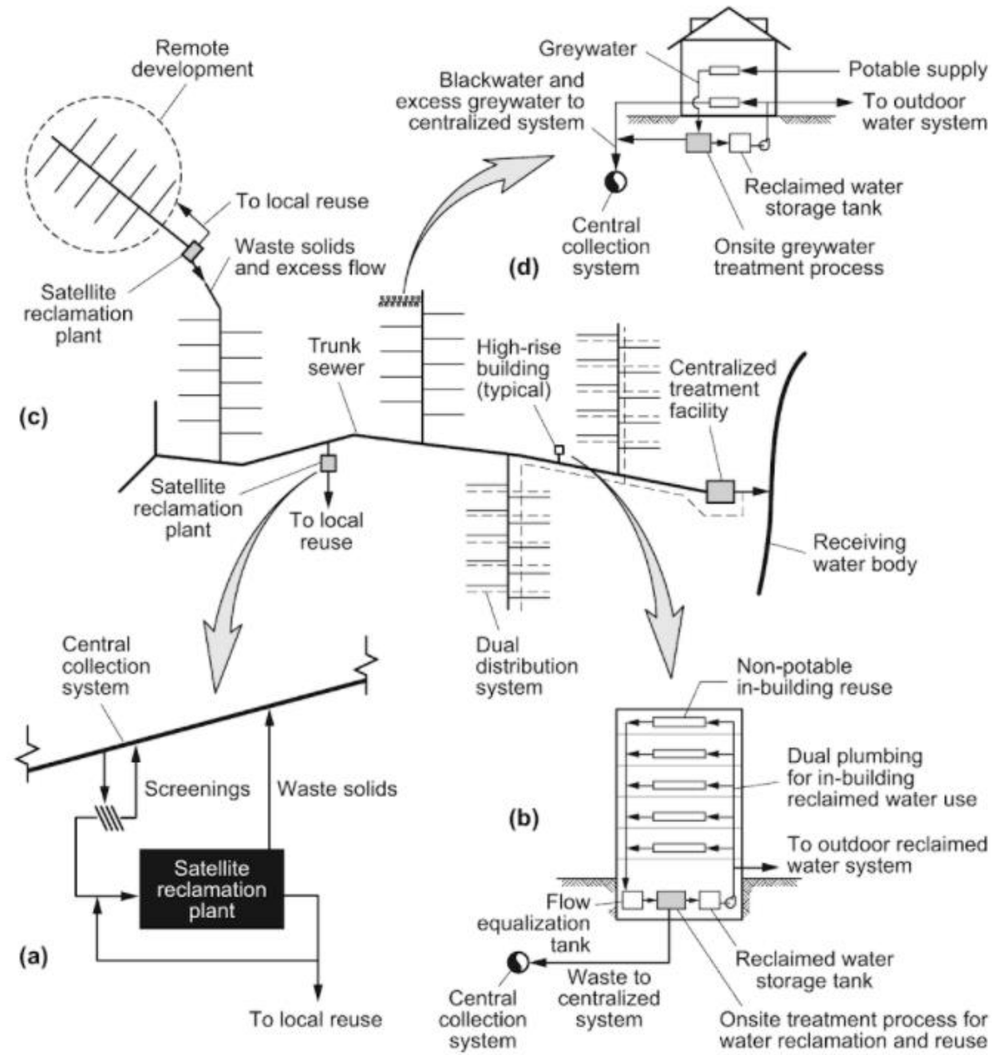
3. **Changes to market demands are driving developers away from “business-as-usual” thinking.**



Definitions

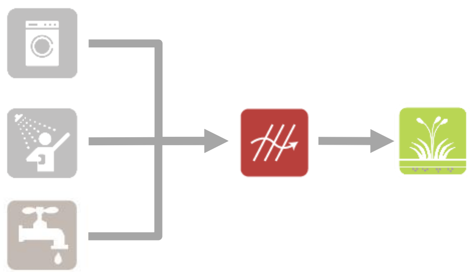
Satellite water systems are district and building scale water treatment systems that are **connected** to the central system.

These systems are designed to treat varying qualities of water sources to meet the quality needs of the ultimate demand as **“fit for purpose”** reuse.

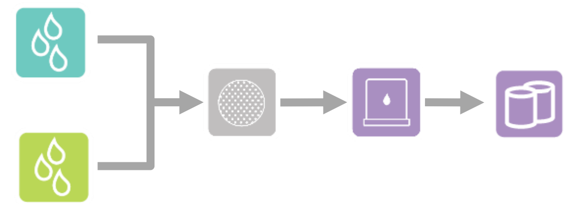


What is the opportunity?

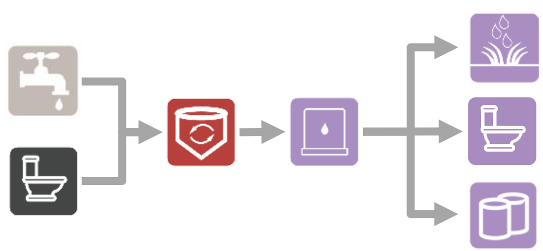
RESIDENTIAL BUILDING: graywater can be separately drained, filtered and reused for subsurface irrigation.



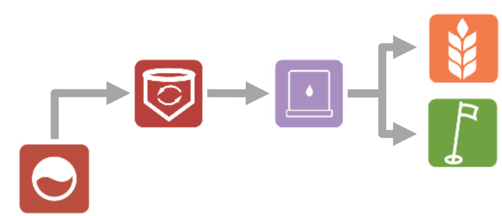
COMMERCIAL BUILDING: Precipitation can be harvested, treated, stored and reused as makeup for evaporative cooling applications.



SITE: Wastewater from buildings can be treated and reused to irrigate landscapes, flush toilets and provide cooling makeup.



DISTRICT: Wastewater can be mined from a nearby sanitary sewer, treated and reused to irrigate crops and golf courses.



