GLOBAL CONNECTIONS DAY

OCTOBER 23, 2019

WATER: SAFETY, EFFICIENCY AND CONSERVATION

2019 ANNUAL CONFERENCE

Oct. 20–23, 2019 | Rio Hotel & Convention Center

ICC 2019 LAS VEGAS NEVADA

ICC GLOBAL CONNECTIONS DAY

Las Vegas, NV // October 23, 2019

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THE JOURNEY


181 FREMONT
LEED 2009 C&S PLATINUM
ONSITE WATER
RECYCLING

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181 FREMONT WATER RECYCLING PLATINUM OPPORTUNITY

POINTS						
27	1	0	**Sustainable Sites (SS)**			
YES	MAYBE	NO			MAX PTS	
Y			SS PrRq 1.0	Construction Activity Pollution Prevention		C
1	0	0	SS 1.0	Site Selection	1	D
5	0	0	SS 2.0	Development Density	5	D
1	0	0	SS 3.0	Brownfield Development	1	D
6	0	0	SS 4.1	Alternative Transportation - Public Transit Access	6	D
2	0	0	SS 4.2	Alternative Transportation - Bicycle Storage and Changing Rooms	2	D
3	0	0	SS 4.3	Alternative Transportation Low - Emitting and Fuel-Efficient Vehicles	3	D
2	0	0	SS 4.4	Alternative Transportation - Parking Capacity	2	D
0	1	0	SS 5.1	Site Development Protect or Restore Habitat	1	C
1	0	0	SS 5.2	Site Development Maximize Open Space	1	D
1	0	0	SS 6.1	Stormwater Design Quantity Control	1	D
1	0	0	SS 6.2	Stormwater Design Quality Control	1	D
1	0	0	SS 7.1	Heat Island Effect - Nonroof	1	C
1	0	0	SS 7.2	Heat Island Effect - Roof	1	D
1	0	0	SS 8.0	Light Pollution Reduction	1	D
1	0	0	SS 9.0	Tenant Design and Construciton Guidelines	1	D

10	0	0	**Water Efficiency (WE)**			
YES	MAYBE	NO			MAX PTS	
Y			WE PrRq 1	Water Use Reduction - 20% Reduction		D
4	0	0	WE 1.0	Water Efficient Landscaping No Potable Water Use or No Irrigation	2 to 4	D
2	0	0	WE 2.0	Innovative Wastewater Technologies	2	D
4	0	0	WE 3.0	Water Use Reduction	2 to 4	D

20	5	12	**Energy and Atmosphere (EA)**			
YES	MAYBE	NO			MAX PTS	
Y			EA PrRq 1	Fundamental Commissioning of Building Energy Systems		C
Y			EA PrRq 2	Minimum Energy Performance		D
Y			EA PrRq 3	Fundamental Refrigeration Management		D
8	1	12	EA 1.0	Optimized Energy Performance	3 to 21	D
0	4	0	EA 2.0	On-Site Renewable Energy	4	D
2	0	0	EA 3.0	Enhanced Commissioning	2	C
2	0	0	EA 4.0	Enhanced Refrigerant Management	2	D
3	0	0	EA 5.1	Measurement and Verification - Base Building	3	D
3	0	0	EA 5.2	Measurement and Verification - Tenant Submetering	3	D
2	0	0	EA 6.0	Green Power	2	C

LEGEND

- = Regional Priority Credit
- = Credits Required by the San Francisco Green Building Ordinance (Sf GBO)
- ='D' Design Phase LEED Online Documenation Credit
- ='C' Construciton Phase LEED Online Documenation Credit
- = Credits to discuss/review with project team

POINTS						
7	0	6	**Materials and Resources (MR)**			
YES	MAYBE	NO			MAX PTS	
Y			MR PrRq 1	Storage & Collection of Recyclables		D
0	0	5	MR 1.0	Building Reuse Maintain Existing Walls, Floors and Roof	1 to 5	C
2	0	0	MR 2.0	Construction Waste Management	1 to 2	C
0	0	1	MR 3.0	Material Reuse	1	C
2	0	0	MR 4.0	Recyled Content	1 to 2	C
2	0	0	MR 5.0	Regional Materials	1 to 2	C
1	0	0	MR 6.0	Certified Wood	1	C

11	0	1	**Indoor Environmental Quality (EQ)**			
YES	MAYBE	NO			MAX PTS	
Y			EQ PrRq 1	Minimum IAQ Performance		D
Y			EQ PrRq 2	Environmental Tobacco Smoke (ETS) Control		D
1	0	0	EQ 1.0	Outdoor Air Delivery Monitoring	1	D
1	0	0	EQ 2.0	Increased Ventilation	1	D
1	0	0	EQ 3.0	Construction IAQ Management Plan DURING CONSTRUCTION	1	C
1	0	0	EQ 4.1	Low-Emitting Materials - Adhesive and Sealants	1	C
1	0	0	EQ 4.2	Low-Emitting Materials- Paints and Coatings	1	C
1	0	0	EQ 4.3	Low-Emitting Materials - Flooring Systems	1	C
1	0	0	EQ 4.4	Low-Emitting Materials - Composite Wood and Agrifiber Products	1	C
1	0	0	EQ 5.0	Indoor Chemical and Pollutant Source Control	1	D
0	0	1	EQ 6.0	Controllability of Systems - Thermal Comfort	1	D
1	0	0	EQ 7.0	Thermal Comfort - Design	1	D
1	0	0	EQ 8.1	Daylight and Views - DAYLIGHT	1	D
1	0	0	EQ 8.2	Daylight and Views - VIEWS	1	D

6	0	0	**Innovation in Design (ID)**			
YES	MAYBE	NO			MAX PTS	
1	0	0	ID 1.1	SSc2 Double Development Density (at least 120,000SF/acre)	1	D
1	0	0	ID 1.2	SSc7.1 Exemplary Performance 100% Parking Underground	1	C
1	0	0	ID 1.3	SSc4.1 Comprehensive Transportation Mgmt Plan	1	D
1	0	0	ID 1.4	Green Cleaning Program	1	C
1	0	0	ID 1.5	Bird Collision Deterenece	1	C
1	0	0	ID 2.0	LEED AP	1	C

3	1	0	**Regional Priority (RP) ZIP 94105**		
YES	MAYBE	NO			MAX PTS
0	1	0	EA 2.0	On-Site Renewable Energy	1
1	0	0	WE 2.0	Innovative Wastewater Technologies	1
1	0	0	WE 3.0	40% water use reduction	1

YES	MAYBE	NO		TOTAL POSSIBLE POINTS
84	7	19	TOTAL	110

LEED Certified = 40-49, Silver = 50-59, Gold = 60-79, Platinum = 80 points and above

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”YUCK” HAS BECOME LESS SCARY

