FINANCIAL CONSULTING SERVICES TO SUPPORT THE CITY'S SOLID WASTE SYSTEM, WASTEWATER SYSTEM, STORMWATER SYSTEM, MARINAS AND ECONOMIC CONSULTING

RFP #15-002

The City of Key West

2 APRIL 2015

BLACK & VEATCH
Building a world of difference.®

BLACK & VEATCH
Building a world of difference.

BLACK & VEATCH CORPORATION
1300 CONCORD TERRACE, SUITE 120 SUNRISE, FL 33323
+1 954-838-0686 | LAMPELK@BV.COM

April 2, 2015

City Clerk
City of Key West, Florida
3126 Flagler Avenue
Key West, FL 33040

Dear City Clerk:

Black & Veatch Corporation (Black & Veatch) is pleased to present our statement of qualifications to the City of Key West (City) for providing Financial Consulting Services for the Wastewater and Stormwater Systems respectively as published in Request for Qualification 15-002 (RFQ) dated February 26, 2015. Black & Veatch has not submitted a statement of qualifications and do not intend to pursue the Financial Consulting Services published in the RFQ for the Solid Waste System.

We believe that your review of our qualifications will reveal the depth and breadth of our project team, a successful track record of providing value to the City and other neighboring utilities, and a wealth of relevant experience and capacity to serve the City.

The Black & Veatch Team is uniquely qualified for this project for the following reasons.

- **The Black & Veatch project team is assembled in Sunrise, FL.** Members of the Black & Veatch team have successfully served the City on previous engagements and strive to gain a complete understanding of all the issues faced by the City. In gaining this understanding, we will be responsive, ready to service the City, and provide the appropriate resources, as required, by the City all from our Sunrise, FL office.
- **Black & Veatch has helped to establish the standard of professional care in the fields of utility rate, financial, and regulatory consulting services**. Representatives of the Black & Veatch were involved in the preparation of the Water Environmental Federation's: User-Fee-Funded Stormwater Programs Manual, which is a comprehensive publication that details all the steps and actions necessary to develop a feasible stormwater utility. In addition, Black & Veatch publishes annual Water Industry Strategic Directions Report, Water and Wastewater Rate Survey, and a Stormwater Rate Survey which serves in understanding the shifts and developments within the utility rate, financial, and regulatory industry.
- **A proven detailed approach for performing wastewater and stormwater rate studies**. Black & Veatch has developed an approach that is comprehensive and flexible in considering the unique aspects of the City's customers, service area characteristics, operating contracts, employees, processes, and regulatory issues. We have performed over 200 such studies across the nation, within the last 5 years.
- **Development and Modifications of Interactive Financial Models**. Black & Veatch continues to develop new and fresh financial planning models that are advanced, interactive, and user friendly financial planning tool that performs specific simulation analysis, scenario analysis, and performance management analysis. In addition, Black & Veatch has worked with

utilities to update their financial models, with no glitch in transition, during the process of completing a Rate Study.

- **Reputation on Wall Street**. Black & Veatch has provided support to clients in over 200 bond issuances valued at $40.0 billion, within the last 10 years. We maintain a full-service office in Manhattan, NY to better service clients that access financial markets.

The Black & Veatch Team believes that our committed leadership, practical solutions, and proven business experience will provide the City with value that will result in timely and high-quality work products.

We welcome the opportunity to discuss the details of our qualifications and invite you to contact Robert Chambers – Project Manager at (407) 419-3574. Thank you for your time and consideration; we look forward to serving the City of Key West on this important engagement.

Very truly yours,
BLACK & VEATCH CORPORATION

Les K. Lampe
Vice President

Black & Veatch Corporation

DIRECTORS:

Last Name	First Name	Middle
Triplett	Timothy	Wayne

OFFICERS:

Last Name	First Name	Middle Name	Executive Status
Abrams	David	L.	Senior Vice President
Achenbach	John	Arthur	Vice President
Aillet	Joe	R.	Associate Vice President
Aitken	David	Scott McDonald	Vice President
Allan	Mark		Vice President
Allender	Bruce	M.	Associate Vice President
Amick	Mark	T.	Associate Vice President
Anderson	Douglas	D	Vice President
Anderson	James	C.	Vice President
Andry	Ted	R.	Vice President
Apple	Terry	R.	Vice President
Araoz	Carlos	E.	Vice President
Armbruster	Stanley	A.	Associate Vice President
Bahora	Greg	T.	Associate Vice President
Baker	Brett	A.	Associate Vice President
Baker	Mike	J.	Associate Vice President
Barcroft	Michael		Associate Vice President
Barrett	Ian		Associate Vice President
Bennett	Mark	E.	Vice President
Bertuglia	Lynn	E.	Associate Vice President
Blauwiekel	Sheri	A.	Executive Vice President
Boersma	Paul	M.	Associate Vice President
Bond	D.	Matthews	Associate Vice President
Borst	Robert	S	Associate Vice President
Brake	Jack	R.	Associate Vice President
Breckenridge	William	R.	Vice President

Last Name	First Name	Middle Name	Executive Status
Brill	David	J.	Associate Vice President
Britton	Brian	K.	Associate Vice President
Brnilovich	Robert		Vice President
Brouwer De Koning	Hector	Horatio	Vice President
Brown	Curtis	G.	Associate Vice President
Brown	David		Associate Vice President
Buhrmaster	Daniel	F.	Associate Vice President
Burger	Brent	B.	Vice President
Butcher	Douglas	C.	Associate Vice President
Byers	Andrew	C.	Associate Vice President
Cabrera	Albert	R.	Associate Vice President
Cabreriza	Luis	A.	Vice President
Cambridge	Derek	L.	Associate Vice President
Campbell	David	B.	Associate Vice President
Carlson	David	J.	Vice President
Cheong	Hoe Wai		Executive Vice President
Chevrette	John	Maurice	President
Childress	Allen	B.	Senior Vice President
Christensen	Thomas	E.	Associate Vice President
Clark	James	H.	Senior Vice President
Clum	Gregory	D.	Senior Vice President
Coggins	Jeffrey	Dale	Associate Vice President
Cohlmia	Peter	J	Vice President
Coleman	Tiffany	A.	Associate Vice President
Connell	Craig	C.	Vice President
Conradt	Joseph	P.	Associate Vice President
Crabb	William	A.	Associate Vice President
Crandall	Robert	A.	Associate Vice President
Crowdis	Richard	N.	Vice President
Currence	Kevin	L.	Vice President
Currie	James	DM	Associate Vice President
Daniel	Karen	Loretta	President
Davis	William	R.	Associate Vice President
Davis	Kevin	N.	Associate Vice President

Last Name	First Name	Middle Name	Executive Status
Davis	Spencer	L.	Associate Vice President
Davisson	John	C.	Vice President
Didriksen	Keith	R.	Associate Vice President
Doane	Jonathan	W.	Vice President
Doull	James	D.	Senior Vice President
Driver	Christi	L	Associate Vice President
Duckworth	Mark	A.	Associate Vice President
Dudley	William	T.	Associate Vice President
Duxbury	Steve	Lynn	Vice President
Dyro	Ralph	J.	Vice President
Eberts	Ralph	Thomas	Executive Vice President
Edwards	Steve	Lane	Chairman, President & CEO
Egger	David	F.	Senior Vice President
Elbert	Ryan	J.	Associate Vice President
Ellermeier	Fred	J.	Vice President
Erington	Kerry	B.	Senior Vice President
Fagan	Morgen	E.	Associate Vice President
Fairweather	Alan		Associate Vice President
Feingold	Russell	A.	Vice President
Felski	John	W.	Associate Vice President
Foellmi	Steven	N.	Vice President
Fournier	Mark	A.	Vice President
Freeland	Frederick	H.	Associate Vice President
Friesen	Glenda	L.	Associate Vice President
Gai	Jingquan		Associate Vice President
Gake	Mark	A.	Associate Vice President
Gammill	Michael	E.	Vice President
Gaston	Eric	K.	Vice President
Gaumnitz	Michael	A.	Vice President
George	John	W.	Vice President
Gerhart	Brett	A.	Associate Vice President
Germinder	Robert		Senior Vice President
Gettinger	James	E.	Vice President
Gibbs	Stephen	M.	Associate Vice President

Last Name	First Name	Middle Name	Executive Status
Gil	Luis	F.	Associate Vice President
Ginn	Donnie	H.	Associate Vice President
Goff	Michael	K.	Associate Vice President
Goldwasser	Sean	M.	Vice President
Gould	Christopher	J	Associate Vice President
Graving	Louis	W	Associate Vice President
Greig	Brenda	M.	Associate Vice President
Gribble	Jon	P.	Associate Vice President
Griffin	Donnie	R.	Associate Vice President
Gruber	George	P.	Vice President
Guenther	Thomas	R.	Vice President
Gustke	John	Michael	Senior Vice President
Hallowell	Dave	S.	Vice President
Hansen	Jacqueline	R.	Associate Vice President
Hardt	John	R.	Associate Vice President
Harris	David	Keith	Vice President
Hart	Garry	W.	Vice President
Hawkins	James	M.	Associate Vice President
Hays	Brady	F.	Vice President
Hemken	Bradley	E.	Vice President
Hengel	James	A.	Senior Vice President
Henson	Jeffrey	W.	Associate Vice President
Hesby	James	C.	Vice President
Heyborne	Stephen	L.	Associate Vice President
Hinkle	Kevin	Thomas	Associate Vice President
Hirsch	Richard	H	Associate Vice President
Hoffart	Shawn	D.	Vice President
Hoffman	Angela	Lungren	Senior Vice President
Holt	David	L.	Associate Vice President
Huang	Xiaoyong		Associate Vice President
Huggins	Roosevelt	R.	Associate Vice President
Hughes	John	R.	Associate Vice President
Hulsey	Robert	A.	Associate Vice President
Jacober	Richard	I.	Vice President

Last Name	First Name	Middle Name	Executive Status
Jamison	Gary	G.	Associate Vice President
Janchar	John	J.	Executive Vice President
Joerger	Robert	A.	Associate Vice President
Johnson	John	E.	Vice President
Johnson	John	H.	Vice President
Johnson	Joy	Delaine	Vice President
Johnson	Michael	S.	Associate Vice President
Julian	Jennifer	L.	Associate Vice President
Kantor	Vladimir	I.	Associate Vice President
Kaufman	Joseph	R.	Vice President
Kaushik	Prahlad	H.R.	Associate Vice President
Kelleher	Lori	J	President
Kerns	David	Eugene	Executive Vice President
Kerschen	Kevin	A.	Associate Vice President
Kieny	Daniel	J	Senior Vice President
Kinchen	David	E	Associate Vice President
King	Michael	L.	Associate Vice President
King	Richard	F.	Vice President
Kinner	Scott	D.	Associate Vice President
Klausner	Brian	J.	Associate Vice President
Kneitz	Paul	R.	Associate Vice President
Koehler	David	J.	Associate Vice President
Koller	Christopher	E.	Associate Vice President
Koodie	Anthony		Associate Vice President
Krafft	Christopher	A.	Vice President
Krage	Ronald	G.	Associate Vice President
Kriesky	Leonard	J.	Vice President
Kringen	Kent	R.	Associate Vice President
Kruzel	Kerry	C.	Associate Vice President
Kurtz	Jeffrey	E.	Vice President
Lackey	Kent	Allen	Associate Vice President
Lampe	Les	K.	Vice President
Lau	Ngai Fai		Associate Vice President
LeBlanc	Daniel	K	Associate Vice President

Last Name	First Name	Middle Name	Executive Status
Lee	Larry	W.	Associate Vice President
Lee	Matthew	Charles	Senior Vice President
Lee	Susan	A	Associate Vice President
Lefebvre	David	M.	Associate Vice President
Leligdon	David	A.	Vice President
Lenertz	Roger	Peter	Senior Vice President
Lewis	Arron	L.	Associate Vice President
Lewis	James	R.	President
Li	Tengjie		Associate Vice President
Lindberg	Dale	Sheldon	Vice President
Lloyd-Henry	Paul		Vice President
Loftspring	Peter	David	Senior Vice President & Assistant Secretary
Mahendran	Joseph	A.	Associate Vice President
Man	Hoi Leung		Vice President
Marshall	John	W.	Vice President
Martin	Curtis	J.	Associate Vice President
Martin	Gary	L	Associate Vice President
Mather	Lee	R.	Associate Vice President
McAleb	William		Associate Vice President
McDermott	Mark	A.	Associate Vice President
McKelvey	James	G.	Associate Vice President
McMenemie	David	F.	Vice President
Meegan	Jennifer	L.	Senior Vice President
Mendelsohn	David	C.	Senior Vice President
Meyer	Danny	W.	Senior Vice President
Mickells	Adrienne	L.	Vice President
Miller	David	D.	Vice President
Miller	Paul	M.	Vice President
Mitchell	Charles	B.	Vice President
Mitts	Steven	J.	Associate Vice President
Morley	James	P	Associate Vice President
Morrow	John	S.	Associate Vice President
Mueller	Christopher	G.	Associate Vice President

Last Name	First Name	Middle Name	Executive Status
Murphy	John	E.	President
Myers	Ervin	B.	Associate Vice President
Myers	Jerry	D	Vice President
Nagle	John	B.	Associate Vice President
Neemann	Jeff	J.	Associate Vice President
Nemeth	Louis	E.	Associate Vice President
Newman	Owen	K	Associate Vice President
Nott	Matthew	Richard	Vice President
O'Brien	Thomas	M.	Vice President
O'Connor	James	E.	Senior Vice President
Oksuz	Faruk		Vice President
Oldenhuis	Eric	J.	Vice President
Orth	Michael	G.	Senior Vice President
Oskvig	Ordean	Harlow	President
Palmer	Timothy	Dale	Associate Vice President
Parish	David	J.	Associate Vice President
Parr	Donald	Arthur	Associate Vice President
Pattani	Anand	P	Vice President
Pelissero	Patrick	J	Associate Vice President
Petz	Carl	F.	Associate Vice President
Phillips	James	Thomas	Vice President
Pierides	Kyriacos	M	Associate Vice President
Pintcke	Theodore	P.	Vice President
Pires	Jose	A.	Vice President
Pletka	Ryan	J.	Associate Vice President
Plubell	Joseph	K.	Senior Vice President
Podrebarac	Marijan		Associate Vice President
Powell	Andrew	Stuart	Associate Vice President
Qadri	Shahid	S.	Vice President
Ratzki	Tom	J.	Vice President
Rector	John	S.	Associate Vice President
Reorda	Thomas	P.	Senior Vice President
Reuss	Brent	M.	Senior Vice President
Roberts	David	W.	Associate Vice President

Last Name	First Name	Middle Name	Executive Status
Robinson	Clinton	O.	Associate Vice President
Roesle	Scott	E.	Associate Vice President
Romack	Randal	D.	Associate Vice President
Ruddle	Christopher	M	Associate Vice President
Rueckert	Daniel	C.	Associate Vice President
Schapker	Dennis	R.	Vice President
Schmidt	Brian	E.	Vice President
Schmidt	Daniel	L.	Senior Vice President
Schnieders	James	H.	Vice President
Schottler	Jason	T.	Associate Vice President
Schrimp	Mark	E.	Vice President
Scott	Christopher	William	Vice President
Scupham	Samuel	K.	Associate Vice President
Serafin	Michael	J.	Associate Vice President
Shah	Alapkumar	R.	Associate Vice President
Shaw	Andrew	R.	Associate Vice President
Shaw	Stuart	K.	Vice President
Siegrist	A.	Dean	Associate Vice President
Sigman	Jay	R.	Associate Vice President
Small	Keith	D.	Associate Vice President
Smith	Curtis	W.	Associate Vice President
Sneath	Allen	L.	Associate Vice President
Song	Ngan		Associate Vice President
Stallard	G.	Scott	Vice President
Stamm	Jeffrey	J.	Vice President
Stark	Michael	S.	Vice President
Steichen	Mark	T.	Associate Vice President
Stevens	Donald	R.	Executive Vice President
Strayer	James		Associate Vice President
Sundberg	James	P.	Associate Vice President
Tahiliani	Mohan		Vice President
Talib	Javid	H.	Vice President
Tan	Eng Guan Eric		Associate Vice President
Tan	Seng Chai		Vice President

Last Name	First Name	Middle Name	Executive Status
Tattersall	John	Michael	Vice President
Taylor	William	K.	Associate Vice President
Terrell	Sean	M.	Vice President
Terry	Lisa	K.	Associate Vice President
Timmermann	David	A.	Associate Vice President
Townsend	Gary	W.	Vice President
Travers	Martin	G.	President
Triplett	Timothy	Wayne	Executive Vice President & Secretary
Unruh	Rodney	I.	Senior Vice President
Van Dyke	William	R	President
Van Long	Brian	J.	Associate Vice President
Wadley	Michael	D	Vice President
Wahl	Thomas	G.	Associate Vice President
Waite	Richard	A.E.	Associate Vice President
Walker	David	M.	Associate Vice President
Wallis-Lage	Cindy	L.	President
Walsh	Edward	J.	Executive Vice President
Wang	Suqing		Associate Vice President
Warn	Brad	A.	Vice President
Wayne	Gregory	L.	Associate Vice President
Webber	Matthew	D.	Senior Vice President
Weber	Cathy	A.	Associate Vice President
Weida	Paul	W.	Vice President
Welch	Robert	E	Vice President
Wells	William	J.	Associate Vice President
Welp	James	E.	Vice President
White	Lyle	A.	Vice President
Williams	Dale	E.	Vice President
Williams	Steven	D.	Associate Vice President
Williams	William	D	Associate Vice President
Winslett	Robin		Associate Vice President
Winterlind	Fredrik		Vice President
Wood	Sheldon	E.	Senior Vice President

Last Name	First Name	Middle Name	Executive Status
Wright	Ernest	D.	Senior Vice President
Yong	Wei Leong		Vice President
Zoller	Jason	A.	Associate Vice President

COMPANY TYPE: General Business Corporation

FEIN: 43-1833073 **REGISTRATION NUMBER:** NA

DATE OF INCORPORATION: 11/16/1998 **PLACE OF INCORPORATION:** Delaware

PRINCIPAL ADDRESS: 11401 Lamar
Overland Park, KS 66211

REGISTERED AGENT IN The Corporation Trust Company
STATE OF INCORPORATION: 1209 Orange St.
Wilmington, DE 19801

FORMER NAMES:

SHAREHOLDERS: Black & Veatch Holding Company

SHARES AUTHORIZED: 3,000 common stock $1.00 par value

SHARES ISSUED: 3,000

PURPOSE:

1. To engage in any and all lawful acts or activities for which corporations may be organized under the Delaware General Corporation Law.

2. Engineering, procurement, and construction consulting and management in the power plant industry, waste water facilities, and telecommunications systems.

Table of Contents

Table of Contents i
Information Page 1
Company Information 2
Methodology and Approach 6
Personnel 12
Qualifications 15
Required Forms 29
Appendix A | Additional Information 30
Appendix B | Project Team Resumes 31

Information Page

PROJECT NAME

Financial Consulting Services to Support the City's Solid Waste System, Wastewater System, Stormwater System, Marinas and Economic Consulting

CONTACT INFORMATION

Project Leader

Robert Chambers
Manager
1300 Concord Terrace
Sunrise, Florida 33323
407-419-3574 p
913-458-3579 f
ChambersR@bv.com

Authorized Representative

Les Lampe
Vice President
11401 Lamar Avenue
Overland Park, Kansas 66211
913-458-3363 p
913-458-3579 f
LampeLK@bv.com

Company Information

Black & Veatch has been privileged to serve the City of Key West in a few previous engagements. During these engagements, the Black & Veatch team has interfaced with City staff through all tiers of the organization, built sound and productive working relationships, and gained an understanding of the City's operations. The knowledge gained by the Black & Veatch team through our past engagement experiences will serve to greatly reduce the learning curve associated with initiating a new project and engaging a new consultant.

Black & Veatch is currently working with neighboring utilities, such as: the City of Hollywood, Broward County, City of North Miami, Miami-Dade County, and Palm Beach County, to solve similar complex planning and financial issues such as those faced by the City. We are a national organization that serves utilities all across the United States, so our learned local and national best practices and resources will be available to the City during this engagement. We have the unique ability to provide the expertise and resources necessary to perform all of the requested services within our company, under one roof, with experts on call and available to the City.

As a company, Black & Veatch has been in business for nearly 100 years. We have seen the industry's ups and downs and have been at the forefront of offering dynamic solutions to our municipal utility clients across the scope of work areas requested by the City. The City can be confident in the fact that Black & Veatch stands by our work and will deliver the best-in-class solutions to the City's complex problems.

As a trusted partner to the City, Black & Veatch would take great pride in being given the opportunity to serve the City on this important engagement.

HISTORY OF THE FIRM

Black & Veatch Corporation's (Black & Veatch) mission of *Building a World of Difference* ®sets a high standard for both defining innovative solutions and delivering service excellence. We live up to that ideal by delivering reliable and innovative infrastructure solutions to our clients' most complex challenges. The result is that Black & Veatch helps to improve and sustain the quality of life around the world.

Founded in 1915, Black & Veatch is a leading global engineering, consulting and construction company. We specialize in these major markets:

- Water
- Energy
- Management Consulting
- Telecommunications

- Federal

Our employee-owned company of more than 10,000 professionals has more than 110 offices worldwide and is among the *Forbes* "Largest Private Companies in the United States." We have been ranked by *Engineering News-Record* as the industry's No. 1 design firm in Telecommunications, the industry's No. 3 design firm in Power and are consistently in the Top 10 in Water. We're also leaders in more than 20 categories among design firms, contractors and environmental companies worldwide. Our professionals earn this kind of recognition by understanding the business needs and by aligning practical and innovative solutions to meet the defined objectives of clients served.

Black & Veatch is an industry ***leader in Water and Energy solutions.*** We enjoy the comprehensive Top 10 rankings in the areas comprising the Water/Energy nexus:
No. 1 .....Telecom
No. 3 ..... Power
No. 6 .....Water Supply
No. 7 ...Wastewater Treatment
ENR, 2014 Rankings

Black & Veatch's service offerings include:

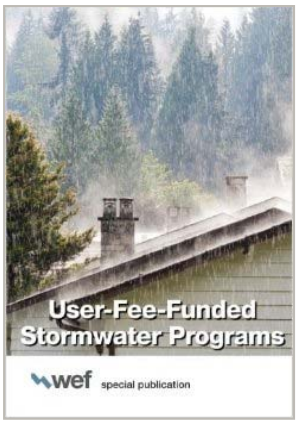
- Strategic planning
- Financial planning and cost of service/rate design
- Business process planning and support
- Environmental consulting
- Sustainability planning
- Conceptual and preliminary engineering
- Engineering design
- Construction

Local Responsiveness and Local Knowledge

The Black & Veatch team that has been chosen to provide the Financial Consulting Services for the Wastewater and Stormwater Systems as defined in the City of Key West (City's) Request for Qualifications (RFQ), includes subject matter experts in Financial Planning, Stormwater Utility Development , Stormwater Utility Planning, Capital Financing, and Special Utility Rate Determination. Many of the team members including the project manager have institutional knowledge of the City's utility system, and due to the strong local presence, the team members also have a strong understanding of the local environment, issues, and sensitivities. The project team leadership and specific task members maintain offices in Black & Veatch's local Sunrise, Florida office. In addition, members of the team have served the City and other neighboring utilities as a team on previous engagements. All Black & Veatch professionals will serve the City, through the Sunrise, Florida, office with a dedicated level of commitment and responsiveness to the City.

Industry Experts

Black & Veatch consultants are key participants in the agencies that set the regulations for the industry and has **served over 200 public water and wastewater utilities in the last 5 years**. Members of our Management Consulting Division have actively participated in the writing of the Water Environment Federation's (WEF) Financing and Charges for Wastewater Systems Manual, which is the current industry standard for developing equitable wastewater rates. In addition, members of the project team that was formed to serve the City have actively participated in the preparation of the **WEF Special Publication: User-Fee-Funded Stormwater Program Manual**, which is a manual that outlines the tenets necessary to feasibily operate a stormwater system based on a charge/fee based mechanism. **Mrs. Prabha Kumar, the stormwater system Quality Control lead who will serve the City, is a co-editor of this publication**. In addition, Black & Veatch team members have also provided expert testimony at the Federal Energy Regulatory Commission and various State Commissions and Courts of Law regarding rate, financial and engineering matters.



Proven Performance

The City can have confidence in its relationship with Black & Veatch. Through our previous and current work with municipal clients across the Country, we have earned a reputation for providing experienced and dedicated teams that meet commitments to project budgets and deliverable schedules.

NCEO
National Center for Employee Ownership

Total Commitment

With more than 100 years of excellence, Black & Veatch will not only be here for the duration of the engagement, but long after to address any requests from the City. We stand behind the services we provide. The strength of the Management Consulting Division of Black & Veatch lies in its proven capability to provide comprehensive, practical and implementable programs that serves and provides value to clients, not just today but in the future. We assist our clients in aligning the appropriate resources to their visions and would be honored to serve the City as a part of this engagement.

Cost-of-Service and Rate Studies

Utility rates are the primary source of revenues for supporting enterprise utility operations and capital funding needs. As such, a periodic review and evaluation of rates is necessary to verify that the revenue requirements are being sufficiently recovered, and that cost recovery is initiated in an equitable manner. Cost-of-service based rate studies are conducted in a systematic manner that will provide a reasonable and legally defensible mechanism to recover system costs. In general, a cost-of-service based rate studies provide a methodology to distribute costs by functional component to customer classes using class units of service. With this information, the proportional responsibility of each customer

class for the total system costs can be specifically identified. The resulting allocation of costs to the various customer classes can then be compared to the revenues generated under existing rates from each class in order to determine if cross-class subsidizations are occurring.

An additional rate study aspect is the development of projected operating results for future planning periods. The customer and level of service characteristics identified in the study can be used to forecast future revenues from user rates. Applying the revenue forecasts against projected revenue requirements provides a mechanism to estimate the timing and magnitude of future rate adjustments and the associated impacts on customers. In general, the projected operating results will provide utility management with a strategic planning tool to help guide decisions related to budgeting and capital funding.

Economic and Financial Feasibility Studies

Costs and benefits of proposed projects and their alternatives are identified and evaluated during economic and financial feasibility studies, which provide a basis to justify capital investment decisions. We have performed feasibility studies relating to the addition of pipeline capacity and interconnections, replacement or improvement of wastewater treatment plants, and the development of stormwater systems.

Sound managerial planning for construction of major capital improvement projects typically requires a comprehensive financial feasibility study. In cases where the project is to be financed by the issuance of municipal revenue, general obligation bonds, or special service funding such as grant and low interest loans, the demonstration of financial feasibility is an integral and essential part of making the case for the investment decision.

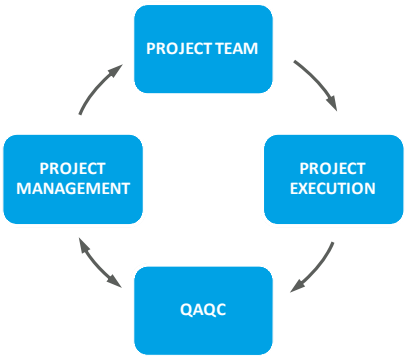
The purpose of an economic and financial feasibility study is to determine the financial viability of the project. The main components of a feasibility study include conceptual design, cost estimates of capital and operation and maintenance expenses, market analysis, financial capability, revenue projections, and feasibility analysis. All of these components are critical to the success of the study.

Methodology and Approach

The methodology and approach Black & Veatch will employ in conducting the wastewater and stormwater rate studies is comprehensive, proven, and fluid enough to be adjusted to account for the City's unique financial planning situation. ***Black & Veatch has previously served the City as its financial consultant in successfully completing, delivering, and gaining City Council approval of the wastewater and stormwater rates***. As a company, Black & Veatch has established basic project engagement principles which have been utilized in the past to serve the City and will drive the manner in which these studies are managed and executed. These principles have allowed project teams within our company to successfully deliver multiple projects.

Our approach to project delivery encompasses four elements that are crucial to the successful completion of this and all similar engagements undertaken by Black & Veatch.

- A highly experienced project team with a broad array of expertise and skill sets;
- Well defined project execution approach that is innovative and aligned with industry standards;
- Quality Assurance and Quality Controls (QAQC); and
- Strong Project Management.

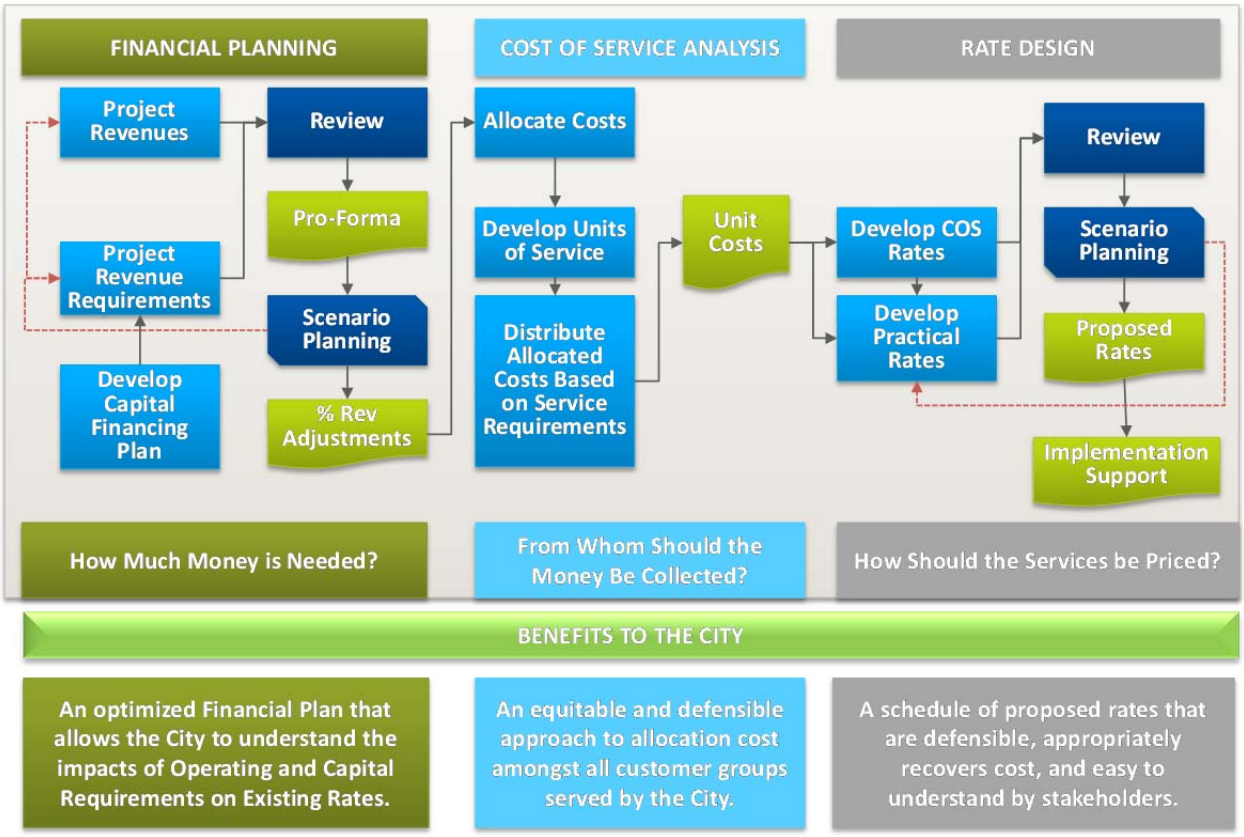


The overall project execution approach defined herein is fluid and flexible in supporting all of the scope of work categories and items requested by the City. The current operating environment faced by the City and other utilities in the United States requires ***the ability to quickly assess policy, operations in case of emergency and financial data in order to make specific and timely decisions.*** Our approach and tools will support the City through these complex decisions.

The approach utilized in executing the wastewater and stormwater rate studies will entail the development of a five-year (FY 2016 through FY 2020) financial plan, performing cost of service analysis, designing service rates, preparing a final report that summarizes the findings and recommendations of the study, preparing a new financial model or updating the City's existing financial model that will be transferred to the City, and providing support through City Council approval.

Exhibit 1 below provides outline of the methodology to be utilized by Black & Veatch in completing the scope of work defined herein.

Exhibit 1 Black & Veatch Rate Study Methodology



The proposed scope of work includes the foundational elements of revenue projections, revenue requirement development, financial planning, cost of service analysis, and rate design analysis. The order of the presentation as detailed on the following pages parallels the sequence in which both studies will be executed.

Task 1—Initial Meeting and Data Collection

This task will involves facilitating a project kick-off meeting and collecting and reviewing basic data from the City relative to both the wastewater and stormwater systems. The project kick-off meeting entails facilitating introduction between the City and Black & Veatch project teams, reviewing and aligning the goals and objectives of the project, establishing the formal medium to communicate and resolve problems, and agreeing on the project milestones and deliverables. In addition, the Black & Veatch team will seek to learn about and discuss key issues faced by the City. At the kick-off meeting, the content and format of the Black & Veatch information request will be discussed.

Black & Veatch understands that the City currently maintains its own financial model, so Black & Veatch will initiate a discussion related to utilizing and maintaining the existing financial model, which is acceptable by Black & Veatch, or building a new financial model.

WASTEWATER RATE STUDY

The following tasks are proposed relative to the completion of the wastewater rate study:

Task 2—Projection of Revenues under Existing Rates

This task will include, as needed, a detailed analysis of historical billable wastewater volume and customers served by customer class and the development of projections of billable volumes and number of customers for a future five-year study period. The results of this analysis will provide the foundation for estimating future revenue levels under existing and proposed rates and will provide the basis for estimating certain variable operating expenses such as power and chemicals that vary with billed volumes.

Task 3—Development of Revenue Requirement Projections

The development of revenue requirements (cost) for the wastewater utility will be based on an examination of historical financial reports, current operating budgets, and the proposed capital improvement and replacement program. Black & Veatch will develop a forecast of revenue requirements over the five-year study period. The forecast of revenue requirements will be developed based on known future revenue requirements obligations over the study period, incorporating industry established escalatory factors for inflation, insurance, power, etc.

Task 4—Determine the Adequacy of Wastewater Rates

Once the forecast of revenue requirements is complete, Black & Veatch will combine the forecast of revenues and revenue requirements to develop a financial forecast. The financial forecast will provide an indication of the magnitude of the overall annual rate increase required for the wastewater system over the five-year forecast period. In addition, Black & Veatch will perform scenario and sensitivity analysis to determine the most acceptable financial forecast based on the established goals and objectives of the project, the ability of the City to source low interest of grant funding for capital projects, and the ability of the City to collect all revenues billed, to name a few. Upon finalizing the financial forecast, Black & Veatch will perform a rate comparison of neighboring utilities to illustrate the competitiveness of the City's existing wastewater rates.

Our ***approach*** will focus on developing a sound financial plan that considers all of the City's issues.

Task 5—Cost Of Service Allocations

The cost of service to be recovered from wastewater revenues is equal to operation and maintenance expenses, plus all capital related costs, less revenues from other sources. Costs of service will be apportioned among customer classes on a utility basis, that is, in terms of operating expenses, depreciation expense, and return on investment. For a municipal utility the cumulative total of depreciation expense and return on investment is equal to the capital cost portion of total cost of service.

The City's annual requirements to be met from existing rates will be allocated to their respective functional components which will provide the basis to further allocate cost to customer classes. Customer class annual requirements allocations will be compared to revenues under existing rates to identify the relative customer class adjustment. For a wastewater utility, these concepts are generally consistent with accepted procedures described in the Water Environment Federation's Manual of Practice Number 27, *Financing and Charges for Wastewater Systems*.

Task 6—Design of Rates and Charges

The existing wastewater rate structure will be evaluated for effectiveness in equitably recovering total revenues from customers served. Revisions to the existing rate structure that are needed in order to recover total revenues and allocated costs by class will be reviewed and evaluated for use by the utility to meet wastewater service policies, pricing objectives, cost of service recovery, and practical limitations. Typical bills for various customer types will be developed under the existing and proposed rates to identify the impact of the recommended fee structure on each individual customer class. Specific consideration will be given to establishing charges that meet the utilities' policies and practical objectives regarding utility service.

STORMWATER RATE STUDY

The following tasks are proposed relative to the completion of the stormwater rate study:

Task 7—Project Revenue under Existing Rates

Currently, the City maintains a stormwater fee methodology that assesses and tracks the use of stormwater services based on impervious area, and the magnitude of stormwater service required is based on Equivalent Standard Units (ESUs). As such, the Black & Veatch team will forecast the City's stormwater billing units for a five-year planning period considering historical growth trends, local economic conditions, and experienced utility industry judgment. It is anticipated that the City will provide historical billing information and any future anticipated adjustments to the stormwater billing units by customer classification. Projections of stormwater revenues under existing rates for the planning period will be developed. In addition to analyzing and projecting revenue based on existing rates, we will also review and project revenues from other existing revenue sources including interest earnings, availability charges, late payment penalties, returned check charges, and other miscellaneous revenues. ***Black & Veatch will work with the City to perform a special assessment of uncollectible stormwater revenues to determine the impact of not collecting these revenues on the total stormwater system and formulate a plan that allows the stormwater system to operate in a financially feasible manner in the event of unsustainable levels of uncollectible revenues.***

Task 8—Revenue Requirements Projection

Revenue requirements for the stormwater utility will be developed based on an analysis of historical currently budgeted and projected operating and capital needs of the system. Black & Veatch will develop a forecast of revenue requirements over the five-year study period. The forecast of revenue requirements will be developed based on known future revenue requirements obligations over the study period, incorporating industry established escalatory factors for inflation, insurance, power, etc.

Task 9—Determine the Adequacy of Stormwater Rates

The projected revenues and revenue requirements will be incorporated into a five-year cash flow analysis to estimate additional revenue needs on an annual basis. The analysis will identify annual adjustments in stormwater utility revenues that may be necessary to meet any bond covenant requirements, good utility practice, or sound utility financial planning considerations. Black & Veatch will perform scenario and sensitivity analysis to determine the most acceptable financial forecast based on the established goals and objectives of the project, the ability of the City to source low interest of grant funding for capital projects, and the ability of the City to collect all revenues billed, to name a few. Upon finalizing the financial forecast, Black & Veatch will perform a rate comparison of neighboring utilities to illustrate the competitiveness of the City's existing wastewater rates.

Task 10—Cost Of Service Assessment

The cost of service to be recovered from stormwater revenues is equal to operation and maintenance expenses, plus all capital related costs, less revenues from other sources. Costs of service will be apportioned among customers based on a customer's existing need for stormwater services. Currently, the City's fee methodology standardizes a customer's stormwater service requirement by determining an ESU measure, which is based on impervious area, for all customer served by the system. As a part of the scope of work defined herein, Black & Veatch will not attempt to adjust the fee methodology, but determine the unit cost to serve the total stormwater system ESUs based on the total cost to operate the stormwater system.

Task 11—Design of Rates

At the completion of the cost of service assessment, Black & Veatch will review the City's current stormwater rate structure to determine its effectiveness in achieving the appropriate level of stormwater system revenues. We will design a schedule of rates that recover the total revenues needed for the stormwater utility to operate in a solvent manner. In addition, revenues projected to be recovered from the proposed fees in each year of the forecast period will be compared with projected revenue requirements to evaluate the overall revenue adequacy over the forecast period. Typical bills for various customer types will

be developed under the existing and proposed rates to identify the impact of the recommended fee structure on each individual customer class.

ADDITIONAL COMBINED SERVICES

The following proposed tasks are common to both wastewater and stormwater financial consulting services:

Task 12—Deliverables

Black & Veatch will provide the following reports and other deliverables during the course of the project.

- *Draft Report* – Black & Veatch will prepare one preliminary report text and tables covering the selected financial plan, cost of service results, and rate design analysis for review by utility representatives. The preliminary report will summarize the analysis, findings, results, and recommendations for both the wastewater and stormwater utility.
- *Final Report* – Upon the completion of the City's review of the draft report, a final report will be prepared and forward to the City.

Task 13—Meetings & Presentations

- *Kickoff/Data Meetings* – One meeting will be scheduled with City representatives during a mutually convenient time to discuss project requirements, gather data, finalize project scheduling and reporting requirements, and receive overall project direction. The meeting will help ensure that the project objectives are clearly defined and understood by all parties.
- *Results Meetings and City Council Presentation* – One meeting will be scheduled to discuss the results of both the sewer and stormwater rate study results. The purpose of the meeting will be to 1) review the results of the analysis, and 2) and formulate a plan to present the results of the analysis to the City Council.

ADDITIONAL SERVICES

Upon request, Black & Veatch will provide additional services related to capital financial planning, financial and compliance support, and special rate determination. A scope of work and fee will be developed and agreed upon for any additional services requested by the City.

Personnel

Black & Veatch has assembled a highly qualified and diverse Project Team to execute the services indicated in the City's Request for Qualifications (RFQ). ***The team will be led by Robert Chambers, a highly experienced and committed Project Manager and a strategic and financial planning expert, who has a strong institutional knowledge of the City and has served the City on past financial planning assignments.***

A key aspect of the team presented herein is that all of the team members have collaborated on other engagements, all the team members located in the Sunrise, Florida have served the City in the past, and as a unit, this team has demonstrated cohesive and coordinated service delivery capabilities to deliver assignments for other neighboring utilities to the City. Such team cohesion is extremely critical to understand the gravity of the issues faced by the City, and successfully deliver solutions to these issues.

The proposed quality control leads are national experts that serve on national committees that drive and make complex industry shifting decisions. ***Mr. Richard Campbell and Ms. Prabha Kumar will be responsible for the overall quality of all work products*** and their knowledge and along with our company's national resources will be available to the City – ***all within a single firm.***

PROJECT LEADERSHIP

Project Manager: Robert Chambers, MBA

Mr. Robert Chambers has served the City, as a Project Manager, in the successful completion of previous wastewater and stormwater rate studies. He will serve as the primary contact for all aspects of the engagement including assignment of task orders, budget, scope and schedule management, and other contractual and administrative matters. Mr. Chambers will provide overall leadership, resources, and coordination between the City and Black & Veatch team.

Mr. Chambers has assisted other neighboring utilities including Broward County, the City of Hollywood, and the City of North Miami, the City of Lauderhill, and Miami-Dade County with strategic and financial planning studies, and hence brings a strong local experience and knowledge.

Robert has had the privilege to serve the City since 2007 in the successful completion of three financial planning projects. His broad base of utility consulting experience will be utilized throughout this engagement.

Client Service Manager: Rafael Frias, PE

Mr. Rafael Frias, currently provides engineering, technical, and leadership guidance to the City through our open and current General Engineering Services contract, and brings the depth of industry and institutional knowledge that can be of value to the City. In his role as the Client Service Manager, Mr. Frias will be responsible for ensuring the involvement of appropriate resources and technical solutions to meet the City's needs.

The City will directly benefit from Rafael's experience, attention and commitment to client service. In addition, he will apply his skill in communicating complex technical ideas to a broad audience and other stakeholders as needed by the City.

Rafael recently managed a utility-wide self-funded **Energy Efficiency Master Plan** for the City of Hollywood, FL, which resulted in a combined **annual energy savings of 7 GWh, or 15% of the utility's annual energy use.**

QUALITY CONTROL LEADS

Sewer System: Richard Campbell

Mr. Campbell is a Director at Black & Veatch that provides comprehensive planning expertise to complex utilities and governmental agencies nationwide. ***Mr. Campbell currently serves on the AWWA's Rates and Charges Committee that recently published, the AWWA M1 Manual: Principles of Water Rates, Fees and Charge.*** Mr. Campbell will be responsible for the methodology and quality associated with the delivery of all sewer assignments. Mr. Campbell has served a diverse number of utilities in Florida such as; JEA, Orlando Utilities Commission, the City of North Miami, and the Utilities Commission of New Smyrna Beach, on matters similar to the services requested by the City. In addition, Mr. Campbell currently serves as the primary Project Contact and Director on all financial planning matters for Black & Veatch's current Miami-Dade County engagement.

Having provided financial planning expertise for over 25 years, Richard understands the complexities that businesses face, from operations, capital planning and financial planning to regulatory compliance and customer experience.

Financial Planning: Prabha Kumar

Ms. Kumar is a Director in the Black & Veatch's Management Consulting Division and directs a wide range of financial advisory and management consulting services. ***Ms. Kumar currently leads the stormwater utility consulting practice at Black & Veatch.*** Ms. Kumar will be responsible for the quality of all stormwater financial planning assignment performed by Black & Veatch for the City.

Ms. Kumar specializes in stormwater utility consulting and in utility business operations optimization.

She has assisted a number of municipalities including the Philadelphia Water Department, PA; Wilmington, DE; and Springfield, OH with stormwater utility planning, development, implementation, and stakeholder engagement. In addition, ***Ms. Kumar's was a co-writer in the development of the WEF User-Fee-Funded Stormwater Programs manual which is a comprehensive publication that details all the steps and actions necessary to develop a feasible stormwater program***.

Provided below is some basic information related to the roles and responsibilities of the project team members:

TEAM MEMBER | ROLE	QUALIFICATIONS / BENEFITS TO THE CITY
Jeff Dykstra Lead Project Consultant	■ ***Specializes in the development of complex financial planning, cost of service, and rate design models.*** ■ Jeff has completed numerous studies related to financial and strategic planning for utilities facing complex problems in Florida and Nationally.
Mihaela Coopersmith Project Consultant	■ Specializes in data research, mining, and analysis as a part of the development of financial planning tools ■ Mihaela will support the project team with financial planning and other day to day project activities.
Isabel Botero Project Consultant	■ Isabel is an engineering manager with a deep experience base related to environmental planning and alternative project delivery methods. Ms. Botero has served the City of previous engagements and will serve in providing technical expertise as a part of the sewer system financial analysis team.

Qualifications

Provided below is a brief summary of Black & Veatch's financial planning experience.

CLIENT	CITY OF KEY WEST	CLIENT	MIAMI-DADE COUNTY
Location:	Key West, Florida	Location:	Miami-Dade County, Miami, Florida
Duration:	Completed in 2010	Duration:	2005 - Present
Black & Veatch Role:	*Rate and Financial Consultant*	Black & Veatch Role:	*Rate Consultant, Bond Engineer, Consulting Engineer, Various Operations Studies.*
Description of Role: Black & Veatch prepared the feasibility report for the development of the stormwater utility for the City of Key West. After the feasibility report was approved, we developed the initial organizational, functional, legal and financial aspects of the stormwater utility. Based on engineering studies prepared by others, Black & Veatch prepared a capital investment plan, developed the stormwater user fees, and performed long term financial modeling. In addition, a stormwater master account billing database was developed and a customer service training manual was prepared with training provided to customer service staff. Additionally, Black & Veatch has provided financial consulting services to the City for the completion of a wastewater and stormwater rate study respectively. Black & Veatch last served the City in this capacity in 2010.		Description of Role: Miami-Dade serves approximately 2 million customers in Florida's largest metropolitan area, is the sixth largest water system in the United States. Black & Veatch has provided rate and financial advisory services to Miami-Dade Water and Sewer Department (MDWASD) since 2005. This effort has included retail rate development, review of bond covenants, and annual wholesale rate development and true-up analysis. In order to complete these efforts, Black & Veatch developed an interactive and comprehensive retail and wholesale rate and financial planning model for MDWASD. Black & Veatch also serves as the Financial Consultant and Bond Engineer for MDWASD. As Consulting Engineer, Black & Veatch assisted MDWASD with issuance of the Series 2010 Bonds which totaled $594,330,000.	

CLIENT	CITY OF NORTH MIAMI	CLIENT	CITY OF LAUDERHILL
Location:	North Miami, Florida	Location:	Lauderhill, Florida
Duration:	2011 - Present	Duration:	Completed in 2011
Black & Veatch Role:	*Rate and Financial Consultant*	Black & Veatch Role:	*Water and Sewer Rate Study*
Description of Role: Black & Veatch has provided financial planning and rate study services to the City's Public Works Department since 2011. Our team has performed comprehensive water and wastewater cost of service analysis and a multi-year financial plan analysis for the City. A major result of the work efforts was a change in rate structure to include an inclining block pricing strategy to promote water conservation. The Black & Veatch team supported the City with educating stakeholders and retained approval for the implementation of the proposed rates. In addition, Black & Veatch has supported the City in sourcing additional financing from local and state agencies in the amount of $46.0 million to fund specific capital projects.		Description of Role: Black & Veatch was selected to perform a cost of service study for the City of Lauderhill. The study required a comprehensive analysis of the cost and rates associated with providing water and sewer service to customers residing within the City limits of Lauderhill. The goals of this study were to: (i) fully evaluate and optimize the revenue generating potential of water and sewer rates considering the scarcity mandates and regulatory requirements issues by the water management districts in Florida, (ii) evaluate the appropriateness and adequacy of cost recovery mechanisms for the water and sewer system (iii) obtain buy-in from external and internal stakeholders, and (iv) develop rates fair and equitable water and sewer rates.	

CLIENT	ALLEGHENY COUNTY SANITARY SEWER AUTHORITY (ALCOSAN)	CLIENT	PHILADELPHIA WATER DEPARTMENT
Location:	Allegheny County, Pittsburgh, Pennsylvania	Location:	Philadelphia, Pennsylvania
Duration:	2011 - Present	Duration:	1972 - Present
Black & Veatch Role:	*Rate Consultant, Financial Planning, Cost of Service Rates, Consent Decree Negotiations and Affordability Analyses*	Black & Veatch Role:	*Rate Consultant, Financial Planning, Cost of Service Rates, Bond Issuance Assistance, And Wholesale Contract Assistance.*
Description of Role: Black & Veatch was selected by ALCOSAN to complete a financial analyses related to an upcoming consent decree from the Environmental Protection Agency (EPA). Black & Veatch was tasked to perform a cost of service rate, financial planning, and revenue sufficiency study. ALCOSAN provides wastewater treatment services to 83 municipalities, so a detailed review and projection of all revenue requirements including operation and maintenance expense, recurring capital, existing debt service, cost of new debt, maintenance of required reserve funds, and anticipated major capital improvements associated with the Wet Weather Plan was developed to meet the EPA's requirements. In addition, detailed cost of service analysis was completed for all ALCOSAN's sewer system customers and rates were designed based on these allocations. Black & Veatch provides continuing financial analyses in support of ALCOSAN's negotiations with the EPA regarding this matter.		Description of Role: Black & Veatch has provided financial planning, rate, utility financing and related consultation to the City's Water Department on a continuous basis since 1972. Water, wastewater, and stormwater rate studies conducted during this period have included the projection of revenues and revenue requirements for a six year period, allocation of cost of service by customer class, and design of rates. Rates are designed for inside City retail service customers as well as for ten outside City suburban customers who are provided service on a wholesale wastewater basis and two on a wholesale water basis. Since 2008, Black & Veatch has assisted Philadelphia Water Department in its stormwater rate reallocation project. The Rate Reallocation project involved changing the basis of stormwater billing from a meter size based charge to a parcel gross and impervious area based charge for the City's non-residential parcels.	