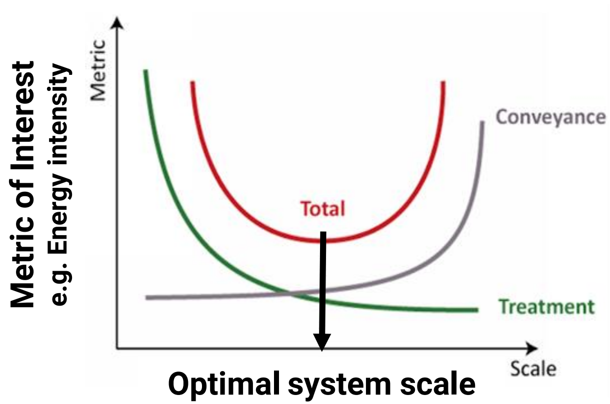
Location + Scale

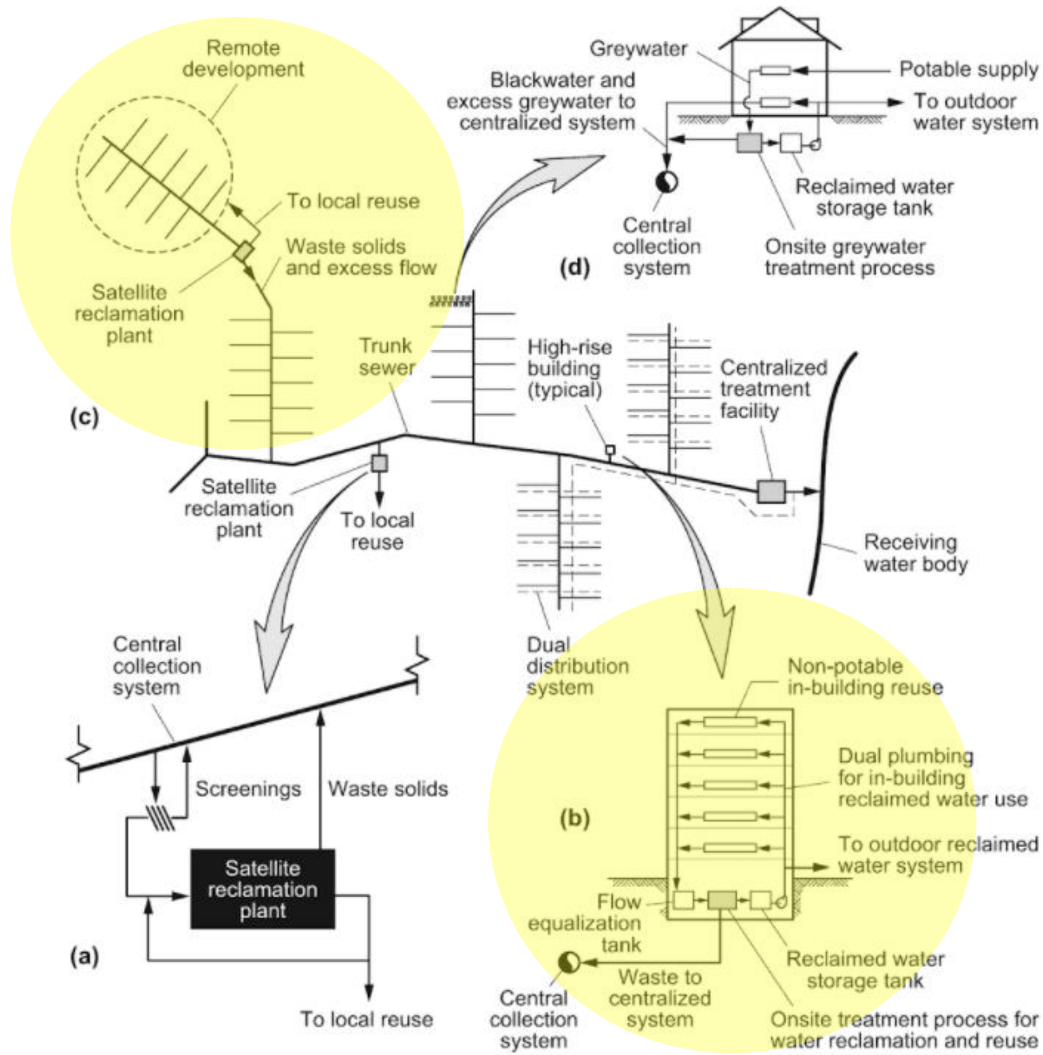
Urban (satellite)

Remote (decentralized)

Water infrastructure is <u>spatially sensitive</u>

Scale/Location	Treatment Energy	Distribution Energy
Centralized	40%	60%
On-site	85%	15%





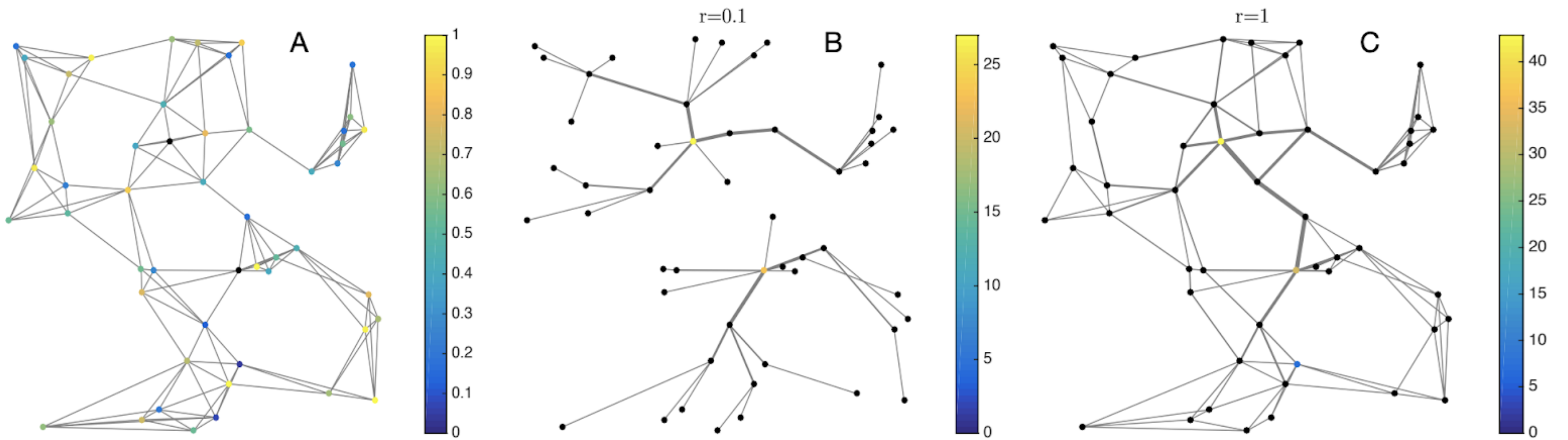
A region that optimizes the system to take advantage of the ideal scale will reap benefits in terms of system resilience, costs, greenhouse gas emissions, and water security.

