

OneWaterSF

A Vision for San Francisco



San Francisco
Water Power Sewer

Services of the San Francisco Public Utilities Commission



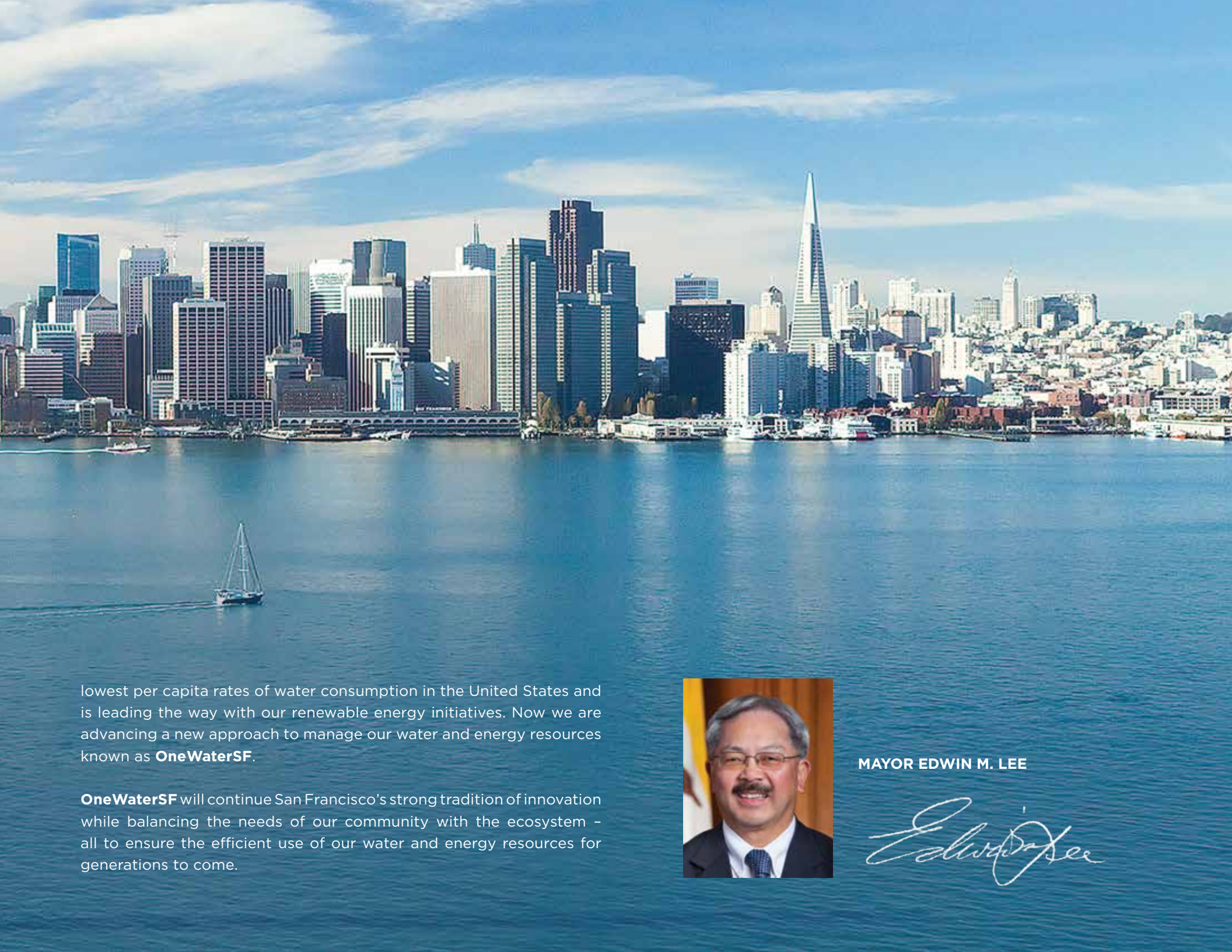
Letter from San Francisco Mayor Edwin M. Lee

The San Francisco Bay Area is a region anchored by world-class companies, educational institutions and thought-leaders. This extraordinary place is inspired by the waters of the Pacific Ocean, the San Francisco Bay, and the high-quality water of the Sierra Nevada delivered to millions by gravity through our Regional Water System.

