

Onsite Water Reuse Transforming Water Management in San Francisco

Taylor Chang
Water Resources Analyst
San Francisco Public Utilities Commission
November 14, 2019



San Francisco Public Utilities Commission



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

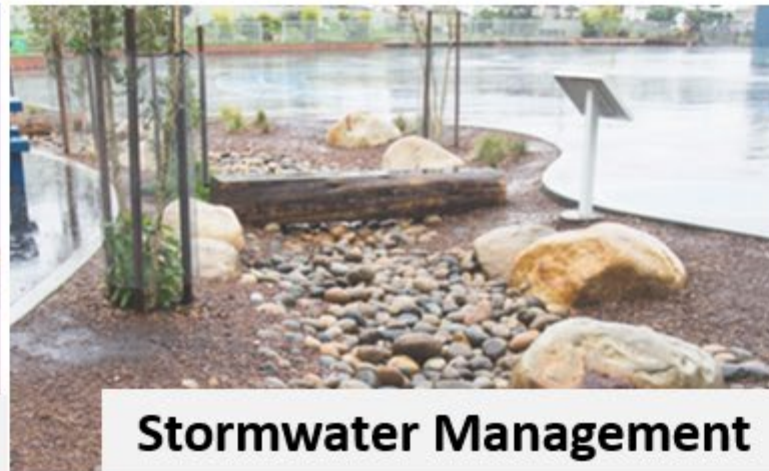


Wastewater: protecting
public health and the
environment



Power: generating clean
energy for vital City
services

Challenges to Reliable Water Delivery & Sanitation Services



HETCH HETCHY + LOCAL WATER

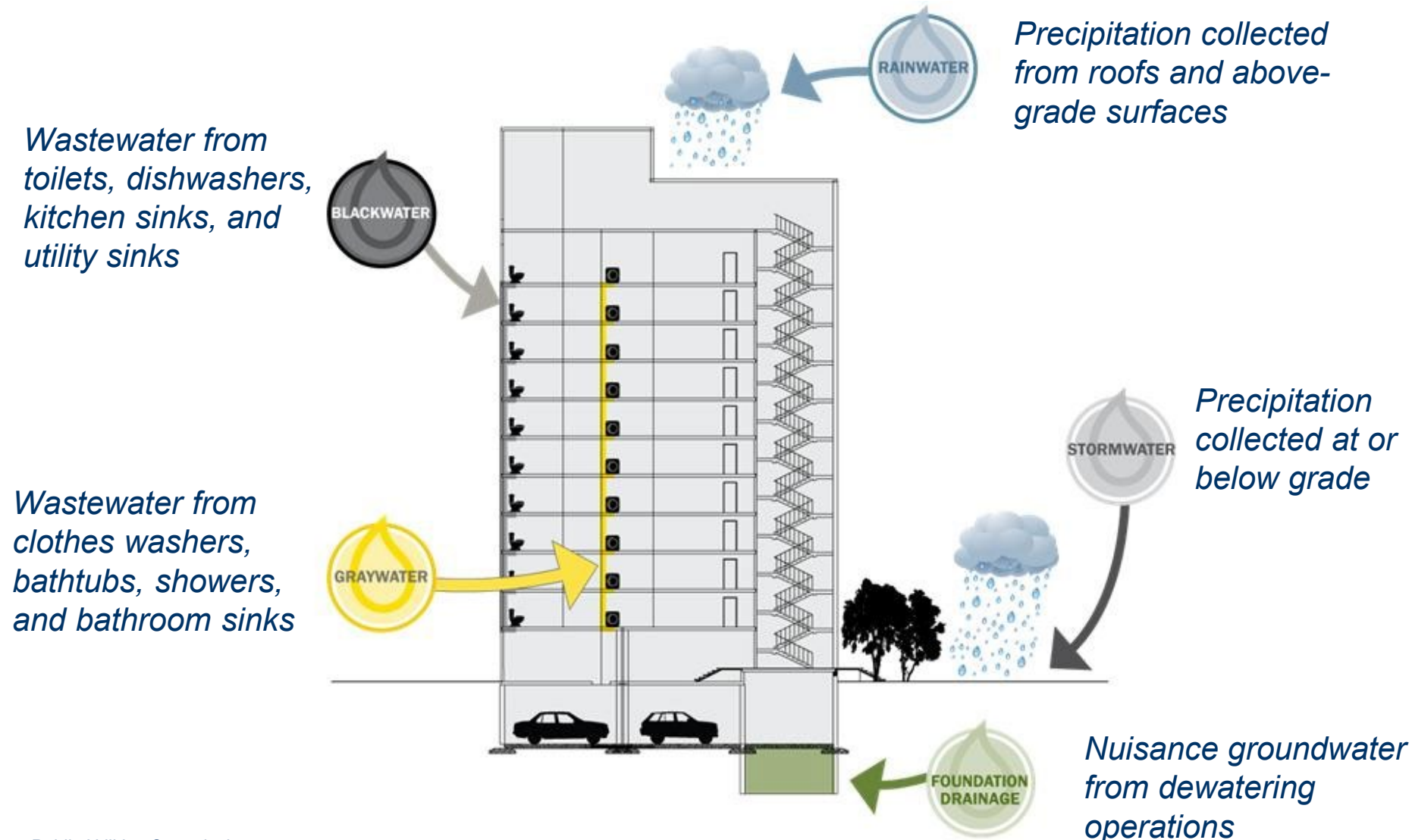
Better together.