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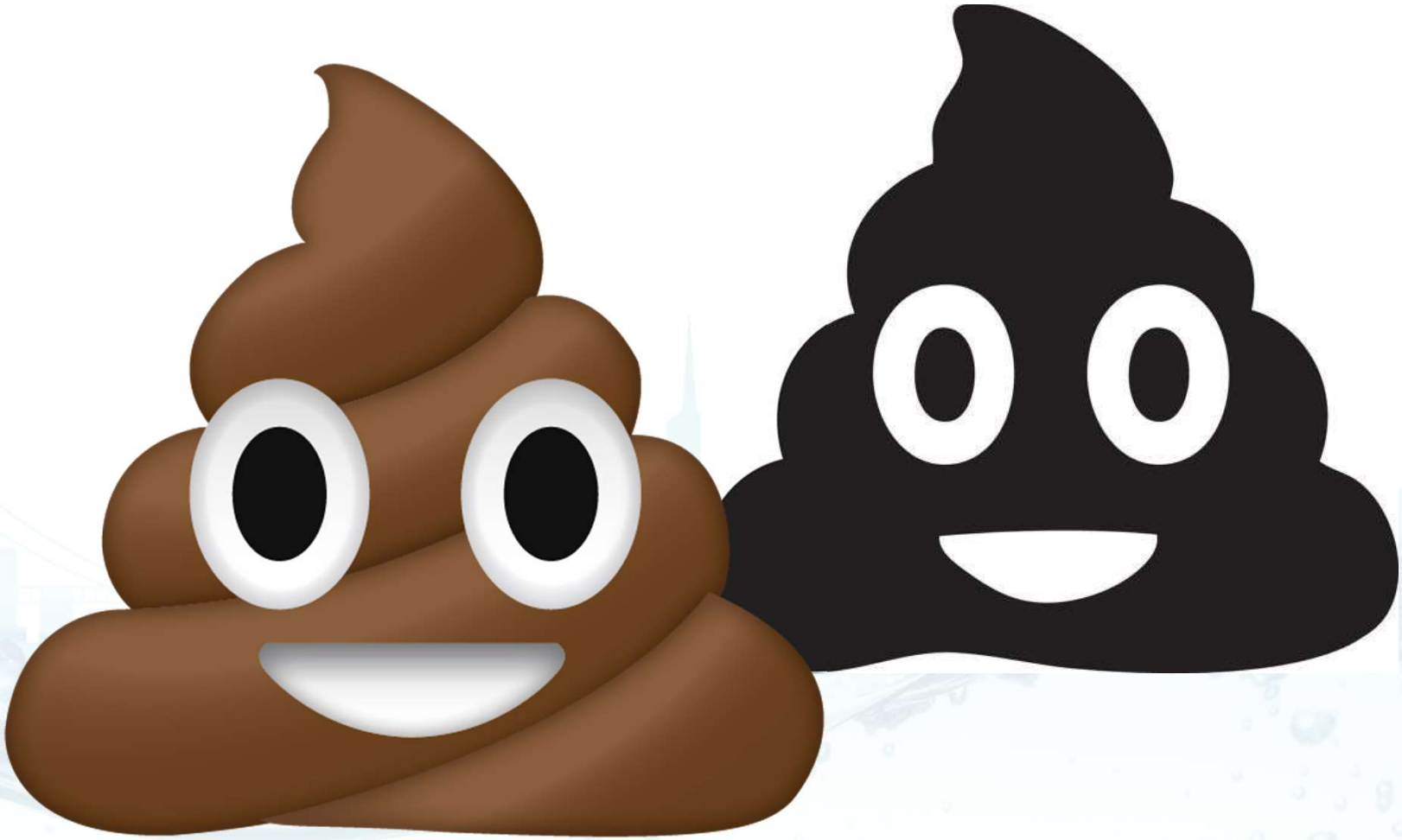

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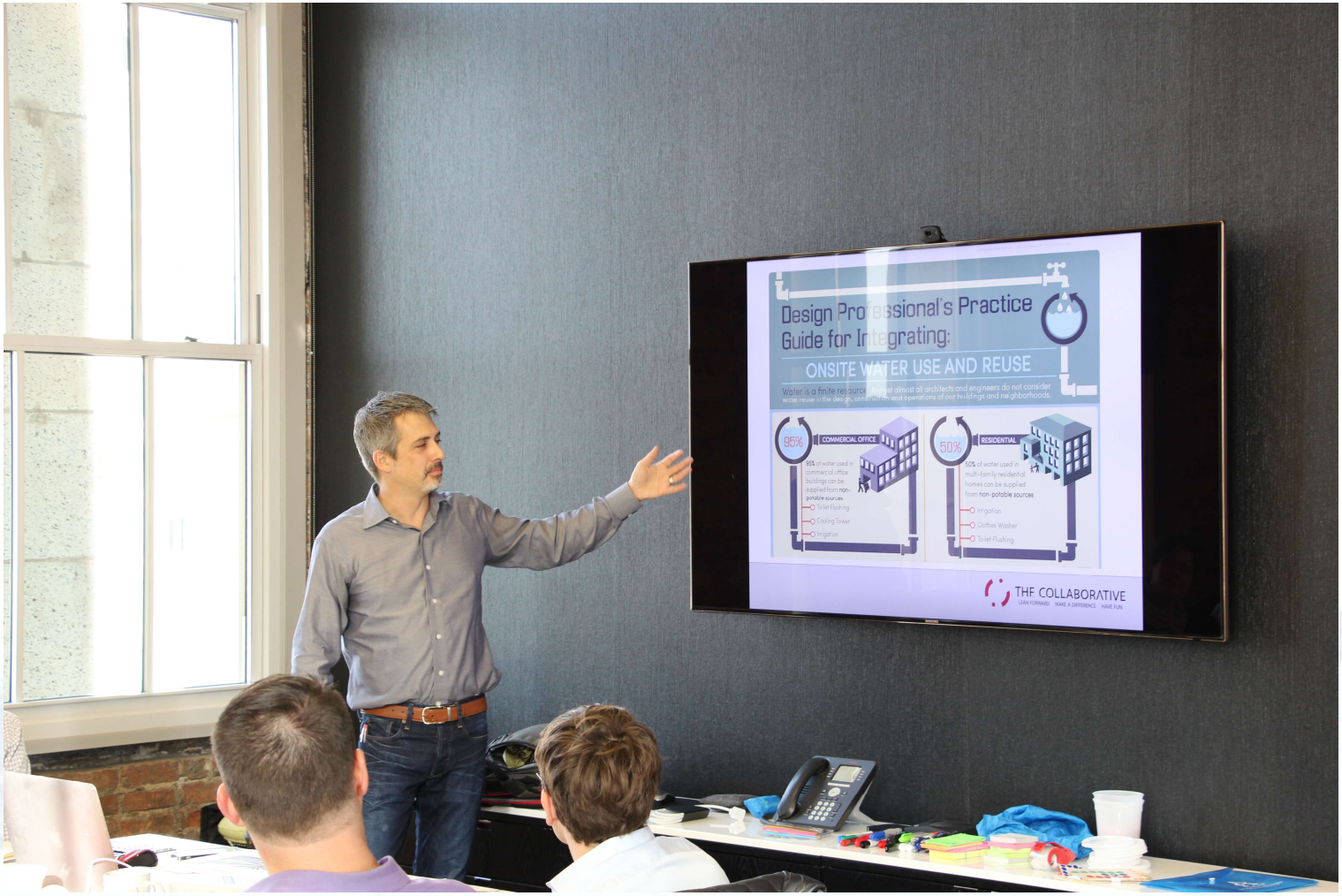
RESOURCE FOR THE INDUSTRY



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THE WILLIAM J. WORTHEN FOUNDATION
A DESIGN, POLICY AND PRACTICE PROFESSIONALS NETWORK
December 15, 2017

PRESS RELEASE

The Urban Fabrick Collaborative, a 501c3 public benefit corporation, now The William J. Worthen Foundation, is pleased to announce the upcoming release of *"A Design Professional's Guide to Onsite Water Use and Reuse"* on Friday, January 19, 2018.

The goal of this guide is to make the design, value and benefits of cost-effective integration of onsite water reuse systems a core competency for architects and engineers. A working group of subject matter and industry experts was convened to develop the content for this guide and infographics, and to validate technical resources for water use and reuse.

