2018 – 2019

50th Largest Cities
Water & Wastewater Rate Survey

BLACK & VEATCH MANAGEMENT CONSULTING, LLC
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INTRODUCING THE 50 LARGEST CITIES SURVEY
Since 2001, Black & Veatch has assessed water and wastewater rates among the 50 largest cities in the United States. This report provides benchmarking data and takes a deeper look at the rate structures the utilities serving our largest populations use to help build and maintain financial resilience in the face of growing infrastructure demands, regulatory requirements and climate change.

Weather-wise, 2018 was another year for the history books. As a nation, we faced severe weather conditions ranging from extreme winter weather, to record-breaking heat, to Hurricanes Florence and Michael. Too much water; too little water; too hot; too cold - for those of us in the water industry, these events impacted not only our ability to provide services to our customers, but also taxed our resiliency.

Recognition that resiliency in all its forms (operating, organizational, financial) is critical in the face of uncertainty is why this issue moved up three places in the Black & Veatch 2018 Strategic Directions: Water Industry Report (Figure 1) since our last 50 Largest Cities Water & Wastewater Rates Survey.

Figure 1 Rank of Importance for These Challenges for the Water/Wastewater/Stormwater Industry
In our last survey, we looked at examples of how water service providers are building financial resilience while addressing the number one issue we have faced for years: aging infrastructure. In our 2018 - 2019 survey, we are answering questions related to what kind of trends we are seeing with respect to rate structures themselves. Are we seeing a change in how our survey participants are charging for services? How are they addressing revenue stability and meeting affordability concerns in light of climate change, continued declining consumption, and increasing costs?

If you have any questions regarding the contents of this report and/or Black & Veatch services, please do not hesitate to contact us at ManagementConsulting@bv.com.

Sincerely,

David Mayers | Water Industry Executive
Black & Veatch Management Consulting, LLC

This 2018 - 2019 report is Black & Veatch’s ninth water & wastewater rate survey.
ABOUT THIS REPORT
COMPANY OVERVIEW

Black & Veatch Management Consulting, LLC provides integrated strategy, transaction advisory, business operational excellence design, regulatory and technology solutions for the global power, water and oil & gas industries. Our highly skilled team of experienced professional consultants bring together combined expertise in advanced analytics and practical business sense with extensive technology and engineering capabilities. We deliver solutions that work best for your program needs, organization, assets and customers.

Our Power industry consultants bring a global level of industry experience to facilitate the investment, design, implementation and operationalization of a clean, distributed and intelligent grid required to serve a changing energy economy. As trusted advisors to utilities, commercial organizations and investors, we facilitate the development of next-gen infrastructure, and manage and advise on projects that align with market solutions.

The Oil & Gas team within Management Consulting works to facilitate and operationalize reliable, efficient and value-laden oil & gas assets. In an increasingly demanding regulatory environment, we work to help our industry participants improve their overall decision-making, risk management, asset portfolio optimization through transaction support, and safety performance. Our advisory professionals also work with our oil & gas clients to help them manage and align their market solutions to meet the needs to support the next generation of asset intelligence.

The challenges of the Water industry are met head-on each day by our industry-leading water consultants. They work to collaborate with clients and help them design new ways to create more sustainable and resilient solutions to managing our water resources. The water industry faces major challenges around the world driven by changes in population, aging infrastructure, climate change and accessibility. As within our other industries, “Owner’s Advisors” play an important role in partnering with water utilities to help align project and solutions to facilitate the delivery of clean water resources.

Black & Veatch is an employee-owned global engineering, procurement, consulting and construction company with more than 100 years of experience building a world of difference. We currently employ more than 10,000 professionals worldwide in more than 100 offices on six continents. To learn more about Black & Veatch Management Consulting, LLC, explore bv.com/consulting.
ANALYSIS TEAM

Ann Bui is Managing Director for water services in Black & Veatch Management Consulting, LLC. In this role, she oversees all rate and financial planning work for water and wastewater clients. She has nearly 30 years of experience working with international and U.S.-based utilities. She has led more than 350 engagements and has provided financial and business services for public and investor-owned utilities of various sizes, ranging from those with only 5,000 service connections to those that serve populations over 3 million.

