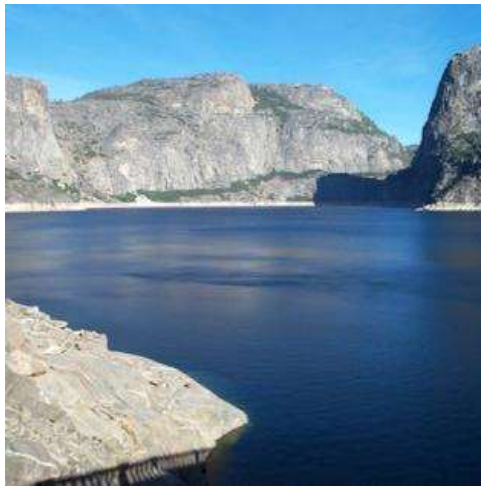
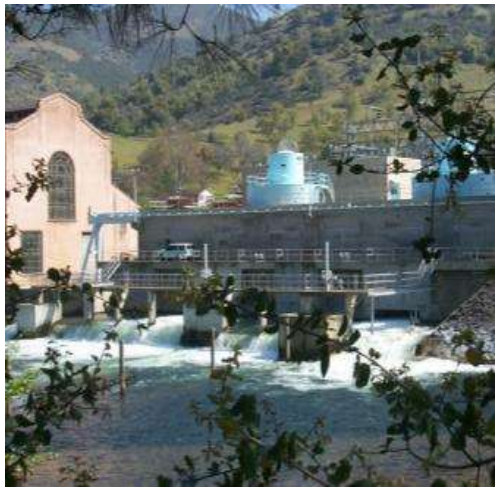
ADVANCING ONSITE WATER REUSE IN SAN FRANCISCO AND ACROSS THE US

Paula Kehoe
Director of Water Resources
San Francisco Public Utilities Commission
July 30, 2019

San Francisco Public Utilities Commission



Water: delivering high quality water every day to 2.7 million people



Power: generating hydropower and solar power

Wastewater: protecting public health and the environment

Moving Away from a Linear to an One Water Approach

San Francisco's Local Water Program

HETCH HETCHY
+ LOCAL WATER
Better together.

Conservation
Groundwater
Recycled Water
Onsite Water Reuse
Innovations Program

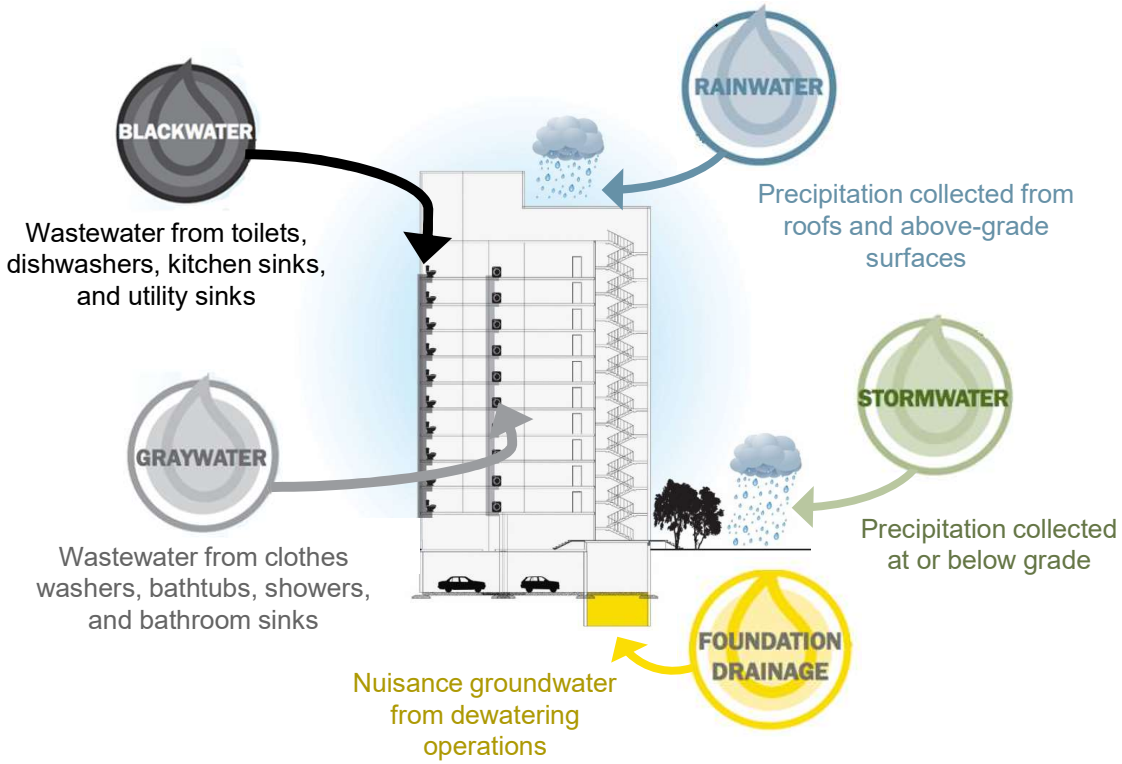
San Francisco knows the importance of diversifying our water portfolio…
To ensure reliability—particularly in the age of climate change—we need
to use every water resource available.