The guide will address project pitch, design, scope definition, system specification, permitting, and operation of onsite non-potable water reuse technologies including rainwater, stormwater, and gray- and blackwater systems for residential and non-residential uses. The guide also includes onsite treatment strategies and conservation measures, the value of a more collaborative and integrated design process to ensure the success of sustainable water reuse systems, the water-energy nexus, and strategies for communicating the value of water reuse systems to clients.

"The challenge for most architects is to understand how to better engage in a water discussion much earlier in the design process. If the first time you seriously discuss water with your client and plumbing engineer is at the time of bathroom and kitchen fixture selection, or when running the calculations to confirm how many LEED credits you get, you are very likely missing some interesting opportunities to collaborate and engage with your client and project team on the subject of water," said Bill Worthen FAIA, LEED Fellow*, co-founder of Urban Fabrick Inc. and The Urban Fabrick Collaborative.

The guide has been funded with generous contributions by The Charles Pankow Foundation, Google, AIA California Council, Magnusson Klemencic Associates, the City of Santa Monica, WE&RF, Crescent Heights, and Urban Fabrick, Inc. and will be made available as a free download on the William J Worthen Foundation's website: collaborativedesign.org

Kyle Pickett, MSOD
Co-Founder & Executive Director

deceased January 28, 2017

2 MINT PLAZA, SUITE 206 SAN FRANCISCO, CALIFORNIA 94103
COLLABORATIVEDESIGN.ORG
EST. 2015

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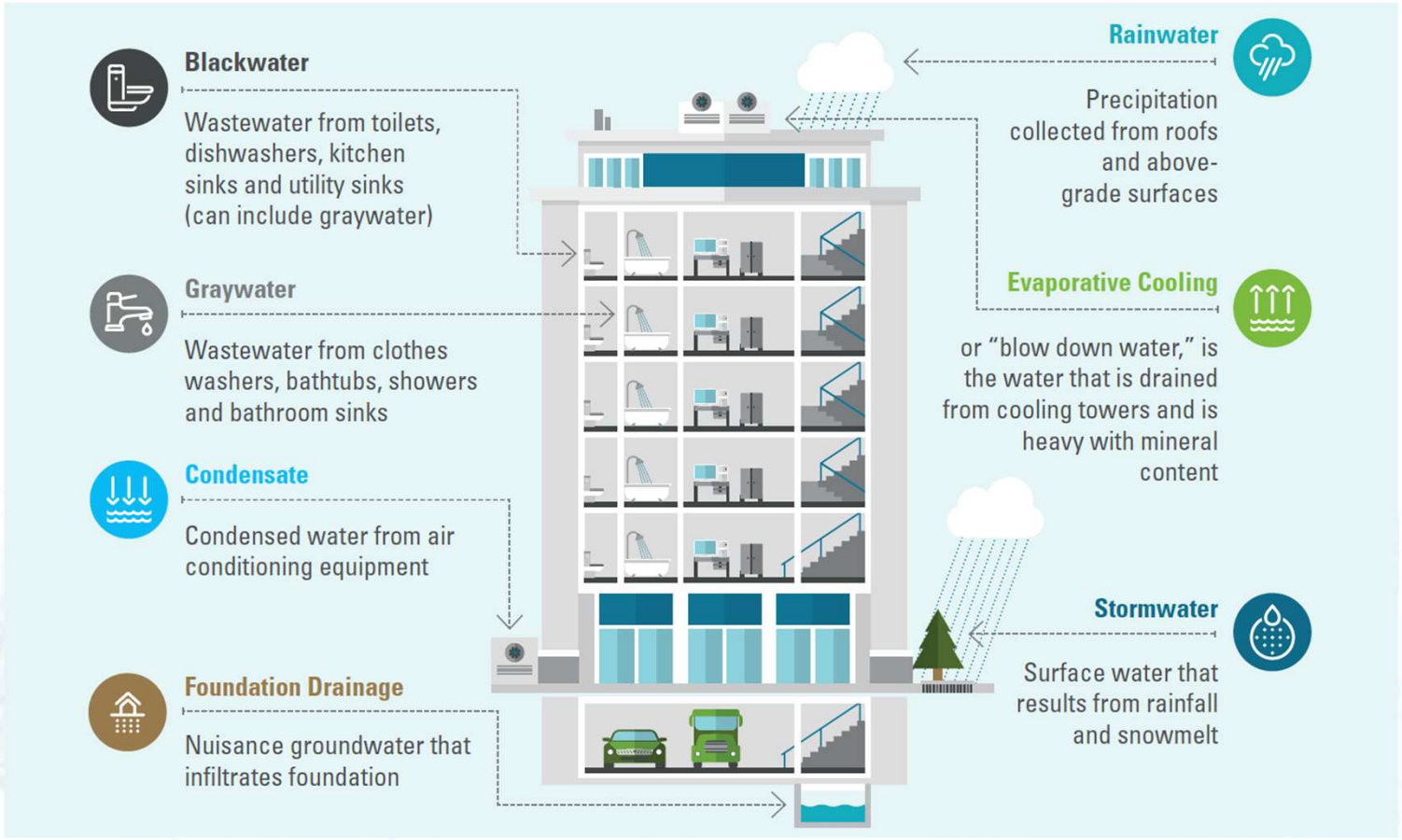
WHAT DOES THE GUIDE COVER?

WATER TYPES IN BUILDINGS



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STAKEHOLDERS & DECISION DRIVERS

Internal Stakeholders		
	Developer/Owner	· Cost efficiency · Regulatory compliance · Brand enhancement
	Design Team/Builder	· Positive industry reputation · New expertise
	Occupants	· Ease of use · Control over rate increases
	Facility Manager	· Seamless, cost effective, reliable operations
External Stakeholders		
	Regulators	· Protect public health and water quality · Conserve scarce resource · Enforce code compliance
	Utilities	· Guarantee water supply · Maintain revenue
	Financial institutions	· Avoid risk · Maintain long term value of investment

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KEY TALKING POINTS WITH REGULATORS

- Non-potable onsite reuse is safe and feasible in this project. The reused water will not be used for drinking and will minimize public health risks.
- The project is using treatment technologies that are proven effective.
- The building will remain connected to centralized water/wastewater systems to continue providing drinking water and to serve as a backup in the unlikely event of system failure.
- The design meets all codes and regulations.
- The system will be regularly monitored and maintained.
- Appropriate signage and public education and outreach are integrated into the project.

KEY TALKING POINTS WITH UTILITIES

- You have an interest in working with utilities, not against them.
- Non-potable onsite reuse can supplement local and regional efforts to build water security and promote environmental sustainability.
- It can reduce treatment costs by reducing unnecessary potable water consumption.
- It can delay or mitigate the need for expensive infrastructure expansion.
- It reduces energy consumption and system overflows.
- A blend of decentralized and centralized treatment boosts system reliability and resiliency.
- You understand that the building will still require connections to water and wastewater systems, regardless of the level of onsite non-potable water reuse.

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KEY TALKING POINTS WITH OCCUPANTS

- Non-potable onsite reuse is safe. All water is already recycled water.
- Effective treatment technologies ensure water is of a sufficient quality to use for non-drinking purposes.
- Regular monitoring and maintenance are conducted.
- Reuse saves energy, water, and costs—contributing to building and community sustainability.