A robust network balances redundancy and cost.

(A) Fully redundant networks are expensive.

(B) Optimizing a system for CapEx cost yields tree-like networks.

(C) Considering the costs of outages yields hybrid networks.



Source: Hines et. al, 2015

2: PROJECT DELIVERY CONSIDERATIONS

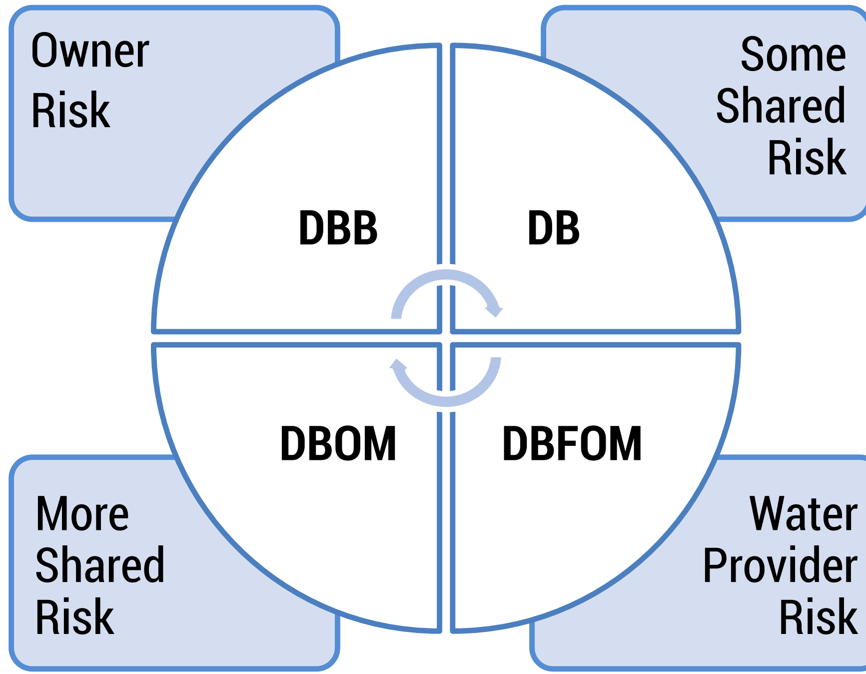
Ownership Typologies

Terminology

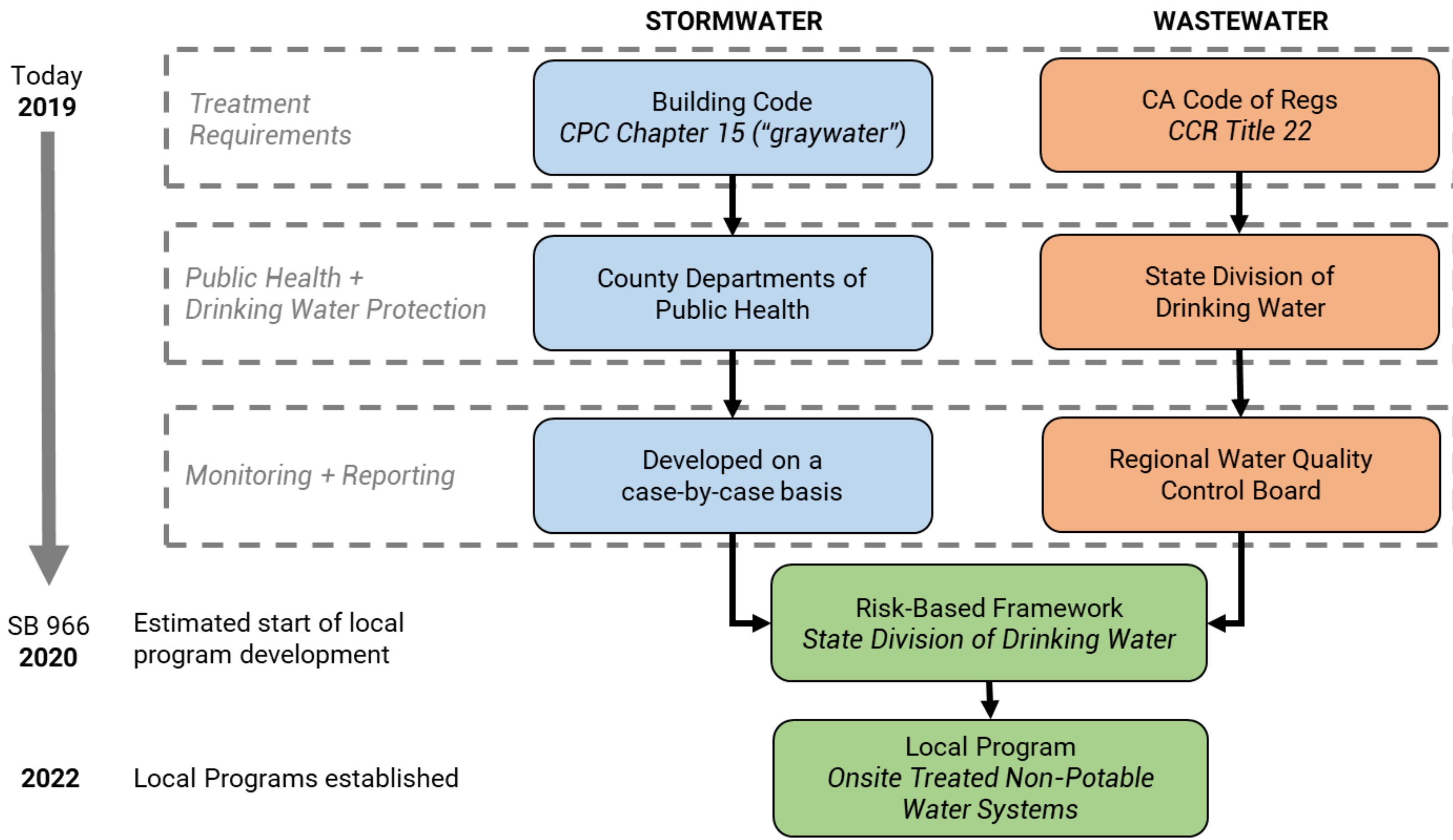
- <u>Project Delivery</u>:
  Design (D), Bid/Build (B), Finance (F)
- <u>On-going</u>:
  Operate (O), Maintain (M),