Harlan L. Kelly, Jr., SFPUC General Manager

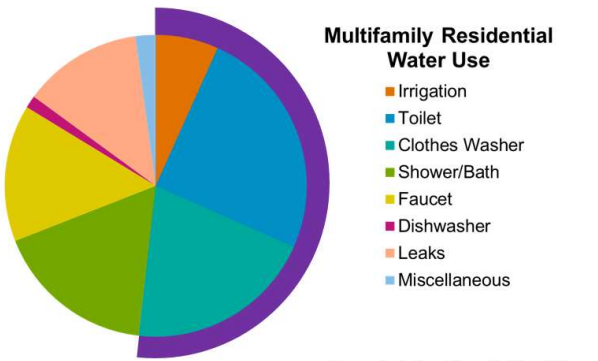
Opportunity to Re-think Building Design & Re-imagine How We Use Water

Source: San Francisco Public Utilities Commission

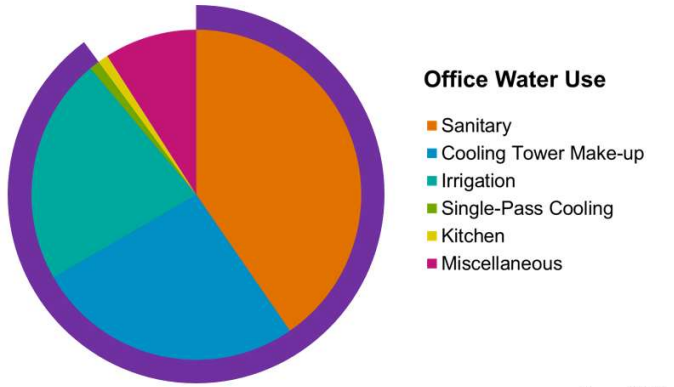
Adapt and Integrate our Water System with Onsite Water Systems



Opportunity to Match Right Resource to the Right Use

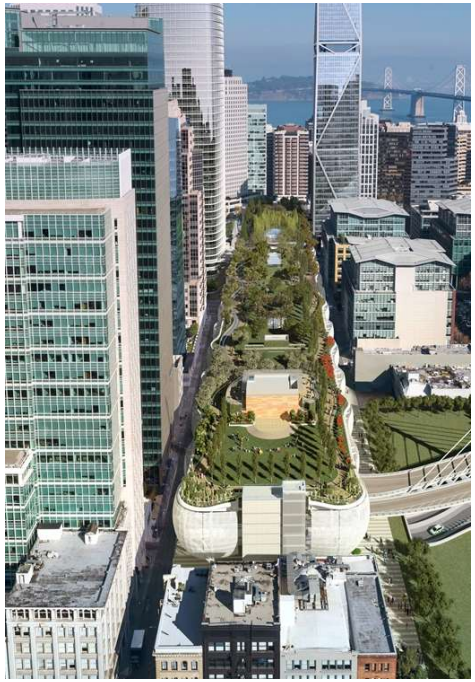


Source: adapted from Alliance for Water Efficiency



Source: USEPA

Meeting the Needs of the Private Sector Interest for Onsite Reuse

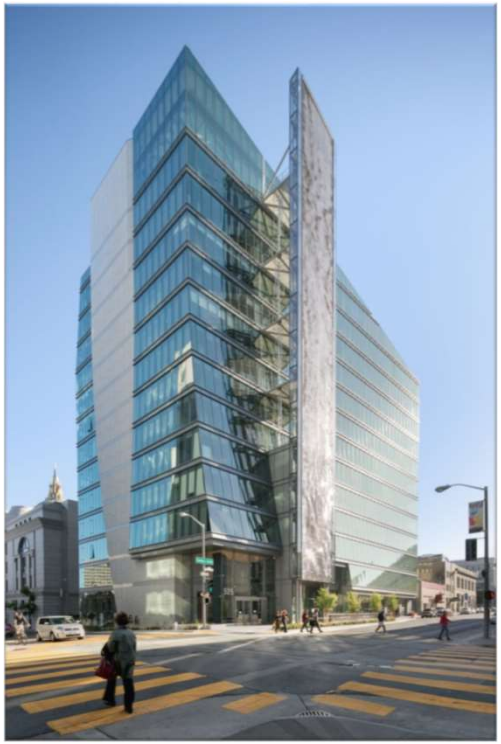


"Onsite water reuse systems create opportunities to significantly enhance the performance of a building."

Brendan Owens, US Green Building Council

Source: Transbay Joint Powers Authority [TJPA] and Project Architect: Pelli Clarke Pelli

SFPUC Pioneer New Ways to Treat and Reuse Water in San Francisco



Source: San Francisco Public Utilities Commission

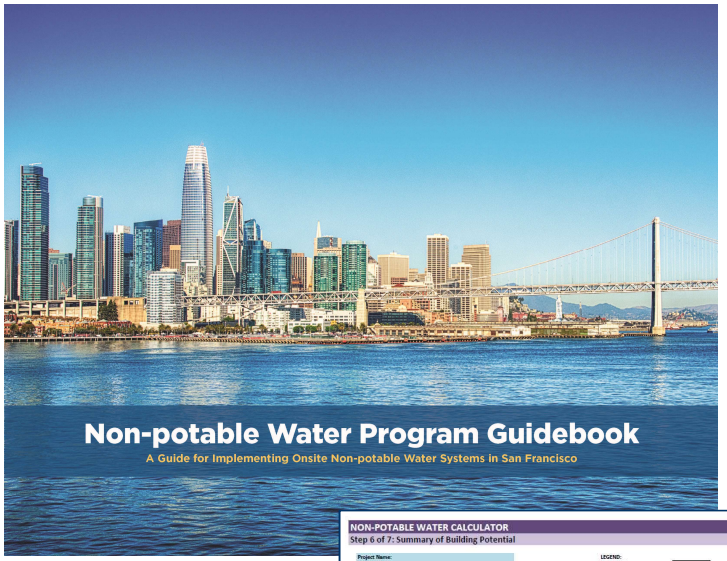
Barriers to Scaling Up Decentralized Water Systems: Water Quality & Oversight