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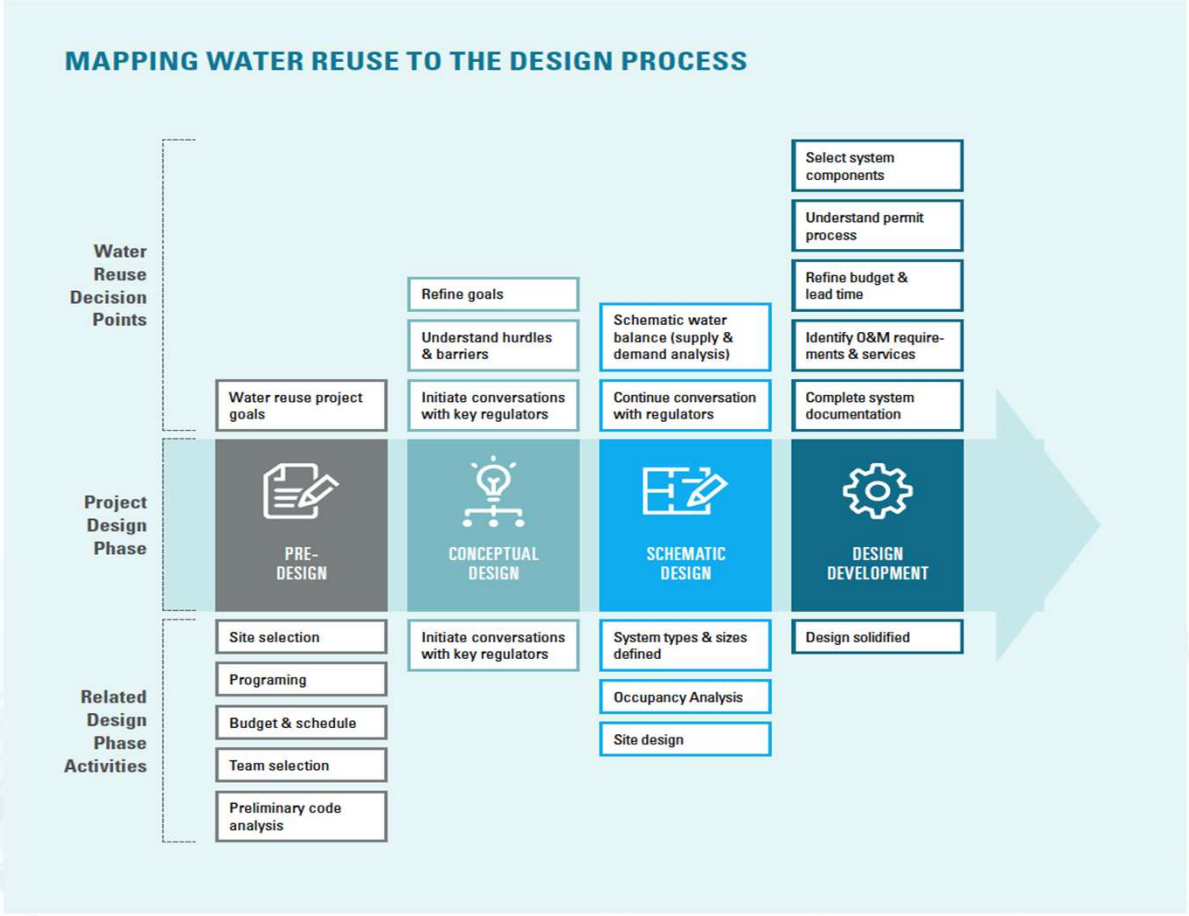
DESIGNING FOR WATER REUSE



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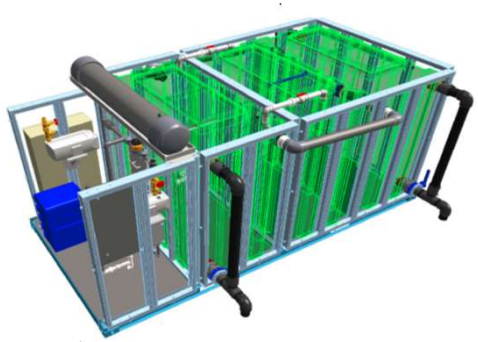
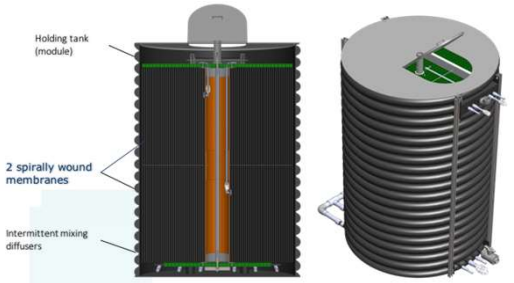
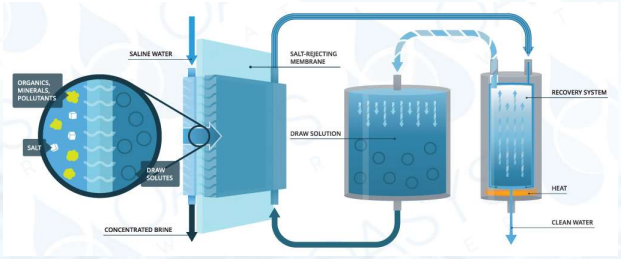
MECHANICALLY BASED SYSTEMS



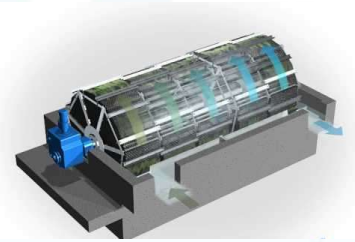
MBR - Membrane Bio Reactor



MABR -Membrane Aerated Biofilm Reactor



FO - Forward Osmosis



RBC – Rotating Biological Contractor

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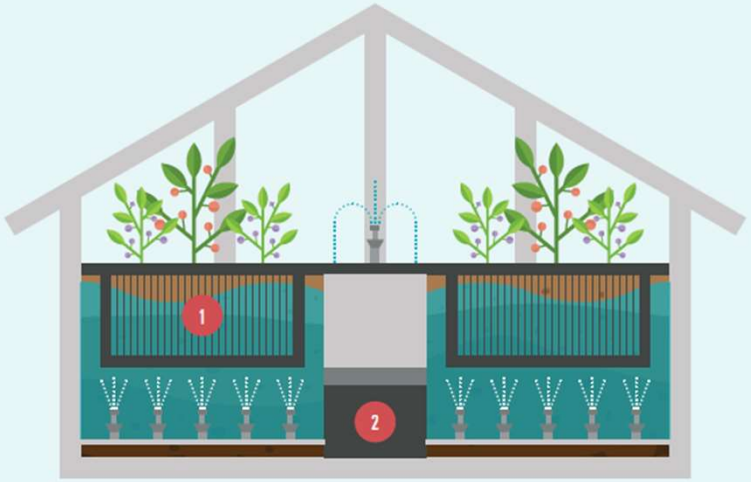
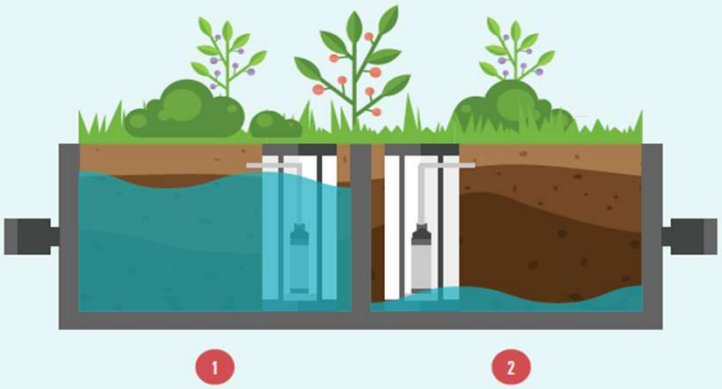
OTHER TECHNOLOGIES

TYPICAL HYDROPONIC TREATMENT SYSTEM



1. Select plant species grown hydroponically in aerated reactors will produce dense root mats up to four feet in depth. The fractal structure of the roots provides greater surface area than synthetic media for biofilm development.
2. Hydroponic reactors generally have greater biodiversity of microorganisms that graze on bacteria, resulting in reduced sludge volumes.

