CITY & COUNTY OF SAN FRANCISCO

Office of the Controller

City Services Auditor

City Services Benchmarking:

Water and Wastewater Rates

July 29, 2014

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CITY AND COUNTY OF SAN FRANCISCO

THE CONTROLLER **July 29, 2014**

Summary

The City and County of San Francisco Charter, Appendix F, Section 101, requires the City Services Auditor (CSA) monitor the level and effectiveness of services provided by the City and County of San Francisco. Specifically, CSA shall review performance and cost benchmarks and conduct comparisons of the cost and performance of San Francisco City government with other cities, counties and public agencies performing similar functions. Using FYE 2011 data from the American Water Works Association (AWWA)[1] and an independently conducted study[2] for the San Francisco Public Utilities Commission (SFPUC), this report compares the water and wastewater rates, services, and infrastructure provided by the SFPUC with similar services provided by peer agencies in 14 other metropolitan areas. The peer group established in this report was developed using common metrics in order to make high-level comparisons between agencies. For a more detailed explanation of the methodology used to develop the peer group, please refer to Appendix A.

It is difficult to directly compare public utilities to one another, since every agency faces different challenges with respect to factors such as the complexity of its infrastructure, amount of water sold or treated, number of assets managed, population served, service allocation between retail and wholesale customers, geography and climate. Some of the SFPUC's unique challenges include building and operating complex infrastructure, piping water over 200 miles to San Francisco from its source in Hetch Hetchy, maintaining pipelines which cross three different earthquake fault lines, serving an unusually large wholesale water customer base spread over a wide geographic area, and operating a combined wastewater and storm water system. With over $7 billion in assets, SFPUC holds more assets than any of its peers and is currently undertaking one of the largest capital improvement projects in the country, the Water System Improvement Program (WSIP), a multi-year project valued at $4.6 billion and approved by San Francisco voters in 2002.

Highlights from the data include the following:

- *San Francisco's water customers' gross water use is significantly lower than its peers, on a per capita basis*. SFPUC water services has the sixth largest total service population in the nation (residential, non-residential, and wholesale customers included), but ranks eleventh in the nation with respect to total gallons of water sold. Within its peer group, only Houston ranks above San Francisco in service population size, while Houston, Dallas, Phoenix, and Miami-Dade rank above San Francisco in total gallons of water sold.
- *The SFPUC has higher water and wastewater rates compared to most of its peers*. However, San Francisco falls well within and exceeds Environmental Protection Agency (EPA) recommended guidelines for household affordability.

(highlights continued on next page)

[1] American Water Works Association. *AWWA Water and Wastewater Survey 2012* and *AWWA Water and Wastewater Survey Update 2013*. Fiscal year periods for each utility may differ slightly. AWWA 2012 data is meant to be current as of January 1, 2012, such that the data on water sold, wastewater treated, and system revenues are for calendar year 2011 or the most recent fiscal year. For San Francisco, this is the fiscal year ending on July 1, 2011.

[2] Carollo-McGovern *SFPUC Water and Wastewater Cost of Service Study 2014*

- *As a percentage of median household income, San Francisco retail users pay between 20 to 80 percent less than retail users in most peer cities*. This may in part be due to San Francisco's low retail gross water usage, in combination with the utilization of an expansive regional water system with a large customer base. By complementing its relatively small retail customer base with a large wholesale customer base, SFPUC retail and wholesale customers are able to share regional water utility costs system-wide.
- *SFPUC retail water rate structure is most affordable for residential households in the 5 hundred cubic feet (Ccf) to 10 hundred cubic feet (Ccf) per month range*, and holds a consistent relative ranking compared to its peers at the same levels of consumption.
- *SFPUC commercial and industrial water rates are more expensive than most of its peers, at the given water use levels where the comparison was made*. However, commercial and industrial users in San Francisco tend to have low overall water usage, with 81% of non-residential accounts using less than 30 Ccf of water per month. Commercial and industrial uses also vary considerably between metropolitan areas, including those in the peer group.
- *Within its peer group, San Francisco ranks average in terms of volume of wastewater treated and population served*. However, San Francisco and its peer group rank high nationally in these categories, indicating that they require more maintenance than most utilities. Specifically, SFPUC wastewater services has the nineteenth largest total service population in the nation and ranks twenty-third with respect to total gallons of water treated (both metrics fall below the 50th percentile within the peer group).
- Over the reported FYE 2012-16 five- year period*, the SFPUC ranks in the middle of its peer group in its capital needs forecast (expansion, upgrade, replacement, etc.) for water services*, *at approximately $600 million, and has the highest capital needs forecast for wastewater and storm water treatment services, at approximately $1.3 billion.*

The 14 peer agencies used in this report are listed below.

Utility Name	*Primary Region Served*	*Utility Name*	*Primary Region Served*
• **Austin Water Utility**	Austin, TX	• **Miami-Dade Water and Sewer Department**	Miami-Dade County, FL
• **Charlotte-Mecklenburg Utilities**	Charlotte-Mecklenburg County, NC	• **East Bay Municipal Utility District**	Alameda and Contra Costa Counties, CA (East Bay)
• **Dallas Water Utility**	Dallas, TX	• **Philadelphia Water Department**	Philadelphia, PA
• **Gwinnett County Public Utilities**	Gwinnett County, GA	• **Phoenix Water Services Department**	Phoenix, AZ
• **Houston Public Works and Engineering Department**	Houston, TX	• **San Antonio Water System**	San Antonio, TX
• **Jacksonville Electric Authority (JEA)**	Jacksonville, FL	• **San Diego Water Department**	San Diego, CA
• **Kansas City Water Services Department**	Kansas City, MO	• **Washington Suburban Sanitary Commission**	Montgomery and Prince George's Counties, MD (DC Suburban)

Agency Profile: San Francisco Public Utilities Commission

The SFPUC is a department of the City and County of San Francisco that provides retail drinking water and wastewater services to San Francisco, wholesale water to three other Bay Area counties and twenty-seven other municipalities and utilities overall, and green hydroelectric and solar power to San Francisco's municipal departments. The agency has approximately 2,300 employees and a combined annual operating budget of over $700 million.[3]

SFPUC's Water Enterprise operates the Hetch Hetchy Regional Water System, a retail and wholesale drinking water utility that serves 2.6 million residents in Alameda, Santa Clara, San Mateo and San Francisco counties. Approximately one-third of this water is delivered to San Francisco, while the remaining two-thirds are delivered to the outlying counties. The Water Enterprise manages several tunnels, pipelines and other facilities of the water transmission system throughout the Bay Area. The City Distribution Division manages distribution of water within San Francisco. This system spans 200 miles from its water source at Hetch Hetchy Valley and encompasses 1,250 miles of distribution pipelines, 12 reservoirs and 8 water storage tanks with a total storage capacity of approximately 413 million gallons.

The Wastewater Enterprise is responsible for wastewater treatment utility operations. The Wastewater Enterprise collects, transmits, treats and discharges flows generated within San Francisco and on Treasure and Yerba Buena Islands for the protection of public health and environmental safety of the San Francisco Bay and the Pacific Ocean.

Water Enterprise revenue is based on retail and wholesale water rate payments from customers. Retail rates are set by the San Francisco Public Utilities Commission. Wholesale rates are adopted by the San Francisco Public Utilities Commission pursuant to Water Supply Agreements with wholesale customers.

The Wastewater Enterprise operates and maintains three around-the-clock wastewater treatment plants that provide liquid and solids treatment, one wet-weather treatment facility, 27 pump stations, deep water and storm water outfalls and multiple sewage discharge overflow structures which can store up to 200 **million gallons per day (MGD)** around the shoreline of the City. The Wastewater Enterprise serves both residential and commercial accounts as well as three neighboring municipal customers in Daly City, the Bayshore Sanitary District, and the City of Brisbane, with cost recovery coming from ratepayer bills based on the volume and strength of the sanitary sewage flow.[4]

Peer Agencies

Benchmarking is a process in which an organization compares its performance to the performance of other similar agencies, or "peers."

Administration of water and wastewater utilities varies widely throughout the United States based on a variety of factors such as the sources of water supply (snowmelt, groundwater, the availability of recycled water), types of treatment and delivery services provided, age of the system, state of capital infrastructure, cost of living, labor and land use agreements, and climate. It is important to keep these differences in mind when making comparisons across agencies, especially when comparing agencies in

[3] *SFPUC Comprehensive Annual Financial Report FY 2013*
[4] *SFPUC Comprehensive Annual Financial Report 2013*

different parts of the country, where land use and water access laws often vary significantly. This section briefly describes how the SFPUC as a whole compares to the peers selected for this analysis.[5]

Peer Group by Region

Northeast
- Philadelphia Water Department

South
- Austin Water Utility
- Charlotte-Mecklenburg Utilities
- Dallas Water Utility
- Gwinnett County Public Utilities
- Houston Public Works
- Jacksonville Electric Authority
- Miami-Dade Water and Sewer Department
- San Antonio Water System
- Washington Suburban Sanitary Commission

Midwest
- Kansas City Water Services Department

West
- East Bay Municipal Utility District
- Phoenix Water Services Department
- San Diego Water Department
- San Francisco Public Utilities Commission

Peer Group by Jurisdiction Type

City or municipality
- Austin Water Utility
- Charlotte-Mecklenburg Utilities
- Dallas Water Utility
- Houston Public Works
- Philadelphia Water Department
- Phoenix Water Services Department
- San Antonio Water System
- San Diego Water Department
- San Francisco Public Utilities Commission
- Kansas City Water Services Department
- Jacksonville Electric Authority

County
- Gwinnett County Public Utilities
- Miami-Dade Water and Sewer Department

Governmental district / authority
- East Bay Municipal Utility District
- Washington Suburban Sanitary Commission

Public utilities are made up of complex water supply systems consisting of reservoirs, tunnels, pipelines, and treatment facilities. Customers who receive water from the utility, or whose wastewater (sewage from homes or businesses) is processed by the utility, are generally broken down into "retail" and "wholesale" customer categories, often with several sub-divisions within these. The retail category in this report includes both residential and non-residential customers who are billed a retail rate.[6] Residents living in single family and multi-family residences in San Francisco, as well as commercial, non-commercial, and industrial customers within San Francisco, fall into this category. Service provided to municipalities and water agencies outside San Francisco's boundaries are considered "wholesale"

[5] The procedures used to select peer agencies for this analysis have been adapted from the performance measurement guidelines outlined in the National Academies of Sciences Transit Cooperative Research Program (TCRP) Report 141. Using this framework for benchmarking, a similar methodology has been adapted for the purposes of benchmarking public utilities. For more information about the TCRP methodology and the manner in which it was used in this case, refer to Appendix A of this document and TCRP Report 141.

[6] For a more detailed breakdown of customer categories, see Appendix C.

services. For example, SFPUC provides wholesale water to Alameda, San Mateo and Santa Clara counties.

The rates for retail and wholesale water and wastewater services are determined separately for the SFPUC, based on customers' respective usage and impact on the system.[7] Federal, state, and local guidelines establish a number of goals and objectives for setting retail water and wastewater rates. In particular, when setting water and wastewater rates, San Francisco's City Charter directs the SFPUC to[8]:

1. Provide sufficient revenues for the operation, maintenance and repair of the enterprise consistent with good utility practice;
2. Provide sufficient revenues to improve or maintain financial condition and bond ratings at or above levels equivalent to highly-rated utilities of each enterprise;
3. Meet requirements and covenants under all bond indentures;
4. Set rates based on cost of service;
5. Investigate and develop rate-based conservation incentives; and
6. Investigate and develop affordability programs for low-income customers.

Of particular note is the requirement to set rates based on the cost of service. Retail customers in San Francisco may only be charged what it costs to provide the service. SFPUC does not profit from the services it provides to either its retail customers or its wastewater customers.

Generally speaking, the types of services an agency provides and the mix of its customer base influences basic characteristics such as its structure and size, budget, and numerous aspects of its day-to-day management. As a result, agencies that operate similar services, serve similarly sized populations, and process a similar amount of gallons of water or wastewater, serve as suitable peers for benchmarking.

By service population alone, San Francisco is within the same range of some of the largest water enterprises in the country, ranking sixth in the nation with respect to total water service population and eleventh with respect to total gallons sold. On the other hand, San Francisco has a comparatively smaller wastewater enterprise, ranking nineteenth in the nation with respect to total wastewater service population, twenty-third with respect to total gallons treated, and twenty-seventh with respect to total gallons billed.[9] It is important to note that in San Francisco, as in some other jurisdictions which operate combined wastewater and storm water systems, billings may be underreported because storm water is not a separately billed service to wastewater customers.[10]

Figure 1a below shows that San Francisco is in the upper range of the peer group with respect to total water service population, at approximately 2.6 million people. Figure 2b below shows that San Francisco is in the upper middle range of the peer group with respect to MGD processed in its water system, at approximately 211 MGD sold.[11]

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[7] In addition to the Wastewater Enterprise's Residential and Non-residential customers, "wholesale wastewater" in this report refers to wholesale sewer service which is provided to North San Mateo County Sanitation District, Bayshore Sanitary District, and the City of Brisbane. These districts are billed in accordance with the provisions of the Joint Powers Agreements between the respective districts and the City and County of San Francisco. North San Mateo County Sanitation District is billed using the same rates as the Wastewater Enterprise's retail customers. Bayshore Sanitary District and the City of Brisbane are billed on a volumetric basis reflecting proportionate share of costs. The rates and charges for Bayshore Sanitary District and the City of Brisbane are contractual and adjusted annually.

[8] *SFPUC Proposed Retail Water and Wastewater Rates Fiscal Years Ending 2015 to 2018*

[9] All rankings based on AWWA's 2012 Benchmarking Survey of 214 agencies across the country.

[10] In San Francisco, dry weather wastewater flows range around 80 MGD, but can surge to over 500 MGD during a storm.

[11] AWWA uses MGD as a measure to group agencies according to their size, and is generally a good measure to be able to gauge an agency's scale.

Figure 1a – Water Service Population – Retail and Wholesale Combined

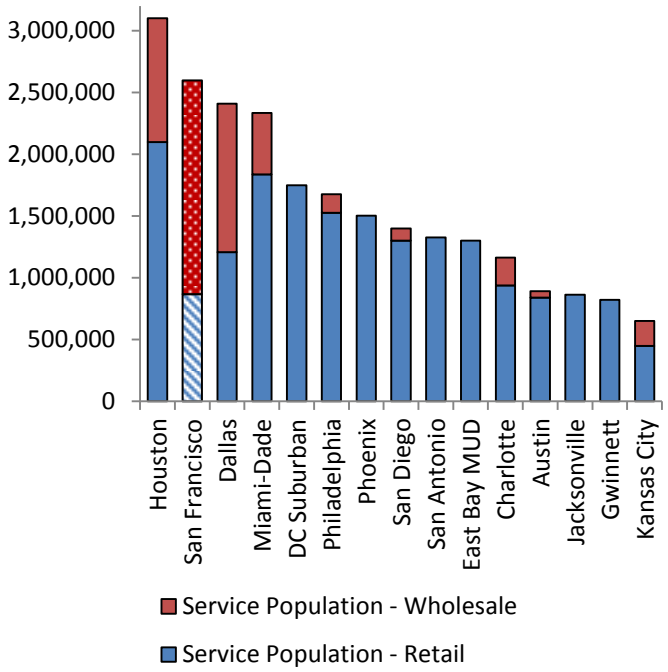


Figure 1b – Water Million Gallons per Day (MGD) Sold – Retail and Wholesale Combined

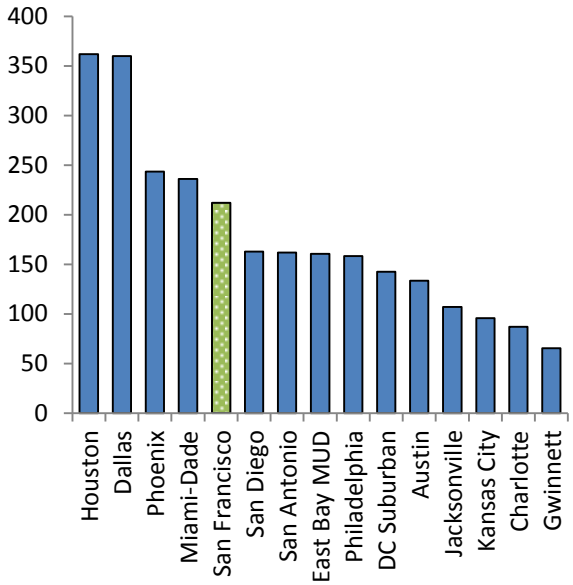


Figure 2a below shows that San Francisco is in the lower middle range of the peer group with respect to wastewater service population, at approximately 1 million people. Figure 2b below shows that San Francisco is in the lower range of the peer group with respect to annual million gallons per day of wastewater treated, at approximately 62 million GPD billed.

It is important to note that the SFPUC has a combined wastewater and storm water system. Whereas some cities maintain separate systems for the collection and treatment of storm water and sanitary wastewater, a combined sewer system captures and treats storm water and urban street runoff in addition to commercial, industrial and sanitary wastewater. Some, but not all, of the peers included in this analysis operate combined systems. Such differences between peer agency wastewater and storm water systems may significantly impact the infrastructure and maintenance costs of these systems.[12]

[12] A combined sewer system is unique in coastal California and offers significant environmental benefits compared to a "separate" sewer system (*SFPUC Comprehensive Annual Financial Report 2013*).

Figure 2a – Wastewater Service Population – Retail and Wholesale Combined

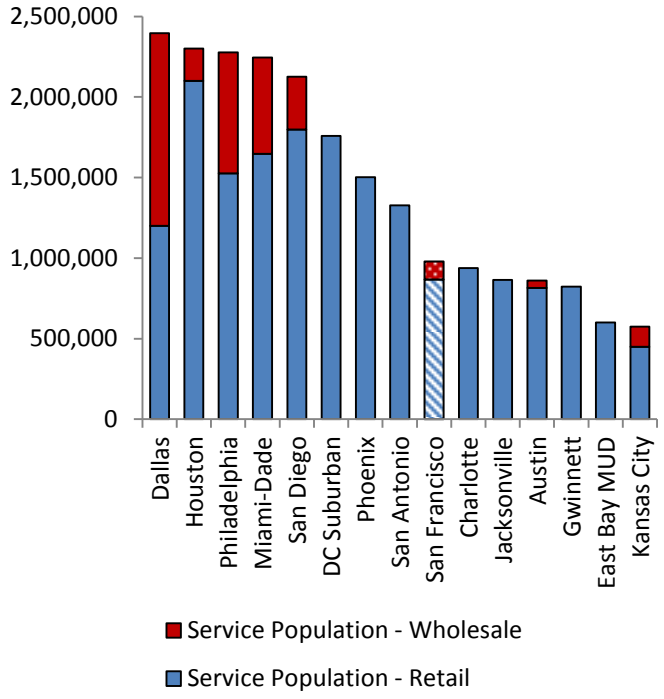
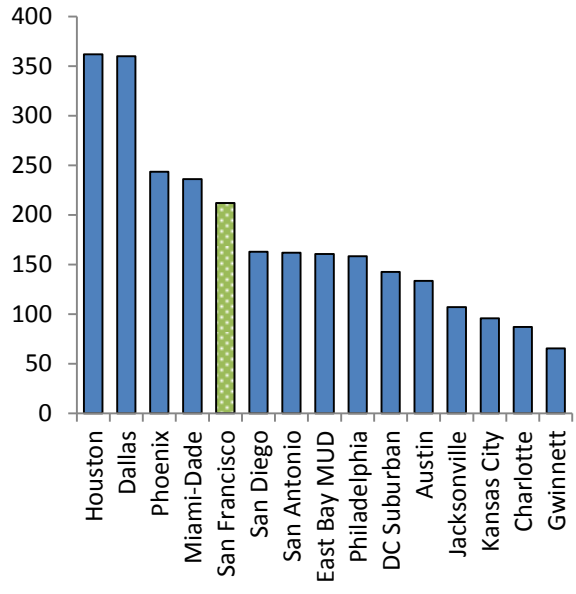


Figure 2b – Wastewater Million Gallons per Day (MGD) Treated – Retail and Wholesale Combined



In considering the relative volume of water and wastewater processed each day, San Francisco ranks relatively high in wastewater service population and MGD sold relative to the peer group. Contrastingly, San Francisco ranks relatively low in wastewater service population and MGD billed relative to the peer group. This exhibits why multiple factors must be considered in combination with one another while benchmarking peer agencies.

In addition to considering the service population size and flow or usage of water and wastewater services, it is important to consider the makeup of the customer pool. Together, these indicators can help gauge the overall composition and size of a utility. Figure 3a below shows the percentage of gallons of water sold and Figure 3b shows the percentage of gallons of wastewater billed, each based on customer category (retail or wholesale). Both figures show a clear predominance of retail service among utility agencies, though the peer group includes some of the largest wholesale water utilities in the nation; these factors are consistent with a benchmarking goal of establishing a group of peers with similar operating characteristics.