San Francisco is proud to showcase how cities worldwide can address pressing water and energy challenges. Our city has made an ambitious commitment to reduce our greenhouse gas

emissions through a comprehensive climate action strategy called 0-50-100-ROOTS: zero waste to landfills, 50 percent of trips made by sustainable modes, 100 percent of energy to be renewable, and increasing our carbon sequestration by expanding our urban forests and fueling our soil with locally-generated compost.

Under the leadership of the San Francisco Public Utilities Commission (SFPUC), San Francisco is recognized for our water and clean power stewardship and innovation. Our city already features one of the



lowest per capita rates of water consumption in the United States and is leading the way with our renewable energy initiatives. Now we are advancing a new approach to manage our water and energy resources known as **OneWaterSF**.

OneWaterSF will continue San Francisco's strong tradition of innovation while balancing the needs of our community with the ecosystem – all to ensure the efficient use of our water and energy resources for generations to come.



MAYOR EDWIN M. LEE



Contents

Introducing OneWaterSF 2

Embracing OneWaterSF. 5

Envisioning OneWaterSF 6

Practicing OneWaterSF 8

Advancing OneWaterSF. 14



Golden Gate Park

Pulgas Water Temple

Introducing OneWaterSF



An Introduction from the General Manager, Harlan L. Kelly Jr.

The San Francisco Public Utilities Commission (SFPUC) is a department of the City and County of San Francisco that provides a breadth of services to over 2.6 million people in San Francisco and the surrounding areas. We are responsible for providing drinking water and wastewater services directly to customers in San Francisco, wholesale water service in three Bay Area counties, and emissions-free power to San Francisco’s municipal departments and other customers. Our mission is to provide our customers with high quality, efficient, and reliable water, power, and wastewater services in a manner that values environmental and community interests and sustains the resources entrusted to our care. Critical to meeting this mission is the ongoing sustainable management of our financial resources.

Since 2012, we have successfully operated a pioneering onsite treatment system at our headquarters to reduce our own potable water consumption by 65 percent. Other innovative projects and programs include the Urban Watershed Management Program and the Non-potable Water Program, which have allowed us to create synergistic projects that diversify our water supplies and better leverage our water resources. In addition to the hydropower produced by our Regional Water System, the SFPUC is also capturing clean, renewable energy by co-locating solar panel arrays and developing biogas generation at our water and wastewater facilities. With these clean energy programs, the SFPUC is contributing significantly to the City’s comprehensive 0-50-100-ROOTS climate action strategy.

We are building on all of these successes, and expanding our City’s sustainability efforts, by formalizing a new approach to water and energy resources management: OneWaterSF. As our City’s utility provider, we are uniquely positioned to take the lead in furthering OneWaterSF. We have been involved with utility leaders on a national level to help define “one water” and the future of water resource management. Through this work, we know that utilities implementing a One Water approach realize a number of organizational benefits and are better equipped to address climate change, water shortages, water quality protection, and aging infrastructure challenges.

In San Francisco, we believe that OneWaterSF will provide greater water and energy resource resiliency and reliability, create opportunities to optimize our water infrastructure, and contribute to the livability and sustainability of our City and the environment. OneWaterSF represents a new way of doing business for the SFPUC that will build upon the values expressed in our 2020 Strategic Plan. Together, these efforts will increase communication across traditional lines within the SFPUC and the City, encourage creative thinking and inventive solutions, and better align each of our business practices with a shared sense of purpose around maximizing the efficient use of our precious and finite resources.







Embracing OneWaterSF

Traditionally, utilities have taken a “water in, wastewater out” approach to water management. Planning was done in silos with water managers responsible for securing potable water, and wastewater managers responsible for removing “used” and “nuisance” water. This compartmentalized approach overlooks the potential of alternative sources of water to be included in a water supply future. The SFPUC recognizes that the traditional approach to water management leaves unrealized water and clean energy benefits on the table.

In recent years, the SFPUC has begun implementing projects that utilize local and alternative water supplies such as groundwater, rainwater, and recycled water. Developing these projects necessitated an evolution in our thinking – a shift from thinking about one project at a time to thinking more holistically; thinking about the impact of one water source on another; thinking about the potential synergies between our water system operations. More simply, this thinking allowed us to view all water as One Water.

One Water is an integrated planning and implementation approach to managing finite water resources for long-term resiliency and reliability, meeting both community and ecosystem needs.

