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Clean Water Edition

Tapping Into The VALUE Of Water

How To Gain Leverage In The Battle For Funding

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PLUS: Extreme Weather: Survival Tips For Utilities

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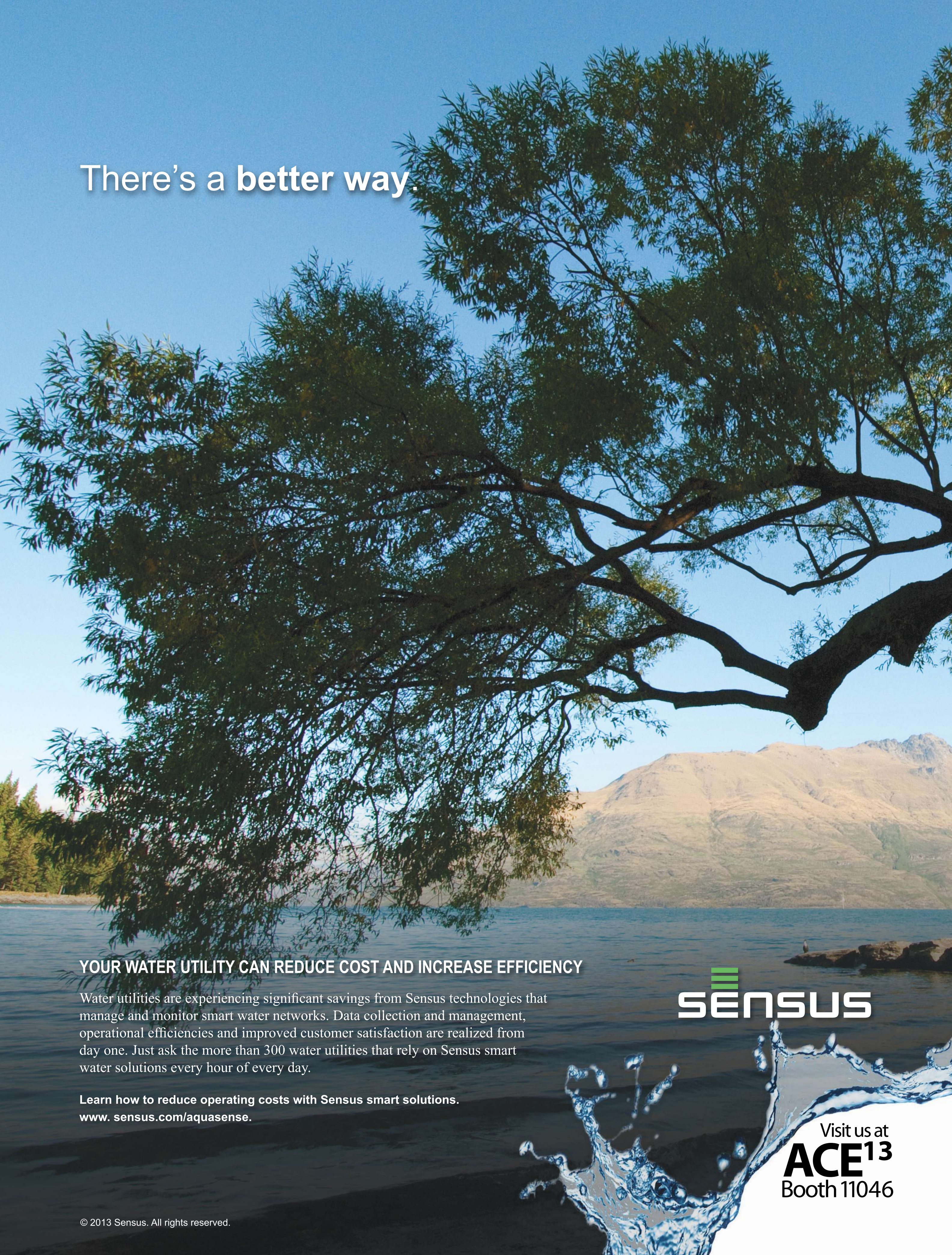
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Water Online The Magazine

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Getting Smart About Water

We've all heard the adage, "Work smarter, not harder," but are we living it in the water industry? While the status quo may have merit and is almost certainly more comfortable, these trying times of big problems and small budgets beckon a new approach — to get smarter about water. You likely know the term "smart water" as it pertains to instruments that collect and interpret data, but the focus of this edition of *Water Online The Magazine* is to first engage the data-collecting instrument within each of us — our brains. Before a bit of technology is deployed, water professionals must compile the essential data to make smart decisions for their facilities and communities.

Research and planning are part and parcel to that quest, and our first article, "Drinking Water Regulations: What Does The Future Hold?" (page 8), is a case in point. Utilities that are proactive with respect to government mandates are almost always better off than their reactive counterparts, but proper information is needed to stay ahead of the curve. To that end, Eric Meliton of Frost & Sullivan offers a sneak peek at the U.S. EPA's 2015 review of the National Primary Drinking Water Regulations (NPDWR), so that utilities can assess their capabilities and devise appropriate plans for what lies ahead.

Along with mandates, utilities must also stay ahead of rising populations and water demand. As far back as Samuel Taylor Coleridge's *The Rime of the Ancient Mariner* (1798), in which he wrote "Water, water, everywhere, Nor any drop to drink," generations have bemoaned our inability to get drinking water from the ocean. But perhaps that's about to change. On page 12, James Smith of Constantine Engineering describes technology breakthroughs that could, at long last, usher seawater desalination into feasibility as a potable water supply source.

These regulatory and supply concerns, along with the advancing age of many water systems, are driving the need for new and upgraded infrastructure. At the same time, these give rise to opportunity — to build smarter, more sustainable facilities that have economic, social, and environmental ("triple bottom line") benefits. The long-term and holistic impacts of such facilities are sometimes hard to measure, however, and are therefore hard to appreciate. Dr. Robert Raucher of Stratus Consulting demystifies the triple bottom line for decision makers on page 16.

Even with return on investment spelled out, high capital costs in today's budget-conscious environment are difficult to swallow for government officials and the public alike, especially when they necessitate a rise in water rates. But with tactical, researched, and clear messaging, utilities can change perception and overcome objections. "Tapping Into The Value Of Water," my article on page 22, presents a methodology to get funding initiatives approved.

In addition to the always advised forward-looking approach, there are great lessons to be learned from the past. Extreme weather has wreaked havoc on many water systems in recent years, and the evidence points at more to come. To combat this trend, U.S. government agencies collaborated with leading water groups and consulting firms to analyze case studies and devise a set of best practices for utilities in the eye of the proverbial storm. On page 26, Claudio Ternieden of Concurrent Technologies Corp. shares the outcomes of this effort.

Last but not least in this guide to smarter water operations is a deconstruction of the Water Infrastructure Finance and Innovation Act (WIFIA). For anyone who has followed this important legislation from the sidelines and is wondering about its practical application, Dan Hartnett of the Association of Metropolitan Water Agencies (AMWA) answers the question "What Can WIFIA Do For You?" on page 30.

Each of these articles, while arming us with valuable information, reminds us of the many challenges confronting water utilities — strict regulations, water scarcity, inadequate infrastructure, and funding issues, just to name a few. However, we also live in an age of innovation, with a plethora of new technologies available to help see us through. The smart water professional will rely on these and every other tool at his disposal — starting with the one on his shoulders.

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Water Online The Magazine

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Drinking Water Regulations: What Does The Future Hold?

A new list of contaminants and round of long-term mandates are under consideration by the U.S. EPA, prompting close attention from drinking water utilities.

By Eric Meliton

In 2009, the U.S. EPA completed its mandatory six year review of the National Primary Drinking Water Regulations (NPDWRs) as part of the Safe Drinking Water Act. In that effort, the EPA assessed 71 NPDWRs and determined that 67 were acceptable, while four required immediate revision. Additional to this effort, the EPA review committee assessed 14 newly proposed NPDWRs, along with a review of existing National Secondary Drinking Water Regulations — a set of guidelines for contaminants that may be selected for further enforcement at the state level.

With the next formal six year review (Six Year Review 3) slated for 2015, the drinking water treatment industry is keen to identify the current NPDWRs that will become prevalent as the review period approaches. By addressing some of the treatment requirements imposed by any revised standards, municipalities and treatment technology providers can gauge how capable their current treatment systems are of maintaining overall NPDWR compliance.

