

BCToday

ENVIRONMENTAL SYSTEMS ARE ON A PAR WITH FINANCIAL AND SOCIAL FACTORS—THE THIRD LEG OF THE STEPSTOOL TO SUSTAINABLE PERFORMANCE.



The Way Forward

OURVIEW



Craig Goehring, P.E.
CEO

Getting things done in the New Normal

Just mention what it is like now “in the New Normal” and you’ll likely prompt a passionate discourse that will range broadly in subject, scale, specifics—and sides. From global competition and financial stresses, to energy security, climate impacts and the quality of life now and for future generations, today’s challenges have produced a new sense of urgency. Common to most exchanges sparked by the notion of a New Normal is the sense that not only have things changed, they seem unlikely to (and should not) return to the way they were.

Within the environmental and water industry—which is Brown and Caldwell’s world—aged infrastructure is being pushed in terms of its reliability, new management models are needed to avoid water shortages, climate change and extreme weather have emerged as real issues, and the immense reinvestment needed for renewal are just some of our challenges making headlines. Emerging from the growing public awareness is a mandate for leadership and the opportunity to reframe these challenges with New Normal solutions.

The direction: sustainable performance and outcomes, and getting things done. And we are.

The EPA’s Four Pillars of Sustainable Water Infrastructure, which it published in 2003, largely in response to the massive funding gap for renewal, offered a broad and compelling model comprised of better management, full-cost pricing, efficient water use and governance by watershed. Looking back, energy was secondary and climate change not even mentioned.

Water and energy have now come to be viewed in lockstep and sustainable water infrastructure is progressively being redefined. In 2007, the EPA and major water industry associa-

tions joined forces to promote Effective Utility Management (EUM). Their *Ten Attributes of Effectively Managed Water Sector Utilities* and *Five Keys to Management Success* shaped a more holistic framework and, importantly, a consistent set of benchmarks for sustaining water and wastewater systems.

In a 2009 report by the Aspen Institute, water industry leaders and stakeholders define sustainable water infrastructure as that which integrates the needs of both the built infrastructure and coincident natural infrastructure (waterways and watersheds). By unifying how built and natural systems are viewed, they reinforced the simplicity of “water is water,” a concept that by definition integrates drinking water, wastewater and stormwater.

Integral to the Aspen Institute report is the Sustainable Path (see page 22), a framework the group developed to manage water infrastructure more holistically by embracing its environmental, economic and social considerations. The Sustainable Path not only works handily within the EUM framework, but is the most comprehensive and explicit model to date and will surely address current challenges while meeting the needs of future generations.

Concepts like sustainable, holistic, footprint, adaptation, lifecycle optimization and integrated bottom line are defining the New Normal and are clearly the way forward. And in this context, we are delighted to be working side-by-side with our clients and industry colleagues on relevant solutions and embracing the urgency of “getting things done.”

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*IWA award-winner
John Willis, P.E.,
is one of our People
Making a Difference*

Technically Speaking: What's a new era without some new jargon? Here are some New Normal terms that you really ought to know.

- B biomass** Organic, non-fossil material that is available on a renewable basis. Examples include forest and mill residues, agricultural crops and wastes, wood and wood wastes, animal wastes, livestock operation residues, aquatic plants, and municipal and industrial wastes.
- C climate neutral** The process of offsetting carbon-producing activities with those that either reduce or capture carbon, thus credibly neutralizing the net amount of carbon released in the atmosphere from a particular activity.
- D dead zone** Aquatic and marine dead zones can be caused by eutrophication, an increase in chemical nutrients in the water. Chemical fertilizer is the prime cause, but sewage runoff and urban land use are frequent contributors. The world's most notorious dead zone: an 8,543-square-mile region in the Gulf of Mexico near the mouth of the Mississippi River.
- E eco-efficiency** Leveraging technological and process changes to create more value than the current offerings, while reducing resource use and environmental impact throughout the product or service's life. Ideally, eco-efficiency not only achieves the best possible efficiency in terms of materials and energy used in the creation, use, and disposal of a product or service, but actually leaves residual value equal to or higher than the inputs.
- ecotistical** Characteristic of: 1) having inflated the truthfulness about one's own environmental accomplishments, 2) having an exaggerated sense of environmental importance, or 3) an environmental disregard of others. Coined by David Crawford of the Manitoba Product Stewardship Corp., writing in GreenBiz.com.
- F feebate** Any system that taxes socially undesirable activities and products and uses the money to support more desirable ones. For example, transportation taxes for gasoline or tolls often support public transportation that has less environmental impact and eases traffic congestion.
- G green design** Designing products, services, buildings or experiences to be sensitive to environmental issues and achieve greater efficiency and effectiveness in terms of energy and materials.
- greenhouse gases (GHGs)** The big three: carbon dioxide, methane and nitrous oxide.
- greenwashing** Disingenuously spinning products, policies and procedures as environmentally friendly. But then again, as Hunter Lovins likes to say, "Hypocrisy is often the first step toward real change!" And the opposite, "greenmuting," is to avoid potential criticism by saying or doing nothing to engage employees and customers in sustainable practices.