An active proponent of advancing the water industry, Bui is the immediate past Chair of the American Water Works Association (AWWA) Finance, Accounting, and Management Controls (FAMC) Committee and is involved with key subcommittees on AWWA’s Rates and Charges Committee, the National Association of Clean Water Agency’s Utility Management Committee, and with the Water Environment Federation (WEF).

Bui is based in Los Angeles, California.

Alberto Morales is a Manager in Black & Veatch Management Consulting, LLC. He has over 15 years of experience working with water and wastewater utilities on financial planning, cost of service and rate design. He specializes in financial planning, cost of service analyses, capacity fees, miscellaneous fees, capital prioritization, business processes, technical due diligence and market valuations for projects involving water, wastewater and electric utilities.

Morales is based in Los Angeles, California.
METHODOLOGY

The analysis team calculated the typical bill for various residential, commercial and industrial user profiles based on the inputs of representatives from the 50 largest cities in the United States, as determined by population, that provide water and sewer services. Calculated bills reflect rates in effect as of 1 October 2018.
SURVEY OBSERVATIONS
COST OF WATER SERVICES

Since 2001, increases in the typical residential water and sewer bill continue to outpace the rate of inflation per the Bureau of Labor & Statistics’ Consumer Price Index-U (CPI-U) as shown in Figure 2.

Figure 2  Compound Average Rate of Change in Surveyed Typical Bills (2001-2018)

<table>
<thead>
<tr>
<th></th>
<th>CPI</th>
<th>Water</th>
<th>Sewer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rate of Change</td>
<td>2.1%</td>
<td>5.7%</td>
<td>5.8%</td>
</tr>
</tbody>
</table>

Market Dynamics

Higher water and sewer bills are a reflection of several dynamics impacting the industry, including (Figure 3):

- Aging infrastructure, which continues to be the industry’s greatest challenge. Funding infrastructure is a top priority and many utilities have developed charges specifically for capital projects or ongoing replacement and rehabilitation (R&R) needs.

- Operational costs associated with source of supply, treatment and disposal, labor, pension obligations, and contract services have increased at a faster pace than the CPI-U.

- Capital funding for water and sewer projects is increasingly scarce and highly competitive. With tightening financing requirements for long-term debt, many utilities have had to cash finance projects through cash reserves and rate increases.

- Regulatory requirements have also driven the need for significant capital programs from developing new water supply sources to complying with clean water requirements. These programs come with significant costs that continue to put pressure on rates.

Figure 3  Water Industry Challenges

- Declining consumption reduces water demand and revenue while costs for water services are increasing.

- Extreme weather events raising awareness of sustainability and resilience as key issues.

- Rising rates drive need for public awareness of the value of water systems and services.

- Regulatory uncertainty from political turmoil.

- Need to influence customer behavior through better customer engagement.

- Increased need for capital and asset management to replace aging infrastructure.
Figure 4 illustrates the trend in the average typical bill for residential customers across all 50 cities for 7,500 gallons/month of billed usage. NOTE: The actual dollar impact on consumers varies by service area.

Please refer to Exhibit A for average monthly rates for residential customers at various usage levels and Exhibit B for average monthly rates for industrial and commercial customers.

**AFFORDABILITY**

Rising rates are a direct result of cities and utilities grappling with the effects of aging infrastructure, rising operational costs, evolving capital funding mechanisms and regulatory requirements. Despite upward rate pressure, water and sewer services within each of the 50 cities remain largely affordable when compared to the Environmental Protection Agency (USEPA) affordability guidelines. While there is recognition in the water industry that the EPA’s guidelines require updating and care when applied to populations because it does not recognize diversity within a service area’s demographics, it can be used as a first estimation of overall affordability.

According to U.S. Census data, the national median household income in 2017 was approximately $61,372, which places the average U.S. affordability target for water and sewer services at $127.86 and $102.29 per month, respectively. The affordability target is based on applying the average CPI-U increase and the EPA’s affordability guidelines at 2.5 percent for water and 2 percent for sewer of median income.