Background Into The NPDWR Review Process

Enforcement of NPDWR takes an appropriate amount of time to determine which contaminants are of potential human risk. With such a diverse list of contaminants that have the potential to enter the public drinking water supply at any time, it becomes a difficult task to determine the inherent risk to the general public. Sources of contamination can be derived from either natural sources such as erosion or from contamination of freshwater sources by industrial manufacturing or municipal wastewater treatment runoff. Reducing public risk and lowering the overall occurrence of the contaminant in public drinking water sources are key mandates specified in the development and review process of NPDWRs.

NPDWRs must go through an extensive review process, which includes publishing through the Federal Registry (in order to obtain appropriate public comment), final notice procedures, and rule making processes. The time required to conduct this effort ensures that appropriate measures are taken to adhere to the mandate of maintaining overall public safety and reducing risk.

Maintaining the selected NPDWR standards enlists the utilization of effective treatment barriers to protect drinking water sources. This review and determination process may enlist the assessment of Best Available Treatment (BAT) technology, development of rules or guidelines for state programs to implement, and/or development of training programs for localized operators and treatment facility personnel. The ultimate goal is to maintain a level of public disclosure of key contaminants that may be present in local drinking water sources.

The ultimate goal is to maintain a level of public disclosure of key contaminants that may be present in localized drinking water sources.

Six Year Review 3 On The Horizon

After completion of the first two cycles (2003 and 2009) of the six year review of NPDWRs, the upcoming Six Year Review (SY3) is due to begin in 2015, with a new set of proposed NPDWRs set to take effect in 2016. Similar to cycles achieved in the past, the development of a Contaminated Candidate List (CCL) is key to determining which contaminants are of major or immediate concern and which can be relegated to the National Secondary Drinking Water Regulation (NSDWR), which includes contaminants that cause cosmetic (e.g., skin irritations) or aesthetic effects (e.g., taste and odor). Although CCLs are assessed during this effort, the public outcry to reach public health goals (more stringent than the NPDWR established levels) is what makes this review process truly work.

Not only does the mandated SY3 (according to the Safe Drinking Water Act) ensure that a review of all NPDWRs is completed every six years, but it also allows for enhancements to existing regulations, while identifying those of immediate concern to be monitored under the Unregulated Continuous Monitoring Program (UCMP), or to have guidelines developed for a NSDWR. With public health concerns always in hand, combined with the issues related to regional freshwater restrictions and shortages, compliance at the state and local levels is at the forefront.

Importance Of Contaminated Candidate List 3 And The Contaminants Under Review For CCL 4

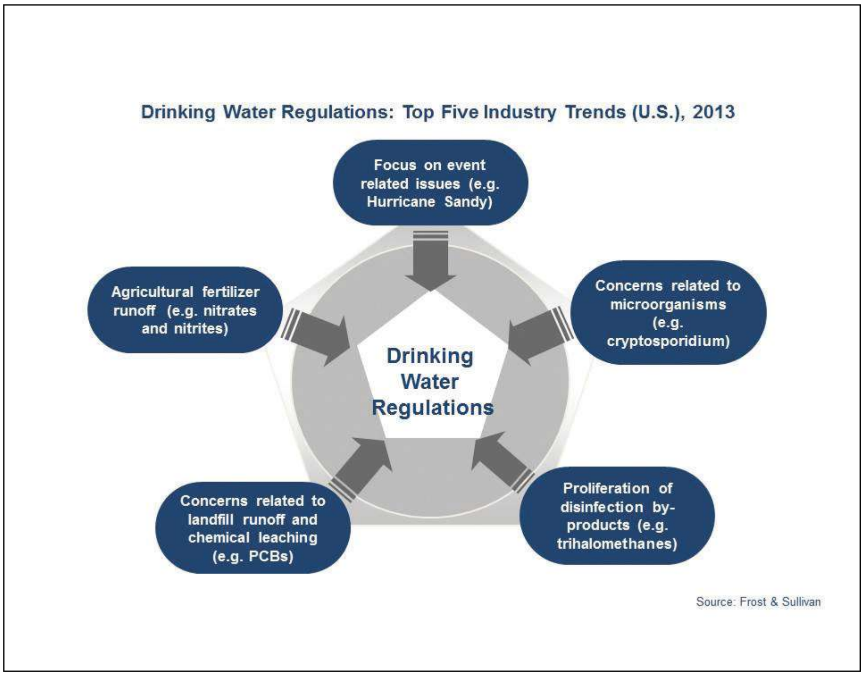
The development of the CCL 3 list was derived from a larger list of more than 7,500 potential chemical and microbial contaminants. This list was narrowed to 600 potential contaminants, utilizing public health risks and potential occurrence in public drinking water supplies as selection criteria. From that preliminary list, a list of 116 contaminants (104 chemicals and 12 microbiological) was derived from insights offered by industry experts and public review.

Highlights of key chemical contaminants from the current CCL 3 list include various estrogen-based hormones from pharmaceutical manufacturing, groups of insecticides and fungicides widely used in agricultural applications, and manufacturing contaminants such as perchlorates, which are difficult to remove using standard treatment methods.

From the list of microbiological contaminants, the key highlights are those viruses and bacteria that can cause varying degrees of gastrointestinal and respiratory illnesses. Effectiveness of standard and advanced systems in the treatment for these types of microbiological contaminants ensures proper treatment levels are determined when developing long-term NPDWR requirements.

The date to submit candidates for the CCL 4 list has passed (June 2012); however, this list, combined with data collected in the effective treatment of the 116 contaminants in CCL 3, is of immediate concern to treatment technology original equipment manufacturers (OEMs) and engineering firms alike. Market growth in the vast water and wastewater treatment industry in the U.S. is driven by regulatory changes. As NPDWRs are developed and enforced, OEMs and engineering firms must adhere to them by providing effective treatment technologies derived from previous designs, while working to enhance existing treatment processes and systems to reach more stringent regulatory levels in order to comply.

NPDWRs sometimes have compliance concessions to allow municipalities, OEMs, and engineering firms to continue to develop effective treatment capabilities to eventually comply, resulting in an implementation and enforcement process that can actually take upwards of five or more years in many cases across the country. Even with the case of arsenic NPDWRs, which rolled out in 2010, the projected timeframe for enforcement was expected to be five years. This timeframe facilitates the continued development of effective treatment systems, while also buffering the time required to generate funding for capital investment to install or retrofit existing treatment infrastructure.



Key Industry Trends

Although the focus by the marketplace will be on the next regulation to evoke potential industry changes, the OEMs and engineering firms must not lose sight of the existing NPDWRs that are either becoming more stringent or require immediate investment to maintain compliance. For example, there is typically significant focus on event-related issues, such as the long-term impact of Hurricane Sandy on the eastern part of the U.S., which resulted in rising total coliform levels, requiring heavy remediation and clean up investment efforts in the region at an estimated $71.3 billion.

In the long-term evolution of the drinking water treatment industry, aggregate industry insights suggest that ongoing concerns related to microorganisms, such as cryptosporidium to zero milligrams per square liter (mg/L^2), are challenging due to their ability to resist even advanced treatment technologies. Also, issues with the proliferation of disinfection byproducts (such as the production of trihalomethanes, bromates, chlorites, and haloacetic acids) are an ongoing concern and are directly linked to the standard use of water disinfectant treatment chemicals. All of the disinfection byproduct contaminants listed are known carcinogens and are difficult to treat to regulated maximum contaminant levels (MCL).

From the organic chemicals perspective, the ongoing treatment concerns related to landfill runoff, chemical leaching, and waste chemical discharges leading to the risk caused by polychlorinated biphenyls (PCBs) is a major industry issue. PCBs are known to cause immune deficiencies and reproductive and nervous system issues, and are a known carcinogen even at trace levels (MCL – 0.0005 mg/L^2).

The run off of nitrates and nitrites from agricultural fertilizer use and sewage/septic spillage can lead to serious illness at MCL levels (10 mg/L^2 for nitrates, 1 mg/L^2 for nitrites), but can also cause serious imbalances in natural bodies of water. This results in issues such as eutrophication, which has led to excessive algae plant growth in areas such as Chesapeake Bay. Restoration of the region has cost millions of dollars, but has also resulted in a greater public awareness of issues related to organic contaminants.