Development

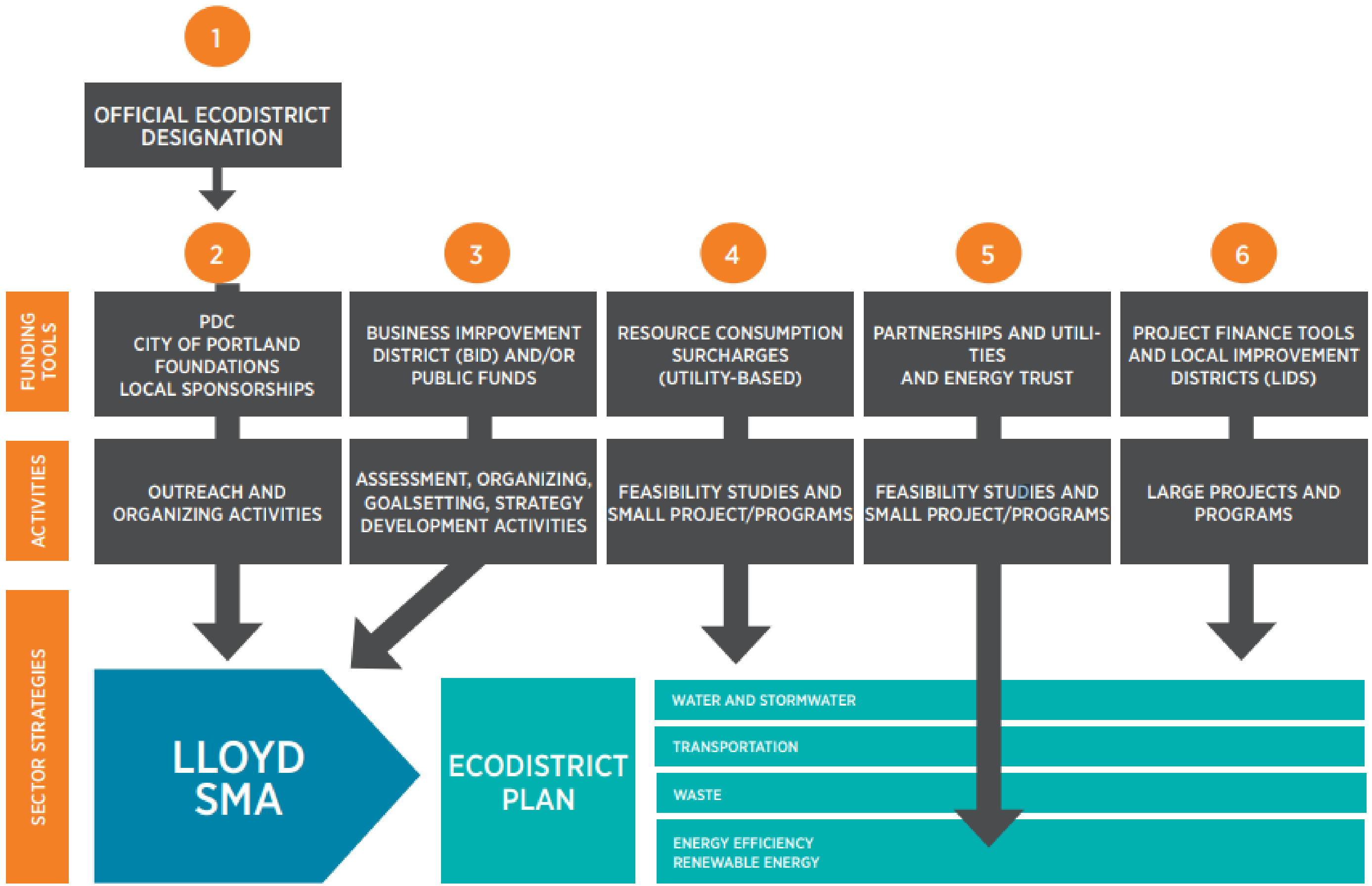
- Owner-Builder → Owner-Occupied (campuses)
- Developer-Builder → Ownership Transfer (everything else)
- Public-private partnerships (P3)



The regulatory framework is simplifying...