Source: Forbes.com

San Francisco's Non-potable Ordinance

SFPUC	SFDPH	SFDBI	SFPW
Program Administration	Environmental Health	Construction	Right of Way and Mapping
Review onsite non-potable water supplies & demands Administer citywide project tracking & annual potable offset achieved Provide technical support & outreach to developers Provide financial incentives to developers	Issue water quality & monitoring requirements Review and approve non-potable engineering report Issue permit to operate onsite systems Review water quality reporting Cross Connection	Conduct Plumbing Plan check and issue Plumbing Permit Inspect and approve system installations	Issue Encroachment Permits as needed for infrastructure in the Right-of-Way (if needed) Includes condition on a subdivision map or a parcel map requiring compliance with the Non-potable Ordinance prior to approval and issuance of said map (if applicable)

SFPUC Technical and Financial Assistance



NON-POTABLE WATER CALCULATOR

Step 6 of 7: Summary of Building Potential

Project Name:
ABC Building

Instructions:
An accounting of total demand and onsite supplies for the project are summarized below.
No user input is needed for this step.

LEGEND:
User Input
Linked from User Input
Default Value
Autogenerated Value

A. TOTAL DEMAND (No user input needed - auto-calculated)

Demand Types	Ave Daily Water Demand (gpd)	Annual Water Demand (gpy)	Average Monthly Demand (gpd/unit): January	February	March	April	May	June	July	August	September	October	November	December
DOMESTIC FIXTURES - Commercial														
Showerhead	13	4,745	395	395	395	395	395	395	395	395	395	395	395	395
Lavatory Faucet	120	43,800	3,650	3,650	3,650	3,650	3,650	3,650	3,650	3,650	3,650	3,650	3,650	3,650
Urinals	174	63,510	5,293	5,293	5,293	5,293	5,293	5,293	5,293	5,293	5,293	5,293	5,293	5,293
Toilet (Water Closet)	191	525,171	27,066	27,066	27,066	27,066	27,066	27,066	27,066	27,066	27,066	27,066	27,066	27,066
Kitchen Faucet	180	65,700	5,475	5,475	5,475	5,475	5,475	5,475	5,475	5,475	5,475	5,475	5,475	5,475
Low Flow Sprayer - Restaurants	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SUBTOTAL	1,378	503,006	42,000	42,000	42,000	42,000	42,000	42,000	42,000	42,000	42,000	42,000	42,000	42,000
DOMESTIC FIXTURES - Multi-Family Residential														
Showerhead	2,143	782,071	65,173	65,173	65,173	65,173	65,173	65,173	65,173	65,173	65,173	65,173	65,173	65,173
Bathroom Faucet	582	165,062	11,922	11,922	11,922	11,922	11,922	11,922	11,922	11,922	11,922	11,922	11,922	11,922
Bath	503	185,413	15,264	15,264	15,264	15,264	15,264	15,264	15,264	15,264	15,264	15,264	15,264	15,264
Washing Machine	2,299	839,222	69,935	69,935	69,935	69,935	69,935	69,935	69,935	69,935	69,935	69,935	69,935	69,935
Toilet (Water Closet)	1,222	446,059	37,172	37,172	37,172	37,172	37,172	37,172	37,172	37,172	37,172	37,172	37,172	37,172
Kitchen Faucet	2,629	1,032,686	86,057	86,057	86,057	86,057	86,057	86,057	86,057	86,057	86,057	86,057	86,057	86,057
Dishwasher	90	32,721	2,727	2,727	2,727	2,727	2,727	2,727	2,727	2,727	2,727	2,727	2,727	2,727
SUBTOTAL	9,477	3,474,300	289,300	289,300	289,300	289,300	289,300	289,300	289,300	289,300	289,300	289,300	289,300	289,300
HVAC/COOLING														
Conventional Cooling	1,957	714,775	43,821	48,481	55,045	55,979	61,290	64,418	67,319	69,580	72,727	72,729	59,922	46,486
SUBTOTAL	1,957	714,800	43,900	48,500	55,100	56,000	61,300	64,500	67,400	69,600	72,800	72,800	59,900	46,500
OTHER INDOOR DEMANDS THAT CAN BE MET WITH NON-POTABLE SUPPLIES														
Indoor Decorative Water Feature	100	25,000	2,083	2,083	2,083	2,083	2,083	2,083	2,083	2,083	2,083	2,083	2,083	2,083
Commercial Laundry	34	1,768	147	147	147	147	147	147	147	147	147	147	147	147
<Please specify here>	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SUBTOTAL	134	26,800	2,300	2,300	2,300	2,300	2,300	2,300	2,300	2,300	2,300	2,300	2,300	2,300
OUTDOOR DEMANDS														
Landscape Irrigation	N/A	106,727	0	0	0	0	13,999	25,093	27,023	24,817	14,995	0	0	0
Decorative Water Feature	100	25,000	2,083	2,083	2,083	2,083	2,083	2,083	2,083	2,083	2,083	2,083	2,083	2,083
<Please specify here>	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SUBTOTAL	100	131,800	2,100	2,100	2,100	2,100	16,100	27,200	30,000	27,000	17,100	2,100	2,100	2,100
GRAND TOTAL	13,047	4,855,700	379,600	381,200	389,800	390,700	410,000	424,300	430,000	429,200	423,500	407,000	395,700	381,200