CLIENT	CITY OF WILMINGTON	CLIENT	CHARLESTON WATER SYSTEM
Location:	Wilmington, Delaware	Location:	Charleston, South Carolina
Duration:	2003 - Present	Duration of Assignment:	1975 - Present
Black & Veatch Role:	*Water, Sewer, and Stormwater Financial and Management Consultant*	Black & Veatch Role:	*Water and Wastewater Cost of Service and Rate Studies*
Description of Role: Black & Veatch has provided financial planning and rate study services to the City's Public Works Department on a continuous basis since 2003. The objective of this annual study is to perform a six-year proforma analysis for the City's water and sewer enterprise fund, to determine the magnitude of annual rate increases required during the six-year study period. The six-year cash flow analysis includes projections of water, wastewater, and stormwater revenues from operating and non-operating sources, annual Capital Improvement Program expenditures, Operation & Maintenance (O&M) expenditures, annual existing and projected debt service, transfers between various funds, debt issuance expense, 60-day operating reserves, other miscellaneous expenditures, and capital revenues. The annual study also involves the apportioning of combined sewer revenue requirements between sanitary sewer and stormwater functional areas, to determine the annual stormwater revenue requirements to be recovered through dedicated stormwater user charge. In 2007, Black & Veatch completed the development and implementation of a stormwater utility to facilitate equitable recovery of costs associated with the City's CSO mitigation and integrated stormwater management.		Description of Role: Comprehensive water and wastewater revenue requirement, cost of service, and rate studies were performed in 1975, 1983, 1988, 1990, 1991, 1996, 2000, 2003, 2006, and 2010. Included in the analyses were service to retail and wholesale customers inside and outside the corporate boundaries, and contract water service to the U.S. Navy (up until 2003). Both water and wastewater costs of service are established using the "Utility Basis" methodology. In subsequent years, various other water and wastewater wholesale service rate and contractual service issues have been successfully resolved with Black & Veatch assistance. Black & Veatch has assisted with the review of renegotiated draft contractual service agreements, and applicable terms of service and bases of charge for the provision of wholesale service to three new suburban municipalities. Negotiations regarding updated cost allocation and billing procedures with a major wholesale wastewater service customer were also completed successfully completed.	

CLIENT	CITY OF SPRINGFIELD	CLIENT	GREATER CINCINNATI WATER WORKS
Location:	Springfield, Ohio	Location:	Cincinnati, Ohio
Duration:	1990 - Present	Duration of Assignment:	1950 – Present
Black & Veatch Role:	*Stormwater Financial Consultant*	Black & Veatch Role:	*Rate Consultant, Financial Planning, Cost of Service Rates, Revenue Bond Issuance*
Description of Role: Black & Veatch has provided consulting services to the City of Springfield for over 25 years. Current work involves the development and implementation of a stormwater utility. Phase 1 of the project includes the feasibility analysis and utility development as listed below: ■ A high level *Program Review*; ■ *Financial Analysis* to determine 5-year revenue requirements and cash flow projections; ■ *Data Assessment and Billing Mechanism* Evaluation; ■ *Rate Structure Analysis* ; ■ *Credits and Appeals Program*; and ■ *Public Involvement and Education* At the completion of these research and development task, the Black & Veatch team will understand the nature and specifics of the stormwater program to be implemented.		Description of Role: Since 1950, Black & Veatch has provided various management consulting services to GCWW. In addition to traditional rate consulting analysis, we have also provided strategic business planning, feasibility analysis of district formation, credit card costs analysis, review of system expansion issues, utilization of family unit classifications, late fee analysis, and payment plan fees. In addition to management services, Black & Veatch has provided engineering and technical services on numerous projects since the 1940s. Black & Veatch has performed comprehensive studies of revenue requirements, cost of service, and rates for the Greater Cincinnati Water Works (GCWW) beginning in 1950, with the most recent comprehensive study completed in 2011. Included in these studies were discussions of alternative rate forms, policy considerations, and review of the city/county water service contract. A comprehensive Excel-based financial planning and rate design model was developed as part of the 2000/2001/2007 study and was updated in 2011. The model was used extensively in the assessment of scenarios regarding the utility's first issuance of revenue bonds and has supported subsequent bond issues as well. Cost of service allocations reflect the varying demand requirements of different service areas and can be easily modified to reflect current or proposed conditions.	

CLIENT	CITY OF HOLLYWOOD	CLIENT	PUERTO RICO ACQUEDUCT AND SEWER AUTHROITY
Location:	Hollywood, Florida	Location:	Puerto Rico
Duration:	2012 - Present	Duration of Assignment:	2012 – Present
Black & Veatch Role:	*Energy Management and Asset Management Advisor*	Black & Veatch Role:	*Performed an Economic Feasibility Analysis*
Description of Role: Black & Veatch developed a comprehensive Energy Efficiency Master Plan for the City's Water and Wastewater systems and facilities. The master plan resulted in an implementation plan for 20 recommended energy cost savings projects and strategies with a net positive value of $4.4 million to the City over the life of the improvements. As a part of the analysis, Black & Veatch developed an existing energy use baseline for the utility facilities and equipment, energy efficiency assessments at the facilities assessed, operations optimization evaluation for the raw water supply, treatment, and distribution systems, and we developed 50 energy conservation measures that were reviewed as a part of the analysis. In addition, the Black & Veatch team developed of an Energy Project Decision Cash Flow Model to perform specific economic and feasibility analysis to define an implementation strategy consistent with the City's overall Capital Improvement planning, project execution, and project funding goals and objectives.		Description of Role: The Puerto Rico Aqueduct and Sewer Authority (PRASA) contracted the CSA Group and Black & Veatch to conduct an extensive study of all nine hydroelectric systems. These assessments entailed performing technical and economic evaluations to determine the most economically feasible manner for PRASA to restore these facilities. Energy costs in Puerto Rico are quite high and represent the second highest operational cost for PRASA and, as a result, PRASA is very interested in the feasibility of rehabilitating these facilities to help offset their energy costs and support the island's goals towards its renewable energy portfolio. Provided below is a summary of the major tasks completed: ■ assessments and recommendations resulting from site visits by the team's hydropower professionals; ■ evaluation of each sites' operational procedures; ■ development of hydrologic/hydraulic models to evaluate and optimize generation potential; and ■ economic feasibility analysis of each rehabilitation and modernization recommendation using the Energy Decision Cashflow Model These evaluations provided a summary of the recommended short-term and long-term rehabilitation actions to assist PRASA in evaluating the feasibility of maximizing generation at each of these hydroelectric facilities. Once implemented, the recommended improvements would result in a 75 percent increase in annual generation from the hydropower facilities from an annual average generation of 150M kWh to 262 M kWh.	

CLIENT	PALM BEACH COUNTY	CLIENT	TAMPA BAY WATER
Location:	Palm Beach, Florida	Location:	Tampa, Florida
Duration:	2012 - Present	Duration of Assignment:	2011 - Present
Black & Veatch Role:	*Strategic and Sustainability Planning Consultant*	Black & Veatch Role:	*Performed a Financial Feasibility Analysis and developed a Financial Model*
Description of Role: Palm Beach County retained Black & Veatch to provide engineering, sustainability and strategic planning services in the development of its 2014-2019 strategic sustainability plan (SSP). This analysis focused on auditing and developing a complete SSP. As a part of the this on-going engagement, Black & Veatch facilitated multiple workshops and conducted numerous interviews to understand the effectiveness of the existing plan and build upon the tenets established in the existing plan. In addition, Black & Veatch is working with the Palm Beach County's leadership team to develop a go-to-market strategy in order to communicate the results of the SSP to all stakeholders.		Description of Role: Tampa Bay Water retained the services of Black & Veatch to evaluate the financial and economic ramifications of various project alternatives. This feasibility analysis included consideration for both operating and capital costs including the issuance of additional debt proceeds and the associated annual debt service requirements. In order to accurately simulate the potential impact of the alternative projects on the financial condition of the utility, modifications were made to the Financial Model utilized by the Utility. This model was prepared by a previous consultant of the Utility. In addition, the model contained several constraints that impeded the required analysis when making a "go/no go" decision on the aforementioned projects. In this regard, Black & Veatch worked with Utility staff members to identify the desired analyses for evaluating the project alternatives. Subsequent to this determination, Black & Veatch made appropriate modifications and adjustments to the Utility's Financial Model such that the desired analyses were incorporated into the model for future use	

CLIENT	KANSAS CITY, BOARD OF PUBLIC UTILITIES (BPU)
Location:	Kansas City, Kansas
Duration of Assignment:	2007 – Present
Black & Veatch Role:	*Rate Consultant, Financial Planning, Cost of Service Rates*

Description of Role:
In 2010, Black & Veatch completed a comprehensive cost of service rate study for the BPU Water Utility. The study included the determination of revenue and revenue requirements, cost of service allocations, and rate design. A final report was prepared and presented to the Board. Black & Veatch participated in a rate hearing for the proposed rates which included presentation of testimony, presentation of rebuttal testimony, and responding to data requests presented by interveners. The Board unanimously approved our four-year proposed rate schedule. Black & Veatch is currently updating the 2010 Rate Study.

Top 50 Largest Utilities Served by Black & Veatch

Listed below is a summary of representative project experience. The summary of highlights project that have been completed by Black & Veatch for Utilities ranked as the largest 50 utilities in the United States by population.

UTILITY	UTILITY TYPES (W/WW)	PROJECT WORK ITEMS										
		Revenue/Revenue Requirements	Financial/Capital Planning	Cost of Service/Rates	Special Fees & Charges	Conservation Planning/Rates	Rate Model Development	Economic/Financial Feasibility	Bond Feasibility/Eng. Cert.	Organizational/Management	Mgmt. Information Systems	Valuation/Appraisal
Atlanta, GA	W,WW	●		●	●		●	●	●			
Birmingham, AL	W,WW	●	●	●				●				
Charlotte, NC	WW									●		
Cleveland, OH	W,WW	●	●	●								
Cincinnati, OH	W,WW	●	●	●			●	●	●	●	●	●
Columbus, OH	W,WW	●	●	●	●	●	●					
Dallas, TX	W,WW	●	●	●			●	●		●		
Denver, CO	W,WW	●	●	●	●							
Detroit, MI	W,WW	●	●	●	●		●	●	●	●	●	●
Greensboro, Winston Salem, & Highpoint, NC	W,WW	●	●	●	●					●		
JEA, FL	W,WW	●	●	●	●		●		●	●		
Kansas City, KS	W	●	●	●					●			
Los Angeles, CA	W,WW	●	●	●	●	●	●	●	●	●		

UTILITY	UTILITY TYPES (W/WW)	PROJECT WORK ITEMS										
		Revenue/Revenue Requirements	Financial/Capital Planning	Cost of Service/Rates	Special Fees & Charges	Conservation Planning/Rates	Rate Model Development	Economic/Financial Feasibility	Bond Feasibility/Eng. Cert.	Organizational/Management	Mgmt. Information Systems	Valuation/Appraisal
Louisville, OH	W,WW	●	●	●			●	●	●			
Memphis, TN	WW	●	●							●	●	●
Miami-Dade County, FL	W,WW	●	●	●	●	●	●	●	●	●	●	●
Milwaukee, WI	W,WW	●	●	●			●	●	●	●	●	●
New Orleans, LA	W,WW	●	●	●					●	●	●	●
OUC, FL	W,WW	●	●	●	●	●	●	●	●			
Philadelphia, PA	W,WW	●	●	●			●	●	●	●		
Phoenix, AZ	W,WW	●	●	●	●		●	●	●	●		
St. Louis, MO	W,WW	●	●	●	●		●	●	●	●		●
Raleigh, NC	W,WW	●	●		●		●	●	●			
Tampa, FL	W,WW								●			

REPRESENTATIVE FINANCIAL SERVICES PROJECTS AND CLIENT REFERENCES

Provided below are four current client contacts as requested.

CLIENT CONTACTS	
Ms. Frances Morris Assistant Director – Finance Miami-Dade County Water and Sewer Department 3071 SW 38th Avenue Miami, FL 33146 786-552-8104 *fgreen@miamidade.gov*	Mr. Aleem Ghany City Manager City of North Miami, FL 776 NE 125 Street North Miami, FL 33161 305-895-9830 ext. 12247 *aghany@northmiamifl.gov*
Ms. Arletta Williams Executive Director ALCOSAN 3000 Preble Avenue Pittsburgh, PA 15233 412-734-8363 *arletta.williams@alcosan.org*	Mr. Cleon Cauley Commissioner Department of Public Works City of Wilmington, DL 19801 302-566-5465 *clcauley@wilmingtonde.gov*

Stormwater Management Financing and Rate Related Experience

Provided below is a summary of Black & Veatch's stormwater financial planning experience matrices.

UTILITY	PROJECT TYPE															
	Strategic Planning / Policies	Facilities Assessment	Legal Authority	Public Info./Education	Operations Financing	Capital Financing	Revenue Alternatives	Cost Allocations	User Fee Methodology	Rate Design	Finance/Rate Model	Ordinances	Options Survey	Staffing/Organization	Accounting	Master Account File
Ann Arbor, Mich.	■		■	■	■	■			■	■	■	■				■
Arnold, Mo.	■				■		■	■	■	■	■	■		■		■
Bloomington, Ind.				■	■	■	■		■	■		■				
Broken Arrow, Okla.					■	■				■	■					
Cincinnati, Ohio				■	■	■	■	■		■						
Columbia, Mo.	■	■			■	■	■	■		■						
Freeport, Ill.			■	■	■	■	■	■	■	■	■					■
Fulton County, Ga.	■								■	■						■
Garland, Tex.	■	■	■													
Hampton, Va.	■	■	■	■	■	■	■	■	■	■	■	■		■		■
Independence, Mo.	■								■							
Jefferson City, Mo.	■	■			■	■	■	■		■						
Johnson County, Kans.	■	■		■		■	■	■								
Kansas City, Mo.	■	■	■	■	■	■	■	■	■	■	■	■		■	■	■
Key West, Fla.	■			■	■	■	■		■	■	■	■	■	■	■	■
Leavenworth, Kans.	■	■	■	■	■	■	■	■	■	■		■				■
Lee's Summit, Mo.	■	■	■	■	■	■	■	■	■	■	■		■	■		■
Los Angeles, Calif.	■		■	■	■	■	■	■	■	■	■		■		■	■
Minneapolis, Minn.	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
New London, Conn.		■	■	■	■	■	■		■	■						■
Norfolk, Va.	■	■	■	■	■	■	■	■	■	■	■	■		■	■	■
Olathe, Kansas	■				■	■		■	■	■	■			■		■
Philadelphia, Pa.	■		■	■	■	■	■	■	■	■	■	■		■		
Pocatello, Idaho			■	■	■	■	■	■	■	■	■	■	■	■	■	■
Portland, Oregon							■						■			

UTILITY	PROJECT TYPE															
	Strategic Planning / Policies	Facilities Assessment	Legal Authority	Public Info./Education	Operations Financing	Capital Financing	Revenue Alternatives	Cost Allocations	User Fee Methodology	Rate Design	Finance/Rate Model	Ordinances	Options Survey	Staffing/Organization	Accounting	Master Account File
St. Joseph, Mo.		■			■	■	■		■	■						
St. Louis, Mo.–MSD	■	■					■	■	■	■	■	■				■
San Luis Obispo, Calif.	■		■	■									■			
Sanitation District No. 1 of Northern Kentucky	■				■	■	■	■			■					
Seattle, Wash.	■		■	■									■			
Springfield, Ohio	■	■	■	■	■	■	■	■	■	■	■	■		■		■
Sydney, Australia													■			
Tacoma, Wash.		■			■	■	■	■		■	■		■		■	
Wichita, Kans.	■	■	■	■	■	■	■	■	■	■				■	■	
Wilmington, Del.	■		■	■	■	■	■	■	■	■	■	■		■		■

Project Experience for Water and Wastewater

Provided below is a summary of Black & Veatch's water and wastewater financial planning experience matrices for the Southeastern United States.

CLIENT	UTILITY TYPES	PROJECT WORK ITEMS										
		Revenue/Revenue Requirements	Financial/Capital Planning	Cost of Service/Rates	System Development Charges/Impact Fees	Conservation Planning/Rates	Computer Modeling	Economic/Financial Feasibility	Bond Feasibility/Eng. Cert.	Organizational/Management	Management Information Systems	Valuation/Appraisal
Alabama												
Bessemer	W	■	■	■								
Hoover	WW	■	■	■			■					
Huntsville	W,WW	■			■							
Jasper Utility Board	W,WW	■	■	■			■		■			
Jefferson County	WW	■		■				■				
Shelby County	W,WW		■									
Florida												
Cape Coral	W,WW	■	■				■		■			
Coral Springs	W,WW							■				■
Daytona Beach	W,WW	■	■	■	■	■	■	■				
Gainesville Regional Utilities	W,WW	■							■			
Hernando County	W,WW											■
Homestead	W,WW	■	■	■								
JEA	W,WW	■	■	■	■		■		■			
Key West	WW	■		■				■				
Lakeland	W,WW									■		
Manatee County	W,WW	■	■	■	■	■	■					
Mariner Properties Inc. (Sanibel)	WW											■
Miami-Dade W&S Dept.	W,WW	■	■	■	■	■	■	■	■	■		
New Port Richey	W,WW						■					
New Smyrna Beach	W,WW	■	■	■	■	■	■	■	■			

CLIENT	UTILITY TYPES	PROJECT WORK ITEMS										
		Revenue/Revenue Requirements	Financial/Capital Planning	Cost of Service/Rates	System Development Charges/Impact Fees	Conservation Planning/Rates	Computer Modeling	Economic/Financial Feasibility	Bond Feasibility/Eng. Cert.	Organizational/Management	Management Information Systems	Valuation/Appraisal
Orlando	W,WW	■	■	■	■		■		■			
Orlando Utilities Commission	W	■	■	■	■	■	■	■	■			
Ormond Beach	W,WW			■				■				■
Plantation	WW											■
Sanibel Sewer System Partners	WW											■
Surfside	W,WW	■	■	■					■			
Tallahassee	W,WW	■			■							
Tampa	W,WW								■			
Tampa Bay Water	W	■					■	■	■			
Georgia												
Atlanta	W,WW	■		■			■	■	■			
Butts County	WW	■			■							
Cobb County	W,WW								■			
Columbus	W									■		
East Point	W,WW		■					■				
Gwinnett County	W,WW		■	■								
Whitfield County	W	■	■					■				
Mississippi												
Natchez	W,WW	■	■	■				■		■		
North Carolina												
Asheville-Buncombe	W,WW	■	■	■			■	■				
Broad River	W	■	■	■				■				■
Cary	W,WW	■	■					■				
Charlotte-Mecklenburg Utilities	WW									■		
Fayetteville, Public Works Commission	W,WW	■	■	■	■		■	■	■			

CLIENT	UTILITY TYPES	PROJECT WORK ITEMS										
		Revenue/Revenue Requirements	Financial/Capital Planning	Cost of Service/Rates	System Development Charges/Impact Fees	Conservation Planning/Rates	Computer Modeling	Economic/Financial Feasibility	Bond Feasibility/Eng. Cert.	Organizational/Management	Management Information Systems	Valuation/Appraisal
Greensboro	W,WW								■			
Hendersonville	W,WW	■	■	■	■		■					
Highpoint	W,WW	■	■	■			■	■	■			
Orange County	W,WW	■	■	■				■	■			
Orange Water & Sewer Authority, Carrboro	W,WW	■	■	■	■	■	■	■		■		
Raleigh	W,WW	■	■		■		■	■	■			
Sanford	W,WW	■	■	■								
Winston-Salem Utilities Commission	W,WW	■	■	■	■				■			
South Carolina												
Anderson County Joint Municipal Agency	W	■	■					■	■	■		■
Bamberg	W,WW	■	■	■								
Beaufort Jasper	W, WW	■	■	■			■	■				
Charleston	W,WW	■	■	■	■	■	■	■	■	■	■	■
Columbia	W,WW	■	■	■			■			■		
Gaffney	W,WW	■	■	■	■							
Grand Strand Water & Sewer Authority	W,WW	■	■	■			■			■		
Greenville Water System	W	■	■	■	■	■	■	■	■	■		■
Greenwood	W	■	■	■					■			
Isle of Palms	W,WW		■				■			■		
Kiawah Island Utility, Inc.	W,WW	■	■	■								
Lexington	W,WW	■	■	■	■			■				
Orangeburg	W,WW	■	■	■							■	■
Spartanburg CPW	W,WW	■	■	■				■			■	■
Western Carolina Regional Sewer Authority	WW	■	■		■		■	■				

Required Forms

- Required Forms
  - Anti-Kickback Affidavit
  - Public Entity Crimes Certification
  - Equal Benefits for Domestic Partners Affidavit
  - Cone of Silence Affidavit

ANTI-KICKBACK AFFIDAVIT

STATE OF Kansas
SS:
COUNTY OF Johnson

THIS FORM MUST BE SIGNED AND SWORN TO IN THE PRESENCE OF A NOTARY PUBLIC OR OTHER OFFICIAL AUTHORIZED TO ADMINISTER OATHS,

This sworn statement is submitted to the City of Key West, Florida, by

Les K. Lampe, Vice President
(print individual's name and title)

for Black & Veatch Corporation
(print name of entity submitting sworn statement)

whose business address is 11401 Lamar Avenue, Overland Park, KS 66211

and (if applicable) its Federal Employer Identification Number (FEIN) is

43-1833073
(if the entity has no FEIN, include the Social Security Number of the individual signing this sworn statement):

I, the undersigned, being hereby duly sworn, depose and say that no sum has been paid and no sum will be paid to any employee or elected official of the City of Key West as a commission, kickback, reward or gift, directly or indirectly, by me or any member of my firm, or by any officer or agent of the corporation.

BY: Les K. Lampe

TITLE: Vice President

sworn and prescribed before me this 31st day of March, 2015

Shelly Campbell

NOTARY PUBLIC, State of Kansas
My commission expires: 2-6-2016

NOTARY PUBLIC STATE OF KANSAS SHELLY CAMPBELL My Appt. Exp. 2-6-2016

* * * * * *

NOTARY PUBLIC STATE OF KANSAS

SWORN STATEMENT UNDER SECTION 287.133(3)(a)
FLORIDA STATUES, ON PUBLIC ENTITY CRIMES

THIS FORM MUST BE SIGNED AND SWORN TO IN THE PRESENCE OF A NOTARY PUBLIC OR OTHER OFFICIAL AUTHORIZED TO ADMINISTER OATHS.

1. This sworn statement is submitted to the City of Key West, Florida, by
Les K. Lampe, Vice President
(print individual's name and title)

for Black & Veatch Corporation
(print name of entity submitting sworn statement)

whose business address is 11401 Lamar Avenue, Overland Park, KS 66211
and (if applicable) its Federal Employer Identification Number (FEIN) is 43-1833073

(If the entity has no FEIN, include the Social Security Number of the individual signing this sworn statement):

2. I understand that a "public entity crime" as defined in Paragraph 287.133(1)(g), Florida Statutes, means a violation of any state or federal law by a person with respect to and directly related to the transaction of business with any public entity or with an agency or political subdivision of any other state or of the United States, including, but not limited to, any bid or contract for goods or services to be provided to any public entity or an agency or political subdivision of any other state or of the United States and involving antitrust, fraud, theft, bribery, collusion, racketeering, conspiracy, or material misrepresentation.

3. I understand that "convicted" or "conviction" as defined in Paragraph 287.133(1)(g), Florida Statutes, means a finding of guilt or a conviction of a public entity crime, with or without an adjudication of guilt, in any federal or state trial court of record relating to charges brought by indictment or information after July 1, 1989, as a result of a jury verdict, nonjury trial, or entry of a plea of guilty or nolo contendere.

4. I understand that an "affiliate" as defined in Paragraph 287.133(1)(a), Florida Statutes, means:
   a. A predecessor or successor of a person convicted of a public entity crime: or
   b. An entity under the control of any natural person who is active in the management of the entity and who has been convicted of a public entity crime. The term "affiliate" includes those officers, directors, executives, partners, shareholders, employees, members and agents who are active in the management of an affiliate. The ownership by one person of shares constituting a controlling interest in another person, or a pooling of equipment of income among persons when not for fair market value under an arm's length agreement, shall be a prima facie case that one person controls another person. A person who knowingly enters into a joint venture with a person who has been convicted of a public entity crime in Florida during the preceding 36 months shall be considered an affiliate.
5. I understand that a "person" as defined in Paragraph 287.133(1)(e), Florida Statutes, means any natural person or entity organized under the laws of any state or of the United States with

the legal power to enter into a binding contract and which bids or applies to bid on contracts for the provision of goods or services let by a public entity, or which otherwise transacts or applies to transact business with a public entity. The term "person" includes those officers, directors, executives, partners, shareholders, employees, members, and agents who are active in management of an entity.

6. Based on information and belief, the statement which I have marked below is true in relation to the entity submitting this sworn statement (indicate which statement applies).

X Neither the entity submitting this sworn statement, or any of its officers, directors, executives, partners, shareholders, employees, members, or agents who are active in the management of the entity, nor any affiliate of the entity has been charged with and convicted of a public entity crime subsequent to July 1, 1989.

___The entity submitting this sworn statement, or one or more of its officers, directors, executives, partners, shareholders, employees, members, or agents who are active in the management of the entity, or an affiliate of the entity has been charged with and convicted of a public entity crime subsequent to July 1, 1989.

___ The entity submitting this sworn statement, or one or more of its officers, directors, executives, partners, shareholders, employees, members, or agents who are active in the management of the entity, or an affiliate of the entity has been charged with and convicted of a public entity crime subsequent to July 1, 1989, AND (Please indicate which additional statement applies.)

_____There has been a proceeding concerning the conviction before a hearing of the State of Florida, Division of Administrative Hearings. The final order entered by the hearing officer did not place the person or affiliate on the convicted vendor list. (Please attach a copy of the final order.)

_____The person or affiliate was placed on the convicted vendor list. There has been a subsequent proceeding before a hearing officer of the State of Florida, Division of Administrative Hearings. The final order entered by the hearing officer determined that it was in the public interest to remove the person or affiliate from the convicted vendor list. (Please attach a copy of the final order.)

_____The person or affiliate has not been put on the convicted vendor list. (Please describe any action taken by or pending with the Department of General Services.)

Les K. Lampe
(signature)

31 March 2015
(date)

STATE OF Kansas

COUNTY OF Johnson

PERSONALLY APPEARED BEFORE ME, the undersigned authority,

Les K. Lampe who, after first being sworn by me, affixed his/her
(name of individual signing)

signature in the space provided above on this 31st day of March, 2015.

My commission expires: 2-6-2016

Shelly Campbell
NOTARY PUBLIC

PERSONALLY APPEARED BEFORE ME, the undersigned authority

Les K. Lampe who, after first being sworn by me,

Les K. Lampe (name of individual) affixed his/her signature in the

space provided above on this 31st day of March, 2015.

Shelly Campbell
NOTARY PUBLIC

Shelly Campbell
Printed Name

My commission expires: 2-6-2016
NOTARY PUBLIC

NOTARY PUBLIC STATE OF KANSAS SHELLY CAMPBELL My Appt. Exp. 2-6-2016

* * * * * *

SHELLY CAMPBELL NOTARY PUBLIC STATE OF KANSAS

EQUAL BENEFITS FOR DOMESTIC PARTNERS AFFIDAVIT

STATE OF ~~FLORIDA~~ Kansas)

: SS

COUNTY OF ~~MONROE~~ Johnson)

I, the undersigned hereby duly sworn, depose and say that the firm of Black & Veatch Corporation

provides benefits to domestic partners of its employees on the same basis as it provides benefits to employees' spouses, per City of Key West Code of Ordinances Sec. 2-799.

By: Les K. Lampe Les K. Lampe, Vice President

Sworn and subscribed before me this 31st day of March 2015.

Shelly Campbell

NOTARY PUBLIC, State of Kansas ~~Florida at Large~~

My Commission Expires: 2-6-2016

NOTARY PUBLIC STATE OF KANSAS SHELLY CAMPBELL My Appt. Exp. 2-6-2016

SHELLY CAMPBELL NOTARY PUBLIC STATE OF KANSAS

* * * * * *

CONE OF SILENCE AFFIDAVIT

STATE OF Kansas)

: SS

COUNTY OF Johnson)

I, the undersigned hereby duly sworn, depose and say that all owner(s), partners, officers, directors, employees and agents representing the firm of Black & Veatch Corporation have read and understand the limitations and procedures regarding communications concerning City of Key West Code of Ordinances Sec. 2-773 Cone of Silence.

By: Les K. Lampe Les K. Lampe, Vice President

Sworn and subscribed before me this

31st day of March 2015.

NOTARY PUBLIC, State of Kansas ~~at Large~~

My Commission Expires: 2-6-2016

NOTARY PUBLIC STATE OF KANSAS SHELLY CAMPBELL My Appt. Exp. 2-6-2016

SHELLY CAMPBELL NOTARY PUBLIC STATE OF KANSAS

* * * * * *

Appendix A | Additional Information

Electronic versions of the following Black & Veatch reports can be found on the accompanying flash drive.

- 2014 Strategic Directions: U.S. Water Industry
- 50 Largest Cities Water/Wastewater Rate Survey
- 2014 Stormwater Utility Survey

BLACK & VEATCH
Building a world of difference.®

2014 STRATEGIC DIRECTIONS: U.S. WATER INDUSTRY

A Black & Veatch Report


BLACK & VEATCH
Building a world of difference.®

TABLE OF CONTENTS

INTRODUCTION 2
The Black & Veatch Analysis Team 4
2014 Report Background 6

EXECUTIVE SUMMARY 10

BRIDGING INDUSTRY GAPS 14
Gaps in Water Financing Now More Pronounced than Ever 14
Three Common Public-Private Partnership Myths 19
Keys to Sustainable Water Supply: Reduce, Reuse, Recover 20
Global Perspective: Reducing Industrial Water Demand 26
Global Perspective: Sustainable Water Planning Making Inroads in the Middle East 28

GAINING OPERATIONAL EFFICIENCIES 32
Creating an Intelligent Water Utility 32
Global Perspective: Energy Recovery from Wastewater Gaining Traction in Europe, India and the Middle East 38
Top Water Infrastructure Issues Solved through Asset Management 40
History and Description of Infrastructure Asset Management Frameworks 42
Perspective: Realizing Value with ISO 55001 47

REGIONAL VIEWPOINTS 48
Northeast Perspective: Climate and Financial Resiliency Top of Mind 48
Southeast Perspective: Prepare for Disruptions with More Resilient Systems 50
Midwest Perspective: Holistic Approach Best for Capital Programs 52
Southwest Perspective: Technology's Role in Overcoming Water Scarcity 54

EXECUTIVE COMMENTARY 58

INTRODUCTION

Welcome to the 2014 Black & Veatch *Strategic Directions: U.S. Water Industry* report. Our third annual report for the water industry provides essential information for overcoming challenges associated with limited budgets, rising costs, aging infrastructure and the need for critical water systems to have greater resiliency against new weather norms.

As we reviewed survey results and prepared this analysis, two common themes emerged. First and foremost, the industry is in dire need of solutions that bridge the significant gaps associated with utility budgets, resiliency, capital improvement programs, customer education and rates.

The second theme focuses on efficiency for all aspects of water system management and operations, including energy use, water use, capital spending and business process enhancements. This theme was first noted in our 2013 report, where more than 90 percent of industry leaders stated they are adopting/implementing or planning to adopt/implement best practice asset management programs.

New to this year's report are regional viewpoints and analysis. While aging infrastructure remains the top industry-wide issue, each region has its own unique challenges that are intensified as a result of degrading buried infrastructure systems. Our regional perspectives provide potential solutions for noted challenges based on the viewpoints of Black & Veatch subject matter experts living and working within each region.

Bridging existing gaps within the industry, generating efficiencies and building greater resiliency are the hallmarks of the next-generation water utility. Achieving each of these requires new thinking about how we generate revenue; how we plan and finance capital improvements; and how we manage the day-to-day operations of our systems. This report provides recommendations and highlights best practices that can help utilities achieve their strategic goals.

We welcome your questions and comments regarding this report and/or Black & Veatch services. You can reach us at **MediaInfo@bv.com**.

Sincerely,

CINDY WALLIS-LAGE | PRESIDENT
Black & Veatch's water business

JOHN CHEVRETTE | PRESIDENT
Black & Veatch's management consulting business

THE ECHO PARK LAKE REHABILITATION PROGRAM IN LOS ANGELES DEMONSTRATES THE VALUE AND BENEFIT OF PRESERVING OR RESTORING WATER HABITATS.

THE BLACK & VEATCH ANALYSIS TEAM

EXECUTIVE SUMMARY

Ralph Eberts is the Executive Managing Director for the Americas region within Black & Veatch's water business. During his more than 30-year career with Black & Veatch, Eberts has established himself as a recognized global water industry thought leader. He has served as Managing Director for the Asia-Pacific region and has overseen notable projects such as the Bundamba Advanced Water Treatment Plant in Australia and the Hyperion Treatment Plant Expansion for the City of Los Angeles. Eberts is based in the company's San Francisco office.

UTILITY RATES AND REVENUES

Michael Orth is a Senior Vice President and Managing Director for the Americas Central Region for Black & Veatch. Orth specializes is developing sustainable solutions that meet or exceed client expectations and needs. He has more than 25 years of experience is designing, managing or otherwise supporting, water treatment projects and programs. This experience includes regulatory evaluation, process modification and alternative disinfection processes. Orth is based in Kansas City, Missouri office.

William Zieburtz is a Director in Black & Veatch's Municipal Rate Consulting Practice. With more than 25 years of consulting experience within the water industry, Zieburtz' diverse experience includes rate, planning, impact fee, valuation and feasibility studies for water, wastewater, stormwater, solid waste, natural gas, and other local government projects. He also provides evaluations of funding alternatives and projections of population and economic growth, among other services. Zieburtz is based in Atlanta.

INTEGRATED WATER MANAGEMENT

Les Lampe, Ph.D., leads Black & Veatch's Global Water Resources practice. With more than 40 years of experience in the field of water resources, Dr. Lampe specializes in all aspects of water supply and flood control. He is currently directing major global water supply planning projects that involve all components of Integrated Water Management. Dr. Lampe is based in the company's World Headquarters located in Overland Park, Kansas.

CREATING AN INTELLIGENT WATER UTILITY

Kevin Cornish is an Executive Consultant and Black & Veatch's Operational Technologies Consulting Practice Lead, supporting technology initiatives for utilities. With nearly 30 years of experience, Cornish focuses on many of the smart technologies and advanced applications that comprise the Smart Grid solution set, particularly smart metering, advanced metering infrastructure (AMI) solutions, data management and the underlying telecommunications networks and related technologies. Cornish is based in the company's San Francisco office.

Jeff Neemann is the Director of Water Treatment Technology for Black & Veatch, specializing in the development and application of advanced water treatment technologies. He is an inventor on two patents for limiting bromate formation during ozonation. With more than 15 years of process engineering experience, Neemann has been involved in the evaluation, pilot testing, design and operation of a variety of treatment technologies and is based in Black & Veatch's Kansas City, Missouri office.

Jeff Buxton is an Executive Consultant at Black & Veatch, specializing in advanced technology solutions for utilities, including AMI, data analytics, MDMS and DMS. Buxton's more than 30 years of experience encompasses strategic business planning, technology roadmap planning, IT

infrastructure management and change and operations management, among other areas. He is based in Philadelphia.

ASSET MANAGEMENT

James Strayer is an Associate Vice President and Department Manager for Infrastructure Planning and Asset Management. He has more than 20 years of experience related to infrastructure planning, asset management and designing conveyance facilities for all types of water systems. Strayer is based in San Marcos, California.

Will Williams is the Director of Black & Veatch's Asset Management consulting practice. He has more than 20 years of experience in asset management planning, including asset failure analysis, risk assessment, performance benchmarking, maintenance optimization and business change management, among other areas. Williams is based in Atlanta.

Jeffrey Stillman is an Asset Management Practice Leader for Black & Veatch, specializing in asset management and system planning for water and wastewater systems. He is responsible for technical leadership on a variety of master planning and asset management projects throughout the United States and is based in the company's in the Burlington, Massachusetts office.

Martin Jones is a Principal Consultant within Black & Veatch's Asset Management practice, specializing in water utility asset management, regulatory audit and wastewater engineering. Throughout his 15-year career, Jones has undertaken a variety of asset management projects, including asset maturity assessments, asset valuations, PAS 55 implementation and strategy development. Jones is based in Atlanta.

REGIONAL VIEWPOINTS

Kyriacos Pierides is an Associate Vice President at Black & Veatch and has more than 25 years of experience. Pierides specializes in wastewater treatment facility design and is based in New York City.

Rafael Frias is a Client Director at Black & Veatch and has more than 15 years of experience. Frias specializes in the management of water resources projects, including water supply, water treatment, hydropower and stormwater planning and design. He is a national Board member of the America Water Resources Association (AWRA) and is based in Sunrise, Florida.

Bruce Allender is the Chief Operating Officer of the infraManagement Group (iMG), a wholly owned subsidiary of Black & Veatch. Allender works with utilities to develop public-private partnership (PPP) opportunities and to identify alternative financing options that support sustainable water infrastructure development. He is based in Kansas City, Missouri.

COMMENTARY

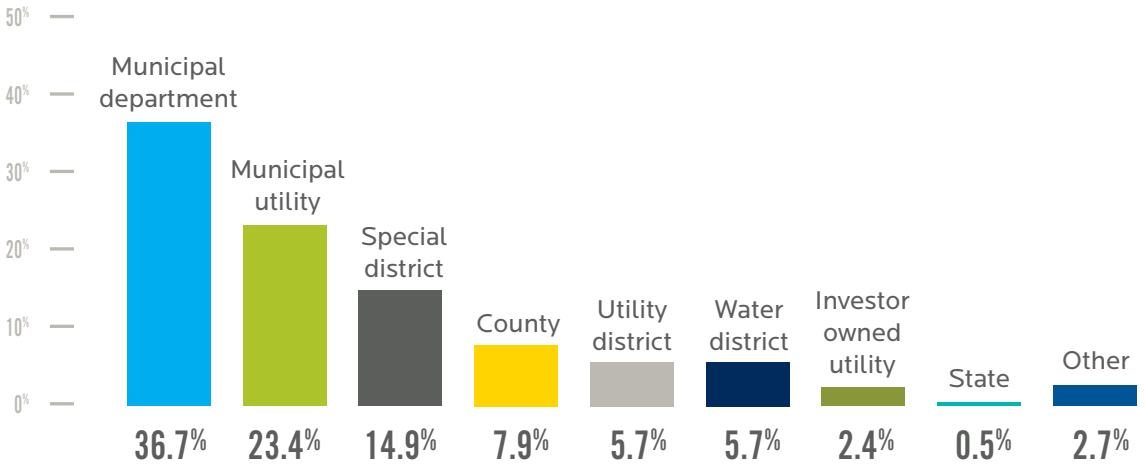
Cindy Wallis-Lage is President of Black & Veatch's water business, leading the company's efforts to address billions of dollars in water infrastructure needs around the world. Wallis-Lage joined the company in 1987 and has provided project and leadership expertise to more than 100 municipal and industrial facilities throughout the United States, the UK and Asia Pacific. Wallis-Lage joined the Black & Veatch Board of Directors in 2012. She is currently on the Board of Directors for the WateReuse Association.

2014 REPORT BACKGROUND

The third annual Black & Veatch *Strategic Directions: U.S. Water Industry* report is a compilation of data and analysis from an industry-wide survey. This year's survey was conducted from March 3 through April 4, 2014. A total of 368 qualified water industry participants completed the online questionnaire.

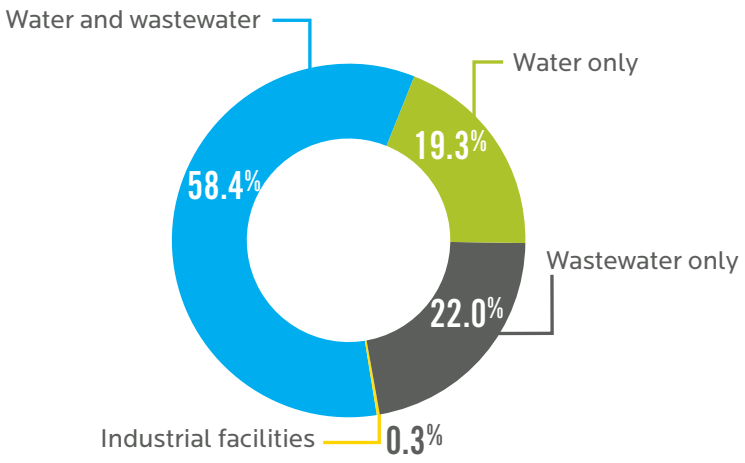
Statistical significance testing was completed on the final survey results. Represented data within this report have a 95 percent confidence level. The following figures provide additional detail on the participants in this year's survey.

RESPONDENTS BY TYPE OF ORGANIZATION



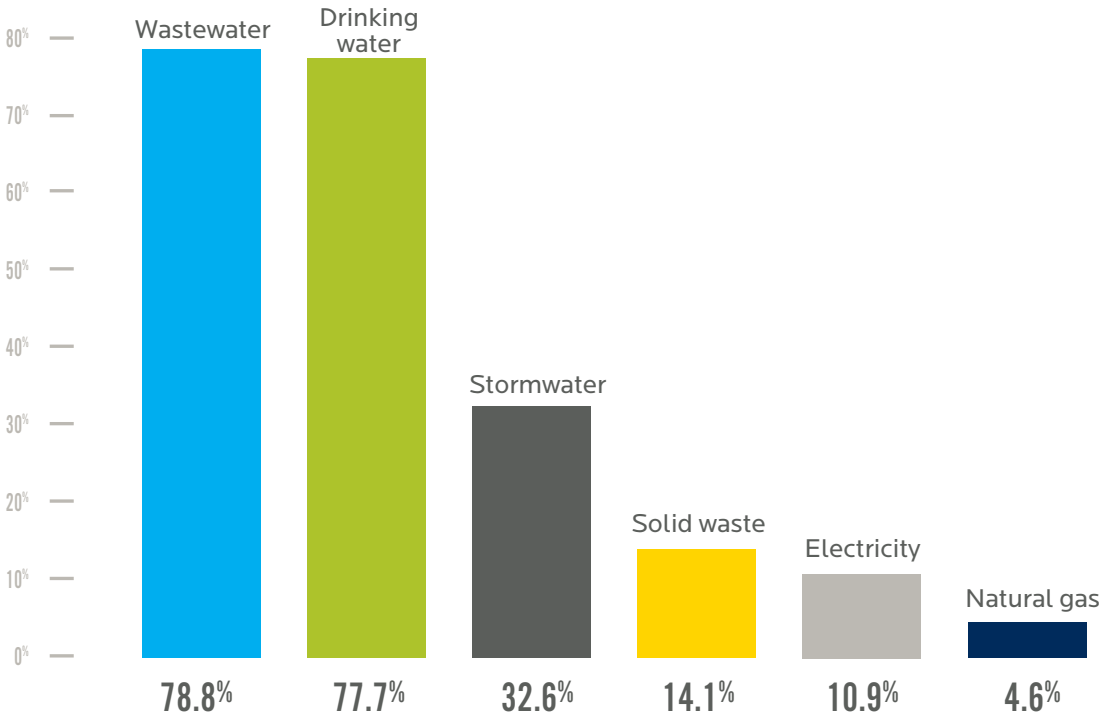
Source: Black & Veatch

INDUSTRY RESPONDENTS BY TYPES OF SYSTEMS AND/OR PLANTS



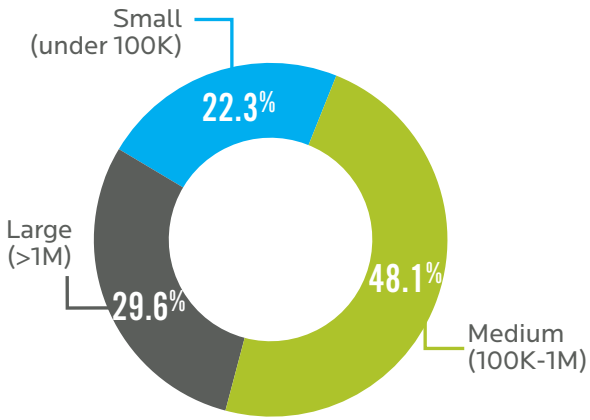
Source: Black & Veatch
Because of the small sample size, report analysis does not include comparisons of data from industrial facilities.

RESPONDENTS BY SERVICES PROVIDED



Source: Black & Veatch

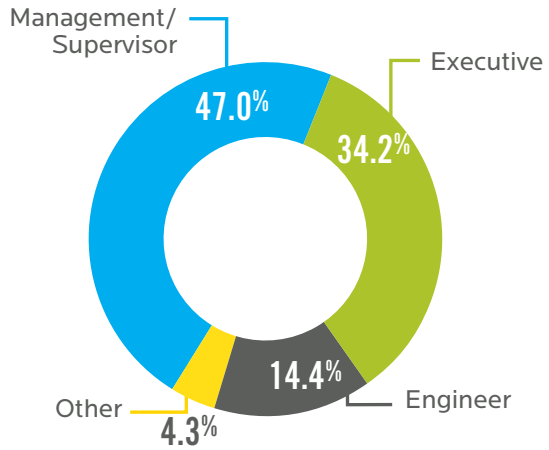
RESPONDENTS BY SIZE OF POPULATION SERVED



Source: Black & Veatch

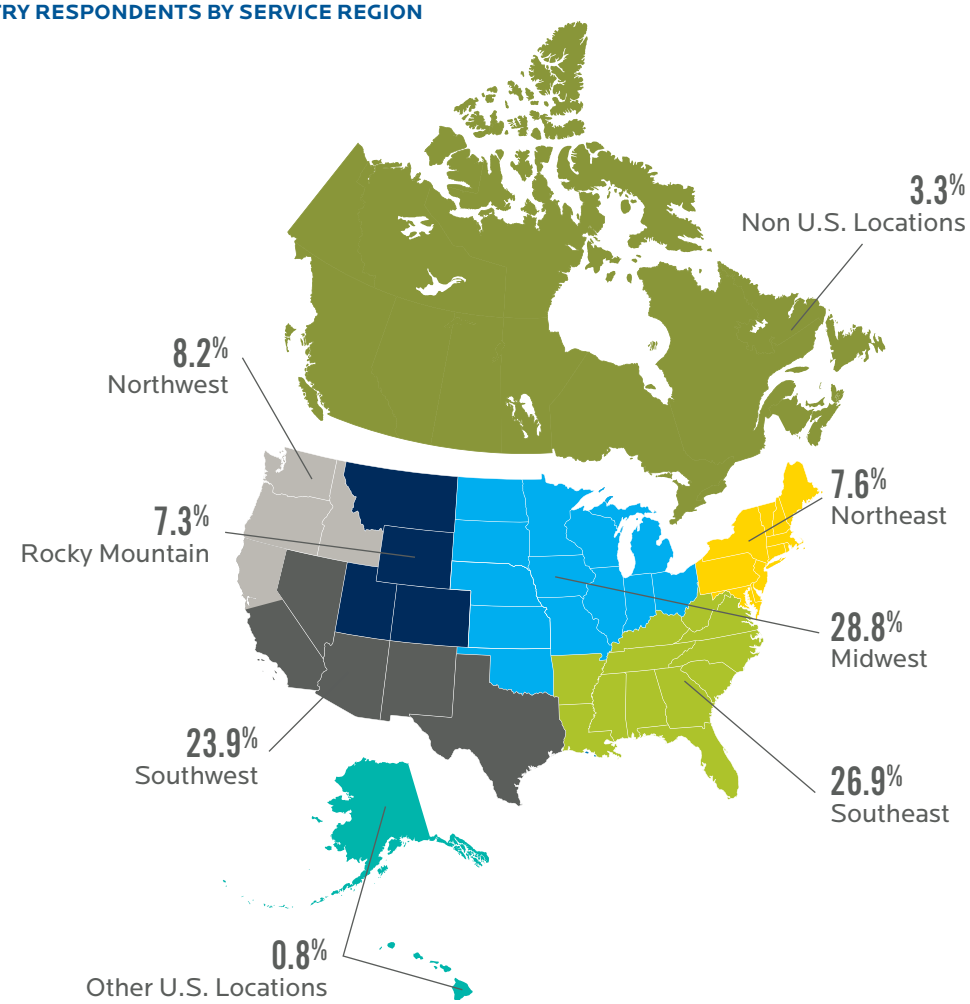
Within applicable sections of this report, Black & Veatch analysis will examine the differences between water utility service providers who serve large, medium and small populations.

RESPONDENTS BY JOB FUNCTION



Source: Black & Veatch

INDUSTRY RESPONDENTS BY SERVICE REGION



Source: Black & Veatch

NOTE: Because of the small sample size of respondents that represent organizations in Alaska, Hawaii and the U.S. Virgin Islands (collectively referred to as "Other U.S."), as well as Canada and Mexico (Non-U.S.), this report will only provide regional data comparisons from within the continental United States.

THE AMERICAN SOCIETY OF CIVIL ENGINEERS ESTIMATES THAT THERE ARE 240,000 WATER MAIN BREAKS PER YEAR IN THE UNITED STATES, DEMONSTRATING WHY AGING INFRASTRUCTURE IS THE PERENNIAL TOP INDUSTRY ISSUE.