– Water Research Foundation, 2016

We have also expanded this thinking to how our water and wastewater systems consume energy, and their potential to generate clean energy. The Hetch Hetchy Power system has long been recognized as San Francisco’s clean energy backbone, generating hydroelectricity at three powerhouses in the Sierra Nevada. In recent years, we have expanded our energy portfolio to include additional sources of clean renewable power that can be generated from within the water and wastewater system – such as solar energy from photovoltaic cells co-located at our facilities and biogas generation at our wastewater treatment plants. These efforts help reduce our greenhouse gas emissions and address climate change.

As a result, the SFPUC has already begun to realize the synergies and multiple benefits of thinking across traditional water, wastewater, and energy boundaries. We have initiated innovative programs and policies that will make our water supply and energy system more resilient and sustainable. With this transition underway, the SFPUC is positioned to formalize a OneWaterSF framework, and embrace new opportunities for innovative resource management.

Envisioning OneWaterSF

OneWaterSF is not a finish line; rather, it represents an approach to resource management – one that recognizes our world is not static, that conditions are continually changing, and that we are strongest when we can quickly adapt to these changes. By creating pathways for technology and innovation, OneWaterSF encourages outcomes that apply the right resource to the right use, harness clean energy opportunities, and provide a long-term reliable and resilient water supply for current and future generations.

Our Vision and Guiding Principles serve as the foundation for developing and implementing projects and programs that advance OneWaterSF. By embracing, envisioning, practicing, and advancing OneWaterSF, we will continue to support a future where our limited resources can be sustained to ensure local and regional resilience.

OneWaterSF Vision

With our OneWaterSF approach, San Francisco will optimize the use of our finite water and energy resources to balance community and ecosystem needs, creating a more resilient and reliable future.

OneWaterSF Guiding Principles

- 1 Match the right resource to the right use.
- 2 Look holistically at our water, wastewater, and power systems to develop programs, policies, and projects that provide multiple benefits.
- 3 Plan for variable outcomes and build in flexibility to adapt to future changes.
- 4 Develop projects and programs that conserve resources and promote ecosystem health, including the health and quality of our watersheds, the San Francisco Bay, and the Pacific Ocean.
- 5 Work across traditional boundaries within our organization to foster collaboration that results in the efficient use of our water, wastewater, energy, and financial resources.
- 6 Engage our communities to foster awareness and collaboration around OneWaterSF.
- 7 Pursue partnerships with other agencies, the private sector, and other stakeholders to generate new and creative ideas.
- 8 Pilot state-of-the-art technologies, and test new approaches to develop new business practices.



Practicing OneWaterSF

The SFPUC is fortunate to have a Regional Water System (RWS) that provides extremely high quality water and greenhouse gas (GHG) free electricity at a low energy cost. At the same time, we have developed a strong Local Water Program, which includes groundwater, recycled water, and conservation, to help diversify and stretch the RWS supplies from the Hetch Hetchy, Alameda, and San Mateo watersheds. We also operate a sewer system that protects public health and water quality of the San Francisco Bay and the Pacific Ocean by reliably collecting and treating sewage and street runoff.

When we look at the entirety of our water and sewer systems, energy is both consumed and generated at various points. While the RWS itself is almost entirely gravity fed and does not consume fossil fuels, we do consume energy at our three water treatment facilities, at our four wastewater treatment plants, and at numerous water and wastewater pump stations. We generate 385 megawatts of GHG-free power at three hydroelectric powerhouses in the Sierra Nevada, and also generate renewable clean power at other key points in the system including solar panel arrays installed on various facilities and through biogas generation at our wastewater treatment plants. This generation and consumption of energy throughout the water and sewer systems, as well as the potential opportunities within the system to further develop clean power, makes energy a key element of OneWaterSF.



EXISTING LOCAL WATER, WASTEWATER, AND CLEAN ENERGY PROGRAMS

We have been successfully linking the planning of our local and regional water supplies and energy generation opportunities that embody OneWaterSF.

Creating a water efficient San Francisco

by promoting efficiency and reducing wasteful consumption in homes and businesses through our Water Conservation Program.

Irrigating San Francisco's large parks and golf courses

by treating water through our Recycled Water Program.

Reusing water in buildings by collecting and treating water within buildings for toilet flushing in lieu of drinking water through our Non-potable Water Program.

Maximizing local water sources by blending groundwater with surface water supplies through our Groundwater Program.