Grant Assistance for Large Alternate Water Source Projects

Grant Assistance for Large Alternate Water Source Projects

Grant Guidelines and Terms

San Francisco Water Power Sewer
Services of the San Francisco Public Utilities Commission

Grant Assistance Overview

The SFPUC's Grant Assistance for Alternate Water Source Projects (Grant Assistance) is a program designed to encourage retail water users to implement the on-site treatment and use of non-potable water including but not limited to rainwater, stormwater, graywater, foundation drainage, and blackwater. The goal is to maximize the use of nonpotable water for toilet flushing, irrigation, and other non-potable uses. The SFPUC has approximately $1,000,000 in funding available for two types of non-potable water projects:
1) district-scale projects that consist of two or more parcels that share treated alternate water sources *or*
2) building-scale projects that include any residential or non-residential building of at least 100,000 square feet or more. Grants will be awarded to those applicants who demonstrate they will significantly and permanently reduce or offset the use of existing drinking water supplies for non-potable applications.

Types of activities considered for funding include the installation of harvesting or collection systems for on-site sources, treatment systems to improve the water quality of on-site sources for beneficial reuse, and/or storage of the treated water. The SFPUC anticipates funding multiple projects. The deadline for applications for Calendar Year 2014 is December 31, 2014. Provision of grant funding is based on the eligibility of the proposed activity and availability of funds. Each application will be reviewed and evaluated on a case-by-case basis. Grant funding is available on a first come, first serve basis and is limited to $250,000 per on-site project and $500,000 per district-scale project. Projects that meet the Grant eligibility criteria for District-scale Grant Assistance may not apply for Building-scale Grant Assistance.

Grant assistance will support customer efforts to implement sustainable water use practices in San Francisco. In addition to advancing water supply reliability, this grant assistance will support the SFPUC's Phased Water System Improvement Program Variant (WSIP) goals adopted by Resolution No. 08-200 on October 30, 2008. The WSIP included a goal of developing an additional 10 million gallons per day (mgd) of locally available water resources.

Definitions

Terms used in this grant application package have the meanings described below:

Alternate Water Source – Non-potable source of water that includes graywater, rainwater, stormwater, foundation drainage, and blackwater. The level of treatment and quality of the alternate water source shall be approved by the City's Department of Public Health and comply with all applicable federal, state, and local regulations.

Applicant – property owner that is a retail water customer of the SFPUC, proposing the installation of a building-scale or district-scale treatment system on their property, and is seeking grant funds from the SFPUC for an alternate water source project, pursuant to the instructions and guidelines set forth in this application package.

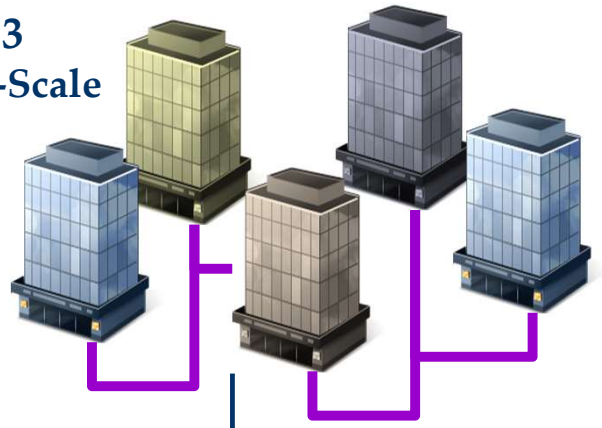
Award – the decision by the SFPUC to provide grant funds, following the review and evaluation of a completed application. An award is made through a Grant agreement.

Blackwater – wastewater containing bodily or other biological wastes, as from toilets, dishwashers, kitchen sinks and utility sinks. Because of plumbing configurations, blackwater leaving a building generally includes graywater.

An Evolving Program: Scale & Requirements

2012
Single Building

2013
District-Scale



2015
Mandatory for projects ≥ 250,000 sf

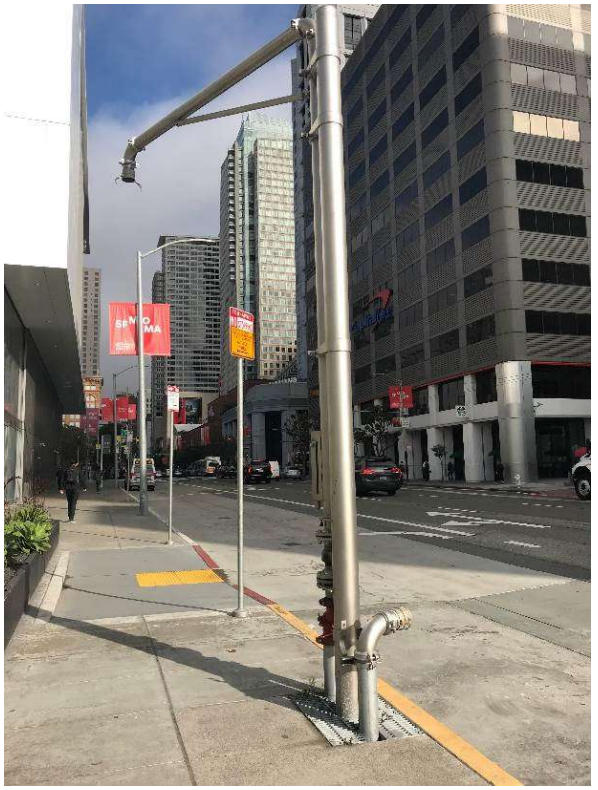
181 Freemont

Graywater and rainwater for toilet flushing and irrigation- 1.4 million gallons potable offset