COMMON ISSUES, DIFFERENT NEEDS

BY **RALPH EBERTS**

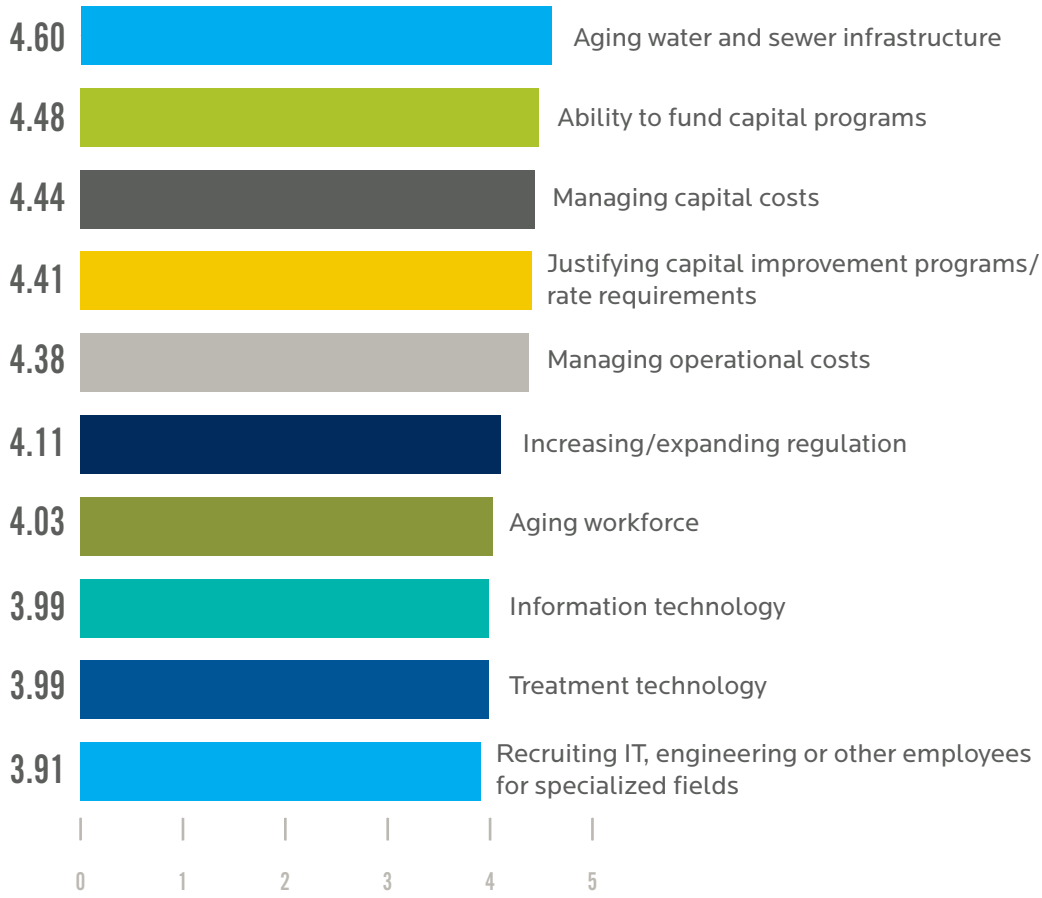
The United States is rich in geography, climates, natural resources and beauty. The communities that collectively make up individual states are as unique as the habitats in which each are located. Our communities each have unique economic drivers, population trends and opportunities resulting in different priorities and approaches to overcoming challenges. Despite our differences, many similarities remain, particularly as they relate to our water resources and infrastructure.

Aging infrastructure, managing operational costs, availability of funding and managing capital costs remain among the top five industry issues at a national level (Figures 1 and 2). Not surprisingly, these issues are also in the top five issues for each geographic region and population demographic. While the gap between current water infrastructure investment and total need is an area of common concern, the difference is why these issues are pressing needs for communities from California to the Carolinas.

Perennial water scarcity issues within the Rocky Mountain and Southwest regions bring intense focus on fixing leaks in aging infrastructure to conserve water resources. In regions such as the Northeast and Midwest, where water is typically plentiful, the drivers for rehabilitating aging infrastructure tend to be based on meeting regulatory requirements and/or improving operational efficiency and resiliency.

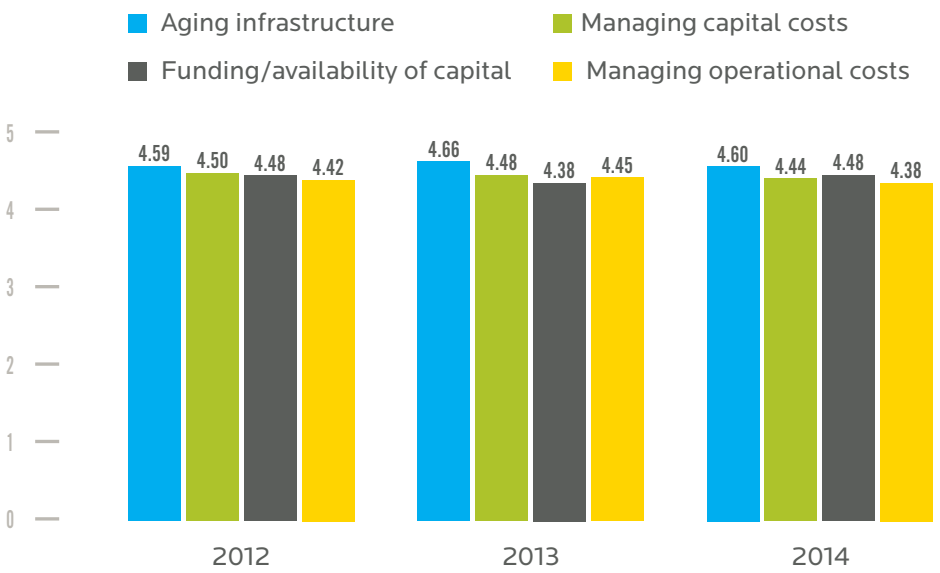
AGING INFRASTRUCTURE, MANAGING OPERATIONAL COSTS, AVAILABILITY OF FUNDING AND MANAGING CAPITAL COSTS REMAIN AMONG THE TOP FIVE INDUSTRY ISSUES AT A NATIONAL LEVEL.

FIGURE 1
TOP 10 INDUSTRY ISSUES



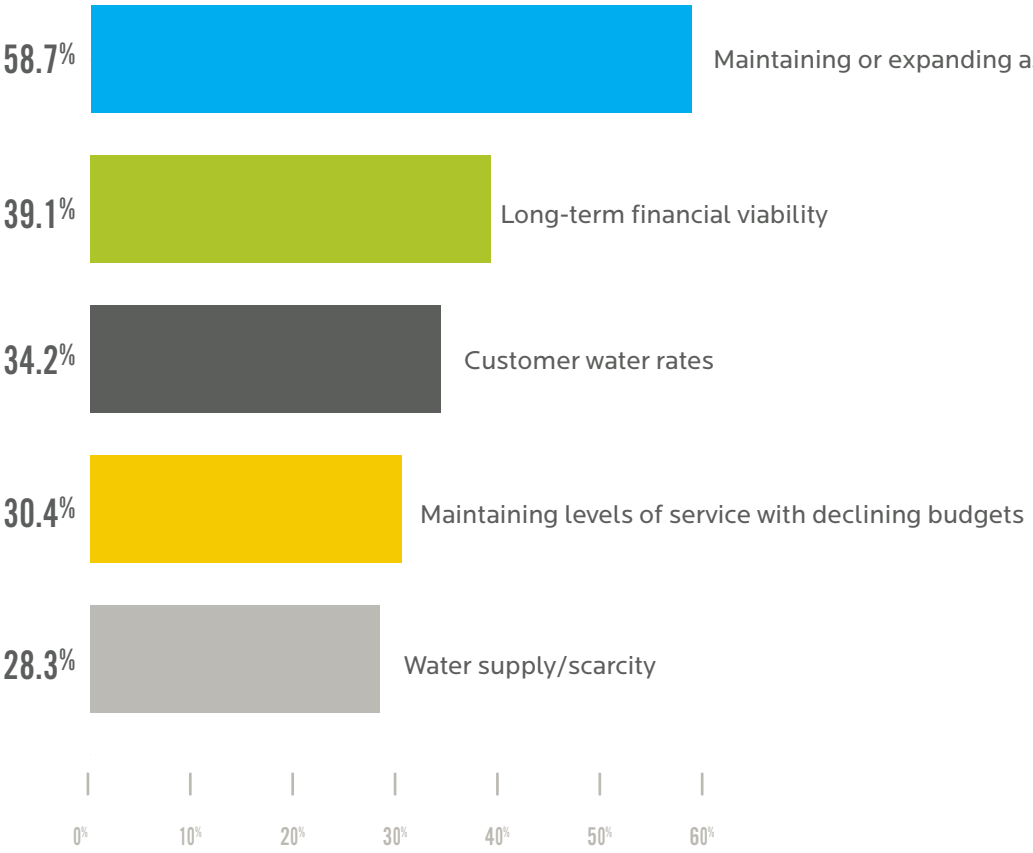
Source: Black & Veatch
Participants were asked to rate the importance of a variety of issues using a scale of 1 to 5, where 1 indicates "Very Unimportant" and 5 indicates "Very Important." This chart provides the 10 industry issues that received the highest rating based on the mean value for each item among all survey participants.

FIGURE 2
THREE-YEAR COMPARISON OF TOP INDUSTRY ISSUES



Source: Black & Veatch
This chart provides a comparison of the rankings of perennial top industry issues during the last three years. Aging infrastructure remains the top issue for the third consecutive year.

FIGURE 3
MOST SIGNIFICANT SUSTAINABILITY ISSUES



Source: Black & Veatch
Respondents were asked to select the three most significant sustainability issues for their utility from a broad list of choices. This chart highlights the five issues selected most among all respondents.

Aging infrastructure and the challenge of managing capital costs align with the industry's most significant sustainability issues (Figure 3), as illustrated by the top two issues: maintaining or expanding asset life and long-term financial viability.

Aging infrastructure, regulatory mandates and/or water scarcity in combination with economic downturn and financing challenges have caused sustained financial stress for the industry. Not surprisingly, the issue of customer water rates is among the top sustainability concerns for nearly all geographic regions and population demographics. The ability to justify capital improvement program needs and necessary rate adjustments requires public education on the value of water resources and the cost of providing water services. These issues are examined in the *Bridging Industry Gaps* section.

The *Gaps in Water Financing Now More Pronounced than Ever* analysis details specific challenges and opportunities for utilities regarding revenues from rates and different ways for managing capital programs and costs. Regardless of utility size or geographic location, the collective water industry in the United States must do a better job of engaging its stakeholders and educating them on the true cost and value of providing reliable and safe service.

The value of water has become apparent in California, Texas and other areas of the country, such as southern Florida, where water scarcity is part of the daily discussion. Survey results indicate the need for a sense of urgency to shore up alternative forms of water supply, such as reuse, to address water scarcity. The *Keys to Sustainable Water Supply: Reduce, Reuse, Recover* analysis highlights the need for public outreach efforts on the same level as the need for diversified water supply portfolios.

Beyond challenges with public awareness and acceptance of necessary infrastructure solutions is the need for operational improvements, covered within the *Gaining Operational Efficiencies* section. Managing operational costs has maintained its position within the top five industry issues for three consecutive years. The application of technological solutions to automate processes and enhance efficiencies is an area of growth and opportunity within the industry. The *Creating an Intelligent Water Utility* analysis details the advantages of investments in advanced metering infrastructure and distribution technologies that can drive down operational expenses.

Based on traditional U.S. water utility management practices, there is no clear path for overcoming the totality of today's most pressing issues. If a water utility seeks to move forward with large-scale infrastructure renewal programs, customers may balk at proposed rate increases. However, utilities that do not renew their infrastructure will experience a greater number of water main breaks that disrupt traffic and community services. Water main breaks require emergency repair budgets to fix. Larger emergency repair budgets may come at the sacrifice of other budgeted maintenance items. The social and economic impact to the end users can also be significant.

Breaking the cycle of deferred maintenance; generating understanding and acceptance of necessary improvements and subsequent rate adjustments; and implementing meaningful operational cost reductions can all be achieved through the use of best practice asset management frameworks. The first step in meeting current and future needs, however, is for utility and community leaders to know the tools are available.

Previous Black & Veatch industry surveys demonstrated the desire for improving asset management across the industry. However, as noted in the *Top Water Infrastructure Issues Solved through Asset Management* analysis, awareness of standardized frameworks and methodologies for such programs is severely lacking. To educate the industry on the opportunities available in the area of improved asset management, this report contains descriptions, benefits and limitations of four different frameworks.

Best practice asset management truly is the foundation toward creating a sustainable water utility. New to this year's report is the inclusion of a *Regional Viewpoints* section. This section provides an overview of the most pressing issues within specific regions and ideas for solving each as viewed by the Black & Veatch professionals who call these regions home. Each region references the value of best practice asset management as an essential tool for meeting current and future challenges.

REGARDLESS OF UTILITY SIZE OR GEOGRAPHIC LOCATION, THE COLLECTIVE WATER INDUSTRY IN THE UNITED STATES MUST DO A BETTER JOB OF ENGAGING ITS STAKEHOLDERS AND EDUCATING THEM ON THE TRUE COST AND VALUE OF PROVIDING RELIABLE AND SAFE SERVICE.

GAPS IN WATER FINANCING NOW MORE PRONOUNCED THAN EVER

BY **WILLIAM ZIEBURTZ AND MICHAEL ORTH**

Picture, if you will, a typical service-oriented business in the United States. This business has high fixed costs, slow growth and flat or declining revenues. Maintaining the service this business provides requires tremendous capital investments to sustain its operations. Under such circumstances, this business would experience difficulties in attracting capital and talent, and over the longer term, be at substantial risk of closure. Closure, however, is not an option for community water utilities, the majority of which face similar challenges and circumstances.

The fundamental issue of constraints to customer water and sewer rates increases is the driving force behind continued deferred maintenance, insufficient capital spends and run-to-fail management practices in effect at many utilities. Difficulties in raising rates is a contributing factor, too. Survey results indicate that only one-third of utilities in the United States have in place a revenue or rate structure that covers all of the components necessary for a financially sound business operation (Figure 4).

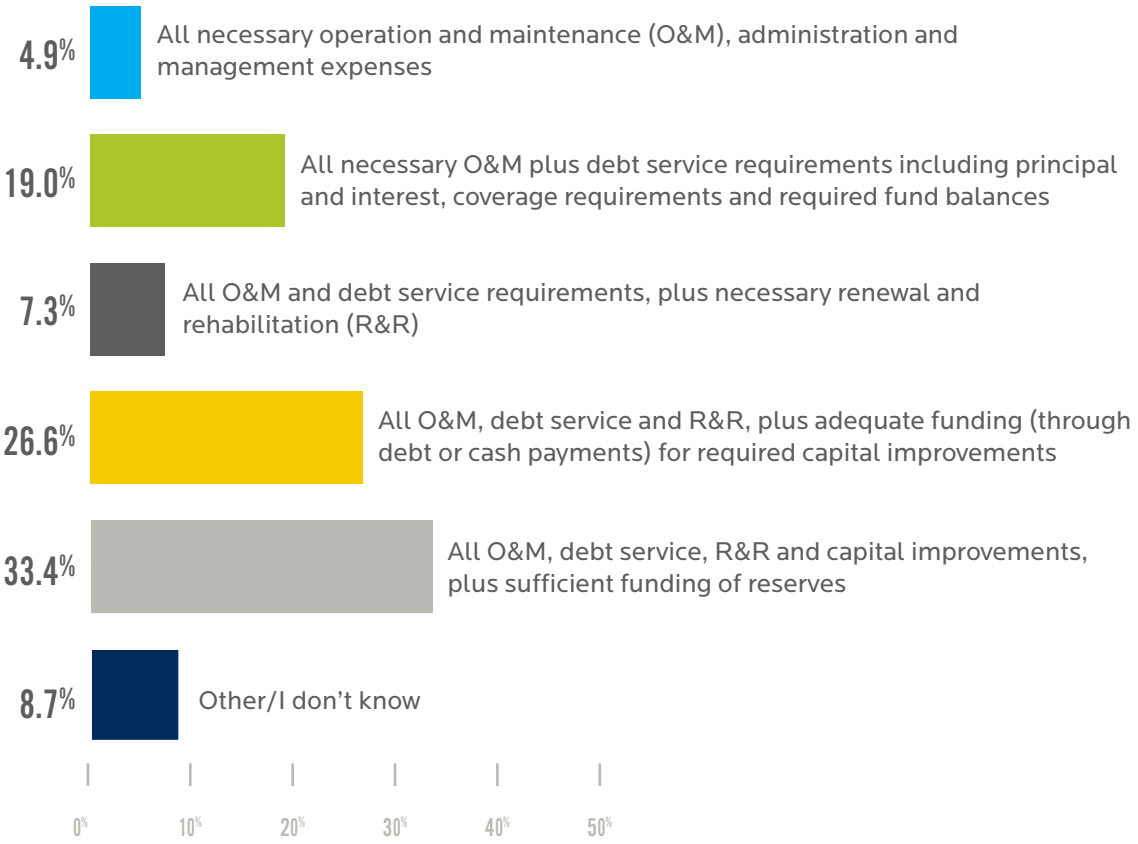
During the last five years, utility revenues have been further affected by consumer conservation measures, slow growth in the housing market, drought conservation measures and loss of industrial or commercial demand (Figure 5). While conservation measures are a positive development for the environment and can even help reduce utility operational costs, the financial viability of the organization can be challenged as a result of lower revenues from reductions in demand.

The gap between need and current resources within utility finances is pronounced. More than 60 percent of all respondents indicated their organization requires an annual rate increase of 5 percent or more each year in order to cover all fixed costs, operational and maintenance needs, funding for capital improvement and contributions to reserve funds (Figure 6).

Astonishingly, more than 20 percent of respondents suggest that rate increases of 10 percent or more are needed every year for the next 10 years in order to cover costs. This would amount to a doubling of current rates in roughly seven years, and in many cases may reflect decades of rate increase deferrals and/or large-scale environmental compliance programs. This large respondent base should offer some solace to water leaders as it indicates that they are not alone in requesting sustained rate increases.

FIGURE 4

COVERAGE LEVELS FROM CURRENT UTILITY REVENUES

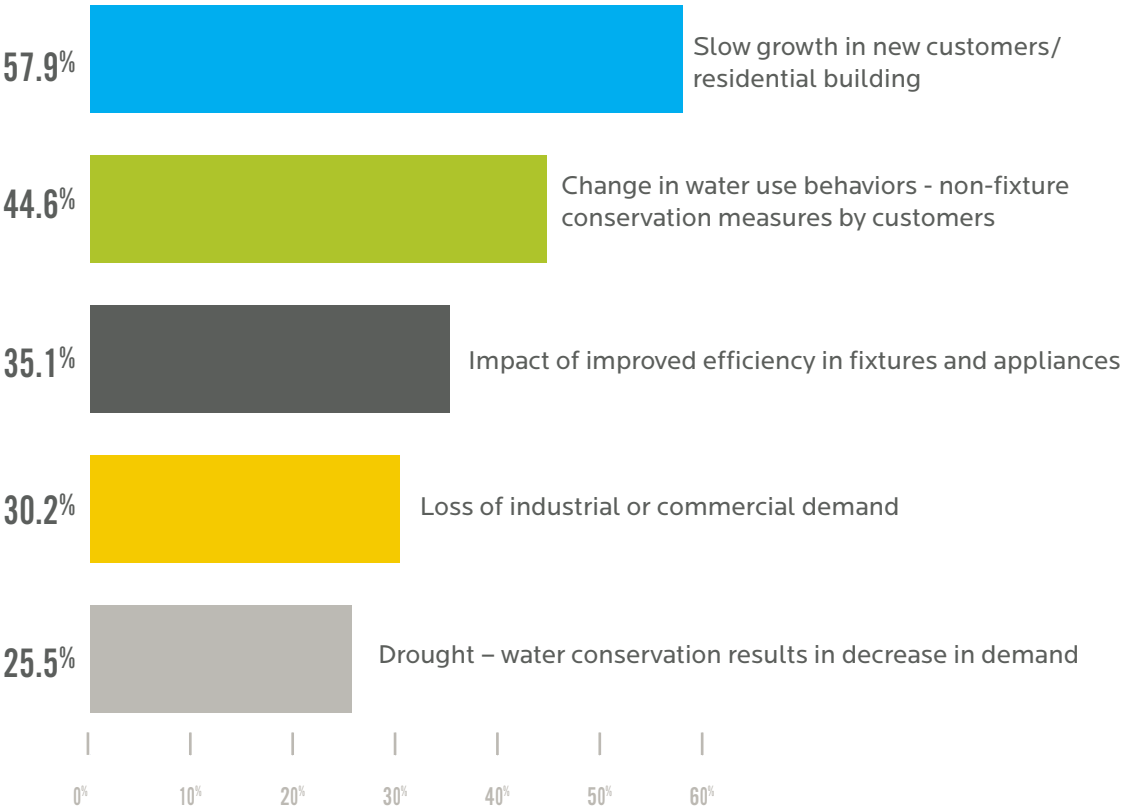


Source: Black & Veatch

Respondents were asked to select the option that best describes the coverage level achieved under their current revenue/rate structure.

FIGURE 5

TOP ITEMS THAT HAVE NEGATIVELY IMPACTED REVENUES DURING THE PAST FIVE YEARS



Source: Black & Veatch

Respondents were asked to select from a list of options all of the items that have negatively impacted their utility's revenue stream during the last five years. This chart highlights the top five issues among all survey respondents.

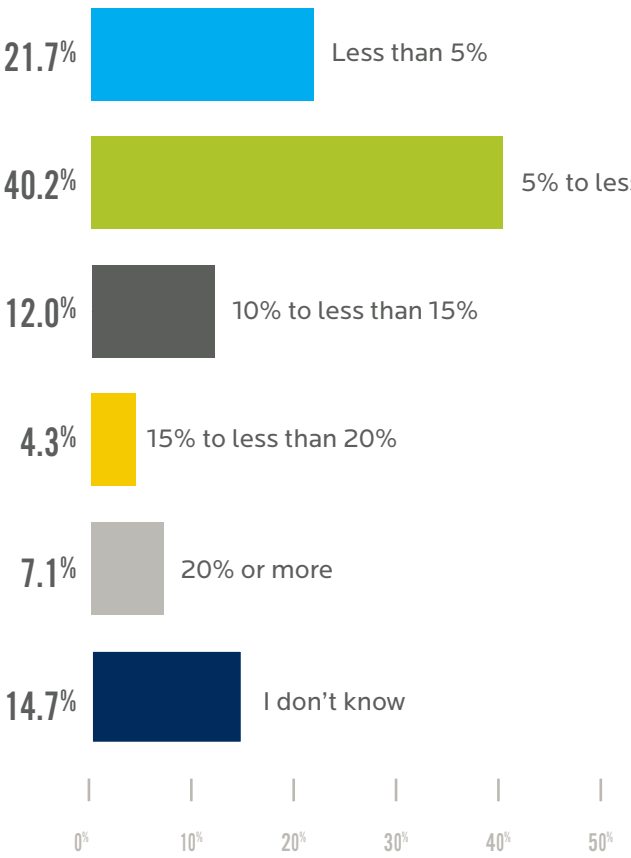
CAPITAL FINANCING AND IMPLEMENTATION

The need to stabilize and increase revenue to sustainable levels is only half of the water utility finance equation. The industry may be reaching a tipping point for critical infrastructure rehabilitation, replacement and expansion. Regardless of investment drivers, such as water conservation, reuse and potentially desalination in water scarce regions, or massive programs to meet federal and state regulations that protect source water, innovation in how these investments are financed is necessary.

Utilities are increasingly considering the use of public-private partnerships (PPPs) as an alternative means for addressing capital improvement needs. Nearly one-third of survey respondents stated their organization is considering some form of PPP in this year's survey as compared to 19 percent from a year ago. Among PPP choices under consideration, Design-Build-Finance and performance contracting were the top areas of interest (Figure 7).

Notably, the primary reason by a considerable margin for not considering PPPs according to survey participants is a lack of demonstrated benefit (Figure 8). This information places responsibility on industry participants, such as financial institutions and service providers, to do a better job with verifying benefits to potential clients and their customers, as well as raising awareness around previous success stories where a specific alternative delivery method has been implemented.

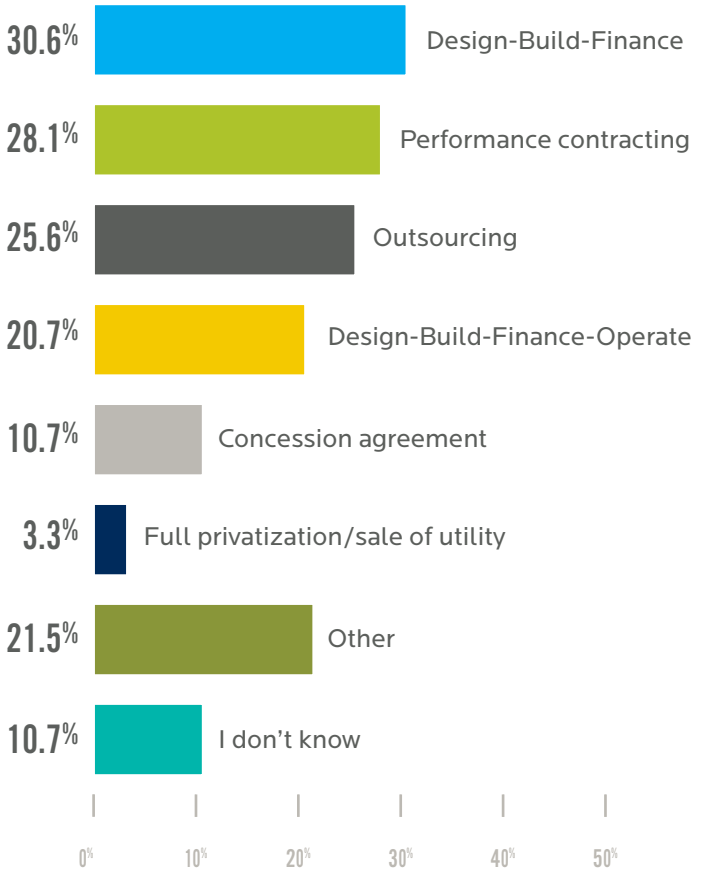
FIGURE 6
ANNUAL RATE INCREASE NEEDED TO COVER COSTS FOR NEXT 10 YEARS



Source: Black & Veatch
Respondents were asked what level of annual rate increases is needed during the next 10 years in order for revenues to fully cover all O&M, debt service, R&R, capital improvements and reserve funds.

FIGURE 7

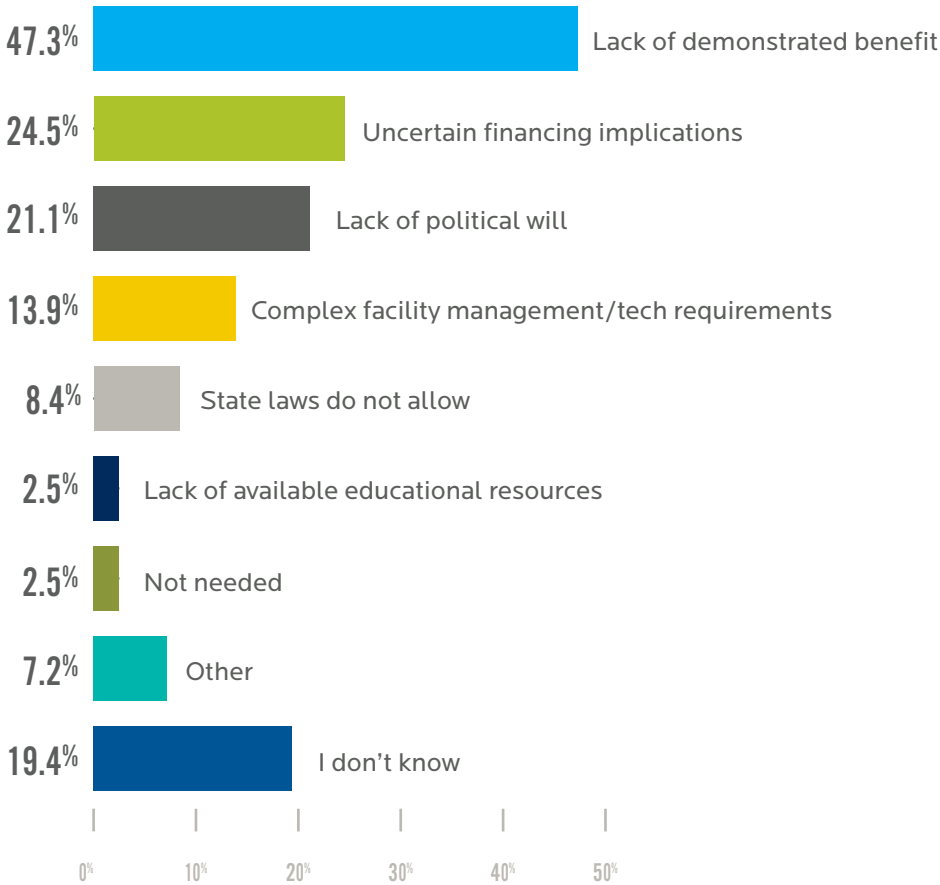
PUBLIC-PRIVATE PARTNERSHIPS UNDER CONSIDERATION



Source: Black & Veatch
Respondents that stated their utility is considering a PPP were asked to identify what types of PPPs their organization is considering.

FIGURE 8

REASONS UTILITIES ARE NOT CONSIDERING PUBLIC-PRIVATE PARTNERSHIPS



Source: Black & Veatch
Respondents who stated their utility is not considering a PPP were asked to select all the reasons why their utility is not considering a PPP.

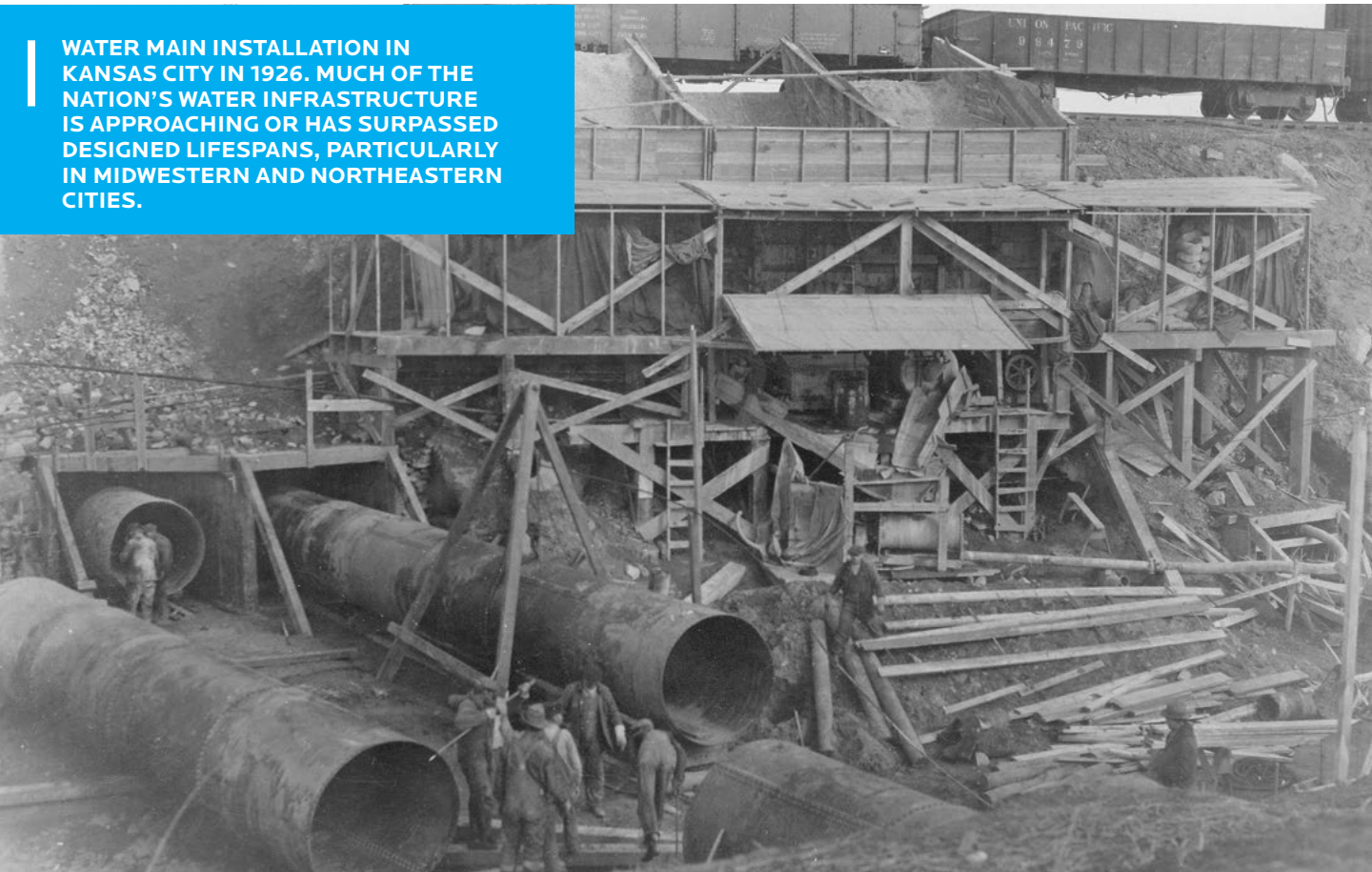
COMMUNICATING COSTS

Justifying capital investments and rate increases was an option listed for the first time in this year's water industry survey and it bumped the perennial issue, "expanding/increasing regulation," from the top five industry issues list. The ability to communicate and justify water utility investments and expenditures is necessary to win public trust and acceptance of revenue policies, alternative delivery methods, and the use of PPPs (where applicable) and water supply opportunities.

The best way for utilities to justify necessary expenditures is to provide information on what is needed, why investment is needed and the risks associated with not investing within suggested areas. Developing capital programs that are based on quantifiable risks are one of the primary benefits of asset management frameworks. After all, it is hard to argue with a $500,000 expense to repair or conduct maintenance on an asset with the knowledge that having to replace the asset could cost three to five times as much (see the *Top Water Infrastructure Issues Solved through Asset Management* analysis for additional information).

Asset management programs are extremely valuable and useful in determining utility budgets, revenue requirements and capital improvement plans. Thorough asset management programs can help reduce the overall capital program spend and drive down operational costs through gained efficiencies. Some water agencies have even benefited from credit rating upgrades as a result of demonstrating best practice utility management.

Regardless of how or why utilities implement their long-term capital programs, communication and education of stakeholders will be necessary. Water utility customers must understand the true cost of providing reliable water services — what it costs today, what it will cost tomorrow and what it will cost in 20 years. Proper preparation following asset management best practices, stakeholder engagement and a thorough analysis of available options on rates, financing and capital delivery will help utility leaders overcome their most pressing challenges and be financially prepared for the future.



WATER MAIN INSTALLATION IN KANSAS CITY IN 1926. MUCH OF THE NATION'S WATER INFRASTRUCTURE IS APPROACHING OR HAS SURPASSED DESIGNED LIFESPANS, PARTICULARLY IN MIDWESTERN AND NORTHEASTERN CITIES.

Three Common Public-Private Partnership Myths

BY **BRUCE ALLENDER**

MYTH 1: RATES GO UP BECAUSE OF PRIVATE SECTOR INVOLVEMENT

Customer rates are impacted by the decision to move forward with large-scale capital programs. The source of funding does not change the reality of the need for additional revenues to finance infrastructure improvements. Increasing rates is the cost of maintaining, expanding and repairing critical infrastructure that provides reliable, safe and secure water services.

Public-private partnerships (PPPs) can benefit customers and municipalities as a result of efficiencies gained in operations and the capital improvement process. The city of Bayonne, New Jersey, provides an example of benefits achieved under a PPP in the form of a concession agreement. Less than one year into the 40-year agreement, Moody's Investors Service upgraded the city's credit outlook. The value for money analysis conducted projects a 6 percent savings, approximately $35 million, for ratepayers and the city over the life of the contract. In addition, customers gain greater reliability and stability with regard to rates over the length of the contract.

MYTH 2: THE CITY/PUBLIC LOSE CONTROL OF WATER SYSTEMS THROUGH PRIVATE INVOLVEMENT

A city only loses control of its assets and water system if it sells them outright through privatization. Other forms of PPPs maintain public ownership of existing assets. In the Bayonne example provided, the city still owns its infrastructure and provides oversight of the agreement.

In some cases, new assets such as a new water treatment facility can be designed, built, financed, operated and owned by the private entity that sells the services provided by the plant back to the public authority. Such an arrangement can be beneficial as it enables cities to acquire expanded capacity, or meet regulatory requirements, without taking on additional debt burdens. In addition, the private entity takes on all risks associated with building and operating the facility.

MYTH 3: CITIES CAN USE STATE AND FEDERAL FUNDS TO FINANCE CAPITAL PROGRAMS

State and federal funds may be available for some infrastructure projects, but research shows there is not enough to cover all needs. The American Society of Civil Engineers (ASCE) gave the collective drinking water infrastructure in the United States a D+ grade (equivalent to poor) and wastewater infrastructure a D in its latest *Report Card for America's Infrastructure* (**www.infrastructurereportcard.org**).

The ASCE estimates that nearly $300 billion in investment is needed for wastewater and stormwater systems alone through 2033. Repairing and/or replacing aging drinking water mains and other buried infrastructure could approach $1 trillion in needed investment. The need varies widely by state. Government officials, utility leaders and customers should review the ASCE information to learn more about the full capital investment needs within their state and compare it to the level of revolving funds, grants or other programs available.

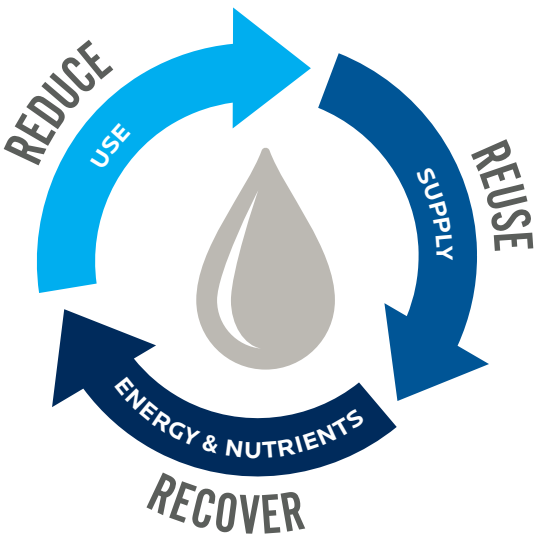
KEYS TO SUSTAINABLE WATER SUPPLY: REDUCE, REUSE, RECOVER

BY **LES LAMPE**

The focus of most space expeditions is not on finding mineral or industrial resources on far away planets; it is on searching for water to see if there are other locations that can sustain life beyond Earth. While the idea of an alternative planet is exciting, it also points to the need for sustaining this essential resource locally and as part of a global community.

Sustained drought across much of the western half of the United States has brought awareness to issues around water scarcity and water supply. At the same time, federal and state regulations regarding the levels of nutrients in water point to the need to protect large water bodies. Now, perhaps more than ever, utility leaders must lead efforts to educate their stakeholders on the value of water and the costs associated with reliable water services.

Awareness of specific environmental programs and needs has been successful in changing consumer behaviors. The mantra of basic environmental programs, Reduce, Reuse, Recycle, has helped communities establish recycling programs, urban gardening projects and other success stories. The water utility industry should customize the three Rs mantra to educate consumers on the needs of our water systems and watersheds: Reduce, Reuse, Recover.



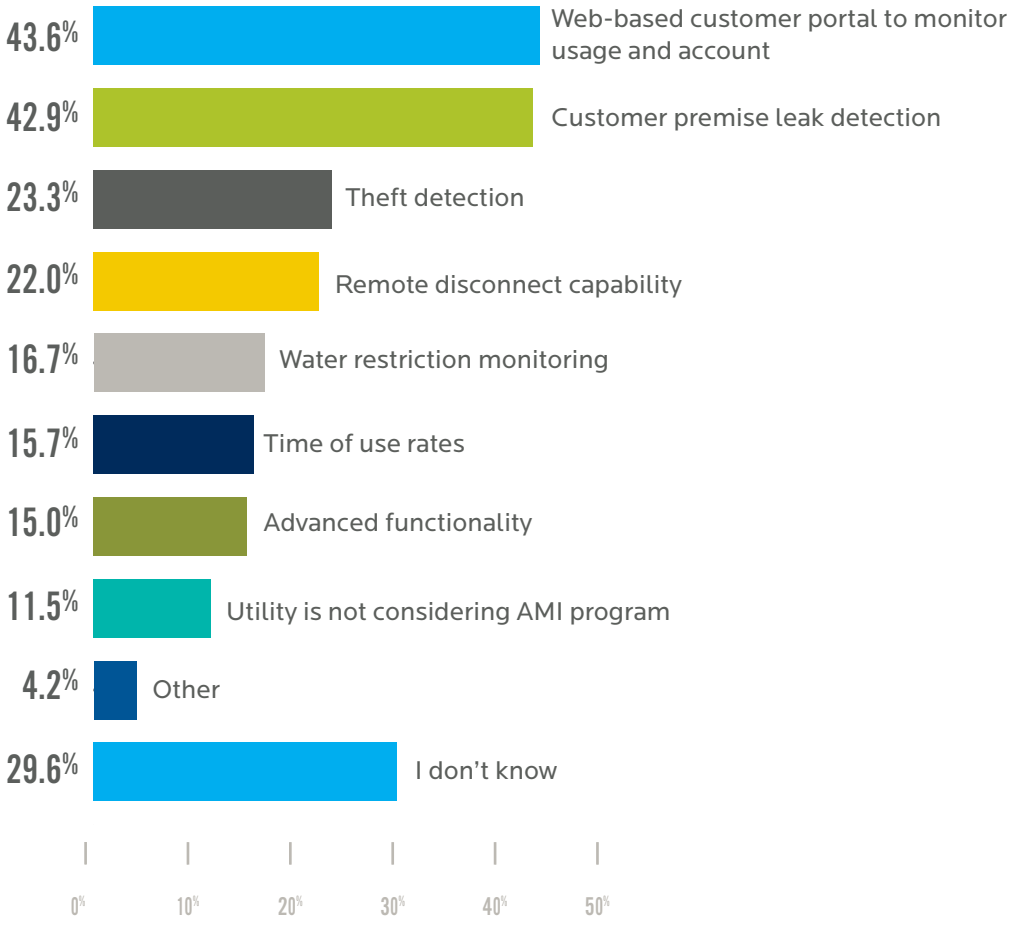
REDUCE WATER DEMAND

For utilities looking to reduce operational expenses, the least expensive drop of water is the one that is not used. Energy conservation among consumers took hold by providing an economic reward for doing so in the form of lower utility bills. However, utility budgets are already strained. Reduced revenues as a result of conservation efforts threaten utilities that have fixed costs associated with debt repayment.

Innovative rate structures are one way to encourage conservation. Currently less than 20 percent of utilities are considering progressive features within their advanced metering infrastructure (AMI) programs that can provide water restriction monitoring and/or time of use rates (Figure 9). In addition to financial motivations for reducing water usage, online monitoring of water use via customer Web portals is another opportunity to encourage conservation. After all, customers cannot save water without knowing how much they use.

Leak detection is another area of opportunity to conserve water. Leaks within the distribution system can go undetected for long periods of time. Advanced distribution measures enable utilities to identify and repair leaks quickly in a manner that also benefits from lower overall operations and maintenance costs.

FIGURE 9
CONSIDERED FEATURES FOR AMI PROGRAMS



Source: Black & Veatch
Respondents were asked to select the features they plan to enable as part of their considered AMI programs.

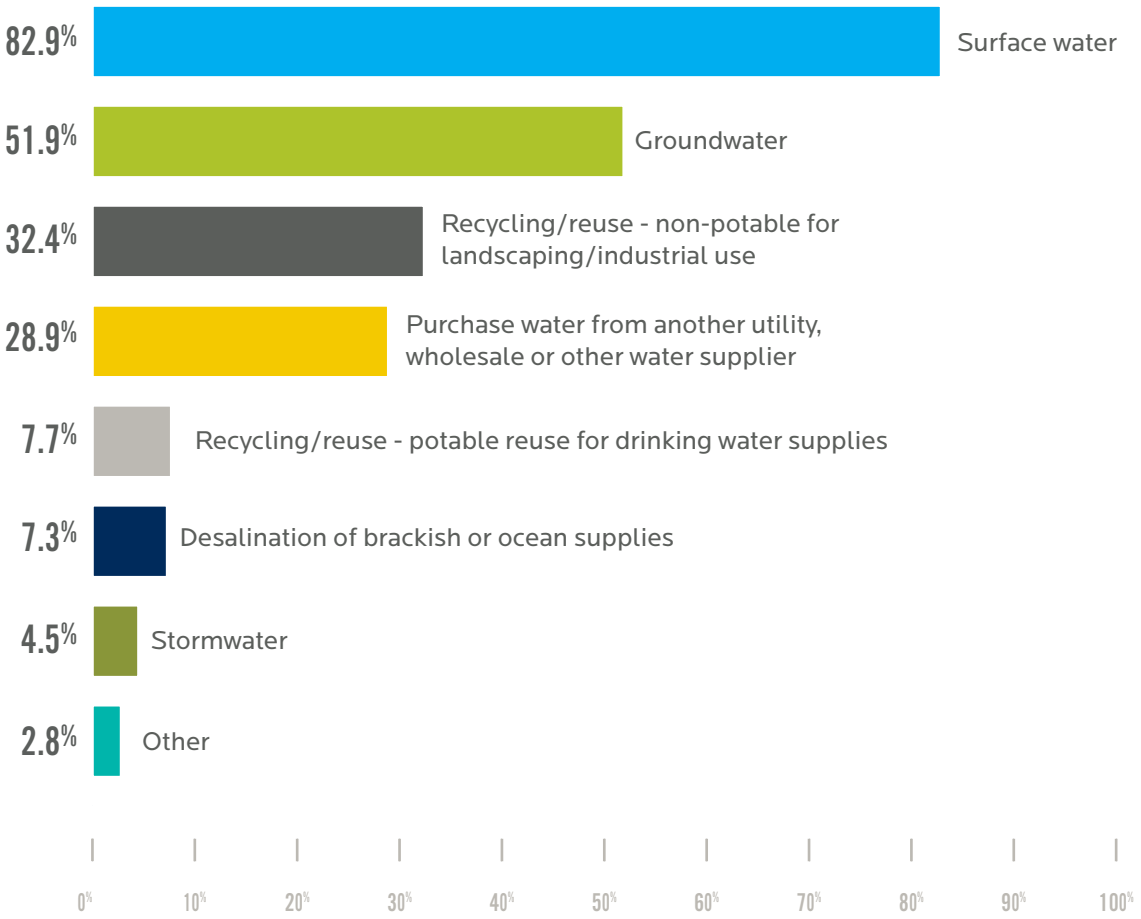
REUSE WATER

Reusing water is absolutely necessary in regions where population growth and customer demand strain available supply. Currently, approximately one-third of all utilities have some form of water reuse as part of their overall water portfolio (Figure 10). In regions such as the Southwest and Southeast, community and state leaders are considering comprehensive water reuse programs to wean industrial users off of freshwater supplies and to also recharge existing reservoirs and aquifers.

Another option for communities to consider is the capture of stormwater. Using stormwater to recharge groundwater is one way to supplement water resources. This option is likely only financially viable in areas where the hydrogeology is suitable for the practice.

The consideration of alternative water supplies highlights a disconnect among industry leaders on the importance of stakeholder engagement. When asked to identify the top three items they consider when comparing alternative water supply options, only 11 percent selected "Social considerations" (Figure 11).

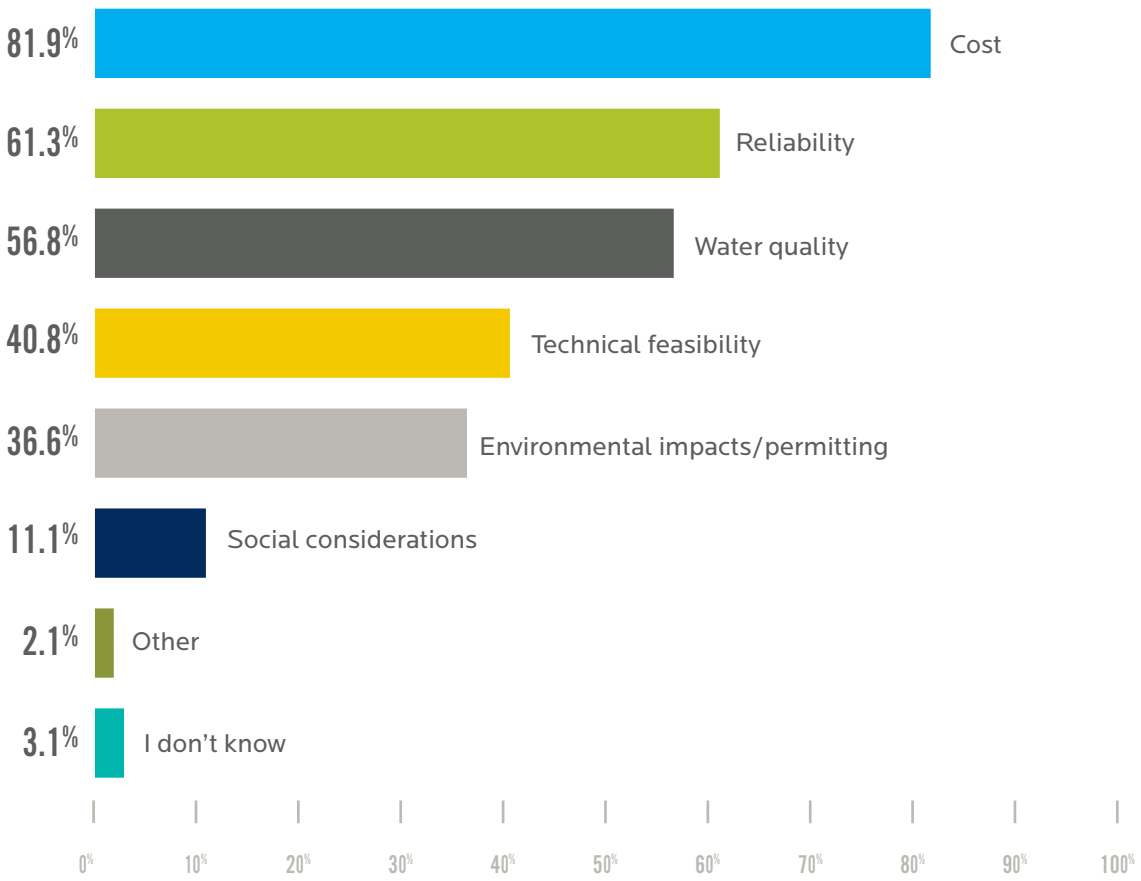
FIGURE 10
CURRENT SOURCES OF WATER SUPPLY



Source: Black & Veatch
Respondents were asked to identify all water supply sources available/used by their utility.
NOTE: Respondents who represent wastewater only utilities were omitted from these results.