- Conservation
- Groundwater
- Recycled Water
- Onsite Water Reuse

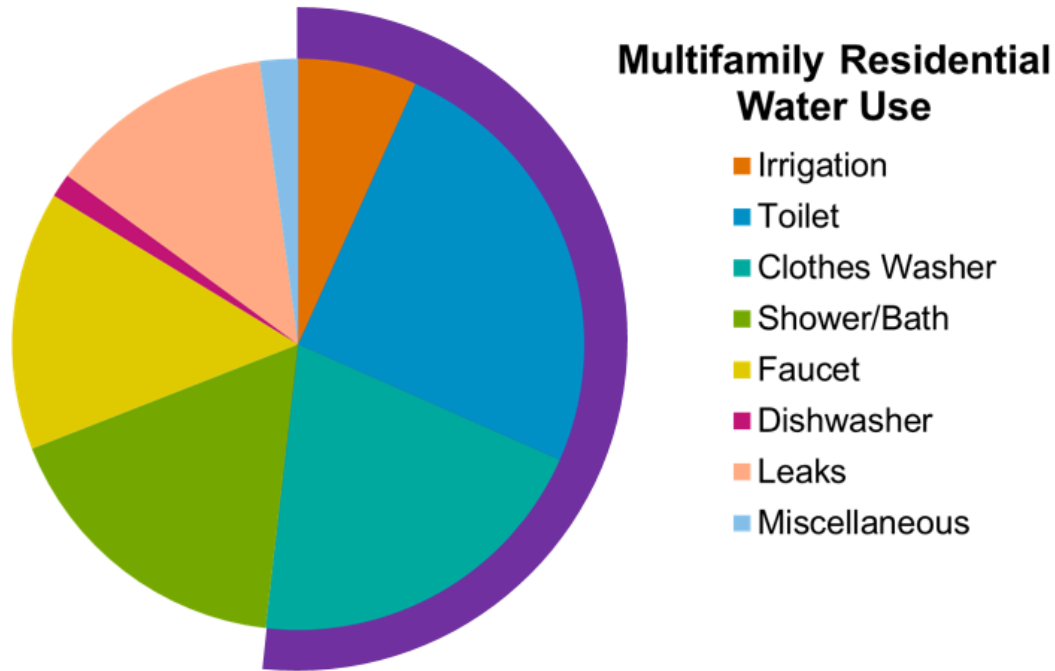
Opportunity to Re-think Building Design & Re-imagine How We Use Water



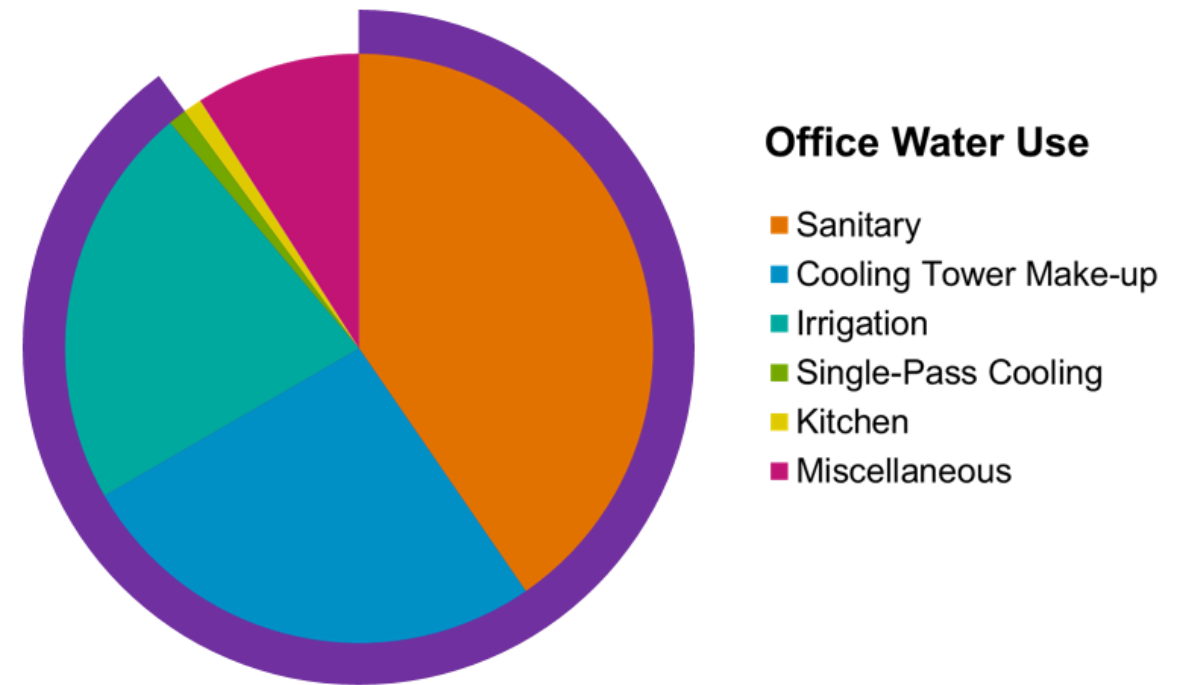
Buildings Generate Water Resources, Not Wastes