Capturing and reusing stormwater by using green infrastructure to manage drainage and combined sewer discharges through our Urban Watershed Management Program.

Protecting public health and the environment

by treating wastewater and stormwater prior to discharge to the San Francisco Bay and the Pacific Ocean.

Encouraging homeowners to irrigate their landscape

by collecting and using rainwater and graywater through our Residential Programs.

Reducing power needs at SFPUC facilities

by implementing energy efficiency improvements and converting biogas produced during the wastewater treatment process to electricity for plant operations.

Harnessing clean energy by generating GHG-free electricity from, and co-locating solar power within, the Regional Water System in a sustainable way.

Turning waste into biofuel by converting waste through resource recovery programs such as SF Greasecycle.

Pioneering Innovative Technologies

SFPUC Headquarters at 525 Golden Gate Avenue and the Non-potable Program

A leader in pioneering new technologies to reduce water use and to reuse water, the SFPUC's headquarters, located at 525 Golden Gate Avenue in San Francisco, incorporates two decentralized water systems and exemplifies OneWaterSF.

Our innovative constructed wetland system, located in the sidewalks around and inside the building, treats roughly 5,000 gallons of blackwater each day for toilet and urinal flushing. In addition to saving over one million gallons of potable water each year, our wetland treatment system is a unique and integrated design that engages the public. The rainwater harvesting system in the building captures rainwater from the roof and stormwater from the play area of the children's day care center. The rainwater and stormwater is collected, treated, and stored in a 25,000 gallon tank. We use the water to irrigate the landscape adjacent to the building. The system reduces the amount of stormwater flows entering the City's combined sewer system as well as saves potable water.

The SFPUC is continuing to look to the future by leading a cutting edge effort to test the feasibility of purified water for San Francisco. This research project will add advanced treatment and monitoring to the onsite blackwater treatment system to produce purified water, which will not be used for drinking, but will help advance regulations.

The pioneering reuse projects at our headquarters were the impetus behind one of the Nation's most cutting-edge onsite water reuse programs. Our Non-potable Water Program allows for the collection, treatment, and reuse of rainwater, stormwater, graywater, and blackwater at a building- or district-scale. The Program establishes a process for permitting the full spectrum of decentralized water systems, provides developers with tools for estimating a building's demand and potential onsite supplies, and incorporates a grant program.

Our Non-potable Water Program represents the paradigm of OneWaterSF thinking. It creates opportunities for innovative use of the resources within the urban water cycle and applies the right water for the right use.



SFPUC Headquarters

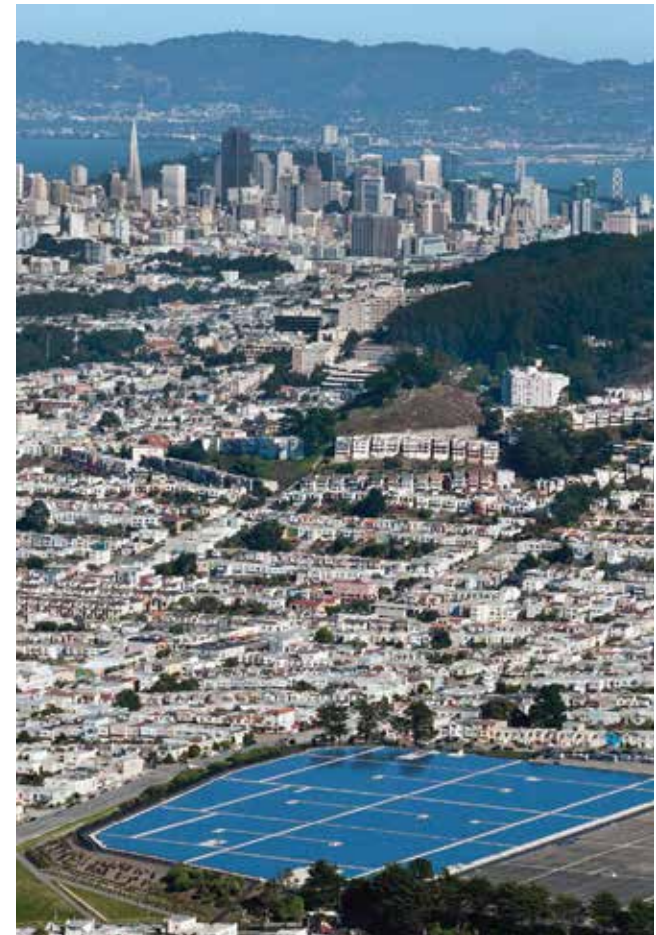
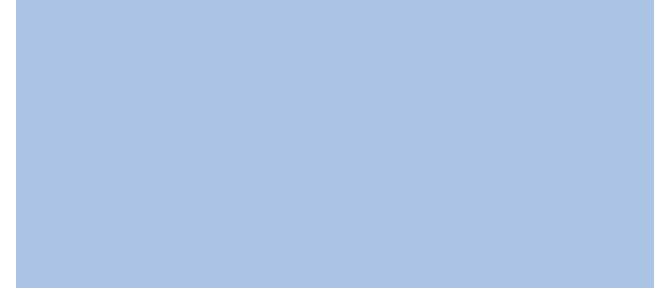
Harnessing Opportunities for Clean Power Generation