FIGURE 11

TOP CONSIDERATIONS WHEN COMPARING WATER SUPPLY OPTIONS



Source: Black & Veatch

Respondents were asked to select the top three items their utility considers when comparing alternative water supply options.
NOTE: Respondents who represent wastewater only utilities were omitted from these results.

A significant difference exists on the effectiveness, particularly as it relates to public acceptance, of developing alternative water supplies for a portfolio over time versus during crisis. Highlighting this point are experiences from Singapore and Australia.

In Singapore, water self-sufficiency is viewed as a strategic requirement for national security and economic growth. Public education and awareness campaigns by the national water agency, Singapore's PUB, have been sustained virtually since the country's independence in the 1960s. Today, the country is the model for conservation, reuse and sustainable water management through a diverse portfolio that is slowly incorporating indirect potable water reuse through its trademarked NEWater supplies.

Extreme weather conditions plagued Australia for the last 10 to 15 years, pressing the country to develop new approaches to planning and securing water resources in addition to water restriction and comprehensive conservation programs. In Brisbane, serious drought led to the implementation of indirect potable reuse by the local government.

During the crisis, the public largely accepted policies implemented to safeguard future water supply. However, increased rainfall that followed the implementation of these measures eliminated the crisis, and the public no longer accepted the alternative water supply strategy. As a result the government changed its recycled water policy to only use indirect potable reuse during times of extreme water emergencies.

RECOVER RESOURCES

Black & Veatch is a strong advocate of the belief that there is no such thing as wastewater. Used water is full of valuable resources that should be recovered. Not recovering the water supply, nutrients and/or the energy potential of this resource is the "waste" element.

Protecting water bodies is the driving force behind regulations on nutrient removal and comprehensive programs to reduce or eliminate combined sewer overflows and/or sanitary sewer overflows. Nutrient removal can be an opportunity for utilities with wastewater assets to reduce energy costs and potentially gain new revenue streams.

Ongoing work with the Metropolitan Water Reclamation District of Greater Chicago (MWRD) for a new nutrient recovery system demonstrates the potential benefits of resource recovery. Black & Veatch and Ostara Nutrient Recovery Technologies were selected to design and build the new facility that will recover phosphorus from reclaimed water in a manner that allows the phosphorus to be sold as a fertilizer for agricultural purposes.

The program benefits MWRD and its ratepayers by meeting water effluent standards with regard to nutrient removal. It also provides a truly sustainable benefit to the global challenge of phosphorus supply. Minable phosphorus is a finite resource, and 90 percent of this resource is controlled by a single country, Morocco. Since no food, flora or fauna can grow without phosphorus, recovering rather than removing this essential nutrient is necessary.

Proven technologies and processes for treating reclaimed water can also be used to recover valuable energy resources. Methane gas produced from the biosolids digestion process can be harnessed to create on-site power. In addition, sewage sludge can be used as a viable biomass for on-site power generation. In the UK and Australia, several large facilities have benefited from the recovery of energy. Many are now energy self-sufficient and others have the capability of being net producers of renewable energy, providing additional revenue opportunities by selling power to the local electric grid.

Economies of size are a factor in any resource recovery program. Utility and community leaders that must upgrade, expand or build new facilities in order to meet regulatory requirements or new capacity needs are looking at options for partnering with other communities to meet a common need, reduce costs and provide tangible environmental benefits.

PLANNING IS THE CRITICAL STEP

Those who are prepared are better positioned to withstand, recover and prevail in the face of crisis or disaster. For this reason, integrated water management plans should be an essential component of utility strategic planning and asset management.

Naturally, comprehensive water supply planning has a greater focus for historically arid climates, such as the Southwest, Rocky Mountain and portions of the Northwest regions. More than half of the utilities within these regions have incorporated integrated water management into their long-range water supply planning process (Table 1). These regions also lead the nation in development of drought contingency plans with community outreach and use of alternative supplies.

Developing a long-term, integrated water resource plan involves all elements of the Reduce, Reuse, Recover ideology. First and foremost, customer engagement and education on the importance of conservation is necessary — even for traditionally "water rich" communities. Conserving water protects supply but also reduces costs. Innovative rate mechanisms combined with tools that enable customers to monitor and manage water usage enable conservation efforts.

Planning for and building in water reuse infrastructure over time is another way to conserve water, reduce industrial demands on freshwater supplies, and replenish reservoirs and aquifers.

TABLE 1

LONG-RANGE WATER SUPPLY PLANNING

Long-Range Water Supply Planning Process	All Respondents	By Service Region					
		Midwest	Southeast	Southwest	Northwest	Northeast	Rocky MT
Drought contingency planning for water conservation, community outreach and use of alternative supplies	64.8%	**37.3%**	67.4%	**79.2%**	**84.6%**	42.1%	68.2%
Water recycling/reuse	50.2%	**25.4%**	45.3%	**81.8%**	42.3%	36.8%	68.2%
Sustainability assessment for facilities planning	41.1%	40.3%	40.7%	39.0%	46.2%	47.4%	50.0%
Integrated water management or total water management	40.4%	**19.4%**	39.5%	**53.2%**	50.0%	26.3%	54.5%
Potential impacts of climate change	38.0%	**22.4%**	33.7%	37.7%	**61.5%**	42.1%	63.6%
Scenario planning	36.2%	**20.9%**	31.4%	37.7%	46.2%	15.8%	63.6%
Desalination of brackish or ocean supplies	15.0%	**6.0%**	19.8%	**33.8%**	11.5%	21.1%	9.1%
Other	4.2%	6.0%	**1.2%**	**1.3%**	7.7%	10.5%	4.5%
I don't know	10.5%	**20.9%**	8.1%	7.8%	7.7%	15.8%	9.1%

■ / ■ Statistically higher / lower than all respondents at the 95 percent confidence level.

Source: Black & Veatch

Respondents were asked if their utility has incorporated any of the listed items into their long-range water supply planning process.

Advanced planning and prioritizing capital expenditures over time will benefit communities susceptible to the increasing frequency of sustained droughts by spreading out costs over time. By contrast, water supply facilities constructed in response to a crisis are frequently characterized by excessive capital expenditures resulting from inadequate planning.

Finally, recovering valuable resources contained in used water benefits the environment, drives down operational costs and can generate new revenues for utilities. Nutrient recovery enhances the quality of freshwater resources, protects source waters and results in the production of beneficial agricultural products. Energy recovery can significantly reduce overall energy costs by providing a renewable energy resource for the utility.

Safe and reliable water services are a cost-intensive process. However, by implementing best practice asset management and leveraging technology, utilities can effectively manage these costs, achieve conservation goals and be more resilient to future challenges, both anticipated and unpredictable.

Global Perspective: Industry and a Sustainable Water Supply

BY **DR. HOE WAI CHEONG**

Reducing global industry's thirst is critical for ensuring sustainable water supply and economic development. According to UN Water, global industry uses double the volume of water compared to domestic applications. Furthermore, industry's proportion of water use is rising in line with the maturity and extent of a nation's industrialization.

The challenge with reducing industrial demand for water is twofold: 1) Industrial processes are often closely guarded secrets and there is a reluctance to share best practices with competitors; and 2) Water is often viewed as a more controllable and lower cost raw material, making changes – particularly those that require capital investment – a lower business priority.

Aligning water utility conservation goals with the business goals of industrial partners is a critical step in this process. One example of engaging industry comes from Singapore, where encouraging sustainable practices by industry forms part of its integrated water supply management program.

USING REGULATIONS AND INCENTIVES

According to PUB, the national water agency of Singapore, the nation's total current water demand is approximately 400 million gallons per day. PUB expects total water demand to double by 2060, with household use accounting for only 30 percent of future demand (*SOURCE:* **http://www.pub.gov.sg/water/**).

As the population and economy continues to grow, Singapore needs to ensure that the demand for water does not rise at an unsustainable rate. While PUB continues to work to reduce household consumption, a key focus area is to reduce water use in the industrial sectors. Singapore, through its work with the business community, has created a fair and optimal environment for water innovation that relies on incentives and regulations to meet water consumption goals.

Water is priced in Singapore to reflect its scarcity given the country's unique constrained circumstances including limited land to store rainwater. The costs involved in the entire national water system are taken into account and the price of water reflects the higher costs of water supplies from NEWater production and desalination as well as all operating costs of the extensive and advanced water infrastructure throughout the country.

The challenge is to keep water costs competitive to the industry while maintaining high service standards in water delivery and pushing for greater efficiency in water usage. This economic reality calls for a close understanding and acknowledgement from both PUB and the businesses that protecting and managing Singapore's water resources is a joint effort. Therefore, as well as tariff structures that encourage conservation, PUB works to design specific outreach programmes which aim to raise awareness and enhance the ability of water users to improve their water efficiencies.

For example, PUB, together with the Singapore Economic Development Board, is actively working with its large industrial water users to implement water management technologies and practices. Jurong Island, a self-contained industrial park in Singapore comprising many of the world's leading energy and chemical companies, accounts for more than 10 percent of Singapore's water demand.

PUB recently reviewed Jurong Island companies' water management and future water needs for processing and cooling. The goal of the study and consultation was to identify cost effective and sustainable solutions to optimize the use of local water resources as, even conservatively, demand from users on Jurong Island will increase.

The study highlighted a number of alternative methods to improve water management practices on the island including identifying more opportunities for water recycling or reuse and using seawater rather than treated water for cooling. Greater waste heat recovery was also identified as a viable option for users to explore as they examine their water management practices in more detail.

Singapore's use of both regulations and incentives encourages its industrial customers to adopt new ways of using and reusing water. Since 2010, PUB has been working with non-domestic customers to develop their Water Efficiency Management Plans. From 2015, it will be mandatory for all large non-domestic water users consuming 5,000 cubic metres per month or more of water to submit their Water Efficiency Management Plans to PUB by June on an annual basis. In addition to identifying potential water savings and developing an implementation timeline, large water users (with funding support) are also required to install private meters to measure and monitor water consumption in order to account for the breakdown of water use at the major water usage area in the premises. The purpose is to promote the establishment of water management systems across large water users, which is a key step for them to better understand and take ownership of their water usage.

In many ways, Singapore's water management strategies are similar to how governments worldwide have encouraged businesses to be more energy efficient. The argument to save energy is more readily understood by the average business leader. However, with the right information, right policies and the right incentives, there is no reason why similar arguments cannot be presented in the case for saving water.

WATER'S ECONOMIC VALUE

While Singapore has long been noted for its comprehensive water strategy and management plans, perhaps its greatest success is with its work in creating broader public awareness on water's true economic value. Singapore rightly boasts that through its work it has turned its water scarcity challenges into economic advantages. In addition to creating a stable and secure environment for investment, Singapore's global hydrohub has a thriving cluster of more than 130 water companies and 26 research centres.

The economic impacts of water shortages can be severe and long lasting. In the United States, severe droughts in California, Texas and other areas of the country, are the reason why meat and dairy prices continue to rise.

China's plans to take advantage of a shale-gas revolution, similar to the unconventional gas success in the United States, is challenged because gas reserves are in the driest parts of the country. The drilling and fracturing of a typical horizontal shale gas well requires a huge amount of water and competes with other local water resource needs. Water constraints like these in China alongside the country's well-documented water pollution problems have led the World Bank to calculate the cost of China's water problems at 2.3 percent of its annual gross domestic product.

Singapore's water advantage dates back to the prominence of water policies from the inception of the country in the 1960s and from the vision of leaders like Lee Kuan Yew. This top-down political will has paved the way for comprehensive planning, investment and education that continues today. The Singapore approach demonstrates how establishing a clear vision and long-term water strategies, supported by the public and various levels of political and business stakeholders, enables a positive environment for investment, alternative financing and, in time, can turn a weakness for a region or country into an area of strength.

Dr. Hoe Wai Cheong is an Executive Vice President at Black & Veatch and leads the company's EPC (engineering, procurement and construction) business for energy projects throughout the world. Dr. Cheong also is responsible for global strategy, business development and project acquisition and execution.

Global Perspective: Sustainable Water Planning Making Inroads in the Middle East

BY **CHRIS SCOTT**

Black & Veatch has been working on water and sanitation projects for communities across the Middle East since the 1920s. Currently, the company is focusing on the needs of the Gulf Co-operation Council (GCC) states[1], a region with very specific water related challenges.

GCC states have high rates of water usage, driven in part by the lifestyles afforded by oil wealth. Average consumption of water per individual in the GCC is the highest in the world. In the United Arab Emirates (UAE), for example, average water consumptions rates are 550 liters per person (145 U.S. gallons), more than double the global national average of 250 (66 U.S. gallons). In addition, it is estimated that an average of 40 barrels of water are needed for the production of one barrel of oil.

A further consideration is that demand is forecast to increase. The UAE's Ministry of Environment, for example, predicts the emirates' annual water demand will double to 8.8 billion cubic meters by 2030. These rates of consumption are all the more startling given the GCC is also among the world's most arid regions. According to the United Nations, all GCC countries, with the exception of Oman, fall into the category of acute water scarcity.

As a result, there is a growing recognition that current levels of usage are unsustainable. Around the world, Black & Veatch has seen that helping people recognize water's value is central to any successful demand management strategy. It is not that people have chosen to undervalue water; it is more that we need to be more effective at helping them understand its value.

To this end, GCC clients and other organizations in the region have launched a number of initiatives to promote water's value. In Qatar, the Tarsheed campaign is targeting public spaces such as schools and mosques. Last summer, Saudi Arabia's Minister of Water and Electricity Minister, His Excellency Abdullah Al-Hussayen, said his ministry had launched a nationwide campaign to reduce water consumption by 30 percent through free distribution of water-saving devices.

In the academic year 2013–2014, the Dubai Electricity and Water Authority (DEWA), in coordination with the emirate's Knowledge and Human Development Authority, launched a competition targeting 400 schools. The institution able to develop the best practices in water and energy conservation will receive a Dh10,000 (approximately US$2,700) prize. DEWA is also among the utilities in the region to launch a mobile application that allows customers to track bills. Such applications can help reduce consumption by up to 15 percent according to Samir Al Bahaie, Google's regional policy manager for the Middle East and North Africa.

Water tariffs that reflect more closely the cost of providing water services are another way of helping people understand water's value. This is a highly sensitive area in the GCC, but it is to be applauded that a dialogue about water tariffs is beginning to be introduced into the debate about managing demand. Alongside education measures, for instance, the UAE's Federal Electricity and Water Authority (FEWA) Director General, His Excellency Mohammed Saleh observed at the end of 2013 that FEWA may have to, "reconsider the current tariff for water services."

[1] The GCC states are Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates

THE WATER ENERGY NEXUS

Recognizing that power and water are inextricably linked is crucial. Energy generation is water intensive, and water services are energy intensive; cutting consumer demand for one will reduce consumption of the other. This is important when considering that customers in the GCC have some of the world's highest per capita demands for energy as well as water.

To ensure the sustainable provision of both precious resources, the integrated planning and delivery of energy and water infrastructure provides the most efficient means to meet and manage demand. As a result, meeting governments' objectives will increasingly require companies like Black & Veatch that have expertise in delivering both water and energy projects, and successfully combining insights from both.

Understanding the technologies involved has a significant role to play. For example Saudi Arabia's average thermal efficiency in generation is around 30 to 35 percent. Converting the kingdom's single cycle plants to combined cycle is estimated to increase thermal efficiency to 40 to 45 percent. Combined cycle plants generate nearly 66 percent more energy per unit of water used compared to traditional gas fired plants. So, by understanding the technology and the nexus of water and energy, a virtuous circle begins to develop with more efficient generation coupled to a reduction in demand for water.

Leadership within the GCC is recognizing water and energy's interrelationship. In January 2014, the GCC's Electricity Cooperation Committee announced it was beginning to explore the possibility of implementing joint legal and legislative rules to strengthen rationalizing the consumption of water and electricity.

RECYCLING AND RECOVERING RESOURCES

A paradigm shift in how wastewater is viewed can contribute significantly to meeting the GCC's water challenges. It is time to treat wastewater treatment works as resource recovery plants. Utilities need partners with the technological understanding of, and experience in, wastewater recycling and unlocking wastewater streams' potential as sources of renewable energy and nutrients.

Interest in water reuse is growing. Abu Dhabi plans to reuse 100 percent of its treated wastewater for irrigation by 2018; up from the 7 percent of treated wastewater it uses currently. Water recycling technology means that virtually any population center that creates a significant wastewater stream has the potential, through water recycling, to create a renewable water source.

Across the world, large-scale transfers and integrated networks have been used to successfully help meet demands for water, so greater cooperation between GCC states is a development of increasing significance. "GCC water interconnection is a must now to overcome water security threats," Qatar's Minister of Energy and Industry, His Excellency Dr. Mohamed bin Saleh Al Sada, observed recently. The announcement by Bahrain's Minister of Electricity and Water that the GCC is commencing studies for a common regional water network shows how seriously this strategy is being taken.

MAINTAINING ASSETS AND KNOWLEDGE TRANSFER

Two other areas that have a significant impact upon the GCC's future ability to deliver sustainable water services are asset management and knowledge transfer. A total of US $300 billion is expected to be invested in water projects in GCC between 2012-2022, according to a report by Global Risk Insights. Asset creation, however, is only half the story. To deliver the levels of customer service and environmental performance that end users and governments seek, the GCC states' infrastructure asset base needs to be managed effectively.

PAS 55 is recognized around the world as the benchmark for asset management quality. Use of the specification in the GCC is growing; Abu Dhabi Distribution Company (ADDC) announced last year the appointment of Black & Veatch to help it achieve PAS 55 certification.

In a recent advance in the discipline of asset management the International Organization for Standardization - commonly called the ISO - published ISO 5500X, the world's first international suite of standards for asset management. This international standard will further increase the implementation of effective asset

management regimes and help utilities in the GCC ensure that their investments deliver the performance desired in the long term.

In addition to developing infrastructure, the GCC needs to develop people. Reliance on expatriate expertise to deliver and manage utility infrastructure is unsustainable. Knowledge transfer is now essential to a project's success. For example, Black & Veatch's PAS 55 work with ADDC includes the development of training and structures for the adoption of industry best practices. Knowledge transfer is an essential component of the overall program.

Overall, trends and developments within the GCC demonstrate the need for a holistic approach for managing water resources and water infrastructure. Public education and awareness is a foundational objective, while investment in water reuse and resource recovery programs provide for new supplies and enhanced operations. Finally, maintaining this infrastructure through the use of globally recognized best practices will help the GCC region ensure a sustainable water supply for generations.

Chris Scott is a Managing Director of Strategic Services for Black & Veatch. He has more than 30 years of experience in the water industry and is based in Redhill, UK.

THE WADI DAYQAH DAM
IN OMAN.

CREATING AN INTELLIGENT WATER UTILITY

BY **KEVIN CORNISH, JEFF BUXTON AND JEFF NEEMANN**

A water utility manager visited a power plant and was amazed at what he saw. A single person, the power plant manager, operates the entire facility. The water utility manager asks how this can be achieved for his water/wastewater treatment facilities. The answer is advanced automation, technology and analytics.

Managing operational costs is one of the top five industry issues nationally, and within nearly all geographic and population demographics (refer to *Executive Summary*). Labor and energy represent the largest operational expenses for water utilities. In addition to the cost of labor, aging workforce is an issue of rising prominence, ranking seventh among all respondents in the top industry issues list, and sixth among respondents that have both water and wastewater facilities.

To help support more sustainable operations, technology, coupled with the implementation of formal asset management frameworks, will enable utilities to capture the institutional knowledge of existing staff and reduce the need to replace retiring staff. In addition, well-planned asset management and technology programs will help utilities reduce energy consumption, improve maintenance programs and potentially improve cash flow and billing accuracy.

ENERGY RECOVERY AND EFFICIENCY

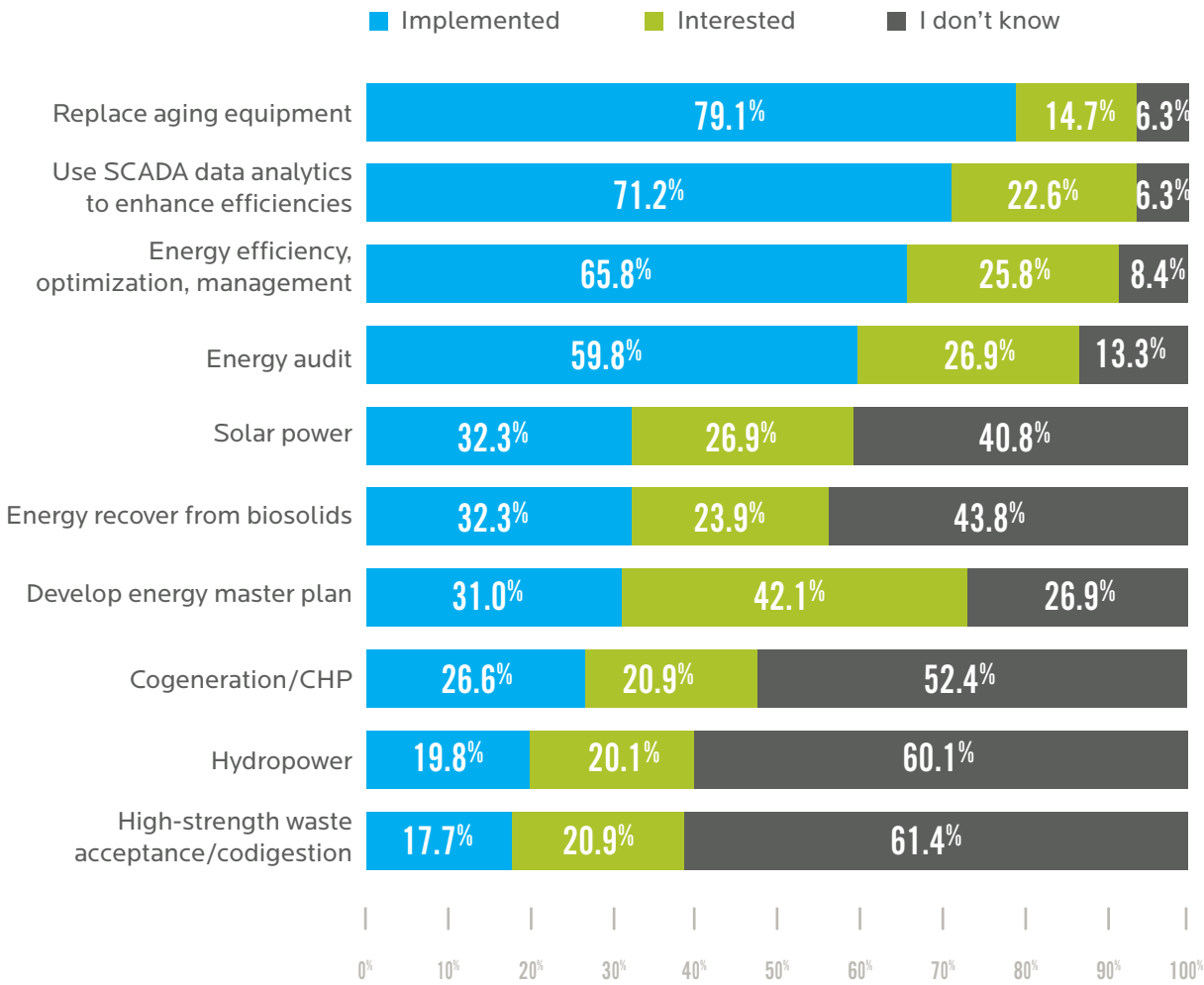
When it comes to reducing operational costs, improving energy efficiency has been the proverbial low-hanging fruit for water utilities. Nearly 80 percent of utilities have replaced some level of inefficient equipment; more than 70 percent are using SCADA data analytics; and nearly 60 percent have conducted energy audits (Figure 12). The chart also indicates that a large portion of water utilities are interested in pursuing more advanced energy programs, with 42 percent indicating interest in developing energy master plans. Energy master plans will help define the next level of energy conservation measures that go beyond what has already been implemented.

Survey findings show a definitive gap between large and small utilities, with utility size determined by the size of the population served, when it comes to the use of more advanced energy efficiency and/or recovery programs. Table 2 shows that more than half of medium and large utilities are considering or have implemented software and/or data analytics programs to proactively manage energy costs as compared to 30 percent of small utilities. Similar gaps exist for renewable energy programs and other energy recovery options, although for some renewable programs, economies of scale do still apply.

WHEN IT COMES TO REDUCING OPERATIONAL COSTS, IMPROVING ENERGY EFFICIENCY HAS BEEN THE PROVERBIAL LOW-HANGING FRUIT FOR WATER UTILITIES.

FIGURE 12

TECHNOLOGIES OR ACTIONS TO BETTER MANAGE ENERGY USE



Source: Black & Veatch

Respondents were asked which of the listed technologies or actions their utility has implemented or is interested in pursuing in order to better manage energy usage.

TABLE 2
ENERGY EFFICIENCY/RECOVERY OPTIONS CONSIDERED OR IMPLEMENTED

Energy Efficiencies Considered or Implemented	All Respondents	By Population Served		
		Small (Under 100K)	Medium (100K–1M)	Large (More than 1M)
Reduce losses or other infrastructure efficiency improvements to reduce water processing and handling requirements	45.9%	50.0%	43.5%	46.8%
Using distribution modeling tools to better size and optimize pumps and pipes	44.3%	37.8%	44.1%	49.5%
Implement software and/or data analytics programs	43.8%	**30.5%**	45.2%	51.4%
Renewable energy programs (e.g., solar panels, wind)	39.1%	**28.0%**	35.0%	**54.1%**
Restructure wholesale electric supply contracts	30.7%	**22.0%**	29.4%	**39.4%**
Waste-to-energy programs	28.0%	**17.1%**	28.8%	34.9%
Recover energy through in-line hydro	21.7%	**13.4%**	**15.8%**	**37.6%**
My utility is not focused on energy efficiency measures or costs	6.5%	7.3%	8.5%	**2.8%**

■ / ■ Statistically higher / lower than all respondents at the 95 percent confidence level.

Source: Black & Veatch
Respondents were asked which of the listed items their utility is considering or has implemented in order to proactively manage energy costs.

ENERGY PERFORMANCE CONTRACTING

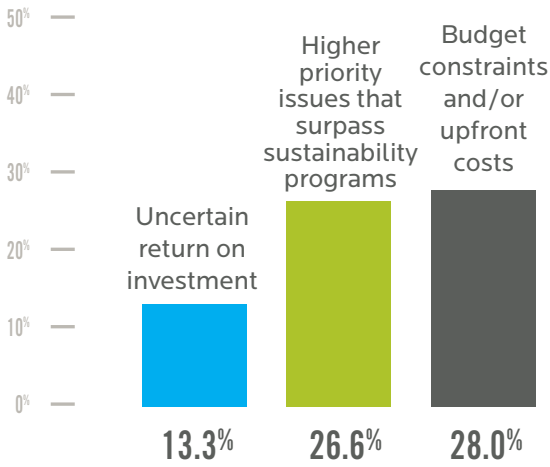
Many utilities remain challenged in developing and implementing enterprise-wide energy efficiency programs. Figure 13 highlights the top three challenges for pursuing sustainable solutions, such as energy efficiency. At the same time, less than 10 percent of all survey participants stated their utility plans to use energy performance contracting as a means for meeting energy efficiency goals (Figure 14).

Energy performance contracting is an alternative financing mechanism that can enable water utilities to move forward with energy efficiency programs while addressing the common challenges to pursuing sustainable solutions. This method often requires minimal upfront capital costs, addressing the challenge of budget constraints. Contracting terms often include guaranteed levels of energy reduction, negating concerns over an uncertain return on investment. Finally, because performance contracting involves a third-party service provider, utility staff can continue to focus on other higher priority issues

Energy performance contracts can be a win-win situation for utilities looking to achieve meaningful reductions in their energy bills that do not have available capital or staff resources to implement necessary changes. However, utilities that are financially sound with a strong business case for improvement will likely self-implement rather than share cost savings with a third party.

FIGURE 13

TOP CHALLENGES TO PURSUING SUSTAINABLE SOLUTIONS

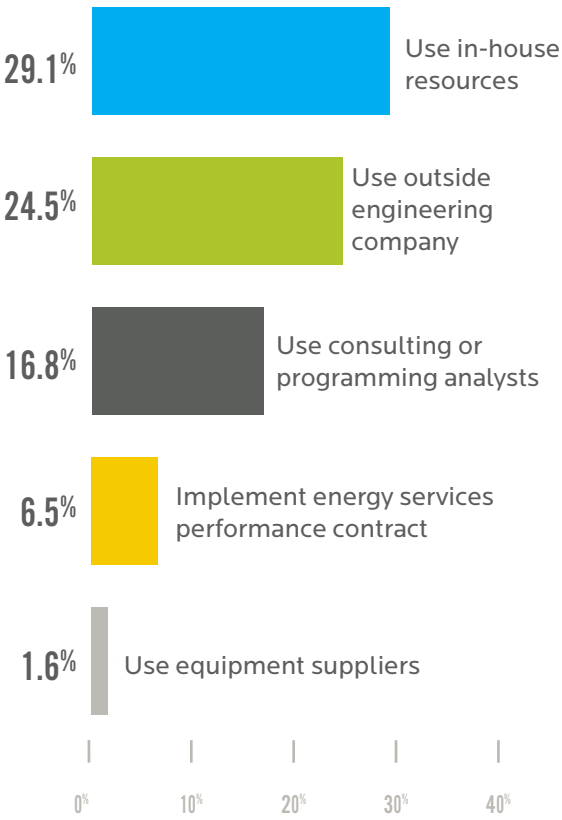


Source: Black & Veatch

Respondents were asked to select the top challenges to pursuing sustainable solutions for their utility. This chart highlights the three items selected most among all respondents.

FIGURE 14

PLANS FOR IMPLEMENTING ENERGY EFFICIENCY AND/OR RECOVERY PROGRAMS



Source: Black & Veatch

Respondents were asked how their utility is planning to implement its energy efficiency and/or recovery programs.

THE WATER SMART GRID

Water utilities are strong believers in the immediate benefits of advanced metering systems. Nearly 75 percent of all respondents cited direct meter reading cost reductions as a primary driver for considering automatic meter reading (AMR) or advanced metering infrastructure (AMI) programs, commonly referred to as smart metering. Nearly half cited leak detection, which can reduce expenses associated with non-revenue water (Table 3).

AMR is a system that enables utility meter reading via mobile or drive-by technology. AMI, on the other hand, refers to more advanced technology where meter data is transmitted over a two-way, fixed network (for example, point to multipoint or mesh) to a central control center for processing. Utilities with AMI systems gain additional benefits from their infrastructure. As noted in Table 3, primary drivers for smart metering programs point toward growth in AMI use across the industry because of the additional benefits these systems can provide beyond meter reading cost reductions. Benefits of AMI systems include the ability to remotely control network devices, such as smart meters, help enhance customer service and support asset management and/or leak detection solutions.

WATER UTILITIES ARE STRONG BELIEVERS IN THE IMMEDIATE BENEFITS OF ADVANCED METERING SYSTEMS.

Black & Veatch projects that the technologies commonly referred to as the "Smart Water Grid" (e.g., smart meters, distribution sensors) will become an integral part of water utilities' enterprise operations. Water utilities can achieve similar results as their electric utility peers who have realized increased system reliability, improved operating efficiency and enhanced customer service as a result of their AMI programs.

Just as the electric industry continues to capitalize from its initial AMI investments by moving forward with projects such as advanced distribution automation, water utilities can also continue moving toward greater levels of automation. Furthermore, water utilities can benefit from cloud-based services that have altered the economics of advanced automation programs.

The benefits that cloud-based services provide utilities were highlighted in Black & Veatch's inaugural *Strategic Directions: Utility Automation & Integration* report released in January 2014:

Multi-tenant systems (cloud-based) have the scale and security needed to safeguard critical operational data and sensitive client information. Most importantly, they give even the smallest organizations cost-effective access to big system capabilities. Previously inaccessible computing power and data analytics and management tools can be deployed to increase efficiency and help facilitate data-driven management approaches.

Cloud-based services are closing the technology gap between small and large utilities. No longer will the latest technology be limited to large organizations capable of supporting dedicated IT budgets and staff. Nor will larger enterprises be locked into static computer systems as cloud technology facilitates continuous improvement approaches.

To achieve the desired future state of highly automated and efficient operations, such as a one-person water plant operation, utility leaders should incorporate technology master plans into their overall asset management plan. After all, evolving from a highly manual process organization to a fully automated utility will take time, change management and a thorough evaluation of current practices and future needs. In an era where utilities are constantly looking to "do more with less," investing in automation technologies and greater intelligence will help water leaders meet their efficiency goals, become more resilient and provide greater levels of customer service.

Perhaps most importantly, advanced technology programs can be enablers of greater customer awareness regarding the value and cost of water services. More accurate billing, the option for on-site leak detection, automated alerts and other features all provide for more engaged customers and greater opportunity for utilities to accurately measure the success of conservation programs and other operational improvements.

BLACK & VEATCH PROJECTS THAT THE TECHNOLOGIES COMMONLY REFERRED TO AS THE "SMART WATER GRID" WILL BECOME AN INTEGRAL PART OF WATER UTILITIES' ENTERPRISE OPERATIONS.

TABLE 3
PRIMARY DRIVERS FOR CONSIDERING AMR OR AMI

Primary Drivers for Considering AMR or AMI	All Respondents	By Population Served		
		Small (Under 100K)	Medium (100K–1M)	Large (More than 1M)
Direct meter reading cost reductions	73.5%	**84.1%**	75.5%	**60.0%**
Leak detection	48.4%	58.0%	46.2%	44.0%
Infrastructure/asset management	36.9%	27.5%	41.3%	37.3%
Water resource management	36.2%	39.1%	34.3%	37.3%
Cash flow improvement via more frequent billing, billing timeliness	34.5%	**44.9%**	**28.7%**	36.0%
Theft detection	23.7%	27.5%	22.4%	22.7%
Distribution automation	19.2%	15.9%	16.1%	**28.0%**
Advanced rate designs such as pre-payment or time-of-use rates	16.4%	18.8%	16.8%	13.3%
Improve response to EPA and other government mandates	5.6%	5.8%	5.6%	5.3%

■ / ■ Statistically higher / lower than all respondents at the 95 percent confidence level.

Source: Black & Veatch
Respondents were asked to identify their utility's drivers for considering AMR or AMI programs

Global Perspective: Energy Recovery from Wastewater Gaining Traction in Europe, India and the Middle East

BY **JOHN TATTERSALL**

A desire to cut energy bills, reduce greenhouse gas emissions and enhance energy security is leading water utilities to explore their assets' potential to generate energy. Water services, after all, are energy intensive. Most energy is used treating wastewater and pumping clean and used water. A Black & Veatch study for UK Water Industry Research (UKWIR) shows that, on average, water services account for 1 to 3 percent of national energy consumption in Europe and 3 to 4 percent in the United States.

The cost of energy is increasingly driving investment decisions. For asset planners considering whole life or total expenditure (totex) models for investment decisions, energy costs represent a critical part of the decision-making process. Typically capital costs are less than 10 percent and energy costs are more than 80 percent of the whole-life cost of plant.

A current example of this approach is in Kolkata, India. Here, as elsewhere, the energy requirement for wastewater treatment has been exacerbated by inefficient, aging infrastructure increasing totex. The Asian Development Bank's recent US$400 million loan to improve sanitation took account of the fact that some of the city's wastewater infrastructure is up to 90 years old and uses far more electricity than modern equipment. As a result, ensuring the use of energy efficient technology at the new treatment plants is one of the project's goals.

The chemical energy in domestic wastewater represents one of water utilities' best energy sources. Biogas produced as a byproduct of wastewater treatment can be used to fuel combined heat and power (CHP) engines. These can help meet treatment works' energy requirements and provide heat for the facility.

Advanced sewage sludge digestion techniques that maximize biogas generation have been used extensively in the UK. Black & Veatch has been involved in several significant EPC (engineer, procure, construct) generation projects. The company recently commissioned the £105 million advanced sludge treatment facility at Davyhulme wastewater treatment works (WwTW), Manchester. The process improves sludge's digestibility, increasing the biogas yield. The gas is used to generate up to 11.5 megawatts (MW) of electricity on-site using CHP engines. The WwTW is energy self-sufficient, and has the ability to export electricity to the grid. Black & Veatch has completed, or is executing, similar EPC projects at Anglian Water's Cotton Valley, Whitlingham, Colchester and Pyewipe WwTW.

In India, there is increasing interest from water utilities in biogas' potential. Ahmedabad Municipal Corporation recently approved a proposal to sell gas generated at Pirana WwTW. Previously the gas was flared off as a waste product. The new Kondli WwTW, built for the Delhi Jal Board, has the reported ability to generate 2 MW of power.

The potential of projects such as these has been noted by, among others, Gujarat State Chief Minister Narendra Modi. Speaking at the 2013 National Summit on Inclusive Urban Development he announced a pilot scheme at 50 cities within the state to recover energy, water and fertilizer from waste digestion infrastructure.

Even in the fossil fuel rich Gulf Cooperation Council (GCC) states of the Middle East, the potential of biogas is being investigated. Taqa, Abu Dhabi's National Energy Company, for example, is among those investigating the use of biogas from wastewater as a fuel for electricity generation.

Hydropower is another way in which water assets can be used to generate energy. With water and wastewater treatment infrastructure, the opportunity to install hydro turbines exists at any point in the hydraulic gradient where energy has to be dissipated. Examples of such opportunities include the head of a treatment process; within distribution systems for pressure management; and at the end of effluent discharge pipes.

In the UK, Black & Veatch has undertaken a number of EPC projects with a hydro generation component. These include schemes in Scotland and Wales, where the topography makes hydro generation especially favorable. Among the most notable hydro generation projects is Glencorse, a £130 million water treatment works for Scotland's capital Edinburgh. The installation of two hydro turbines utilizing pressure available from the raw water reservoirs makes the works energy self-sufficient and able to export power to Scotland's electricity grid.

Scottish Water has also begun a scheme to retrofit hydro turbines to a number of other Scottish Water treatment and distribution assets. The schemes will contribute 9,500 megawatt-hours (MW-h) of electricity per annum to Scottish Water's renewables generation target of 25,000 MW-h per annum by March 2015.

Although hydro generation from water utility assets will be comparatively small-scale, in India it is potentially interesting against the backdrop of the government's support for this source of power. Plans to make it mandatory for power distribution utilities to purchase a fixed amount of hydropower have been mooted. Similar schemes already exist for other forms of renewable generation.

The land bank available to some water utilities has also allowed them to site small-scale solar photovoltaic (PV) and wind generation to augment their power needs, and sometimes export to other users. Black & Veatch has undertaken a study for the UK Environment Agency to assess the viability of renewable generation, including solar PV and wind, at some of their sites.

The nexus of water and energy means boundaries between the sectors are becoming blurred. This is especially the case with renewable generation. As a result, there are increasing opportunities for companies able to combine both water and energy expertise.

John Tattersall is the Global Director of Water Technology for Black & Veatch. He is based in the company's Redhill, UK office.

TOP WATER INFRASTRUCTURE ISSUES SOLVED THROUGH ASSET MANAGEMENT

BY **JAMES STRAYER, WILL WILLIAMS, JEFFREY STILLMAN AND MARTIN JONES**

The need for best practice asset management continues to grow within the water industry. The top five industry issues identified by our annual survey, such as aging infrastructure, managing capital and operational costs, and justifying investments and rate requirements, represent the core tenets and ultimate benefits of asset management.

Water utility leaders recognize that using asset management concepts can help address their most pressing challenges. On the surface, asset management provides a risk-based investment approach that is replicable, auditable and targets the best return on investment. A deeper dive into asset management frameworks provides even broader benefits. However, one of the more surprising results from Black & Veatch's industry survey is the general lack of awareness of available asset management frameworks. All of the four major frameworks used within the United States had an awareness level of less than 50 percent (Figure 15).

The value of asset management is the ability for utility leaders and managers to shift viewpoints from a facility to an objective. Asset management goes beyond identifying the age of an asset to quantifying the likelihood and consequence of that asset failing. Organizations that have committed to best practice asset management have identified their objectives and service goals and know the role people, processes and assets have in meeting those goals. The frameworks help define procedures and processes. They allow proactive management of the asset life cycle at the tactical level within the context of strategic considerations such as the utility's capital, operational and maintenance expenditure, appetite for risk and levels of service (refer to *History and Description of Infrastructure Asset Management Frameworks* for more information about each asset management framework).

PREFERENCES FOR ASSET MANAGEMENT

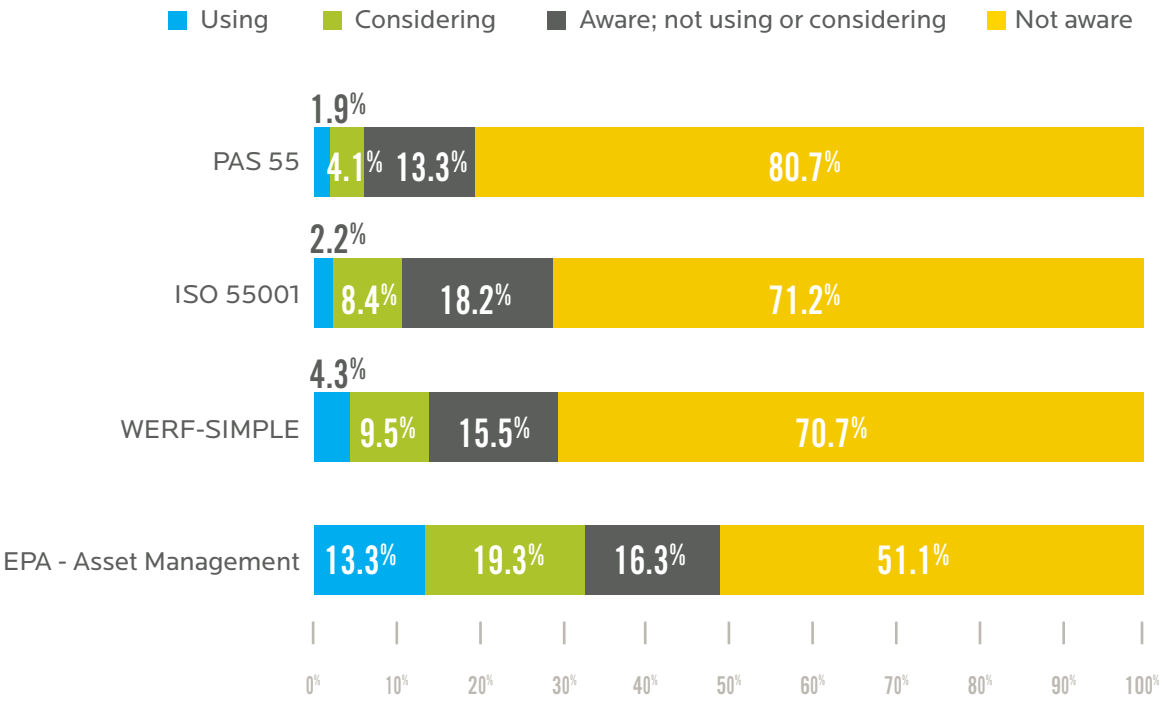
This year's water industry survey addressed influencing factors for selecting or considering an asset management framework. Preferences among respondents on the top attributes or factors for considering a specific framework were "Simple to understand" and "Covers all asset life cycle activities" (Figure 16). The conflicting nature of simplicity versus comprehensiveness underscores one of the most important challenges for implementing asset management programs. Merging complicated and comprehensive approaches, tools and processes into streamlined and easier to understand frameworks is not a simple undertaking.

The relative ranking of the various responses provides a good barometric reading on the U.S. water industry's level of sophistication in asset management. Following simplicity and comprehensiveness, survey participants placed the strongest level of importance on practical application with proven results. This is a typical entry point into asset management, leveraging the experience of others in deploying an approach that has been proven to work.

The growing importance of the role of people within an asset management framework demonstrates growth in overall engagement and a growing realization that good practice needs to focus not just on assets but also on people and process to be truly successful. Utility leaders are moving beyond a facility-centric approach to more enterprise-level planning.

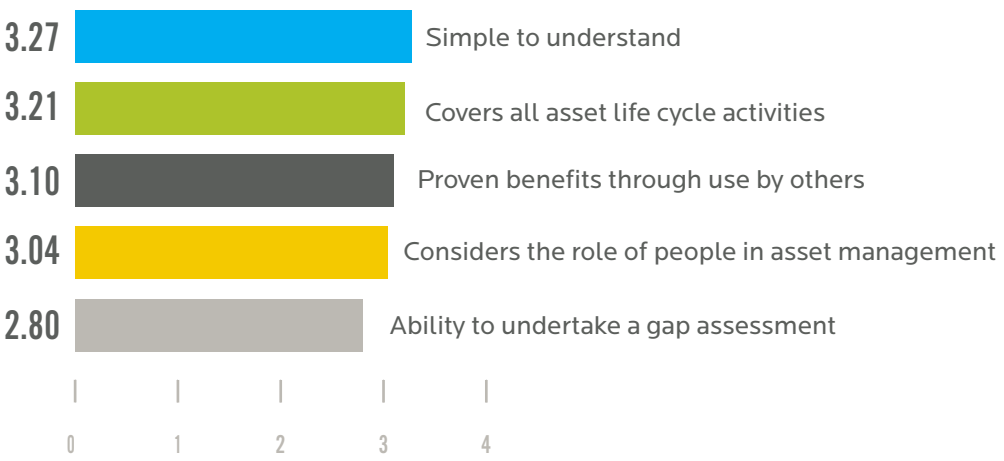
Regulatory drivers, certification and international best practice scored lowest. While these factors are not currently top considerations or drivers, the emergence of ISO 55001 may change this in the future. Learning from other, more mature, asset management programs (from the international water community and other utility industries, such as gas and electric) suggests that utilities should track the development of standards and regulatory drivers. Adoption of best practice asset management could become part of the regulatory review process that affects capital cost recovery, bond ratings and approval for rate adjustments. *Continued on page 44.*

FIGURE 15
USE/AWARENESS OF ASSET MANAGEMENT FRAMEWORKS



Source: Black & Veatch
Respondents were asked if their utility is using or considering any of the listed asset management frameworks.

FIGURE 16
TOP CONSIDERATIONS FOR SELECTING AN ASSET MANAGEMENT FRAMEWORK



Source: Black & Veatch
Respondents were asked to rate the level of importance each of the listed items has in selecting their organization's asset management framework using a scale of 1 to 4, where 1 indicates "Not Important" and 4 indicates "Very Important."

History and Description of Infrastructure Asset Management Frameworks

BY **JAMES STRAYER AND WILL WILLIAMS**

The origins of asset management frameworks can be traced to the UK, Australia and New Zealand. In the UK, from the early 1980s, manuals like the *Sewerage Rehabilitation Manual, Water Mains Rehabilitation Manual* and the *Urban Pollution Management Manual* laid out the core concepts of condition and performance assessment and good practice, risk-based asset management.

The need for asset management within the UK was driven by regulatory oversight of privatized water companies where thorough demonstration of organizational effectiveness and justification for capital cost recovery is required. As a result of these requirements, the *Common Framework Approach to Capital Maintenance Planning* was published in 2002 in the UK for water companies to develop their asset replacement programs.

Similarly, in Australia and New Zealand the governments identified the need to address the management of infrastructure early on and promoted the development of asset management throughout the 1980s. This led to the development of the *International Infrastructure Management Manual* in 2000 which provided guidance and case studies of good practice asset management.

Publicly Available Specification (PAS) 55 was developed by the UK Institute of Asset Management in conjunction with the British Standards Institution in 2004. PAS 55 defines good practice asset management and specifies what elements need to be included in a successful asset management program. The framework is being used by a number of utilities in the UK and other parts of the world. However, adoption of PAS 55 among U.S. water utilities has been limited, an observation confirmed by survey results that show less than 6 percent of U.S. utilities using or considering the framework.

Based on research that commenced in 2006, the Water Environment Research Foundation (WERF) developed its Sustainable Infrastructure Management Program Learning Environment (SIMPLE). SIMPLE is a Web-based knowledge management tool that provides a framework for strategic planning, guidance on best appropriate practices, decision analysis tools, case studies and a training program. SIMPLE includes a 10-step process for developing asset management plans.

The United States Environmental Protection Agency's (EPA) *Asset Management: A Best Practice Guide* published in 2008 has the greatest level of awareness among U.S. water utility leaders. It is targeted at small to mid-size utilities and provides guidance and a communicable structure for understanding asset management, focused around the following five core questions:

- What is the current state of my system's assets?
- What is my required "sustainable" level of service?
- Which assets are critical to sustained performance?
- What are my minimum life cycle costs?
- What is my best long-term funding strategy?

These various frameworks have migrated in varying degrees to the U.S. market. The level of use also varies by utility. Some organizations have adopted a well-structured approach, building from the ground up. Other U.S. utilities have selected a single area to improve, such as capital prioritization. Utilities that have taken the single area approach often find that adopting a comprehensive asset management framework is necessary in order to achieve

the more complex enterprise-wide improvements once areas of obvious need have been enhanced.

The need for an international standard for asset management was the driving force behind the development of ISO 55001 by the International Organization for Standardization (ISO). This standard was published in early 2014, so it is understandable that more than 70 percent of respondents are not yet aware of the framework. However, what is encouraging is that a small percentage of large utilities (serving populations greater than 1 million) have begun using the standard with nearly 14 percent considering its use.

There is high expectation for rapid acceptance of the ISO 55001 standard in the coming years among water utilities in the United States and globally, as well as other utility sectors such as natural gas and electric. A recent article in the Institute of Asset Management's Assets magazine suggests that more than 4,000 organizations worldwide are currently considering adoption of ISO 55001 as their asset management framework.