The underlying trend related to these ongoing concerns is that OEMs and engineering firms cannot lose sight of the potential market to address real-time issues in the municipal drinking water marketplace. Anticipation of upcoming regulatory changes, such as those linked to the SY3 in 2015, ensures adaptability to upcoming requirements, but also takes away the necessary focus to address the needs of the here and now. As public health goes, with trends toward zero mg/L[2] levels for many prevalent contaminants, advances to existing treatment technologies and processes are key to address these requirements. U.S. states willing to invoke public health goals above and beyond MCL requirements will create a strong market for leading-edge innovation, an aspect that will only benefit the national competitive landscape as well.

U.S. states willing to invoke public health goals above and beyond MCL requirements will create a strong market for leading-edge innovation.

Conclusion

With the 2015 SY3 expected to identify challenging contaminants requiring immediate or long-term treatment capabilities in the future, the ongoing growth derived from regulatory changes will be sustained. The potential to capture existing treatment market share by achieving treatment levels that adhere to public health goals as opposed to MCLs is a key innovative initiative that many firms can incorporate to further their market presence. Although anticipation of the next industry-changing regulation is part of the allure of analyzing the regulatory trends of the drinking water industry, the amount of time required to implement, effectively treat, and enforce the regulation will restrain long-term industry market growth in many cases. ■

Eric Meliton is an Energy and Environment Industry Analyst for Frost & Sullivan, covering environmental technologies. His expertise includes industrial and municipal water/wastewater treatment technologies, regulatory affairs, and compliance. Meliton holds a Bachelor of Science degree in Chemistry and Environmental Science from the University of Western Ontario.

Reverse Osmosis Desalination: A Feasible Alternative For Potable Water Supply

Recent technology advances are making desalination less energy-intensive and less costly, bringing us closer to a long-sought solution to water scarcity.

By James N. Smith, P.E.

Freshwater is the liquid of life. Without it the planet would be a barren wasteland. The supply of freshwater is finite, but the demand is rising rapidly as world population grows and as global water use per capita increases. Freshwater supplies are not distributed evenly around the globe, throughout the seasons, or from year to year. Fully two-thirds of the world population — 4 billion people — lives within 250 miles of a seacoast; just over half of the world population occupies a coastal strip 120 miles wide, representing only 10% of the earth's land surface. A solution to the burgeoning use of freshwater would be to tap the almost limitless volume of ocean water and inland brackish water using desalination processes.

Reverse osmosis (RO) installation in Dauphin Island, AL

Reverse osmosis (RO) filtration by means of semipermeable membranes is the leading technology used in drinking water desalination. Advances in reverse osmosis treatment and membrane materials have created systems that typically use less energy than other desalination processes. The key to expanding the use of RO desalination has come down to finding ways to reduce the energy required to overcome the osmotic forces applied to the membrane. These improvements have led to an overall reduction in desalination treatment costs over the past decade.

Advancements in membrane technologies continue to lower energy usage and the costs associated with desalination. Developments such as thin-film composite (TFC) membranes with advanced permeability and flux properties have been key to the widespread use of RO for desalination. Continued research and development of new fouling-resistant and energy-efficient membranes is underway. Over the last decade, advances in RO membranes have allowed them to become more permeable, thereby allowing higher flow rates at lower pressures than previously achieved. Higher permeability lowers the power cost for the same amount of filtered water. Advanced materials have reduced fouling rates, resulting in reduced cleaning cost and increased replacement intervals. Other recent work has focused on integrating RO with electrodialysis (ED) to improve recovery of valuable deionized products or to minimize concentrate volume requiring discharge or disposal.

Possibly the greatest energy savings breakthrough in the last two decades is the result of integrating energy recovery devices (ERDs) into the operation of desalination RO systems. Thanks to ERDs, it is possible to reuse the energy from the concentrate flow. The concentrate is directed to the ERDs, where it directly transfers its energy in part to the feed flow. ERDs include energy recovery turbines, which can provide power savings of 30-40% over standard RO units not equipped with ERDs. Furthermore, in the last decade innovations in pressure exchanger (PX) technology have created increased energy savings of 50-60% over non-ERD equipped RO units.

PX technology utilizes isobaric energy recovery technologies with the two-stage RO desalination systems. PX technology provides the opportunity to develop unbalanced flow schemes to improve the performance of RO desalination by increasing the overall recovery of desalination RO systems and transferring energy to the feed flow.

Any RO treatment alternative is a high-energy solution compared to "fresh" surface water or groundwater treatment systems. However, "low pressure" brackish water RO technology (BWRO) has been successful in brackish water applications where total dissolved solids (TDS) are less than 3,000 ppm. In contrast, seawater typically has a TDS content of approximately 32,000 ppm. The higher dissolved solids content of seawater requires much higher pumping pressure to overcome the osmotic forces. Seawater RO (SWRO) typically operates at a pressure of approximately 750-1,000 psi. BWRO systems typically operate at pressures less than 200 psi; this lower pressure translates to a much lower power cost. In addition to the power savings, BWRO has less waste product produced per gallon of water treated. BWRO typically rejects about 20-30% of the raw water produced in a waste concentrate stream, while SWRO typically rejects up to 40% of the raw water in the waste concentrate stream and pretreatment operations.

The key to expanding the use of RO desalination has come down to finding ways to reduce the energy required to overcome the osmotic forces applied to the membrane.

The capital cost of desalination is project specific. Many elements of the project can influence the capital

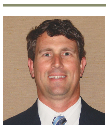
Possibly the greatest energy savings breakthrough in the last two decades is the result of integrating energy recovery devices (ERDs) into the operation of desalination RO systems.

costs of the project. Aspects such as location, facility architecture, source water location relative to the treatment facility, and source water quality can substantially impact the cost of constructing an RO facility. Capital costs can range from $1.25 to $7.50 per gallon of installed capacity. Economy of scale affects the capital cost per gallon; the cost per gallon typically decreases for large facilities and increases for small RO plants. Programmable logic controller (PLC) and software technology can allow almost unlimited automation of facilities; however, higher levels of automation can increase capital costs over simpler designs. The experience of the project design and construction team can greatly impact the project cost. As engineers and constructors gain experience in designing and constructing facilities, cost and liability of the project delivery on future projects will come down. In addition, the reverse osmosis equipment manufacturer's (ROEM) experience can influence capital cost. ROEMs are involved with the day-to-day assembly, testing, and operation of RO equipment. As their research and development knowledge increases, it brings innovations and cost savings to the finished product.

Pressure exchanger (PX) energy recovery device (ERD)

Much like capital cost, the operation and maintenance (O&M) cost for RO facilities can be project site specific. Source water quality is a major component that affects RO O&M cost. Raw water quality impacts operating pressure, chemical consumption, cartridge filter life, cleaning frequency, and membrane life. The largest single component of the O&M cost is typically power consumption, due to high-pressure pumping. Power consumption for RO facilities can be up to 30% or more of the total O&M costs for a facility. Economy of scale influences O&M costs similarly to capital cost with smaller facilities having slightly higher cost per gallon produced over larger facilities. O&M costs range from less than $0.20 per thousand gallons to over $1.90 per thousand gallons. Innovations in membrane manufacturing, ERDs, facilities design, and treatment chemicals have lowered overall O&M costs, in some cases by more than half over the last decade.

President John F. Kennedy recognized the need for desalination in a 1961 speech in which he said, "If we could ever competitively at a cheap rate get freshwater from saltwater, that would be in the long-range interest of humanity and would dwarf any other scientific accomplishment." Of the world's 104 million cubic kilometers of water, 97% is salty. An astounding 70% of the remaining freshwater is hidden deep underground in aquifers or frozen in glaciers or ice caps. All life on earth depends on less than 1% of the total water volume. Unfortunately, the freshwater available to us is not evenly distributed throughout the world. Often, it is unavailable where it is needed, resulting in large arid regions. RO has become the key technology for providing reliable potable water to the world. RO is one of the fastest-growing water treatment technologies, and continuing advances in the industry are making the process more practical and efficient. RO treatment systems offer advantages of high effluent quality and simple operation and are fast becoming the economical choice for supplying potable water to the world's growing population. ■



James Smith is a project manager with Constantine Engineering in Fort Payne, AL. James received a B.S. degree in Civil Engineering from Auburn University. He has over 15 years of experience in the design and construction of water and wastewater infrastructure projects. James has completed several comprehensive water and wastewater treatment facility projects in Alabama and Florida.

Using A Quantitative Triple Bottom Line Approach To Make A Strong Business Case

Fully understanding and explaining the financial, social, and environmental benefits of a water project can be keys to gaining approval.

