ADVANCING ONSITE WATER REUSE IN SAN FRANCISCO AND ACROSS THE US

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San Francisco Public Utilities Commission
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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 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

- **BLACKWATER**: Wastewater from toilets, dishwashers, kitchen sinks, and utility sinks
- **GRAYWATER**: Wastewater from clothes washers, bathtubs, showers, and bathroom sinks
- **RAINWATER**: Precipitation collected from roofs and above-grade surfaces
- **STORMWATER**: Precipitation collected at or below grade
- **FOUNDATION DRAINAGE**: Nuisance groundwater from dewatering operations
Opportunity to Match Right Resource to the Right Use

Multifamily Residential Water Use
- Irrigation
- Toilet
- Clothes Washer
- Shower/Bath
- Faucet
- Dishwasher
- Leaks
- Miscellaneous

Office Water Use
- Sanitary
- Cooling Tower Make-up
- Irrigation
- Single-Pass Cooling
- Kitchen
- Miscellaneous

Source: adapted from Alliance for Water Efficiency

Source: USEPA
Onsite water reuse systems create opportunities to significantly enhance the performance of a building.

Brendan Owens, US Green Building Council

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

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<td><strong>Program Administration</strong></td>
<td><strong>Environmental Health</strong></td>
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<td><strong>Right of Way and Mapping</strong></td>
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<td>Review onsite non-potable water supplies &amp; demands</td>
<td>Issue water quality &amp; monitoring requirements</td>
<td>Conduct Plumbing Plan check and issue Plumbing Permit</td>
<td>Issue Encroachment Permits as needed for infrastructure in the Right-of-Way (if needed)</td>
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<td>Administer citywide project tracking &amp; annual potable offset achieved</td>
<td>Review and approve non-potable engineering report</td>
<td>Inspect and approve system installations</td>
<td>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)</td>
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<td>Provide technical support &amp; outreach to developers</td>
<td>Issue permit to operate onsite systems</td>
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<td>Provide financial incentives to developers</td>
<td>Review water quality reporting</td>
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<td>Cross Connection</td>
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SFPUC Technical and Financial Assistance
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, Owings & 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 efficiency 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 and 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
Beginning of Our Journey & Share Lessons Learned
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

Thermal Energy Recovery

BLACKWATER
GRAYWATER
SFPUC Program for Breweries to Treat and Reuse Process Water

Source: Water & Wastes Digest, 2018
Opportunities to Adapt Our Water Systems and Engage the Public

Source: Golden State Warriors; San Francisco Public Utilities Commission
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www.sfwater.org/np