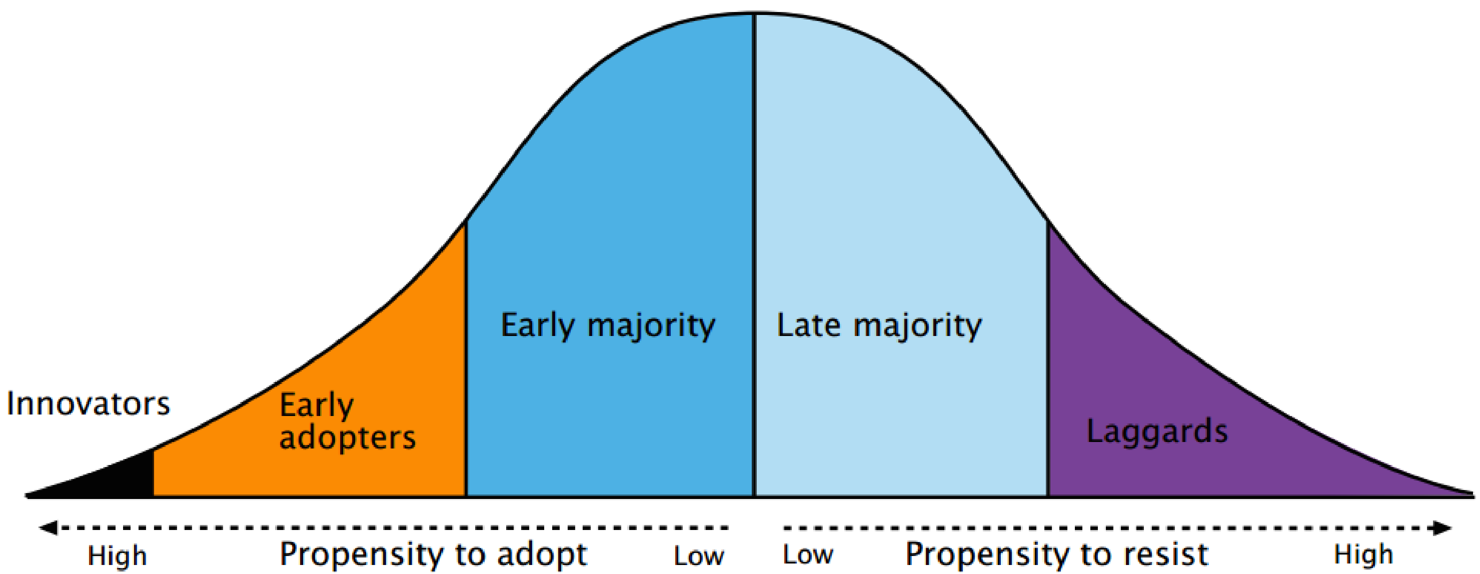
…while novel funding and governance frameworks are under-explored.



There is an innovation deficit in urban water systems.

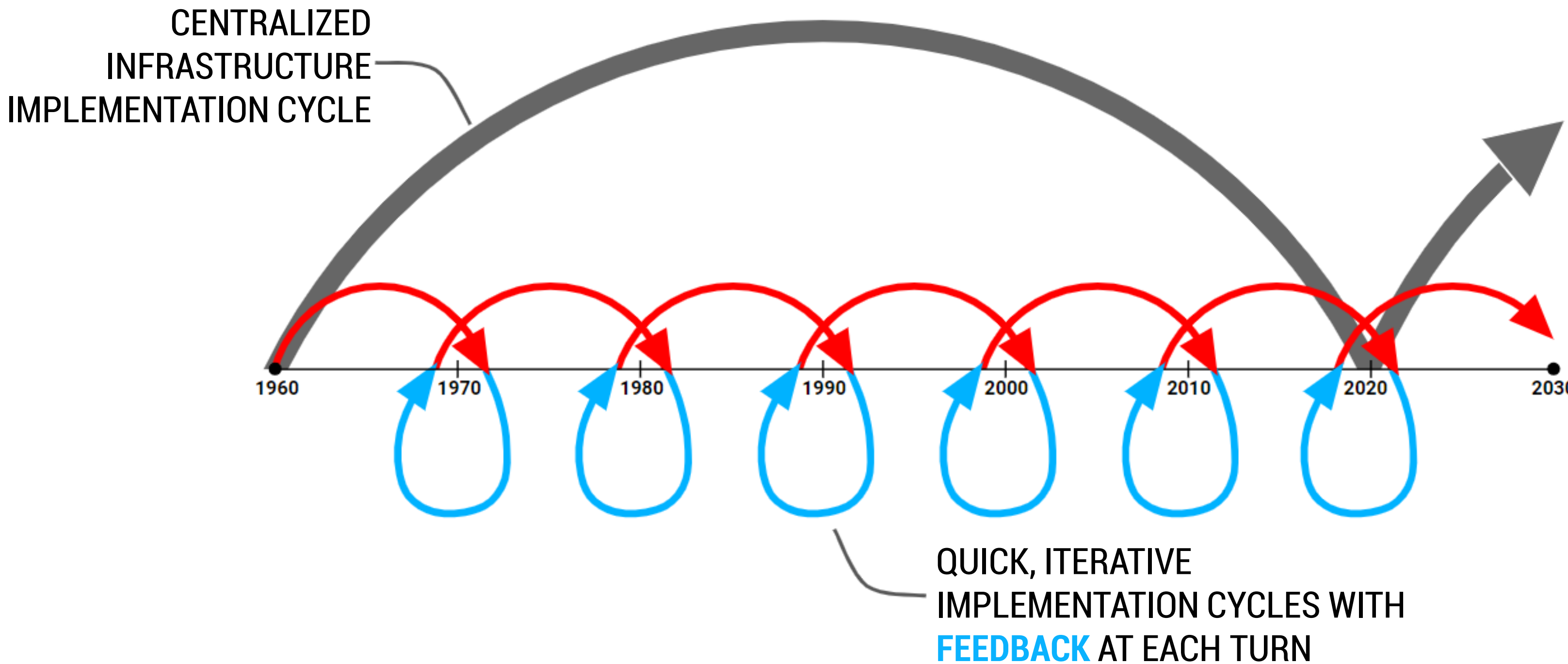
*Responding to [climate change, increasing urbanization, and the decay of existing infrastructure] will require **SUBSTANTIAL TECHNOLOGICAL AND MANAGEMENT CHANGES** for which major changes in regulations or funding for operation and maintenance may not be available.*

- Kiparsky et al. 2013



3: CRTICAL NATURE OF TIMING

Distributed systems are deployed on a rapid cycle.



An expense deferred today has value TODAY.