By Robert S. Raucher, Ph.D.

It is always good practice to make a sound and effective business case — or value proposition — when a utility is seeking support for a large capital outlay or other investment. Utility managers, governing boards, and economic regulators (such as public service commissions) are keenly interested in moderating future rate increases on water and wastewater utility customers, especially in difficult economic times. They need to be well convinced that the problem to be addressed is real, that there are high costs or other serious consequences if the utility fails to act, and that the proposed investment is a wise choice that will leave the community better off than if no action were taken, and also better off than if an alternative potential solution were selected.

Utility customers and local stakeholder organizations may also be skeptical of the need for a specific large-scale investment that their utility is considering. Concerns may reflect a broader array of issues than just the cost and the ultimate impact on rates. There may be strongly held opinions about the environmental or social consequences of a proposed utility project. For example, utilities often face opposition to efforts to invest in desalination, water reuse, reservoir expansion, or other such options to increase local water supply reliability for the community as it grows and as its current water sources become fully tapped. Such public concerns extend beyond the overall fiscal costs and often include potential impacts on local ecosystems, community identity, energy demands, carbon footprints, and so forth.

Ultimately, utility professionals need to be able to convince themselves, their managers and boards, their customers, and other stakeholders that they are proposing a wise course of action. They need to effectively communicate that even if a proposed action entails a costly investment, the community will be better off for having taken that action.

An objective, quantitative triple bottom line (TBL) assessment can provide a highly effective and useful approach for assessing the overall impacts of a potential investment. A well-executed quantitative TBL can be extremely valuable as a way to assess a project's potentially diverse array of benefits and costs, and also can serve as a highly effective means of engaging and communicating the issues and outcomes with various stakeholders.

What Is A Quantitative Triple Bottom Line Assessment?

TBL is an approach intended to reflect all the impacts — both positive and negative — associated with a project or program. As such, it may be considered as a comprehensive type of benefit-cost analysis. As implied by the name, the impacts are organized and portrayed according to three bottom lines:

- Financial: reflecting the cash flow implications for a utility, such as revenues gained and expenditures or other costs incurred. This is similar to a traditional accounting style bottom line, as might be reported in a utility's fiscal annual report.
- Social: reflecting impacts on the broader community, such as public health and welfare, water system reliability, contributions to employment or other community values, affordability, and so forth.
- Environmental: reflecting impacts to watersheds and other ecosystems, carbon footprints, and other consequences for natural systems.

The TBL concept emerged from the sustainability field, as a suggested approach for corporations and other entities to expand how they conduct their annual reporting.[1] In lieu of reporting a single financially oriented, accounting-based bottom line in an annual report, the suggestion was made to have businesses and public sector entities report annually on how their activities also affected social and environmental matters. Water utilities in Australia and other parts of the Commonwealth now provide such annual, enterprise-level TBL reporting routinely (although much of the reporting is highly qualitative rather than quantitative).

Applying the TBL concept can be greatly expanded beyond annual enterprise-level reporting, and the TBL approach now is often applied at a project or programmatic level as a form of business case evaluation. Over the past several years, we have been applying the TBL framework as a way of organizing and communicating quantitative benefit-cost analyses for specific utility projects or programs. In our quantitative TBLs, we aim to identify and describe, and then quantify and monetize (to the extent credible and feasible), all the important consequences of a potential project (and its alternatives). We then structure the resulting outcomes in a simple graphic or table, accounting for all three bottom lines. Several examples of practical applications in the water sector are provided later in this article, where each bottom line is depicted as a corner of a TBL triangle figure.

The TBL concept has also been applied by some practitioners across the water sector in more descriptive and less empirically robust forms. For example, in some applications the results are only described qualitatively. There also are practitioners who apply subjective scores and weights to outcomes and cast these subjective rankings within the three bottom lines. The qualitative and subjective scoring/ranking approaches have some merit. However, the most useful and sound TBL applications rely as much as possible on objective, quantitative measures of the benefits and costs, which can be derived by drawing upon an array of advanced and professionally accepted estimation approaches, including what economists refer to as non-market valuation techniques. These techniques enable suitably trained professionals to develop valid monetary measures for impacts that are not typically reflected directly in prices observed from market transactions, such as the value of improved water-based recreation or of enhanced critical habitat for special status wildlife (such as salmon).

Advantages To Using A Quantitative TBL Approach

Our experience has demonstrated that the quantitative TBL approach can be extremely useful as a way of understanding and communicating the big picture values of a proposed or contemplated action. This can overcome limitations of other, less comprehensive assessment approaches.

Factoring in Important Co-Benefits. Although many water reuse programs may have costs that outweigh anticipated revenues (because recycled water is often sold at rates that do not recover full costs), we have applied the TBL approach to clearly demonstrate that when examining the broader perspective of utility- and community-wide impacts as a whole, the benefits often greatly outweigh the costs. In other words, various factors (such as discounted pricing of reclaimed water) can make a water reuse program appear to be an unwise financial investment when examined in isolation and focusing only on revenues and costs. But when the broader water sector implications are considered — including the avoided cost of securing and delivering additional potable supplies in lieu of reclaimed water — then it typically becomes evident that the utility and the community are better off financially (and often environmentally and socially, too) by investing in water reuse, because the overall benefits often do outweigh the costs.

The TBL approach is also useful where some options

under consideration may not be the most cost-effective choice at first glance, but may nonetheless warrant serious consideration because they provide benefits beyond the main objective of the options being evaluated. (Conversely, TBL can help reveal where a project may have ancillary negative impacts that the utility and community should consider in their deliberations.) In other words, when there are multiple options to address a specific water-related issue, and one or more of the options generates important "co-benefits" to the community, then a TBL approach can highlight the value added of such options and help guide a better informed public discourse and decision making.

Wide-Ranging Applicability. One example, discussed below, pertains to stormwater management, where tried-and-true engineered solutions such as collection and storage tunnels (gray infrastructure) are known to be highly effective — albeit expensive — at helping manage storm flows. However, green infrastructure approaches — even if potentially less certain in long-term performance and O&M costs — tend to provide very high co-benefits to the community in addition to their contribution to stormwater management. The TBL approach helps reveal where and how a utility, and the community it serves, may be better off (in overall net benefits) by using an approach that may not appear as cost-effective (when evaluated on a narrow basis), or that relies on less traditional and potentially more expensive approaches. At a minimum, it helps utilities and the communities they serve gain a more complete picture of the choices they have and the implications of their potential choices (see Figure 1).

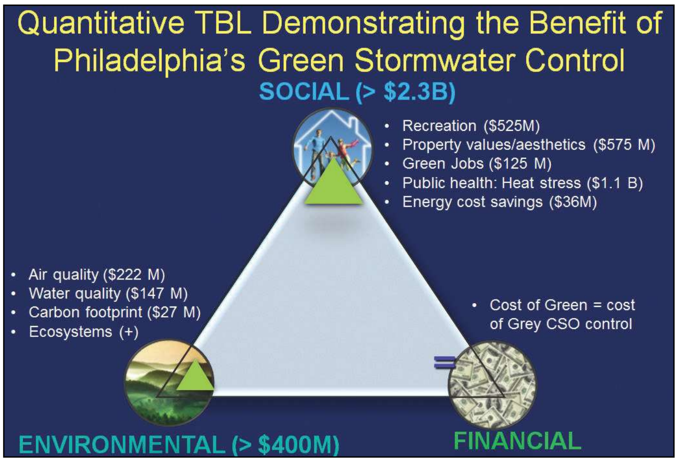


Figure 1: Quantitative TBL depiction of large benefits for CSO and stormwater controls including a large green infrastructure component in Philadelphia, compared to a traditional gray-only approach (present values over a 40-year time horizon).

In another type of application, TBL has helped characterize how and why the total value added by capturing and generating energy from digesters and other processes often makes great sense in terms of financial, environmental, and social outcomes. This biosolids-oriented application dovetails nicely with the wastewater sector's ongoing transition, as reflected in the Water Environment Federation's rebranding of wastewater treatment plants as "water resource recovery facilities."

Engaging Stakeholders. We also have found the TBL approach to be a highly effective way to include stakeholders within an active dialogue. By explicitly recognizing at the outset that the approach is intended to capture the broad array of impacts — including social and environmental issues — stakeholders are often more open to participating in the process. Stakeholders are able to recognize at the outset that the issues of priority to them will have a place in the analysis and related deliberations.