Reduce Potable Water Demands in Buildings: Right Water for Right Use



Source: adapted from Alliance for Water Efficiency

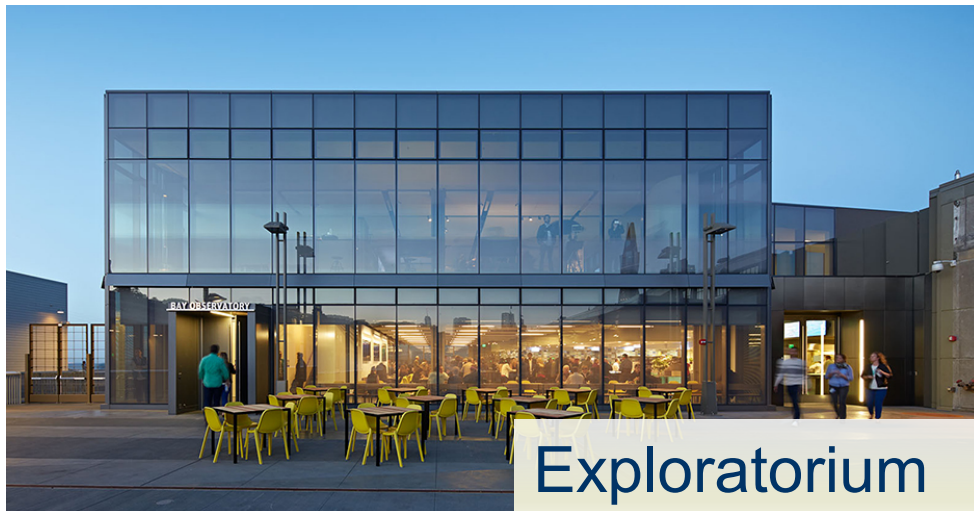


Source: USEPA

Private Sector Interest in Onsite Reuse



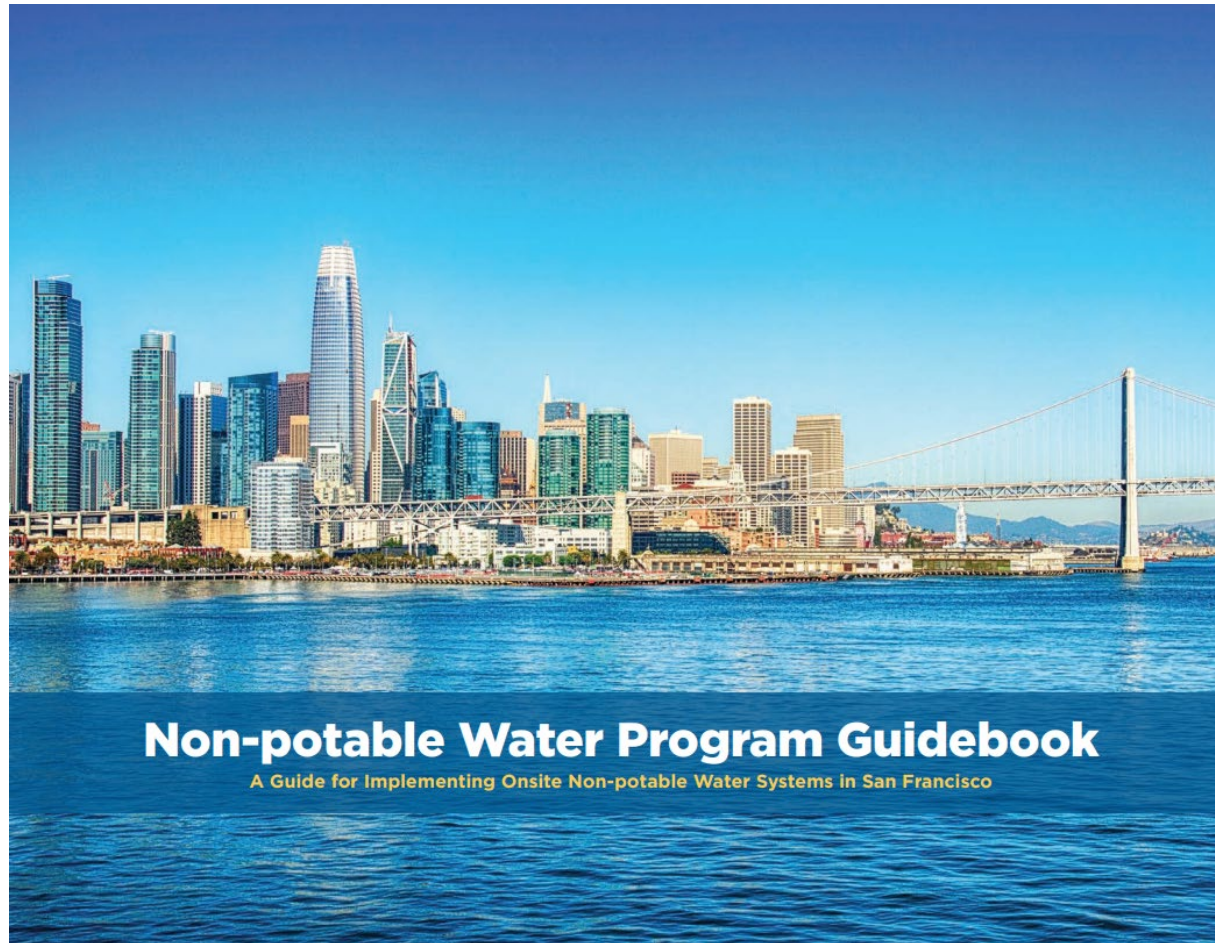
Early Projects



Pioneer New Ways to Reuse Water at SFPUC Headquarters



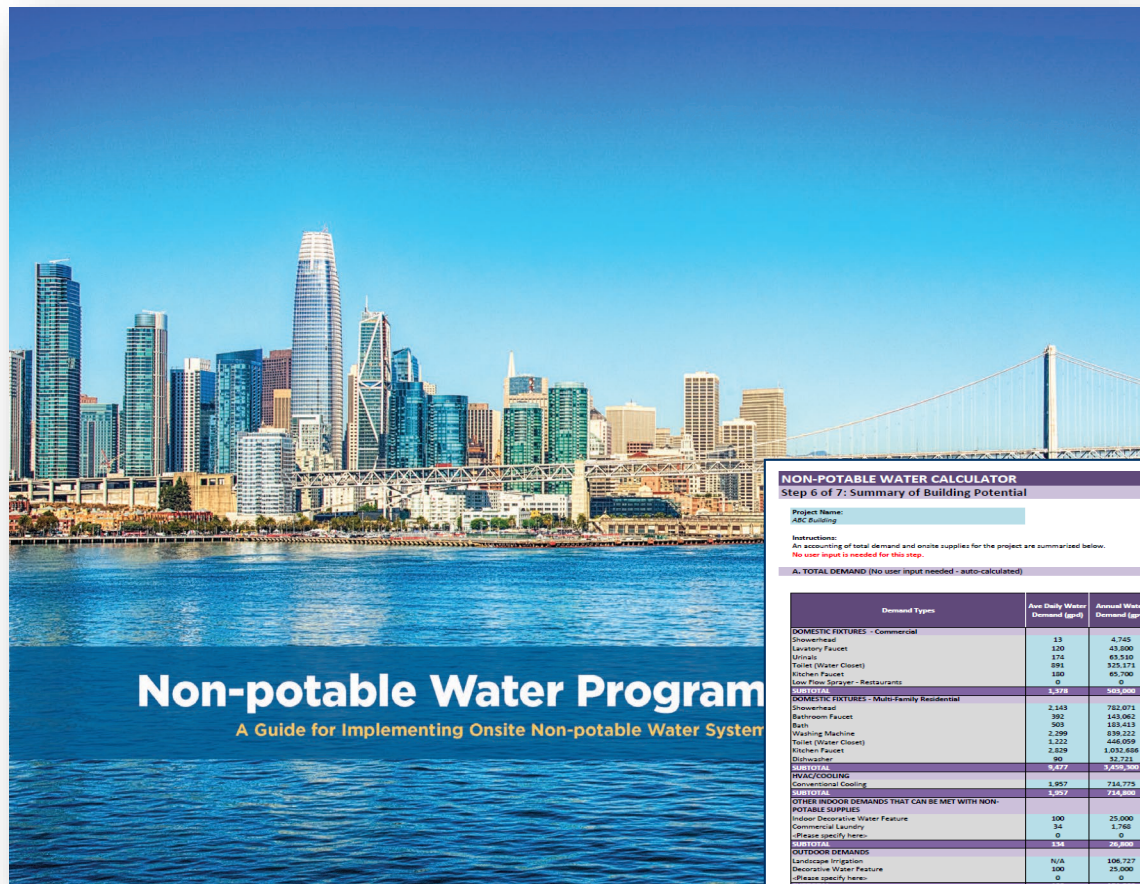
Inter-Agency Partnership to Streamline Permitting Process



SF Ordinance Provides Necessary Oversight and Management

SFPUC	SFDPH-EH	SFDBI	SFPW
Program Administration and Cross-Connection Control	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 Manages Cross-Connection Control Program	Issue water quality & monitoring requirements Review and approve non-potable engineering report Issue permit to operate onsite systems Review water quality reporting	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 Program

A Guide for Implementing Onsite Non-potable Water System

NON-POTABLE WATER CALCULATOR
Step 6 of 7: Summary of Building Potential

Project Name: _____
User Input: _____
Linked From User Input: _____
Default Value: _____
Auto-generated Value: _____