Figure 3a – Percentage of Gallons of Wholesale Water Sold vs. Gallons of Retail Water Sold

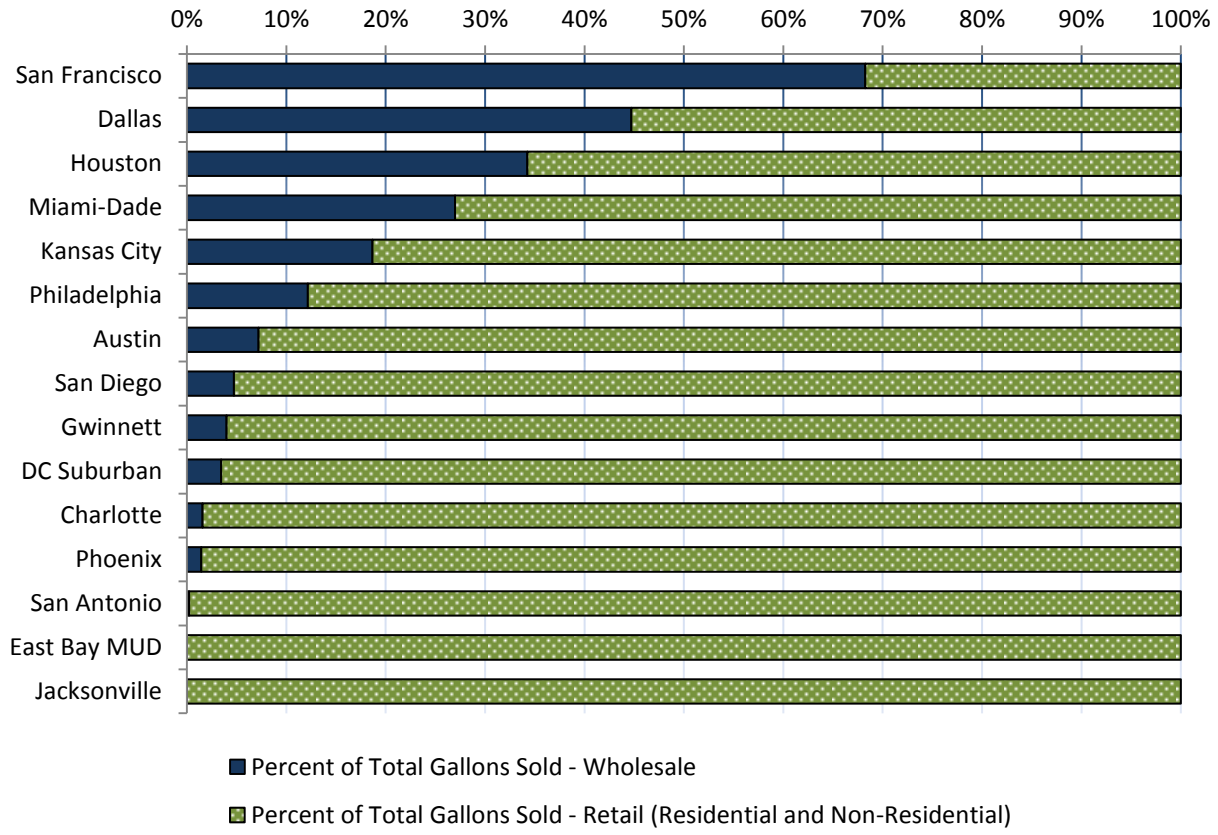


Figure 3a above shows the SFPUC is unique in that more than two-thirds of its **water** is sold to wholesale **customers**. However, despite having the highest percentage of its water service allocation for wholesale service, San Francisco ranks second among its peer group with respect to **total gallons** of water sold to wholesale customers. In comparison, other peer agencies sell no more than 45% of their water supplies to wholesale customers. Agencies that sell more water in volume tend to devote a *greater* proportion of their water enterprise to wholesale water treatment and distribution.

Figure 3b – Percentage of Gallons of Retail Wastewater Billed vs. Wholesale Wastewater Billed

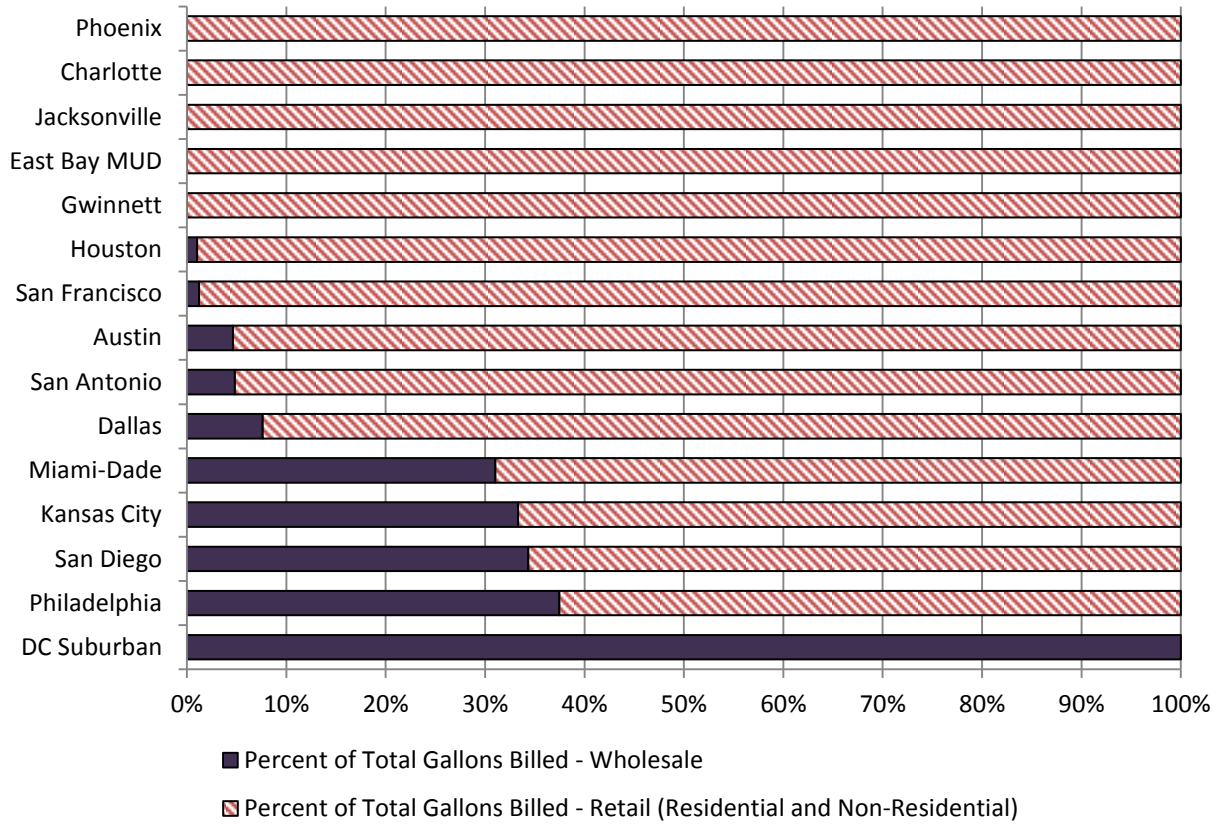


Figure 3b above shows the SFPUC derives only a tiny fraction of its total **wastewater** billings from wholesale **customers** (which come from three sanitary districts neighboring San Francisco). However, San Francisco falls in the middle among its peer group with respect to **total gallons** of wastewater billed for wholesale customers. Agencies that bill more wastewater in volume tend to devote a *lesser* proportion of their wastewater enterprise to wholesale wastewater collection and treatment.

Results of Peer Comparison

This report focuses only on the **water** and **wastewater** utilities operations of the SFPUC. Its purpose is to evaluate the overall level and effectiveness of selected utility services, and it is based on a broad range of performance measures covering topics such as: cost-efficiency, cost-effectiveness, productivity, resource utilization, utility investment, service utilization (by customers), and delivered service quality.

Cost-Efficiency Measures

Cost-efficiency measures generally reflect an agency's ability to provide service outputs (e.g., gallons of water and treated wastewater) within the constraints of service inputs such as available funding.[13] The cost-efficiency measures examined here are *operating cost per gallon of water sold/wastewater billed* and *operating cost per capita* (both per capita for the retail service population and for the total combined, retail and wholesale, service population). *Gallons of water sold* reflects the raw number of units of water that are sold; similarly, *gallons of wastewater billed* reflects the raw number of units of wastewater that are billed.

[13] *National Academy of Sciences TCRP Report 141, 2010*

Figures 4a, 4b, and 4c below show the annual operating expenses(not including depreciation, interest expense, miscellaneous expense, or other non-operating expense), for the SFPUC and selected peers (those that reported separate water and wastewater income statements to AWWA) by service type. All charts describing operating expenses refer to operating expenses as defined above and for FYE 2011, unless otherwise noted. Selected peers are shown in some charts, based on the availability of data.

Figure 4 – Operating Expenses FYE 2011 (Before Depreciation) by Service Type (millions)

Figure 4a. Water

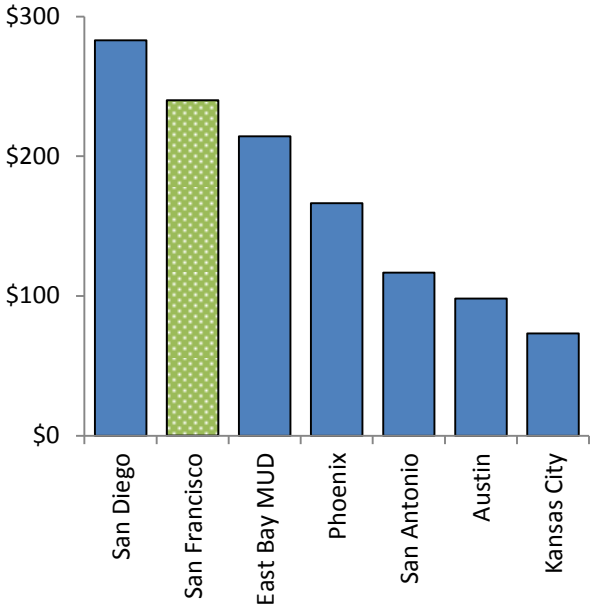


Figure 4b. Wastewater

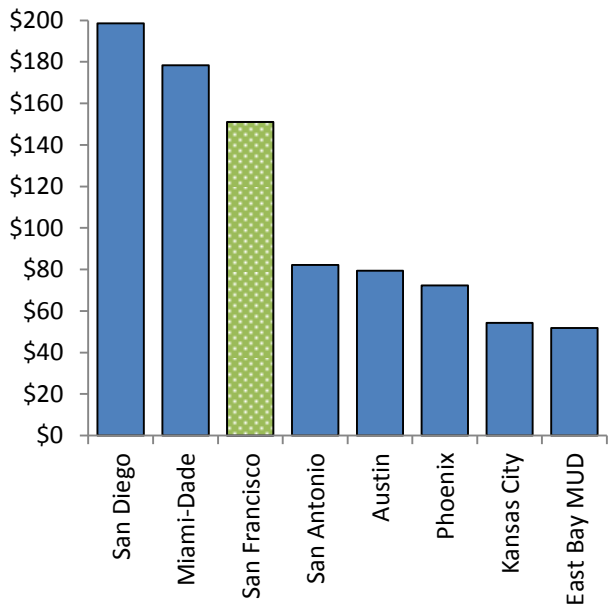
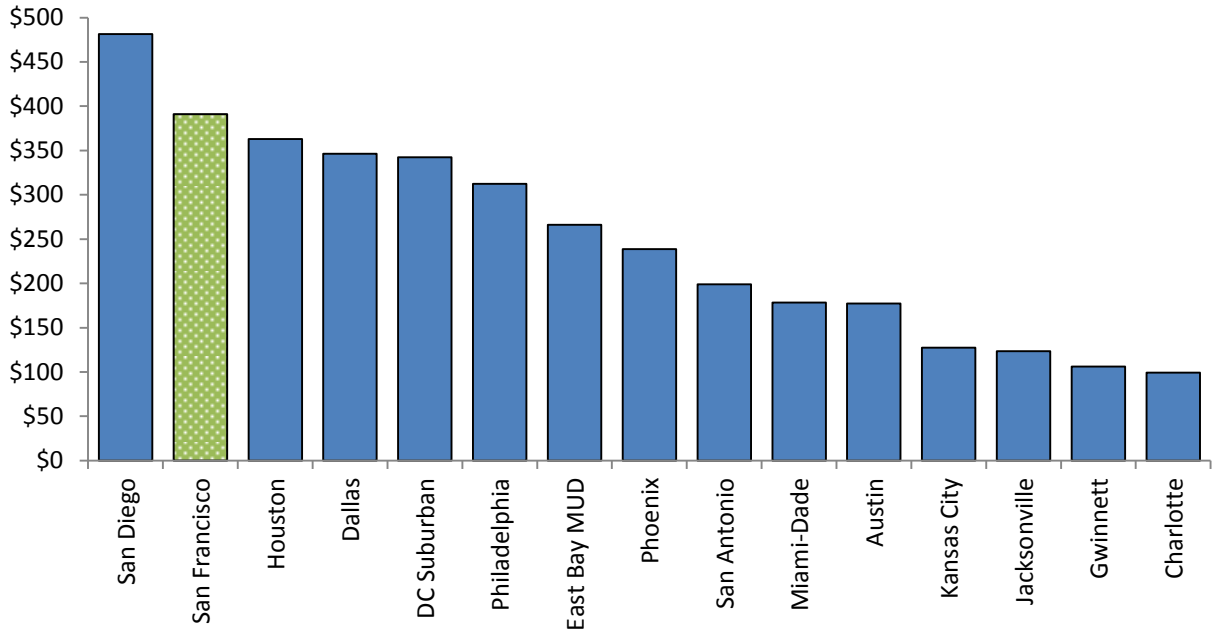


Figure 4c. Total Water and Wastewater Operating Expenses (Before Depreciation)



Figures 4a and 4b show that San Francisco is near the upper range of the group for both water and wastewater service. Figure 4c shows total operating expenses for all peers. San Francisco ranks among the top of several utilities in total operating expenses among the peer group.

Infrastructure differences among utility systems may partially account for the wide variation in operating expenses across agencies. For example, the SFPUC operates over 1,250 miles of distribution pipeline, in part due to the distance of San Francisco from the Hetch Hetchy water source and its service of several regional customers, whereas other systems may have been designed to draw water from a nearer source or other agencies' existing pipelines.

Additionally, while operating costs do not include debt service from capital projects, operating costs may be impacted by capital projects after construction is completed and the project is brought "online." For example, the replacement or refurbishment of old infrastructure may decrease operations and maintenance (operating expenses) . Alternatively, the introduction of new infrastructure which is made in *addition* to old infrastructure tends to increase operating expenses. The SFPUC's $4.6 billion WSIP includes a combination of projects which introduce new infrastructure (such as California's largest ultra-violet water treatment plant, the Tesla Treatment Facility) and projects that upgrade, repair, and replace aging infrastructure (such as the replacement of old pipes and dams system-wide).[14]

Figure 5 below shows the total gallons of water sold annually among the peer group and Figure 6 below shows the water enterprise's operating expenses per million gallons of water sold (with selected peers). San Francisco's water system processes a substantially larger load of water than many of its peers and approximately two-thirds of San Francisco's water sales are wholesale with the remainder retail. SFPUC's volume of retail water sales are comparatively low relative to its peers, and its volume of wholesale water sales are comparatively high.

Figure 5 also shows that SFPUC sells 8 times as much wholesale water as Kansas City, its peer with the lowest operating expenses for water service, even though San Francisco and Kansas City operate a comparable number of active wholesale water accounts. For comparison, East Bay Municipal Utility

[14] *Water System Improvement Program: The Quarter in Brief, Q4 FYE 2011*

District (EBMUD) does not sell wholesale water, and many of the other utilities in the peer group have only minor wholesale water enterprises.

Figure 5 – Water Total Gallons Sold Annually – Retail and Wholesale (millions)

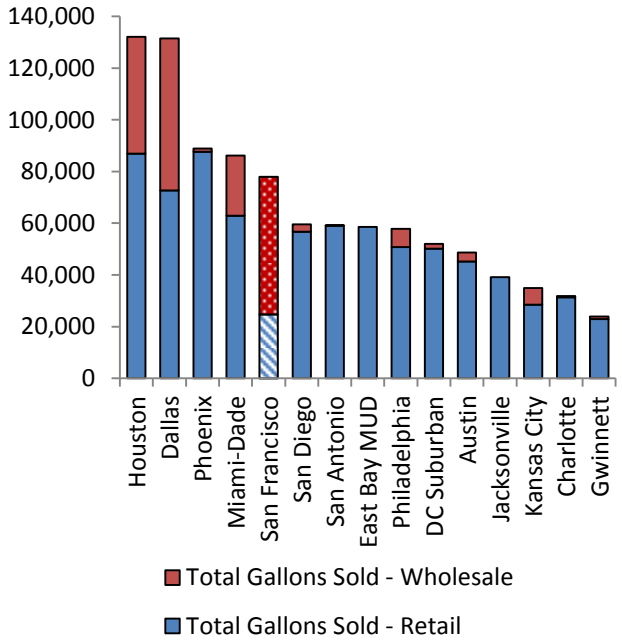


Figure 6 – Operating Expenses Per Million Gallons of Water Sold

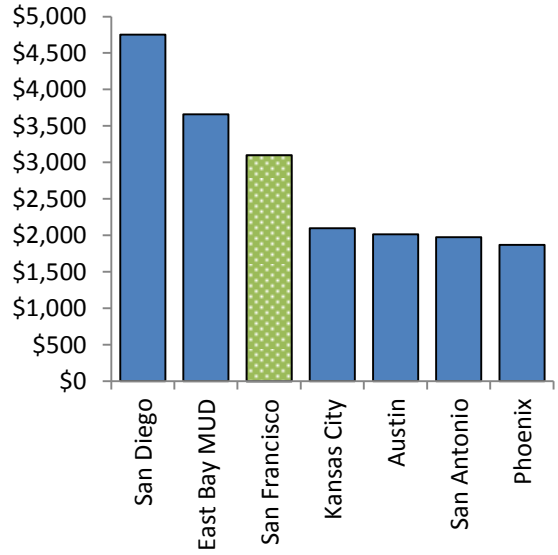


Figure 6 shows that San Francisco's operating expenses per million gallons of water sold are relatively high compared to selected peers. One possible reason for the SFPUC's higher operating expenses is that San Francisco operates significantly more wholesale accounts than its peers, requiring a need to establish and maintain infrastructure outside of city limits and over a wide geographic region. Much of SFPUC's infrastructure also cuts over earthquake fault lines, which can significantly contribute to infrastructure cost, though, San Francisco's peers may have unique infrastructure requirements of their own.

Houston and Dallas are the only peers that sell nearly as much wholesale water as San Francisco. Table 1 below shows SFPUC and these peers' total number of active retail and wholesale water accounts, volume of water sold/billed, and total operating expenses of the combined enterprises. The agencies selling comparable volumes of wholesale water also have relatively comparable wastewater enterprises, and their total operating expenses are also comparable in scale, especially when compared to agencies that do not have such large wholesale water enterprises.