Resource Recovery and Solar Energy Programs

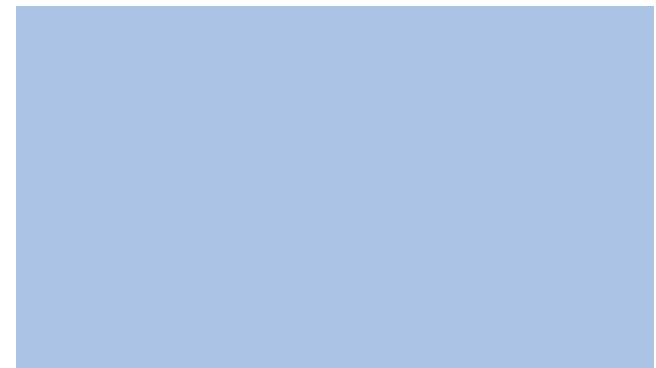
The SFPUC's diverse clean energy portfolio makes us one of the cleanest energy utilities in California. The SFPUC's resource portfolio consists of almost completely greenhouse gas (GHG) free electricity. And it is one of the SFPUC's guiding principles to continue to reduce the GHG emissions in the electricity sector of San Francisco. By looking at the system holistically, we recognized that while energy is consumed at various points in the system, such as treatment plants and pump stations, it can also be generated at other points in the system. This holistic approach to identifying points of energy consumption and opportunities for clean power generation makes energy an important element of OneWaterSF.

We are maximizing opportunities for clean, renewable power generation by recognizing the energy potential provided by our water and wastewater systems. The Sunset Reservoir solar panel array is San Francisco's largest solar installation and, with a generating capacity of up to 5 megawatts, is one of California's largest municipal solar arrays located in an urban setting. By co-locating the panels on top of Sunset Reservoir, we were able to more than triple the amount of municipal solar generating capacity of San Francisco.

We are also capturing and using biofuels and methane gas, byproducts of our wastewater collection and treatment operations. Methane gas (biogas) is captured at our Oceanside and Southeast wastewater treatment facilities and converted to electricity used for plant operations. At the Southeast Treatment Plant, we have utilized both biogas and solar panel arrays installed at the plant to meet up to 40 percent of the plant's energy needs. The SF Greasecycle Program generates renewable biofuel by collecting fats, oils, and grease (FOG) from restaurants and residences throughout the City. The collected FOG is converted into biodiesel and used to run city buses and vehicles, offsetting 250,000 gallons of petroleum based diesel per year, which reduces GHG emissions.



Sunset Reservoir



Greening the City and Controlling Stormwater Flows

Stormwater Management Ordinance

The San Francisco Stormwater Management Ordinance (SMO) has been a catalyst for innovative stormwater management, green infrastructure implementation, and rainwater harvesting across the city.

The main goal of the SMO is to require new and redevelopments that create or replace 5,000 square feet or more of impervious surface to manage stormwater on-site, but there are many ancillary benefits that embody OneWaterSF. The Program has been the main driver for rainwater harvesting in the city; a strategy that manages stormwater and reduces potable water use at the same time. To date, over 270 projects have submitted Stormwater Control Plans to the SFPUC, and nearly 70 of them propose rainwater harvesting to meet their stormwater management requirements. The SMO dovetails with the Non-potable Water Program to make stormwater an important part of a more diverse and resilient water portfolio.