A Stormwater Management, Green Infrastructure Example

In Philadelphia, longstanding issues with stormwater and combined sewer overflows (CSOs) needed to be addressed through high-level investment in long-term compliance strategies. The Philadelphia Water Department (PWD) and city administration envisioned that many important community-wide values could be enhanced if they could use green infrastructure (GI) elements as key portions of their compliance approach. However, they needed to obtain buy-in from the U.S. EPA that an approach that entailed a mix of green and gray infrastructure would be warranted, in lieu of a more traditional gray-only compliance approach.

We assisted the PWD in conducting a quantitative TBL that revealed the high number of social and environmental benefits that could be obtained by the GI-inclusive approach. Significant social and environmental benefits were estimated for the GI-inclusive approach, when compared to the alternative relying solely on gray infrastructure. Figure 1 provides our depiction of the TBL results for Philadelphia, comparing the net advantages of the GI-inclusive approach relative to a gray-only approach of similar total cost. Because the two alternatives have the same cost, the financial corner of the TBL triangle in Figure 1 is a wash. However, the social benefits are considerable, with GI investments providing significant reductions in urban heat island-related heat stress mortality, improved property values, improved air quality, energy savings, local employment opportunities, and several other important beneficial outcomes. Ultimately, PWD was able to gain EPA acceptance of the GI-inclusive approach as part of its CSO Long Term Control Program.

Water Reuse And Desalination Example

We have also used quantitative TBL assessments to demonstrate the high net value for utilities that have included water reuse and/or brackish groundwater desalination (desal) in their water supply portfolios. In these instances, the investments in reuse and desal were known to be quite high when contrasted with the cost of the utilities' historical water supply options (such as pumping and treating local groundwater). However, in each community, local groundwaters were over-extracted and subject to significant quality degradation. In order to sustain local groundwater quality and long-term extraction, alternative water supply sources were required to meet the communities' current and anticipated future demands.

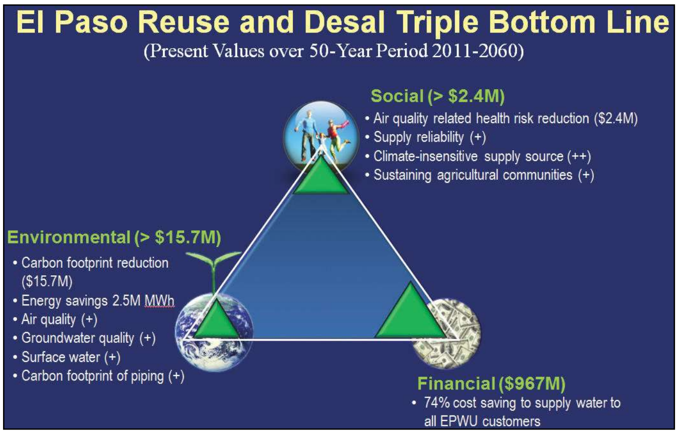


Figure 2: TBL results for including water reuse and brackish groundwater desal in the water supply portfolio for El Paso Water Utilities, compared to the next-best alternative of groundwater importation (present values over a 50-year planning horizon).

Figure 2 shows the results of a quantitative TBL we conducted for the El Paso region of Texas. Its investments (past and planned) in water reuse and desalination of brackish groundwater appear — on the surface — to be very expensive in terms of the cost per acre foot (AF) of water derived when compared with their historical costs from local groundwater pumping. However, because of pumping limitations imposed to ensure sustainable aquifer yields and avoid degradation of groundwater quality, no additional fresh groundwater extractions are feasible to meet all existing or anticipated larger demands through 2060. Additional supplies must rely on reuse and desal, or on long-distance importation of groundwater that the utility holds rights to, but which is located many miles away. Over the 50-year water supply planning period, our TBL study revealed savings of nearly $1 billion dollars (in present value terms) due to the existing and planned use of reuse and desal, as contrasted with the alternative of water importation. Social and environmental benefits also were derived for the reuse and desal programs, as contrasted with the alternative of accelerated water imports.

Conclusion: TBL Helps Utilities Move Ahead With Sound Investments

Quantitative TBL can be a highly effective approach for understanding the overall merits and importance of the many high-cost investments needed by water sector utilities in the 21st century. This approach has proven to be effective across a wide array of applications, in water, stormwater, wastewater, and biosolids management. A soundly developed quantitative TBL can help engage stakeholders, evaluate alternatives, and ultimately help make a solid business case for worthwhile capital projects. ■

[1] *E.g. Elkington, John. 1998. "Cannibals with Forks: The Triple Bottom Line of 21st Century Business" New Society Publishers. Gabriola Island, BC, Canada*

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Tapping Into The Value Of Water

By educating key stakeholders on the true value of water, utilities can better position themselves to secure much-needed and long-overdue funding.

By Kevin Westerling

The value of water is a study in contrasts: It is both blatantly obvious (try living without it for a day) and easily overlooked. In the United States, potable water has been so cheap and readily available that few consumers consider the process that brings it to their spigot. The nation's crumbling distribution system, in particular, is out of sight/out of mind — until it's out of service.

Clearly, with respect to water, public perception is not reality. Those in the industry realize that high-quality water that adheres to today's strict regulatory standards is *not* easily produced and certainly not cheap. On the contrary, the cost is rising to the point of unsustainability. Cost drivers include the aforementioned failing infrastructure and regulations but also population growth and water scarcity.

In terms of dollars, you have probably heard reports in recent years about the massive investment needed to repair, replace, and expand America's water/wastewater system — or, more likely, you're living it. A 2012 study by the American Water Works Association (AWWA) estimated the cost to be $1 trillion over the next 25 years[1], raising the question: "Where do we get the money?"

While financing initiatives such as public-private partnerships and loan programs, like the State Revolving Fund (SRF) and the Water Infrastructure Finance and Innovation Act (WIFIA), are viable solutions, the fact is that most capital improvements will ultimately be financed through water sales revenues. In other words, the same customer who takes water for granted — and considers it a right — will need to pay more for it.

No one ever likes to pay more, and it's an especially hard sell in this economic climate. However, there are few things (one could argue *nothing*) more vital to a community and a society than clean water. When lobbying for the rate increases necessary to achieve sustainable operations into the future, utilities must reset the common (mis)understanding of the value of water so that it gets the attention — and money — it deserves. This article provides a two-phase approach to getting water its just due.

Phase 1: Win Over Decision-Makers Via Asset Management

A recent research study conducted by McGraw-Hill Construction and CH2M HILL analyzed the use and benefits of water infrastructure asset management, defined as "a set of practices and methods for delivering desired services to residents and businesses, at the lowest lifecycle costs (including environmental and social costs), while managing risk to an acceptable level."[2] The report looked at the rate of adoption and the effectiveness of asset management in the water sector, broken down into three main categories: technology and data practices, strategy and performance measurement practices, and processes and methods for sound investment decisions.

A survey of 451 utilities across the U.S. and Canada revealed that the single greatest benefit to practicing water infrastructure asset management was the "improved ability to explain and defend budgets/investments to governing bodies," cited by

80% of practitioners. The next most popular answer, reported by 67%, was "better focus on priorities." Taken together, these responses indicate that a clear understanding — and presentation — of a utility's current assets and efficiencies, alongside data-driven projections of what will be needed in 5, 10, or 20 years, is essential to getting approval for the rate hikes necessary to maintain sustainable operations.

The study also revealed that heavier adopters of asset management practices were more likely to have higher planned rate increases (of more than 5%) by 2017, suggesting a higher cost assessment for future needs. To apply these findings conversely, non-practitioners would be more likely to forecast, request, and receive less funding than they actually need.

> **"The same customer who takes water for granted – and considers it a right – will need to pay more for it."**

The report therefore confirmed that water infrastructure asset management lends itself to smarter decisions — for utilities and, should they listen — administrative boards and elected officials. But elected officials are often motivated more by votes than by what is "right," and raising water rates would not appear to be politically expedient. That's where Phase 2 comes in.

Phase 2: Win Over The Public Via Community Outreach

If the public truly understands and appreciates the value of water and, by extension, the role of the water provider, then they are more likely to support the investment required to adequately fund the repair, expansion, and upkeep of vital water systems. Once the public is won over, governing bodies can grant approval on water rate or tax increases with less fear of political fallout. This is why community outreach is so important, to be conducted in concert with asset

management as a lead-up to funding proposals.