Table 1 – Water and Wastewater Accounts, Volume Sold/Billed, and Operating Expenses

Agency	Retail Accounts	Wholesale Accounts	Total Gallons of Retail Sold/Billed	Total Gallons of Wholesale Sold/Billed	Operating Expenses (Water + Wastewater)[1]
Dallas					
Water	292,145	23	72,660	58,770	-
Wastewater	273,740	0	48,490	4,000	-
Total	**N/A**	**N/A**		**N/A**	**$346,455,000**
Houston					
Water	450,600	274	86,891	45,259	-

Wastewater	418,393	24	72,798	753	-
Total	**N/A**	**N/A**		**N/A**	**$362,851,000**
San Francisco					
Water	173,372	28	24,768	53,234	$239,967,0000
Wastewater	163,316	3	22,439	277	$151,058,000
Total	**N/A**	**N/A**		**N/A**	**$391,025,000**

Notes: 1. Dashes indicate that data was not reported to AWWA

Figure 7 below shows the total gallons of wastewater billed and treated annually, as well as the customer breakdown for wastewater billed. At approximately 22,700 gallons billed and 31,600 gallons treated, San Francisco processes a low relative volume of wastewater compared to its peers, and a vast majority of its wastewater billing is for retail service. A retail focus for wastewater services is common among this peer group. Figure 8 shows the wastewater enterprise's operating expenses per million gallons of water treated, which at approximately $4,800 per million gallons treated, lead its peer group.[15]

Figure 7 – Wastewater Total Gallons Billed and Treated– Retail and Wholesale (millions)

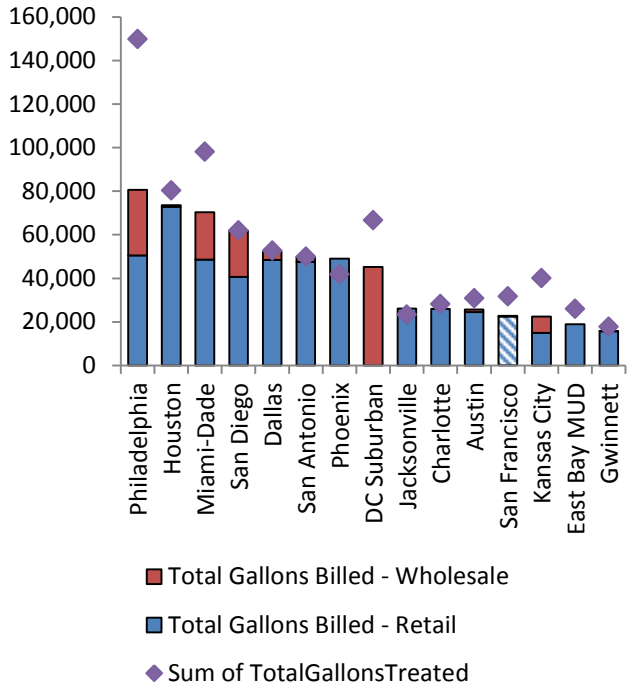
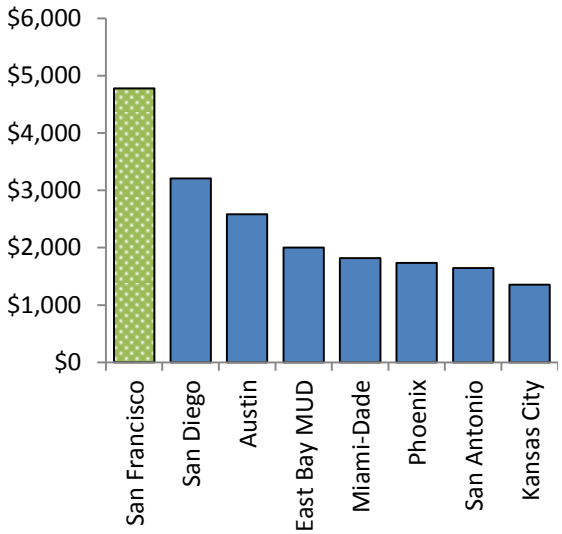


Figure 8 – Operating Expenses Per Million Gallons Wastewater Treated



[15] The number of millions of gallons of wastewater actually treated is higher for each of these agencies than the number of gallons of wastewater billed; though, the degree of variation between number of gallons billed and number of gallons treated varies significantly between agencies. This may be due to the way that storm water is managed for each agency. When considering operating expenses, however, since more gallons of wastewater are being treated than are being billed, this would bring overall operating expenses per million gallons of wastewater down, at least with respect to those gallons which are *treated* versus gallons which are *billed*. Nonetheless, while the disparities between peers are less when comparing operating expenses per million gallons of wastewater treated than when comparing operating expenses per million gallons of wastewater billed, San Francisco is still higher than its peers in both measures.

To further illustrate the cost impacts of higher levels of service, Figures 9 and 10 below show a national industry-wide comparison of operating expenses as it relates to the amount of water sold or wastewater treated. Figure 9 shows the total number of gallons of water sold vs. operating expenses for a number of water enterprises throughout the country. Figure 10 shows the total number of gallons of wastewater billed vs. operating expenses for a number of wastewater enterprises throughout the country.[16] Both plots demonstrate clear trends of increasing expenses with an increase in the number of gallons of water sold or wastewater billed.

Though a best-fit correlation line is presented for illustrative purposes on both charts, it is important to note that the correlation is not particularly strong for water service. Figure 9 shows that as utilities cross the threshold of selling about 40,000 million gallons of water, operating expenses begin to diverge more noticeably from the trend line; Figure 10 shows that this threshold for accurately estimating operating expenses for large utilities lies at around 20,000 million gallons of wastewater treated. Operating expenses at high levels of water production or wastewater treatment may depend increasingly on externalities such as geography, climate, types of technology used, or the scale of infrastructure.

At approximately 80,000 gallons of water sold, the national trend line in Figure 9 would estimate expenses of around $125 million. However, San Francisco's expenses are higher than the estimate, at $240 million per year. Likewise, at approximately 30,000 gallons of wastewater treated, the national trend line in Figure 10 would estimate expenses of around $60 million. However, San Francisco's expenses are higher than the estimate, at $150 million per year. Nonetheless, San Francisco's expenses are generally in line with the trend established within its peer group; that is, it can be recognized that peers in California and the western United States in general have higher expenses than in other parts of the nation. Many of San Francisco's peers fall into this group with high operating expenses relative to the industry and mid to high levels of water sold and wastewater billed.

A national industry-wide comparison was chosen in this section of the report to help illustrate this very fact – the unique operating environment of San Francisco and its peers compared to national industry averages. Additionally, a national comparison more clearly illustrates the relationship of level of service to operating expenses than a peer-only comparison could provide; since at higher levels of service like in San Francisco, operating expenses increase in variance between peers.

[16] Figures 9 and 10 need to be plotted separately because the costs and volume sold of water, or wastewater treated, varies greatly between water and wastewater enterprises, and each peer agency differs with respect to the performance of and costs associated with either of its enterprises.

Figure 9 – Total Number of Water Gallons Sold vs. Water Operating Expense (Before Depreciation) – Industry-Wide Comparison[17]

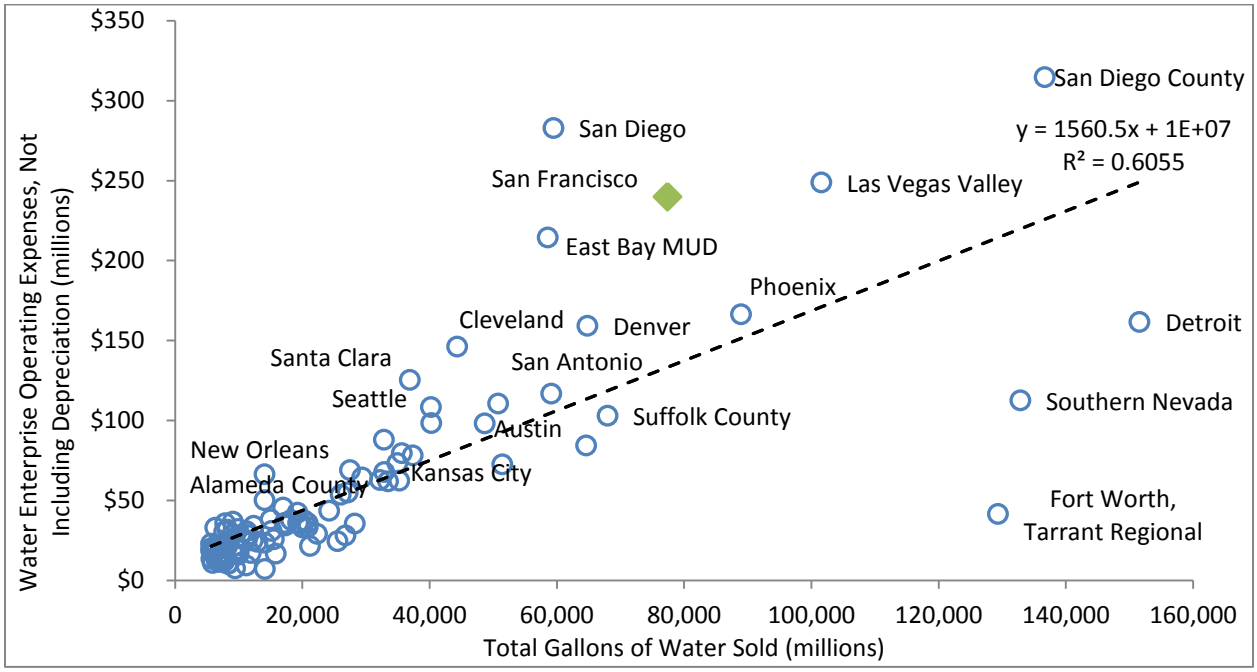
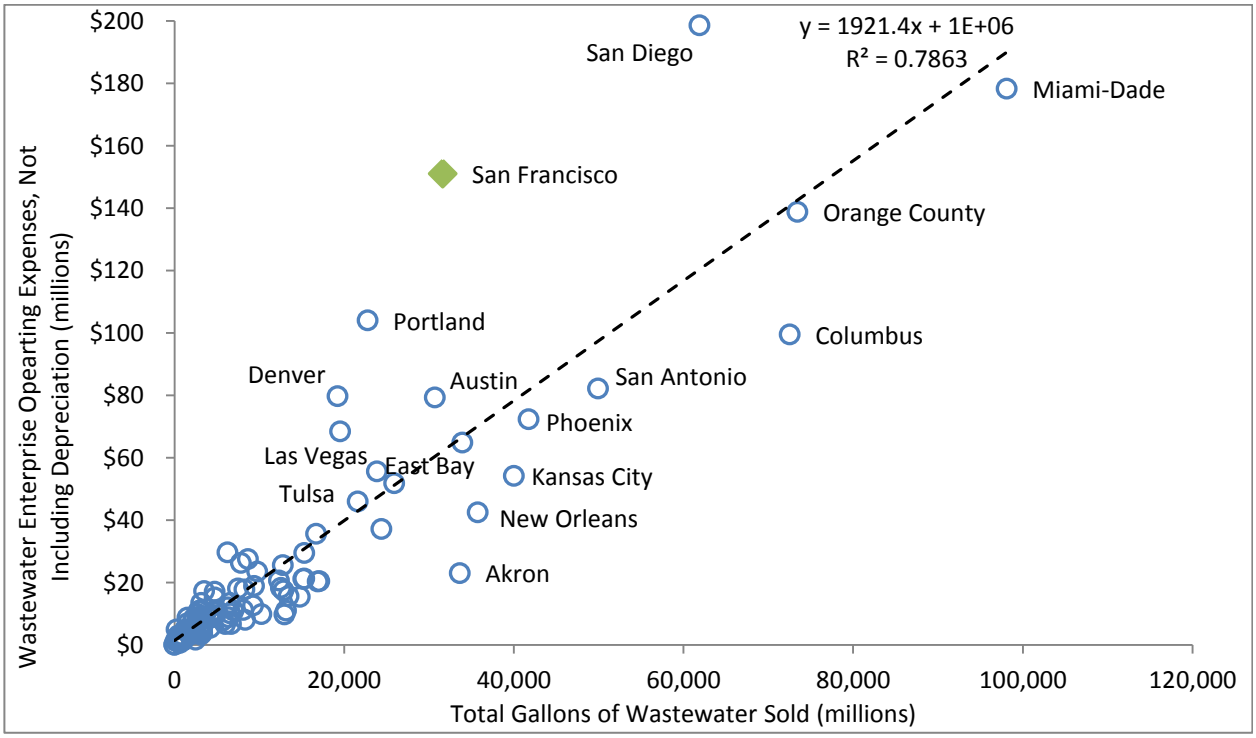


Figure 10 – Total Number of Wastewater Gallons Billed vs. Wastewater Operating Expense (Before Depreciation) – Industry-Wide Comparison[18]



[17] 104 agencies from around the country were used in this comparison, for which water enterprise-specific operating costs information was available through AWWA; data excludes outliers from San Francisco's peer group. The chart includes labels for San Francisco's peers for which data was available, as well as some other key agencies which diverge from the best-fit trend line.
[18] 103 agencies from around the country were used in this comparison, for which wastewater enterprise-specific operating costs information was available through AWWA; data excludes outliers from San Francisco's peer group. The chart includes labels for San Francisco's peers for which data was available, as well as some other key agencies which diverge from the best-fit trend line.

Without knowing the specific impact of retail versus wholesale services on operating expenses, as the AWWA data does not go into this level of granularity, peers' separate retail and wholesale enterprise cost-efficiency cannot be definitively compared, on the basis of per unit operating expenses. This is because retail and wholesale revenue requirements may differ substantially, even within a given water or wastewater enterprise. Nonetheless, it is useful to understand the overall cost-efficiency of each enterprise in terms of its overall per unit operating expenses.

While San Francisco's total service population is larger than all of its peers except Houston, based on the available data, it cannot be conclusively determined why San Francisco's per unit operating expenses for both water and wastewater is also higher than its peers.[19] A more comprehensive analysis would require looking at, among other things, the specific operating expense drivers for each agency, as well as the proportion of cost that is attributable to retail versus wholesale services. With the available data, we can see that the difference in operating expenses might be explained by the fact that, compared to its peers, San Francisco has relatively small retail (residential and non-residential) service populations for both water and wastewater (see Figures 1a and 2a). The same holds true for San Francisco's output in terms of gallons of retail water and wastewater – both numbers are relatively low for San Francisco, compared to its peers (see Figures 1b and 2b).

That is, operating expenses are affected both by the number of people who need to be served and how much water needs to be produced. Since San Francisco's retail service populations are relatively small for both water and wastewater, and since San Francisco has achieved high levels of water use efficiency and conservation, this could skew per unit operating expenses because any public utilities system requires significant capital investment be allocated in order to maintain fixed infrastructure (e.g. the Hetch Hetchy water supply system). Refer to Appendix B for more detailed information on San Francisco's total assets and liabilities, capital needs forecasts, and overall system size and utilization as compared to its peers.

Fixed infrastructure aside, Figure 11a below shows that San Francisco's operating expenses are in fact significantly impacted by its service population when compared to its peers. On a per capita basis, the SFPUC is one of the most cost-efficient agencies amongst its peer group, with its operating expenses for water per capita coming in at around $90 per person served. It is important when considering these operating expenses *per capita* charts, however, that operating expenses per capita may not be fully represented for all of the peers. For example, San Francisco supplies water to approximately 870,000 retail customers and nearly 1.8 million wholesale customers. While the costs for San Francisco's retail customers are fully represented within SFPUC's operating expenses, SFPUC's wholesale service population must receive further service from other utilities which SFPUC sells its wholesale water to. That is, while SFPUC supplies the water itself, other local utilities are responsible for distributing the water, in addition to any further treatment or storage which may be necessary. East Bay MUD is one of these utilities which SFPUC sells wholesale water to.

Nonetheless, by serving relatively more people with a single water system, cost savings could be achieved. This suggests that the wholesale water enterprise may in fact help reduce regional water costs, on a per capita basis. Looking at Figure 11b, the same cannot be said for SFPUC's wastewater enterprise in terms of the scale of overall operating cost reduction – because SFPUC's wholesale service population is relatively small. Operating expenses per capita is a useful metric for understanding the impact and cost-efficiency of each agency as a whole – regardless of whether its sales go to retail or wholesale customers.

[19] This discussion only focuses on peers for whom operating cost data is available in the separate water and wastewater service categories. Only agencies with outlier or erroneous data were removed from the above charts. AWWA does not break out operating costs relative to retail and wholesale services, so the total level of service must be assessed instead.

Figure 11 – Operating Expenses (Before Depreciation) Per Capita, Total Service Population – Retail and Wholesale Combined

Figure 11a. Water

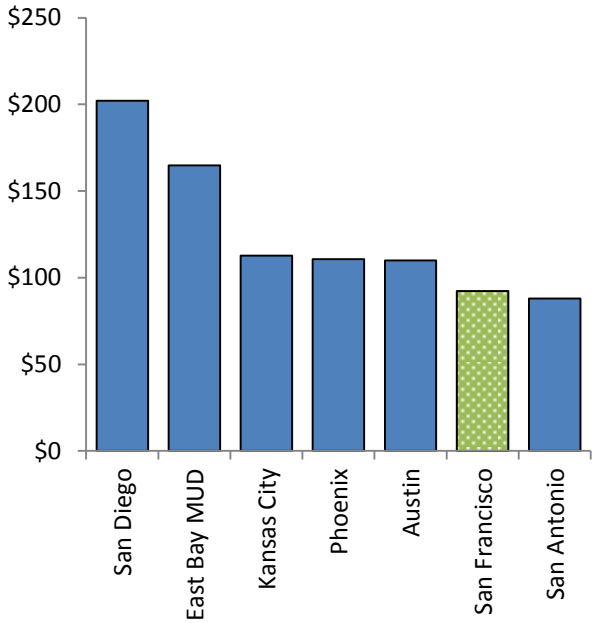
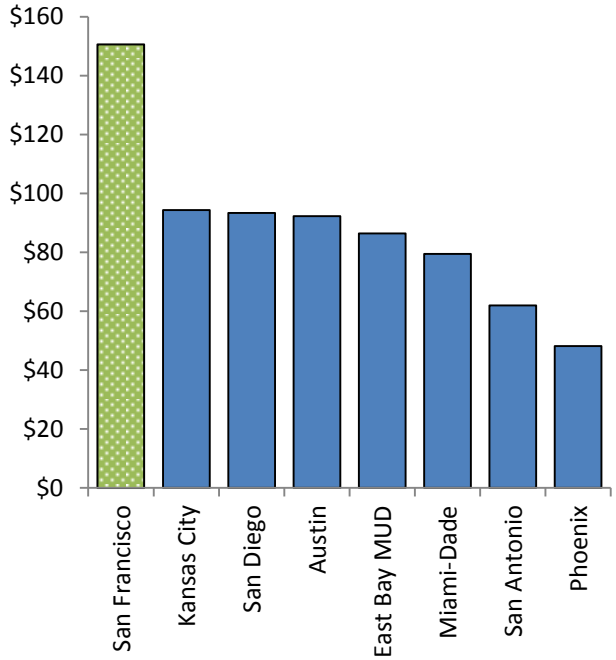


Figure 11b. Wastewater



In sum, while the SFPUC's water operations are relatively cost-efficient on a dollar per capita basis (when considering the total service population), SFPUC is less cost-efficient on a dollar per gallon sold basis. Compared to its water enterprise, SFPUC's wastewater enterprise is less cost-efficient compared to its peers on both a dollar per capita basis and dollar per gallon billed basis. However, SFPUC's water and wastewater operating cost efficiency is comparable in scale with all of its peers for which separate water and wastewater operating cost data is available.

Rate-Efficiency Measures

This section will examine outward-looking measures that reflect the prices charged to SFPUC customers. Rate-efficiency measures are a type of cost-efficiency measure. Like cost-efficiency, rate-efficiency generally reflects an agency's ability to provide service outputs (e.g., gallons of water and treated wastewater) within the constraints of service inputs such as available funding.[20] The rate-efficiency measures that are observed in this section are *cost of water/wastewater per consumption level* (various levels chosen based on AWWA benchmarking) and *wholesale weighted average rate*.

Cost of water/wastewater per consumption is a measure reflecting the cost customers pay per gallon of water or wastewater. This report assesses the cost of a water and wastewater bill at various levels of consumption. Water consumption and wastewater treatment is generally measured in cubic feet (cf), **hundred cubic feet (Ccf)**, gallons (1 gallon = 13.37 Ccf and 1 Ccf = 748.05 gallons), or million gallons. The *wholesale weighted average rate* is the average rate charged to wholesale customers for either water or wastewater services.

It is important to note when considering rate-efficiency in the public utilities context that the vast majority of water and wastewater utilities costs are fixed costs and the vast majority of its costs are

[20] *National Academy of Sciences TCRP Report 141, 2010*

recovered through usage rates. For example, looking at the components of Charlotte-Mecklenburg Utilities which are dependent on service usage, 82% of revenues come from usage rates, but only 7% of expenses go toward payment for power and chemicals. The remaining 93% of expenses go toward fixed costs, with 52% of the total going toward debt service, 25% toward operations, 10% toward billing costs, and 7% toward pay-go payments. San Francisco's expenses are similarly burdened mostly by fixed costs.21 Over 90% of SFPUC's water and wastewater expenses go to covering fixed costs, regardless of volumes of water sold or wastewater treated (from which usage rates would be derived).

It is also important to note that retail (residential and non-residential) rates are determined separately from wholesale rates. According to the SFPUC:

> Wholesale Customer rates are determined based upon the Wholesale Customers' collective share of the Water Enterprise's total revenue requirements, known as the "Wholesale Revenue Requirement" in the WSA[22]. Under the WSA, the cost of service for suburban resale is calculated on the same "cash basis"[23] as retail rates. Using the cash basis, the cost of service for Wholesale Customers will include a pro-rata share of operation and maintenance expense plus a prorate share of debt service and appropriations for revenue-funded capital improvements of the Regional Water System. (*SFPUC Proposed Retail Water and Wastewater Rates Fiscal Years Ending 2015 to 2018*, p. 16)

Going forward, we will first consider retail water rates, and then wholesale water rates. Second, we will consider retail wastewater rates, and then wholesale wastewater rates.[24] In the next section, we will consider the relative affordability of these rates within each peer jurisdiction. In the section after that, we will provide rate and affordability comparisons for a subset of San Francisco's peers.

