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# Innovation in Action: 21st Century Water Infrastructure Solutions

## Executive Summary


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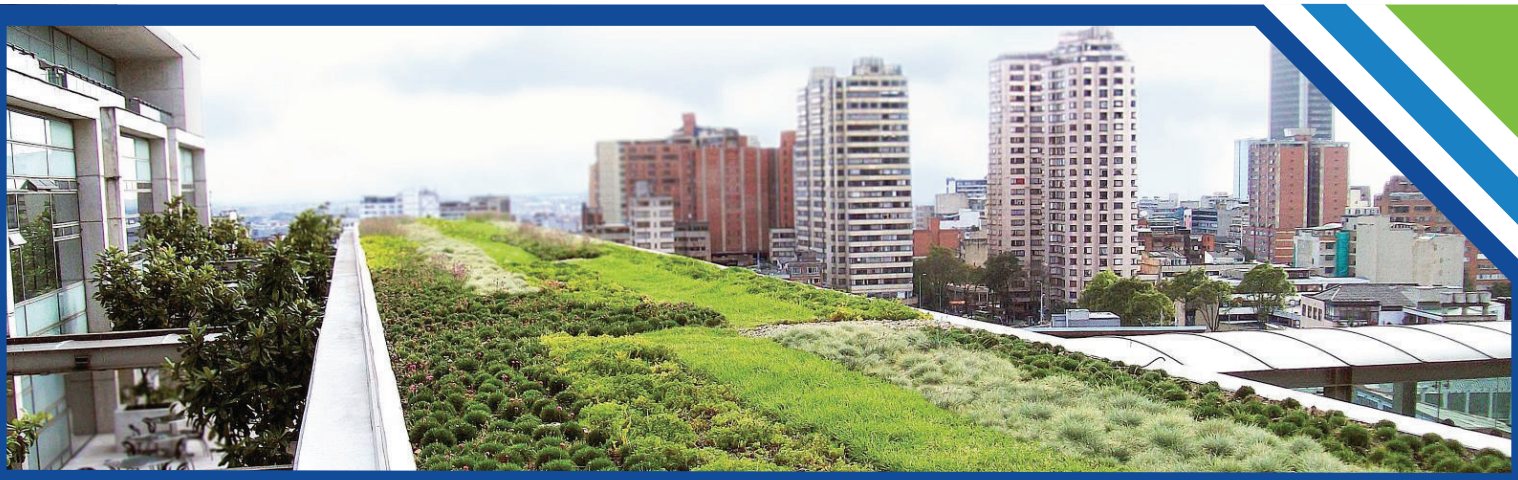


## Introduction

Infrastructure is back. After years of being ignored, devalued, overlooked, and neglected, water infrastructure is in the news. Everyone, it seems, wants to be an infrastructure hero. But even in the digital age, much of the infrastructure discussion at the federal and state levels is centered on the conventional approaches of the past century.

Missing from the conversation is the reality that many public water resource agencies are investing in local water infrastructure and finding a new set of strategies – localized and distributed across communities – to be viable, sustainable, affordable and equitable solutions to water management challenges.

WaterNow Alliance's new white paper examines site-level strategies that can address the range of drinking water, wastewater, and stormwater issues facing the nation. **Through 13 case studies of public utility successes, the report demonstrates the new water infrastructure is decentralized, onsite, and local.** These strategies entail their own set of implementation challenges, and this paper doesn't address all of them (and some are explored in WaterNow's Tap into Resilience Toolkit that will also be regularly updated based on new research), but points the way to solutions that are already demonstrating meaningful success and can be replicated and scaled nationwide.

As the climate changes and communities move toward a One Water strategy, these localized solutions will support communities in building a resilient water future. The issue is scale. Communities will only realize the full potential of the benefits that distributed solutions can provide if they can invest in and adopt these strategies widely across their businesses, neighborhoods, residences, streets, and parks. The paper includes a 10-part decision making framework that supports local water leaders in bringing this approach to scale.