Source: Aquacell and Jay Paul Company and Heller Manus Architects

Moscone Convention Center

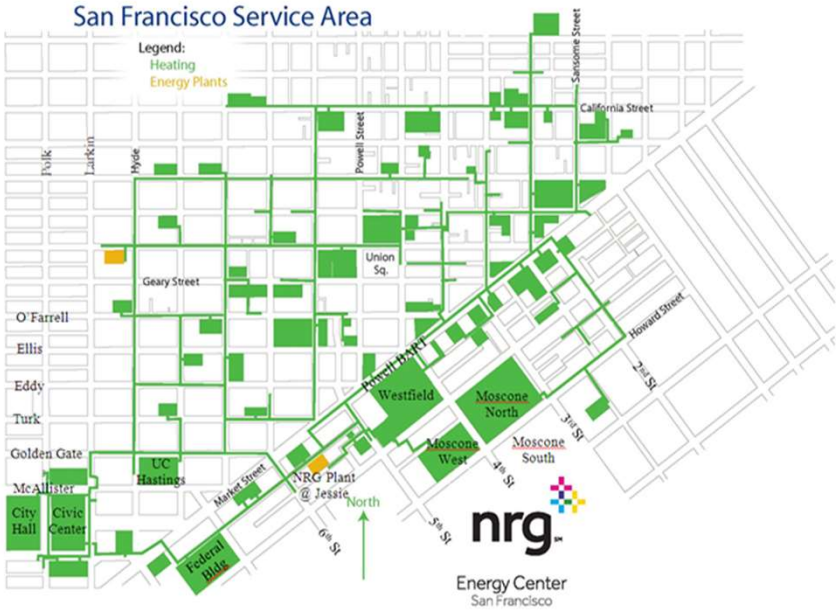
Foundation drainage for flushing irrigation, street cleaning-
5 million gallons potable water offset



Source: Skidmore, Ownings & Merrill LLP with Mark Cavagnero Associates

Energy Center

Foundation Drainage for underground steam loop- 25+ million gallons potable water offset