An initial obstacle to asking for more is the fact that consumers have already been paying more. In 2012, *USA TODAY* reported survey results from 100 municipalities, finding that over 25% had at least doubled their rates over the past 12 years.[3] This sharp increase reflects the rising costs of water treatment, but also illustrates the need to change the perception of the value of water.

According to the U.S. EPA report "Water On Tap," published in 2009, Americans were paying an average of just $2.00 per 1,000 gallons of tap water — less than almost any country in the developed world. In contrast to other services, even higher water rates won't typically rise to the level of electricity and gas services and are decidedly less than nonessential services such as cable TV and Internet. And for the sizable portion of consumers who shun tap water for bottled water, the *New York Times* notes that 8 glasses of water per day from the tap cost about 50 cents per year, while the same amount of bottled water costs up to $1,400 dollars.[4]

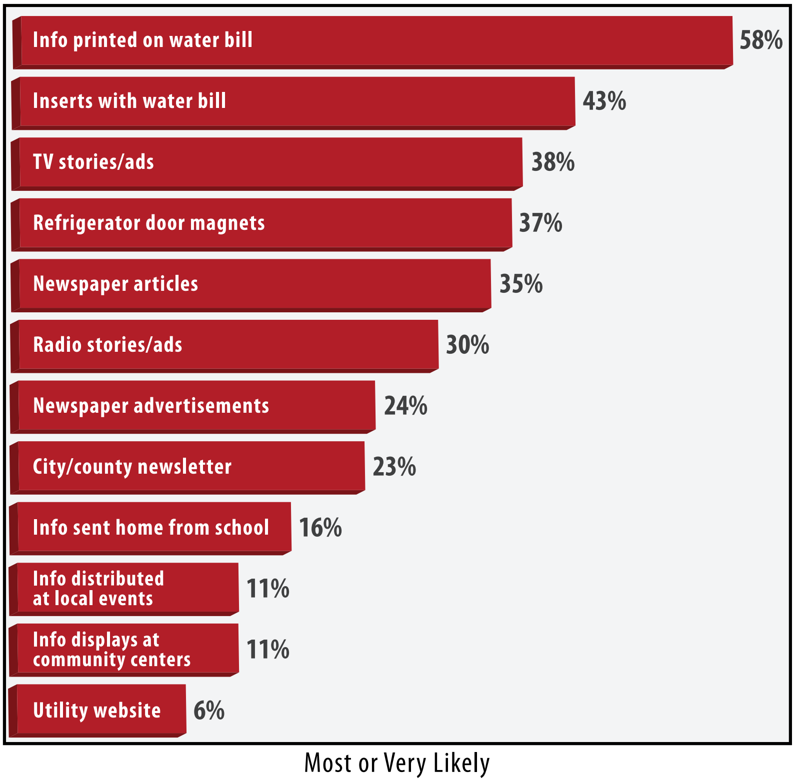

Figure 1. Likelihood of customers viewing information from various sources (Credit: Water Research Foundation/U.S. EPA)

Put in context, water is still a bargain, especially for all that it provides. Water not only sustains life but also is vital to our quality of life. Through its purveyor, the municipality, water also provides the community with disease protection, fire protection, basic sanitation, economic development, and countless other benefits. This is part of the message that needs to be conveyed to the public.

The other part is the fact that the collection, treatment, and distribution of water is a massive and expensive operation, and one that is at risk. Precisely by underpricing water for so long, while at the same time neglecting the infrastructure put in place long ago (in some cases more than 100 years), the U.S. has accumulated a funding gap of $540 billion. That estimate was reported by Steve Allbee, project director of Gap Analysis for the EPA, who derived the number by comparing current spending to the investment needs over the next 20 years.[5]

The good news is that the public may be receptive to the message. In a nationwide poll of consumers conducted last year by water technology provider Xylem Inc., 88% of respondents felt that U.S. water infrastructure is in need of reform, and 61% said they are willing to pay more for water — $7.70 per month more, on average. That slight crack in the door exposed, utilities would be wise to take advantage and walk through it.

While the outreach effort in "selling" these higher rates should focus mainly on the value of water — both of the product itself and the services associated with it — the argument can also be made that higher short-term costs to the consumer can pay off in the long term, especially in water-scarce regions. Higher rates promote conservation, thus reducing the burden on infrastructure and lowering long-term operation and maintenance (O&M) costs. With populations and demand on the rise, water made available through conservation is much cheaper than alternatives such as desalination and imported water. Of course, the rate structure must be applied in such a way that the financial impact is a net positive for the utility, despite the decrease in consumption. This can be achieved through volumetric pricing that penalizes "heavy"

"Higher rates promote conservation, thus reducing the burden on infrastructure and lowering long-term operation and maintenance (O&M) costs."

users who exceed prescribed limits, or through marginal cost pricing, which simply sets the price of water at what it costs to supply it.

In practice, "brand building" — the term used for communicating public sector value — can be accomplished in a variety of ways, largely depending on the size of the utility and available resources. Small utilities may be restricted to flyers in water bills and Internet/social media campaigns, while large utilities can reach out through radio spots, television commercials, and professionally designed mailers.

In a survey conducted for a 2008 study on communicating the value of water, cosponsored by the Water Research Foundation and the U.S. EPA, water customers answered the question of "how their water utility should keep them informed" by citing water bills (58%) and water bill inserts (43%) most frequently. TV, radio, and newspaper ads were favored by 35%, 30%, and 24%, respectively, while refrigerator magnets snuck in at 37%. See Figure 1 on page 24 for more detail on the methods and responses represented in the study.[6]

The Importance Of Influence

Both initiatives described above — asset management for formal decision-makers and community outreach for the general public — have a common goal: to amplify the values that resonate with that audience. In the case of elected boards and officials, it is imperative to make a strong business case (one of the tenets of asset management) that clearly presents current and future needs of the utility, a plan for capital improvements, all risk factors, and the anticipated return on investment — not just economic return, but also social and environmental returns. This audience legitimately requires such data to make informed decisions, but they will also need the solace of public support. For the public, it is a matter of rewiring and reconsideration, to stop seeing water as a boundless, cheap commodity and start seeing it as a necessity worth investing in. These are no small tasks, to be sure, but very important toward maintaining the level of service that has for too long been taken for granted. ■

1 American Water Works Association: "Buried No Longer: Confronting America's Water Infrastructure Challenge," 2012.
2 McGraw-Hill Construction: "Water Infrastructure Asset Management: Adopting Best Practices to Enable Better Investments," 2013.
3 USA TODAY, "USA TODAY analysis: Water costs gush higher," September 29, 2012.
4 New York Times, "In Praise of Tap Water," August 1, 2007.
5 Pennsylvania State University, Liquid Assets: The Story of Our Water Infrastructure, 2008.
6 Water Research Foundation/U.S. EPA: "Communicating the Value of Water: An Introductory Guide for Water Utilities," 2008.

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Can Our Water Infrastructure – And Utility Managers – Weather The Storm?

Extreme weather is battering our nation's water infrastructure, but utilities are gaining valuable lessons on how to deal with future events.

By Claudio H. Ternieden, Erica Brown, Lauren Fillmore, Karen Metchis, Kenan Ozekin, and Nancy Beller-Simms

Extreme weather events are increasingly common and can potentially impact the nation's water infrastructure, such as water and wastewater conveyance and treatment systems, intakes, stormwater, and drainage management systems. These events may include longer and more frequent and intense storms with higher winds and storm surges, prolonged higher temperatures, extended drought, earlier snowmelts, and sea level rise. These extreme events have added unpredictability to an already challenging job facing water, wastewater, and stormwater service providers, emergency planners and responders, elected officials, and local and regional decision-makers. Recently, federal agencies and research organizations joined to collect information on these events in six areas of the United States, and their findings will help utilities and other organizations to better plan their infrastructure investments and implementation approaches.

In August 2010, more than 80 drinking water, stormwater, and wastewater utility practitioners participated in a workshop that focused on their weather-sensitive information needs for making key decisions on long-lived and costly investments. (See Water Research Foundation publication *"The Future of Research on Climate Change Impacts on Water"* [2011] or the *Water Environment Research Foundation* [WERF6C10] report for the full workshop proceedings and outcomes.) These practitioners were particularly concerned about their risk and vulnerability in preparing for and adapting to an increased number and intensity of extreme weather events. Participants noted that a number of their colleagues have faced an extreme event in the recent past and that they could benefit from the knowledge gained and lessons learned from others' experiences to better prepare for and adapt to future events.