CAPITAL PLANNING AND PRIORITIZATION

Asset management programs focus on replacing the right infrastructure or assets in the right way and at the right time. This year's survey provides a baseline for the current basis of repair and replacement decisions among U.S. utilities (Table 4). As expected, staff knowledge of assets and the condition of each is used by more than 85 percent of all utilities in developing repair and replacement programs.

It is encouraging to see that more than half of respondents in each size demographic also use detailed condition assessments and risk assessments to provide analytical support to these important financial decisions. However, deterioration modeling is only used by a small number of all respondents (15.5 percent), which is likely a reflection of the lack of available data and understanding or awareness of this capability. Deterioration models are powerful tools for forecasting risks and impacts on service levels. Justifying capital expenditure and/or customer rates is a top issue nationally. Deterioration models will help utility leaders demonstrate the need for specific investments and quantify the potential consequences of inaction.

As greater levels of intelligence and data collection are implemented across the utility enterprise, such as advanced distribution programs and sensors, obtaining data on asset performance and condition over time will enable the development of deterioration models. This appears to be an area of growth and opportunity for the industry. Approximately 30 percent of respondents stated they are using or planning to improve or implement deterioration models, although this is much greater among large utilities.

In addition to asking the basis for utility repair and replacement decision-making, the Black & Veatch survey once again evaluated the usage plan for many common tools, software and techniques related to asset management (Figure 17). Respondents reported across the board increases in the use and planned development of these supporting elements. The top categories for improvement included condition assessment and operational items such as paperless work order systems and mobile applications. Managerial dashboards were rated the biggest planned improvement, similar to last year's results. The marked improvement and use of these elements paints a positive trend. Today's organizations are advancing all the tools in their portfolio to become the Smart Water Utilities of the future.

TABLE 4
TOOLS FOR DEVELOPING CAPITAL IMPROVEMENT PROGRAMS

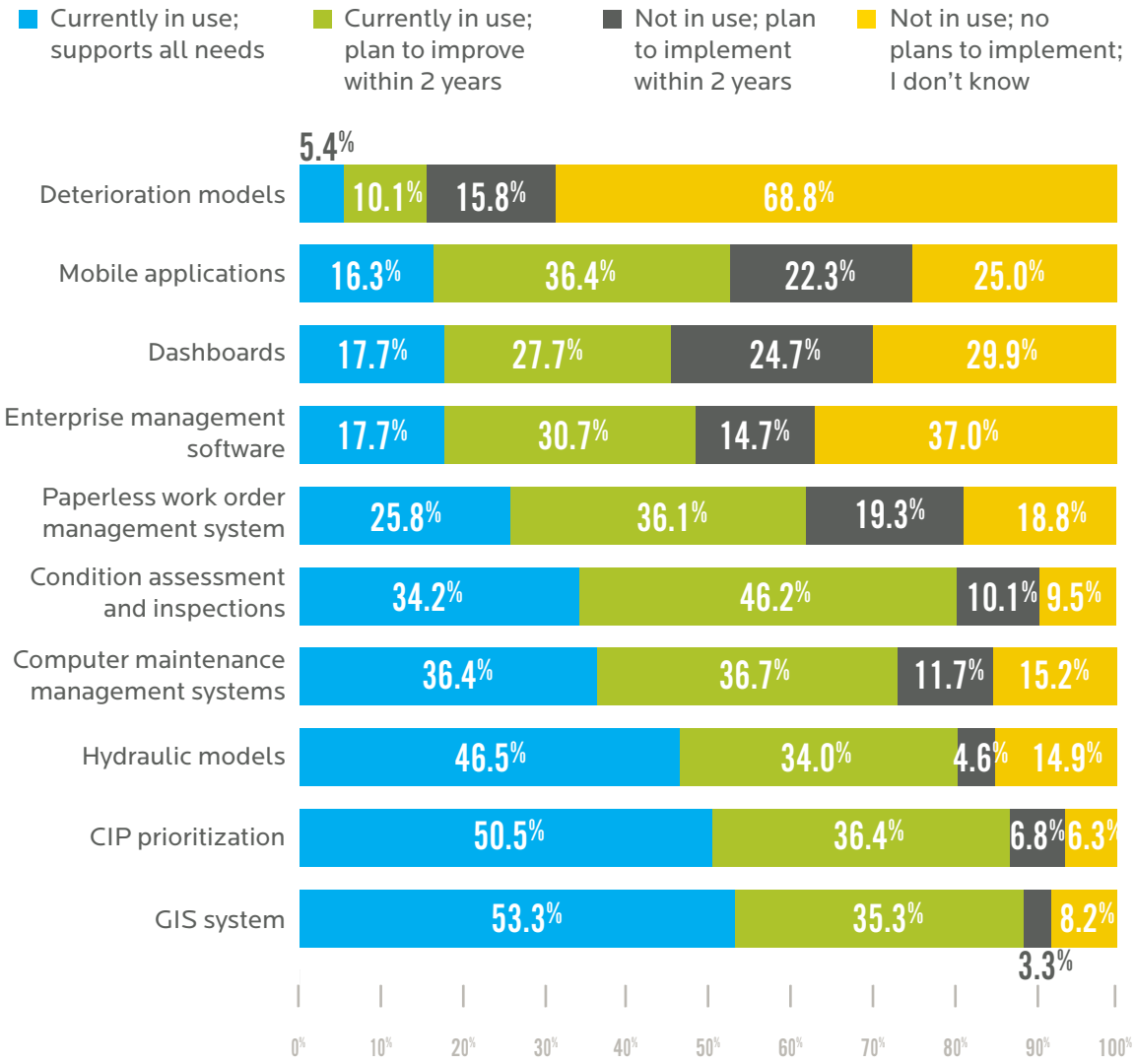
Development of Rehabilitation Projects for CIP	All Respondents	By Population Served		
		Small (Under 100K)	Medium (100K–1M)	Large (More Than 1M)
Based on staff knowledge of the asset base and understanding of condition	85.6%	86.6%	85.9%	84.4%
Based on detailed condition assessment	62.8%	**52.4%**	61.0%	**73.4%**
Based on risk assessment	61.4%	**41.5%**	61.0%	**77.1%**
Based on book life/design life	27.2%	24.4%	28.8%	26.6%
Based on deterioration modeling	15.5%	13.4%	14.7%	18.3%
Other	4.1%	3.7%	4.0%	4.6%
I don't know	3.3%	3.7%	4.0%	1.8%

■ / ■ Statistically higher / lower than all respondents at the 95 percent confidence level.

Source: Black & Veatch
Respondents were asked to select all items from the listed options that their utility uses to develop replacement and rehabilitation plans for its capital improvement program (CIP).

FIGURE 17

CURRENT USAGE PLAN FOR TOOLS/SYSTEMS THAT SUPPORT ASSET MANAGEMENT



Source: Black & Veatch

Respondents were asked to select their utility's current usage plan for each of the listed tools/systems that support asset management with their utility.

PLANNING REQUIRED FOR FUTURE SUCCESS

Asset management is playing a profound role in building resilient, financially sound organizations. The vision and commitment to build next generation Smart Water Utilities has led to the continued maturity and adoption of asset management best practices throughout all sizes of organizations in the United States. Achieving this vision, however, requires a commitment to continuous organizational improvement as best practice asset management is not a checklist.

Utilities do not need to have all the tools and systems in place to begin the process of implementing a best practice framework. Rather, utility leaders can begin with the data they have and integrate new data sources over time. The new ISO 55001 standards for asset management, along with other frameworks currently in use, offer the opportunity for U.S. utilities to evolve into the broader benefits of asset management.

GAINING OPERATIONAL EFFICIENCIES

Conditions in the U.S. water industry mirror those experienced in other parts of the world where asset management has become "business as usual." The need to repair and rehabilitate aging infrastructure, manage and communicate costs, integrate people into asset decisions, and consider how policies affect all aspects of organizations justifies the need for broader adoption of asset management practices.

As more utilities begin framework processes, it will be important to set expectations. True implementation is not an out of the box, flip of the switch solution. Comprehensive programs often take three to five years to fully plan and implement. Implementation often involves organization change that requires strong support from the highest levels of the utility. But through this change, utilities will emerge better equipped for the challenges ahead. The results from this year's survey support these conclusions and show a positive trend for asset management in the United States.

DIGESTERS AT THE DAVYHULME FACILITY IN MANCHESTER, ENGLAND, ENABLE UNITED UTILITIES TO RECOVER NUTRIENTS AND ENERGY. THE FACILITY IS ENERGY SELF-SUFFICIENT.

Perspective: Realizing Value with ISO 55001

BY **WILL WILLIAMS**

In January 2014, the International Organization for Standardization (ISO) published ISO 55001, the new international asset management standard. This new standard is the result of more than three years of development and collaboration among 30 participating countries, including the United States, led by ISO Project Committee 251 (ISO/PC251).

The ISO 55001 standard was developed to meet a need for an asset management standard that provides a common and uniform asset management language, is translatable globally and changes the perception that such standards are only applicable to large-scale utility and infrastructure companies and physical assets.

The standards are designed to provide a common language for communicating with financial stakeholders, such as bond agencies, investors, credit agencies and insurers. There are specific requirements for identifying financial reporting needs, considering financial implications of plans and including financial performance when reporting on performance.

While uniform standards and common language are beneficial, the fundamental objective of the international standards is to guide and influence the design of an organization's asset management activities. This is achieved by embedding a number of key concepts and principles within the asset management framework, such as the following:

- Focus on the value that assets provide to the organization and its stakeholders;
- Alignment of organizational objectives into technical and financial decisions;
- The importance of leadership and culture;
- Assurance that assets fulfill their required function.

While ISO 55001 is a new standard, it is based on Publicly Available Specification (PAS) 55 developed by the Institute of Asset Management (IAM) in the UK. PAS 55 methodologies have a proven track record for success within the water, electric and gas utility industries within the UK, Australia, United Arab Emirates (UAE) and, to some extent, the United States. Prior to the development of ISO 55001, PAS 55 served as the default international asset management standard since 2008.

Overall, ISO/PC251 produced three international standards related to asset management. The following provides a high-level description of each:

- **ISO 55000:** Provides an overview of asset management principles, concepts, terms and definitions, as well as a description of the benefits of asset management. Under ISO 55000, asset management is defined as the "coordinated activities of an organization to realize value from assets." The standard defines assets as "Something that has potential or actual value to an organization."
- **ISO 55001:** Provides the specific requirements for a management system for asset management, or a framework.
- **ISO 55002:** Provides guidance for the application of the requirements specified in ISO 55001

The new international standards move the discipline of asset management in a more strategic and financial direction and are likely to add value especially in terms of increasing the exposure and understanding of asset management to a wider audience. Utilities of all sizes can benefit from the adoption and implementation of the ISO 55001 framework, which can be purchased online at: **www.webstore.ansi.org**.

NORTHEAST PERSPECTIVE: CLIMATE AND FINANCIAL RESILIENCY TOP-OF-MIND

BY **KYRIACOS PIERIDES**

From Washington, D.C. to Maine, the winter of 2013 - 2014 delivered some of the coldest sustained temperatures in years. The headline-grabbing "Polar Vortex" followed in the wake of the historically hot summer of 2012, continuing a trend of extreme weather and storms that have battered the region. For many of the area's 50+ million residents, the challenging winter served as a further reminder of the complex operating environment facing Northeast water utilities.

With some of the oldest and largest systems in the nation, time in and of itself is an enemy to ensuring the Northeast's critical water services. As systems age and become more fragile, their weaknesses can be exposed by frigid temperatures through ruptured pipes and mains. As many homeowners know, a ruptured water pipe is a problem. A ruptured pipe buried underground or behind a wall, is a BIG problem. But, a broken pipe buried under the busiest streets of Washington D.C., Philadelphia, Boston or Manhattan represents an entirely different challenge.

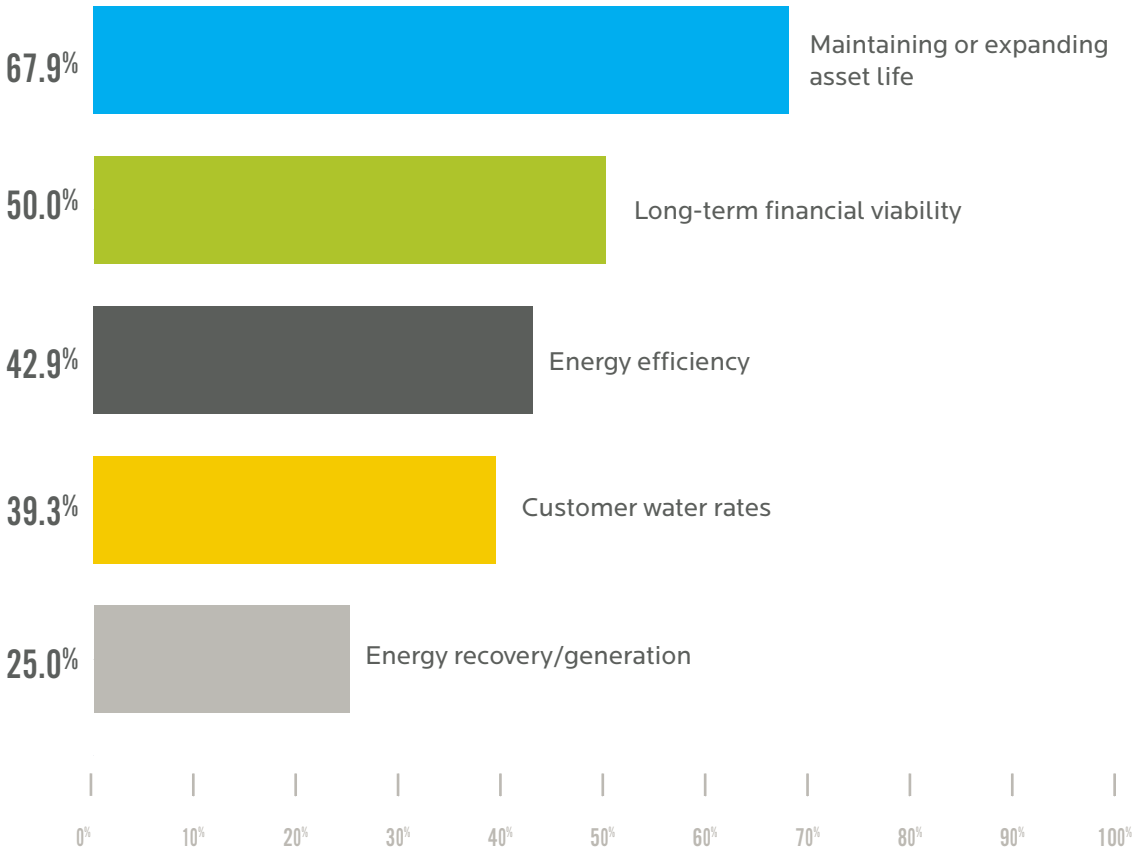
Unfortunately, the financial realities facing many water utilities prevent the rapid deployment of capital to upgrade water systems. Among survey respondents, maintaining or expanding asset life was the number one sustainability issue identified by Northeast respondents (Figure 18).

As memories of winter fade, regional water utilities find themselves preparing for the flip side of the climate coin. Increasingly warm summer temperatures are creating a different set of operating challenges, including the need to manage through strong weather events in high population zones.

The double impact of Hurricane Irene (2011) and, particularly, Hurricane Sandy (2012) accelerated regional action to address challenges caused by flooding. With more than 50 million residents living in the coastal megalopolis, flood protection and structural resiliency against flooding has become a central focus of capital spending. Solutions for key issues that were not anticipated decades ago are now under review as system vulnerabilities become more clear.

For example, Hurricane Sandy exposed the fundamental challenge of locating wastewater facilities in coastal flood zones. Many of the plants in the New York/New Jersey metropolitan area were impacted in some way by water surges that backed up outflow routes, overwhelmed pumps or exceeded plant treatment capabilities. Given the function and key role of gravity in discharging treated water, moving a wastewater treatment plant away from a water source is not feasible. Now, some operators are looking at how to balance the costs of new floodwalls and elevating critical equipment above floodplains to harden assets and improve resiliency.

FIGURE 18
MOST SIGNIFICANT SUSTAINABILITY ISSUES – NORTHEAST REGION



Source: Black & Veatch
Respondents were asked to select the three most significant sustainability issues for their utility from a broad list of items. This chart highlights the five issues selected most among all respondents serving the Northeast region.

COMPREHENSIVE RESILIENCY PLANNING

In the wake of major climate events, the pressure on elected officials and water utility executives to take preventive action is significant. In these moments it is critical to take a holistic approach to managing resiliency planning. For example, floodwalls and barriers can be a workable solution, but only as part of an integrated plan, as each measure has corresponding impacts on their surroundings.

Highlighting a comprehensive approach to resiliency planning is the groundbreaking New York City Special Initiative for Rebuilding and Resiliency. Released in June 2013, the report was created by a task force charged with developing a long-term focus on preparing for and protecting against the impacts of climate change to increase the resilience of infrastructure and buildings citywide. Black & Veatch experts worked with the task force to help officials view the potential impacts of storms on water, wastewater, power, telecommunications and other forms of infrastructure.

Finding the balance between moving quickly while being deliberative is essential to developing a forward-looking resiliency plan. In an era where even the largest system operators are limited by budget constraints, risk-based assessments and planning help build resiliency through replacing, fixing, investing in the areas of greatest need and at greatest risk of failure.

SOUTHEAST PERSPECTIVE: PREPARE FOR DISRUPTIONS WITH MORE RESILIENT SYSTEMS

BY **RAFAEL FRIAS**

Water utilities in the Southeast face a dizzying array of challenges. Hurricanes, water scarcity, population growth and looming federal and/or state regulations concerning water effluent quality, are top-of-mind among industry leaders within the region. Failure to address these threats can directly impact a water utility's financial standing, customer relations, and ability to provide safe and reliable service.

Aesop's *The Grasshopper and the Ant* fable highlights the virtues of preparing for the future. Just as the ant and the grasshopper both knew winter was coming, water industry leaders in the Southeast know stricter water effluent regulations are forthcoming. We know every tropical depression that forms in the Caribbean between mid-May and November has the potential to become the next hurricane capable of wreaking havoc on communities and infrastructure. We also know our available freshwater supply is shrinking.

What is not known is *when* these disruptions will occur, so it is critical to begin preparing by building more resilient operations. Perhaps herein reveals the greater challenge: convincing a skeptical public and hesitant elected officials that rate increases are necessary to ensure the sustainability of water supplies and a utility's ability to quickly recover from natural and/or man-made disasters. For utilities that rely on city council approval for rate adjustments to finance needed improvements, leaders must do what they can to educate city leaders and their constituents on the true value and cost of delivering fresh drinking water, and the risks that come with not making necessary investments.

TWO PROBLEMS – ONE SOLUTION

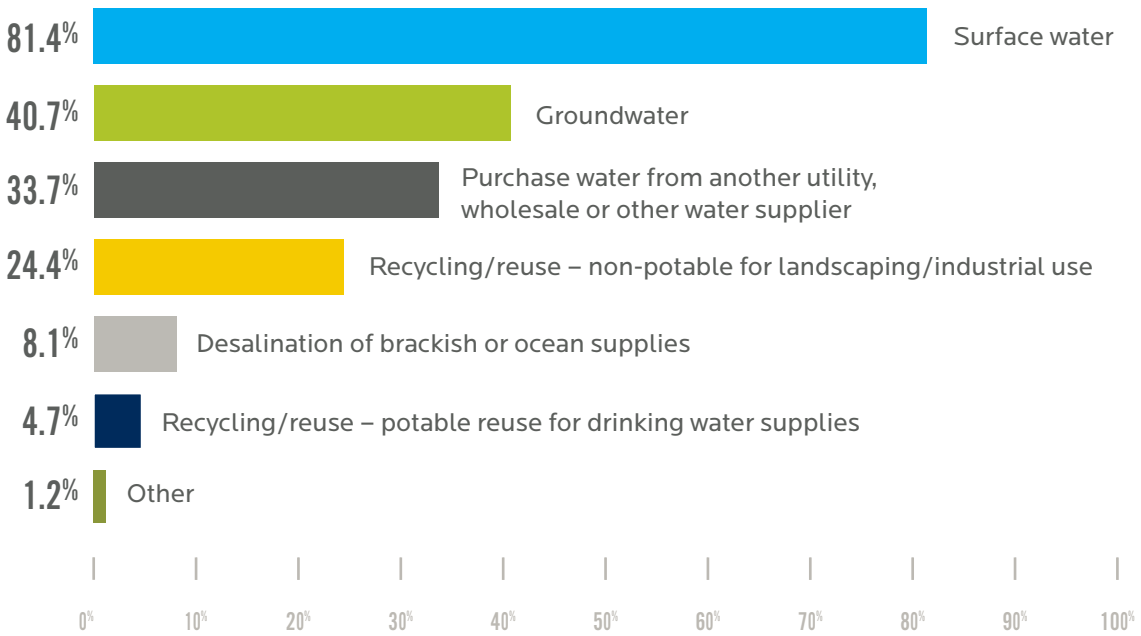
The concentration of nutrients within water effluent is an important issue impacting utility capital spending and overall environmental quality. The U.S. Environmental Protection Agency (EPA) has mandated a numeric criterion be developed to reduce nutrient concentrations within the Gulf of Mexico. Currently, each state is responsible for developing these criteria, although the EPA will step in if a state or states fail to do so.

Nutrient criteria will affect all utilities in the region that treat wastewater and return it to water sources. Utilities can begin working in advance to address this issue by assessing current effluent concentration as well as various advanced treatment processes needed to reach anticipated concentration goals.

At the same time, the availability of water is becoming a much sharper area of focus as a result of drought, saltwater intrusion and overall availability. Highlighting this issue was the "water war" between Alabama, Georgia and Florida that raged within the federal court system for more than 20 years. The tri-state dispute started in 1990 when Alabama and Florida filed separate federal suits against the U.S. Army Corps of Engineers and Georgia challenging the Corps authority to reallocate water supply from Lake Lanier to the Atlanta region. In 2011, a federal appeals court confirmed the Corps authority to regulate Lake Lanier for Atlanta's water supply.

Advanced water treatment programs to meet nutrient regulations can help the region address its water scarcity issues. Water reuse or water recycling is a proven solution and an area of opportunity. Currently, less than 5 percent of utilities in the region use reclaimed water for drinking water supply (Figure 19). Utility leaders should consider the possibilities of harnessing this highly treated water resource for aquifer and/or groundwater recharge.

FIGURE 19
CURRENT SOURCES OF WATER — SOUTHEAST REGION



Source: Black & Veatch
Respondents were asked to identify all water supply sources available/used by their utility. This chart represents responses from survey participants serving the Southeast region.

PLAN THE WORK, WORK THE PLAN

Implementing best practice asset management frameworks is the first step for any utility, regardless of location, to begin the transformation from a reactive organization to a proactive one. Asset management programs provide utility leaders with the information and metrics needed to justify necessary rate adjustments (refer to *Top Water Infrastructure Issues Solved through Asset Management* analysis).

Through an asset management program, comprehensive plans can be developed that are based on the assets the utility currently has, current condition of assets and the capabilities of each. For the Southeast utilities, these plans must include integrated water resources management as well as preparations for enhanced nutrient removal. Technology master plans should also be developed in order to adopt automated processes that can help further reduce operational and labor expenses and increase efficiencies.

From water supply issues to storms, drought and other climate effects, Southeast water utilities have long been affected by challenging operating conditions. Yet, a key benefit of what has become an extended period of hardship is hindsight. Utilities in the Southeast are perhaps best positioned to apply lessons learned not just at home, but from abroad as they embark on proactive planning campaigns. To prepare for the future, these lessons must be applied now.

MIDWEST PERSPECTIVE: HOLISTIC APPROACH BEST FOR CAPITAL PROGRAMS

BY **BRUCE ALLENDER**

"What's the best way to eat an elephant? One bite at a time." This age-old adage is often cited by business, organizational and industrial leaders when determining the best way to tackle overwhelming challenges. For Midwestern water utilities, however, a one bite at a time approach will not help them catch up to the tremendous capital program needs brought on by:

- Years, and sometimes decades, of deferred maintenance;
- Environmental compliance programs, specifically stormwater runoff and/or combined sewer overflow reduction programs; and
- A need to add resiliency to infrastructure and water supply in a region prone to severe drought and flooding (many Midwest cities have experienced both during the last 10 years).

Addressing the full scale of a water utility's infrastructure needs will likely take decades. This is particularly true for communities whose infrastructure challenges include all of the previously listed items. The sheer scale and longevity of such programs underscores the need for best practice asset management. Black & Veatch's work as part of the Asset Management Alliance supporting Welsh Water for the past 15 years demonstrates the payback of such programs over time.

Welsh Water is one of 10 regulated water and sewerage companies in England and Wales, serving more than 3 million people. Over the course of a 15-year, $650 million capital improvement program, Welsh Water was able to reduce overall capital expenditures by 20 percent and its operating costs by 10 percent while still maintaining its level of service to its customers. Welsh Water was able to achieve this using the PAS 55 framework (refer to *History and Description of Infrastructure Asset Management Frameworks* for more information).

FINANCING THE CHALLENGE

Formal asset management frameworks are proven methods for reducing overall utility costs and enhancing services. However, the best asset management practices cannot erase the massive capital needs of our utility systems. Public officials are understandably concerned with creating a greater financial burden for their constituents. Some argue that water is free because it falls from the sky and is a basic human need. What these arguments fail to mention is that providing and maintaining the delivery of clean, safe and reliable water and wastewater services is a high-cost undertaking.

Community leaders and their constituents must understand that rates must rise in order to make the needed investments in their water and wastewater systems. How much and how fast rate increases happen depends squarely on the condition of the system and the willingness of the community and utility leadership to explore different management and financing mechanisms. Specifically, utility and city leaders should rethink how they finance large-scale deferred maintenance needs in a manner that minimizes rate impacts to customers.

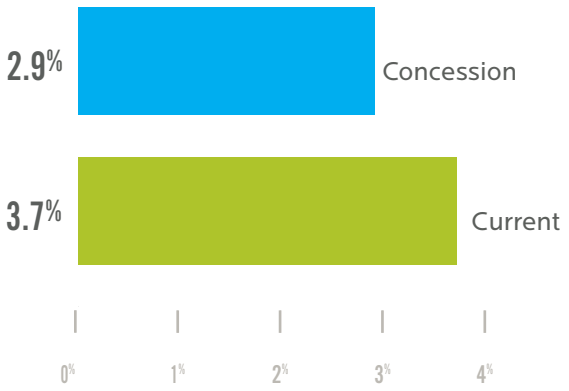
Private sector capital, through the form of a public-private partnership (PPP), can come in many forms, with many different arrangements. A common challenge for PPPs, however, is the overall "cost of money" from the private sector versus the cost of municipal bonds, the preferred

choice of municipal leaders. At first glance, the difference can be significant: typically 3 to 5 percent interest for municipal bonds versus a weighted average cost of capital between 7 and 9 percent from the private sector.

The difference in the cost of money often ends discussions of PPPs before a thorough analysis of potential benefits can take place. However, utility and community leaders should look beyond the cost of money and look at "value for money." A life cycle cost analysis will enable utility leaders to consider the best approach for a capital program and assess the near- and long-term impacts to rates (Figure 20).

In addition to examining new financing methods, utilities should also try to match financing timelines to system needs and consider a generational payback period. Generational payback periods can provide rate relief to current customers and evenly distribute the financial burden of capital program spending among all who will ultimately benefit from the service.

FIGURE 20
COMPARISON OF FORECASTED AVERAGE ANNUAL RATE INCREASES FOR LARGE MUNICIPAL UTILITY



Source: Black & Veatch
This chart provides a comparison of the average annual rate increase customers of a large municipal water utility would have over the life of a concession agreement versus current operations and CIP financing methods. The analysis examined the total revenue requirement of the system in order to address regulatory requirements, deferred maintenance needs and costs associated with day-to-day operations and maintenance.

BUILDING IN RESILIENCY

The longer communities wait to address their aging infrastructure systems, the greater the issue and burden becomes. Unlike Midwestern residents, century-old pipes simply cannot become accustomed to the wide variety of extreme weather experienced within any given timeframe.

In 2013, the state of Kansas became the first state to have declared disaster zones as a result of flooding (in the east) and drought (in the west). In the last 10 years, the Missouri River has had two significant floods, in 2008 and 2011, and dramatically reduced water levels as a result of drought. Severe drought in 2012 threatened to close the Mississippi River to barge traffic. Addressing the aging infrastructure challenge at the same time utilities work to meet environmental regulations provides the opportunity to build in resiliency to the system to meet the new normal in weather and climate for the region.

Without question, balancing the conflicting demands of a community is a significant challenge for local elected official and utility leaders. The critical condition of many water and wastewater system assets coupled with financially constrained ratepayers is a huge hurdle to overcome. Yet, opportunities to challenge the status quo and explore proven best practices from around the world could be the solution to improve our water and wastewater infrastructure.

SOUTHWEST PERSPECTIVE: TECHNOLOGY'S ROLE IN OVERCOMING WATER SCARCITY

BY **KEVIN CORNISH**

Perennial water scarcity issues in the Southwest and South Central United States have fundamentally changed how water is viewed, managed and used. Increasingly, competing interests often erupt between agricultural, community and environmental water needs – all of which cannot be satisfied with limited water resources. Additionally, there are no new freshwater resources to tap, highlighting the urgency for enhanced conservation programs.

While the entire solution set for overcoming water scarcity challenges is multifaceted, utilities within the region are increasingly using available technologies to improve water management. Specifically, technology programs provide utilities with improved metering information, the ability to monitor water rationing, provide utility and customer-side leak detection, and support customer education and conservation programs.

The following provides a high-level overview of technology-enabled programs and how each can support greater levels of water conservation and management.

ADVANCED METERING INFRASTRUCTURE

Advanced metering infrastructure (AMI) is a solution that not only improves operational efficiency, reduces ongoing expenses and improves customer service, but also provides the utility and end-use consumers alike with significantly more information on which to make decisions. Beyond the current industry practice of only colleting monthly or bi-monthly water meter reads, there are currently a large number of water users in California's Sacramento Valley that do not even have water meters. Without the ability to measure consumption at a level of refinement and timeliness, it is difficult for water providers to know where conservation efforts should be focused and/or the success of each program.

Information contained from AMI meters can be aggregated to provide time-synchronized system flow information. Custody transfer meters and large C&I meters can be monitored continuously, eliminating potential for catastrophic failures or surprises. Meter flow for residential customers can be used to identify potential leak conditions on the customer side of the meter. This capability enables the utility to alert customers of a potential leak, thereby reducing wasted freshwater resources and unexpectedly high water bills.

Increased data from AMI meters also support development of advanced rate methodologies, such as time-of-use programs. Time-of-use rates help to inform customers and create incentives to shift water usage to more efficient periods. This can be especially useful for utilities that purchase power from entities that also charge premiums during high-demand periods.

CUSTOMER ENGAGEMENT

Customer engagement strategies are critical components of utility efforts to improve water understanding and conservation. Without customers actively changing how and when they use water, conservation efforts will not be as successful as they should. As with most utility commodities, customers rarely understand what a cubic foot of water looks like, or when news reports refer to an acre-foot.

Leveraging AMI data to provide consumers with daily — and even hourly — water consumption provides improved understanding of water use. Residential customers can see when sprinklers water in the early morning, how much water it really takes to fill up the hot tub and more. Studies have repeatedly shown that greater customer understanding and information on water use leads to reduced water use.

LEAK DETECTION

A critical component of an integrated water loss management approach is leak detection. All water systems have leaks; many exist for long periods of time but go unnoticed underground. The challenge for utilities is identifying, locating and focusing on the more impactful leaks with the limited capital infrastructure budget that exists.

Advanced acoustic leak detection systems that triangulate and locate leaks provide accurate and reliable leak information on which to act. Reducing water loss contributes not only to conservation but improves operating efficiency and may even delay significant utility water processing facility upgrades.

WATER REUSE OR RECYCLING

Technology enables water quality monitoring and real-time system flow information from SCADA and AMI systems. This information can be used by utilities to create programs and target infrastructure investment in the area of water reuse.

While water reuse is a well-used tactic by larger commercial and industrial customers, few cities have taken advantage of this resource to create a utility-managed recycled water program. The city of Santa Rosa, California, and Global Water properties in the Phoenix, Arizona area are excellent U.S. examples of developing a comprehensive, utility-managed recycled water system.

Currently, less than 20 percent of utilities in the Southwest region reuse water to supplement drinking water supplies (Figure 21). As demand grows, reuse must also grow within the region.

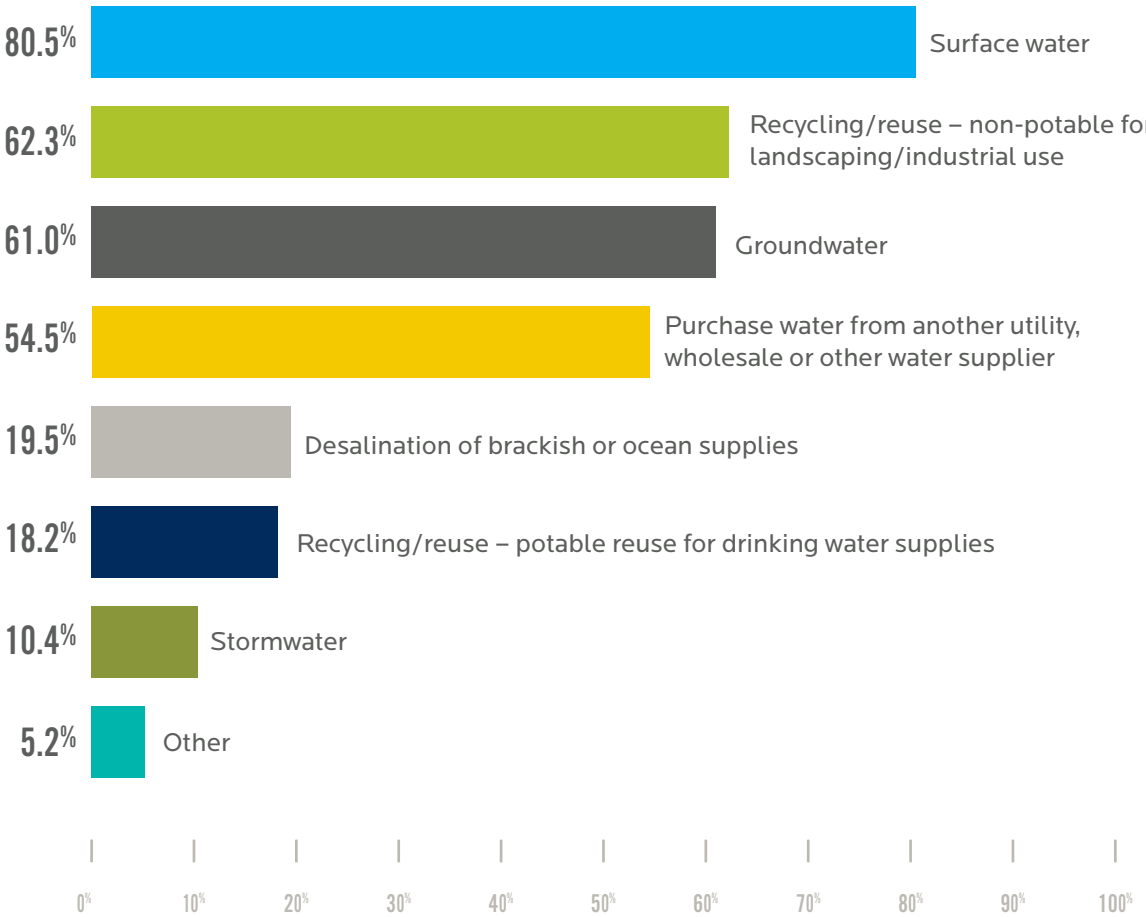
ENERGY EFFICIENCY

Electric energy use is a significant component of operating costs for all utilities for the production, treatment, pumping, storage and delivery of water. This is especially true for utilities in the West and South Central United States where water is sometimes pumped hundreds of miles from source to consumer.

There are two ways to lower utility energy costs: implementing off-peak pumping programs and reducing the need to use energy. Conservation and/or loss reduction programs reduce the amount of water that is treated and pumped through a system.

System monitoring capabilities enable utilities to determine the amount of current water storage, forecasted water use, and the impact of deferring pumping to off-peak periods. By deferring pumping, water utilities can take advantage of very favorable time-of-use rates and curtailment options from their local electric utilities. In addition, given that energy production is a water-intensive activity, saving energy also helps save water.

FIGURE 21
CURRENT SOURCES OF WATER – SOUTHWEST REGION



Source: Black & Veatch
Respondents were asked to identify all water supply sources available/used by their utility. This chart represents responses from utilities serving the Southwest region.

TECHNOLOGY AND DATA ANALYTICS CAN HELP UTILITIES AND CUSTOMERS BETTER MANAGE PRECIOUS WATER SUPPLIES.

STRATEGIC DIRECTION FOR U.S. WATER UTILITIES

BY **CINDY WALLIS-LAGE**

At the macro level, solutions to widespread water industry challenges seem simple: invest more in infrastructure, save more water, keep customers happy. But, as this report shows, when it comes to individual communities making difficult choices between raising customer rates and meeting operating budgets; or states deciding between fish, people and agriculture for scarce water resources, clear-cut solutions can be difficult to ascertain.

Identifying actionable plans that balance competing interests, such as water allocation, rate affordability and necessary investment requires an all-encompassing approach. For this reason, Black & Veatch continues to advocate the adoption of best practice asset management programs.

Frameworks, such as the new ISO:55000 series, provide proven standards and methods for utilities to develop their customized blueprint for achieving desired organizational goals. For utility leaders struggling to justify expenses and rate adjustments, risk-based planning provides essential data. This includes the information needed to educate decision-makers on why investment is needed and the potential risks associated with continued deferred maintenance programs.

Information-based decision-making is also becoming the norm for Smart Water Utilities as they move toward a Smart Integrated Infrastructure paradigm. System data should underpin everything because advances in information capture and analysis can provide major cost benefits in terms of how a utility or a specific asset is managed. While there are still barriers to entry for smaller organizations based on cost, it is imperative to note that advances in cloud-based services and telecommunications networks are quickly leveling the playing field between large and small utilities. Information systems once out of reach for a host of reasons can be integrated with few hurdles.

Greater access to information is a powerful tool for both the utility and its customers. Utilities can use information to identify, detect and repair problems before they

become potentially catastrophic asset failures. In regions suffering from sustained and severe drought conditions, information can help enforce water rationing and monitor usage, as well as quickly identify resource-wasting leaks. Customers who have access to information regarding their water usage are empowered to change water use behaviors, similar to demand side management developments and new consumer tools impacting the electric industry.

Even as utilities work to introduce advanced metering infrastructure (AMI) or other significant capital programs, the adoption, implementation and strict adherence to best practice asset management frameworks can help guide a utility through current and future challenges. In an era when utilities must leverage every opportunity for efficiency, justify every dollar spent and conserve as much water as possible, there really is no substitute for good asset management practices.

Asset management programs are also powerful management practices for optimizing capital spending. Prioritization of need enables utilities to make investment decisions based on actual asset condition and can help reduce overall capital spending requirements. Beyond efficiencies gained, however, lies the inherent need to invest in large-scale repair and replacement, environmental compliance and water resource programs.

How utilities choose to implement capital programs will affect current ratepayers and future generations, as well as the utility's ability to continue to meet community needs in the future. Implementing new financing mechanisms can be challenging within any community. Private financial firms and/or design-build, or EPC (engineering, procurement and construction) service providers must demonstrate value in any proposed alternative solutions, particularly value to the ratepayers. At the same time, utility and municipal leaders should thoroughly examine side-by-side comparisons of current financing mechanisms against proposed solutions.

If information derived from the use of asset management programs can help utilities improve performance and reduce costs, this same information can be leveraged to change customer behavior. Water conservation requires widespread customer engagement and access to information in order to achieve optimal results.

Conservation is an important and valuable endeavor for all utilities, including those in seemingly "water rich" regions. The least expensive drop of water is the drop of water not used. When consumers use less water, utilities pump less through the system, process less water and generally spend less within the overall operations and maintenance of the system. At the same time, customer understanding of the true value of water and the costs associated with providing even that first drop is critical to gaining acceptance to rate-impacting capital improvement programs.

There are many opportunities to deploy innovative technology solutions to address industry water infrastructure needs. However, innovation for the sake of innovation is not ideal for utilities or their ratepayers. Utilities need solutions that make sense to their triple bottom line, accounting for a community's unique financial, social and environmental needs. However, utilities that make innovative technological and capital investment choices based on proven asset management principles have chosen the path of strategic and purposeful direction toward becoming a Smart Water Utility.

BUILDING A WORLD OF DIFFERENCE®

Black & Veatch is an employee-owned, global leader in building Critical Human Infrastructure™ in Energy, Water, Telecommunications and Government Services. Since 1915, we have helped our clients improve the lives of people in over 100 countries through consulting, engineering, construction, operations and program management. Our revenues in 2013 were US $3.6 billion. Follow us on www.bv.com and in social media.

BLACK & VEATCH
11401 Lamar Avenue, Overland Park, KS 66211
P +1 913-458-2000 | **E** MediaInfo@bv.com | **W** bv.com

BLACK & VEATCH
Building a world of difference.®

50 LARGEST CITIES WATER/WASTEWATER RATE SURVEY

A BLACK & VEATCH 2012/2013 REPORT

BLACK & VEATCH
Building a world of difference.®


BLACK & VEATCH
Building a world of difference.

TABLE OF CONTENTS

EXECUTIVE SUMMARY **4**

Average Residential Typical Bills Continue to See Upward Pressure 4

Key Factors Driving Typical Bills Up 6

A B&V Management Consulting Survey

TYPICAL MONTHLY WATER AND WASTEWATER BILLS **8**

Residential Customers – *No Billable Water Usage* 8

Residential Customers – *3,750 Gallons Billable Water Usage* 10

Residential Customers – *7,500 Gallons Billable Water Usage* 12

Residential Customers – *15,000 Gallons Billable Water Usage* 14

Commercial Customers – *100,000 Gallons Billable Water Usage* 16

Industrial Customers – *10,000,000 Gallons Billable Water Usage* 18

50 LARGEST CITIES TRENDING **20**

Residential Typical Bill – *No Billable Usage* 20

Residential Typical Bill – *3,750 Gallons Billable Usage* 21

Residential Typical Bill – *7,500 Gallons Billable Usage* 22

Residential Typical Bill – *15,000 Gallons Billable Usage* 23

Commercial Typical Bill – *100,000 Gallons Billable Usage* 24

Industrial Typical Bill – *10,000,000 Gallons Billable Usage* 25

FOOTNOTES **26**

EXECUTIVE SUMMARY

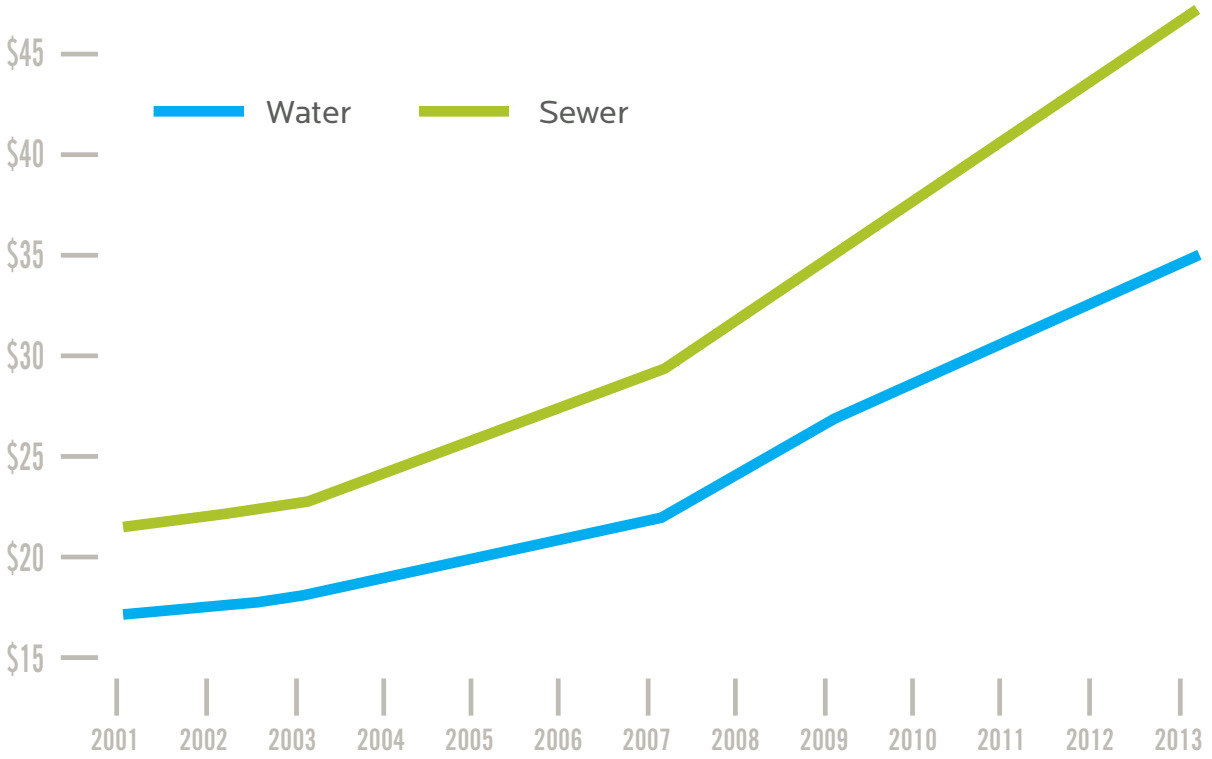
This survey of water and sewer rates is provided by Black & Veatch Management Consulting as a service to the water and sewer industry. A typical bill has been calculated for various residential, commercial and industrial user profiles, focusing on the top 50 cities as determined by population. This year, we have included a minimum bill or zero usage typical bill as part of the survey. The specific cities included in the survey have changed over time as warranted by population shifts in some communities. Since 2001 Black & Veatch Management Consulting has produced 6 surveys. The results of the 2013 survey reflect rates in effect as of April 2, 2013.

AVERAGE RESIDENTIAL TYPICAL BILLS CONTINUE TO SEE UPWARD PRESSURE

Since 2001, the typical bills for a residential user consuming 7,500 gallons per month (1,000 cubic feet) have increased at a rate of over two and a half times the rate of increase in the consumer price index, defined as the Bureau of Labor Statistics CPI U average annual index.

Figure 1 illustrates the trend in the average typical bill for a resident consuming 7,500 gallons per month across all top 50 cities since the 2001 survey. Note that in most regions the actual dollar impact on consumers tends to be slightly less than these figures as a result of ongoing reductions in water consumption.

FIGURE 1
RESIDENTIAL 7,500 GALLONS TREND

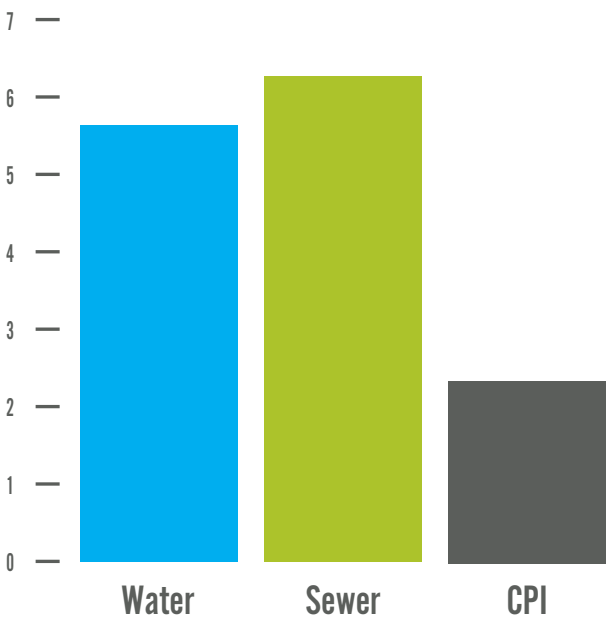


*Survey Results for these years are extrapolated based on the average of the preceding and following year.

Figure 2 demonstrates that the compound average annual increase in residential water typical bills is approximately 5.6% from 2001 through the first quarter of 2013. For residential sewer typical bills, the compound average increase is approximately 6.1%. The CPI-U average rate of change over the same timeframe is approximately 2.4%.

Over the past 12 years, the minimum residential bill for water customers (zero usage) has increased at a rate of 5.6% while the corresponding sewer bill has increased more than 20.1%. The higher sewer minimum bill reflects the institution of sewer system customer charges or minimum bills in addition to charges for water service in many locations, as well as a continuing trend among the 50 largest cities to institute a variety of rate changes to manage revenue volatility due to declining consumption.

FIGURE 2
COMPOUND ANNUAL INCREASE IN SURVEYED TYPICAL BILLS 2001-2013



EXECUTIVE SUMMARY

KEY FACTORS DRIVING TYPICAL BILLS UP

Several of the dynamics impacting the increasing trend of water and sewer typical bills include:

- Economic Downturn. The impacts of the aftermath of the financial crisis of 2008 are still being felt by agencies across the United States. Reductions in economic activity have directly translated into reductions in sales volumes in many communities as plants have closed or reduced the number of shifts being worked. Further, managers at many utilities were surprised to realize the extent to which they were relying on cash flow from expansion of their customer base. The elimination or dramatic reduction in growth has emphasized the critical importance of fully recovering costs through user charges to existing customers.
- Commodity Price Increases. Particularly in the areas of electricity, chemicals, and fuel. Inflationary pressure on natural gas has abated somewhat since 2010, but still remains volatile.
- Lower Consumption and Higher Fixed Costs. Drought conditions in many of areas of the country serves to only highlight that per capita consumption levels are at their lowest levels since the 1950s. Finding solutions to deal with declining consumption in an industry where fixed costs may be as high as 90% remains an on-going challenge.
- Influence of Wastewater Consent Decrees. Significant capital programs are being implemented in most major cities to comply with consent decrees regarding the performance of wastewater systems.
- Aging Infrastructure. Rehabilitation and replacement of aging infrastructure remains a significant liability for most water and sewer utilities. Funding this liability will undoubtedly create additional inflationary pressure for the foreseeable future.
- Lack of Capital Funding. Further hampering the ability to re-invest in water and sewer assets is the lack of available, low-cost funding. Tightening financing requirements for long-term debt are changing how utilities look at prioritizing capital needs, manage cash reserves, and plan for rate increases.
- Recognizing the Value of Water and Wastewater. Increased public outreach is helping consumers understand the true value they receive from their water and sewer utilities. As seen in Figure 3, the increase in the average water and sewer bill since 2001 is significantly less than the increases seen in the typical bundled cable, mobile phone, and energy bills.