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

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

Demand Types	Ave Daily Water Demand (gpd)	Annual Water Demand (gpy)	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	3,600	3,600	3,600	3,600	3,600	3,600	3,600	3,600	3,600	3,600	3,600	3,600
Urinal	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)	881	325,171	27,086	27,086	27,086	27,086	27,086	27,086	27,086	27,086	27,086	27,086	27,086	27,086
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	1,218	500,000	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	2,145	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	392	143,062	11,922	11,922	11,922	11,922	11,922	11,922	11,922	11,922	11,922	11,922	11,922	11,922
Bed	503	183,413	15,284	15,284	15,284	15,284	15,284	15,284	15,284	15,284	15,284	15,284	15,284	15,284
Washing Machine	2,289	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	2,829	1,032,486	86,057	86,057	86,057	86,057	86,057	86,057	86,057	86,057	86,057	86,057	86,057	86,057
Subtotal	9,072	3,435,300	288,300	288,300	288,300	288,300	288,300	288,300	288,300	288,300	288,300	288,300	288,300	288,300
WATER COOLING														
Conventional Cooling	1,957	714,775	63,821	66,481	55,045	55,979	61,290	66,418	67,519	69,580	72,727	72,729	58,922	46,468
Subtotal	1,957	714,775	63,800	66,500	55,100	56,000	61,300	66,500	67,600	69,600	72,800	72,800	59,000	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	1,788	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	26,788	2,230	2,230	2,230	2,230	2,230	2,230	2,230	2,230	2,230	2,230	2,230	2,230
OUTDOOR DEMANDS														
Landscape Irrigation	N/A	106,727	0	0	0	0	15,999	25,093	27,815	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	121,727	2,083	2,083	2,083	2,083	18,082	27,082	29,902	26,902	17,082	0	0	0
GRAND TOTAL	13,047	4,835,700	378,600	381,200	385,800	390,700	410,000	424,300	430,000	429,200	422,500	407,500	393,700	381,200

Grant Assistance for Large Alternate Water Source Projects

Grant Assistance for Large Alternate Water Source Projects

Grant Guidelines and Terms



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. To ensure the reliability of this grant assistance will support the SFPUC's Phased Water Supply Improvement Program (WSIP) goals adopted by Resolution No. 08-200 on October 1, 2008, and developing an additional 10 million gallons per day (mgd) of locally

package have the meanings described below:

Alternate source of water that includes graywater, rainwater, stormwater, and blackwater. The level of treatment and quality of the alternate water source shall be approved by the Public Health and comply with all applicable federal, state, and local

Alternate water customer of the SFPUC, proposing the installation of a non-potable water system on their property, and is seeking grant funds from the SFPUC for the project, pursuant to the instructions and guidelines set forth in this

Grant agreement to provide grant funds, following the review and evaluation of a project by the SFPUC.

Blackwater or other biological wastes, as from toilets, dishwashers, kitchen sinks, and laundry configurations, blackwater leaving a building generally includes

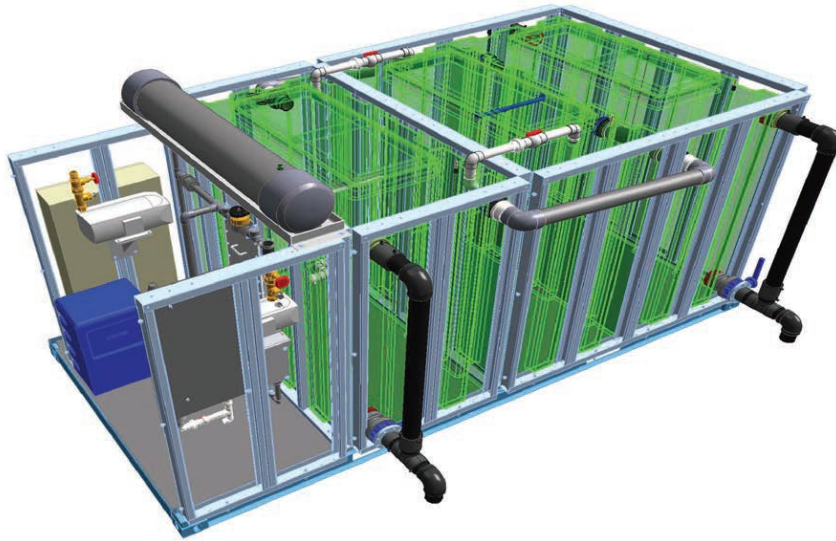
San Francisco's Evolving Onsite Water Reuse Program