In addition to the SMO, the SFPUC uses watershed planning, grant programs, and capital projects to inform and advance the implementation of green infrastructure in San Francisco. Our innovative watershed planning tools integrate green and gray infrastructure to solve drainage problems and include an award-winning community engagement tool called *The Watershed Planning Game*. Our grant programs fund community organizations to implement green infrastructure, from rain gardens to rainwater harvesting. Over \$1.4 million has been granted so far, and grantees include 30 public schools. In the area of capital projects, the SFPUC has pursued eight green infrastructure pilot projects, one in each of our city's urban watersheds, including green streets with rain gardens and permeable pavement. Through these projects and programs, green infrastructure gradually restores natural functions to San Francisco's urban watersheds, brings beauty and wildlife habitat to the public realm, and helps to green San Francisco's neighborhoods.



Hayes Valley

Matching the Right Water to the Right Use

Westside Recycled Water Project and San Francisco Groundwater Project

For decades, San Francisco has been using local groundwater for irrigation of Golden Gate Park. However, our local groundwater supplies are high quality and appropriate for use as drinking water. The Westside Recycled Water Project and the San Francisco Groundwater Project work synergistically to stretch our water supplies and apply the right water for the right use.

The Westside Recycled Water Project will provide recycled water for irrigation of Golden Gate Park, replacing the groundwater that is currently used. The recycled water project will utilize reverse osmosis technology to produce high quality water that will safeguard sensitive habitat in Golden Gate Park and also provide flexibility for considering purified water opportunities in the future.

The San Francisco Groundwater Project will blend up to 4 million gallons a day of high quality, sustainable groundwater from the City's local groundwater basin into our drinking water supply. Including local groundwater with our other water supplies helps ensure that our drinking water is more reliable, diverse, and less vulnerable to disruptions.



Golden Gate Park

Advancing OneWaterSF

San Francisco has already had great success in implementing a number of projects and programs that embody the OneWaterSF philosophy. Yet many challenges lie ahead. Climate uncertainty gives us the potential for more frequent and prolonged droughts that threaten the stability of our existing water supplies, as well as periods of intense storms that can overwhelm our sewer system. Expanding water recycling and reuse programs will result in increased energy requirements for advanced treatment. And, in California, we are continually challenged by the need to plan for disruptions in service that can occur from natural disasters such as earthquakes or wildfires in our watersheds.

With OneWaterSF, we can maximize the efficient use of our resources and recognize the potential of all resources within our system. It also allows us to look holistically at our system for efficiencies, project synergies and opportunities to harness clean energy, and to match the right water for the right use. If we view future challenges through this lens, new opportunities for innovative resource management emerge.

For example, advances in water treatment technology allow us to purify water to levels that weren't possible 20 years ago. Under OneWaterSF, these advances provide an opportunity to explore purified water as an option for directly increasing our water supplies. A holistic approach to stormwater management under OneWaterSF, coupled with the latest water treatment technology, allows us to consider opportunities for collecting rainwater for both non-potable and potable purposes. This innovative view can benefit both water supply and protect the quality of the Bay and Ocean waters. Additionally, resource recovery has the potential to harness high-energy resources from the wastewater stream so that we can utilize these resources to supplement energy requirements, including those that may be needed for advanced water purification processes. These opportunities become obvious through OneWaterSF.

OneWaterSF challenges each of us to adopt a new way of doing business. The holistic approach requires collaboration across traditional organizational boundaries within the SFPUC and with external partners, so that our programs and projects contribute to the OneWaterSF Vision. It requires us to utilize advances in technology and encourages innovation in problem solving so that projects and programs optimize our operations, and we are more thoughtful about how we harness and utilize our finite resources. With OneWaterSF, we strengthen our common purpose. These approaches are consistent with the SFPUC's 2020 Strategic Plan.

The next phase of OneWaterSF activities will focus on implementation, with the development of the OneWaterSF Implementation Roadmap. The Roadmap will:

- Identify new opportunities** for projects and programs under OneWaterSF;

- Develop recommendations** related to research and development;

- Suggest partnerships** for research or project implementation; and

- Identify policy needs** to help further OneWaterSF.

The Roadmap will also prioritize short-term and long-term activities and will be designed as a living document to enable the SFPUC to continue expanding the OneWaterSF approach. The Roadmap will be the next step in advancing OneWaterSF to help the SFPUC fulfill our shared vision of creating a more resilient and reliable future for San Francisco.





OneWaterSF

October 2016