### Major Findings:

**(1) Distributed strategies can effectively serve as water infrastructure across the "One Water" spectrum of water resource management challenges.**

**(2) Tangible evidence demonstrates that localized strategies can be affordable, sustainable, scalable, and provide multiple co-benefits.**

**(3) Cities and utilities nationwide can readily build on current successes and adopt decentralized sustainable practices most suited their communities.**

## What is Distributed Infrastructure?

Installations, appliances, and technologies located at or near the point of use and distributed across many properties, and generally employed in coordination with a utility's conventional infrastructure. WaterNow has identified 5 categories capturing these strategies listed below:

- Water Use Efficiency

  - Indoor high efficiency appliance and fixtures
  - Turf replacement
  - Smart irrigation controllers
  - Customer-side leak detection devices

- Stormwater and Flood Management

  - Green roofs and blue roofs
  - Urban forests
  - Bioswales and rain gardens
  - Green streets and permeable pavements
  - Coastal restoration
  - Low impact development
  - Aquifer storage and recovery (ASR)

- Reuse and Other Alternative Non-Potable Water Sources

  - Onsite non-potable water systems
  - Graywater systems
  - Rainwater harvesting

- Source Watershed Protection

  - Headwaters preservation and restoration
  - Conservation easements
  - Revegetation
  - Riparian buffers
  - Wetland restoration and creation

- Replacement of Private Service Lines

  - Lead service line replacement
  - Private sewer lateral replacement

## Public Utilities Are Leading the Way

WaterNow's research found noteworthy gains in deployment of decentralized strategies from green stormwater infrastructure (GSI), to conservation and efficiency to lead line replacements in communities nationwide. The white paper focuses on public agencies – cities, towns, counties, water districts, sanitary and stormwater agencies, and other special districts – because these entities serve the vast majority of the U.S. population, and will shoulder much of the burden for addressing the impacts of climate change. As stewards of public resources, as well as public dollars, they can pass along significant benefits to their communities in the form of access to low interest, tax-free financing; accountability and transparency to local ratepayers; greater responsiveness to equity and affordability concerns, among others.

## Localized Water Infrastructure Case Studies

The strategies profiled in this white paper address a range of water management challenges:

- extending or generating new water supply
- improving water quality
- capturing urban runoff
- reducing wastewater overflows

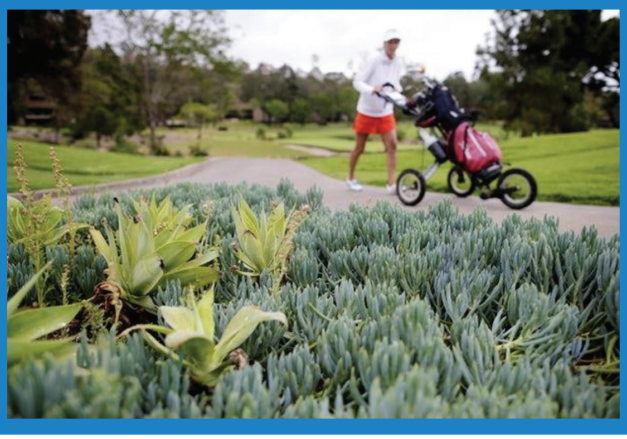
They often serve more than one of these purposes simultaneously. We have focused on examples where communities have made investments in solutions that are effective, affordable, sustainable, and scalable. Together, these case studies show that cities and utilities nationwide can build on current successes and adopt sustainable practices in their communities.

The most commonly cited drivers for turning to localized infrastructure include:

- concerns about climate change
- drought or long-term water supply limitations
- more affordable ways of addressing combined sewer overflows and urban stormwater management challenges
- increasing local resilience
- compliance with various regulatory mandates
- higher cost of more conventional alternatives

In addition, the case study communities almost uniformly made the decision to "go greener" based on perceptions that these distributed strategies could provide a range of community and equity co-benefits including but not limited to:

- urban revitalization and green space
- energy savings
- increased local economic development
- improvements in public health



# Water Supply Case Studies

## • Santa Fe Water Division: Efficiency As A Way of Life

- Combination of mandates and financial incentives have resulted in broad adoption of distributed water efficiency measures leading to major reductions in per capita water.

## • Moulton Niguel Water District: Not Using Less, Wasting Less

- Consumer rebates for onsite outdoor and indoor efficiency measures based on data analysis showing greatest potential for water savings.

## • San Antonio Water System: Conservation As Supply

- Early leader in treating decentralized conservation measures as a source of water supply, implemented primarily through financial incentives for consumers.