2012/2013 SURVEY BY THE NUMBERS

89%
MONTHLY RESIDENTIAL BILLS

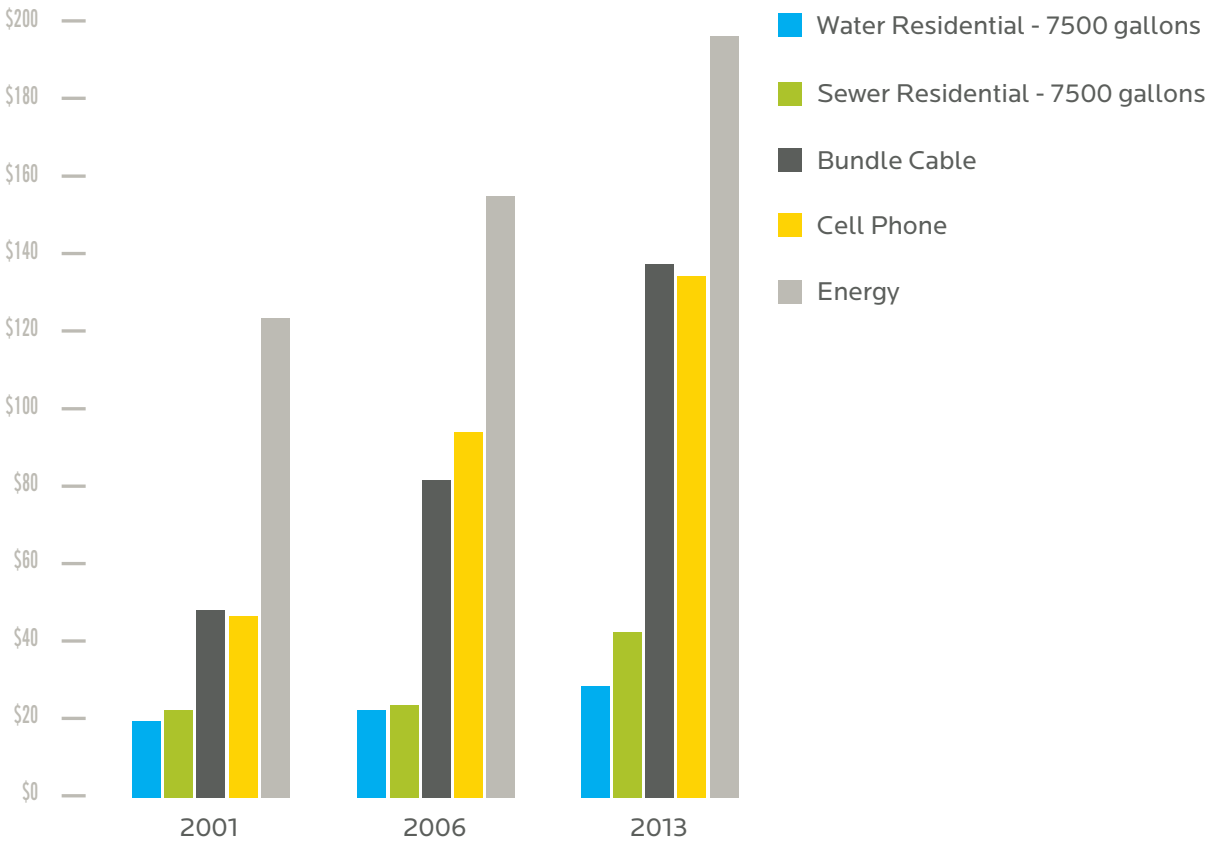
13%
SEASONAL WATER RATES

21%
UNIFORM WATER RATES

36.5%
OTHER CHARGES ON BILL

13%
SEWER RATES BASED ON ACTUAL WATER USE

FIGURE 3
TRENDS IN AVERAGE MONTHLY UTILITY BILLS



According to US Census data, the national median household income in 2011 was just over $50,000. Applying the average CPI-U increase and looking at the USEPA's affordability guidelines of 2% (water) and 2.5% (sewer) of median income, we see that the affordability threshold is about $80/month for water and $100/month for sewer for 2012/2013. Recognizing that the realities of local economic conditions vary widely within every service area, let alone between service areas, and that many utilities and organizations are working to improve USEPA's affordability guidelines, it is still true that taken nationally, current typical bills are still significantly less than current USEPA affordability threshold levels.

A B&V MANAGEMENT CONSULTING SURVEY

Should you have any questions regarding this survey, need additional copies, or if you would like to speak with us regarding innovative ways to address the financial and strategic challenges specific to your utility, please visit our website at **www.bv.com**, call us **(949) 302 – 6017**, or email your inquiry to us at **BuiAT@bv.com**.

TYPICAL MONTHLY BILLS

TYPICAL MONTHLY WATER AND WASTEWATER BILLS: RESIDENTIAL CUSTOMERS – NO BILLABLE WATER USAGE
RANKED FROM LOWEST (1) TO HIGHEST (50)

Community	Water	Rank	Sewer	Rank	Combined	Rank
	($)		($)		($)	
Albuquerque (a)	11.80	38	7.86	25	19.66	31
Arlington	8.57	28	8.05	26	16.62	26
Atlanta	6.56	18	6.56	20	13.12	20
Austin (b)	9.10	29	10.00	29	19.10	29
Baltimore (c)	10.66	34	14.33	38	24.99	35
Boston	0.00	1	0.00	1	0.00	1
Charlotte	2.41	5	4.56	13	6.97	6
Chicago (d)	0.00	1	0.00	1	0.00	1
Cleveland	7.00	20	2.10	7	9.10	11
Colorado Springs (e)	14.13	44	15.28	39	29.41	39
Columbus (f)	7.27	21	6.69	21	13.96	23
Dallas	4.40	10	4.20	11	8.60	9
Denver (g)	6.33	17	8.90	27	15.23	25
Detroit (h)	5.28	14	4.82	14	10.10	13
El Paso (i)	11.57	36	10.93	31	22.50	34
Fort Worth (j)	7.50	23	5.10	15	12.60	19
Fresno (k)	14.55	45	25.75	46	40.30	47
Houston (l)	4.73	13	10.05	30	14.78	24
Indianapolis	9.63	30	7.72	24	17.35	27
Jacksonville (m)	12.60	40	14.10	36	26.70	37
Kansas City	10.85	35	11.55	33	22.40	33
Las Vegas (n)	15.10	47	18.41	41	33.51	41
Long Beach (o)	12.54	39	20.17	43	32.71	40
Los Angeles (p)	0.00	1	0.00	1	0.00	1
Louisville (q)	8.48	26	25.75	46	34.23	43
Memphis	8.48	26	0.00	1	8.48	8
Mesa (r)	20.73	50	14.11	37	34.84	45
Miami	3.20	7	3.25	10	6.45	5
Milwaukee (s)	6.76	19	5.14	16	11.90	17
Minneapolis	2.00	4	3.00	8	5.00	4

Community	Water	Rank	Sewer	Rank	Combined	Rank
Nashville	3.13	6	7.62	23	10.75	15
New York (t)	13.80	43	21.94	44	35.74	46
Oakland (u)	13.37	41	42.43	50	55.80	49
Oklahoma City	10.55	33	3.01	9	13.56	22
Omaha (v)	15.08	46	18.54	42	33.62	42
Philadelphia	6.12	16	6.30	19	12.42	18
Phoenix (w)	4.36	9	5.50	17	9.86	12
Portland (x)	10.04	31	0.53	6	10.57	14
Raleigh	5.81	15	5.81	18	11.62	16
Sacramento (y)	20.16	49	41.10	49	61.26	50
San Antonio (z)	7.31	22	11.54	32	18.85	28
San Diego (aa)	19.33	48	15.33	40	34.66	44
San Francisco (aa)	7.90	24	0.00	1	7.90	7
San Jose (bb)	10.44	32	33.83	48	44.27	48
Seattle (cc)	13.50	42	11.65	34	25.15	36
Tucson (dd)	8.27	25	11.86	35	20.13	32
Tulsa	4.50	12	4.50	12	9.00	10
Virginia Beach (ee)	4.41	11	24.86	45	29.27	38
Washington, D.C. (ff)	3.86	8	9.57	28	13.43	21
Wichita	11.62	37	7.52	22	19.14	30
Average	**8.72**		**11.04**		**19.75**	
Median	**8.38**		**7.96**		**15.93**	

Assumes 0 gallons (or 0 cubic feet) monthly usage and a 5/8" (or nearest equivalent) meter size. Actual average use will vary by utility. Rates effective April 2, 2013.

TYPICAL MONTHLY BILLS

TYPICAL MONTHLY WATER AND WASTEWATER BILLS
RESIDENTIAL CUSTOMERS – 3,750 GALLONS BILLABLE WATER USAGE
RANKED FROM LOWEST (1) TO HIGHEST (50)

Community	Water	Rank	Sewer	Rank	Combined	Rank
	$		$		$	
Albuquerque (a)	19.58	28	13.93	7	33.50	10
Arlington	14.95	10	20.54	18	35.48	13
Atlanta	24.98	42	63.06	50	88.04	49
Austin (b)	14.95	11	34.23	41	49.18	34
Baltimore (c)	15.99	14	21.50	21	37.48	19
Boston	22.25	35	28.81	34	51.06	35
Charlotte	8.95	5	26.16	30	35.11	12
Chicago (d)	10.78	7	9.92	3	20.70	4
Cleveland	18.95	26	29.83	35	48.77	33
Colorado Springs (e)	29.68	46	27.58	32	57.26	40
Columbus (f)	20.25	30	25.29	28	45.54	31
Dallas	11.04	8	22.20	25	33.24	9
Denver (g)	16.04	15	12.19	5	28.23	7
Detroit (h)	5.28	2	4.82	1	10.10	1
El Paso (i)	13.13	9	12.31	6	25.44	6
Fort Worth (j)	17.35	18	19.35	17	36.70	16
Fresno (k)	17.59	20	25.75	29	43.34	27
Houston (l)	19.11	27	21.30	20	40.41	24
Indianapolis	23.23	38	21.12	19	44.35	28
Jacksonville (m)	17.48	19	34.01	40	51.49	37
Kansas City	29.20	45	30.65	37	59.85	41
Las Vegas (n)	20.59	32	18.41	14	39.00	22
Long Beach (o)	23.52	39	21.90	23	45.42	30
Los Angeles (p)	18.58	24	17.99	11	36.57	15
Louisville (q)	17.83	22	37.00	42	54.83	38
Memphis	7.37	4	6.36	2	13.73	2
Mesa (r)	22.68	37	16.32	9	39.00	21
Miami	5.10	1	10.23	4	15.33	3
Milwaukee (s)	15.16	12	25.04	27	40.20	23
Minneapolis	18.45	23	18.70	16	37.15	18

Community	Water	Rank	Sewer	Rank	Combined	Rank
Nashville	10.12	6	21.84	22	31.96	8
New York (t)	30.75	48	48.89	48	79.64	48
Oakland (u)	25.47	43	45.75	47	71.22	46
Oklahoma City	20.11	29	16.70	10	36.81	17
Omaha (v)	20.32	31	26.53	31	46.85	32
Philadelphia	23.94	40	18.67	15	42.61	26
Phoenix (w)	6.26	3	14.77	8	21.03	5
Portland (x)	26.65	44	41.53	45	68.17	44
Raleigh	18.73	25	22.56	26	41.29	25
Sacramento (y)	24.28	41	41.10	43	65.38	43
San Antonio (z)	16.20	16	18.41	13	34.61	11
San Diego (aa)	37.39	50	33.32	38	70.71	45
San Francisco (aa)	30.00	47	42.62	46	72.62	47
San Jose (bb)	22.32	36	33.83	39	56.15	39
Seattle (cc)	36.38	49	58.25	49	94.63	50
Tucson (dd)	16.72	17	27.88	33	44.60	29
Tulsa	15.64	13	22.16	24	37.80	20
Virginia Beach (ee)	20.95	33	41.31	44	62.26	42
Washington, D.C. (ff)	20.96	34	30.47	36	51.43	36
Wichita	17.73	21	18.32	12	36.05	14
Average	**19.22**		**26.03**		**45.25**	
Median	**18.84**		**22.38**		**41.95**	

Note: Assumes 3,750 gallons (or 500 cubic feet) monthly usage and a 5/8" (or nearest equivalent) meter size. Actual average usage for a 5/8" residential customer will vary by utility. Rates effective April 2, 2013.

TYPICAL MONTHLY BILLS

TYPICAL MONTHLY WATER AND WASTEWATER BILLS
RESIDENTIAL CUSTOMERS – 7,500 GALLONS BILLABLE WATER USAGE
RANKED FROM LOWEST (1) TO HIGHEST (50)

Community	Water	Rank	Sewer	Rank	Combined	Rank
	$		$		$	
Albuquerque (a)	27.35	20	19.99	5	47.34	7
Arlington	22.52	8	33.03	16	55.55	11
Atlanta	54.96	47	139.46	50	194.42	50
Austin (b)	30.10	26	67.68	45	97.78	42
Baltimore (c)	31.97	27	42.99	28	74.96	31
Boston	45.39	44	58.38	44	103.77	44
Charlotte	23.11	9	47.76	34	70.87	26
Chicago (d)	21.56	6	19.84	4	41.40	3
Cleveland	33.69	29	57.55	42	91.24	40
Colorado Springs (e)	45.26	43	39.88	25	85.14	36
Columbus (f)	34.68	30	43.89	29	78.57	34
Dallas	23.91	12	40.20	26	64.11	18
Denver (g)	25.76	17	24.38	8	50.13	9
Detroit (h)	25.12	14	45.77	33	70.89	27
El Paso (i)	20.93	5	19.21	3	40.14	2
Fort Worth (j)	28.86	24	33.60	17	62.46	17
Fresno (k)	20.63	4	25.75	9	46.38	5
Houston (l)	37.27	36	48.23	35	85.49	37
Indianapolis	36.82	34	34.53	21	71.35	28
Jacksonville (m)	24.86	13	55.55	41	80.40	35
Kansas City	49.19	46	49.75	38	98.94	43
Las Vegas (n)	28.39	21	18.41	2	46.80	6
Long Beach (o)	35.72	33	23.64	7	59.35	14
Los Angeles (p)	37.16	35	35.97	22	73.13	30
Louisville (q)	28.55	23	48.25	36	76.80	32
Memphis	14.74	1	12.72	1	27.46	1
Mesa (r)	32.43	28	23.62	6	56.05	12
Miami	17.03	3	32.59	15	49.62	8
Milwaukee (s)	23.56	10	44.94	31	68.50	21
Minneapolis	34.90	31	34.40	19	69.30	24

Community	Water	Rank	Sewer	Rank	Combined	Rank
Nashville	21.77	7	45.54	32	67.31	20
New York (t)	47.70	45	75.84	46	123.54	46
Oakland (u)	39.31	40	49.06	37	88.37	38
Oklahoma City	29.68	25	30.39	13	60.06	15
Omaha (v)	25.74	16	34.51	20	60.25	16
Philadelphia	41.75	41	31.04	14	72.79	29
Phoenix (w)	16.47	2	28.54	10	45.01	4
Portland (x)	43.25	42	82.53	47	125.78	47
Raleigh	37.73	38	39.31	23	77.04	33
Sacramento (y)	28.39	22	41.10	27	69.49	25
San Antonio (z)	26.54	18	29.83	12	56.37	13
San Diego (aa)	56.37	49	51.31	39	107.68	45
San Francisco (aa)	56.00	48	92.77	48	148.77	48
San Jose (bb)	35.28	32	33.83	18	69.11	23
Seattle (cc)	61.43	50	116.50	49	177.93	49
Tucson (dd)	25.17	15	43.89	30	69.06	22
Tulsa	26.78	19	39.83	24	66.60	19
Virginia Beach (ee)	37.49	37	57.76	43	95.25	41
Washington, D.C. (ff)	38.06	39	51.37	40	89.43	39
Wichita	23.85	11	29.12	11	52.97	10
Average	**32.70**		**44.52**		**77.22**	
Median	**29.89**		**40.04**		**70.18**	

Assumes 7,500 gallons (or 1,000 cubic feet) monthly usage and a 5/8" (or nearest equivalent) meter size. Actual average use will vary by utility. Rates effective April 2, 2013.

TYPICAL MONTHLY BILLS

TYPICAL MONTHLY WATER AND WASTEWATER BILLS
RESIDENTIAL CUSTOMERS – 15,000 GALLONS BILLABLE WATER USAGE
RANKED FROM LOWEST (1) TO HIGHEST (50)

Community	Water	Rank	Sewer	Rank	Combined	Rank
	$		$		$	
Albuquerque (a)	42.91	8	32.12	5	75.03	5
Arlington	42.47	7	58.00	19	100.47	13
Atlanta	116.56	49	296.36	50	412.92	50
Austin (b)	91.10	44	134.58	46	225.68	46
Baltimore (c)	59.84	25	85.98	33	145.82	30
Boston	93.58	45	118.75	44	212.33	45
Charlotte	74.11	35	90.96	38	165.07	37
Chicago (d)	43.12	9	39.67	8	82.79	7
Cleveland	63.17	26	113.00	43	176.17	40
Colorado Springs (e)	103.66	47	64.48	22	168.14	39
Columbus (f)	63.71	27	81.09	31	144.80	29
Dallas	59.13	24	77.65	29	136.78	28
Denver (g)	55.54	20	48.75	11	104.29	14
Detroit (h)	47.59	11	86.72	34	134.31	25
El Paso (i)	36.53	4	33.01	6	69.54	4
Fort Worth (j)	56.86	22	62.40	20	119.26	18
Fresno (k)	26.70	1	25.75	3	52.45	1
Houston (l)	81.35	40	103.35	40	184.70	42
Indianapolis	64.26	28	62.71	21	126.96	23
Jacksonville (m)	53.43	18	110.52	42	163.95	36
Kansas City	90.84	43	87.95	36	178.79	41
Las Vegas (n)	47.67	12	18.41	1	66.08	3
Long Beach (o)	66.21	30	27.11	4	93.31	9
Los Angeles (p)	81.19	39	71.95	25	153.14	32
Louisville (q)	53.15	17	70.75	24	123.90	20
Memphis	29.48	2	25.44	2	54.92	2
Mesa (r)	55.80	21	40.79	9	96.59	11
Miami	49.19	15	79.25	30	128.43	24
Milwaukee (s)	40.36	6	84.74	32	125.10	22
Minneapolis	68.80	31	67.30	23	136.10	27

Community	Water	Rank	Sewer	Rank	Combined	Rank
Nashville	52.56	16	106.95	41	159.51	33
New York (t)	81.60	41	129.74	45	211.34	44
Oakland (u)	72.03	33	49.06	12	121.09	19
Oklahoma City	48.80	13	57.76	18	106.56	15
Omaha (v)	43.51	10	50.48	13	93.99	10
Philadelphia	78.37	38	57.20	17	135.57	26
Phoenix (w)	53.69	19	56.08	16	109.77	16
Portland (x)	76.46	36	164.53	47	240.99	47
Raleigh	89.13	42	73.51	26	162.64	35
Sacramento (y)	36.63	5	41.10	10	77.73	6
San Antonio (z)	57.26	23	52.69	15	109.95	17
San Diego (aa)	98.42	46	87.30	35	185.72	43
San Francisco (aa)	109.80	48	193.07	48	302.87	48
San Jose (bb)	64.53	29	33.83	7	98.36	12
Seattle (cc)	122.62	50	233.00	49	355.62	49
Tucson (dd)	76.62	37	75.92	28	152.54	31
Tulsa	49.05	14	75.15	27	124.20	21
Virginia Beach (ee)	71.71	32	90.66	37	162.37	34
Washington, D.C. (ff)	72.46	34	93.17	39	165.63	38
Wichita	36.07	3	50.72	14	86.79	8
Average	**64.99**		**81.43**		**146.42**	
Median	**61.50**		**72.73**		**134.94**	

Assumes 15,000 gallons (or 2,000 cubic feet) monthly usage and a 3/4" (or nearest equivalent) meter size. Actual average usage for a 3/4" residential customer will vary by utility. Rates effective April 2, 2013.

TYPICAL MONTHLY BILLS

TYPICAL MONTHLY WATER AND WASTEWATER BILLS
COMMERCIAL CUSTOMERS – 100,000 GALLONS BILLABLE WATER USAGE
RANKED FROM LOWEST (1) TO HIGHEST (50)

Community	Water	Rank	Sewer	Rank	Combined	Rank
	$		$		$	
Albuquerque (a)	341.68	22	327.08	12	668.77	12
Arlington	295.34	15	389.35	19	684.69	14
Atlanta	818.80	50	2,085.02	50	2,903.82	50
Austin (b)	594.33	44	833.00	45	1,427.33	45
Baltimore (c)	284.08	10	576.07	35	860.14	24
Boston	686.09	46	855.55	46	1,541.64	46
Charlotte	331.49	21	615.38	36	946.87	32
Chicago (d)	288.90	12	265.79	8	554.70	7
Cleveland	405.90	31	745.13	43	1,151.03	40
Colorado Springs (e)	634.28	45	380.94	16	1,015.22	37
Columbus (f)	390.07	28	509.77	30	899.84	28
Dallas	327.91	20	348.63	14	676.54	13
Denver (g)	273.83	9	325.00	11	598.83	8
Detroit (h)	289.96	13	621.23	37	911.19	30
El Paso (i)	270.53	8	246.72	6	517.25	5
Fort Worth (j)	327.32	19	489.02	27	816.34	22
Fresno (k)	131.11	1	239.80	4	370.91	1
Houston (l)	398.86	29	559.97	34	958.83	34
Indianapolis	377.50	25	382.10	18	759.60	18
Jacksonville (m)	286.80	11	808.20	44	1,095.00	39
Kansas City	496.90	42	523.43	31	1,020.33	38
Las Vegas (n)	377.47	24	244.86	5	622.34	10
Long Beach (o)	379.09	26	246.77	7	625.85	11
Los Angeles (p)	725.73	49	482.06	26	1,207.79	42
Louisville (q)	359.84	23	509.46	29	869.30	25
Memphis	209.47	4	227.26	2	436.73	3
Mesa (r)	294.82	14	235.44	3	530.26	6
Miami	296.93	16	635.36	38	932.29	31
Milwaukee (s)	263.92	7	548.56	33	812.48	20
Minneapolis	456.86	35	444.76	22	901.62	29

Community	Water	Rank	Sewer	Rank	Combined	Rank
Nashville	315.11	18	635.97	39	951.08	33
New York (t)	468.06	39	744.22	42	1,212.28	43
Oakland (u)	464.39	37	496.75	28	961.14	35
Oklahoma City	311.23	17	381.04	17	692.27	15
Omaha (v)	251.70	5	163.22	1	414.92	2
Philadelphia	419.86	33	359.38	15	779.23	19
Phoenix (w)	478.53	41	334.85	13	813.38	21
Portland (x)	475.13	40	1,100.10	47	1,575.24	47
Raleigh	410.96	32	464.56	23	875.52	26
Sacramento (y)	169.69	2	439.59	20	609.28	9
San Antonio (z)	384.80	27	311.68	10	696.48	16
San Diego (aa)	578.88	43	682.33	40	1,261.21	44
San Francisco (aa)	713.60	48	1,107.76	48	1,821.36	48
San Jose (bb)	423.78	34	467.66	24	891.44	27
Seattle (cc)	686.69	47	1,561.10	49	2,247.79	49
Tucson (dd)	404.53	30	441.06	21	845.59	23
Tulsa	261.52	6	481.02	25	742.54	17
Virginia Beach (ee)	461.41	36	535.44	32	996.85	36
Washington, D.C. (ff)	465.82	38	687.72	41	1,153.54	41
Wichita	178.41	3	305.43	9	483.84	4
Average	**398.80**		**548.05**		**946.85**	
Median	**378.29**		**481.54**		**872.41**	

Assumes 100,000 gallons (or 13,400 cubic feet) monthly usage and a 2" (or nearest equivalent) meter size.
Actual average usage for a 2" commercial customer will vary by utility. Rates effective April 2, 2013.

TYPICAL MONTHLY BILLS

TYPICAL MONTHLY WATER AND WASTEWATER BILLS
INDUSTRIAL CUSTOMERS – 10,000,000 GALLONS BILLABLE WATER USAGE
RANKED FROM LOWEST (1) TO HIGHEST (50)

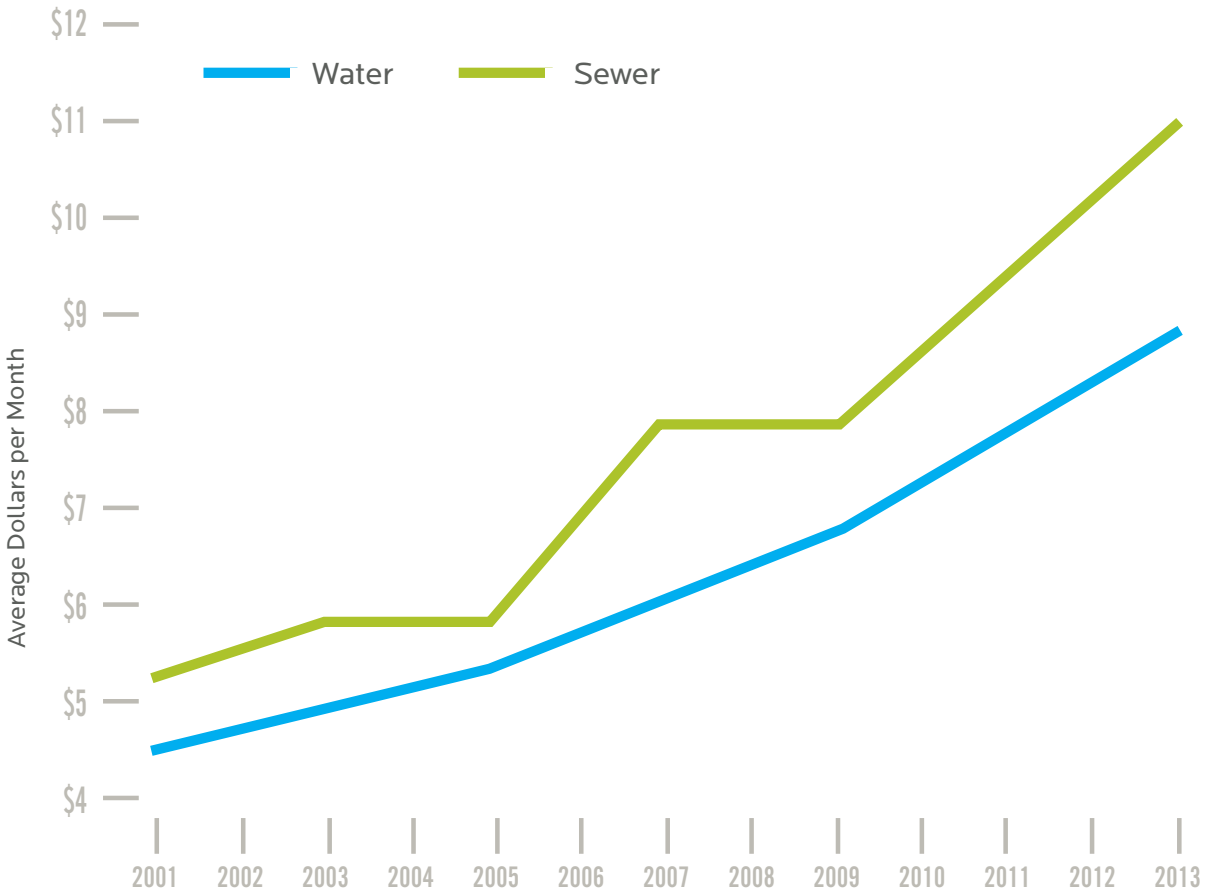
Community	Water	Rank	Sewer	Rank	Combined	Rank
	$		$		$	
Albuquerque (a)	22,889.03	13	19,347.22	4	42,236.25	5
Arlington	24,513.24	14	33,624.78	16	58,138.02	11
Atlanta	82,537.36	50	210,228.56	50	292,765.92	50
Austin (b)	48,848.17	41	75,110.00	45	123,958.17	44
Baltimore (c)	18,226.57	8	57,606.60	36	75,833.17	23
Boston	74,542.65	48	93,366.12	46	167,908.77	47
Charlotte	31,348.48	24	58,127.53	37	89,476.01	34
Chicago (d)	28,890.40	22	26,579.17	9	55,469.57	10
Cleveland	39,583.74	32	74,305.10	44	113,888.84	40
Colorado Springs (e)	58,045.80	45	35,137.86	17	93,183.66	37
Columbus (f)	26,033.58	18	53,618.97	34	79,652.55	27
Dallas	30,904.40	23	32,592.05	13	63,496.45	17
Denver (g)	26,756.33	20	32,500.00	12	59,256.33	13
Detroit (h)	22,157.31	12	55,131.62	35	77,288.93	26
El Paso (i)	21,292.28	11	18,841.52	3	40,133.80	4
Fort Worth (j)	28,241.00	21	48,024.50	29	76,265.50	24
Fresno (k)	10,053.53	1	14,400.00	1	24,453.53	1
Houston (l)	38,867.15	31	60,126.55	38	98,993.70	38
Indianapolis	19,380.40	10	39,372.72	19	58,753.12	12
Jacksonville (m)	19,230.00	9	64,957.50	40	84,187.50	30
Kansas City	39,768.04	34	51,199.55	32	90,967.59	36
Las Vegas (n)	34,897.28	28	24,547.16	8	59,444.45	14
Long Beach (o)	32,998.17	26	21,728.14	5	54,726.31	8
Los Angeles (p)	79,438.24	49	48,206.37	30	127,644.61	45
Louisville (q)	24,933.60	15	47,561.57	28	72,495.17	22
Memphis	10,768.06	2	22,726.00	6	33,494.06	3
Mesa (r)	26,248.24	19	22,906.44	7	49,154.68	7
Miami	50,241.63	43	62,383.78	39	112,625.41	39
Milwaukee (s)	14,536.18	5	53,412.28	33	67,948.46	19
Minneapolis	44,186.00	36	42,226.00	20	86,412.00	32

Community	Water	Rank	Sewer	Rank	Combined	Rank
Nashville	24,940.34	16	44,920.96	24	69,861.30	21
New York (t)	45,439.80	39	72,249.28	43	117,689.08	43
Oakland (u)	42,058.77	35	48,519.67	31	90,578.44	35
Oklahoma City	25,992.37	17	36,640.48	18	62,632.85	16
Omaha (v)	13,719.18	4	15,815.38	2	29,534.56	2
Philadelphia	35,618.28	29	33,317.46	14	68,935.74	20
Phoenix (w)	49,758.24	42	33,385.76	15	83,144.00	29
Portland (x)	44,531.52	38	109,634.98	47	154,166.50	46
Raleigh	39,604.71	33	44,964.71	25	84,569.42	31
Sacramento (y)	11,392.14	3	43,959.31	22	55,351.45	9
San Antonio (z)	31,942.03	25	30,476.98	11	62,419.01	15
San Diego (aa)	50,784.53	44	66,715.22	41	117,499.75	42
San Francisco (aa)	68,503.20	47	110,776.46	48	179,279.66	48
San Jose (bb)	36,878.69	30	46,230.00	26	83,108.69	28
Seattle (cc)	66,449.42	46	156,110.00	49	222,559.42	49
Tucson (dd)	33,533.71	27	42,932.06	21	76,465.77	25
Tulsa	18,185.19	7	47,127.46	27	65,312.65	18
Virginia Beach (ee)	44,216.31	37	44,708.50	23	88,924.81	33
Washington, D.C. (ff)	46,096.14	40	68,772.00	42	114,868.14	41
Wichita	16,341.99	6	28,922.24	10	45,264.23	6
Average	**35,526.87**		**52,521.49**		**88,048.36**	
Median	**32,470.10**		**45,597.36**		**76,877.35**	

Assumes 10,000,000 gallons (or 1,340,000 cubic feet) monthly usage and a 6" (or nearest equivalent) meter size. vary by utility. Actual average usage for a 6" industrial customer will vary by utility. Rates effective April 2, 2013.

50 LARGEST CITIES TRENDS

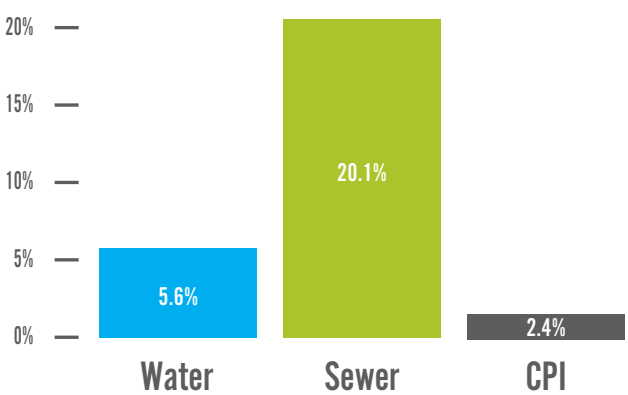
50 LARGEST CITIES TRENDING
RESIDENTIAL TYPICAL BILL – NO BILLABLE USAGE



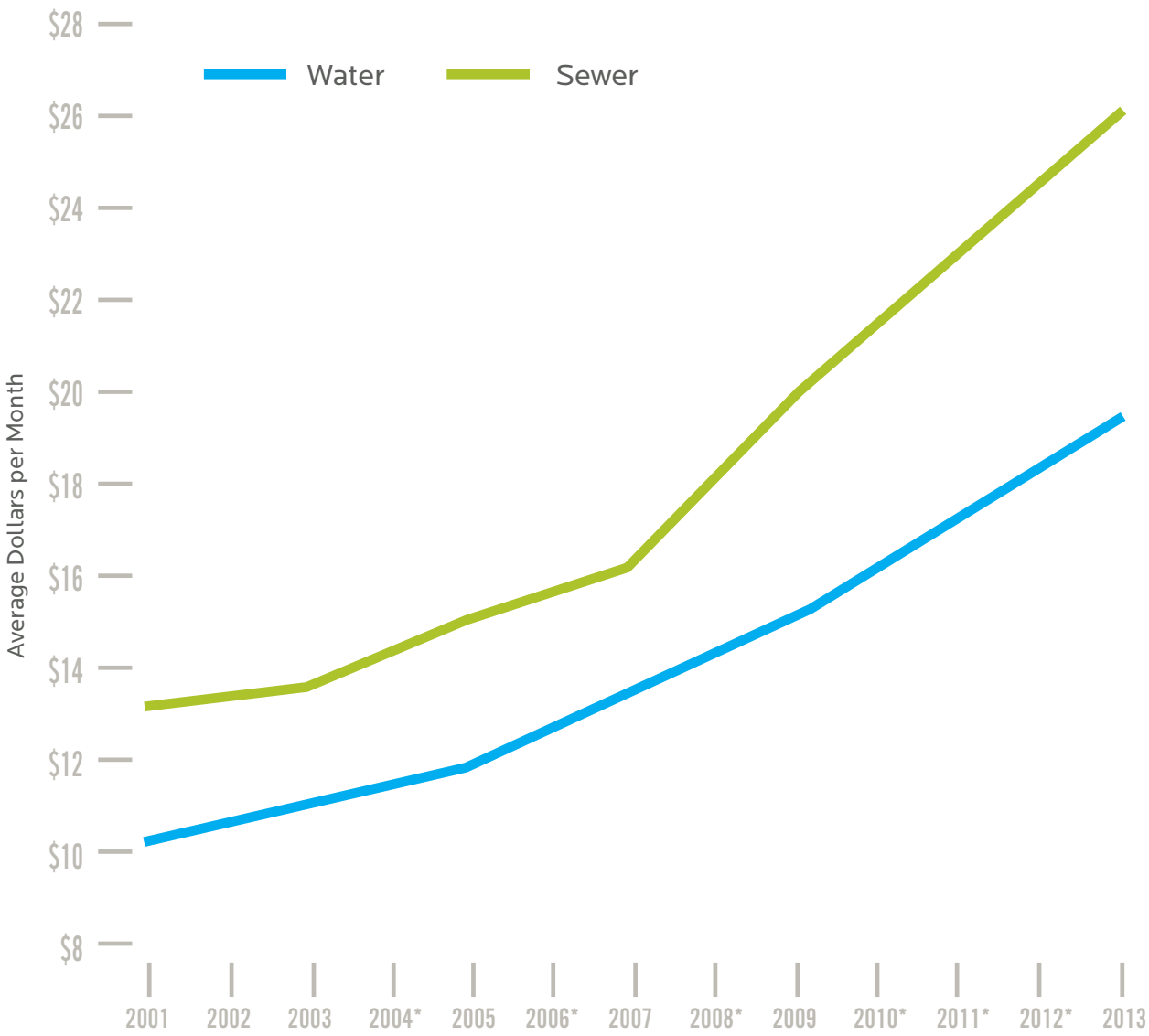
	2001	2002	2003	2004*	2005	2006*	2007	2008*	2009	2010*	2011*	2012*	2013
WATER	$4.52	$4.74	$4.95	$5.14	$5.33	$5.73	$6.13	$6.50	$6.86	$7.32	$7.79	$8.25	$8.72
SEWER	$5.12	$5.51	$5.89	$5.93	$5.97	$6.90	$7.83	$7.88	$7.92	$8.70	$9.48	$10.26	$11.04

** Survey results for these years are extrapolated based on the average of the preceding and following year.*

COMPOUND ANNUAL INCREASE IN SURVEYED TYPICAL BILLS 2001 - 2013



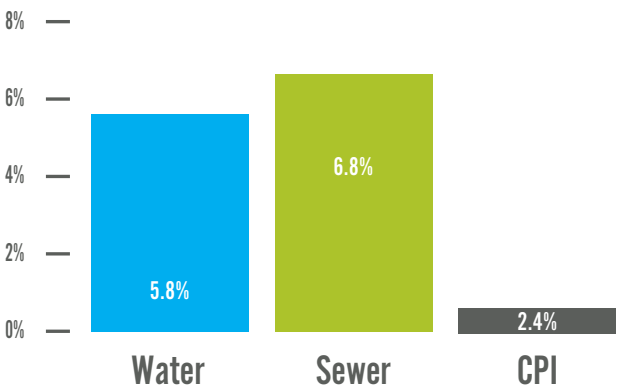
50 LARGEST CITIES TRENDING
RESIDENTIAL TYPICAL BILL – 3,750 GALLONS BILLABLE USAGE



	2001	2002	2003	2004*	2005	2006*	2007	2008*	2009	2010*	2011*	2012*	2013
WATER	$10.10	$10.55	$11.00	$11.49	$11.97	$12.67	$13.37	$14.36	$15.35	$16.32	$17.28	$18.25	$19.22
SEWER	$13.39	$13.65	$13.91	$14.56	$15.21	$16.04	$16.86	$18.44	20.03	$21.53	$23.03	24.53	26.03

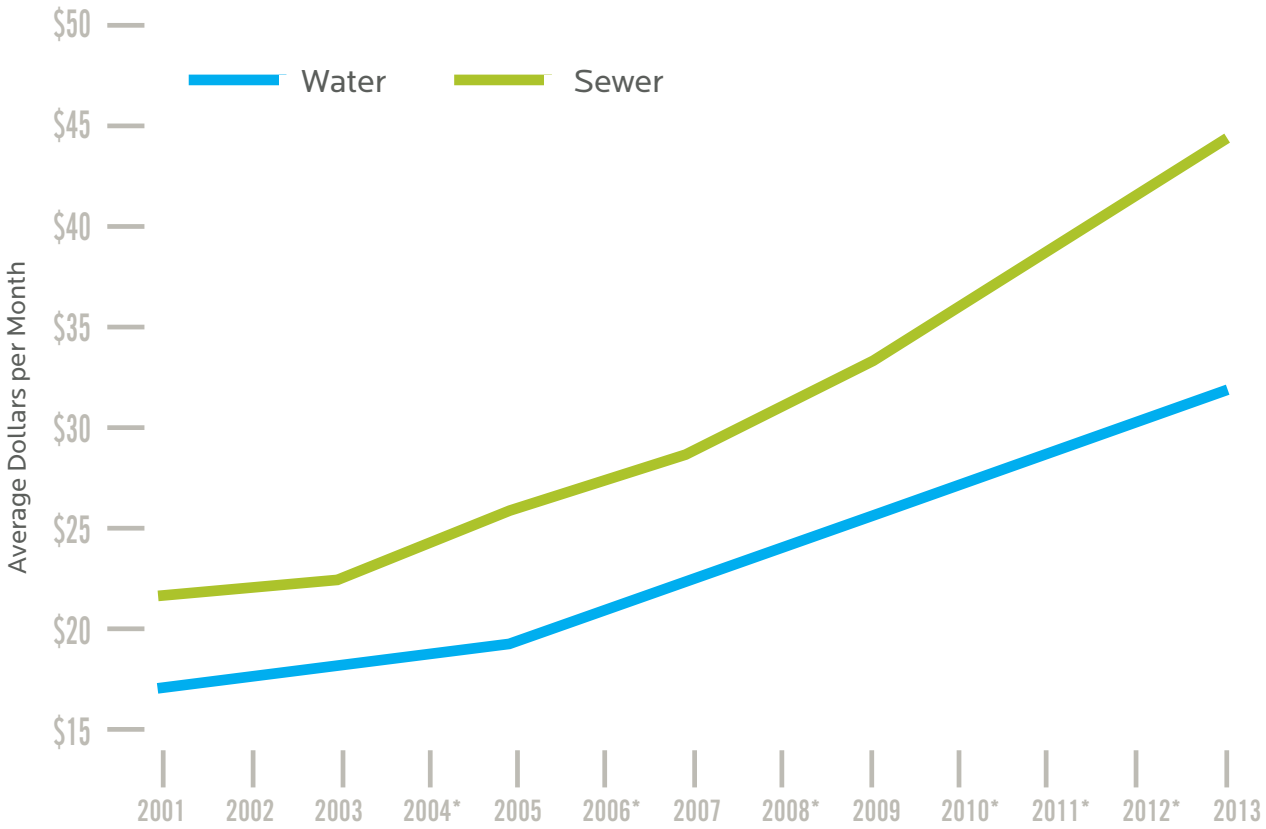
** Survey results for these years are extrapolated based on the average of the preceding and following year.*

COMPOUND ANNUAL INCREASE IN SURVEYED TYPICAL BILLS 2001 - 2013



50 LARGEST CITIES TRENDS

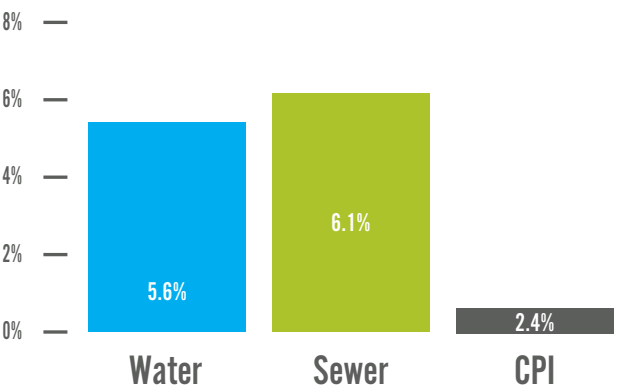
50 LARGEST CITIES TRENDING
RESIDENTIAL TYPICAL BILL – 7,500 GALLONS BILLABLE USAGE



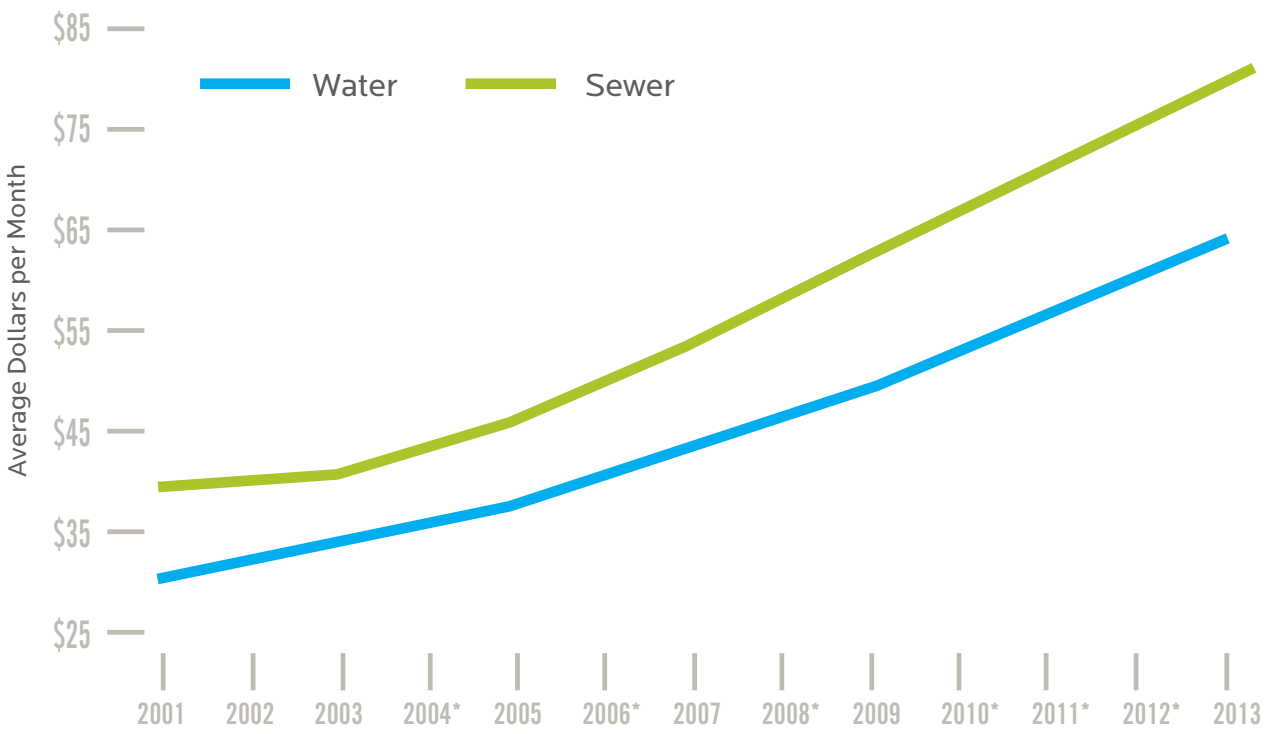
	2001	2002	2003	2004*	2005	2006*	2007	2008*	2009	2010*	2011*	2012*	2013
WATER	$17.01	$17.31	$17.77	$18.67	$19.57	$20.40	$21.23	$23.45	$25.66	$27.42	$29.18	$30.94	$32.70
SEWER	$21.97	$22.39	$22.93	$24.52	$26.10	$27.44	$28.78	$31.29	$33.80	$36.48	$39.16	$41.84	$44.52

** Survey results for these years are extrapolated based on the average of the preceding and following year.*

COMPOUND ANNUAL INCREASE IN SURVEYED TYPICAL BILLS 2001 - 2013



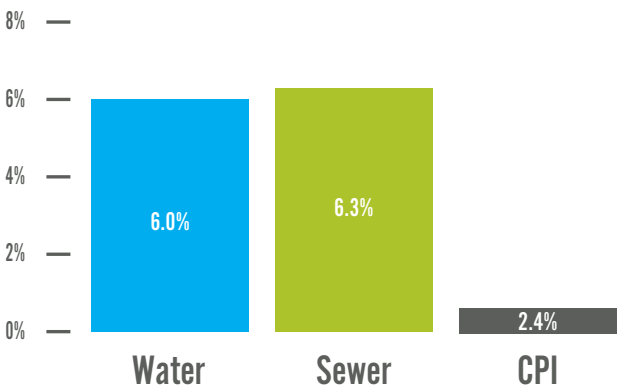
50 LARGEST CITIES TRENDING
RESIDENTIAL TYPICAL BILL – 15,000 GALLONS BILLABLE USAGE



	2001	2002	2003	2004*	2005	2006*	2007	2008*	2009	2010*	2011*	2012*	2013
WATER	$32.35	$33.06	$34.09	$35.92	$37.74	$39.80	$41.85	$45.97	$50.09	$53.81	$57.54	$61.27	$64.99
SEWER	$39.06	$40.19	$41.39	$43.88	$46.36	$49.61	$52.85	$58.06	$63.28	$67.81	$72.35	$76.89	$81.43