Figures 5, 6 and 7 show the average monthly water, sewer and combined bills for typical customers using 7,500 gallons per month compared to each city’s affordability target.

Despite increasing water and sewer bills, the value of water continues to be a good value compared to other household bills. Figure 8 provides the average combined water and sewer bills for typical customers as compared to average monthly bills for other services.
Albuquerque
Arlington
Atlanta
Austin
Baltimore
Boston
Charlotte
Chicago
Colorado Springs
Columbus
Dallas
Denver
Detroit
El Paso
Fort Worth
Fresno
Houston
Indianapolis
Jacksonville
Kansas City
Las Vegas
Long Beach
Los Angeles
Louisville
Memphis
Mesa
Miami
Milwaukee
Minneapolis
Nashville
New Orleans
New York
Oakland
Oklahoma City
Omaha
Philadelphia
Phoenix
Portland
Raleigh
Sacramento
San Antonio
San Diego
San Francisco
San Jose
Seattle
Tampa
Tucson
Tulsa
Virginia Beach
Washington

Figure 5  Typical Residential Water Bill for 7,500 Gallons Versus Affordability Target

- $0 $20 $40 $60 $80 $100 $120 $140 $160 $180 $200
- Current average monthly bill for typical residential water services (7,500 gallons per month)
- Each city’s affordability target as defined by the U.S. EPA affordability guidelines
Figure 6  Typical Residential Sewer Bill for 7,500 Gallons Versus Affordability Target

- Albuquerque
- Arlington
- Atlanta
- Austin
- Baltimore
- Boston
- Charlotte
- Chicago
- Colorado Springs
- Columbus
- Dallas
- Denver
- Detroit
- El Paso
- Fort Worth
- Fresno
- Houston
- Indianapolis
- Jacksonville
- Kansas City
- Las Vegas
- Long Beach
- Los Angeles
- Louisville
- Memphis
- Mesa
- Miami
- Milwaukee
- Minneapolis
- Nashville
- New Orleans
- New York
- Oakland
- Oklahoma City
- Omaha
- Philadelphia
- Phoenix
- Portland
- Raleigh
- Sacramento
- San Antonio
- San Diego
- San Francisco
- San Jose
- Seattle
- Tampa
- Tucson
- Tulsa
- Virginia Beach
- Washington

- Current average monthly bill for typical residential water services (7,500 gallons per month)
- Each city's affordability target as defined by the U.S. EPA affordability guidelines
Albuquerque
Arlington
Atlanta
Austin
Baltimore
Boston
Charlotte
Chicago
Colorado Springs
Columbus
Dallas
Denver
Detroit
El Paso
Fort Worth
Fresno
Houston
Indianapolis
Jacksonville
Kansas City
Las Vegas
Long Beach
Los Angeles
Louisville
Memphis
Mesa
Miami
Milwaukee
Minneapolis
Nashville
New Orleans
New York
Oakland
Oklahoma City
Omaha
Philadelphia
Phoenix
Portland
Raleigh
Sacramento
San Antonio
San Diego
San Francisco
San Jose
Seattle
Tampa
Tucson
Tulsa
Virginia Beach
Washington

Figure 7  Typical Residential Water and Sewer Bill for 7,500 Gallons Versus Affordability Target

- Current average monthly bill for typical residential water and sewer services (7,500 gallons per month)
- Each city’s affordability target as defined by the U.S. EPA affordability guidelines
**Figure 8  Average Monthly Utility Bills Across the United States**

- Combined Water & Sewer Bill (7,500 gallons)
- Bundled Cable* (cable, internet, phone)
- Cellular Phone Per Household (with mobiles, avg=2.7)
- Energy Bill (per household per month)