181 Fremont, San Francisco

Graywater and Rainwater for Flushing and Irrigation

1.3M GPY Potable Offset



Source: Aquacell and Jay Paul Company and Heller Manus Architects



Salesforce Tower, San Francisco

Blackwater for Flushing, Cooling, and Irrigation

7.8M GPY Potable Offset



Moscone Convention Center, San Francisco

Foundation Drainage for Flushing, Irrigation, and Street Sweeping

11M GPY Potable Offset



Chase Center, San Francisco

Rainwater, Stormwater, Graywater, and Condensate for Flushing

3.7M GPY Potable Offset



Industrial Reuse at Energy Center SF

30M GPY Potable Offset

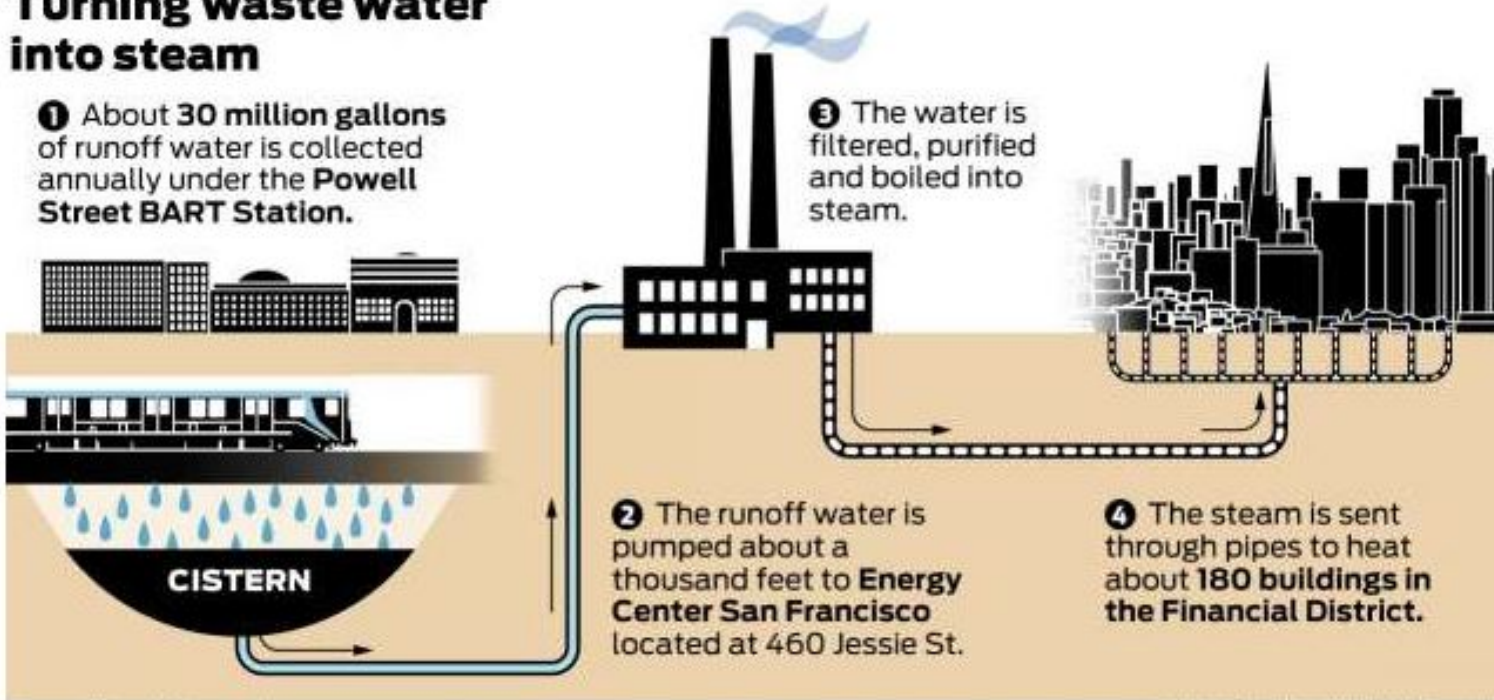
Turning waste water into steam

❶ About 30 million gallons of runoff water is collected annually under the **Powell Street BART Station**.

❸ The water is filtered, purified and boiled into steam.

❷ The runoff water is pumped about a thousand feet to **Energy Center San Francisco** located at 460 Jessie St.

❹ The steam is sent through pipes to heat about **180 buildings in the Financial District**.



Source: Chronicle reporting

John Blanchard / The Chronicle



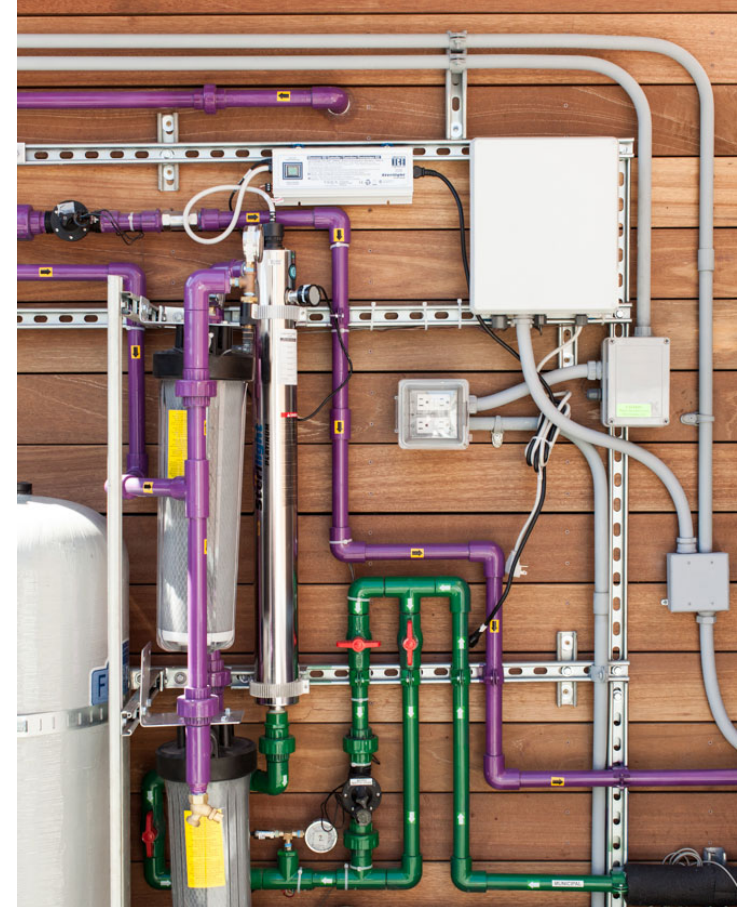
- Implementing onsite water systems is easiest and most cost-effective in new buildings, not retrofits.
- Project owner, design engineer, & daily operations staff should communicate about costs and responsibilities for design, commissioning, and ongoing O&M.
- Early communication with regulators will ease implementation.
- First understand the water budget for the project.