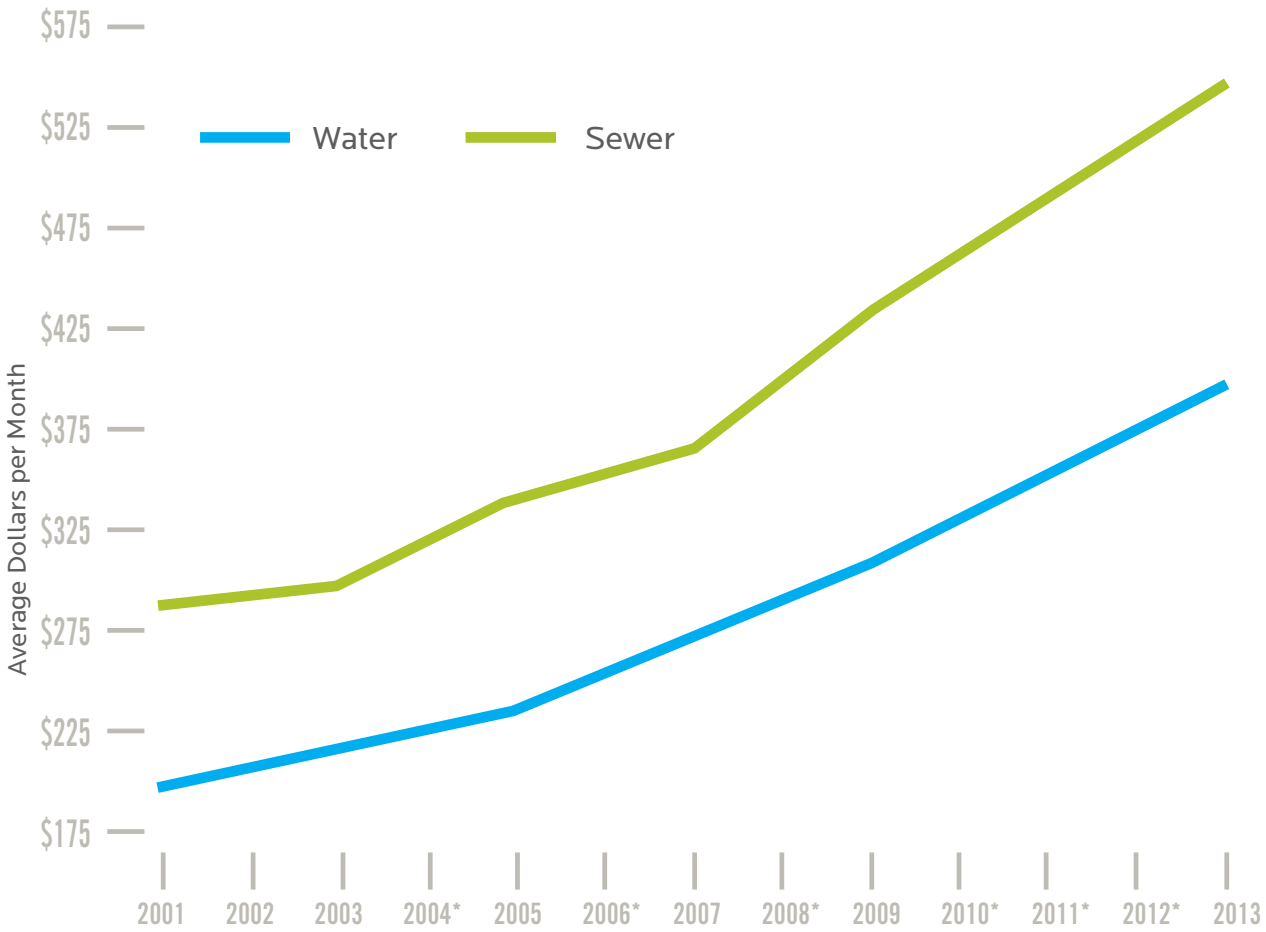
** Survey results for these years are extrapolated based on the average of the preceding and following year.*

COMPOUND ANNUAL INCREASE IN SURVEYED TYPICAL BILLS 2001 - 2013



50 LARGEST CITIES TRENDS

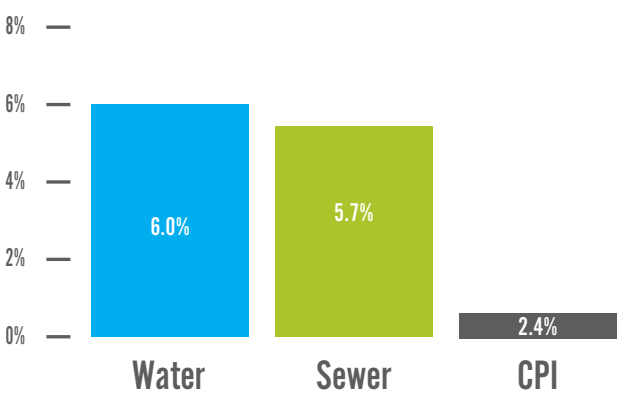
50 LARGEST CITIES TRENDING
COMMERCIAL TYPICAL BILL – 100,000 GALLONS BILLABLE USAGE



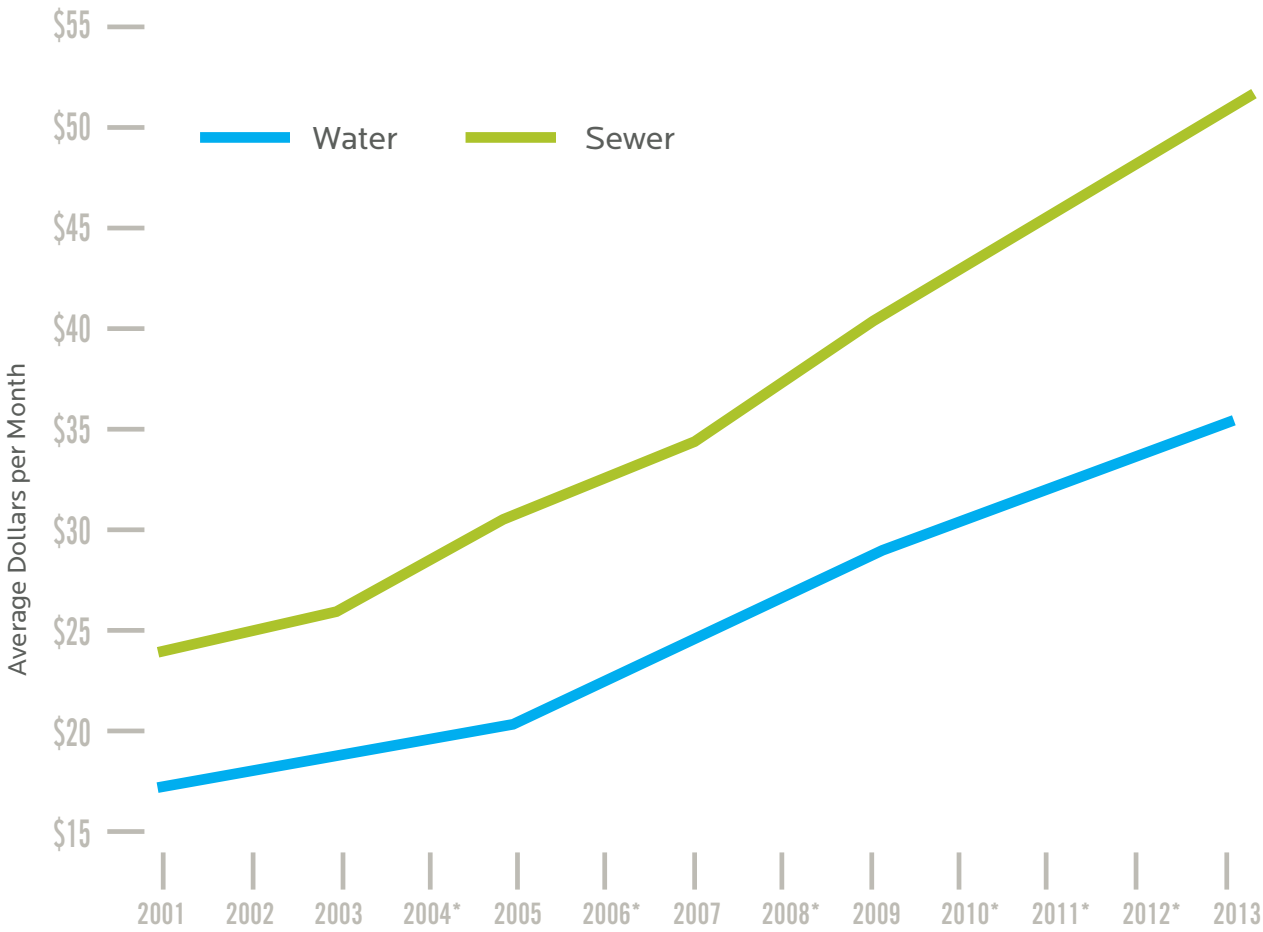
	2001	2002	2003	2004*	2005	2006*	2007	2008*	2009	2010*	2011*	2012*	2013
WATER	$198.44	$201.40	$211.00	$222.91	$234.81	$250.16	$265.51	$286.69	$307.87	$330.60	$353.33	$376.07	$398.80
SEWER	$280.32	$286.20	$293.78	$316.08	$338.37	$353.42	$368.46	$401.49	$434.52	$462.90	$491.29	$519.67	$548.05

** Survey results for these years are extrapolated based on the average of the preceding and following year.*

COMPOUND ANNUAL INCREASE IN SURVEYED TYPICAL BILLS 2001 - 2013



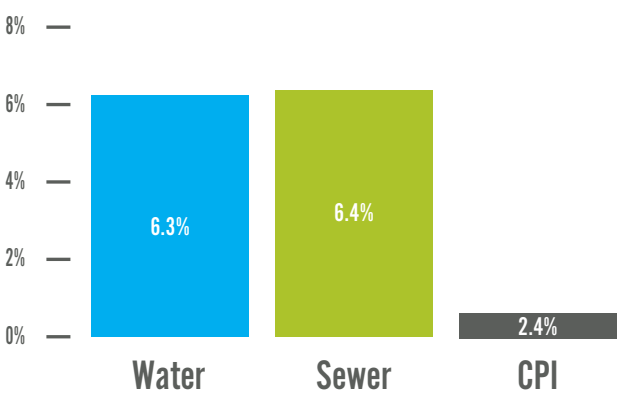
50 LARGEST CITIES TRENDING
INDUSTRIAL TYPICAL BILL – 10,000,000 GALLONS BILLABLE USAGE



In $000's	2001	2002	2003	2004*	2005	2006*	2007	2008*	2009	2010*	2011*	2012*	2013
WATER	$17.11	$17.13	$18.28	$19.56	$20.84	$22.27	$23.70	$25.73	$27.77	$29.71	$31.65	$33.59	$35.53
SEWER	$24.87	$25.62	$26.77	$28.94	$31.11	$32.90	$34.68	$37.85	$41.01	$43.89	$46.77	$49.64	$52.52

** Survey results for these years are extrapolated based on the average of the preceding and following year.*

COMPOUND ANNUAL INCREASE IN SURVEYED TYPICAL BILLS 2001 - 2013



FOOTNOTES

The following footnotes apply to all tables presented in the survey.

- (a) Water charge includes a fixed based Strategy Implementation fee and commodity based Sustainable Water Supply Program and State Water Conservation fees.
- (b) Water rates for commercial and industrial uses weighted average of peak and off-peak rates.
- (c) Water and sewer minimum metered charge includes a usage allowance based on meter size.
- (d) Sewer charge is based on 89% of water bill.
- (e) Water rates for commercial and industrial uses weighted seasonal rates.
- (f) Sewer charge includes a fixed Clean River Fund fee.
- (g) Water rates for commercial and industrial uses weighted winter and summer rates.
- (h) Sewer commercial and industrial charge includes industrial waste control charge.
- (i) Water and sewer minimum monthly charge includes a usage allowance a set CCF regardless of meter size. Water charge includes a fixed Water Supply Replacement Charge.
- (j) Sewer residential charge capped at 15 CCF per month.
- (k) Water residential charge based on metered accounts rates. Traditionally rate was based on square footage. Water commercial rate based on medium strength and industrial rate based on low strength.
- (l) Water and sewer minimum residential metered charge includes a usage allowance based on meter size.
- (m) Water and sewer charge includes commodity based Environmental Charge.
- (n) Water charge includes commodity based SNWA Volume Charge, fixed based SNWA Infrastructure Charge and SNWA Reliability Surcharge. Sewer charge based on equivalent residential units. Rate includes CWC rebate.
- (o) Sewer charge includes Los Angeles County Sanitation District treatment charge.
- (p) Water rates are based on location, lot size, and temparture. Rates adjusted quartely.
- (q) Water charges exclude all pressure zone charges. Sewer charges includes EPA surcharge.
- (r) Water and sewer minimum charge includes a set CCF usage allowance regardless of meter size.
- (s) Sewer charge includes City of Milwaukee commodity based collection fee.
- (t) Sewer charge is based on 159% of water bill.
- (u) Water charge includes commodity based seismic improvement charge. Sewer residential charge by EBMUD capped at 10 CCF per month and includes fixed SF Bay Pollution Prevention fee. Sewer charges includes City of Oakland collection charge.
- (v) Water commodity rate incorporates a weighted average of peak and off-peak rates. Water includes. Water Infrastructure Replacement Rider fee based on meter size.
- (w) Water and sewer charge includes a commdity based Environmental Charge. Water rates average low, medium and high seasons. Water and sewer minimum charge includes a set CCF usage allowance regardless of meter size and by winter and summer seasons.
- (x) Sewer charge includes a square footage based Portland Harbor Superfund Charge.
- (y) Sewer residential charge includes flat Sacramento Regional County Sanitation District treatment charge. Commercial and industrial charge is based on equivalent single family dwelling.

- (z) Water and sewer charge include fixed TCEQ pass-through fee. Water charge includes a commodity based Water Supply Fee and Edwards Aquifer Permit Fee. Water rates for residential uses weighted standard and seasonal rates.
- (aa) Sewer commercial and industrial charge assumes COD and SS strength discharges of 250 and 250 mg/l respectively.
- (bb) Water charges are based on Pressure Zone 1. Sewer residential charges are based on a flat rate.
- (cc) Water rates uses weighted average of peak and off-peak rates.
- (dd) Water charge includes a commodity based CAP fee and conservation fee.
- (ee) Sewer charge includes Hampton Roads Sanitary District treatment charge.
- (ff) Sewer charge includes an additional CSO-LTCP fee.

LEGAL NOTICE

This Survey was compiled primarily based on information Black & Veatch Corporation (B&V) received from third-parties. The Survey's accuracy solely depends upon the accuracy of the information provided to B&V, and such information is sub¬ject to change at any time. All utilities included in the Survey were contacted to validate results. In some instances responses were not received by B&V. Survey results are not intended to represent the typical bill for each utility, as usage characteristics will vary across Survey participants. Rather, this Survey is intended to present comparative results of utility user charges at specific usage levels subject to the limitations noted in the Survey and this Legal Notice. As such, this Survey is merely provided as an additional reference tool to be used in combination with user's other due diligence inquiries and resources. B&V assumes no legal liability or responsibility for the accuracy, completeness, or usefulness of any information, or process disclosed, nor does B&V represent that its use would not infringe on any privately owned rights. The Survey may reflect facts, views, opinions and recommendations of individuals and organizations deemed of interest and assumes the reader is sophisticated in this industry. Use of this Survey is at the user's sole risk, and no reliance should be placed upon it or any other oral or written agreement, representation or warranty relating to the infor-mation contained in the Survey. THIS SURVEY IS PROVIDED ON AN "AS-IS" BASIS. B&V DISCLAIMS ALL WARRANTIES OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING, WITHOUT LIMITATION, ANY WARRANTY OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT. NEITHER B&V, NOR ITS PARENT COMPANY, MEMBERS, SUB¬SIDIARIES, AFFILIATES, SERVICE PROVIDERS, LICENSORS, OFFICERS, DIRECTORS OR EMPLOYEES SHALL BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, PUNITIVE, SPECIAL, EXEMPLARY OR CONSEQUENTIAL DAMAGES ARISING OUT OF OR RELATING TO THIS SURVEY OR RESULTING FROM THE USE OF THIS SURVEY OR ANY INFORMATION CONTAINED THEREIN OR DERIVED THEREFROM, INCLUDING BUT NOT LIMITED TO DAMAGES FOR LOSS OF PROFITS OR REVENUE, LOSS OF OPPORTUNITY, LOSS OF USE, LOSS OF GOODWILL, COST OF CAPITAL, LOSS OF DATA, CLAIMS OF CUSTOMERS FOR SUCH DAMAGES OR OTHER INTANGIBLE DAMAGES, EVEN IF SUCH PARTY HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

In addition, user should place no reliance on the summaries contained in the Survey, which is not intended to be exhaustive of the material provisions of any document or circumstances. If any point or issue in the survey raises a concern or is of particular interest or significance to the user, the user should perform its own due diligence inquiries and research to satis¬fy itself as to the same.

This Survey (and the content and information included therein) is copyrighted and is owned or licensed by B&V. B&V may restrict the user's access to this Survey, or any portion thereof, at any time without cause. User shall abide by all copyright notices, information, or restrictions contained in any content or information accessed through this Survey. User shall not reproduce, retransmit, disseminate, sell, copy, distribute, perform, display, publish, broadcast, circulate, create new works from, or commercially exploit this Survey (including the content and information made available through this Survey), in whole or in part, in any manner, without the written consent of B&V, nor use the content or information made available through this Survey for any unlawful or unintended purpose.

BUILDING A WORLD OF DIFFERENCE®

Black & Veatch is an employee-owned, global leader in building Critical Human Infrastructure™ in Energy, Water, Telecommunications and Government Services. Since 1915, we have helped our clients improve the lives of people in over 100 countries through consulting, engineering, construction, operations and program management. Our revenues in 2012 were US $3.3 billion. Follow us on www.bv.com and in social media.

BLACK & VEATCH
11401 Lamar Avenue, Overland Park, KS 66211
P +1 913-458-2000 | **W** bv.com

ANN BUI | DIRECTOR
P +1 949-302-6017 | **E** BuiA@bv.com

BLACK & VEATCH
Building a world of difference.®

2014
STORMWATER UTILITY SURVEY

A BLACK & VEATCH REPORT

BLACK & VEATCH
Building a world of difference.®


BLACK & VEATCH
Building a world of difference.

TABLE OF CONTENTS

INTRODUCTION	3
SURVEY HIGHLIGHTS	4
SURVEY OVERVIEW	5
ORGANIZATIONAL INFORMATION	6
PLANNING	8
FINANCING AND ACCOUNTING	10
STORMWATER USER FEES AND BILLING	12
STORMWATER CREDITS AND INCENTIVES	17
PUBLIC INFORMATION/ EDUCATION	20

Cover photo courtesy Wes Peck

INTRODUCTION

Welcome to the 2014 Black & Veatch *Stormwater Utility Survey*. We initiated the bi-annual survey in 1991 to assess and share insights on stormwater management, financing, governance and other evolving trends. We have continued that tradition, and this year we are proud to share our tenth stormwater utility survey.

This survey reports on the continuing trends in stormwater utility organization, planning, and financing; the persistent funding challenges; the issues that utility managers perceive to be the most important; and the priorities that drive capital investment decisions.

In stormwater industry parlance, the phrase "Stormwater Utility" refers to three primary elements, namely, a Program that defines stormwater operations and management, an Organization that is responsible for governance, and a Funding approach that provides dedicated financing.

Stormwater is increasingly beginning to be perceived as a resource to be protected and managed similar to drinking water resources. To do so effectively, the Program, Organization, and Funding aspects have to be aligned and holistically addressed, as it is done in the water and wastewater sectors of the utility industry.

To assess the current trends in all these three elements, and especially the funding aspect, this survey was only administered to those municipalities and/or entities that already have established stormwater user charge programs. A "stormwater user charge" is similar to a water or sewer user charge in that the user fee or charges have some key characteristics including the following:

- The charges are assessed for stormwater service that is provided, and hence has a reasonable nexus to the costs incurred in providing that service;
- The revenues from stormwater charges are dedicated to stormwater management, in other words to the purpose for which it is assessed;
- The charges assessed are proportional to the property's contribution and impact of stormwater runoff;
- The charges assessed are "voluntary" in that the user has the opportunity to limit the use of the service; and
- The fee or charge is non-discriminatory.

SURVEY HIGHLIGHTS

The survey results again affirm the following key facts about the state of the stormwater utility industry:

Prevalence of Stormwater Utilities:
There continues to be a prevalence of individual municipally governed stormwater utilities rather than regional stormwater authorities. Consequently, even though stormwater issues such as surface water quality and habitat degradation typically do not follow jurisdictional boundaries, municipalities are limited to focusing on and managing stormwater issues only within their geographical jurisdictional authority.

Stormwater Industry Priorities:
In this year's survey, we added a new question on industry priorities to garner perspectives on what utility managers perceive to be the issues of importance in the stormwater industry. We asked, and utility managers responded! The three (3) issues that respondents ranked in the order of importance are: (i) availability of adequate funding, (ii) enhancing public awareness and support for stormwater management, and (iii) management of the expanding regulatory requirements.

A highlight of this response is that this is the first time since the inception of this bi-annual survey, that "public awareness and support" has been cited as the second most important issue. These stormwater issues of importance that respondents cited are closely aligned with those from the water industry, which we recently published in our "*2014 Strategic Directions: U.S. Water Industry*".

Infrastructure Investment Drivers:
In response to our new question on what drives infrastructure investment planning and decisions, utility managers responded by selecting Regulatory Compliance; Flood Control; and Safety and Reliability as the top three drivers in the order listed.

Proactive Planning:
Balancing the competing goals of achieving regulatory compliance, providing the level of service that the community desires, and maintaining affordable rates requires effective planning and innovative approaches. This balancing act applies not only to stormwater utilities but also to wastewater utilities, and especially to those communities that have combined sewer systems. Therefore, in this survey, we continued to assess the type of integrated planning that utilities engage in. The survey indicates that while a majority of the participants has developed individual planning documents such as stormwater master plans and stormwater management plans, only 12% of the respondents have developed *integrated wet weather management plans* to address water resources issues more comprehensively.

Funding Adequacy:
Lack of adequate funding continues to plague even those municipalities that have a dedicated stormwater user fee. Out of a total of 78 respondents that participated in this survey and indicated having a stormwater user fee, 62% did not have adequate funding to meet most of their utility needs. The survey continues to highlight a growing funding gap. Despite funding inadequacy, 31% of the respondents indicated not having any rate increases since 2004, which can further exacerbate the funding gap.

The interdependencies among service level needs, regulatory requirements, asset management, innovation, and financing significantly increase the complexity of stormwater utility management. To effectively address multiple needs and challenges, utilities have to engage in more holistic solutions that include integrated planning, green infrastructure solutions, a strong public awareness and education campaign, public-private partnerships, and regional collaborations to achieve cost efficiencies and regional solutions.

SURVEY OVERVIEW

The 2014 *Stormwater Utility Survey* reports the results of six functional areas:

Section 1: Organization and Operations
Provides a profile of the respondents including population served, size of service areas, the characteristics of the service area, and type of utility governance.

Section 2: Planning
Provides insights in to what utility managers perceive to be most important industry issues and the infrastructure investment drivers. This section also highlights the types of permit requirements that utilities have to comply with and the types of planning utilities have engaged in to address stormwater management.

Section 3: Finance and Accounting
Reviews stormwater utility revenues, expenditures, sources of capital improvement and O&M financing, and the adequacy of stormwater utility funding to meet utility obligations.

Section 4: Stormwater Rate Structure and Billing
Evaluates the types of costs recovered through user fees, the fee methodology used in setting rates, the rate structures, and the average monthly residential rate of each utility that participated in the survey. Information on the billing frequency and types of exemptions and discounts that utilities offer, and insights on legal challenges are also provided.

Section 5: Stormwater Credits and Incentives
Offers insights in to the types of credits, criteria used in offering credits, credits for "green initiatives", and any innovative programs such as credits trading and banking.

Section 6: Public Information/Education
Assesses the level of importance respondents attribute to public information/education and the methods of education and multi-media sources used in educating and in disseminating information.

PROFILE OF RESPONDENTS

This year's nationwide survey was conducted online during March and April 2014. A total of 78 participants completed the online questionnaire.

- The participants spanned 25 states. All of these participants fund stormwater management in whole or in part through stormwater user fees.
- This year's participants reflect a much different mix of utilities with a larger participation from smaller utilities, and 25 first time participants and 53 repeat participants.
- Eighty seven percent of the respondents serve a city, rather than a county or region.
- The population served by the respondents ranges from 9,785 (Cottage Grove, OR) to 1.5 million people (Philadelphia, PA); the areas served varies from 3 to 1,020 square miles.
- For those utilities that base charges on gross property area, an Equivalent Residential Unit (ERU) ranged from 2,105 square feet to 22,500 square feet of total parcel area, with a median of 8,000 square feet.
- For those utilities that base charges on impervious area, an ERU ranged from 794 square feet to 7,500 square feet of impervious area, with a median of 2,368 square feet.

COMPARATIVE RESULTS

Black & Veatch has been assessing stormwater utility financing and management trends since 1991 through the use of this bi-annual, nationwide survey. Comparisons of current and prior survey results provide insights into possible industry changes. Please note, however, that these comparisons are not necessarily indicative of trends, because the survey respondents may be different between the current and prior surveys.

It is our hope that the information provided in this report will be a valuable resource to those involved in the stormwater industry. We welcome your questions and comments regarding this survey report and/or Black & Veatch services. You can reach us at **Stormwater@bv.com.**

ORGANIZATIONAL INFORMATION

Nationwide, stormwater management responsibility resides with individual municipal entities rather than with a multi-jurisdictional stormwater authority. The traditional approach of each municipality managing its own stormwater system and obligations affords greater asset ownership, budget control, and program flexibility to meet service level needs. However, such an approach also impacts economies of scale, creating operational inefficiencies, funding challenges, and significant disparities in stormwater management standards, even within a small geographic region or within a watershed.

This survey affirms the continuing trend of stormwater user fee programs ("utility") being more prevalent in cities rather in counties or special districts. Eighty seven percent of the participants reported serving a city jurisdictional area, with three participants representing a regional authority. These trends have remained fairly consistent since 2007.

This year's survey participants included a greater participation from smaller stormwater utilities when compared with our previous 2012 survey. While the median number of stormwater customers at the participating utilities is 36,000, which is fairly consistent with the previous stormwater surveys, the percentage of participants that identified themselves as stand-alone utilities has increased from 46% to 55%.

FIGURE 1
FOR MS4 PERMITTING PURPOSES ARE YOU CLASSIFIED AS: *(Select one)*

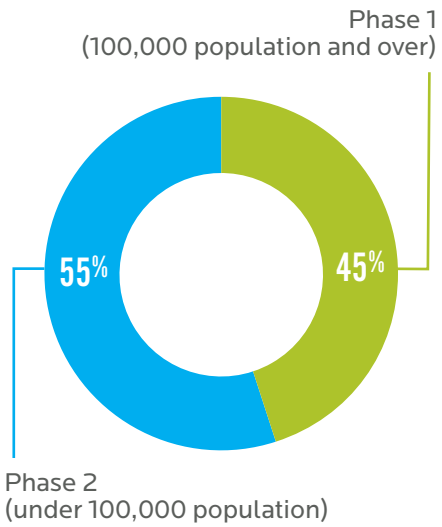


FIGURE 2
WHAT JURISDICTIONAL AREA IS YOUR STORMWATER UTILITY RESPONSIBLE FOR? *(Select one)*

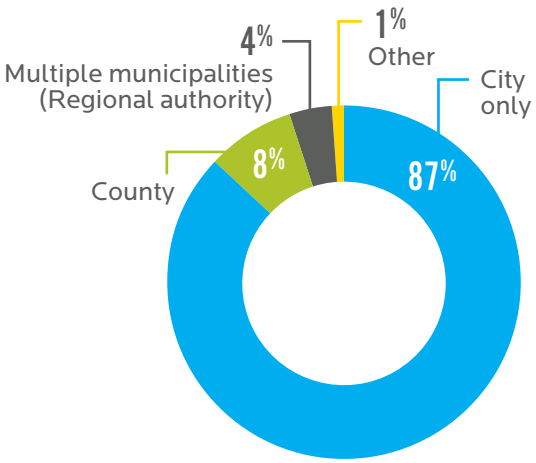


FIGURE 3

WHAT IS THE CHARACTERISTIC OF YOUR SERVICE AREA? *(Select one)*

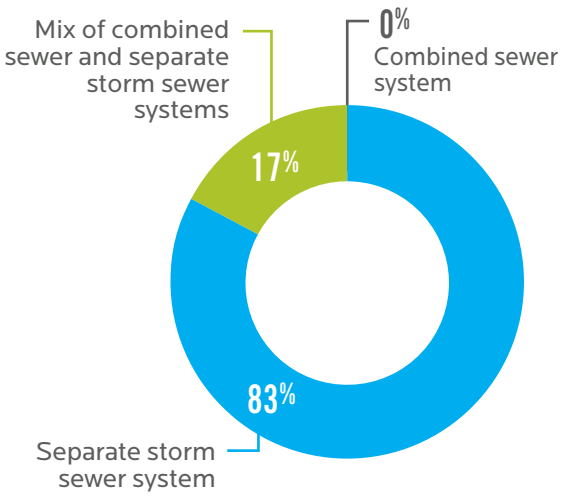


FIGURE 4

IF YOU SELECTED "MIX OF COMBINED SEWER AND SEPARATE STORM SEWER SYSTEMS" IN THE PREVIOUS QUESTION, INDICATE THE PERCENTAGE OF COMBINED SEWER VERSUS SEPARATE STORM SEWER SERVICES.

Combined sewer	Over 75%	50% – 75%	25% – 50%	Less than 25%
Separate storm sewer	Less than 25%	25% – 50%	50% – 75%	Over 75%
Number of utilities	0	4	5	4
Percentage*	0%	31%	38%	31%

**Based on number of utilities that selected "Mix of Combined Sewer and Separate Storm Sewer Systems" in the previous question.*

FIGURE 5

IS YOUR UTILITY UNDER CONSENT ORDER FOR COMBINED SEWER OVERFLOW ISSUES?

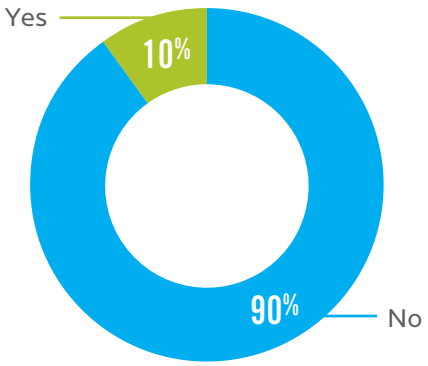


FIGURE 6

PLEASE INDICATE HOW YOUR CURRENT STORMWATER OPERATIONS ARE GOVERNED. *(Select one)*

	2014	2012
Stand-alone stormwater utility	55%	46%
Combined with Department of Public Works (Nonwater/wastewater utility)	25%	28%
Combined with water and/or wastewater utility	19%	21%
Other (Multiple city departments)	1%	5%

PLANNING

Utilities currently face the challenge of complying with multiple discharge permits including the National Pollutant Discharge Elimination System (NPDES) and the Municipal Separate Storm Sewer System (MS4) permits to meet the Clean Water Act (CWA) obligations. The survey indicates the continuing trend of municipalities generally focusing on individual permit requirements, rather than comprehensively planning for multiple permit obligations, even though many of these permits have overlapping requirements. Integrated strategic and tactical planning enables municipalities to effectively leverage available resources to fulfill multiple regulatory requirements and public needs concurrently.

This survey finds that while 73% of the respondents have to comply with both NPDES and MS4 permit requirements, only 12% of respondents have developed any type of integrated wet weather or water resources plan.

Especially with a growing funding gap where utilities need to consistently do more with less resources, utilities need to proactively develop and deploy integrated planning and foster the idea of "one water". Such an approach would better position the utility to achieve the triple bottom line - economic, environmental, and community benefits.

With respect to stormwater rate setting, in the case of combined sewer systems, utilities continue to grapple with the policy issue of whether to allocate a portion of the combined sewer system and CSO mitigation O&M and capital costs to the stormwater utility. The survey indicates that while some CSO communities, such as Philadelphia, allocate a portion of the combined sewer system costs to stormwater utility, many others do not. Such differences in methodology directly impact the magnitude of stormwater rates that utilities define.

FIGURE 7

WHAT REGULATORY PERMIT REQUIREMENTS DO YOU CURRENTLY HAVE TO COMPLY WITH?

MS4 permit	91%
NPDES permit	79%
Total maximum daily load (TMDL)	50%
CSO program	14%
Other	4%

Percentage based on number of utilities that responded to the question.

FIGURE 8

WHAT TYPES OF PLANS HAS YOUR UTILITY DEVELOPED?

(Select all that apply)

Stormwater/watershed management plan	73%
Stormwater master plan	72%
Long-term control plan (LTCP)	17%
Integrated wet weather management plan (to support wastewater and stormwater requirements)	12%
Integrated water resources plan	9%
Other	1%

Percentage based on number of utilities that responded to the question.

FIGURE 9

PLEASE RANK ON A SCALE OF 1 TO 5, THE IMPORTANCE OF EACH OF THE ISSUES LISTED BELOW TO THE STORMWATER INDUSTRY. *(1: Least important; 5 = Most important)*

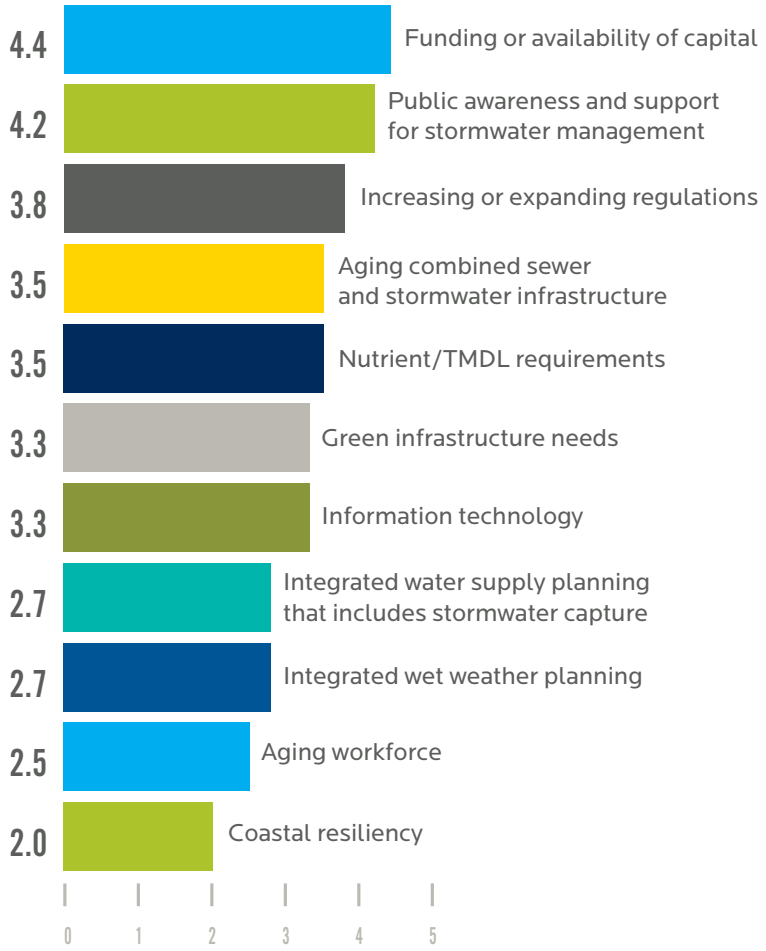
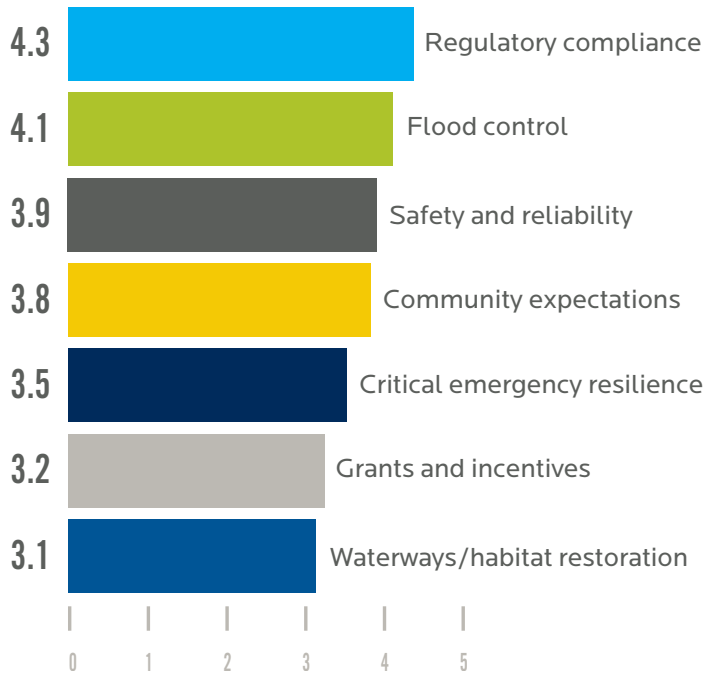


FIGURE 10

PLEASE RANK ON A SALE OF 1 TO 5, HOW THE FOLLOWING ISSUES DRIVE INFRASTRUCTURE INVESTMENT PLANNING AND DECISIONS WITHIN YOUR STORMWATER UTILITY. *(1: Very weak; 5 = Very strong)*



FINANCING AND ACCOUNTING

A user fee funding mechanism typically provides revenue stability, certainty, and a dedicated funding stream. However, even in a user fee funded program, diligent annual financial planning and rate adjustments are necessary to maintain revenue sufficiency, build financial resiliency to meet changing needs, and provide for long term financial viability. In the current environment, utilities are under pressure to keep rates low while maintaining or enhancing the level of service.

Stormwater utilities continue to fund capital program primarily through cash financing as opposed to debt financing. As Figure 13a indicates, 85% of the participants indicate cash financing as the primary source of capital funding, and the trend of funding capital program through user fee generated cash revenues seems to continue. In the absence of a balanced funding mix of debt and cash financing, utilities that rely solely on cash financing of capital program, face capital funding challenges if they are unable to raise the rates. Consistent with the last survey, only 32 % of the participants indicate funding is adequate for meeting most needs. In this survey that 17% of the participants indicate that funding is not sufficient to meet even the "most urgent" needs indicating a growing funding adequacy gap at a time when regulatory requirements and asset management needs are increasing..

Utilities need to engage in more robust and continuous public education to enhance understanding of the stormwater management needs and financial issues in conjunction with integrated planning. These measures will likely help utilities chart a more financially viable path and enhance equity in cost recovery. Ninety six percent of the utilities reported having a user fee that is supported by a State enabling legislation.

FIGURE 11

PLEASE INDICATE THE PERCENTAGE OF YOUR STORMWATER BUDGET THAT IS ATTRIBUTABLE TO CSO MITIGATION ISSUES. *(Select one)*

0%, stormwater budget does not include expenditures related to combined sewer overflow (CSO) issues	46%
1% – 10%	23%
11% – 20%	16%
21% – 30%	0%
31% – 50%	0%
Over 50%	15%

FIGURE 12

WHAT IS THE ESTIMATED 2014 ANNUAL STORMWATER CAPITAL IMPROVEMENT PROGRAM BUDGET?

Minimum	$30,000
Maximum	$72,000,000
Average	$7,082,127

FIGURE 13

PLEASE PROVIDE AN APPROXIMATE PERCENTAGE OF FUNDING FROM EACH SOURCE.

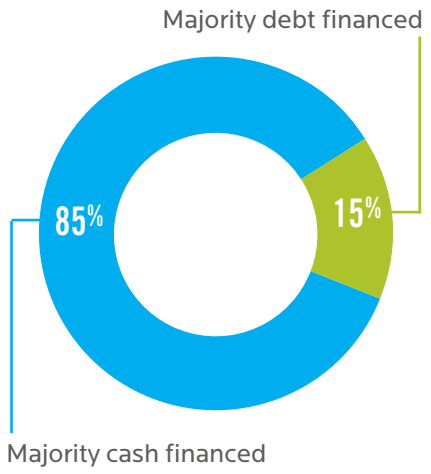


FIGURE 13A

PLEASE PROVIDE AN APPROXIMATE PERCENTAGE OF FUNDING FROM ONE OR MORE OF THE FOLLOWING SOURCES THAT ARE USED TO FINANCE YOUR UTILITY'S STORMWATER CAPITAL IMPROVEMENT PROGRAM (CIP).

Debt financed	15%
Stormwater revenue bonds	17%
General obligation (tax) bonds	8%
Sales tax bonds	1%
Combined stormwater/other bonds	1%
Benefit district bonds	0%
Other debt	5%

Cash financed	85%
Stormwater user fees	92%
Grants	27%
Ad valorem taxes	4%
Permitting and other taxes	18%
Sales taxes	5%
Special tax districts	8%
New development impact fees	8%
Other cash	12%

Percentage based on number of utilities that responded to the question.

FIGURE 14

PLEASE PROVIDE AN APPROXIMATE PERCENTAGE OF REVENUE FROM ONE OR MORE OF THE FOLLOWING SOURCES.

	Over 75%	50% – 75%	25% – 50%	Less than 25%
Stormwater user fees	87%	5%	5%	3%
Taxes	0%	13%	13%	74%
Grants	28%	0%	43%	29%
Other	5%	5%	0%	90%

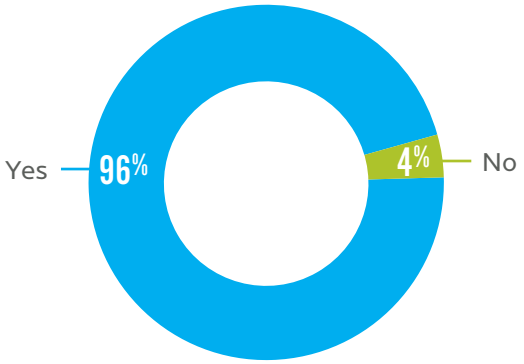
FIGURE 15

PLEASE INDICATE THE LEVEL OF ADEQUACY OF AVAILABLE STORMWATER FUNDING.

	2014	2012	2010	2007
Adequate to meet all needs	6%	18%	7%	8%
Adequate to meet most needs	32%	31%	36%	39%
Adequate to meet most urgent needs	45%	40%	47%	40%
Not adequate to meet urgent needs	17%	11%	10%	13%

FIGURE 16

DOES YOUR STATE HAVE ENABLING LEGISLATION THAT AUTHORIZES MUNICIPALITIES TO CHARGE A STORMWATER USER FEE?



STORMWATER USER FEES AND BILLING

A user fee needs to reflect a reasonable nexus between the costs incurred in providing services and the magnitude of charges that are defined for the rate payer. As it is not practical to measure stormwater runoff, stormwater charges are established based on surrogate measures such as a property's pervious and/or impervious areas. Over 90% of the participants have indicated that they use actual and/or effective impervious area as the basis of charges.

As service levels may differ among the various geographical areas, utilities often have to contend with the policy issue of whether to set rates that reflect service level differences. While zone-based rates may provide for equity in cost recovery, they can be administratively more burdensome and have the potential to create economic disparities among zones.

With respect to rate setting, affordability is key to enabling stakeholder buy-in. The survey indicates that a majority of the participants (78%) do not offer any type of discounts, and only 11% offer low income discount. The survey also indicates that 30% of the participants had not adjusted the rates in over 10 years. Instead of having a long hiatus from implementing requisite rate adjustments, utilities should consider the feasibility of implementing consistent rate adjustments to maintain financial viability while concurrently exploring mechanisms such as low income assistance programs to help with affordability.

The risk of legal challenges could be a potential barrier to establishing stormwater user fees. Seventy-eight percent of the utilities that responded in this survey had not faced any legal challenges to their fees. Of those that faced a legal challenge, the challenge primarily seems to have been either due to lack of authority to assess fees or on the grounds of constitutionality.

FIGURE 17

PLEASE INDICATE THE YEAR WHEN YOUR UTILITY'S CURRENT STORMWATER USER RATE SCHEDULE BECAME EFFECTIVE.

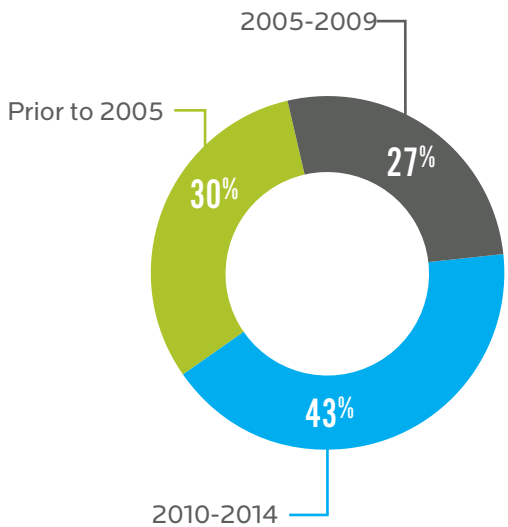
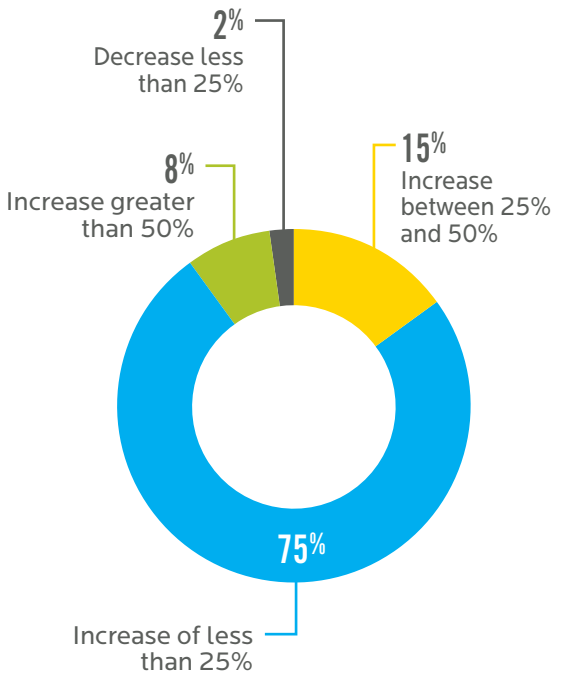


FIGURE 18

WHAT WAS THE MAGNITUDE OF YOUR UTILITY'S LAST CHANGE IN FEES?



Percentage based on number of utilities that responded to the question.

FIGURE 19

IS YOUR STORMWATER USER FEE BASED ON SOME FORM OF PARCEL AREA SUCH AS GROSS AND/OR IMPERVIOUS AREA?

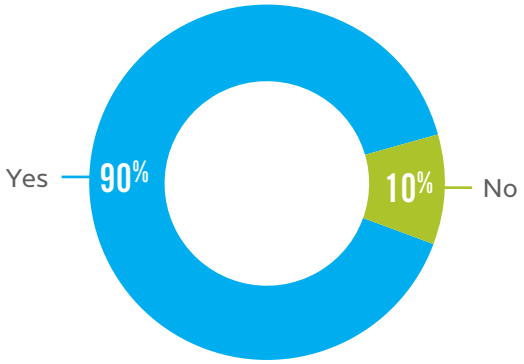
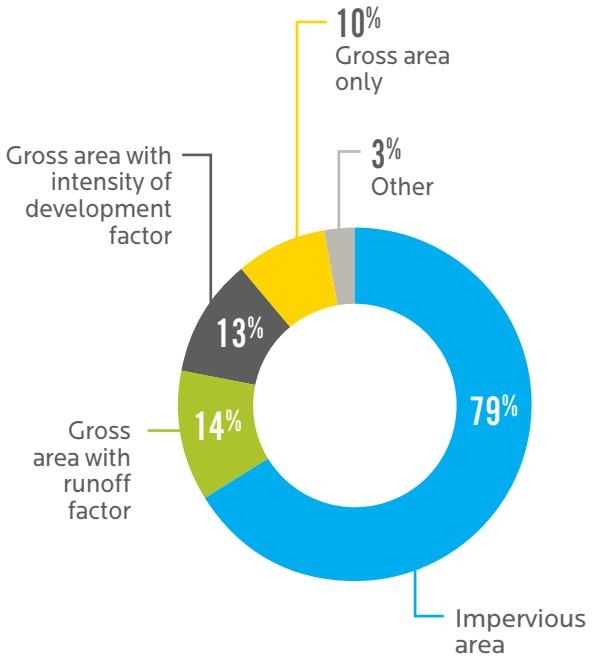


FIGURE 20

WHAT IS THE BASIS FOR CALCULATING YOUR PARCEL AREA BASED STORMWATER USER FEES?

(Select all that apply)



84% of respondents use only one method.

FIGURE21

WHAT IS YOUR UTILITY'S AVERAGE SINGLE FAMILY RESIDENTIAL PARCEL SQUARE FOOTAGE? *(Include attached residential up to four dwelling units)*

Average Gross Area	Square feet
Minimum	2,105
Maximum	22,500
Median	8,000
Average Impervious Area	
Minimum	794
Maximum	7,500
Median	2,368

FIGURE 22

WHAT TYPE OF RATE STRUCTURE DOES YOUR UTILITY HAVE FOR THE SINGLE FAMILY RESIDENTIAL PARCELS?

(Select all that apply)

Uniform flat fee	67%
Tiered rates	28%
Individually calculated	6%

FIGURE 23

IF YOU HAVE A TIERED RESIDENTIAL RATE STRUCTURE, PLEASE INDICATE THE TOTAL NUMBER OF TIERS.

Percentage based on number of utilities that indicated they had tiered rates.

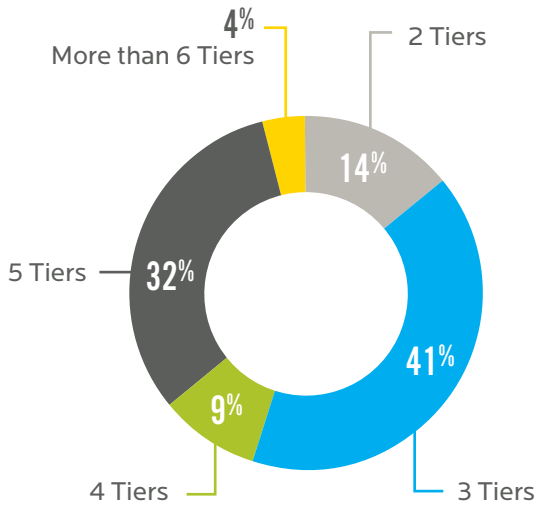


FIGURE 24

IF YOU HAVE A TIERED RESIDENTIAL RATE STRUCTURE, WHAT IS THE BASIS OF THE TIERS? *(Select one)*

Impervious area tiers only	59%
Gross area tiers only	32%
Tiers for impervious area and gross area	9%

FIGURE 25

DOES YOUR STORMWATER RATE STRUCTURE INCLUDE A SEPARATE BILLING/COLLECTION OR SERVICE CHARGE?