<table>
<thead>
<tr>
<th>Year</th>
<th>Combined Water &amp; Sewer Bill</th>
<th>Bundled Cable</th>
<th>Cellular Phone</th>
<th>Energy Bill</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>$39</td>
<td>$48</td>
<td>$50</td>
<td>$76</td>
</tr>
<tr>
<td>2009</td>
<td>$109</td>
<td>$111</td>
<td>$59</td>
<td>$104</td>
</tr>
<tr>
<td>2018</td>
<td>$140</td>
<td>$149</td>
<td>$100</td>
<td>$114</td>
</tr>
</tbody>
</table>

Source: U.S. Census Bureau Table H-8 until 2016 and EIA Table 5a (www.eia.gov/electricity/sales_revenue_price/)

*Cable Industry reports that cable subscriptions have decreased dramatically since 2014. This is part of the “cut the cord” movement and the rise of streaming services. Bundled service package costs have remained stable or slightly decreased since 2016 survey, but number of households with streaming services (Netflix, Hulu, etc.) have increased. 2018 value includes bundled package with one streaming service.

**RATE STRUCTURE TRENDS**

Since our last survey, we have been asked what changes we have seen in rate structure design over the course of our survey history. We explore the rate structure trends and compare them to previous survey findings.

**National Water Use**

The U.S. Geologic Society (USGS) tracks national water data as part of the U.S. Census. Looking at municipal and industrial (M&I) water data from 1950, we see that the usage peaked in 1980 and has declined ever since (Figure 9). Similarly, per capita consumption peaked in the 1970s and dropped slowly until 1980 when there was a huge decline between 1980 and 1985. Since 1985, the per capita usage has declined at a rate of 0.5 percent per year.
Comparing our 2001 and 2018 survey data (Figure 10), we find that the number of survey participants with a uniform rate for residential customers remains essentially the same at just over one-third of participants. However, since 2001, there has been a significant decline in the popularity of the declining rate structure. The use of the inclining tier design climbed from 46 percent to 60 percent of participants in 2018.

Figure 10  Residential Water Rate Structure Types

Source: USGS Water Data

*M&I includes public supply delivered and used, self-generated domestic and industrial supply, and commercial supply.

Residential
When looking with more granularity at the data, we see that in 2001, for those communities with an inclining block structure, the most common number of blocks designed was three. By 2018, the most common number of blocks is essentially a tie between three and four (Figure 11).

**Figure 11 Number of Blocks - Water Residential Inclining Structure**

On the wastewater side, the dominance of the uniform rate continues (Figure 11). Of interest in this survey is the disappearance of the declining block rate structure among survey participants.

**Non-Residential**

Like the trend observed for residential customers, survey participants are moving away from the declining block structure for non-residential customers (Figure 12). While the percentage of uniform rate has decreased from 2001 to 2018, the inclining block structure has gained in popularity.

**Figure 12 Residential Wastewater Rate Structure Types**
Also like the residential trends seen for wastewater rates, by 2018, none of our survey participants are using the declining block structure for non-residential customers (Figure 13).
EXHIBIT A: RESIDENTIAL WATER AND SEWER RATES
The following graphs illustrate a typical monthly bill for residential customers under the following consumption classifications: 0 - (minimum bill); 3,750 gallons per month; 7,500 gallons per month; 15,000 gallons per month.

Figure 15  Average Residential Water and Sewer Costs Per Month (0 gallons – minimum bill)

Figure 16  Average Residential Water and Sewer Costs Per Month (3,750 gallons)
Figure 17  Average Residential Water and Sewer Costs Per Month (7,500 gallons)

Grey text = survey results for these years are extrapolated based on the average of the preceding and following year.

Figure 18  Average Residential Water and Sewer Costs Per Month (15,000 gallons)

Grey text = survey results for these years are extrapolated based on the average of the preceding and following year.
EXHIBIT B: COMMERCIAL & INDUSTRIAL WATER AND SEWER RATES
The following graphs illustrate the typical monthly water and sewer bills for commercial customers using 100,000 gallons of water per month and industrial customers using 10 million gallons per month.

Figure 19  Average Commercial Water and Sewer Costs Per Month (100,000 gallons)

Figure 20  Average Industrial Water and Sewer Costs Per Month (10 million gallons)
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