TYPICAL RECIPROCATING OR TIDAL FLOW WETLANDS TREATMENT SYSTEM



1. After primary treatment, wastewater is pumped into subsurface wetland cells that are alternately filled and drained multiple times per day. During the fill phase, biofilm communities on plant roots and aggregate consume nutrients in the wastewater.
2. During the drain phase, atmospheric oxygen passively fills the void area, helping to "turbocharge" the microbial processes. Plants play an important role by increasing nutrient removal, microbial diversity, and long term aggregate porosity.

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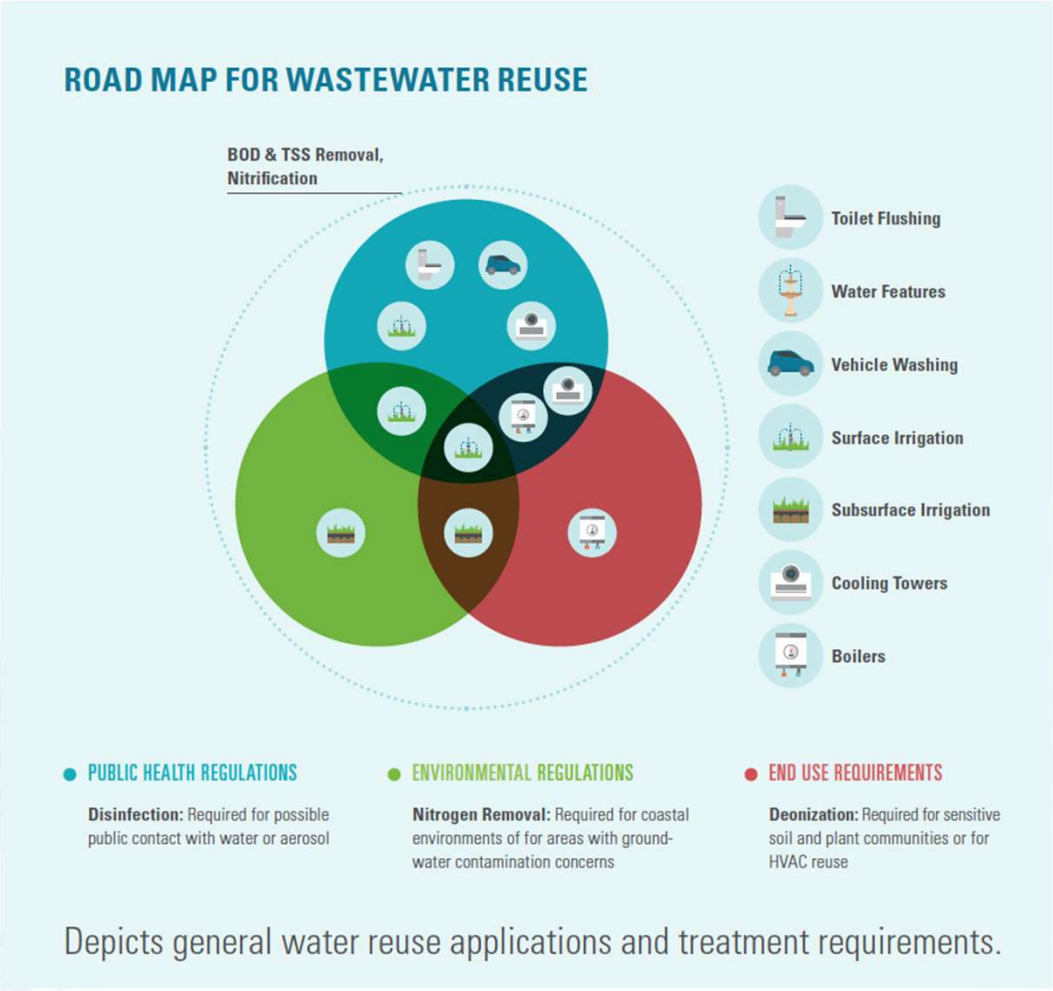
OPERATIONS & MAINTENCE



Water Reuse Operations

- Visual Inspection
- Water Quality Testing
- Servicing Instrumentation
- Replenishing Consumables
- Preventative Maintenance
- Emergency Maintenance

Equipment Replacement

- Filter/Membranes
- Mechanical Components

Waste Removal

- Fats, Oils, and Grease (FOG)
- Sludge

Know your Costs!

- Energy Use – Variable among system types
- Pumps
- Treatment
- Disinfection
- Monitoring Equipment

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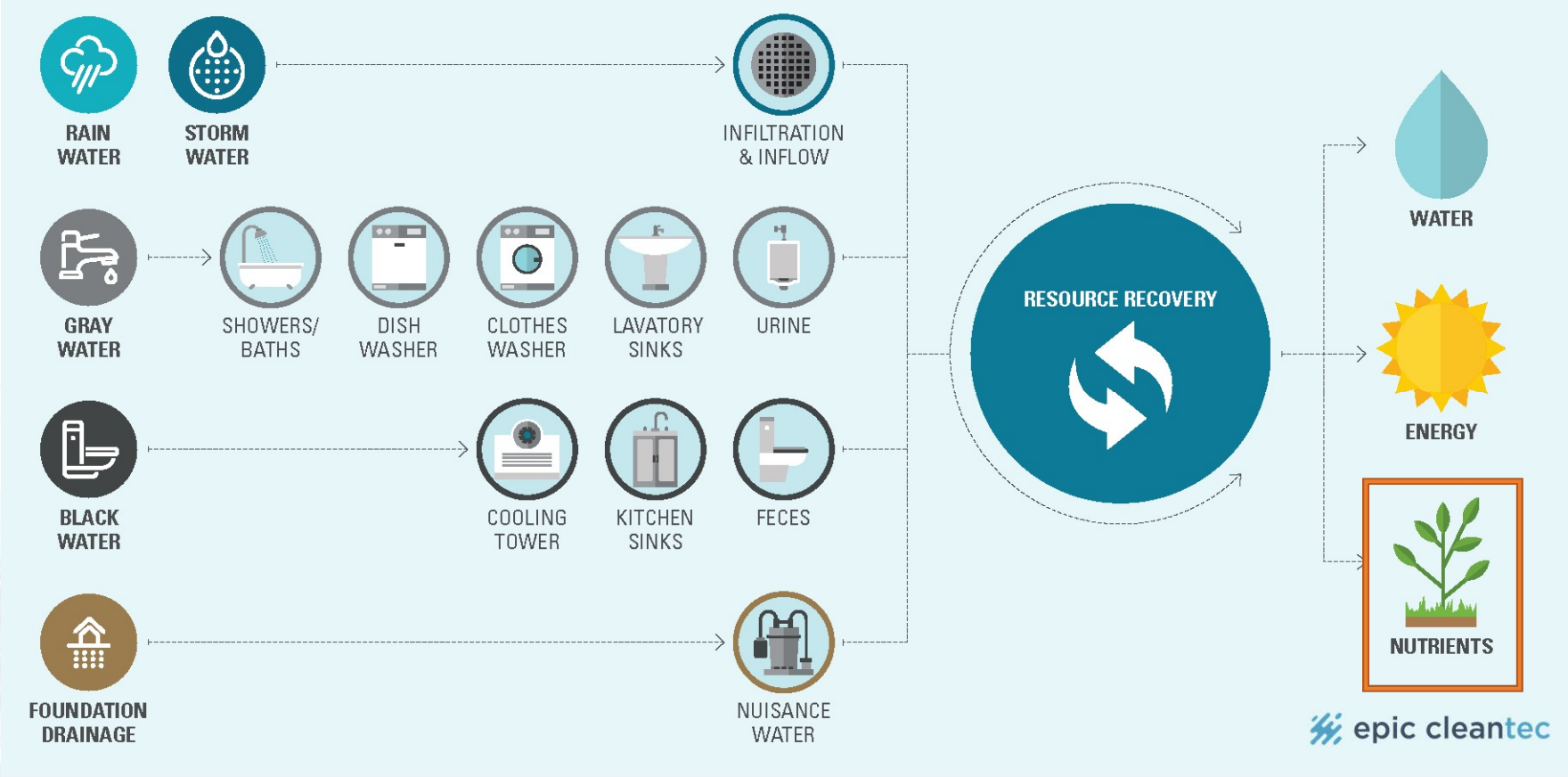
RESOURCE RECOVERY