Before delving further into water and wastewater rates, it is important to understand rate structures.[25] San Francisco employs an **inclining block structure** for both. An inclining block structure accounts for costs incurred to meet peak demands and also encourages conservation by charging a higher price per block as consumption increases. Depending on the number of blocks and the differential between blocks, an inclining block rate structure can provide a strong conservation price signal.[26] San Francisco

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[21] *AWWA Water and Wastewater Rate Survey 2012*, pp. 11-12 *AWWA Water and Wastewater Rate Survey 2012*, pp. 11-12

[22] The Water Enterprise provides wholesale water service to 27 suburban wholesale customers. They, in turn, provide retail water service to approximately 1.8 million people in Alameda, Santa Clara and San Mateo counties. Wholesale water service is provided under the terms of the 2009 Water Supply Agreement (WSA) which expires on June 30, 2034.

The Wastewater Enterprise supplies wholesale sewer service to three special districts: North San Mateo County Sanitation District, Bayshore Sanitary District, and the City of Brisbane. These districts are billed in accordance with the provisions of the Joint Powers Agreements between the respective districts and the City and County of San Francisco. North San Mateo County Sanitation District is billed using the same rates as the Wastewater Enterprise's retail customers. Bayshore Sanitary District and the City of Brisbane are billed on a volumetric basis reflecting proportionate share of costs. The rates and charges for Bayshore Sanitary District and the City of Brisbane are contractual and adjusted annually.

[23] "Cash basis" refers to an accounting practice under which the agency recognizes revenues and expenses (which are used to calculate income) at the time that physical cash is actually received or paid out. This is opposed to accrual accounting, in which income is recognized and recorded at the time when the revenue is earned (but not necessarily received) and when the expense or liability is incurred (but not necessarily paid for) (Investopedia).

[24] It is important to remember that this rate information is based on FYE 2010-11 data. SFPUC water and wastewater rates have changed since then, and likely rates for other jurisdictions have changed as well. AWWA provides detailed data for benchmarking across a wide selection of peer groups and its complete report is only made available biannually, which is why slightly older data is being used.

[25] For more information about rate structures, see Appendix D.

[26] SFPUC has decided to phase in a uniform wastewater rate by 2018, i.e. do away with tiers and have a single rate at all consumption levels.

has two price blocks for both water and wastewater retail, although utilities that use inclining block rates differ greatly in where they place their tier thresholds and the number of tiers they use.[27]

It is important to note the context which AWWA's biannual rate survey provides in understanding rate-setting in the water and wastewater utilities industry at large. The AWWA survey found that between 1996 and 2012, water rates had increased by an annual average of 4.90% and wastewater rates by 5.19%, while the Consumer Price Index (CPI) had increased by 2.50%. This means that water rates have increased faster than inflation – a trend, which according to AWWA, is likely to continue, due to infrastructure spending in combination with decreased consumption and increased regulation. [28]

The decline in per capita water consumption can have significant revenue implications for utilities. Because the vast majority of costs for a utility are fixed, as consumption declines, rates need to increase in order to make up the difference in revenue recovery. In this regard, the country could be faced with a "self-perpetuating cycle" in the water utilities, where consumption continues to decline and rates continue to rise. [29] Though the rate of consumption decline could depend on a number of factors, AWWA suggests that there are four primary factors which are causing the decline in consumption:

1. Acceptance of a general conservation ethos;
2. Prevalence of water efficient fixtures and appliances;
3. Elasticity impact of increasing water rates; and
4. Impacts of the economic recession that began in approximately 2008.[30]

Water Rates

Figures 12-14 show the peer group's respective water bills at various AWWA benchmarked levels of consumption. The first of these, Figure 12, shows the water bill for a range of 0 to 10 Ccf/month, a normal range for single-family or multi-family residential consumption.

San Francisco has a low fixed charge for monthly water service, at $7.00 per month for 0 Ccf/month, i.e. the charge for billing and meter reading. This fixed charge falls at both the mean and median averages for its peer group. At 5 Ccf/month, San Francisco ranks third in its peer group, at around $27 per month; and at 10 Ccf/month, San Francisco rises to second most expensive amongst its peers, at around $50 per month.[31] San Francisco's relative rise in ranking among its peers, in terms of the cost of a customer's monthly water bill, may suggest that the SFPUC's inclining block rate structure does indeed help incentivize conservation. However, a March 2014 study from San Francisco's Office of Economic Analysis, *Price Elasticity of Demand for Water: Estimates for San Francisco Retail Customers*, suggests that water efficient measures in the building code for plumbing requirements actually contribute to incentivizing conservation more than rates alone.[32]

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[27] According to AWWA, 52% of its survey participants use an inclining block rate structure. Sample water and wastewater rate schedules for San Francisco, and a subset of its peer group, appear later in this section.

[28] AWWA claims that decreasing opportunities for external funding, increasing challenges associated with regulation – which are only likely to become more stringent – garnering public support for rate increases, and asset repair and replacement, would necessitate additional expenditures by utilities to meet compliance. Furthermore, AWWA posits that the federal government is likely to rely on regulation through unfunded mandates, forcing utilities to address rising costs by raising rates.

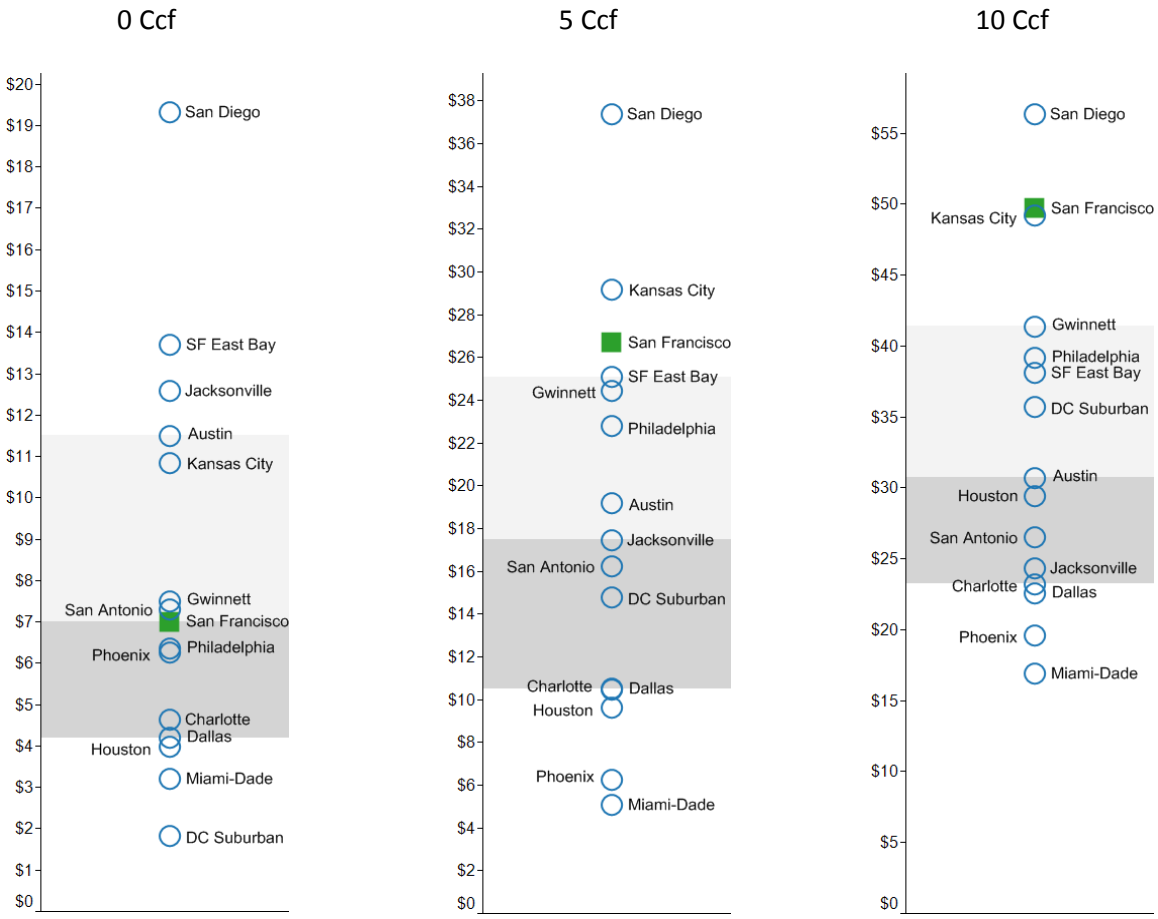
[29] *AWWA Water and Wastewater Rate Survey 2012*, pp. 11-12

[30] *AWWA Water and Wastewater Rate Survey 2012*, pp. 11-12

[31] In San Francisco, less than 10% of both single family residential and multi-family residential customers use 10 Ccf/month (*SFPUC Proposed Retail Water and Wastewater Rates Fiscal Years Ending 2015 to 2018*). However, 10 Ccf/month of water usage is not uncommon in other parts of the country.

[32] In order to understand the impact of water savings resulting from plumbing codes and City conservation programs, the SFPUC commissioned a study by M.Cubed; SFPUC Passive and Active Conservation Savings: 1992-2012. This study found that water savings from plumbing codes and programs resulted in a 3.5 MGD reduction in consumption for SFR customers compared to an

Figure 12 – Monthly Water Bill for Retail Customers (Residential Lower Range)



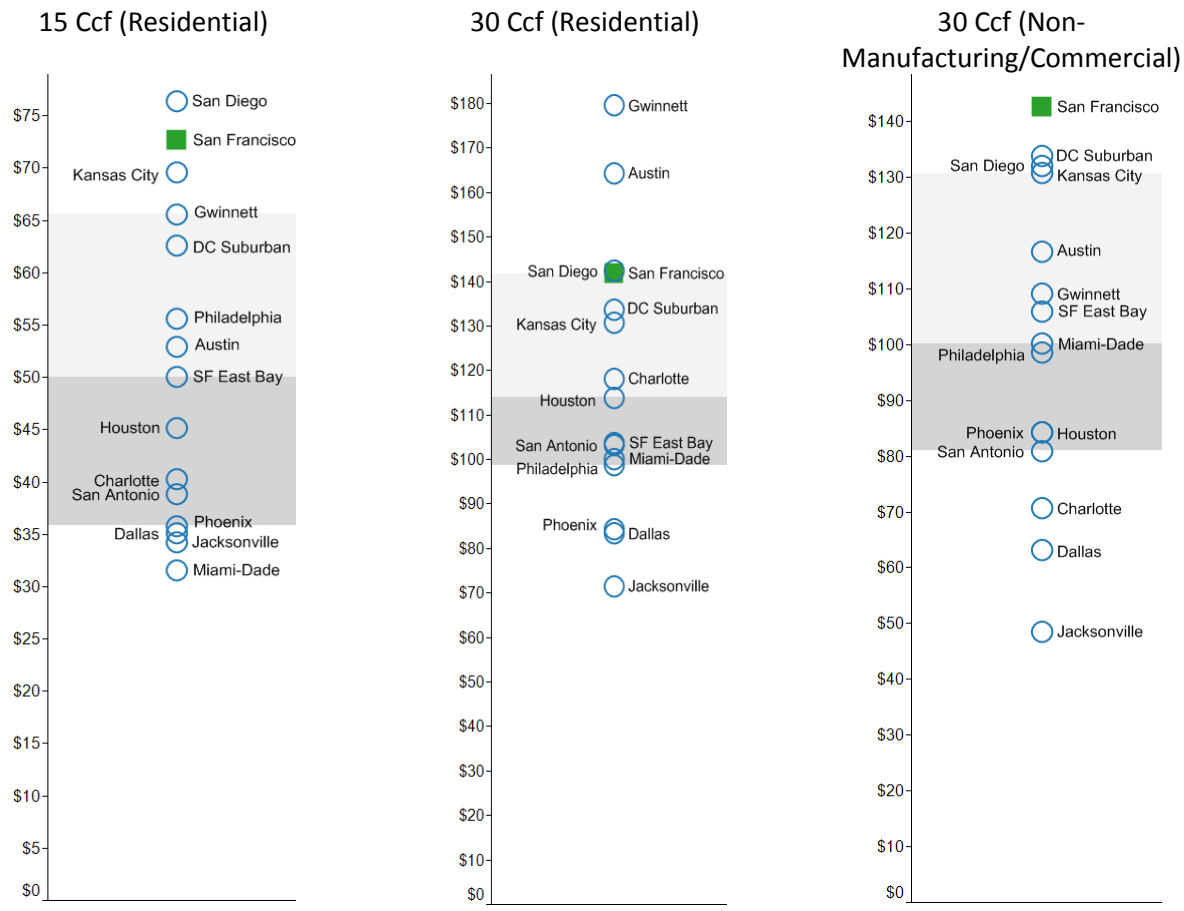
It is important to note that average *residential* water usage in San Francisco is only 6.0 Ccf per month. The vast majority of SFPUC residential users fall below 10 Ccf of water usage per month.[33] In most other service areas around the country, especially where outdoor watering is common, average residential consumption lies at around 10 Ccf of water or more per month.

Figure 13 below shows the water bill for 15 to 30 Ccf/month, a range that is considered high for single-family or multi-family residential consumption. 30 Ccf/month is considered a standard level of consumption for commercial, non-manufacturing retail customers.

actual reduction over the period of 3.6 MGD. Similarly for MFR customers, water savings from plumbing codes and programs resulted in a 6.4 MGD reduction in consumption compared to an actual reduction over the period of 6.6 MGD. Finally, for non-residential customers, water savings from plumbing codes and programs resulted in a 1.3 MGD reduction in consumption compared to an actual reduction over the period of 4.5 MGD (*SFPUC Proposed Retail Water and Wastewater Rates Fiscal Years Ending 2015 to 2018*).

[33] *SFPUC Proposed Retail Water and Wastewater Rates Fiscal Years Ending 2015 to 2018*

Figure 13 – Monthly Water Bill for Retail Customers (Residential Upper Range and Commercial Lower-Range)



Comparing Figures 12 and 13, SFPUC's retail water price structure optimizes residential household costs in the 5 to 10 Ccf/month range. That is, while San Francisco residential retail customers' monthly water bill at 10 Ccf/month and 15 Ccf/month both rank as the second most expensive among the peer group, San Francisco draws progressively closer to having the most expensive water bill in the peer group as consumption level rises. The 15 Ccf/month residential retail water bill is near $73 per month.

The inclining block retail price structure discourages excessive water usage for any customer in the 15 Ccf per month range, and San Francisco becomes increasingly more expensive compared to its peers at the same level of consumption. However, in the 30 Ccf per month range for residential retail customers,[34] San Francisco becomes slightly more inexpensive compared to its peers – at near $142 per month, it remains near the upper quartile of the peer group although Gwinnett County and Austin are substantially more expensive.

It is important to note, however, that for San Francisco and most of its peers *residential* water usage generally falls below 15 Ccf/month (refer to Figure 15 for actual average monthly residential consumption levels for water). In the 15 to 30 Ccf/month range, most customers are in fact commercial, non-manufacturing operations – i.e. *non-residential* customers. Of all non-residential accounts in San Francisco, approximately 81% use less than 30 Ccf of water per month.[35] At 30 Ccf/month for non-

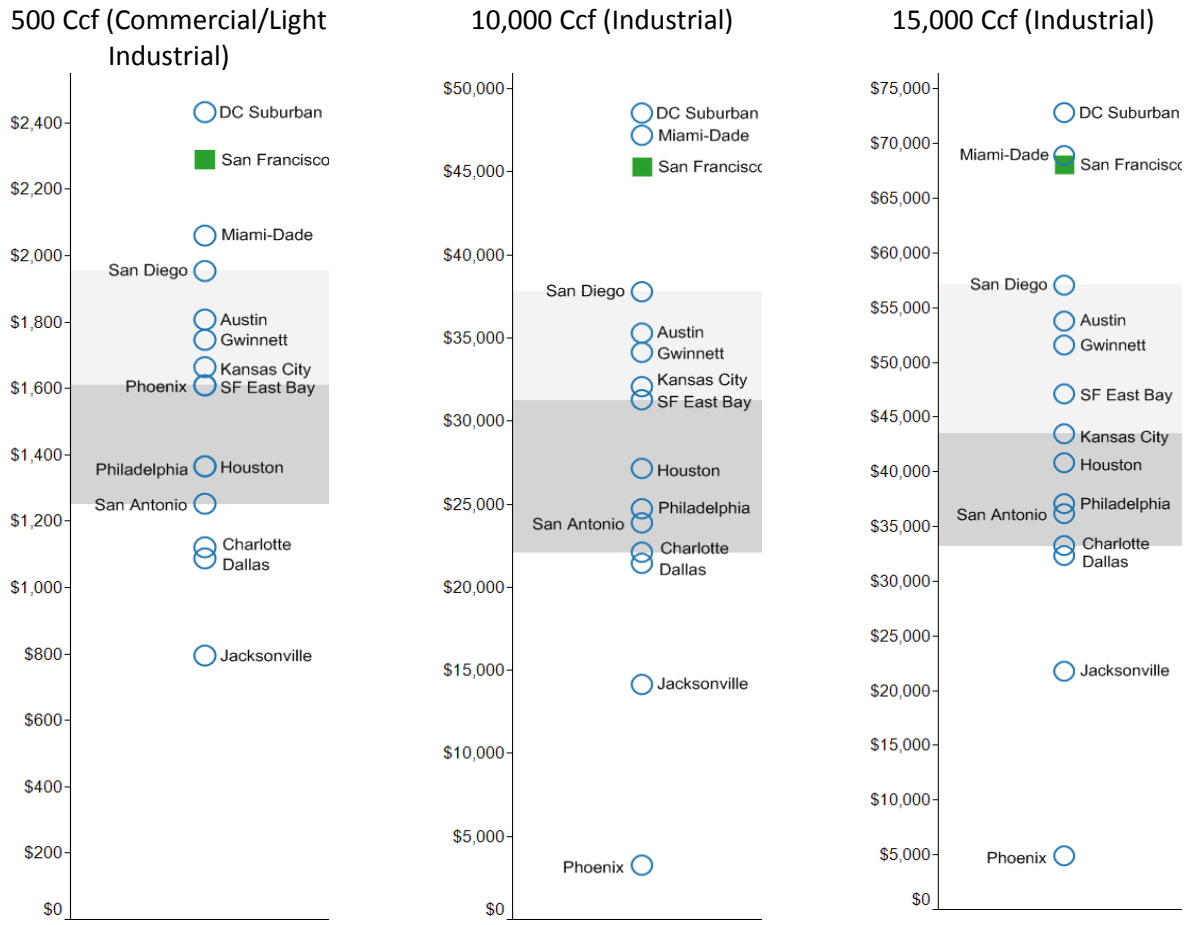
[34] This is an abnormally high amount of usage for residential customers, but may be appropriate for someone in a non-residential, non-commercial capacity. However, commercial customers follow a different rate structure than residential customers.
[35] Data provided by the SFPUC.

manufacturing customers, San Francisco has the highest water bill among its peers, also at around $142 per month.

Figure 14 below shows the monthly water bill for retail customers at various levels of consumption for commercial and industrial uses. San Francisco hovers around the second or third ranking, in the upper range of its peers, for all consumption levels. At 500 Ccf/month (commercial), San Francisco averages approximately $2,300 per month. At 10,000 Ccf (industrial), San Francisco averages approximately $45,000 per month. At 15,000 Ccf (industrial), San Francisco averages approximately $67,500 per month.

Of all non-residential customers in San Francisco, approximately 17% use 30 to 499 Ccf per month, a little over 1% use 500 to 9,999 Ccf/month, less than 1% use 10,000 to 14,999 Ccf per month, and less than 1% use 15,000 Ccf per month or more.

Figure 14 – Monthly Water Bill for Retail Customers (Commercial and Industrial)[36]



For the purposes of this benchmarking report, the primary focus is on residential rates, specifically those for single-family homes. Table 2 below shows an example water rate schedule for a standard single-family home 5/8" meter across several peer jurisdictions for which data is available.

[36] Phoenix is excluded from industrial water rates, because no data was reported.