- Simple designs are best! Remember someone has to operate the system in perpetuity!
- Routing rainwater collection through rooftop planter or green roof may impact treatment downstream by causing turbidity issues.
- Treatment using ozone or free chlorine can address color of treated water for toilet flushing and improve aesthetics.
- Ensure all tanks, pipe inlets/outlets are properly sealed to prevent mosquitos.
- Design for back-up water and sewer connections.

Lessons Learned on Implementation

- Prepare for cross-connection testing. Ensure onsite contractors are informed of exactly what fixtures will be installed so they can make accommodations for the test.
- Ongoing monitoring of treatment system performance is critical to be protective of public health.
- Operator capacity is needed, yet often overlooked.
- Sharing data on costs, ownership and operations models, treatment system designs, successes, and challenges will help improve future implementation.

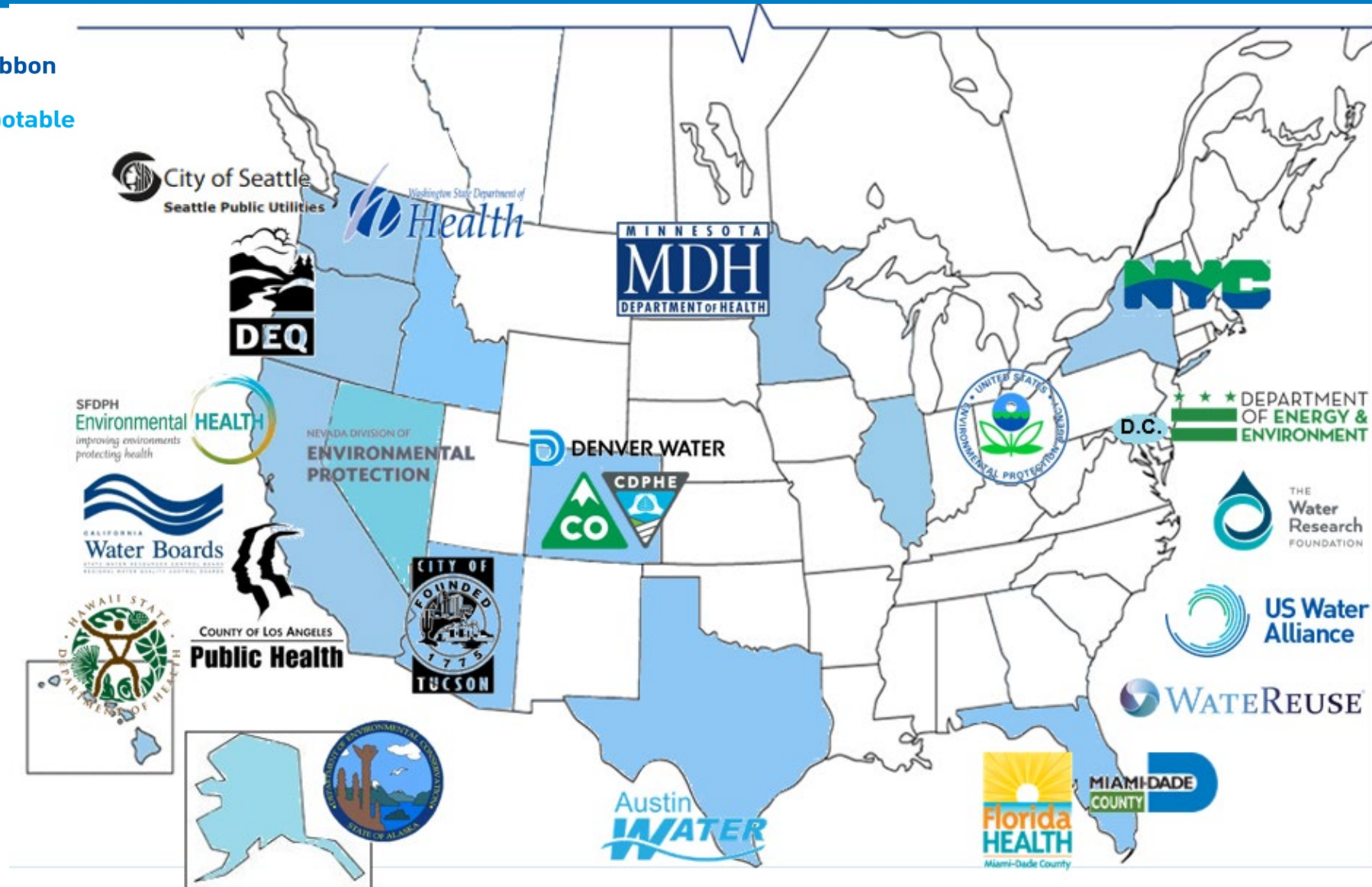
- Cultural shift
- Wastewater flows and odors
- Revenue impacts
- Capacity charge adjustments
- Excess use charges
- Policy synergies
- SFPUC infrastructure integration and capital projects