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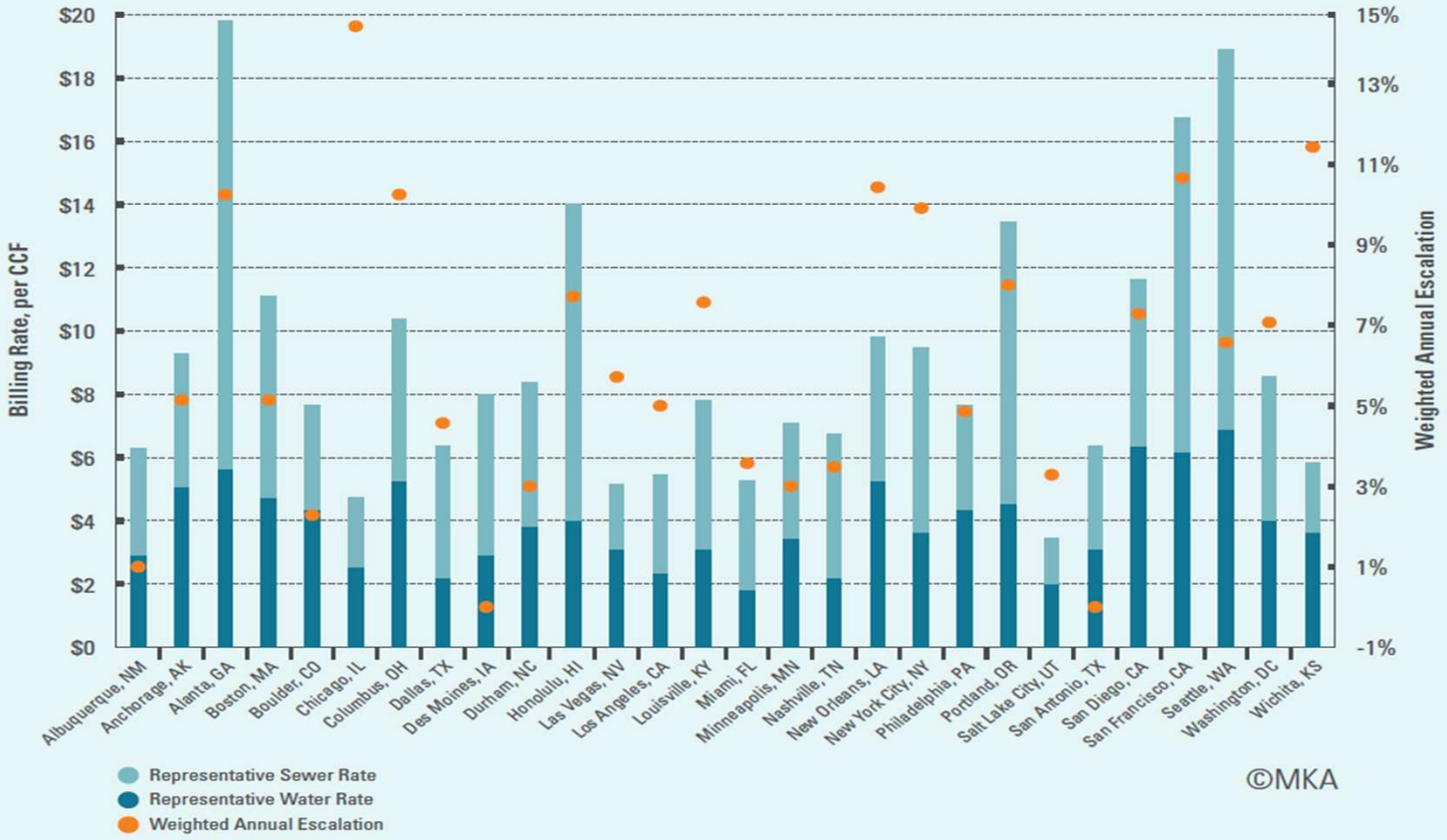
‘SHOW ME THE MONEY’

RESIDENTIAL COMBINED WATER/SEWAGE RATES AND ESCALATION (2014)



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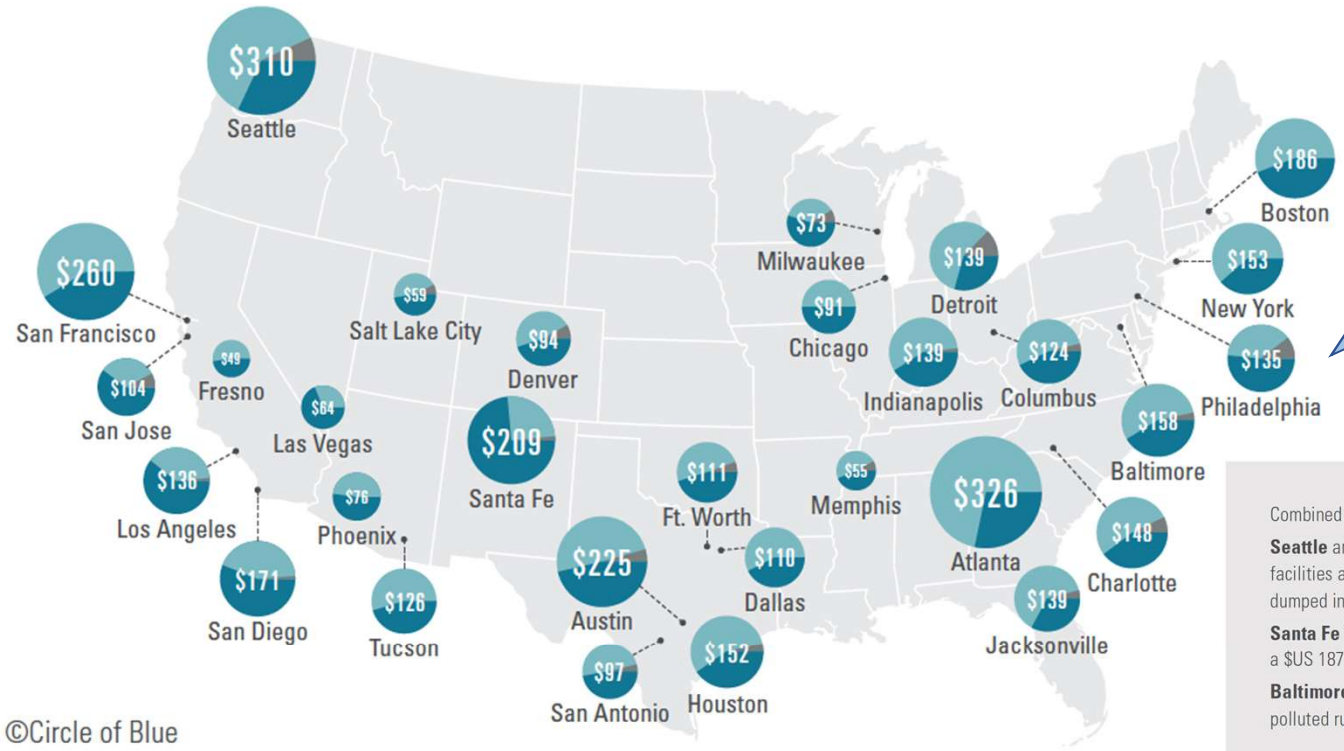
THE PRICE OF WATER (2015)



©Circle of Blue

Key Question: Does onsite water reuse make financial sense?