Extreme low water levels due to drought are evident in Lake Travis, Austin TX.

An outcome of the 2010 discussions was an agreement between the National Oceanic and Atmospheric Administration (NOAA) and the U.S. EPA to collaborate with water research organizations, including the Water Environment Research Foundation (WERF) and the Water Research Foundation (WaterRF), to document these experiences and synthesize collective knowledge. Over time, other research organizations, such as Concurrent Technologies Corporation (CTC) and Noblis, joined this effort. This groundbreaking collaboration enabled researchers to examine how water utilities, resource managers, county and/or regional planners, and military installations made decisions while experiencing these types of extreme events and how they adapted their planning to better prepare for them in the future. The study will identify how scientific data was used in various regions of the country to inform decision making, either during the event or while planning for future events. In addition, the study will identify what information gaps need to be filled to improve the ability of water services and local and regional planners to adapt and respond to recurring events.

Collaborators have held a series of regional extreme-event-focused workshops, organized by type of extreme event (or cascading sets of events) including drought, heavy rain and flooding, sea level rise and storm surge, and extreme temperatures. Each workshop included an overview of scientific understanding of past, present, and future climate; descriptions of the events, including how they affected the community and the water and wastewater utilities and/or military installations; and discussions with other water resource decision-makers in the watershed that affected the stakeholders' actions. Participants examined the actions taken and the constraints under which the communities operated, based on first-hand accounting. Practitioners and experts discussed

"Extreme events have added unpredictability to an already challenging job facing water, wastewater, and stormwater service providers."

the roles that decision-makers, information providers, and other relevant officials played in the response to the events and in planning for future extreme events. These meetings have allowed extensive discussions of local planning and water resource issues, collaboration among a broad group of stakeholders, and the identification of possible new partners.

The research team and collaborating organizations will extract both the lessons learned and the information needed by the communities and water service providers to make better decisions to prepare for and respond to extreme events in the future. Case studies documenting the events, the experiences, and the workshop objectives, outcomes, and findings will be published. Specific outcomes will address:

- The key challenges experienced in responding to these conditions;
- Partnerships, technologies, tools, information, services, and/or other approaches that were most helpful;
- Communications conducted before and during these conditions;
- Procedures that were in place and invoked during the response to the event;
- The decisions made during these conditions and who made them;
- The key impacts to water resources, as well as social, economic, and ecological impacts; and
- Changes as a result of these events — in planning, implementation, approaches, capital improvements, collaboration, communication, and decision-making.

The regions and water basins documented in these case studies include the Russian River watershed California; Apalachicola/Chattahoochee/Flint River Basin, Georgia; the Tidewater area, Virginia; the National Capital area, Washington, D.C.; the Lower Missouri River Basin, Kansas and Missouri; and the Lower Colorado River Basin, Austin, Texas. The issues, impacts, approaches, information gaps, needs, and local resilience are unique to each region. However, some preliminary observations have emerged that allow us to think about adaptation to extreme events with a focus on local needs.

For example, the Russian River watershed has a history of variable weather and now it faces an emerging pattern that is more erratic and unpredictable — the 2006 New Year's Day flood, the 2007-2009 droughts, and an unusually intense period of frosts in the spring of 2008. These weather-driven events require management of both flood risk and water supply in balance with environmental needs, and they show the interdependent challenges water resource professionals face. In the Tidewater area of Virginia — the eastern Virginia coastal plain where the James, Rappahannock, and York Rivers join the Chesapeake Bay — are four cities (Hampton, Newport News, Norfolk, and Virginia Beach), rural and small communities, military installations, including the world's largest naval station (the Norfolk Naval Base), and a large state-owned cargo port. In the last few years, this region has seen Hurricane Isabel, Hurricane Irene, and more recently, three days apart (August 25 and 28, 2012), two "short-fuse" nor'easters — all with devastating effects on its coastlines and adjacent communities. Coastal erosion continues to affect infrastructure, sea level rise is causing salinity of inland water sources, and utilities are recording salt water at their intakes. Newport News raised its reservoir water level one foot to keep fresh water upstream and brackish tidal water downstream, and the Norfolk Naval Base has experienced storms which caused base and roadway flooding, overtopped piers, disrupted utilities, eroded shoreline, destabilized grounds, and increased loads on structures. These communities, utilities, and the Navy are working to identify ways they can adapt to and prepare for future extreme events.

"More than 80 drinking water, stormwater, and wastewater utility practitioners participated in a workshop that focused on their weather-sensitive information needs for making key decisions on long-lived and costly investments."

Some preliminary observations collected through these various workshops are:

- Water utilities and communities must embrace both emergency response and long-term preparedness;
- The complex array of decision-makers affecting water resources within a watershed require communication (and innovation) beyond boundaries to manage surprises;
- Multijurisdictional fragmentation creates community patterns and vulnerabilities that are difficult to address;
- Water utility managers are competently taking action within their span of control — but confronting real, long-term vulnerability is likely to require broader community action; and
- Managers need better access to local information to manage resources for impending extreme events.

These case studies will help communities think about their own challenges, plan and respond to potential threats, and educate their citizens and decision-makers on the importance of adaptation planning, no matter where in the country they are located. More importantly, these communities will be able to identify gaps in information and potential needs that need to be addressed — before these extreme events happen. ■

This article was prepared by a team of authors: Claudio H. Ternieden (Concurrent Technologies Corporation); Erica Brown (Noblis); Lauren Fillmore (WERF); Karen Metchis (EPA); Kenan Ozekin (WRF); and Nancy Beller-Simms (NOAA).

What Can WIFIA Do For You?

The nuts and bolts of the Water Infrastructure Finance and Innovation Act (WIFIA) are revealed, as well as its benefits to municipalities.

By Dan Hartnett

When most Americans visualize the nation's aging infrastructure, thoughts typically turn to the decaying bridges and potholed roads on which they travel every day. The nation's water infrastructure, on the other hand, is largely forgotten, though hundreds of millions of people rely on it to deliver clean and safe drinking water to the tap. Unfortunately, this vast network of underground pipes and hidden-away treatment facilities is facing profound challenges of its own.

Take, for example, the 650 different water main breaks that inconvenience the residents of cities and towns across the country on an average day. Over the course of a year, these force communities to waste nearly two trillion gallons of treated water at a cost of $2.6 billion.[1] Figures like these help put the scale of the problem into focus.

Though we know the water infrastructure problem is expensive, so too is the solution. One recent study found that the country's buried network of drinking water pipes will require at least $1 trillion in new investments over the next 25 years.[2] The U.S. EPA, meanwhile, estimates that water and wastewater systems together will need nearly $633 billion over the next two decades just to maintain current levels of service — not counting additional expenditures necessary to account for expansion and population growth.[3] Challenges of this magnitude require innovative solutions.

Spurred by these figures and the need to think creatively in today's era of tighter budgets, a new approach to financing water infrastructure improvements is getting attention on Capitol Hill. Known as the "Water Infrastructure Finance and Innovation Act," or WIFIA, the proposal has the potential to offer cities and towns low-cost water infrastructure financing options without compromising quality or relying on unsustainable rate increases. Moreover, WIFIA will encourage innovative approaches to replacing infrastructure and reward communities that think outside of the box as they rebuild and renew their water systems for the coming decades.

To fully understand the value behind WIFIA's new approach, it is important to first consider how communities currently maintain and upgrade their water infrastructure. According to the U.S. Conference of Mayors, the country's local governments — and local taxpayers — pay for 95% of water and sewer infrastructure development, rehabilitation, and operating costs. These investments totaled $82 billion in 2008.[4]

Local water rates and service fees cover typical operating and maintenance costs, and larger infrastructure projects — from major water main replacement efforts to treatment plant upgrades and water resource projects — are often financed through local municipal bond sales. These generate the needed capital up front, but also cause communities to collectively pay billions of dollars in interest charges over time.

Other funding sources include the federal Clean Water and Drinking Water State Revolving Fund (SRF) programs. Authorized by Congress and administered by the EPA, SRFs follow a formula to annually disseminate federal dollars for water and wastewater infrastructure among the states and territories. Individual state revolving fund administrators then lend their share

> **"Major metropolitan water infrastructure projects tend to miss out on State Revolving Fund (SRF) assistance because there is simply not enough money to go around."**

of dollars out to individual communities to fund eligible projects, and these communities repay the principal and below-market interest to the state. This is an effective system that has financed billions of dollars worth of water infrastructure projects over the past few decades, but the program's reach is limited because the SRF was not intended to address the full scale of infrastructure needs facing the water sector today.