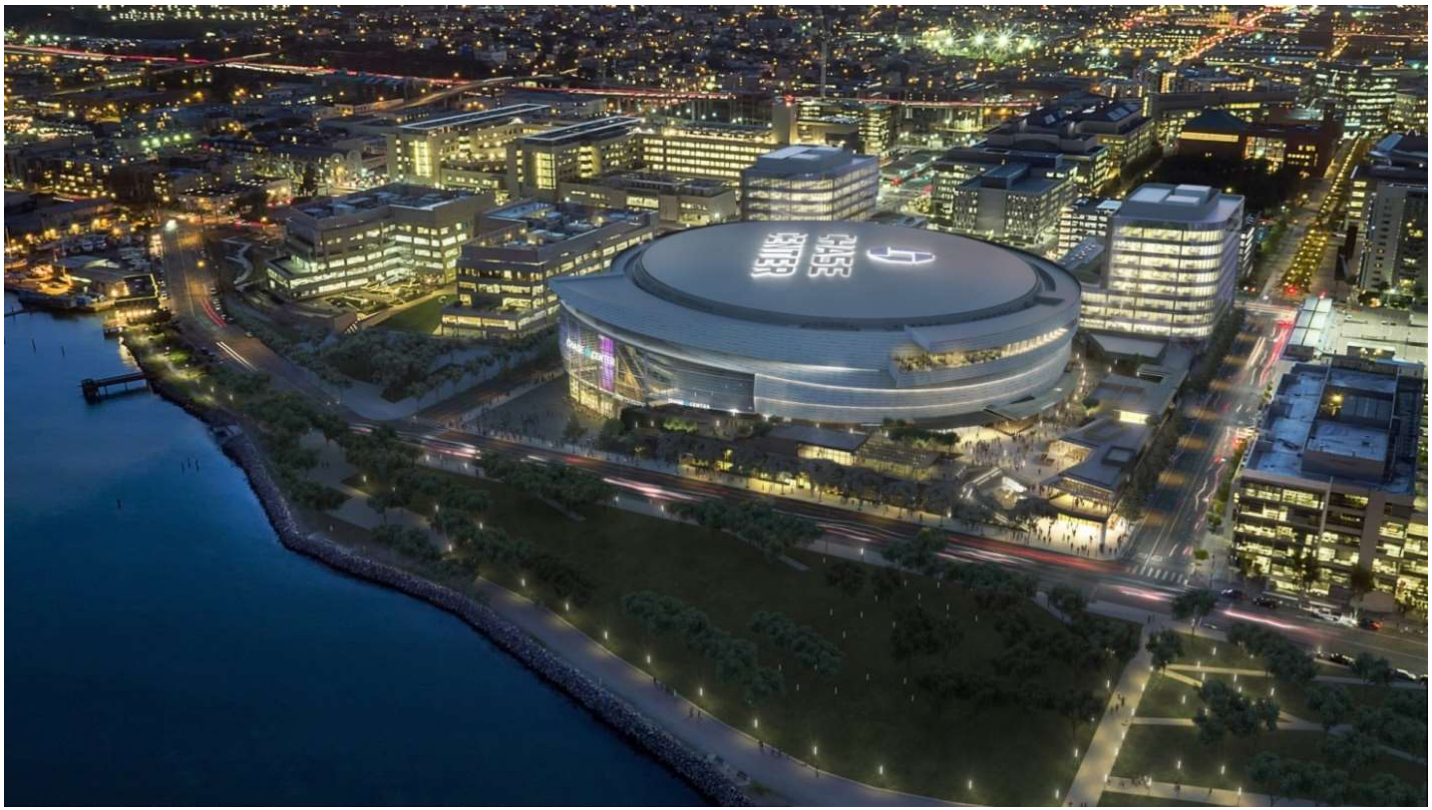
Salesforce Tower

Blackwater for toilet flushing, cooling and irrigation- 7.8 million gallons potable offset

Source: Aquacell

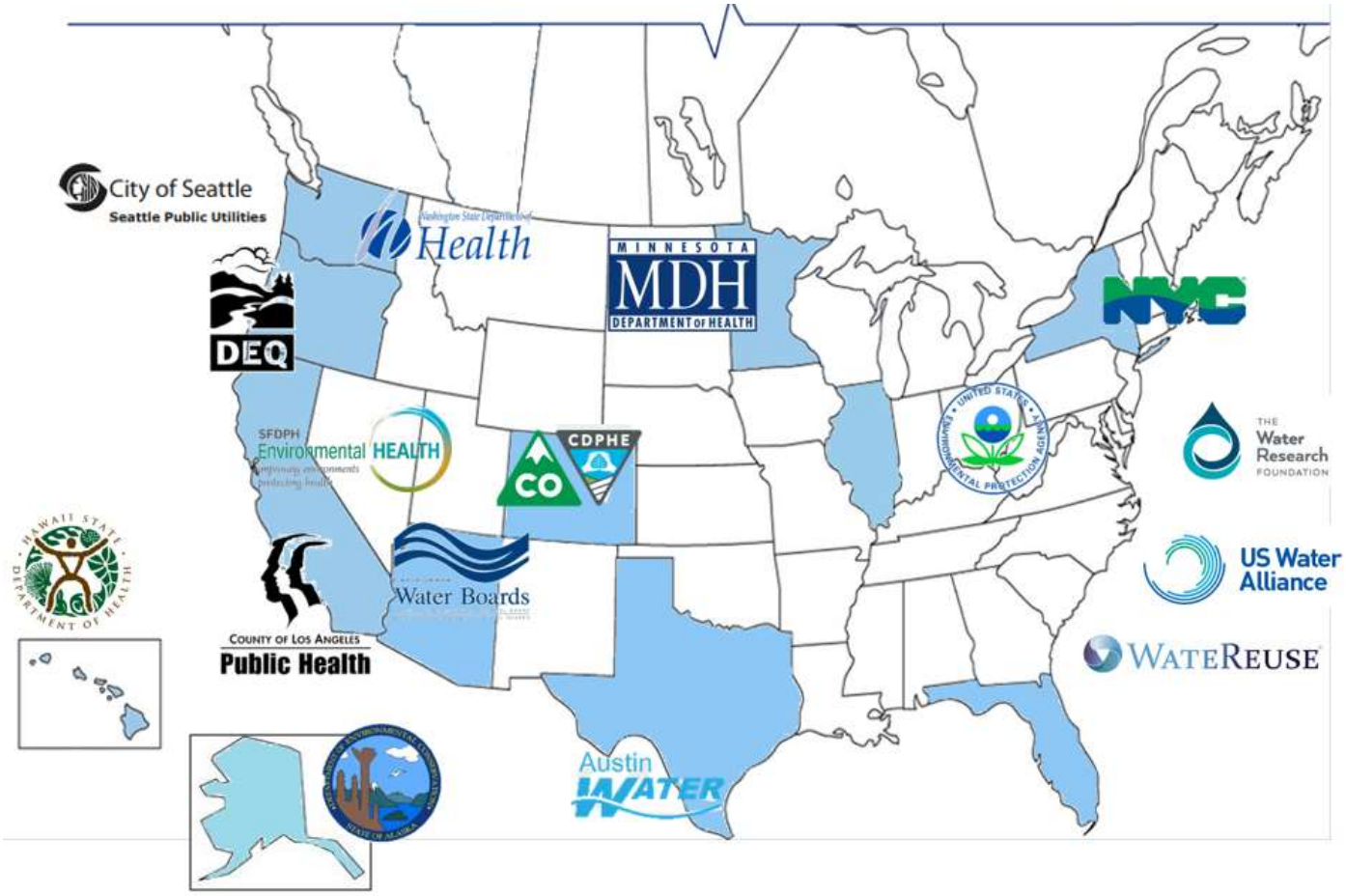
Chase Center

Rainwater, stormwater, graywater and condensate for flushing and irrigation- 55% potable water offset



Source: Golden State Warriors

Collaborating on a National Level



Addressing Barriers: *Governance*

Developing a local program to manage onsite water systems offers a proactive way to increase water resiliency and promote green building practices while protecting public health. The development of a program should follow a sequence of steps and associated actions, which will inform critical decisions regarding the scope, structure, and implementation of the program.