Sanitary Sewer Upgrades	Avoided cost of expanding sewer and/or avoided upgrades to system to carry additional volume
Central Wastewater Treatment	Operational savings for volume diverted to satellite facility
Recycled Water Network	Avoided cost of expanding recycled water network and operational savings from reduced pumping

Optimizing centralized and decentralized infrastructure to work together to benefit to ENTIRE system

Developers

1. Insulation from market volatility
2. Potential for return on investment
3. Increase allowable density (FAR)
4. **Demystify water entitlements process for predictable outcomes and to meet permitting schedules**

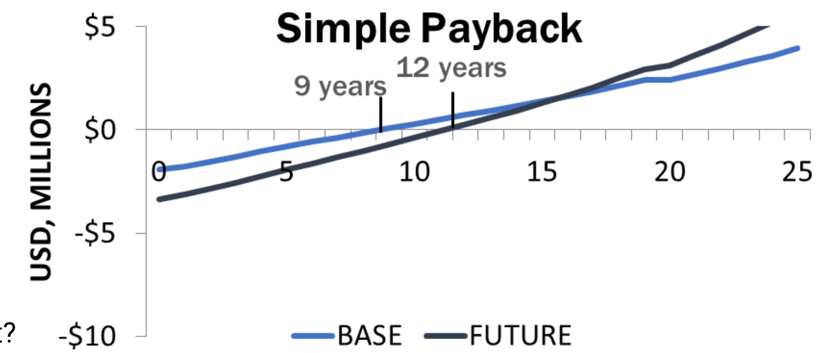
Utilities

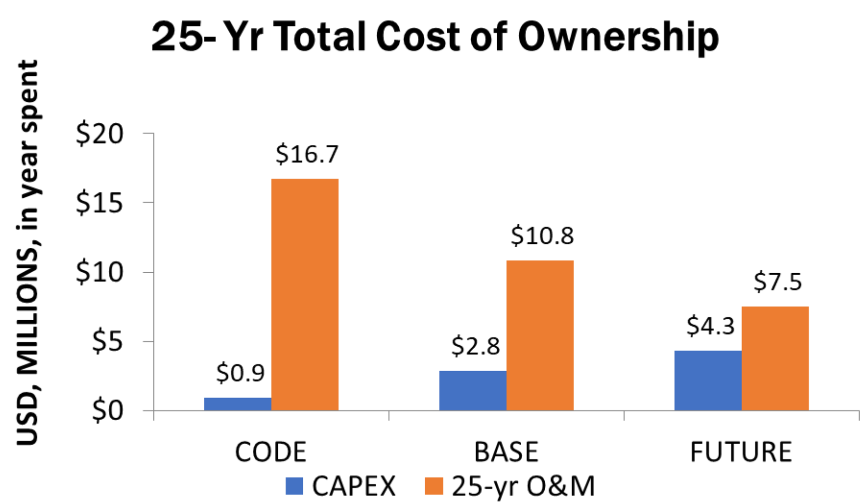
1. Bolster regional infrastructure
2. Contribute to a diverse future water supply (reuse as conservation)
3. Avoid upgrading capacities of existing water and wastewater networks (and potentially wastewater treatment plant)
4. Avoid additional operating costs at wastewater treatment plant
5. Avoid extending recycled water networks
6. Avoided additional operating costs of recycled water systems

4: BUSINESS CASE STUDIES

How will I pay for this investment?

1. Review <u>true delta</u> between "business as usual" and ONWS
2. Assess whether lifecycle costs are important for your development
   - If not, what costs can be recovered via water purchase agreement?
3. Determine first cost offsets
   - Identify incentives, connection fee discounts
4. Articulate less tangible benefits
   - Community benefits
5. Review water, sewer, stormwater rates
   - Create business case





Water Reuse in Atlanta

District-Scale Reuse Concepts

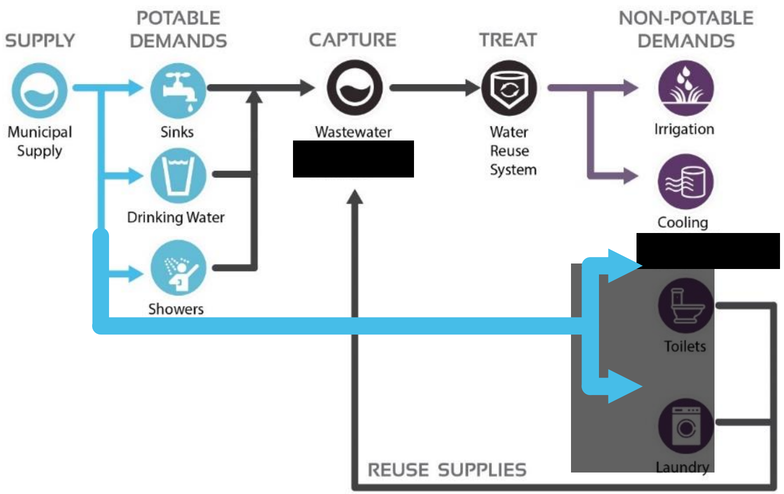
Alt 2 includes water reuse for toilet flushing

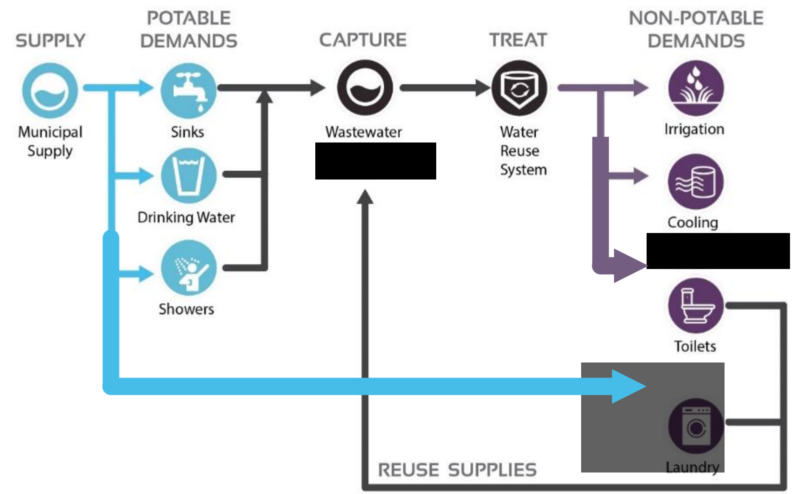
Alt 1

- Harvest wastewater from sanitary system
- Treat in central treatment plant
- Supply from: O+C & Multi-Family Buildings
- Reuse for: Site & Park Irrigation
  Office and Residential Cooling