The reason is two-fold: First, federal law prescribes strict guidelines that require states to place certain types of projects at the front of the line for SRF assistance. The Drinking Water SRF (DWSRF), for example, directs states to prioritize projects that address serious public health concerns, facilitate compliance with federal drinking water standards, or assist water systems with the greatest infrastructure needs on a per-household basis. These objectives are in line with the Safe Drinking Water Act's primary goal of protecting public health, so it is natural that communities facing these particular water quality and public health challenges are the focus of the program.

A side effect of this focus on maintaining public health — rather than more broadly maintaining infrastructure — is that the SRF offers large communities fewer opportunities to receive low-cost financing. Nationwide, 96% of health-based drinking water quality violations occur in water systems that serve fewer than 10,000 people,[5] so these small drinking water systems are positioned to end up with a disproportionate share of DWSRF funding. The actual numbers bear this out: through 2010, small systems had received 38% of all-time DWSRF assistance,[6] while collectively serving 19% of the U.S. population. Meanwhile, drinking water utilities serving more than 100,000 people had historically collected just 24% of DWSRF assistance, while serving 46% of the U.S. population.[7]

Of course, helping small communities come into and maintain compliance with drinking water public health standards is and must remain an important federal policy objective. But focusing on these needs alone does not begin to address the full scope of the water infrastructure investment required by America's cities and towns.

Second, major metropolitan water infrastructure projects also tend to miss out on SRF assistance because there is simply not enough money to go around. With every state guaranteed at least 1% of each year's SRF appropriation, the pot of available money is divided up very quickly. And once a state has received its share of funding for the year, it is not uncommon for the state's SRF administrators to spread the dollars out to as many communities as possible. This allows many water projects to receive a piece of the funding, but also ensures that most of the pieces are small; through fiscal year 2010 the average DWSRF loan was only $2.4 million.[8] This is not an insignificant amount of money — especially for budget-strapped small towns — but it amounts to little more than a rounding error for metropolitan water systems facing infrastructure upgrades that could cost hundreds of millions of dollars.

The resulting reality is that we currently have no federal program specifically designed to offer low-cost financing for major water infrastructure rehabilitation and rebuilding projects that do not rectify an imminent public health threat — the very type of project that is essential to modernizing much of the country's water infrastructure.

This is where WIFIA comes in. Based on the successful Transportation Infrastructure Finance And Innovation Act (TIFIA) that has helped communities across the country finance large-scale transportation projects, WIFIA could offer direct low-cost financing for a broad range of construction, replacement, rehabilitation, and security improvements at drinking water and wastewater systems. Innovative energy and water efficiency enhancements and water reuse projects — investments that will help build the "green" communities of the future — could also be made eligible for WIFIA assistance.

"From a federal budgeting perspective, WIFIA loans are likely to represent a low-risk investment of taxpayer dollars."

As envisioned by the Association of Metropolitan Water Agencies (AMWA) and other water sector organizations that support WIFIA, communities and their water systems would assess their water infrastructure needs, develop project proposals, and submit applications to the EPA. The agency would vet these submissions against eligibility criteria designed to identify the strongest and most essential projects from the nationwide pool of applicants. Factors considered by the EPA could include the overall need and significance of the project; its economic, environmental, and public health benefits; its creditworthiness; and the degree to which it incorporates innovative techniques and environmentally sustainable approaches. Projects that are not completely reliant on WIFIA funding — that is, those that have secured additional sources of capital — could be identified as stronger candidates and therefore stand a better chance of receiving assistance.

To keep the program's focus on projects that are too large for meaningful SRF assistance, a minimum loan amount — such as $20 million per application — could be established as a baseline for WIFIA eligibility. But to avoid shutting out smaller communities that do not have multimillion dollar infrastructure needs, multiple utilities could be allowed to pool their smaller-scale proposals into a single WIFIA application that meets or exceeds the minimum threshold. State water officials could serve as the aggregators of these combined applications. This framework would ensure that water systems of all sizes and needs have an opportunity to take advantage of WIFIA loans, while also recognizing that the existing Clean Water and Drinking Water SRFs will remain the primary federal loan programs for most water infrastructure projects.

To maximize savings opportunities for water systems and their ratepayers, WIFIA would allow the EPA to offer project loans at long-term U.S. Treasury rates — which frequently beat the interest rates available to communities on the municipal bond market. Recipients of WIFIA loans would pay back all funds to the Treasury with interest over several decades, thereby replenishing federal coffers and creating a new base of capital that may be drawn on to issue future loans. But again, because the borrowing costs incurred by communities would be lower than typical bond market rates, water systems and their ratepayers would save millions of dollars in interest and finance charges over the life of their WIFIA loans. This will help communities stretch their own dollars further and make more local resources available to support additional infrastructure improvements or to simply ease the burden of increasing water rates on customers.

From a federal budgeting perspective, WIFIA loans are likely to represent a low-risk investment of taxpayer dollars. The American Water Works Association (AWWA) reports that Fitch Ratings calculated the default rate on water bonds issued between 1979 and 1997 to be only 0.04% — making them one of the safest investments anywhere.[9]

This is not to suggest that WIFIA can be successful without a substantial federal investment to get off the ground. It cannot. But if WIFIA duplicates the 10-to-1 leverage ratio currently enjoyed by TIFIA — where $1 in subsidy appropriation supports $10 worth of credit assistance — then a relatively small outlay of federal monies can support a substantial number of water infrastructure projects across the country. Factor in the job-creating and economy-stimulating benefits of water infrastructure investments (Each dollar of water and wastewater infrastructure investment increases America's GDP by $6.35, and that each new job in the water and wastewater industry creates 3.68 additional jobs in the national economy.[10]) and the deal only gets better.

These are just a few of the many reasons WIFIA offers the right approach to addressing our nation's water infrastructure needs. Fortunately, lawmakers on Capitol Hill are starting to pay attention. The Senate Environment and Public Works Committee included a pilot version of WIFIA in a water resources bill it approved earlier this year, and more and more elected representatives are speaking out in favor of the concept. Oregon Democratic Senator Jeff Merkley, an early WIFIA backer, has argued that it could save money for community residents and businesses while creating local construction jobs.

This combination of sobering data, workable solutions, and congressional support has created some real momentum for WIFIA in Washington. Establishing a new Water Infrastructure Finance and Innovation Act would represent a victory for America's communities and help ensure the reliability of the nation's water and wastewater infrastructure for generations to come. It is an opportunity we cannot let slip down the drain. ■

1 Xylem Inc. (formerly ITT Corporation), "ITT's Value of Water Survey reveals that Americans are ready to fix our nation's crumbling water infrastructure," October 27, 2010.

2 American Water Works Association, Buried No Longer: Confronting America's Water Infrastructure Challenge, February 27, 2012.

3 U.S. EPA's 2007 Drinking Water Needs Survey estimates that drinking water infrastructure requires $334.8 billion over 20 years; EPA's 2008 Clean Water Needs Survey puts the number at $298.1 billion for wastewater infrastructure.

4 United States Conference of Mayors, "Mayors Water Infrastructure Report Shows Investment Yields High Returns," August 14, 2008.

5 Testimony of Cynthia Dougherty, Director, Office of Ground Water and Drinking Water, Office of Water, U.S. Environmental Protection Agency, Before the Energy and Environment Subcommittee, Energy and Commerce Committee, U.S. House of Representatives, May 13, 2010.

6 U.S. EPA, Annual U.S. Drinking Water SRF Assistance by Community Size Category, November 9, 2010.

7 U.S. EPA, Fiscal Year 2010 Drinking Water and Ground Water Statistics, June 2011, Updated February 2012.

8 U.S. EPA, November 9, 2010.

9 Mark Kellett and Lisa Casseres, Financing Water Infrastructure," American Water Works Association, 2009.

10 United States Conference of Mayors, August 14, 2008.

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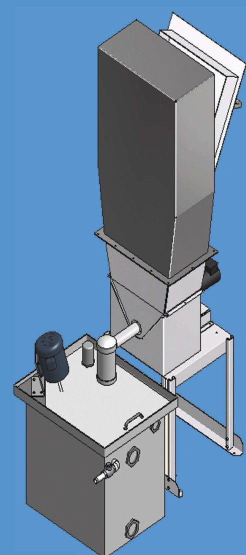

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