1 **Convene a Working Group**
Establish a small working group to guide the development of the local program.

2 **Select the Types of Alternate Water Sources**
Narrow the specific types of alternate water sources covered in the program.

3 **Identify End Uses**
Classify specific non-potable end uses for your program.

4 **Establish Water Quality Standards**
Establish water quality standards for each alternate water source and/or end use.

5 **Identify and Supplement Local Building Practices**
Integrate your program into local construction requirements and building permit processes.

6 **Establish Monitoring and Reporting Requirements**
Establish water quality monitoring and reporting requirements for ongoing operations.

7 **Prepare an Operating Permit Process**
Establish the permit process for initial and ongoing operations for onsite water systems.

8 **Implement Guidelines and the Program**
Publicize the program to provide clear direction for project sponsors and developers.

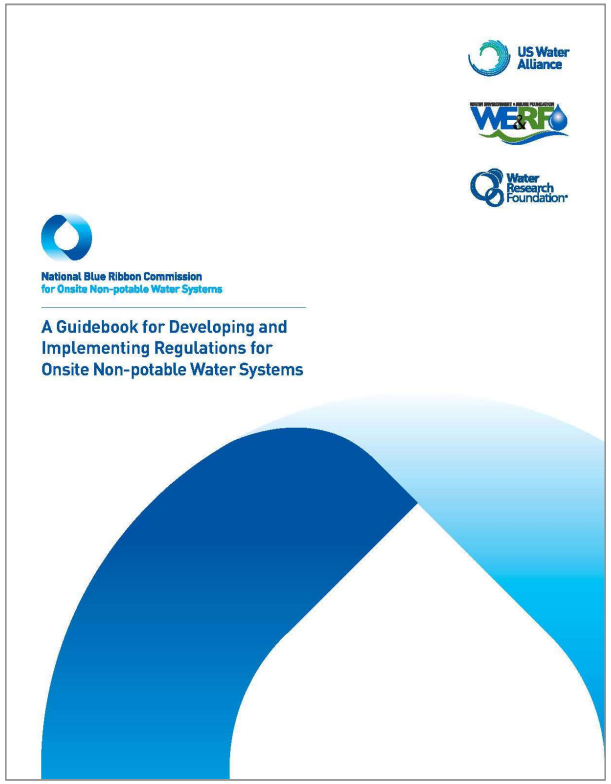
9 **Evaluate the Program**
Promote best practices for onsite water systems.

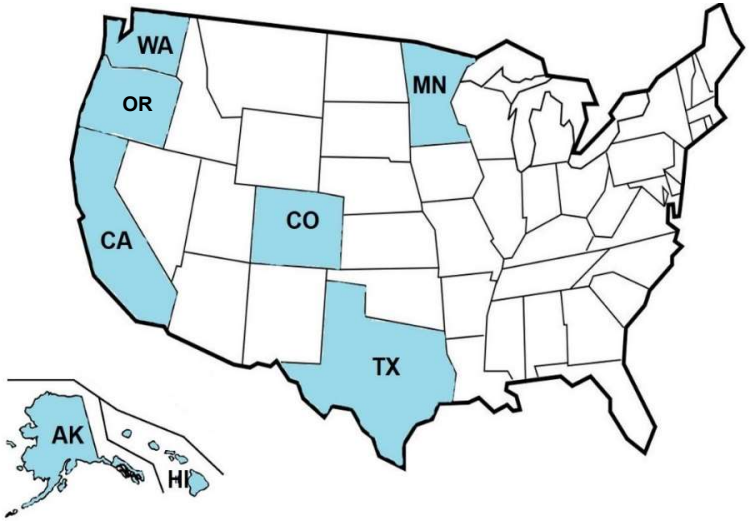
10 **Grow the Program**
Explore opportunities to expand and encourage onsite water systems.

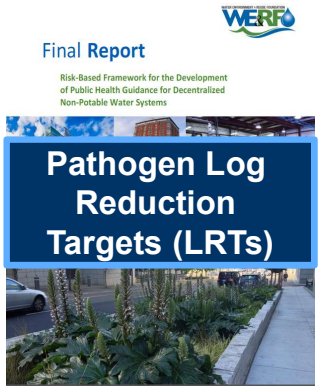
Source: San Francisco Public Utilities Commission

Risk-Based Framework for Public Health Guidance

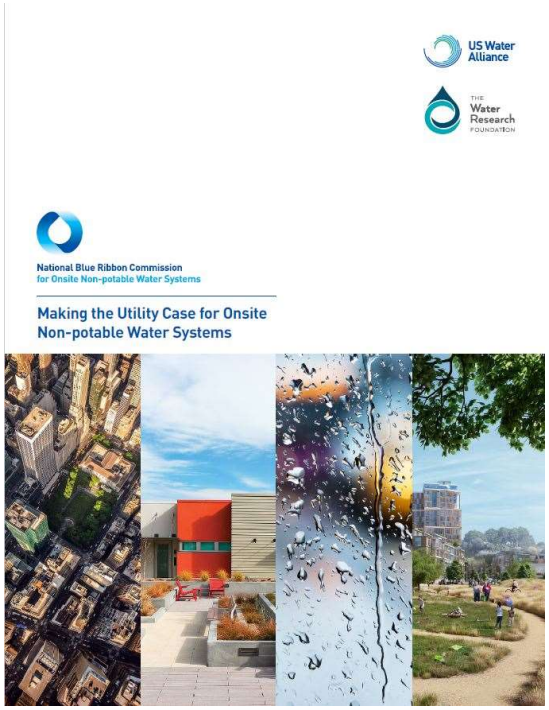
Model Legislation for Consistency across US