Combined water, sewer and stormwater prices for households in 30 major cities.

Seattle and **Atlanta** have the highest total monthly bills. Each is building costly underground storage facilities and treatment plants to comply with federal requirements to reduce raw sewage that is dumped into lakes and rivers.

Santa Fe has the highest water prices in the survey. The small city of 70,000 recently completed a $US 187 million pipeline from the Rio Grande.

Baltimore has stormwater fees that are mandated by state law as part of a program to keep polluted runoff from entering the Chesapeake Bay.

WATER prices for treating, pumping and delivering water, while sewer prices cover the cost of cleansing the water that goes down the drain.

SEWER prices are often higher that water prices because more energy and chemicals are required for treatment. Following the Clean Water Act, the federal government gave grants for new treatment plants during the 1970s and 1980s. Over the past three decades, however, new spending has been cut for local sewer infrastructure.

STORMWATER fees are not included in every city's monthly bill. Some cities use general tax revenues to pay for projects to reduce polluted runoff from streets and parking lots. However, these projects must then compete for funds with other departments like police and schools.

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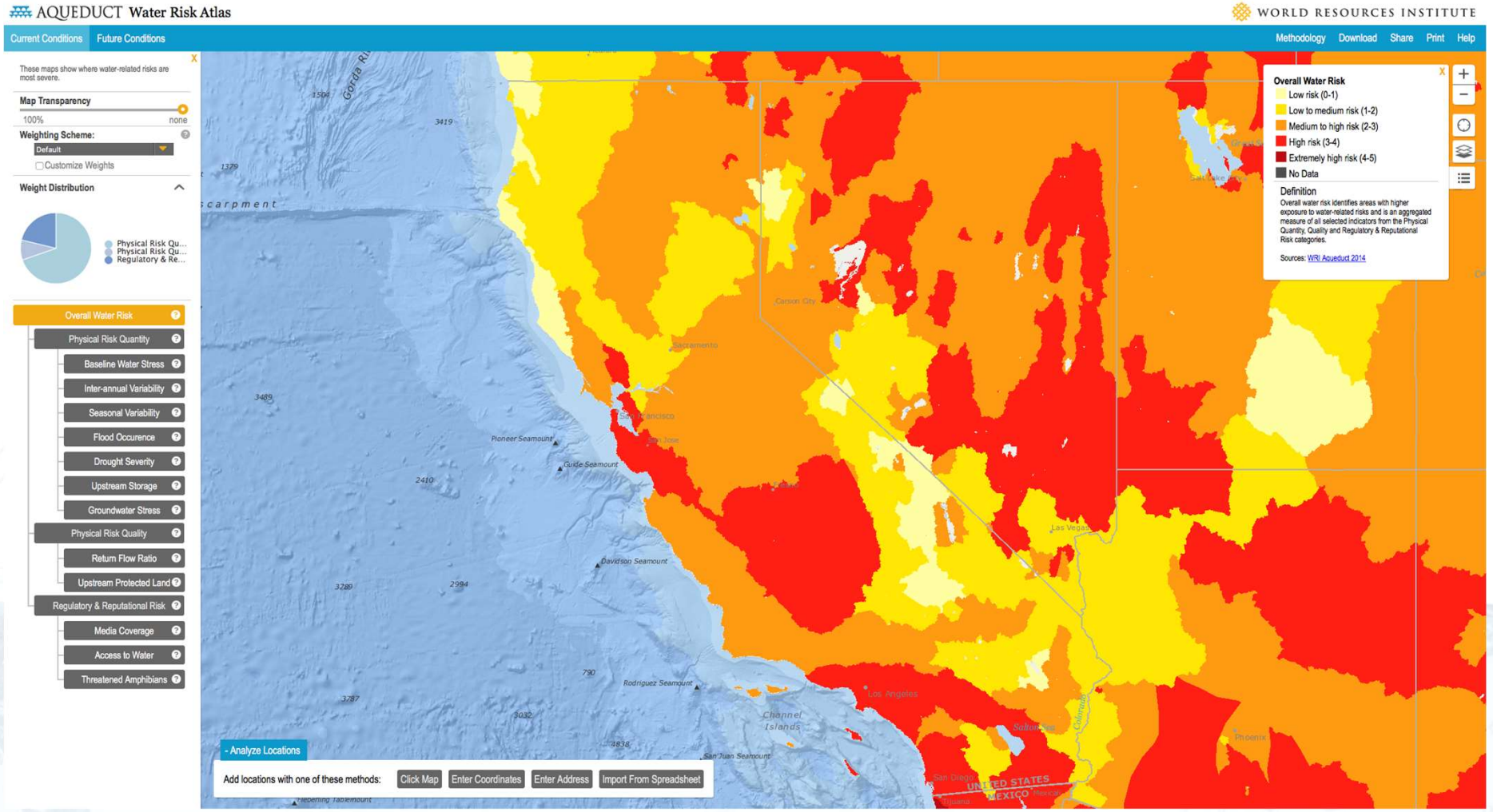

https://www.wri.org/our-work/project/aqueduct/

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DEVELOPMENT INCENTIVES

MUNICIPAL DEVELOPMENT INCENTIVES

Properly researching incentives and funding opportunities in your region can substantially inform you and your clients' decisions during the vetting process. Some development incentives offered in the marketplace include:

- **Chicago's Green Permit program expedites reviews for projects that meet certain LEED criteria**
- New Jersey adopted business tax credits and sales tax refunds as incentives to support reuse in industrial processes
- Seattle launched The Living Building Pilot Program to encourage innovative green buildings
- **Cincinnati offers financial grants and low-interest loans for innovative projects**
- City and Co of San Francisco offer capacity charge adjustments for new buildings installing onsite non-potable water systems to ensure projects are only charged for the demand placed on the municipal water and sewer systems. San Francisco also offers grants for onsite non-potable water projects that meet eligibility criteria (*heat recovery grant)
- **City of Santa Monica waives building permit fees for projects and properties that include water reuse systems**
- New York City charges discounted service rates for projects and properties that include water reuse systems
- (*new grant!)

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LEGISLATION

WATER REUSE LEGISLATION

California SB966 *passed Sept 2018!

Recognition that as onsite water treatment systems are being installed across CA, current water quality standards do not address ongoing oversight, management, and monitoring

SB966 directs the State Water Resources Control Board (SWRCB) to develop risk-based standards to assist local governments in developing oversight and management programs for onsite non-potable water systems

SWRCB will develop the framework in consultation with the California Building Standards Commission

Passage of SB966 will ensure that innovators can develop technologies to a single, clear standard and that local governments can permit onsite water reuse with the assurance that public health will be protected.

Senator Scott Wiener, 11th Senate District

Senate Bill 966 – Onsite Non-Potable Water System Standards

SUMMARY

Although increasing numbers of onsite water treatment systems are being installed across California for non-potable use, current water quality standards are limited and do not address ongoing oversight, management, and monitoring requirements to protect public health. Senate Bill 966 directs the State Water Resources Control Board (SWRCB) to develop risk-based standards to assist local governments in developing oversight and management programs for onsite non-potable water systems in commercial, mixed-use, and multi-family residential buildings.