Alt 2

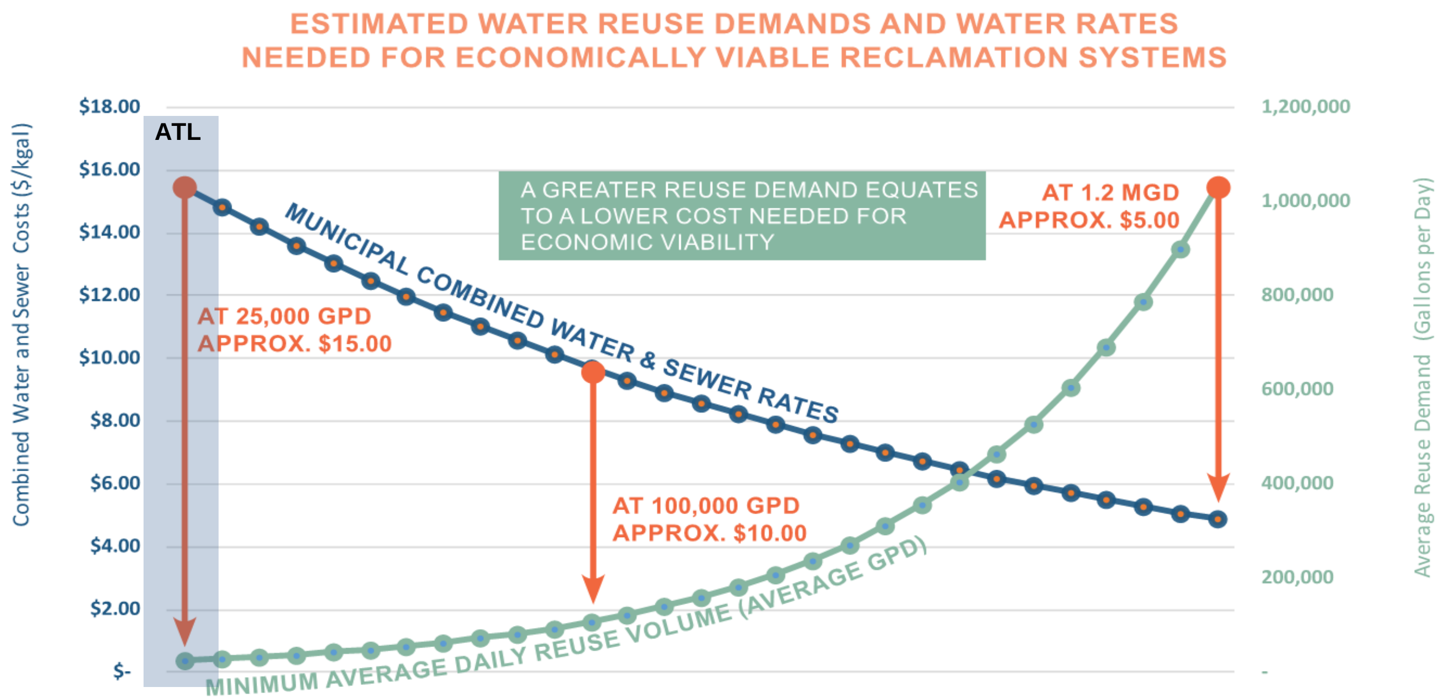
- Harvest wastewater from sanitary system
- Treat in central treatment plant
- Supply from: O+C & Multi-Family Buildings
- Reuse for: Site & Park Irrigation
  Office Cooling
  All Toilets





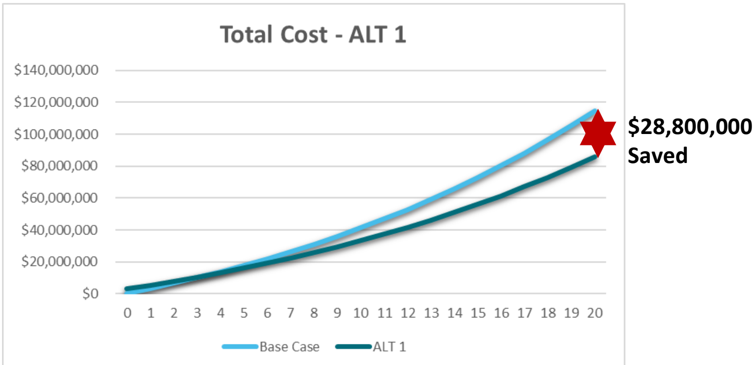
Financial Comparison

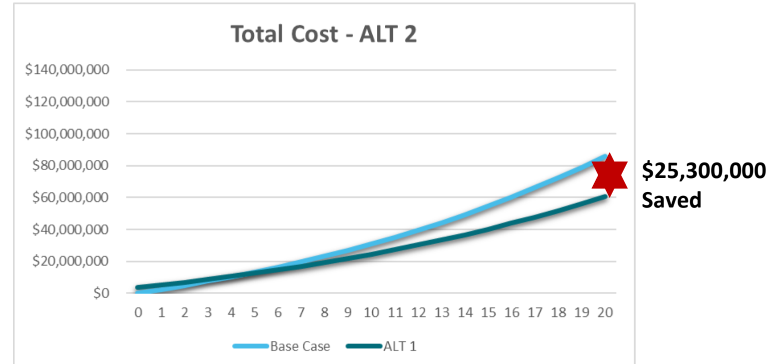
Total cash flow includes CapEx, OpEx, savings from water and sewer bills compared to no reuse