Collaborating on a National Level to Create Consistent Approaches



**National Blue Ribbon
Commission
for Onsite Non-potable
Water Systems**



Training Manual for Engineers, Operators, Utilities and Regulators



**DESIGN
ENGINEER**



OPERATOR



REGULATOR



**PROGRAM
ADMINISTRATOR**

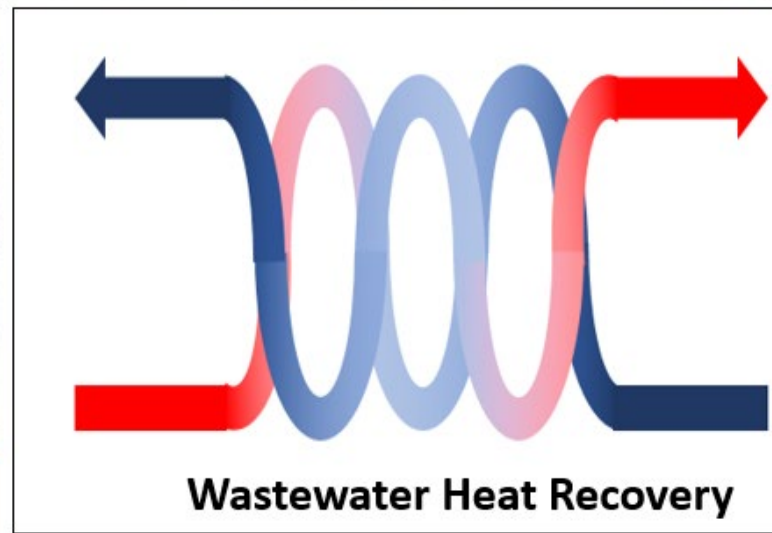


**SYSTEM
OWNER**

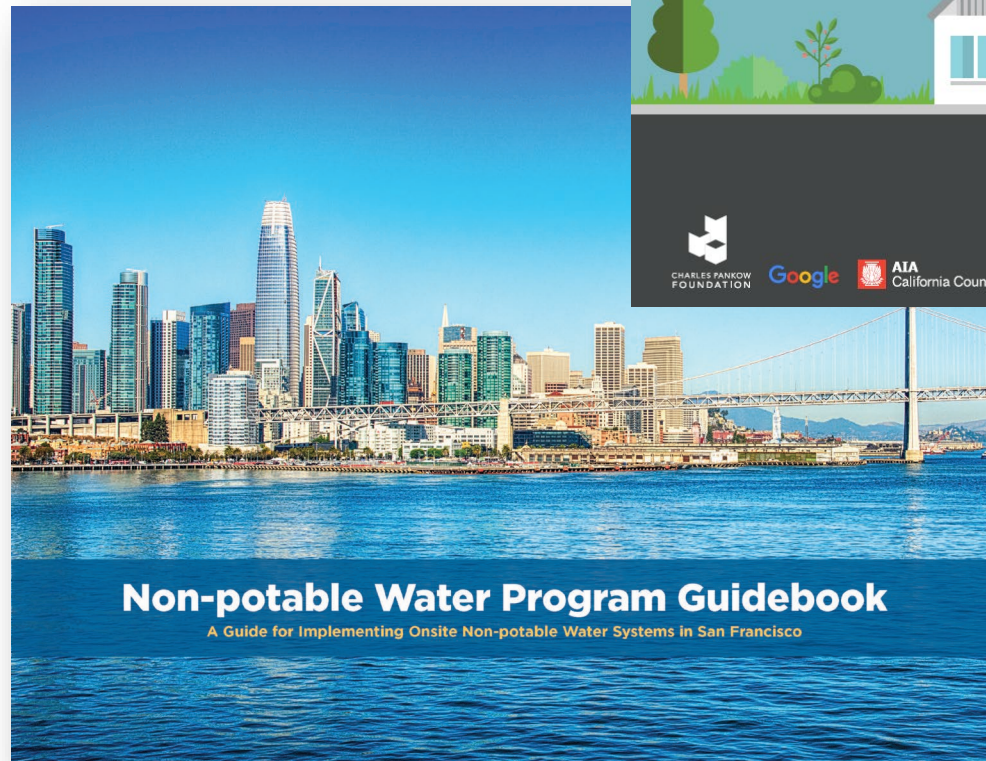
SF Expanding Framework to Breweries to Treat and Reuse Process Water



SF Expanding Innovations Program



Resources



Taylor Chang
tachang@sfgwater.org

www.sfgwater.org/np