Addressing Utility Considerations



Source: San Francisco Public Utilities Commission; Jim G. Maloney/Biohabitats, Inc; City of Santa Monica

Utilities Incorporating Onsite Water Systems

SAN FRANCISCO

Mandatory for new development over 250,000 sq ft

DENVER WATER

Blackwater system at new admin building

AUSTIN WATER

10 mgd from decentralized systems by 2040

SANTA MONICA

Downtown stormwater, groundwater, wastewater reuse by 2020

NEW YORK CITY

Battery Park operating decentralized system since 2003;
Grant program for onsite systems

ANAHEIM

Operating blackwater system for irrigation around City Hall and toilet flushing in Anaheim West Tower

Training Manual for Engineers, Operators, Utilities and Regulators

Source: Water Research Foundation

Beginning of Our Journey & Share Lessons Learned

Source: San Francisco Public Utilities Commission

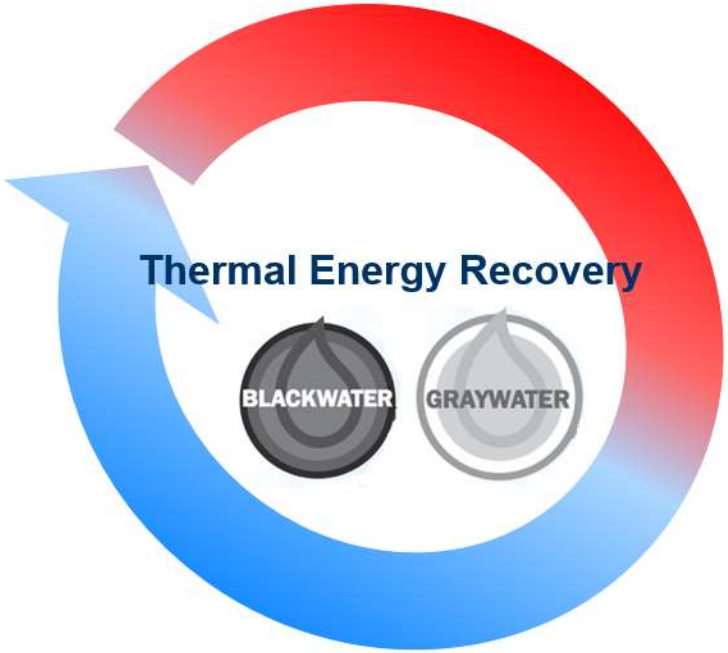
SFPUC Key Lessons Learned

- Water and sewer connections
- Hydraulic analysis for wastewater flows and odors
- Backflow protection requirements & cross connection test prior to operation
- Operator capacity
- Interagency collaboration and requires dedicated staff for oversight and management
- Adapt to an evolving industry (technology, science and regulations)

Atmospheric Water Generation Technologies

Source: Zero Mass Water and FogQuest

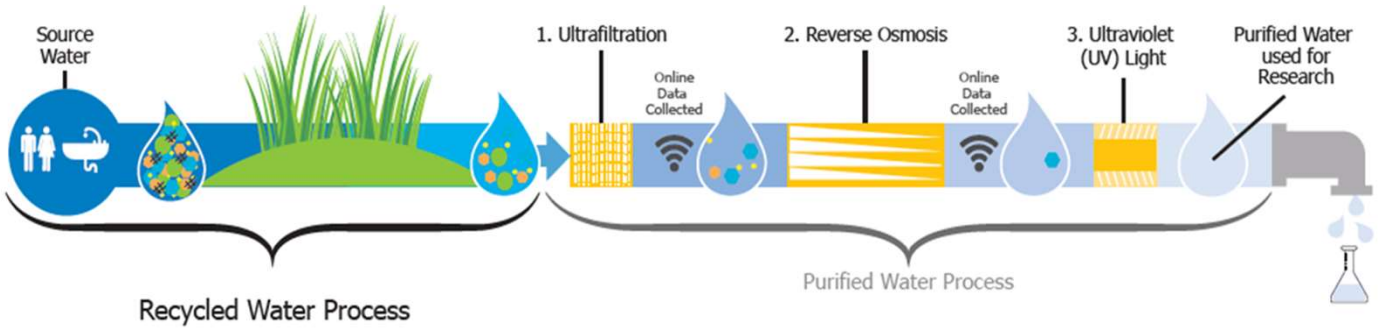
Heat Exchangers & Onsite Water Systems



SFPUC Program for Breweries to Treat and Reuse Process Water

Source: Water & Wastes Digest, 2018

SF Piloting Decentralized Purified Water



Source: San Francisco Public Utilities Commission

Opportunities to Adapt Our Water Systems and Engage the Public

Source: Golden State Warriors; San Francisco Public Utilities Commission

THANK YOU

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www.sfwater.org/np