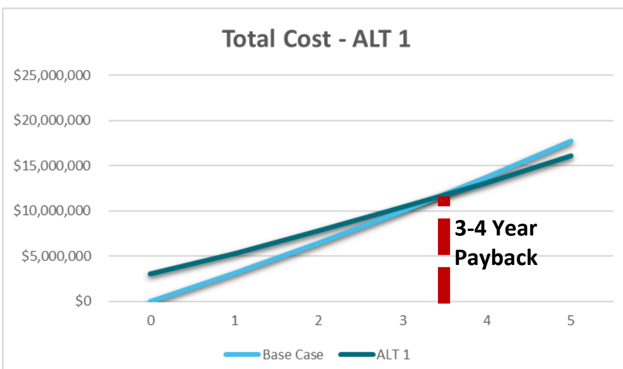


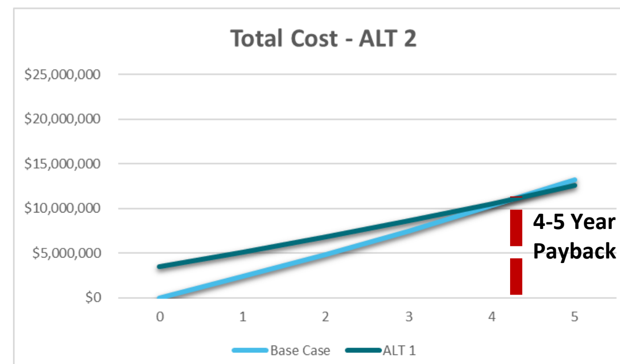
Financial Comparison

5.95% Historic Water Escalation Rate



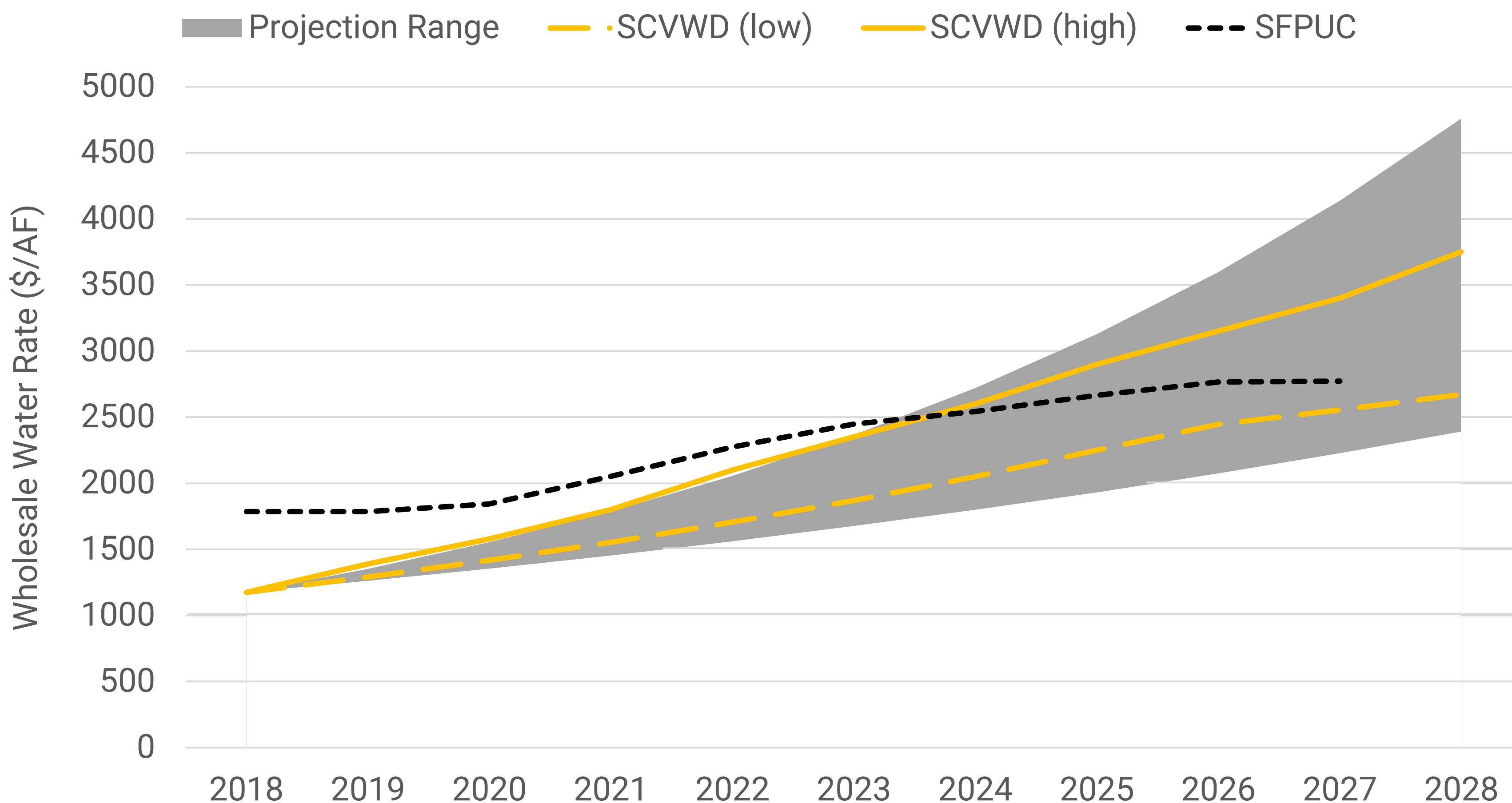






5: WHAT'S NEXT FOR THE INDUSTRY?

Rate forecasting as a risk framework.



Credit: content compiled by Ember Strategies and Arup

Stressors direct risk tolerance.

CLIMATE CHANGE
- Multi-year droughts
- Sea level rise (WWTPs)
- Storage constraints (snowpack, reservoirs)

INCREASING URBANIZATION
- Population growth
- Construction constraints

DECAY OF EXISTING INFRASTRUCTURE
- ASCE Report Card (Cs and Ds)
- Earthquakes (shocks)

REGULATORY RESTRICTIONS
- Groundwater (SGMA)
- Nutrients
- Potable reuse

What projects should be built in response?

Themes		Actions
1. On-site non-potable water systems can be a transformative opportunity	➡	Engage in an engineering assessment early to inform decision-making
2. Consider all driving forces	➡	Timing is critical
3. Changes to market demands are driving developers away from “business-as-usual” thinking	➡	Create a project-appropriate business case framework that considers water risk factors

THANK YOU!

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