Table 2[37]: Example Water Charges and Tiers for Single-Family Residential Retail Customers[38]

Agency Water	Water Quantity Charge (per 100 cubic feet - Ccf)	Monthly Service Charge (5/8" meter)
SFPUC FYE 2014	<3Ccf = $4.20; >3Ccf = $5.50	$8.40
EBMUD (East Bay)	< 172gpd = $2.66; 172-393gpd = $3.29; >393gpd= $4.04	$14.67
San Diego Public Utilities	< 14 Ccf = $3.612; 15-28Ccf = $3.917; >28Ccf = $4.398	$19.33
Houston Public Utilities Drinking Water Operations Branch	>6000gal = $30.26/month + $4.67/1000gal; >12,000gal = $58.28/month + $7.69/1000gal	<1000 gal = $4.73; 1000-2000gal = $4.86; 2000-3000gal = $11.08; 3000-4000gal = $11.45; 4000-5000gal = $21.66; 5000-6000gal = $25.96
Philadelphia Water Department Water System	<20Ccf = $3.563; 20-1,000Ccf = $2.864; 1,000-20,000Ccf = $2.63; >20,000Ccf = $1.948	$6.12
City of Phoenix Water Services Department	Oct-Nov >6Ccf = $3.37; Dec-Mar >6Ccf = $2.86; Apr-May >6Ccf = $3.37; Jun-Sep >10Ccf = $3.77	$4.36 (Oct-May <6Ccf; Jun-Sep <10Ccf)
San Antonio Water System	May-Sep[39]: <8Ccf = $0.0984/100gal; 8-17Ccf = $0.1492/100gal; 17-23Ccf = $0.2219/100gal; >23Ccf = $0.4597/100gal	$7.14

Table 2 shows how significantly inclining block rate structures can vary as well as how rates might be constructed to arrive at an overall monthly water bill. Just as water rates vary from peer to peer, so too will water consumption. Therefore, in addition to benchmarking water rates at standardized consumption levels, it is also useful to understand water rates in the context of actual consumption.

Actual monthly water consumption data was available for a subset of the peer group. Figure 15 below shows that, relative to its peers, San Francisco customers consume a very low amount of water each month, at only 6.0 Ccf per month for an average single-family residence. This is in fact a very low number by California standards in general. San Francisco's gross water use is about 88 gallons per capita

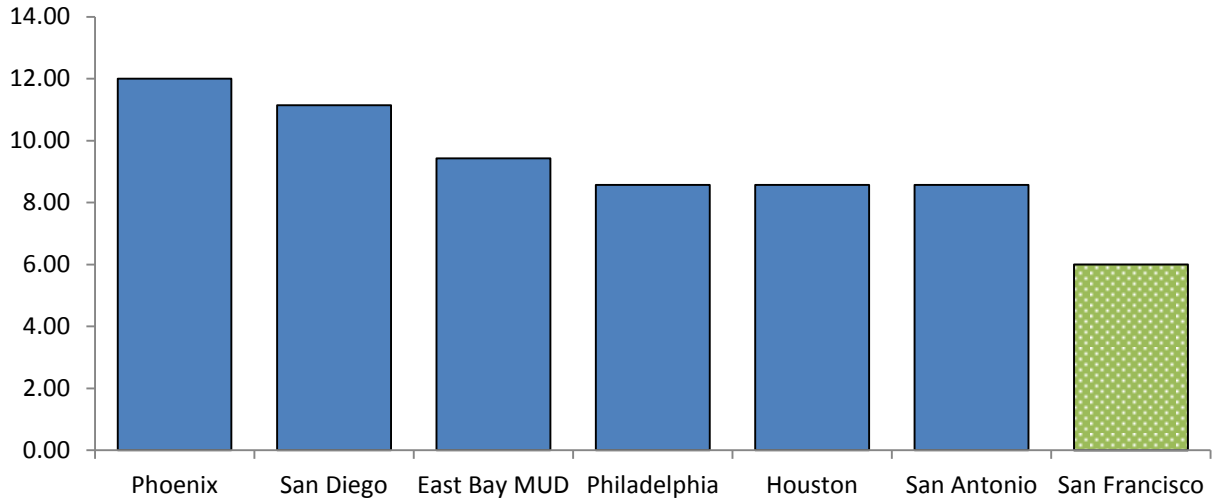
[37] This data was retrieved from Carollo-McGovern's *SFPUC Water and Wastewater Cost of Service Study Survey* and represents data for FYE 2014.

[38] Additional fees may apply, but for the purposes of simplification in this report, we are only looking at continual operating expense charges, which are by far the most significant portion of any water or wastewater bill (i.e. volume and monthly service charges). Other fees in San Francisco or other jurisdictions may include: fire service charge; elevation surcharge; seismic improvement charge; water supply fees; environmental fees; capital needs fees; installation fees and fee/capacity charge. Additionally, conservation incentives and rate assistance for low-income individuals may be available.

[39] San Antonio (18) - Oct-Apr: <8ccf = $0.0984/100gal; 8-17ccf = $0.1372/100gal; 17-23ccf = $0.1935/100gal; >23ccf = $0.3388/100gal

per day (gpcd), less than one half the statewide average of 197 gpcd. **Gross water use** per capita reflects total water deliveries by a water agency (as measured by service area meters) divided by total population and includes residential, commercial, industrial and other water uses. San Francisco's residential water use is even lower, at about 49 gpcd. Residential per capita is the total water sales (measured by residential meters) divided by total population.[40] It is projected that the actual consumption of water will remain constant in San Francisco into the near future (*SFPUC Proposed Retail Water and Wastewater Rates Fiscal Years Ending 2015 to 2018*).

Figure 15[41] – Actual Monthly Water Consumption in Ccf, for an Average Single-Family Residence[42] - FYE 2014



Actual monthly consumption can be used to calculate the weighted average water rate. The weighted average water rate represents the average monthly water bill at a given level of water consumption, divided by the gross actual consumption. This normalizes the monthly water bill to represent the total cost of water on a per hundred cubic feet basis, by distributing the cost of any fixed charges or additional charges into the cost of one unit of water. This is a useful measure for understanding the cost of water on per unit terms, relative to the actual amount of consumption in a given jurisdiction.

Figure 16 below shows the respective weighted average rates for single-family residential retail as well as wholesale water. AWWA's 2012 Benchmarking Survey included a self-reported number for weighted average rate for wholesale customers.[43]

[40] Gallons per capita per day tell us the number of gallons of water used per person per day. Climate, land use, population density and other factors can cause significant variation in gpcd among regions.

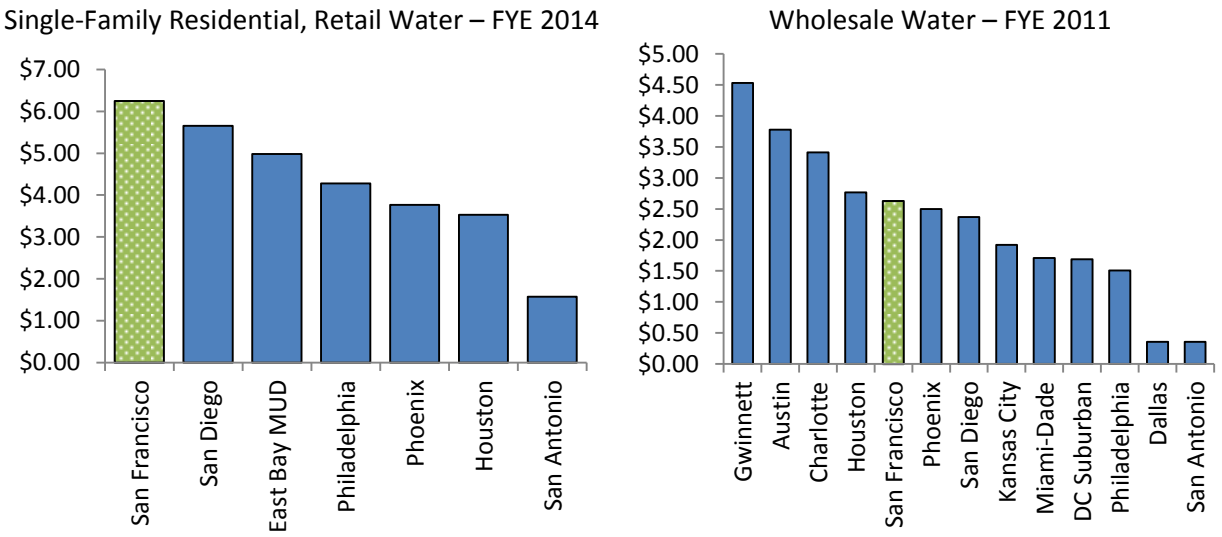
Even though San Francisco has low per capita water usage, the SFPUC continues to aggressively pursue water conservation as the best means to protect our vital water supply. Through active conservation and plumbing code requirements, we forecast the potential to reduce water demands by 14 million gallons per day (MGD) by 2018 and 23 MGD by 2035 (*SFPUC Water Supply Update 2014*).

[41] This data was retrieved from Carollo-McGovern's *SFPUC Water and Wastewater Cost of Service Study Survey* and represents data for FYE 2014.

[42] In calculating average retail wastewater bills and weighted retail wastewater rates, the data from Figure 17 for actual Ccf of water used per month was used to calculate Ccf of wastewater processed per month. 90% utilization of water was assumed for the calculation of actual wastewater Ccf.

[43] It is assumed the same methodology as described for calculating weighted average retail rates was used to determine weighted average wholesale rates, only using the total cost for wholesale water in the numerator and the actual average consumption of wholesale water in the denominator. The information for this calculation is not available.

Figure 16 – Weighted Average Water Rate ($/Actual Ccf Consumed)



San Francisco leads its peer group in weighted average retail water rate for single-family residential customers, in terms of dollar cost per actual consumption of water, at $6.25 per Ccf. The SFPUC weighted average wholesale water rate reflects the average rate SFPUC charges to wholesale customers for treating and collecting one gallon of water. San Francisco's weighted average wholesale water rate is substantially lower, at $2.63 per Ccf, falling into the middle of the peer group. SFPUC is average compared to its peers in water wholesale rates, but with a large wholesale water customer base, this mid-level rate generates a substantial amount of total revenue for SFPUC.

The difference between weighted average retail and wholesale water rates here is a function both of the total cost of providing water as well as the average amount of water consumed. SFPUC retail customers have a very low actual consumption level compared to the rest of its peer group (and the nation); many of SFPUC's wholesale customers likely have a higher actual consumption level (including East Bay MUD, whose single-family residential actual average consumption level is 12.0 Ccf per month, twice as much as SFPUC's respective consumption level). Additionally, operating expenses generally tend to decline with more units of output; wholesale water makes up roughly two-thirds of SFPUC's water sales.

All of these facts considered together – SFPUC retail customer's low actual consumption level, potential operating cost differences between retail and wholesale operations, as well as differences in operational and structural characteristics – could help explain why the weighted average retail and wholesale water rates differ.

Wastewater Rates

It is important to note in the wastewater rates figures that not all peer agencies operate a combined wastewater and storm water system like San Francisco. Often, storm water is separately billed for utilities which operate separate wastewater and storm water systems, so this data may not be represented in the wastewater rates which AWWA benchmarked. Dallas, Gwinnett, Houston, Kansas City, and Philadelphia are peers which do, however, operate combined wastewater and storm water systems. Figures 17-19 show the peer group's respective wastewater bills at various AWWA benchmarked levels of treatment.[44] The first of these, Figure 17, shows the wastewater bill for a range of 0 to 10 Ccf/month, a normal range for single-family or multi-family residential treatment.

San Francisco has no fixed charge for monthly wastewater service, and thus has the lowest fixed charge amongst its peers; wastewater charges are only volumetric for San Francisco. At 5 Ccf/month, San Francisco ranks highest in the peer group, at approximately $36 per month; and at 10 Ccf/month, San Francisco also ranks as the most expensive utility amongst its peers, at approximately $78 per month.

As wastewater treatment increases in the 5 to 10 Ccf/month range, the distance increases between San Francisco as the most expensive wastewater service provider and the next most expensive utility. This suggests that, like the inclining block rate structure for the SFPUC water enterprise, SFPUC's inclining block rate structure for wastewater also incentivizes conservation – but at an even lower level of treatment for wastewater than for water consumption. The SFPUC is phasing out its tiered rate structure for wastewater by 2018, however.[45]

Figure 17 – Monthly Wastewater Bill for Retail Customers (Residential Lower Range)

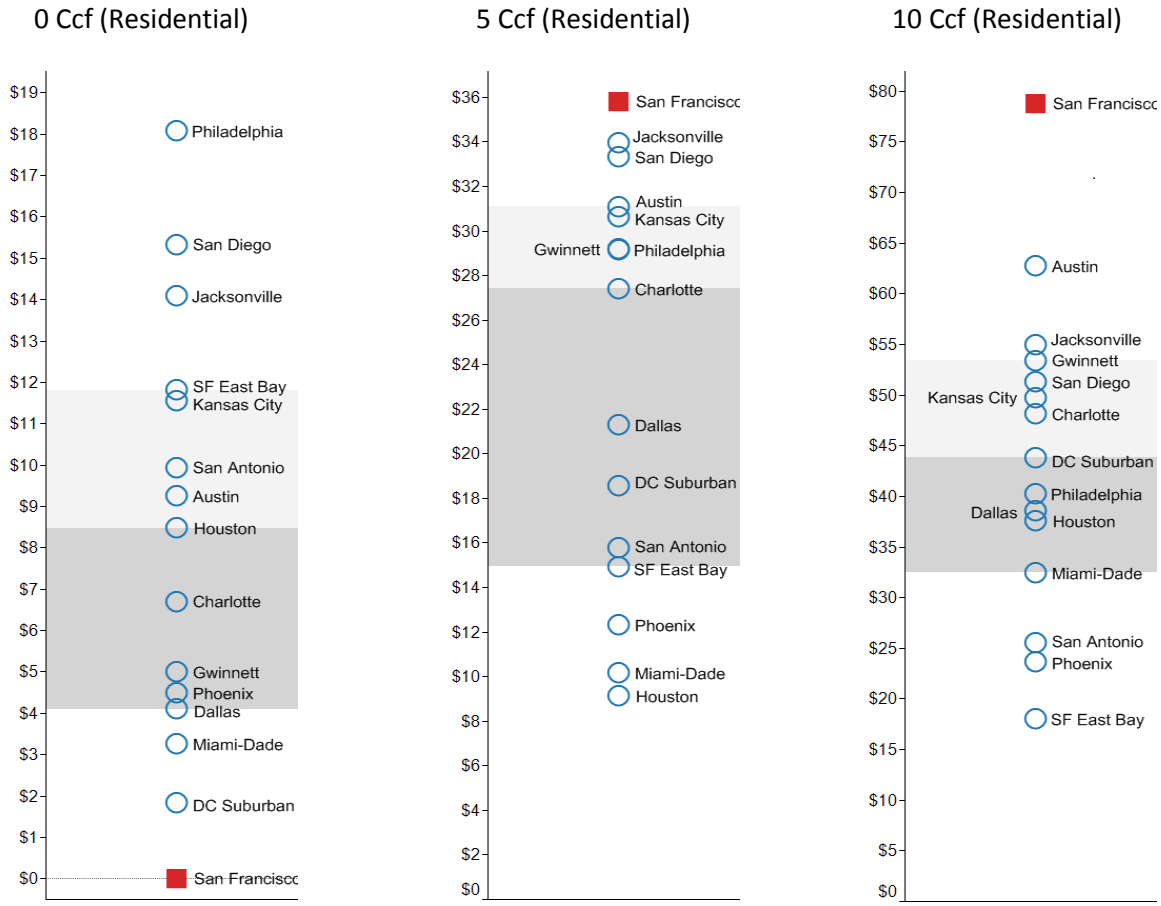


Figure 18 below shows the wastewater bill for 15 to 30 Ccf/month, a range that is high for single-family or multi-family residential treatment. Like water usage, it is important to note that the vast majority of SFPUC retail users fall below 10 Ccf of water usage per month. 30 Ccf/month is a standard level of treatment for non-manufacturing retail customers.

The 15 Ccf/month residential retail water bill is approximately $122 per month and for 30 Ccf/month it is approximately $250 per month. The 30 Ccf/month non-manufacturing retail water bill is approximately $198/month. Aside from wastewater at 0 Ccf, SFPUC's retail wastewater prices

[45] *SFPUC Proposed Retail Water and Wastewater Rates Fiscal Years Ending 2015 to 2018*

consistently remain the highest in its peer group, becoming relatively more on par with other levels of treatment for non-manufacturing customers at 30 Ccf per month.[46]

Figure 18 – Monthly Wastewater Bill for Retail Customers (Residential Upper Range and Commercial Lower Range)

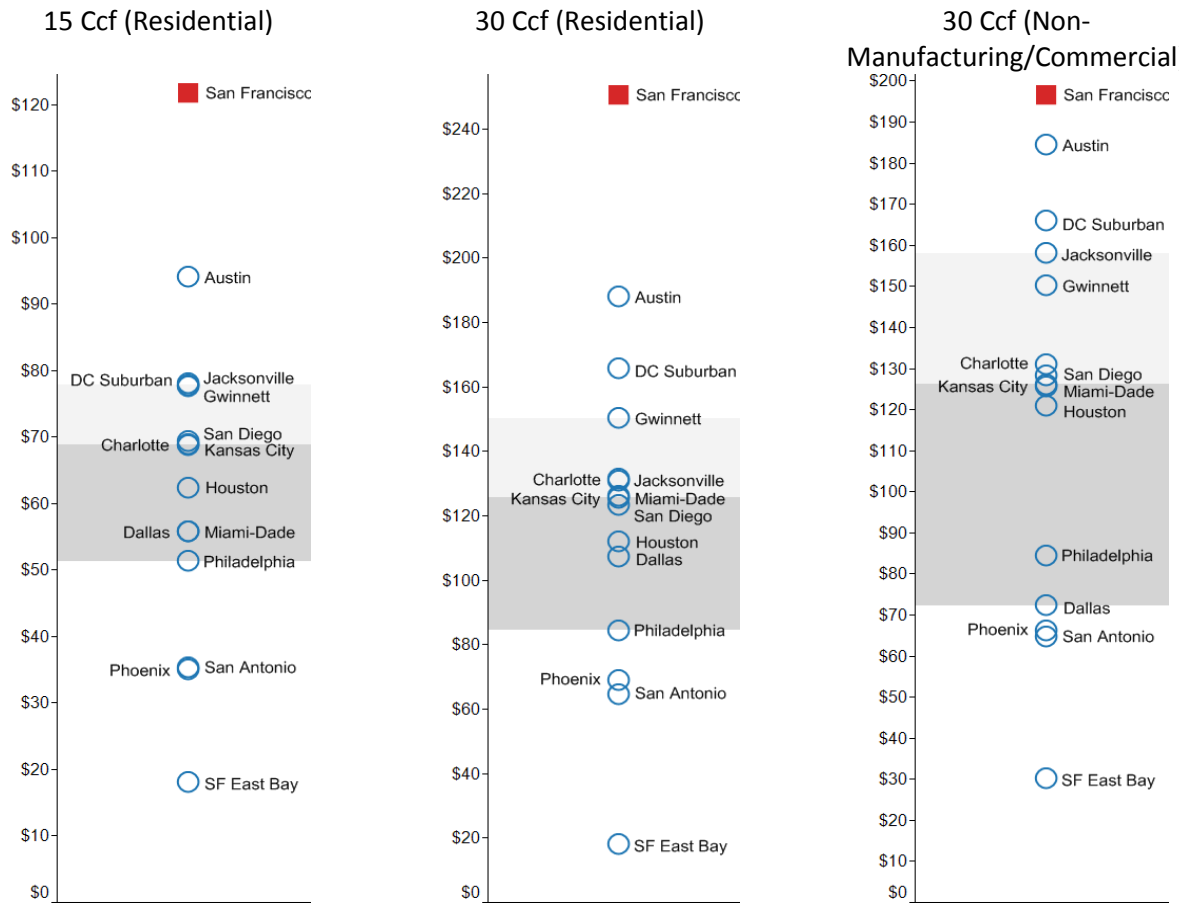
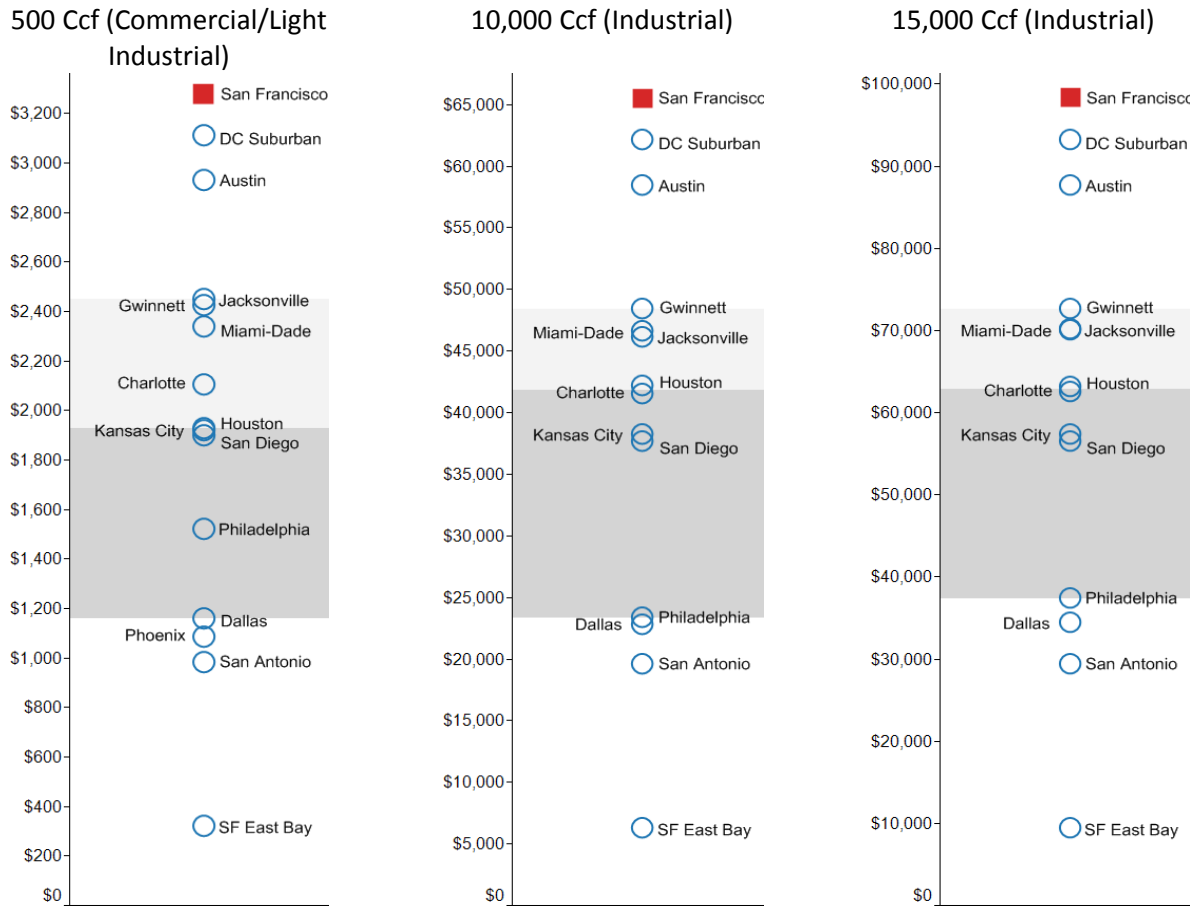


Figure 19 below shows the monthly wastewater bill for retail customers at various levels of treatment for commercial and industrial uses. As with previous wastewater bill comparisons for other customer categories, San Francisco remains the most expensive wastewater service provider for commercial and industrial customers, sharing the upper quartile of commercial and industrial retail wastewater costs with DC Suburban and Austin for each of the comparison treatment levels below. At 500 Ccf/month (commercial), San Francisco costs approximately $3,250 per month; at 10,000 Ccf (industrial), San Francisco costs approximately $65,000 per month; and at 15,000 Ccf (industrial), San Francisco costs approximately $98,000 per month.