BACKGROUND/EXISTING LAW

As water supplies become more strained and climate change persists, communities are looking for new ways to develop and manage local water supplies and increase resiliency. Through the Recycled Water Policy, SWRCB encourages communities to enhance water conservation, water reuse, and the use of stormwater. Onsite non-potable water systems collect non-potable source water such as graywater, rainwater, stormwater, and foundation drainage, and treat it so that it can be reused for non-potable purposes such as toilet flushing and irrigation.

Despite the many benefits that can be achieved by implementing onsite non-potable water systems, widespread adoption has been constrained due to institutional and regulatory barriers. Previous proposals, such as SB 918 (Pavley, 2010) and SB 322 (Hueso, 2013), have focused largely on developing regulations governing alternate drinking water sources. Nonetheless, exposure to pathogens in non-potable water can still pose health risks if not treated and monitored correctly.

PROBLEM

As water scarcity in California becomes an increasingly pressing issue, reuse of onsite water can relieve overburdened water districts and negate the need for costly piping and plant upgrades. Unfortunately, local governments generally lack the expertise to develop regulatory frameworks that allow for the use of treated alternate water sources. In particular, guidance is needed on setting appropriate performance criteria and developing structures to manage, monitor, and permit onsite systems.

SOLUTION

SB 966 directs SWRCB to develop risk-based water quality standards for use by local governments when regulating the treatment of alternate water sources. ("Risk-based" simply refers to standards that require levels of monitoring and protection proportional to the cleanliness of the water: for example, blackwater would be considered to have a higher risk of transmitting pathogens than graywater.) A recent report – *Risk-Based Framework for the Development of Public Health Guidance for Decentralized Non-Potable Water Systems* – lays the foundation for creating these standards. Should local governments decide to permit onsite non-potable water reuse facilities (which would be optional and ineligible for any state funding), attainment of the standards would be mandatory in all systems installed.

SWRCB will develop the framework in consultation with the California Building Standards Commission. Passage of SB 966 will ensure that innovators can develop technologies to a single, clear standard and that local governments can permit onsite water reuse with the assurance that public health will be protected.

STATUS

- Pending referral

SUPPORT

- San Francisco Public Utilities Commission (Sponsor)
- U.S. Green Building Council
- WateReuse California

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"The best way to predict the future is to design it."

—

Buckminster Fuller

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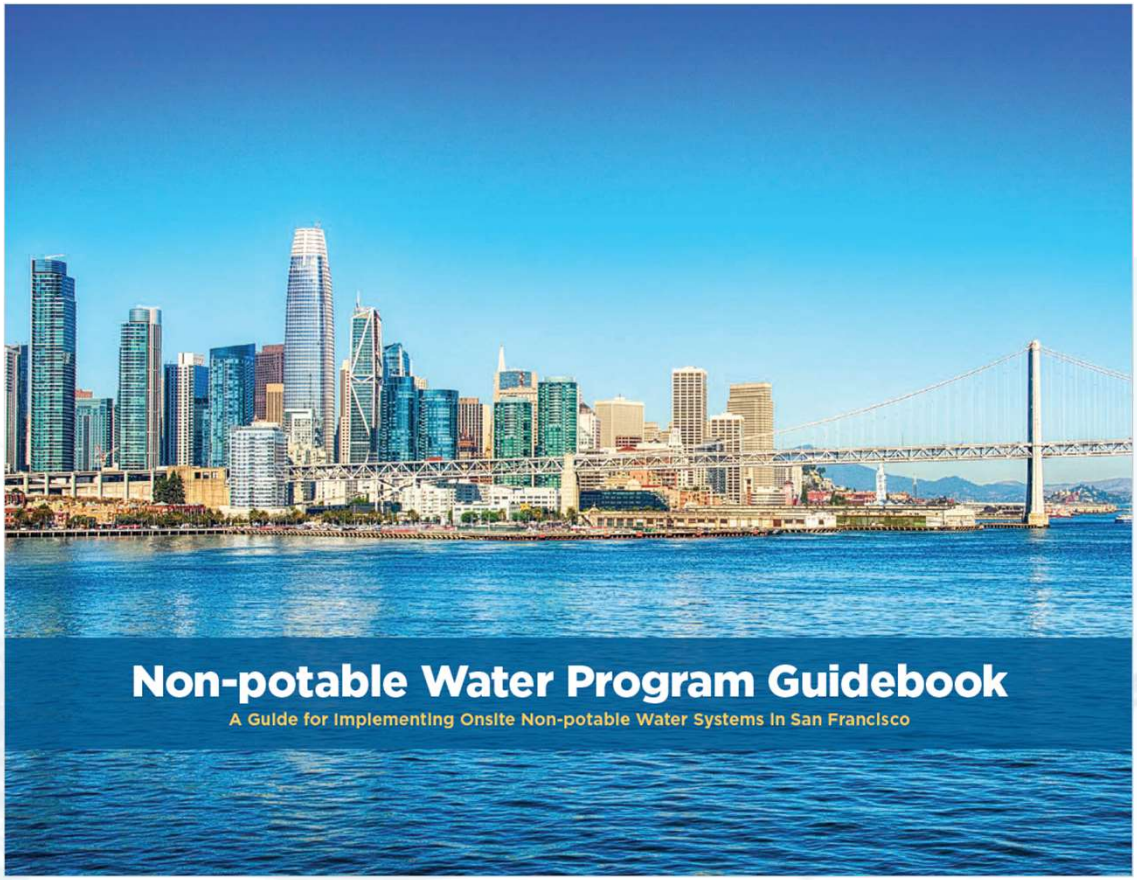
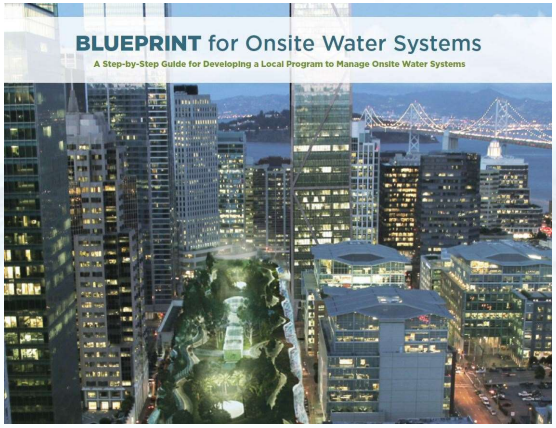
RESOURCES



San Francisco Water Power Sewer

Services of the San Francisco Public Utilities Commission

SFWATER.ORG/NP



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RESOURCES

FREE DOWNLOAD – COLLABORATIVEDESIGN.ORG

THE Water Research FOUNDATION

WERF.ORG

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DESIGN PROFESSIONAL'S GUIDE TO

DECARBONIZATION OF THE BUILT ENVIRONMENT

PRIMARY AUDIENCE

Architects, designers and industry professionals practicing in the U.S., with a specific focus on States and Municipalities with established emissions reduction and carbon neutrality goals.

SECONDARY AUDIENCE

Engineers, building owners and property managers, code officials, contractors, students and professors of architecture, and policy makers.

EARLY FUNDING COMMITMENTS FROM:

Google

CHARLES PANKOW FOUNDATION
Building Innovation through Research

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CRESCENT HEIGHTS
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THANK YOU!

KYLE PICKETT, MSOD
Co-Founder & COO, Urban Fabrick, Inc.
Co-Founder & Executive Director, The William J. Worthen Foundation

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