Yes	12%
No	88%

FIGURE 26
AVERAGE MONTHLY SINGLE-FAMILY RATE

City/County	State	2014 Average Monthly Residential Charge
Seattle	WA	26.58
Fort Collins	CO	14.26
Philadelphia	PA	13.45
Everett	WA	13.19
Longmont	CO	13.05
Appleton	WI	12.92
Naples	FL	12.80
Lubbock	TX	12.00
Palo Alto	CA	11.99
Orlando	FL	11.00
Gresham	OR	9.84
Bremerton	WA	9.83
Austin	TX	9.20
Loveland	CO	9.10
Hamilton County	TN	9.00
Pierce County	WA	8.83
Gainesville	FL	8.56
Aurora	CO	8.16
Edgewater	FL	8.00
Charlotte	NC	7.89
Cottage Grove	OR	7.47
Denver	CO	7.38
Hampton	VA	6.99
St. Paul	MN	6.83
Titusville	FL	6.62
Duluth	MN	6.08
Charleston	SC	6.00
Lakeland	FL	6.00
Cocoa Beach	FL	6.00
Oakland Park	FL	6.00
Cocoa	FL	5.75
Wooster	OH	5.75
Bloomington	MN	5.72
Dubuque	IA	5.60
Olathe	KS	5.55
Tulsa	OK	5.43
Dayton	OH	5.42
Fort Worth	TX	5.40
Satelite Beach	FL	5.33

City/County	State	2014 Average Monthly Residential Charge
Roseburg	OR	5.00
San Clemente	CA	5.00
Cedar Rapids	IA	4.90
Northen Kentucky Sanitation District No. 1	KY	4.80
Griffin	GA	4.79
Niceville	FL	4.51
Haines City	FL	4.50
Topeka	KS	4.25
Summerville	SC	4.00
Lawrence	KS	4.00
Raleigh	NC	4.00
Richmond	VA	3.75
Ellicott City	MD	3.75
Wichita Falls	TX	3.55
Cincinnati	OH	3.54
Mesquite	TX	3.50
Billings	MT	3.01
Arnold	MO	3.00
Forest Park	OH	3.00
Fayetteville	NC	3.00
McKinny	TX	2.75
Clark County	WA	2.75
Modesto	CA	2.73
Littleton	CO	2.50
Contra Costa County	CA	2.50
Ashville	NC	2.34
Overland Park	KS	2.00
Frisco	TX	2.00
Lakewood	CO	1.98
Moline	IL	1.94
Santa Clarita	CA	1.87
Santa Cruz	CA	1.75
Shelby County	TN	1.50
Springfield	OH	1.30
Elkhart	IN	1.25
Columbia	MO	1.15
Hillsborough County	FL	1.00
Omaha	NE	0.64
St. Louis	MO	0.24

FIGURE 27

IN YOUR STORMWATER RATE STRUCTURE, DO YOU HAVE RATES THAT DIFFER BY SERVICE AREAS/ZONE OR WATERSHEDS?

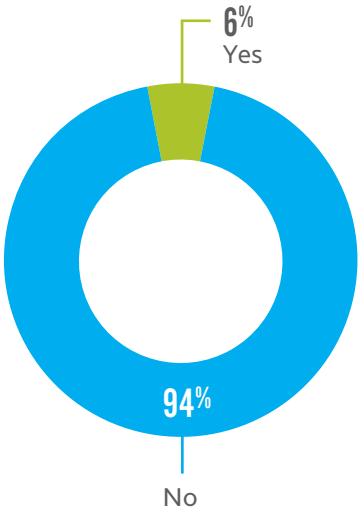


FIGURE 28

ARE ONE-TIME IMPACT/CAPITAL RECOVERY FEES APPLIED TO NEW STORMWATER UTILITY CUSTOMERS OR NEW DEVELOPMENTS?

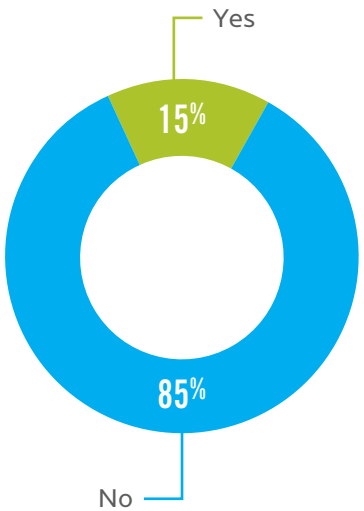


FIGURE 29

HOW FREQUENTLY DOES YOUR UTILITY UPDATE CUSTOMER PARCEL INFORMATION, SUCH AS CUSTOMER CLASSES AND GROSS AND IMPERVIOUS AREAS SPECIFIC TO STORMWATER BILLING? *(Select One)*

No specified frequency/as needed	70%
Annually	14%
Monthly	9%
Quarterly	4%
Other	3%

FIGURE 30

HOW ARE STORMWATER USER FEES BILLED? *(Select One)*

Included with Other Utility Bill (Water/Sewer/Electric/Gas)	71%
Included with tax bills	24%
Separate stormwater bill	5%

FIGURE 31

DOES YOUR UTILITY OFFER ANY OF THE FOLLOWING STORMWATER DISCOUNTS? *(Select all that apply)*

No discounts offered	78%
Low-income discount	11%
Other	8%
Elderly/senior citizen discount	7%
Educational institutions discount	5%
Disabled discount	1%

FIGURE 32

WHAT OF THE FOLLOWING CLASSES OF PROPERTIES ARE CURRENTLY EXEMPT FROM STORMWATER USER FEES? *(Select all that apply)*

Public streets/roads/median /public-right-of-way	63%
Undeveloped land	54%
Rail rights-of-way	41%
Public parks	27%
Government	24%
Agricultural land	21%
School districts	19%
Cemeteries	13%
Colleges/universities	12%
No properties are exempt	12%
Other	10%
Airports	9%
Religious organizations	5%
Direct discharge to water body	3%

FIGURE 33

WHO IS RESPONSIBLE FOR PAYMENT OF STORMWATER USER FEES? *(Select One)*

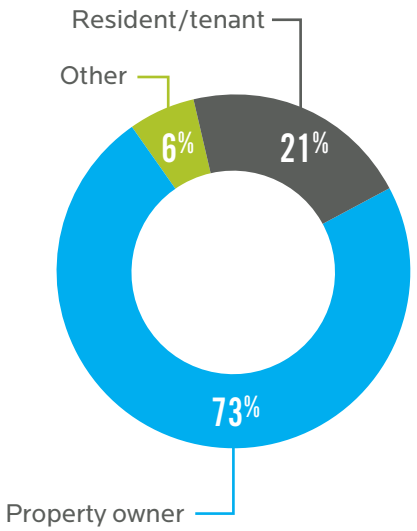


FIGURE 34

HOW IS PAYMENT ENFORCED? *(Select all that apply)*

Water/electric service shutoff	51%
Lien on property	47%
Collection agency	27%
Other	10%
Sheriff's sale	4%

FIGURE 35

HAVE YOUR STORMWATER USER FEES EVER FACED A LEGAL CHALLENGE?

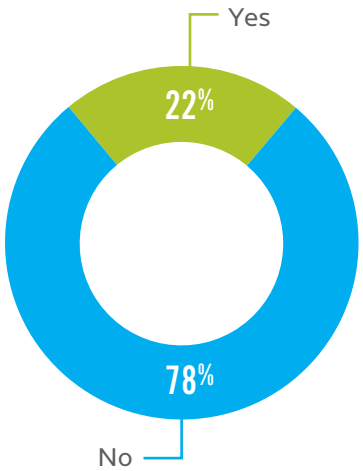


FIGURE 36

PLEASE INDICATE THE CUSTOMER/CLASS THAT CHALLENGED YOUR STORMWATER USER FEE.

(Select all that apply)

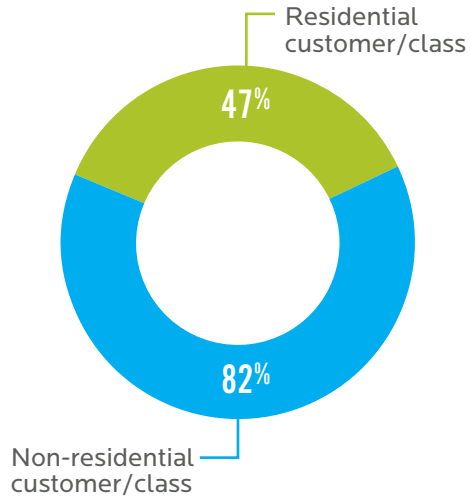


FIGURE 37

WHAT WAS THE BASIS OF THE CHALLENGE?

(Select all that apply.)

Tax and not a user fee	59%
Constitutionality	35%
Lack of authority to assess stormwater fees	29%
Equity and fairness	12%
Rate methodology	12%
Other	6%

STORMWATER CREDITS AND INCENTIVES

Stormwater incentives can be defined as one-time monetary assistance or other rewards that municipalities offer to encourage property owners to support community goals such as engaging in sustainable development practices or protecting water quality. Incentives can be used as a mechanism to foster public-private partnerships in stormwater management.

Stormwater credits are ongoing reductions to a property's calculated stormwater charges that are given to properties that either reduce demand on the stormwater system and/or reduce the utility's cost of service through functional stormwater management practices and Best Management Practices (BMPs). Stormwater credit serves a key role in enhancing the perception of "user fees" by affording the customers opportunities to reduce the magnitude of the user fees commensurate with extent of onsite stormwater management.

As Figure 38 indicates, 44% of the respondents offer some type of credits and only 15% to 18% percent offer some type of incentives. The most common criteria for offering credits are volume reduction and peak flow reduction. Even in utilities that offer credits, the actual number of parcels that seek credits is relatively low at four percent. This is to some extent due to the fact that onsite stormwater management is capital intensive yielding low return on investment, which in turn impacts the economics of engaging in onsite stormwater management.

FIGURE 38

DOES YOUR UTILITY HAVE A STORMWATER CREDIT PROGRAM?

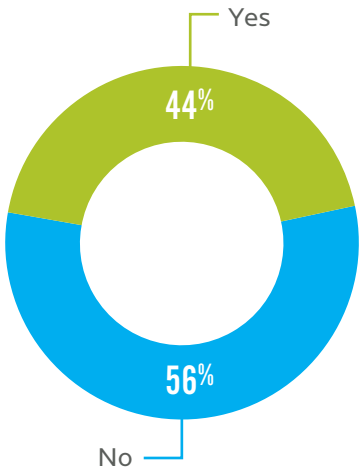


FIGURE 39

PLEASE INDICATE THE CLASSES OF PARCELS THAT ARE OFFERED STORMWATER CREDITS. *(Select one)*

Nonresidential only (includes multifamily and condos)	53%
Both residential and nonresidential	47%

FIGURE 40

DO YOU OFFER CREDITS FOR ANY OF THE FOLLOWING STORMWATER MANAGEMENT ACTIONS? *(Select all that apply)*

Volume reduction	65%
Peak flow reduction	59%
Water quality control	50%
Direct discharge to a surface water body (without using a municipal stormwater system)	41%
Good housekeeping practices (sweeping, oil separation, etc.)	21%
Education	18%
NPDES permit compliance	15%
Other	3%

FIGURE 40A

PLEASE INDICATE THE MAXIMUM ALLOWABLE CREDIT FOR EACH ACTION SELECTED.

	Maximum allowance credit			
	Over 75%	**50% – 75%**	**25% – 50%**	**Less than 25%**
Volume reduction	37%	38%	25%	0%
Peak flow reduction	26%	20%	27%	27%
Water quality control	14%	22%	43%	21%
NPDES Permit Compliance	0%	0%	0%	100%
Education	0%	50%	17%	33%
Direct discharge to a surface water body (without using a municipal stormwater system	50%	10%	10%	30%
Good housekeeping practices (sweeping, oil separation, etc.)	20%	0%	20%	60%
Other	0%	0%	0%	100%

FIGURE 41

IS THERE A CAP FOR THE TOTAL AMOUNT OF CREDITS THAT ARE OFFERED?

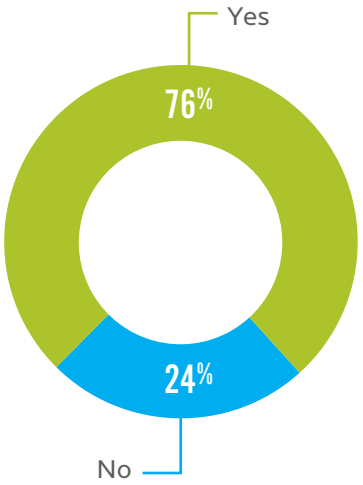


FIGURE 41A

IF YES, WHAT IS THE MAXIMUM STORMWATER FEE REDUCTION?

Maximum stormwater fee reduction		
>75%	**50 – 75%**	**25 – 50%**
32%	40%	28%

FIGURE 42

DO YOU OFFER CREDITS FOR ANY OF THE FOLLOWING TO ENCOURAGE "GREEN" OR LOW IMPACT DEVELOPMENT (LID) STORMWATER MANAGEMENT PRACTICES? *(Select all that apply.)*

None of the above	61%
Porous/permeable surfaces	36%
Rain gardens	27%
Green roofs	21%
Rain barrels	9%
Other	6%

Percentage based on number of responses

FIGURE 43

DOES YOUR UTILITY OFFER ANY TYPE OF STORMWATER CREDITS TRADING/BANKING PROGRAM?

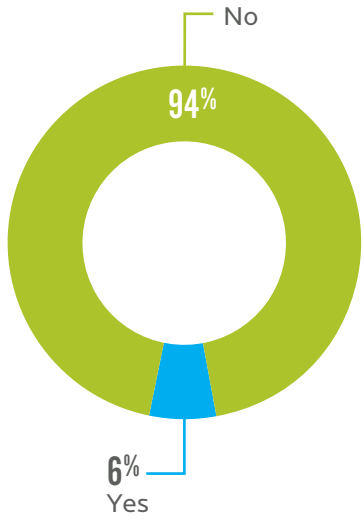


FIGURE 44

DO YOU OFFER ANY OF THE FOLLOWING INCENTIVE PROGRAMS? *(Select all that apply)*

Site assessment/BMP design assistance	18%
Stormwater grants	15%
Cost sharing	15%
BMP installation cost rebates	6%

PUBLIC INFORMATION/EDUCATION

Majority of the participants consider educating the public and the policy makers on stormwater management and engaging them in developing integrated solutions as essential outreach tasks to sustaining stormwater utilities. Public education and outreach is also one of the MS4 permit requirements which with utilities have to comply. As indicated in Figure 45, 96% of the respondents view ongoing public education as either "helpful" or "essential" to the success of their use fee-funded stormwater utility.

To better understand how utilities are engaging stakeholders, respondents were asked to rate the effectiveness of various stakeholder engagement activities that they have conducted. Consistent with the previous survey, direct and targeted interface with the customers through community events/presentations continues to rank the highest and interestingly social media had the lowest ranking. Utilities continue to view leveraging schools, to educate on stormwater management, as important a channel as print/TV media.

And, with all large-scale public information and educational campaign, the key to effective communication is the use of multiple communications channels frequently and consistently to ensure stakeholders see and remember the education campaign.

FIGURE 45

HOW IMPORTANT IS AN ORGANIZED, ONGOING PUBLIC INFORMATION/EDUCATION EFFORT TO CONTINUED SUCCESS OF USER FEE-FUNDED STORMWATER UTILITY? *(Select one)*

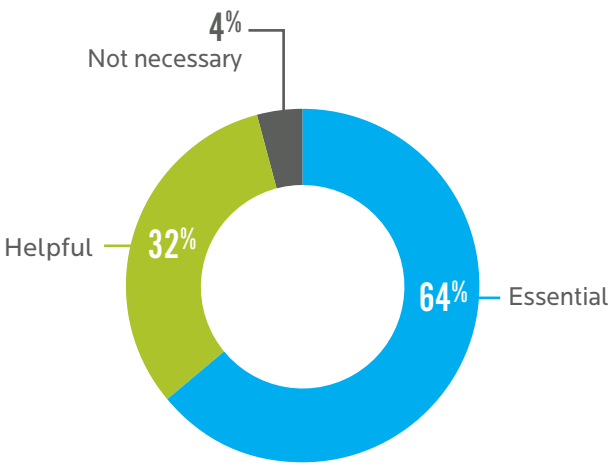
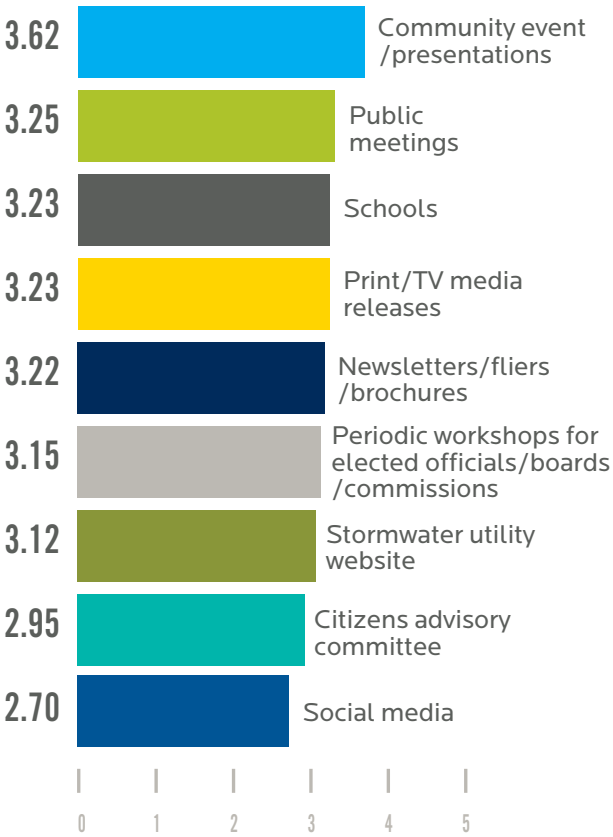


FIGURE 46

PLEASE RANK ON A SCALE OF 1 TO 5, THE EFFECTIVENESS OF THE SPECIFIC ACTIVITIES YOU HAVE UNDERTAKEN TO SECURE STAKEHOLDER APPROVAL AND SUPPORT FOR STORMWATER USER FEES. *(1: Least Effective, 5: Most Effective)*



BUILDING A WORLD OF DIFFERENCE®

Black & Veatch is an employee-owned, global leader in building critical human infrastructure in Energy, Water, Telecommunications and Government Services. Since 1915, we have helped our clients improve the lives of people in over 100 countries through consulting, engineering, construction, operations and program management. Our revenues in 2013 were US $3.6 billion. Follow us on www.bv.com and in social media.

BLACK & VEATCH
Management Consulting
P +1 913-458-2000 | **E** Stormwater@bv.com | **W** bv.com/stormwater

BLACK & VEATCH
Building a world of difference.®

11401 Lamar Avenue, Overland Park, KS 66211
P +1 913-458-2000 | **W** bv.com

Appendix B | Project Team Resumes

Robert Chambers

Mr. Chambers is a Manager with extensive utility and consulting experience involving a variety of projects associated with electric, water and wastewater, stormwater, both public and private, throughout the southeastern United States. His utility knowledge covers a wide range of utility finance issues, including capital financing analyses, valuation studies for acquisitions, revenue bonds, utility rates, utility regulatory processes, economic feasibility studies and cost-of-service studies.

In addition, Mr. Chambers has led project teams in the development of dynamic and interactive financial models for utility cost-of-service studies, rate studies, financial benchmarking, data retrieval and analysis, feasibility analyses, system expansion programs, capital acquisition alternatives, business case analysis, wholesale capacity transactions and utility regionalization scenarios. Mr. Chambers has spoken at national utility programs such as AWWA – Utility Management, the Southwest Florida Government Financial Officers Association, the Florida American Water Works Association Conference, and the Alabama Mississippi American Water Works Association conferences, to name a few, on topics such as demand management, program development, energy management, customer affordability, and financial planning. In addition, Mr. Chambers has earned a Masters of Business Administration with a concentration in Finance from the Crummer Graduate School of Business at Rollins College.

PROJECT EXPERIENCE

- Wastewater & Stormwater Utility Rate & Feasibility Analysis | City of Key West, FL
- Common Cost Allocation Study, Economic Feasibility Assessment, and Adequacy of Utility Rates Assessment | Miami-Dade Water and Sewer Department, FL
- Water & Wastewater Drought Management Rate Structure Review | Broward County, FL
- Water & Wastewater Rate Study | North Miami, FL
- Water & Wastewater Rate and Impact Fee Study | Lauderhill, FL
- Revenue Bond Feasibility Study | Emerald Coast Utility Authority, FL
- Water, Wastewater, & Electric Cost of Service and Rate Study | Utilities Commission, City of New Smyrna Beach, FL
- Water & Wastewater Capacity Fee Study and General Rate Review | City of Lakeland, FL
- Allegheny County Sanitary Authority (ALCOSAN), Pittsburgh, Pa. | Wastewater Cost of Service Rate Study, Financial Forecast, and Wet Weather Plan Feasibility Financial Analyses

MANAGER

Specialization:
Cost of Service Analysis, Capital Financing, Acquisitions and Valuations, Revenue Bonds, Utility Rates, Utility Regulatory Processes

Education
- B.S., Finance University of Central Florida, 2002
- M.B.A., Crummer Graduate School of Business, Rollins College, 2007

Experience: Utility Finance
2001 –Present

Hartman & Associates, Inc.
2001–2002

Black & Veatch, Inc.
2003–2008

Malcolm Pirnie, Inc.
2008–2010

Black & Veatch, Inc.
2010–Present

- Water & Wastewater Rate Study | Puerto Rico Aqueduct and Sewer Authority, Puerto Rico
- Water, Sewer, and Stormwater Cost of Service Analysis | Wilmington, DE
- City of Hollywood, FL | Energy Efficiency Master Plan
- Asset Management Plan Financial Assessment | Lee County, FL
- Strategic Sustainability Plan Development | Palm Beach County, FL
- Water and Wastewater Rate and Special Services Fees Study | San Antonio Water System, TX
- Wastewater Wholesale Cost-of-Service and Rate Study | City of Fort Worth, TX
- Water and Wastewater Rate Study | Taylor, TX
- Rate Water Rate Study | Birmingham Water Works Board, AL
- Water and Sewer Impact Fee Analysis| City of Reno, NV Water & Sewer Rate,
- Debt Issuance Support | City of Greensboro, NC
- Water and Wastewater Rate Study | Beaufort Jasper Water and Sewer Authority, SC
- Water and Wastewater Rate Study | Athens Clarke County, GA

PUBLICATIONS & PRESENTATIONS

Energy Efficiency Master Planning: A Florida Utility Case Study, Florida Water Resources Journal, March 2015

Energy Efficiency Master Planning: A Florida Utility Case Study, Florida American Water Works Association Conference, December 2014

Energy Cost Management, A Discretion or a Necessity – Managing Energy Cost Utilizing the Energy Decision Cash Flow Model, Mississippi Alabama American Water Works Conference, October 2014

How to Implement a Utility Level Customer Affordability Program – Basic Elements and Key Considerations, Mississippi Alabama American Water Works Conference, October 2014

How to Utilize and Administer Low Cost State Revolving Funding in Florida, Florida American Water Works Association Region VII Quarterly Meeting, October 2012

How to Use Program Development Funding to support Financial Needs for Water and Sewer Utilities, Southwest Florida Government Financial Officers Association Conference, June 2012

Rafael E. Frías III, P.E.

Mr. Frias serves as a Senior Project Manager and Client Director with the global water business of Black & Veatch Corporation and is responsible for the management of the Company's operations in Southeast Florida and Puerto Rico. Rafael specializes in the management of water resources projects, including water supply, water treatment, hydropower and stormwater planning and design. Mr. Frias is also experienced in incorporating sustainability principles into project designs and in the development of sustainable water planning technologies for the management of watersheds and ecosystems, water scarcity and wet-weather conditions. Rafael is an active member of the American Water Resources Association (AWRA), Water Environment Federation (WEF) and American Water Works Association (AWWA), for which he as published papers and delivered presentations on comprehensive water resources issues, including sustainable water planning, surface water management, water treatment technologies, aquifer storage and recovery (ASR) and small hydropower.

Some of Mr. Frias' key recent assignments and experience include:

- Project management for dam failure studies in Puerto Rico.
- Program Management/Construction Management for implementation of a $455 million Capital Improvement Program in Puerto Rico.
- Project management for chemical facilities at a water treatment plant.
- Experience using of surface water and groundwater modeling applications including HEC-1, HEC-HMS, HEC-GeoHMS, HEC-RAS, HEC-GeoRAS, XP-SWMM, ICPR, TR-55, EPANET, Processing MODFLOW, PLUMES, ArcGIS and project scheduling applications, including Primavera P3e/c and Microsoft Office Project.

PROJECT EXPERIENCE

- PREPA | Dam Failure Study at Carite Dam; Puerto Rico | 2011 – 2012
- PRASA | Program Management/Construction Management Services; Puerto Rico | 2008 – Present
- Hillsborough County | New Chemicals Facility at the Fawn Ridge Water Treatment Plant; Tampa, FL | 2008 - 2011
- Hillsborough County | Drainage Improvements at the Fawn Ridge Water Treatment Plant; Tampa, FL | 2008 - 2009
- City of Fort Myers | East Water Reclamation Campus; Fort Myers, FL | 2008
- Hillsborough County | South/Central Wastewater Service Area Wastewater Master Plan Update Report; Tampa, FL | 2007 - 2008
- South Florida Water Management District | L-63N Canal ASR System Reactivation for the Lower Plan; West Palm Beach, FL | 2007

CLIENT SERVICE MANAGER

Specialization:
Water Resources, Stormwater and Water Treatment Systems

Office Location
Sunrise, FL

Education
- Master of Civil Engineering, University of Kansas, December 2002
- BS, Biological Engineering, Louisiana State University, December 1997

Professional Registration
PE – 2004, FL, 61912
PE – 2011, PR, 24726
PE – 2003, KS, 17469

Specialization Certification and Awards:
- Designing for Effective Sediment and Erosion Control
- 10-hour OSHA Safety and Health Construction Certification
- AWRA A. Ivan Johnson Outstanding Young Professional Award – 2006
- Public Works Magazine 2007 Trendsetters List
- Member of the Board of Directors for AWRA – 2010
- Member of the Potable Reuse Committee for the WateReuse Association – Florida

Professional Associations
- American Water Resources Association
- Water Environmental Federation
- American Water Works Association
- WateReuse – Florida

Year Career Started
1997

Year Started with B&V
1999

- Tampa Bay Water | South Pasco Water Treatment Plant Chemical Feed Modifications; Tampa, FL | 2007
- Tampa Bay Water | Continued SWFWMD ERP Permitting Services – Inspection of Stormwater Treatment Facilities; Tampa, FL | 2006 - 2009
- PRASA | Optimization of the Lajas Valley Irrigation System; Puerto Rico | 2006 - 2008
- City of Lakeland | English Oaks Wastewater Booster Pump Station Project; Lakeland, FL | 2007
- City of Ocala | Consumptive Use Permit (CUP); Ocala, FL | 2006
- City of Ocala | Lake Tuscawilla and Old City Yard Watersheds Flood Analysis; Ocala, FL | 2006
- South Florida Water Management District | Everglades Agricultural Area (EAA) Reservoir A-1, Canals, Earthworks, and Structures Design; West Palm Beach, FL | 2006
- Tampa Bay Water | Seawater Desalination Facility Modifications; Tampa, FL | 2006 - 2007
- Tampa Bay Water | Regional Reservoir Expansion Analysis; Tampa, FL | 2006
- South Florida Water Management District | Everglades Agricultural Area (EAA) Reservoir A-1, Seepage and Borrow Canal Excavation; West Palm Beach, FL | 2006
- City of Ocala | Old City Yard Drainage Study and Detention Basins Design; Ocala, FL | 2005 - 2006
- South Florida Waters Management District | Everglades Agricultural Area Reservoir A-1, Water Balance Model; West Palm Beach, FL | 2004 - 2006
- City of Lakeland | West Lakeland Wasteload Reduction Facility; Lakeland, FL | 2004 - 2007
- City of Ocala | SR-40 Drainage Study and Detention Basins Design; Ocala, FL | 2004 - 2007
- City of Ocala | Lake Tuscawilla Drainage Study; Ocala, FL | 2004
- Heartland Water Alliance (HWA) | Water Supply Planning; DeSoto, Hardee, Highlands, and Polk Counties, FL | 2004
- City of Ocala | Thompson's Bowl Drainage Study and Re-Permitting Efforts; Ocala, FL | 2004
- Tampa Bay Water | Regional Water Treatment Plant – Drainage Study; Tampa, FL | 2004
- Tampa Bay Water | System Engineering Services; Tampa, FL | 2004
- Nestle Waters North America | Groundwater Monitoring; Tampa, FL | 2004

- Johnson County | Captain/Kill Watershed Study; Johnson County, KS | 2003 - 2005

SELECTED PUBLICATIONS

An Island-Wide Hydropower Study, Hydrovision International, July 2012, Coauthor

Sustainable Water Resources Technologies for a Changing Climate, American Water Resources Association *Water Resources IMPACT,* July 2010, Coauthor

Numeric Nutrient Criteria on the Horizon – Can Nutrient Removal Surpass the Limits of Technology? Water, Environment and Technology, April 2010, Coauthor

Water Resources Technologies for Sustainable Water Planning, Journal of the American Water Works Association – International Issues, May 2009, Coauthor

Testing of Disinfection Alternatives for South Florida ASR Facility, Journal of the New England Water Works Association, December 2008, Coauthor

Disinfection Alternatives for South Florida Water Management District's ASR Facility, Florida Water Resources Journal, April 2008, Coauthor

Old Faults Aren't Our Fault: Proposed Rio Valenciano Dam, Juncos, Puerto Rico, Safety Issue of Perception Problem, WEFTEC Latin America, 2001, Coauthor

OTHER INFORMATION

"On behalf of all our personnel, I would like to express our sincere appreciation for your display of professionalism and support as speakers during this technical workshop. We look forward to continue working in the future with Black & Veatch on this and other matters regarding our Dam Safety Program."

Carlos A. Negron Alfonso, PE, Head of the Public Irrigation, Dams & Reservoir Division, Puerto Rico Electric Power Authority (PREPA), writing about Rafael Frias and his project team

"As the District Manager, I oversaw Black & Veatch's work, and they successfully met project schedule and budget requirements. The District was very pleased with the professional services provided by Black & Veatch."

Robert Verrastro, PG, Lead Hydrogeologist, South Florida Water Management District, writing about Rafael Frias and his project team.

PRESENTATIONS

Conduit Hydropower: Maximizing Renewable Energy in PRASA's Water and Wastewater Systems, Puerto Rico Water & Environment Association Annual Conference, San Juan, 2012, Author

Membrane Treatment Processes to Manage Source Water Quality and Protect Human Health in Puerto Rico, AWRA National Conference, Albuquerque, 2011, Author

Water Resources Strategies for Climate Change & Shortages: An AWWA Webcast, AWWA, March 2010, Co-Author

Optimization of the Lajas Valley Reservoirs to Maximize Water Supply and Hydropower Generation, AWWA ACE, San Diego, 2009, Author

Sustainable Planning Practices and Technologies for" Green" Utilities, Puerto Rico Water & Environment Association Annual Conference, Rio Grande, 2009, Author

Mass Balance Modeling for Optimizing Surface Water Reservoirs, ASCE Water Resources Seminar, Orlando, 2008, Author

Sustainable Planning is Key to Becoming a "Green" Utility, FSAWWA Fall Conference, Orlando, 2008, Coauthor

Optimization of Reservoir Operations to Meet Multiple Water Supply Demands in Puerto Rico, AWRA National Conference, New Orleans, 2008, Author

Water Requirements for Energy Generation: Opportunities for Combined Efficiencies, AWRA National Conference, New Orleans, 2008, Presenter

Optimization of the Lajas Valley Reservoirs to Meet Multiple Demands, Puerto Rico Water & Environment Association Annual Conference, Rio Grande, 2008, Author

Surface Water Reservoirs: A Sustainable Approach to Everglades Restoration, FSAWWA Fall Conference, Orlando, 2007, Author

Disinfection Alternatives for South Florida Water Management District ASR Facility, FSAWWA Fall Conference, Orlando, 2007, Author

ASR for Lake Okeechobee and Estuary Restoration – The Taylor Creek/L-63N Canal ASR System, Aquifer Storage and Recovery VII, Orlando, 2007, Author

Testing of Disinfection Alternatives for South Florida ASR Facility, NEWWA 126th Annual Conference, Baltimore, 2007, Author

ASR as a Water Management Strategy, NJAWWA Annual Conference, Atlantic City, 2007, Author

Everglades Agricultural Area Reservoir A-1 – Management of Runoff for Everglades Restoration and Agricultural Irrigation, WEFTEC, Dallas, 2006, Author (Poster)

Reservoirs for Everglades Restoration and Agricultural Irrigation, AWRA National Conference, Baltimore, 2006, Author

XP-SWMM vs. ICPR – Surface Water Modeling, Black & Veatch Technology Conference, Kansas City, 2006, Author

Supply and Demand: Optimizing Operations of the Everglades Agricultural Area (EAA) Reservoir A-1, AWRA Conference, Key West, 2005, Author

Moving Latin America towards an Appropriate Solid Waste Management, National Technical & Career Conference, Minneapolis, 2002, Coauthor

Stormwater Drainage to Support Small Communities in Honduras, National Technical & Career Conference, Fresno, 2001, Author

Richard Campbell

Mr. Campbell has extensive consulting experience and has served as Project Manager on a variety of projects associated with municipal electric, natural gas, water, wastewater, stormwater and reclaimed water utilities. His experience encompasses the full range of utility finance issues, including wholesale and retail ratemaking, revenue bond financial feasibility reports, valuation studies for acquisitions and mergers (including condemnation proceedings), capital financing analyses, economic feasibility studies, and strategic and business planning.

Mr. Campbell also has experience in analyzing the economics of small-engine peaking generation facilities and other peaking and/or load management programs. He has assisted in the development of operation and management studies of municipal and rural electric cooperative utility systems and has managed and coordinated the development of distribution system studies, alternative power supply analyses and peak shaving studies.

Mr. Campbell has participated in preliminary hearings and settlement conferences for open-access transmission (FERC Order 888), as well as municipal annexation hearings, and has provided expert witness testimony before state commissions.

PROJECT EXPERIENCE

- Development of Stormwater Financial Model | City of Raleigh, N.C.|2008
- Miami-Dade County Water and Sewer Department | Miami, Fla.|2007-Present
- Orlando Utilities Commission (OUC) | Evaluation of Regionalization Alternatives, City of Orlando, Fla.|2007
- Electric Authority (JEA) | Transmission System and Ancillary Services Rate Design, Jacksonville, Fla.
- Jacksonville Electric Authority (JEA) | Unbundled Cost-of-Service, Rate Design and Capacity Fee Study, Jacksonville, Fla.|2002
- Water/Wastewater Impact Fee Study, City of Brownsville, Tex.|2009
- Water/Wastewater Cost-of-Service and Rate Study, City of Brownsville, Tex.|2001
- Water/Wastewater Inside-/Outside-City Rate Differential Study, City of Fort Worth, Tex.|2006
- Wastewater Wholesale Cost-of-Service and Rate Study, City of Fort Worth, Tex.|2008
- Revenue Bond Feasibility Report, City of High Point, N.C.|2004
- Billing/Metering Conversion Analysis, City of Raleigh, N.C.|2004

PROJECT MANAGER

Specialization:
Valuation, Condemnation, Rates, Power Supply Assistance, Mergers / Acquisitions, and Revenue Bonds

Education
- B. S., Electrical Engineering, University of Central Florida
- United States Naval Nuclear Power Training

Experience
1988-present

Joined Black & Veatch
2000

Regulatory Appearances
- Federal Energy Regulatory Commission
- Virginia Utilities Commission

Professional Associations
- American Public Power Association
- American Water Works Association

Committees
- National AWWA Rates and Charges Committee

Office Location
Dallas, TX

- Revenue Bond Feasibility Report, City of Raleigh, N.C.|2004
- 10-Year Capital Financing Analysis, City of Raleigh, N.C.|2006
- Water/Wastewater Rate Study, City of High Point, N.C.|2006

Prabha Kumar

Ms. Kumar currently leads the stormwater utility consulting practice within Black & Veatch's Management Consulting Division. Ms. Kumar specializes in stormwater utility feasibility studies and utility development, implementation, and program support. Ms. Kumar's comprehensive utility consulting expertise also includes directing business process optimization studies, strategic planning, financial planning, cost of service, and rate design studies; and providing expert witness services in stormwater utility rate cases.

PROJECT EXPERIENCE

- Philadelphia Water Department, City of Philadelphia, Pennsylvania | Stormwater Cost of Service and Rate Study | 2012
- City of Olathe, Kansas | Stormwater Rate Restructure Study |2013
- City of Wilmington, Delaware | Integrated Wet Weather Management Plan| 2012
- City of Wilmington, Delaware | Stormwater Utility Billing Support and Advisory Services | 2012
- Pittsburgh Water and Sewer Authority, Pittsburgh| Stormwater Management and Rate Structure Project | 2012
- Henrico County, Richmond, VA| Stormwater Utility Study | 2011
- Philadelphia Water Department | Stormwater Implementation Management Services, City of Philadelphia, Pennsylvania | 2009 - 2011
- City of Springfield, Ohio | Stormwater Utility Feasibility Study | 2011
- City of Dallas, Texas | Stormwater Rate Study | 2009 - 2010

SELECTED PUBLICATIONS

"User Fee Funded Stormwater Utilities Manual". 2nd Edition. Lead Author for Chapter 3 – Stormwater Feasibility Study. (To be published by the Water Environment Federation (WEF) in October 2013).

"Trends in Stormwater Utilities Across the Nation". Presented at the 24th Annual Environment Virginia Symposium, April 2013, Lexington, VA.

"Managing Non-Revenue Water: Balanced Focus through Holistic Management Approach". Presented at the 2012 Utility Management Conference, February, Miami, Fl.

"*Stormwater User Fees Come Up Short*", PUBLIC WORKS News Service (online), by Prabha Kumar, November 23, 2010. Print version published in May 2011.

"Promoting Sustainable Stormwater Management: The Role of a Stormwater Credit Program". Presented at the 2009 Stormcon Conference, August, Anaheim, CA.

DIRECTOR

Specialization:
Stormwater Utility; Process Optimization; Strategic Planning; Financial Planning; Rate Studies; Benchmarking; Systems Needs Assessment & Requirements; Implementation Support

Education
- M.B.A, MIS & Marketing; University of California, Riverside
- M.Phil., English Literature; Madras University, India
- M.A., English Lang. & Literature; Madras University, India
- B.A., English Lang. & Literature; Madurai-Kamaraj University, India

Professional Associations
- National Association of Clean Water Agencies, Stormwater Committee
- Water Environment Federation
- American Water Works Association
- Member of AWWA's Strategic Management Practices Committee (SMPC)

Year Career Started
1999

Year Started with B&V
1999

"Look Before you Leap: Developing Policies for Stormwater User Fee Implementation," Presented at the August 2008 Stormcon Conference, Orlando, Fl.

Kumar, Prabha, White, Anna. (2008). *"Know Your Way – Policy Development in Stormwater User Fee Implementation,"* Published in the May 2008 issue of Stormwater, Vol. 9. No.3.

"Stormwater Billing: Navigating the Integration Challenges," Presented at the February 2008 Utility Management Conference, Tampa, Fl.

"Stormwater User Fee Financing: Charge the Runoff, not the Usage," Presented at the 2007 AWWA-WEF Joint Management Conference, Portland, Ore.

"Fundamentals of a Stormwater Utility Feasibility Study," Presented at the Section AWWA Tri-Association Conference, August 2006, Ocean City, Md.

"Activity Based Costing: A Success Story," Presented at the AWWA-WEF Joint Management Conference, February 2000, Seattle, Wash.

Jeffrey Dykstra

Mr. Dykstra is responsible for developing financial and pro forma models for utilities, performing cost-of-service and rate analyses, and analyzing utility finances and operations. He has assisted in the development of many dynamic Microsoft Excel based financial models for utility financial planning purposes and of utility operational benchmarking metrics, cost-of-service and rate analyses, rate surveys, benchmarking studies, and revenue bond and operational feasibility analyses.

PROJECT EXPERIENCE

- Norfolk Department of Utilities| Consulting Services; Va. | 2010-2014
- Miami-Dade Water and Sewer Department (MDWASD) | Rate and Cost of Service Services; Fla.|2009-2014
- Tampa Bay Water | Water Revenue Bond Feasibility Study and Financial Model Development; Fla.| 2013
- Allegheny County Sanitary Authority (ALCOSAN) | Wastewater Cost of Service Rate Study, Financial Forecast, and Wet Weather Plan Feasibility Financial Analyses; Pittsburgh, Pa.| 2012
- JEA| Electric Cost of Service Rate Study; Jacksonville, Fla. | 2011-2013
- City of North Miami | Water and Wastewater Cost-of-Service Study and Irrigation Rate Review; Fla. | 2011-2012, and 2014
- JEA| Electric, Water, Wastewater and Chilled Water Depreciation Rate Study; Jacksonville, Fla. | 2011
- Jefferson County | Wastewater Cost-of-Service Study; Ala. | 2011-2012
- City of Lauderhill| Water and Wastewater Cost-of-Service Study; Fla. | 2008 & 2010
- Greenville Water System| Water Cost-of-Service and Impact Fee Study; Greenville, S.C. | 2009 and 2010
- Woodruff Roebuck Water District (WRWD) | Water Utility System Feasibility and Cost-of-Service Rate Design; Woodruff, S.C. | 2010
- City of High Point| Water and Wastewater Utility Bond Feasibility Analysis and Cost-of-Service Rate Design; N.C. | 2010
- Brownsville Public Utilities Board | Electric and Water Cost of Service and Financial Planning Analyses, and Impact Fee Semi-Annual Update; Tex. | 2009 and 2013
- City of Orange| Water and Sanitation Cost of Service Rate Study and Financial Forecast; Calif. |2009
- City of Key West | Stormwater and Wastewater Rate Study; Fla. | 2008

MANAGER

Specialization:
Financial Analysis, Planning, and Modeling, Cost-of-Service Analyses, Bond and Financial Feasibility Studies, Revenue Bond Refunding Analysis, Energy Efficiency Cash Flow Analyses, Utility Operations Benchmarking, Raw Water Valuation

Education
- B.A., Business Administration – Finance, Dordt College, 2008.

Year Career Started
2008

Year Started with Black & Veatch
2008

Mihaela Coopersmith

Ms. Coopersmith is a municipal financial consultant. Her experience includes work as a Financial Analyst, Purchasing Analyst, and Customer Support Analyst. She has experience with financial modeling and budget forecasting. She has been involved in several financial planning projects for different utilities in the Southeast.

PROJECT EXPERIENCE

- Harford County | Cost of Service Model; Bel Air, MD, 2013 – present
- Metropolitan Sewer District of Greater Cincinnati (MSDGC) | Cost of Service Model; Cincinnati, OH – 2014
- Beaufort-Jasper Water & Sewer Authority | Cost of Service Model; Okatie, SC – 2012 – present
- Charleston County | Feasibility Study; Charleston, SC – 2012
- Bartow County Water Department | Sewer Feasibility Study; Cartersville, GA – 2013
- Mount Pleasant Waterworks | Water Pricing, Revenue Stability and Sufficiency Workshop; Mount Pleasant, SC – 2014
- Brownsville Public Utilities Board | Cost of Service Model; Brownsville, TX – 2012
- Harpeth Valley Utility District | Financial Model; Nashville, TN – 2012 – 2014
- Kansas City, Missouri | Water Audit Letter Report; Kansas City, MO – 2012
- Charleston Water Systems | Cost of Service Model Update; Charleston, SC – 2013
- Powdersville Water District | Financial Planning Model; Powdersville, SC – 2010 – Present
- Beaufort-Jasper Water & Sewer Authority | Financial Planning Model; Okatie, SC – 2010 – 2012
- Town of Lexington, SC | Bond Feasibility Study; Lexington, SC – 2007
- Town of Lexington, SC | Water and Wastewater Impact Fee Study; Lexington, SC – 2008
- Little River Water & Sewer Company | FEMA Pre-Disaster Mitigation Grant Application Assistance; Little River, SC – 2010
- Broad River Water Authority | Budgeting Assistance; Spindale, NC – 2010
- Broad River Water Authority | Financial Planning Model; Spindale, NC – 2008 – Present

CONSULTANT

Specialization:
Financial modeling, budget forecasting, feasibility analysis

Office Location
Charleston, SC

Education
- IMBA, Finance, University of South Carolina, 2006
- BBA, Management, Brenau University, 2003

Professional Associations
- American Water Works Association

Year Career Started
2006

Year Started with B&V
2012

- Broad River Water Authority | Capital Improvements Plan; Spindale, NC – 2009
- Broad River Water Authority | Bond Feasibility Letter; Spindale, NC – 2010
- Town of Rutherfordton, NC | Financial Planning Model; Rutherfordton, NC – 2011
- City of Portland, TN | Financial Planning Model; Portland, TN – 2011
- City of Springfield, TN | Financial Component of the Master Plan; Springfield, TN – 2011
- Town of Kiawah Island, SC | Water and Wastewater System Valuation; Kiawah Island, SC – 2011-2012
- City of Arnold, MO | Sewer System Valuation; Arnold, MO – 2011
- City of Georgetown, SC | Water and Wastewater System Development Fee Study; Georgetown, SC – 2007
- City of Georgetown, SC | Raw Water Rate Study; Georgetown, SC – 2008
- Athens-Clarke County Public Utilities Department | Financial Planning Model; Athens, GA – 2008 – Present
- Fulton County Public Works Department | Capital Improvements Planning; Fulton County, GA – 2007 – 2010
- Etowah Water & Sewer Authority | Minimum Bill Analysis; Dawsonville, GA – 2008
- Etowah Water & Sewer Authority Water and Wastewater Capital Recovery Fee Study and Capital Improvements Funding Plan Study; Dawsonville, GA – 2007 – 2011
- Etowah Water & Sewer Authority | Water Conservation Rate Study; Dawsonville, GA – 2008
- Etowah Water & Sewer Authority | Bond Feasibility Letter; Dawsonville, GA – 2010
- Fulton County Public Works Department | Impact Fee and Ancillary Charges Study; Fulton County, GA – 2007 – 2010
- Newton County Water & Sewerage Authority | Financial Planning Model; Newton County, GA – 2010 – 2012
- Macon Water Authority | Financial Planning Model and Bond Feasibility Report; Macon, GA – 2011 – 2013
- City of Rome, GA | Water and Wastewater Rate Study Update; Rome, GA – 2008 – 2013
- Butts County Water and Sewer Authority | Water and Wastewater Capital Contribution Fee Study; Butts County, GA – 2007

- City of Douglas, GA | Surcharge Study; Douglas, GA – 2007
- James Island Public Service District | Rate Study Review; Charleston, SC – 2007

SELECTED PUBLICATIONS

Win-Win Deals: How to Use Economies of Scale to Your Small Utility's Advantage. Presented at the 2009 South Carolina Environmental Conference, Myrtle Beach, South Carolina, March 2009 (co-presented with Bill Zieburtz).

Effective Utility Budgeting. Presented at the 2010 South Carolina Environmental Conference, Myrtle Beach, South Carolina, March 2010 (co-presented with Beth Finney).

How Smart Financial Planning Models Can Help you Win A Grant You Deserve. Presented at the 2010 North Carolina AWWA-WEA Annual Conference, Winston-Salem, North Carolina, November 2010.

Utility Master Planning – How Finance Keeps Your Documents From Becoming a Paperweight! Presented at the 2011 South Carolina Environmental Conference, Myrtle Beach, South Carolina, March 2011 (coauthor Bill Zieburtz).

Financial Planning Models Help Managers Make Good Decisions. Presented at the 2013 South Carolina Environmental Conference, Myrtle Beach, South Carolina, March 2013.

Isabel C. Botero, P.E.

Ms. Botero is an engineering manager and environmental engineer with more than twelve years of experience and knowledge of water and wastewater systems. Ms. Botero has served as project manager, engineering manager, and project engineer on a number of environmental engineering projects including water and wastewater treatment plant facilities design. She has participated in detailed design of water and wastewater projects for alternative delivery methods (design/build/operate). She is also experienced in developing scope documents for pricing of design/build projects.

PROJECT EXPERIENCE

- Bogota Water & Sewer Authority | Water Distribution System Master Plan; Bogota, Colombia, South America | 2011-2012
- Bogota Water & Sewer Authority | Water Pipeline Geotechnical Stabilization; Bogota, Colombia, South American | 2011-2012
- City of Boynton Beach | East Water Treatment Plant Disinfection System Upgrade; Boynton Beach, FL | 2011-2012
- Miami Dade County | Alexander Orr Jr. Water Treatment Plant, Chlorine Gas Onsite Generation System; Miami, FL | 2009-2010
- City of Dania Beach | Solids Handling System and Backwash Recovery Modifications; Dania Beach, FL | 2009
- Solid Waste Authority of Palm Beach County | North County Resource Recovery Facility Alternative Water Supply Evaluation; Palm Beach County, FL | 2009
- City of Boynton Beach | East Water Treatment Plant Disinfection System Upgrade; Boynton Beach, FL | 2007-2010
- South Florida Water Management District | Lake Okeechobee Fast Track (LOFT) Project; Lakeside Ranch, FL | 2007-2009
- Seacoast Utility Authority | Hood Road Water Treatment Plant Membrane Conversion; Palm Beach Gardens, FL | 2007-2008
- Western Corridor Recycled Water Pty Ltd | Bundamba Advanced Water Treatment Plant; Brisbane, Australia | 2006-2007
- Yucaipa Valley Water District | Wochholz Wastewater Treatment Plant Secondary Treatment Expansion; Yucaipa, CA | 2005
- Maricopa County | White Tanks Water Treatment Plant; Maricopa County, AZ | 2003-2005
- City of Phoenix | Lake Pleasant Water Treatment Plant; Phoenix, AZ | 2003
- City of Phoenix | Lake Pleasant Water Treatment Plant; Phoenix, AZ | 2001-2002

ENGINEERING MANAGER

Specialization:
Water and Wastewater Systems

Office Location
Sunrise, Florida

Education
- M.S., Environmental Engineering, University of Kansas, 2004
- B.S., Civil and Environmental Engineering, University of Missouri-Kansas City, 1999

Professional Registration
PE – 2007, FL, 67176
PE – 2005, MO, 2005001044

Professional Associations
- American Society of Civil Engineers
- Water Environmental Federation, Florida Water Environment Association
- American Public Works Association

Year Career Started
2000

Year Started with B&V
2000-2007; 2012

- Metropolitan Council Environmental Services | Eagles Point WWTP; Cottage Grove, MN| 2001-2002
- Puerto Rico Aqueduct and Sewer Authority (PRASA) | CIP Annual Inspections; Puerto Rico | 2001
- USAID / FHIS | Hurricane Mitch Relief Projects; Honduras, Central America | 2000-2001
- AFI | Dorado Regional Wastewater Treatment System, AFI; Dorado, Puerto Rico | 2000-2001