[46] It is possible that the relative affordability of wastewater or water rates changes within a smaller range than the benchmarked values outlined here. For purposes of comparing across several peer groups, these benchmarked consumption levels provide the best source for analysis.

Figure 19 – Monthly Wastewater Bill for Retail Customers (Commercial and Industrial)



As in the previous section of this report benchmarking water rates, this report focuses on residential wastewater rates, specifically those for single-family homes. Table 3 below shows an example wastewater rate schedule for a standard single-family home 5/8" meter, across several peer jurisdictions for which data is available.

Table 3[47]: Example Wastewater Charges and Tiers for Single-Family Residential Retail Customers

Agency Wastewater	Base Charge	Strength Charge	Flow Charge	Residential Service Charge
SFPUC FY2014	$0.00	commercial or industrial only	first 3Ccf discharged = $7.90/Ccf; >3Ccf discharged = $10.53/Ccf[48]	
EBMUD (East Bay)	$6.58	$6.60	$0.735/Ccf up to $7.35[49]	$6.862[50]
San Diego Metropolitan Wastewater Department	$15.33		$3.5983/Ccf with 20Ccf max charge	
Houston Public Utilities Wastewater Operations Branch	<1000 gal = $10.05; 1000-2000gal = $10.21; 2000-3000gal = $10.45; 3000-4000gal = $10.81; 4000-5000gal = $24.80; 5000-6000gal = $29.85		>6000gal = $37.20/month + $7.35/1000gal;	
Philadelphia Wastewater Department Water System	$6.30		$2.474/Ccf	$12.49/month[51]
City of Phoenix Water Services Department			$2.7539/Ccf[52]	$0.70/Ccf included in wastewater flow charges[53]
San Antonio Water System	<2Ccf = $11.49		>2Ccf = $0.3047/100gal	<5,000sf = $3.22; >5,000sf = $4.25

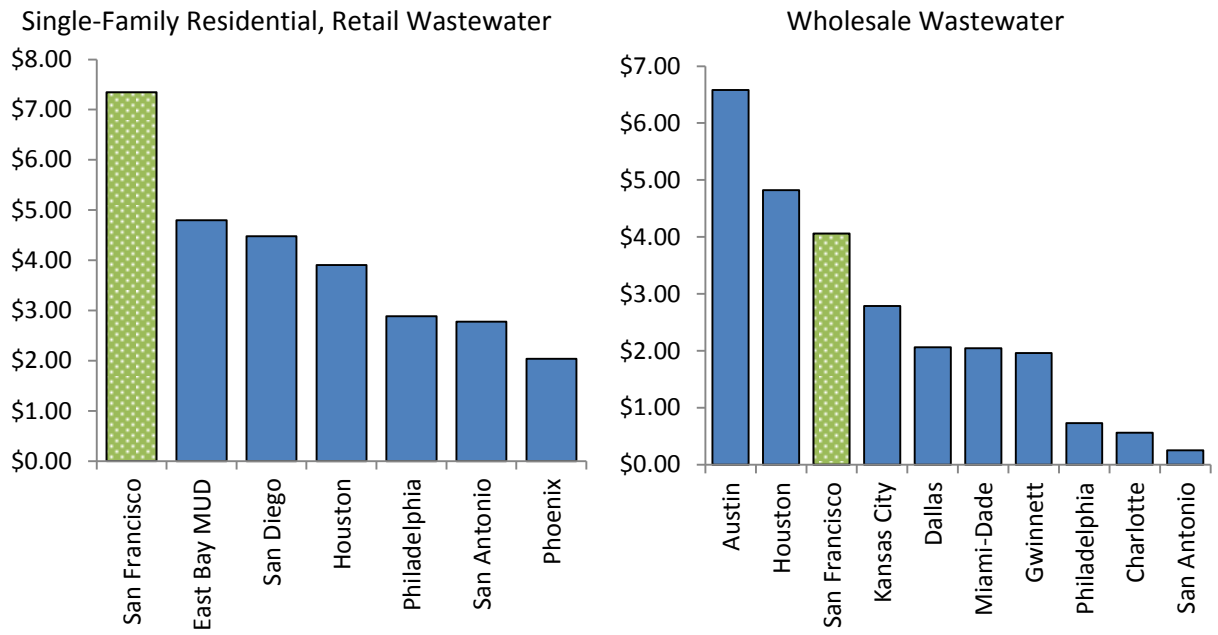
Like Table 2 for water rates, Table 3 for wastewater rates shows how significantly that inclining block rate structures can vary as well as how rates might be constructed to arrive at an overall monthly wastewater bill. As before, it is instructive to consider water rates in the context of actual treatment respective to each peer jurisdiction, rather than only at standardized benchmarking levels.

[47] This data was retrieved from Carollo-McGovern's *Cost of Service Study Survey* and represents data for 2013.
[48] San Francisco - Wastewater discharge rate is assumed to be 90% of water usage.
[49] EBMUD - Based on water consumption (assumed)
[50] EBMUD - The $82.34/yr Wet Weather Facilities charge is to help pay for the $240 million Wet Weather Program mandated by the U.S. Environmental Protection Agency to improve the District's capacity to collect and treat all sewer flows during rainy weather. The charge is not a tax but is being collected on property tax bills to separate the special Wet Weather Facilities Charge from regular sewage treatment charges. For public agencies - who do not receive tax bills - the charge appears as an additional line item on their EBMUD water bill. Billed two times a year.
[51] Philadelphia - Storm water charge consists of $10.51 SWMS charge and $1.98 billing and collection charge. In July 2013, storm water rates will increase to $11.80 SWMS charge plus $2.15 billing and collection.
[52] Phoenix - Additional 2.7% Utility Services Tax (aka City Tax) on water service charge, quantity charge, environmental charge, as well as wastewater service charge, quantity charge, and environmental charge. Sewer rate includes $1/Ccf monthly charge, 0.5385/Ccf in environmental charges, and $1.2154/Ccf in other charges. Monthly sewer charge is based on a calculation of 80% of the average water billed for January through March.
[53] Phoenix - Storm water charge is included as part of $2.75/Ccf on sewer bill as Excise Storm water Tax on monthly water/sewer bill.

Actual monthly wastewater treatment data was available for a subset of the peer group. For wastewater, 90% utilization of water resources was assumed across all peers. So, for example: Since San Francisco single-family residential customers consumed on average 6.0 Ccf of water per month, wastewater treatment was assumed to be 6.0*0.9 = 5.4 Ccf per month. Thus, since San Francisco's actual average water consumption levels came in lowest amongst its peers, so too would its actual average wastewater treatment.

Figure 20 below shows that San Francisco leads its peer group in terms of weighted average retail wastewater rate for single-family residential customer at $7.35 per Ccf. San Francisco's weighted average wholesale wastewater rate is substantially lower at $4.06 per Ccf, and ranks somewhat above average amongst its peers. Wholesale wastewater makes up a very small proportion of SFPUC's overall wastewater enterprise – only about 1.22% in terms of total gallons of wastewater billed, so the comparison between retail and wholesale rates is negligible in terms of the costs or revenue impacts for the wastewater enterprise.

Figure 20 – Weighted Average Wastewater Rate ($/Ccf)



Cost-effectiveness Measures

While the foregoing sections provide insight into how cost-efficient the SFPUC is in providing utility service, one limitation of cost-efficiency measures is that they do not speak to a utility system's ability to meet the needs of its users.[54] Because public utilities are provided at cost-of-service – i.e. utilities cannot charge customers for more than it costs to provide the service – and San Francisco's operating expenses were generally high compared to its peer group, the benchmarking data on rates support a parallel pattern of San Francisco also having relatively higher water and wastewater rates than its peers. That is, operating expenses translate directly to the rates that customers pay.

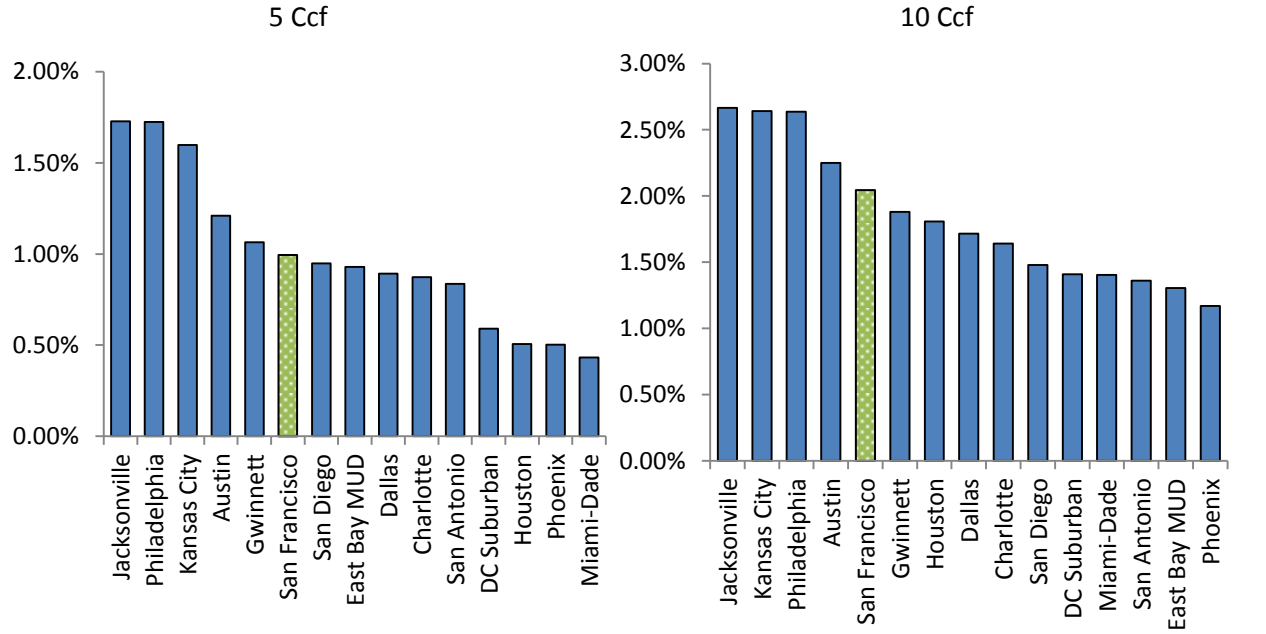
However, it is also important to consider significant differences in the economy, cost of living, and relative costs of service and maintenance when comparing different peers. One common economic

[54] *National Academy of Sciences TCRP Report 141, 2010*

measure of affordability comes by comparing rates to household income. The Household Affordability Index represents the proportion that a combined monthly water and wastewater bill makes of an average household's monthly income.

Figure 21 below provides information on the Household Affordability Index for the standard range of 5 to 10 Ccf/month for residential retail customer consumption of water and treatment of wastewater. The SFPUC ranks squarely in the middle of its peer group in terms of household affordability, where at 5 Ccf/month, residential customers' combined water and wastewater bill is 0.99% of median household income,[55] and at 10 Ccf/month, San Francisco residential customers' combined water and wastewater bill is 2.04% of median household income.

Figure 21 – Household Affordability Index for Total Combined Water and Wastewater Bill: Residential Retail Customers, at Standardized AWWA Consumption Levels[56]

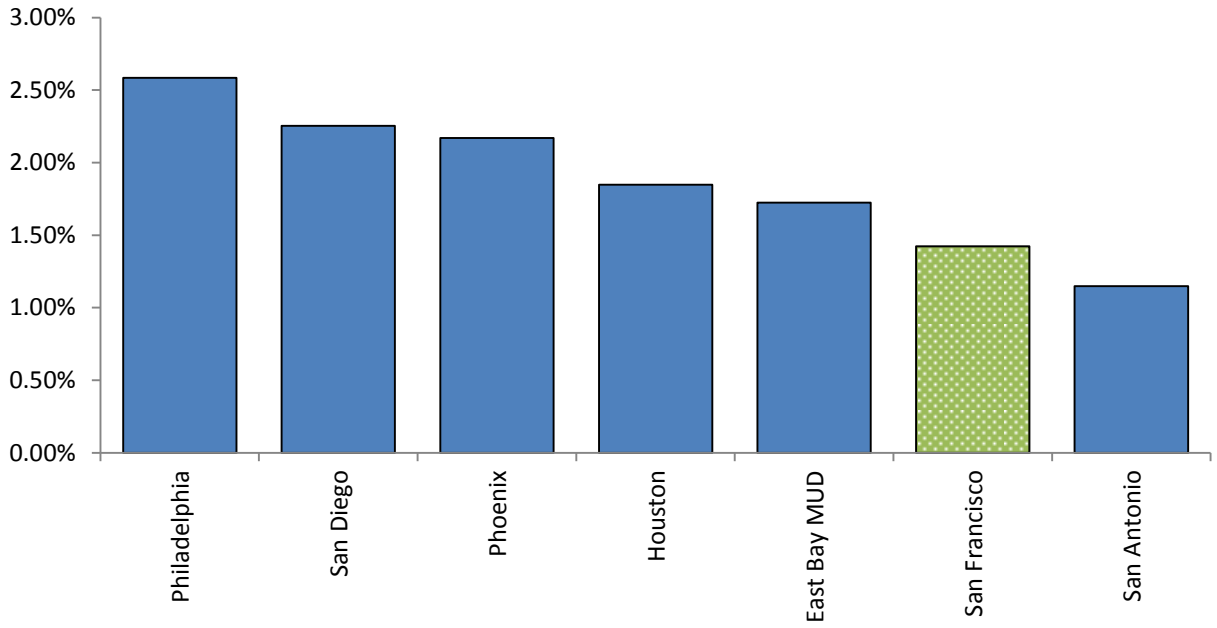


It is important to consider actual water consumption and wastewater treatment levels respective to each peer, since this will affect the actual cost billed to each customer. Accordingly, the Household Affordability Index for a subset of San Francisco's peers of which actual consumption/treatment level data was available is shown below in Figure 22, normalized for actual consumption/treatment levels. San Francisco's average residential water bill at 1.42% of median household income is very affordable compared to its peers, becoming nearly the most affordable jurisdiction amongst all peers for which data was available.

[55] A "Water Affordability Programs" report argues that water should be priced based on a rate of 2% of individual low income households, rather than MHI—some households may skew the data otherwise. Eskaf, S. (2010). Water rates affordability and affordability programs. Proceedings of the Florida rural water association annual conference (*SFPUC Strategic Sustainability Plan FY 2012-13*).

[56] Figure 21 – AWWA data was collected in 2011 and provides FYE 2010-11 rate information for peers. For San Francisco, this means that rates effective on July 1, 2011 were used for analysis (because AWWA data is collected in early to mid-2012 and San Francisco's rate schedules do not change until July 1 of each year, when the City and County of San Francisco's fiscal year begins).

Figure 22 – Household Affordability Index for Total Combined Water and Wastewater Bill: Residential Retail Customers, Based on Actual Average Ccf Usage[57] - FYE 2014



The SFPUC endorses a policy of having a combined water and wastewater bill under 2.5% of median household income, while the EPA defines water affordability as a rate below 4% of median household income, with 2% of income going to water services and 2% going to wastewater.[58] SFPUC has outperformed both of these goals, achieving a combined water and wastewater bill near 1.5% of median household income, and achieving a combined water, wastewater *and* power bill near 2.5% of median household income.[59]

Even with proposed rate increases in coming years to account for capital programs,[60] average household water bills will remain similar proportionally, with the Household Affordability Index expected to increase from a current level of 1.42% to 1.51% in FY2015-16. In addition, various federal and local rate assistance programs are available for low-income households.[61]

[57] Figure 22 – Household affordability was calculated based on FYE 2014 water and wastewater rates for each peer and 2012 median annual household income for each peer. Household income data was taken from the US Census and rate information was retrieved from the Carollo-McGovern's *SFPUC Water and Wastewater Cost of Service Study Survey*.

[58] Other jurisdictions, such as Vermont and The Republic of Macedonia define household affordability to be at an even higher threshold. The Vermont Department of Public Service and The Republic of Macedonia define power affordability as being 6% of MHI for heating and electricity, and 2% for heating alone. (*SFPUC Strategic Sustainability Plan FY 2012-13*).

[59] According to the *SFPUC Strategic Sustainability Plan (SSP) FY 2012-13:* Customers of SFPUC have historically experienced a combined Water, Wastewater and Power bill that is less than 2.5% of median household income in San Francisco. For Water and Power, SFPUC performed better than peers and reached its FY 2012-13 targets. Even though SFPUC did not reach its FY 2012-13 target for Water and Wastewater combined, the SFPUC performed better than our SSIP Level of Service (LOS) Goal of less than 2.5% of median household income, exceeded the AWWA industry standard, and met EPA's definition of affordability for these services.

[60] Refer to Appendix B for more detailed capital needs information.

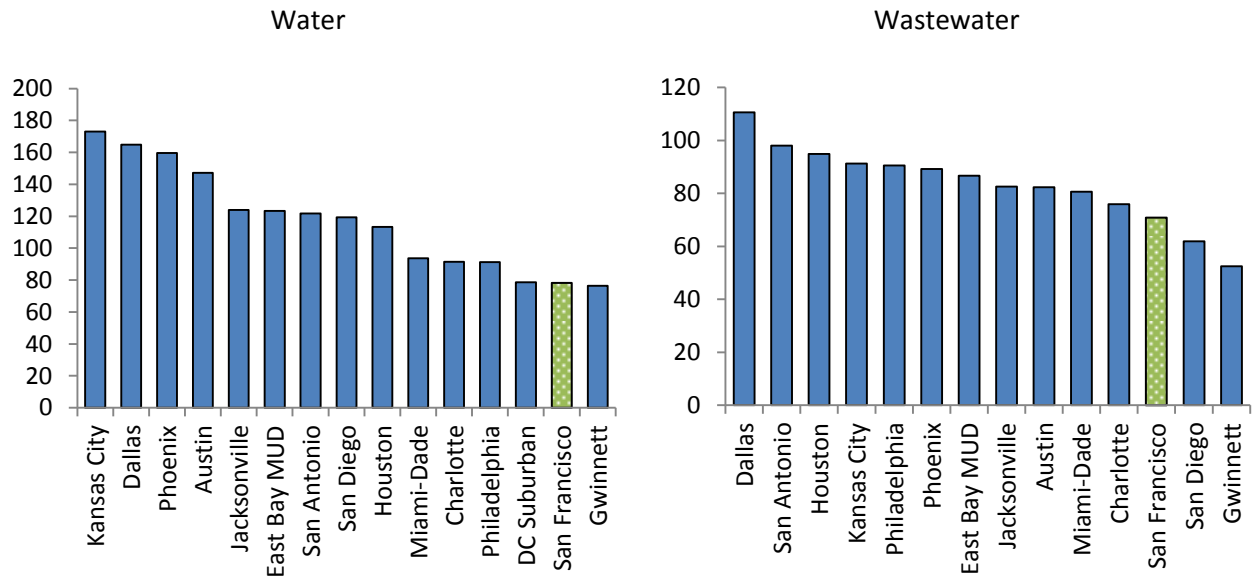
[61] The Safe Drinking Water Act established special assistance for communities with rates over 2% of MHI each for water and wastewater (*SFPUC Strategic Sustainability Plan FY 2012-13*).