## • Tucson Water: Efficiency Means Avoided Costs

- Long-term investment in consumer incentives for efficiency has kept total water use flat since 1985 notwithstanding significant population growth.

## • Austin Water: Water Resource Planning For The Next Century

- 100-year One Water plan focused on local resilience and mitigating climate change impacts largely through expanded investments in efficiency and reuse.

## • Seattle Public Utilities [Part 1]: Putting Capital Behind Efficiency

- Debt financing efficiency rebates for private property installations.

# Wastewater and Stormwater Case Studies

## • Philadelphia Water Department: Green City, Clean Waters

- Billion dollar investment in distributed green stormwater infrastructure across the community over the next 25 years to address combined sewer overflows.

## • Milwaukee Metropolitan Sewerage District: Going Big On Green

- Goal to use distributed green infrastructure to capture 740 million gallons of stormwater (per storm) by 2035—more stormwater than is captured than MMSD's Deep Tunnels.

## • City of Eugene: Leveraging Development Standards To Deploy Decentralized GSI

- Local ordinance requiring onsite stormwater management for new development, and city-wide green infrastructure to address urban runoff.

## • Seattle Public Utilities [Part 2]: Incentivizing Citywide Private Property GSI

- Debt financing green infrastructure for private property installations.

## • One Water LA: One Water Planning In Action

- Comprehensive One Water Plan integrates centralized facilities and distributed green infrastructure program to manage stormwater.

## • DC Water: Clean Rivers Project

- Green stormwater infrastructure for public and private property owners to address combined sewer overflows.

# Lead Service Line Replacement Case Studies

## • Madison Water Utility: A Lead Leader

- City-wide program to replace private lead service lines paid for in part with public funds.

## Innovations in Finance

For most utilities, significantly scaling adoption of distributed water strategies will require access to investment capital in the same way that they raise capital to fund conventional water infrastructure. The white paper reviews a number of opportunities available to utilities including State Revolving Fund and other low interest federal loan programs, Environmental Impact Bonds and similar types of performance-based vehicles.

In a particularly interesting development, the General Accounting Standards Board (GASB) has clarified that consumer incentives issued by public entities to pay for decentralized water systems can be capitalized, opening the door for utilities to deploy tax-free municipal bonds to finance rebate programs. This would allow utilities to put their investments in distributed and conventional infrastructure on par, amortizing costs for both of these long-term expenditures over time, avoiding rate-shock and more equitably sharing the cost burden with future ratepayers.

**The GASB guidance is a game changer. If even a tiny percent of the billions in annual capital spending for local water infrastructure nationwide is redeployed to distributed onsite solutions, it would represent vast new investment capacity and a major expansion in the adoption of these technologies and programs.**

## Decision-Making Framework

WaterNow has distilled lessons from the case studies into a high-level decision-making framework for deploying these strategies at larger scale as best fit a community's particular needs:

1. **Identify whether and how DI strategies can address local drivers.**
2. **Identify appropriate models and data to assess potential performance.**
3. **Evaluate costs and benefits holistically – include financing options and multiple benefits.**
4. **Incorporate distributed onsite systems into capital planning alongside conventional infrastructure.**
5. **Think broadly and creatively about financing options.**
6. **Incorporate stakeholder outreach and engagement in planning & implementation.**
7. **Plan for project- and place-specific implementation challenges.**
8. **Identify internal capacity, gaps and available support resources.**
9. **Have a plan for ongoing maintenance.**
10. **Establish performance metrics and evaluation methods.**

## Conclusion

Water is the delivery vehicle for climate disruption in the United States. Water resource utilities – particularly the public entities serving the vast majority of the U.S. population – are on the front lines to ensure that their communities are safe, healthy, and resilient when it comes to water resources, and that these services are available and affordable for all. We have only just begun to realize how the new distributed water infrastructure can serve these functions while providing significant co-benefits, particularly to more vulnerable communities, in the form of increased local resilience, affordability, green space, economic development, community engagement, and more.

Hundreds of communities nationwide have been experimenting with distributed systems on a relatively small scale, and those profiled here are thinking bigger. We have the technology, the data, and the tools to take advantage of the opportunities that localized strategies present now.

What is needed is primarily a shift in our collective thinking about what constitutes "water infrastructure," and the leadership to invest and move forward accordingly.