Service Quality Measures

Service quality measures include performance measures related to the level and quality of service provided. This report also includes supplementary information about gross water usage and general services provided.

Figure 23 below shows that SFPUC retail customers' gross water usage (gallons of water per day, per capita for the service population), is in the lowest range within its peer group. On average, San Francisco retail customers use about 78 gallons of water per day. Similarly, SFPUC retail customers' gross wastewater discharge (gallons of wastewater discharged per day, per capita for the service population), is in the middle of the range for San Francisco's peer group. On average, SFPUC treats about 86 gallons of wastewater per day for San Francisco's retail customers.

Figure 23 – Gross Water Usage and Wastewater Discharge[62] in Gallons per Day, Residential and Non-Residential



It is important to note, however, that these numbers include both residential and non-residential users. Should the number be broken out to only show residential consumption/treatment, they would be much lower because residential customers use significantly less water than non-residential customers (such as manufacturing, commercial, and industrial customers). It is interesting to see that, even with large-scale users included in the calculation, San Francisco ranks well below the peer average. This could be caused by a large combination of factors, including San Francisco's already very low residential consumption/treatment levels as well as what are probably relatively low level consumption/treatment for large-scale industrial customers.

Table 4 below shows a summary of utility services provided for each of San Francisco's peers. By looking across the table, we can see that SFPUC provides a much wider range of services than any of its peers.

[62] Gross wastewater discharge calculated using data for total wastewater billed, not total wastewater treated. This is assuming that billed wastewater more accurately reflects residential and non-residential actual discharge than total wastewater treated. This is because in service areas that operate a combined wastewater and storm water system, total wastewater treated would include storm water flows, and would thus inflate the discharge amount.

Table 4: Summary of Services Provided by Utility

Utility	Potable Drinking Water Treatment	Potable Drinking Water Distribution	Wastewater Collection	Wastewater Treatment	Storm water	Reclaimed Water	Natural Gas	Electric	Solid Waste Collection	Raw Water	Hydro-Electric Generation	Other Services
Austin	YES	YES	YES	YES		YES						
Charlotte	YES	YES	YES	YES								
Dallas	YES	YES	YES	YES	YES					YES		
Gwinnett	YES	YES	YES	YES	YES	YES						
Houston	YES	YES	YES	YES	YES	YES				YES		
Jacksonville	YES	YES	YES	YES		YES		YES				Chilled water
Kansas City	YES	YES	YES	YES	YES							
Miami-Dade	YES	YES	YES	YES								
Philadelphia	YES	YES	YES	YES	YES							
Phoenix	YES	YES	YES	YES		YES				YES		
San Antonio	YES	YES	YES	YES		YES						Chilled water and steam
San Diego	YES	YES				YES				YES		
San Francisco	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	
East Bay	YES	YES		YES		YES					YES	
Washington Suburban	YES	YES	YES	YES								

Areas for Future Research

The measures included in this report provide a broad and high-level overview of complex water and wastewater utilities and their related rates. Further, this report represents a snapshot in time and it should be regarded only as a starting point for further evaluation. Based on the foregoing analysis, potential opportunities for future research and evaluation may include the following:

- Further research the retail and wholesale revenue requirements for peer agencies, in order to better understand how the SFPUC compares to other peers in terms of operating expenses for both retail and wholesale enterprises;
- Further research other peers' rate structures and determine which rate structures provide the most conservation incentivizes and optimize affordability;
- Determine how the SFPUC's long-term capital needs and maintenance of fixed assets may affect rates.
- Investigate potential effects of potable and recycled water onsite reuse, as well as drought pricing, on rates;
- Continue to make customers and stakeholders aware of rate structures, capital financing needs, and the services which SFPUC provides (rate proposal stakeholder outreach);
- Plan future activities to evaluate the effectiveness of stakeholder outreach and input initiatives;
- Continue to evaluate customers based on greatest water and wastewater users, and areas for conservation;
- Evaluate SFPUC low-income affordability programs and benchmark their efficacy compared to other similar programs in peer service areas.

Appendix A

Benchmarking Methodology

The American Water Works Association (AWWA) conducts a biannual survey of water and wastewater from a diverse sample of cities from around the United States, providing key information on water and wastewater rates, charges, financial information, and agency operating characteristics. Data from *AWWA Water and Wastewater Rate Survey 2012* was used as the baseline data to conduct this analysis and develop a peer group comparable to the City and County of San Francisco's Public Utilities Commission (SFPUC). AWWA 2012 data was also supplemented with *AWWA Water and Wastewater Rate Survey Update 2013* data, as well as data collected as part of Carollo-McGovern's *SFPUC Water and Wastewater Cost of Service Study 2014*, as part of an independent report issued every five years, based on the SFPUC water and wastewater rate proposal – most recently, this rate proposal was made for FYE 2015 through 2018.

Using this data, the Controller's Office developed a comprehensive methodology for performance measurement and peer comparison of public utilities systems including an approach for selecting peer agencies and considerations for identifying performance measures.

Data Sources

AWWA 2012 data on water sold, wastewater treated, and system revenues are current as of January 1, 2012. AWWA Update 2013 data, which exclusively provides information on water and wastewater rates, is current as of January 1, 2013. Carollo-McGovern data, which exclusively provides information on rates, actual consumption levels, and low-income programs, is current as of March 2013. AWWA 2012 calculates its Household Affordability Index using Census 2010 data, adjusted according to the 2012 Consumer Price Index. The Supplemental Household Affordability Index was developed by interpolating Carollo-McGovern data with American Community Survey 2012 updates. All data presented in this study should be derived from AWWA 2012 data, unless otherwise noted.

AWWA 2012 focuses on a wide distribution of sample cities for which water supply and distribution and wastewater and treatment utilities serve the core population of their communities. This is because characteristics of service providers will often vary even for communities with similar populations. For example, while many cities have a single utility responsible for both water and wastewater services, other cities have multiple utilities agencies that manage water and wastewater for different sections of the city.

Utilities from 44 states and the District of Columbia responded to the AWWA 2012 survey; the final data includes information provided by 290 water utilities and 214 wastewater utilities.

Peer Agency Selection

In order to develop a robust, practical, and transparent process for selecting peer agencies based on uniformly defined and readily available data, we developed a framework for benchmarking public utilities agencies that draws from industry-specific standards for water and wastewater, as outlined by AWWA, and combined it with best practices benchmarking methodologies.

Sorting the AWWA 2012 sample by city or service population does not necessarily yield comparable groups of systems, since peculiarities of the service area may not accurately correlate with how the system is sized by operational characteristics. Instead, AWWA prioritized its peer grouping based on three size classifications, using the daily flow rate of both water and wastewater enterprises: Group

A, Group B, and Group C. Water utilities were grouped by gallons of water sold, measured in million gallons per day (MGD). Wastewater utilities were sorted by gallons of wastewater treated, also measured in MGD. With approximately 212 MGD water sold and 87 MGD wastewater treated, San Francisco is classified in Group A, as a large utility, for both water and wastewater enterprises. The classifications are as follows:

Water Enterprise:

- Group A >75 MGD sold
- Group B 20-75 MGD sold
- Group C <20 MGD sold

Wastewater Enterprise:

- Group A >70 MGD sold
- Group B 20-70 MGD sold
- Group C <20 MGD sold

All of San Francisco's selected peers in this study are Group A water enterprises. All peers except two are Group A wastewater enterprises; Gwinnett and Jacksonville fall in the upper range of Group B, treating 48 MGD and 64 MGD of wastewater, respectively. However, this report considered each utility as a combined water and wastewater enterprise entity, so in grouping peers, the enterprises had to be considered in their entirety.

Using a range of screening and grouping factors (detailed in Tables 6 and 7 below), "Likeness scores" were developed to compare each utility's similarity to the SFPUC. Separate Likeness Scores were developed for both water and wastewater enterprises, and then a combined Water and Wastewater Likeness Score was developed based on the average of the separate scores. When considering all screening and grouping factors, both Gwinnett and Jacksonville produced relatively strong Wastewater Likeness Scores. No utility was selected as a peer which had a Likeness Score greater than 1.5 for either the water or wastewater category. Gwinnett is an exception, given its relatively strong Wastewater Likeness Score and in order to provide a wider sampling of peers from across the nation.

Three screening factors and seven peer-grouping factors were used to identify agencies that are similar to the target agency:

Screening Factors

- Municipality or County System Ownership (yes/no)
- Water/Wastewater Treatment (yes/no)
- Water Distribution/Wastewater Collection (yes/no)

Peer-grouping Factors

- Service population size
- Total number of accounts
- Daily gallons sold/treated
- Average-day production/treatment
- Average annual capital needs
- Total assets/equities and liabilities
- Region served

Table 5: Water and Wastewater Utilities Likeness Scores

Utility Name	*State*	*ID*	*TOTAL WATER LIKENESS SCORE*	*TOTAL WW LIKENESS SCORE*	*FINAL LIKENESS SCORE (Average of WATER + WW)*
• **JEA Jacksonville**	FL	1022	0.751203331	0.910229306	0.830716318
• **Miami-Dade Water and Sewer Department**	FL	1029	0.632346972	1.161522209	0.89693459
• **Gwinnett County Public Utilities**	GA	1057	1.574740773	0.97030391	1.272522342
• **Washington Suburban Sanitary Commission**	MD	1173	0.630040369	0.760490888	0.695265628
• **Phoenix Water Services Department**	AZ	1227	0.443726115	0.64248917	0.543107643
• **Charlotte-Mecklenburg Utilities**	NC	1240	0.870812955	0.99438232	0.932597638
• **East Bay Municipal Utility District**	CA	1337	0.485774398	1.269569385	0.877671891
• **San Diego Water Department**	CA	1367	0.558818187	1.158141935	0.858480061
• **San Francisco Public Utilities Commission**	CA	1369	0	0	0
• **Philadelphia Water Department**	PA	1456	0.846140214	1.808289919	1.327215067
• **Austin Water Utility**	TX	1492	0.479978398	0.643174462	0.56157643
• **Dallas Water Utilities**	TX	1500	0.547327805	0.762784196	0.655056
• **City of Houston**	TX	1508	0.84872274	1.080113351	0.964418045
• **San Antonio Water System**	TX	1526	0.490939428	0.774269797	0.632604613
• **City of Kansas City**	MO	30197	1.217399446	0.809992145	1.013695795

In an effort to be more inclusive for this initial benchmarking analysis of the SFPUC, we considered all ten of the above agencies as peers. However, we have taken care throughout the report to consider differences among the agencies that may be relevant to the performance comparisons.

Table 6: Water Likeness Score – Measures Used

Performance Measure	*Measure Definition*	*Screening Characteristic(s)*	*Grouping Characteristic*
Service Population, in Thousands	Population served by the water utility system at the time of the survey		YES
Total Number of Accounts	Number of water accounts, including residential, nonresidential, and wholesale accounts, at the time of the survey		YES
System Ownership	Indicates ownership of the system: city, county, district/authority, private (investor-owned), or homeowner's association/cooperative	YES	
Daily Gallons Sold, in MGD	Calculated from annual data for 2011 or the most recent reporting year		YES
Average Day Production, in MGD	Average water production during 2011 or the most recent reporting year		YES
Average Annual Capital needs, in Thousands	Average of each utility's capital needs over the next five years (beginning with FY 2012), or as many years as the utility provided		YES
Balance Sheet, in Thousands	Total assets, total long-term debt, and total equity at the end of FY 2012 or the most recent reporting year		YES
Basic Services Provided	(1) Services: Potable Drinking Water Treatment, (2) Services: Potable Drinking Water Distribution	YES YES	
Region	Location of water district. Rank assigned based on distance from San Francisco.		YES

Table 7: Wastewater Methodology – Measures Used

Performance Measure	*Measure Definition*	*Screening Characteristic(s)*	*Grouping Characteristic*
Service Population, in Thousands	Population served by the wastewater utility system at the time of the survey.		YES
Total Number of Accounts	Number of wastewater accounts, including residential, nonresidential, and wholesale accounts.		YES
System Ownership	Indicates ownership of the system: city, county, district/authority, or private (investor-owned).	YES	
Daily Gallons Treated, in MGD	Calculated from annual data for 2011 or the most recent reporting year.		YES
Average-Day Treatment, in MGD	Average wastewater treatment during 2011 or the most recent reporting year.		YES
Average Annual Capital Needs, in Thousands	Average of each utility's capital needs over the next five years (beginning in FY 2012), or as many years as the utility provided.		YES
Balance Sheet, in Thousands	Total assets, total long-term debt, and total equity at the end of FY 2011 or the most recent reporting year.		YES
Basic Services Provided	(1) Services: Wastewater Collection, (2) Services: Wastewater Treatment	YES YES	
Region	Location of water district. Rank assigned based on distance from San Francisco.		YES

Appendix B

Productivity, Resource Utilization, and Utility Investment Measures

Utilities systems can also be analyzed by looking at measures that focus on system administration, including measures related to productivity, resource utilization, investment in utilities, and the relative infrastructure size of the utility (and its corresponding maintenance).

Figure 24 shows that in FYE 2010-11, San Francisco had a greater number of assets than any of its peers, at approximately $7.2 billion. A large proportion of these assets are restricted assets (25% of total water assets 8% of total wastewater assets), which are likely tied to the SFPUC's large capital improvement projects for its water enterprise.

Figure 24 – Utilities Total Assets, Combined Water and Wastewater Enterprises FYE 2011 (millions)

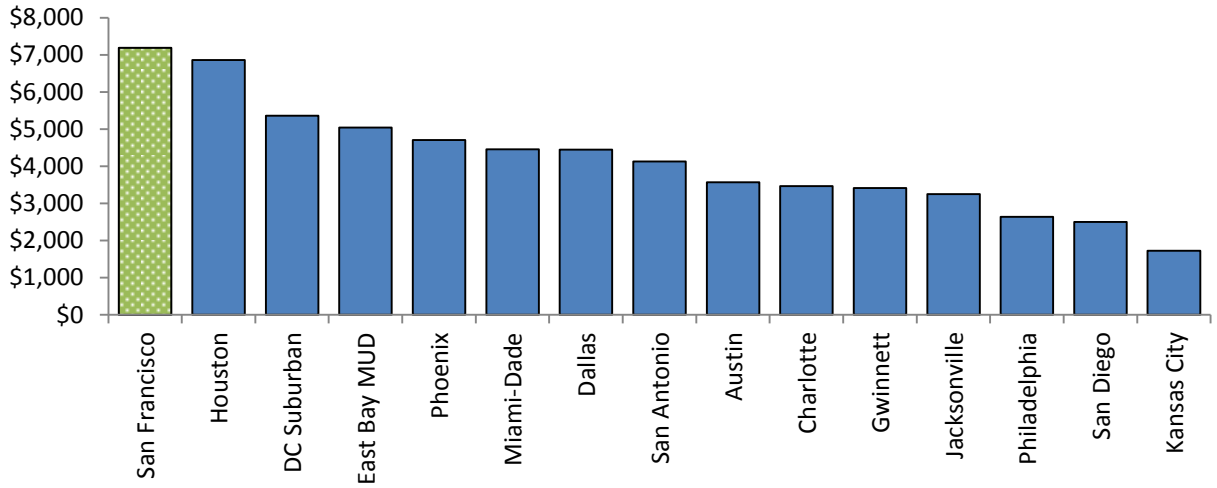


Figure 25 shows that the SFPUC also has the highest dollar amount for capital needs for both water and wastewater enterprises, over the period 2012-16, at approximately $560 million and $1.3 billion, respectively.

Figure 25 – Total Capital Needs, FY 2012-2016 (millions)

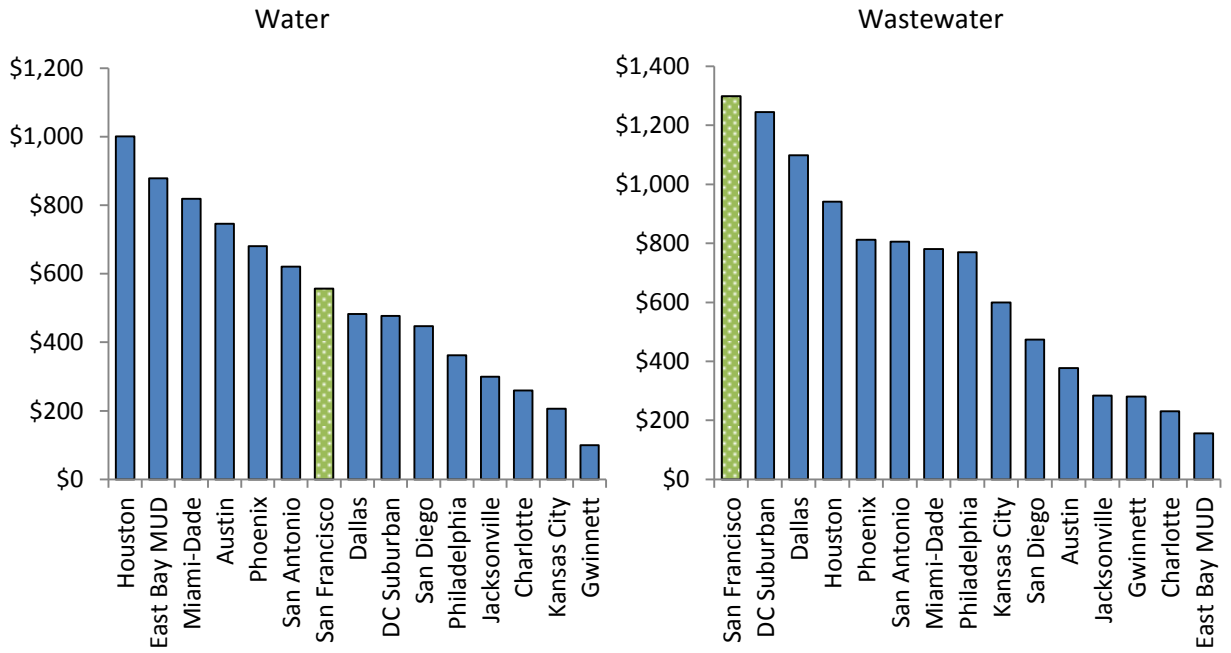


Figure 26 shows that San Francisco is in the mid to upper tier of its peer group in terms of its average-day and maximum-day water production amount, at 240 MGD and 298 MGD, respectively. San Francisco's maximum water treatment capacity, at 315 MGD, comes very near its actual system usage.

Figure 26 – Water Production – Actual vs. Total Capacity

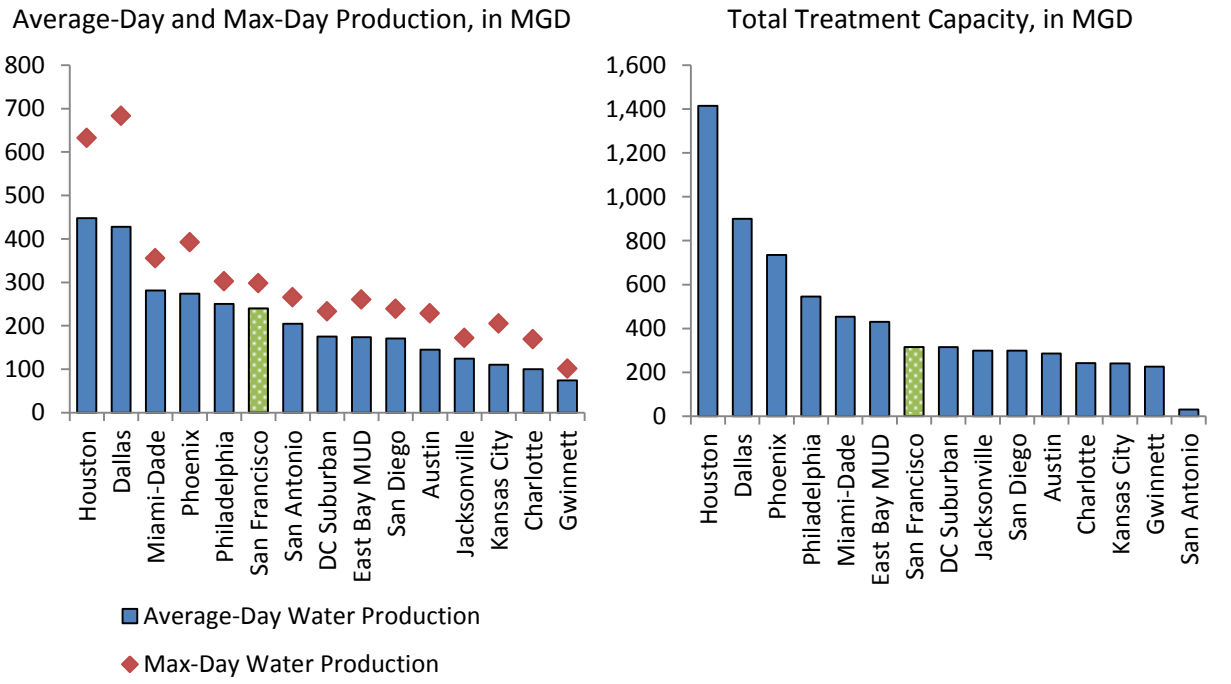
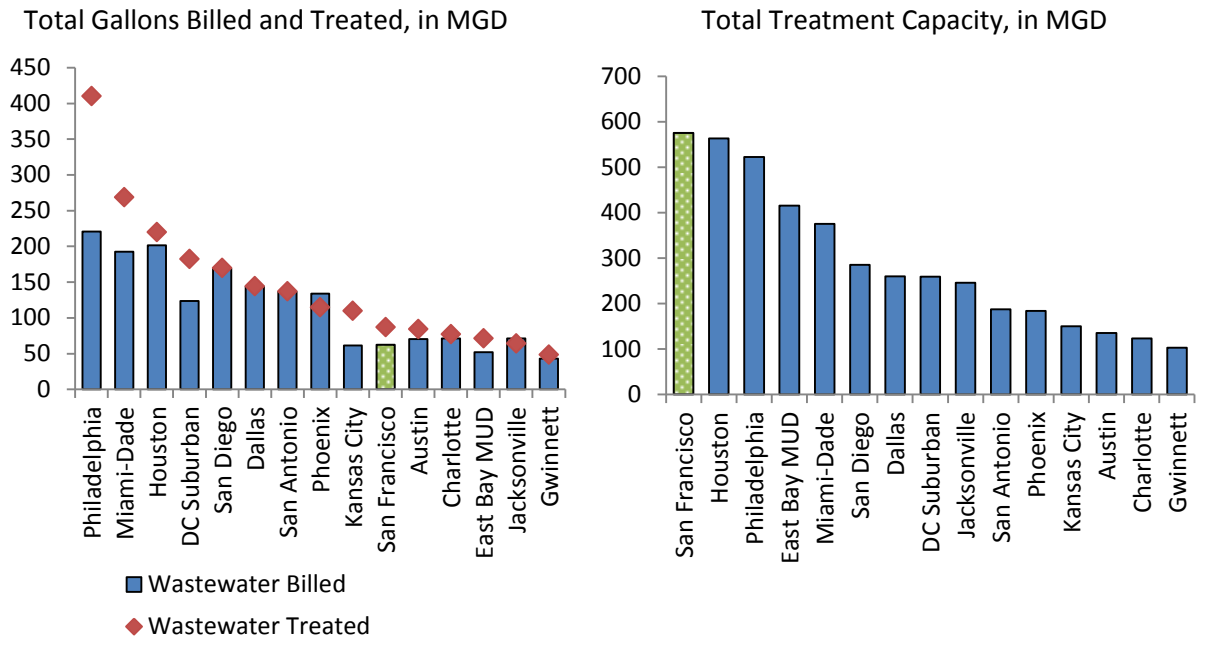


Figure 27 shows that San Francisco is in the lower tier of its peer group in terms of its daily levels of wastewater billed or treated, at approximately 62 MGD and 87 MGD, respectively. San Francisco has the greatest wastewater treatment capacity amongst its peer group, at 575 MGD, which far outpaces San Francisco's actual average daily volume of wastewater billed or treated. Thus, in order to deal with wet weather and flood control, San Francisco has to maintain a much larger wastewater and storm water system than is needed on a normal day of wastewater discharge. The wastewater treatment capacity of other combined wastewater and storm water systems – Dallas, Gwinnett, Houston, Kansas City, and Philadelphia – also outpace their average daily treatment needs, but not at nearly the rate as for San Francisco. Thus, San Francisco is unable to collect revenues from its usage rates, in order to offset fixed costs, at nearly the same rate as its peers.

Figure 27 – Wastewater Treatment and Billing – Actual vs. Total Capacity



Appendix C

Water Customer Categories[63]

Water Enterprise customers are grouped into retail and wholesale service categories. The retail customer category is further divided into in-city and outside-city customers. Customers within each sub-category are then grouped into revenue classes based on their service characteristics. The wholesale customer category consists of only one revenue class – suburban resale with long-term contract.

The customer classes (and their subgroups) are described briefly below.

Retail Customers (In-City) - In FYE 2013, the Water Enterprise provided retail water service in San Francisco to 173,362 accounts representing a service population of over 825,000 people. The customer classes served include single family and multiple-family residential, commercial, industrial, municipal, docks and shipping, and builders and contractors. All accounts are metered.

Suburban Retail Customer (Outside-City) - The Water Enterprise provides retail water service outside San Francisco to a small number of customers in the Town of Sunol and other customers served directly from the Water Enterprise's transmission pipelines. Municipal accounts outside San Francisco include San Francisco International Airport, Sharp Park and the San Francisco's county jail in San Bruno.

Wholesale Customers - The Water Enterprise provides wholesale water service to 27 suburban wholesale customers. They, in turn, provide retail water service to approximately 1.8 million people in Alameda, Santa Clara and San Mateo counties. Wholesale water service is provided under the terms of the 2009 Water Supply Agreement (WSA) which expires on June 30, 2034.

Wastewater Customer Categories[64]

The Wastewater Enterprise serves a population of approximately 840,000 within San Francisco and adjacent communities of Brisbane, Bayshore, and Daly City. Customers are grouped into two classes - residential and non-residential. Grouping customers with the same or similar wastewater characteristics into classes allows the Enterprise to allocate cost responsibility to each class based on their respective volumes and strengths (i.e. wastewater characteristics). Within each class, subgroups have been established to facilitate rate analysis and rate administration.

Residential - Residential sewage discharge results from human habitation of dwelling units. All residential sewage is assumed to have the same strength ("domestic strength") and is billed at the same rate. In FYE 2013, the Wastewater Enterprise served 147,308 residential accounts representing approximately 359,000 dwelling units. According to Customer Care and Billing (CC&B) System monthly reports, residential customers discharged 19,609,603 Ccf of wastewater, for a monthly average of 4.5 Ccf per dwelling unit. There are two categories of residential users – residents of single-family homes and residents of multi-family buildings.

Single-Family Residential (SFR) customers live in dwelling units served by individual water meters. Each SFR customer account represents one dwelling unit. The customer of record, who may be the property owner or a tenant, is responsible for paying the monthly sewer bill.

[63] *SFPUC Proposed Retail Water and Wastewater Rates Fiscal Years Ending 2015 to 2018*, pp. 12-13
[64] Ibid. pp. 37-39

In FYE 2013, the Wastewater Enterprise served 111,007 SFR accounts (68% of total accounts). These accounts discharged a total of 7,925,009 Ccf of wastewater (i.e. discharge units), an average of 6.0 Ccf per dwelling unit per month.

Multi-Family Residential (MFR) customers live in buildings with multiple dwelling units served by a common water meter or bank of water meters. Typically, the occupants of these dwelling units are tenants. One MFR customer account can represent any number of dwelling units – from a two dwelling unit duplex to an apartment building with more than 100 dwelling units. The customer of record is usually the building owner or a property manager who is responsible for paying the monthly sewer bill. Most multifamily properties include the cost of sewer service in the rent, if allowable, or in homeowners' dues for condominium associations. Because individual tenants do not receive a bill, many MFR tenants may not be aware of the cost of sewer service. This payment arrangement makes it difficult to develop low income assistance or conservation programs for MFR residents.

In FYE 2013, the Wastewater Enterprise served 36,301 MFR accounts (22% of total accounts) representing about 248,044 dwelling units. MFR accounts discharged 11,684,594 Ccf of wastewater, an average of 4.0 discharge units per dwelling unit per month. The average Single-Family and Multi- Family customer discharges about 50 gallons of wastewater per person per day, which well under the EPA's estimated national standard of 70 gallons per person per day for indoor use. At nearly half of the national standard, San Francisco's volume of per capita discharge is illustrative of the city's conservation values and practices.

Non-Residential – Non-residential wastewater discharges result from commercial, industrial, municipal, and other business activities. Non-residential customers include office buildings, hotels, restaurants, laundries, wholesale and retail stores, consumer services, manufacturing, and other businesses. These activities result in wastewater discharges that vary by customer both in the volume and pollutant strengths of wastewater discharged. Non-residential customers are separated into three subgroups; significant dischargers, minor dischargers and other dischargers.

Significant Dischargers meet one or more of the following criteria***:***

- Are subject to categorical pretreatment standards; Discharge more than 25,000 gallons per day excluding sanitary, noncontact cooling and boiler blowdown wastewater;
- Discharge wastewater accounting for 5% or more of dry weather 5-day Chemical Oxygen Demand (COD) / Total Suspended Solids (TSS) capacity of the treatment plant(s); or
- Discharge wastewater that in the opinion of the General Manager will adversely affect the sewerage system by causing interference, pass-through of pollutants, sludge contamination or endangerment of City workers.

SFPUC samples the wastewater of significant dischargers on a regular basis, typically every 6 months, to assess their discharge characteristics (total suspended solids, chemical oxygen demand, and fats, oil and grease). Significant dischargers are billed at a rate based on the volume of wastewater discharged and their particular wastewater characteristics.

Minor Dischargers contribute more than 10,000 gallons per day whose discharges are regulated by standards other than EPA pretreatment standards. Minor dischargers are monitored and the discharges sampled on periodic basis.

Other Dischargers are not monitored or sampled. These dischargers are placed into one of 11 different commercial/industrial profiles ("Standard Industry Classification" or SIC), each of which has a specifically calibrated rate for its discharge characteristics.

Appendix D

Water Commodity Rate Structures[65]

Residential Commodity Rates
In developing a proposal for residential commodity rates, the SFPUC considered a number of different rate structures, including:

Uniform structure. Under a uniform rate structure, the price per unit is the same for all units of water consumed. A uniform rate is easy to communicate and administer but provides a weak conservation price signal. Additionally, a uniform rate structure does not account for costs incurred to meet peak demands for water in excess of basic demand. These costs include capital costs related to oversizing the system to meet excess demand.

Inclining block structure. An inclining block structure account for costs incurred to meet peak demands and also encourages conservation by charging a higher price per block as consumption increases. Depending on the number of blocks and the differential between blocks, an inclining block rate structure can provide a strong conservation price signal. Large users, especially those whose high usage is related to household occupancy, may consider this rate structure to be burdensome.

Lifeline structure. A lifeline rate structure provides a lower price for essential water use and is intended to ensure low-income users are not unduly burdened by high prices. Utilities offering this type of rate typically limit its application to qualifying low-income customers. However, rate eligibility requirements based on income do not to comply with California law for municipal water and wastewater utilities under Proposition 218 without an appropriate funding source.

Tier Adjustment Based on Number of Occupants. The SFPUC's current inclining block rate structure does not account for household size and the potential for higher non-peak water demand, due to higher household occupancy, which would result in decreased costs. An extension of the first tier based on household size could account for lower peak demands, and the resulting reduced cost associated with these households. The SFPUC considered an extended tier 1 for large households; however, the SFPUC currently has neither sufficient data nor billing-system flexibility to offer a tier adjustment according to requirements of Proposition 218. While a voluntary grant program could be established to begin collecting data regarding household size, public support for such a program is uncertain.

Non-Residential Commodity Rate
No change is being proposed in the rate structures applicable to nonresidential customers. Currently, non-residential users pay a uniform commodity rate water due to wide ranging usage characteristics among customers in this class. Unlike residential customers who are relatively homogeneous, nonresidential users are diverse and vary significantly in size and usage, even between similar businesses. The proposed non-residential rate retains the existing uniform commodity rate structure.

Interruptible Commodity Rate
Capacity has been built into the SFPUC water system to provide service for all customers at all times, including times of drought. During non-shortage periods, unused capacity can be utilized to serve interruptible users. The SFPUC implemented an interruptible water rate in 2007, which excluded all capital costs, for customers who may not be served during times of drought. The proposed interruptible service rate does not include capital-related costs associated with reserve capacity. The capital cost

[65] *SFPUC Proposed Retail Water and Wastewater Rates Fiscal Years Ending 2015 to 2018*, pp. 29-33

component to maintain this capacity will be borne by non-interruptible customers who use this capacity. Interruptible users would still be required to pay for capital costs associated with the treatment and delivery of water.

Other Commodity Rates
For Docks and Shipping as well as Builders and Contractors, the nonresidential commodity rate is different from the general use unit rate. The main reason for the divergence is the difference in peaking factors which are based on a customer's peak day and peak hour consumption relative to their average base usage. The proposed non-residential commodity rates for Docks and Shipping and Builders and Contractors utilize SFPUC peaking factor assumptions specific to each customer class. Customer classes that peak on the system more often are assessed a greater unit charge per Ccf to reflect the extra capacity that must be reserved for these customers' peak usage.

In addition to changes in the commodity rate, staff proposes that Docks & Shipping customers pay a one-time connection charge per occurrence and that water be billed on actual usage without the current minimum billing amount of 3,300 Ccf. In addition, staff proposes that Builders and Contractors customers pay a one-time connection charge and that the monthly service charge be based on the actual meter size instead of the current fixed amount.

Fire Service Charge
In addition to providing public fire protection through hydrants, the SFPUC provides water quantities and pressures necessary for private fire service throughout the distribution system. Although private fire protection connections do not use water except in case of fire, they do consume available capacity within the system. Proposed fire service charges are based on system capacity costs to store and deliver water for fire suppression to privately owned and operated fire sprinkler systems. In addition to funding fire system costs, the monthly fire protection rates include a customer service component, which is charged to each account regardless of service type. This component was included in the proposed rates to reflect the cost of billing, collection, and customer service. The addition of this cost component is the main driver for the increase in the monthly fire service charge associated with small meters. To determine the charge, the fire service unit cost is multiplied by the meter capacity.

Wastewater Commodity Rate Structures[66]

Residential Commodity Rates
Currently, Residential sewer service customers are billed based on an inclining block rate structure where a set volume of monthly discharge per dwelling unit is charged at one rate and discharge units beyond that volume threshold are billed at a higher rate. These inclining blocks are often referred to as "tiers."

The SFPUC first adopted an inclining block rate structure in 1978, and a similar two-tiered structure is in practice today. For a period between FYE 2006 and FYE 2009, the SFPUC billed sewer services based on three tiers with the third tier set at five or more monthly discharge units per dwelling unit. Currently, the first tier is applied to the first three units of monthly discharge per dwelling unit, and all additional units of monthly discharge per dwelling unit are billed at a higher rate. For Multiple Family Residential accounts, the billable use in each block is calculated by multiplying the allowed use by the number of dwelling units. For example, an account with ten dwelling units would be allowed 30 discharge units in the first tier and all other discharge units in the second tier. There is no adjustment for vacant units in Multi-Family dwellings.

[66] *SFPUC Proposed Retail Water and Wastewater Rates Fiscal Years Ending 2015 to 2018*, pp. 29-33

Non-Residential Commodity Rates

For non-residential customers, the sewer service charge is calculated based on the volume wastewater discharged and the pounds of pollutants contained in that discharge. The charges for non-residential customers with sampled discharges are billed on the basis of their specific waste characteristics. Other non-residential customers are billed on the basis of the standard waste characteristics for their respective business activity, as assumed by their assigned SIC code. A customer or business activity which discharges high strength waste is charged a higher rate than a customer or business activity which discharges waste similar to residential customers. In addition to the costs shared with residential customers, all non-residential customers are responsible for the costs of the Wastewater Enterprise's pretreatment program. The pretreatment program monitors customers with high strength waste to ensure prohibited substances are not discharged to the sewer system. Since the pretreatment intends to monitor non-residential strength waste, Residential customers do not bear any cost responsibility for the pretreatment program.

Unlike the Water system where water peak demands are a result of incremental water consumption, wastewater system peak demands are not driven by incremental discharge. Rather, wastewater peak costs are driven primarily by wet weather discharge flows, which are not currently tied to the wastewater cost allocation. Because there is not a clear nexus between wastewater peak costs and incremental discharge, recovering peak costs through a second tier is not an accurate means of cost recovery under the requirements of Proposition 218.

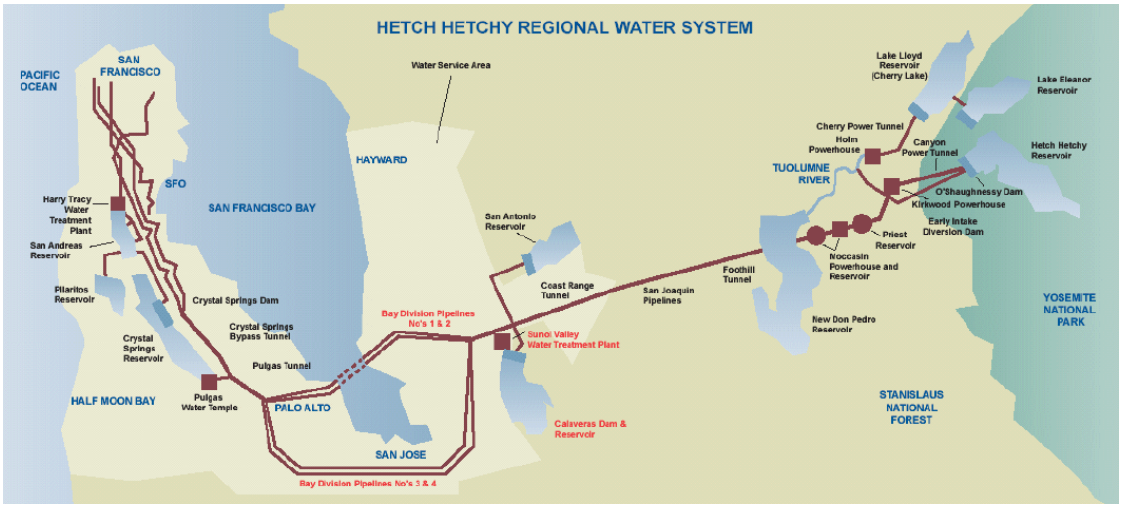
After considering the features of alternative rate structures, the SFPUC Rates Policy principles, and requirements of Proposition 218, the SFPUC proposes to phase-out the existing two-tier wastewater rate structure and phase-in a uniform wastewater rate structure over the 4-year rate proposal period. Although a two tier wastewater rate structure has historically achieved the conservation values of the SFPUC, the proposed phase-in approach to a uniform rate represents the SFPUC's constant drive to increase ratepayer equity. To avoid producing undue impact to the current ratepayers, the current Residential wastewater tiers will progressively phase-out beginning in FYE 2015 to eventually reach a uniform wastewater rate effective in FYE 2018. This change will not only reflect a stronger, more defensible cost nexus, but will also align the SFPUC with other wastewater utility best practices across California.

Non-Residential Wastewater Rates

Unlike Residential customers who have similar domestic discharge characteristics, Non-Residential customers discharge varying pollutant types depending on the type of business. Therefore, in addition to contributed discharge flow, Non-Residential customers are assessed separately for each billable constituent discharged into the wastewater system.

Appendix E

Bay Area Water Supply and Conservation Agency (BAWSCA)[67] System Map



[67] The Bay Area Water Supply and Conservation Agency (BAWSCA) was created on May 27, 2003 to represent the interests of 24 cities and water districts, and two private utilities, in Alameda, Santa Clara and San Mateo counties that purchase water on a wholesale basis from the San Francisco regional water system.

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CONTROLLER'S OFFICE
CITY SERVICES AUDITOR

The City Services Auditor was created within the Controller's Office through an amendment to the City Charter that was approved by voters in November 2003. Under Appendix F to the City Charter, the City Services Auditor has broad authority for:

- Reporting on the level and effectiveness of San Francisco's public services and benchmarking the city to other public agencies and jurisdictions.
- Conducting financial and performance audits of city departments, contractors, and functions to assess efficiency and effectiveness of processes and services.
- Operating a whistleblower hotline and website and investigating reports of waste, fraud, and abuse of city resources.
- Ensuring the financial integrity and improving the overall performance and efficiency of city government.

Project Team: Peg Stevenson, Director
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Joe Lapka, Performance Analyst
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