- K keystone species** A species so critical to an ecosystem that its removal could potentially destroy the entire system. A good example of this are sea otters, which keep sea urchin populations in check. Where the otter populations decline, exploding urchin populations decimate kelp and other aquatic vegetation beds vital to fish for refuge and spawning habitat.
- N natural capital** All forms of resources from the environment, including minerals, water, air, sunlight, heat, plants, animals and other organic matter. Sustainable organizations seek to maximize their effectiveness and efficiency in using natural capital and practice policies that sustain the quality and quantity of natural capital sources in the future.
- negawatt** A megawatt of power saved by reducing consumption or increasing efficiency.
- R radical resource productivity** Obtaining the same or increased amount of utility or work from a product or process while using fewer resources, including energy, manmade materials and natural resources such as air, water or minerals.
- S stewardship** Making decisions regarding the care of our environment with the goal of passing healthy ecosystems on to future generations.
- T tipping point** The level at which the momentum for change becomes unstoppable. Malcolm Gladwell, author of *The Tipping Point: How Little Things Can Make a Big Difference*, defines a tipping point as a sociological term: "the moment of critical mass, the threshold, the boiling point."
- triple top line** The effect that attention to sustainable management of natural, financial and human capital has to an organization by increasing revenues (offering more desirable products and services) and reducing costs and expenses throughout operations (more streamlined operations). While many of these benefits are measured in terms of triple bottom line accounting, even more valuable are their effects to a company's top-line financial performance because they require less capital investment and reduce the cost of capital.
- U upcycle** The process of converting an industrial nutrient (material) into something of similar or greater value in its second life. With phosphorus reserves projected to be fully depleted within the next 50 to 70 years, some wastewater utilities are using the Ostara Process to create fertilizer-grade phosphorus pellets from their anaerobic digestion recycle streams. The sustainable approach is "upcycling" an otherwise dwindling resource.

Technically Speaking was sourced from, among other places, Wikipedia and Triple Pundit's Dictionary of Sustainable Management, a project of the Presidio School of Management (sustainabilitydictionary.com).

MORE WITH LESS

**GREENSBORO, N.C., OFFICIALS
DIDN'T SET OUT TO SLASH
CONSTRUCTION COSTS BY
MORE THAN \$1 MILLION
AND CUT HORSEPOWER
IN HALF WITH A NEW
PUMP STATION, BUT
THEY MANAGED
TO DO BOTH WITH
A BOLD DESIGN.**





Photos: Scott Hoffman

In 2006, water officials in Greensboro, N.C., discovered that Lake Townsend—the city’s primary water supply—was in trouble. Alkali-silica reactivity (ASR) had seriously weakened the lake’s concrete dam, fast-tracking it for replacement. First, though, a new 30 mgd pump station was needed to ensure a continuous water supply for the community during the construction.

There was little time to lose.

“Our 40-year-old pumps were slated for major maintenance,” says Steve Drew, Greensboro’s water supply manager. “When we knew we would be building a new dam and pump station, we didn’t want to sink more money into our old pumps, but we couldn’t wait long.”

Robert Teem, P.E., Brown and Caldwell’s project manager, recognized the city’s dilemma. “In fact, the city was as concerned about the schedule as it was about cost and power consumption. The dam replacement was urgent and the pump station needed to be built first. They had to do it fast, but they wanted to do it right.”

Rather than replicate the existing pump station, BC engineers recommended a design that would improve the intake, make the facility user friendly and require less than half the horsepower to deliver the required water flows. The proposed design—using innovative pump cans and finding the optimal pumps for the

job—would save nearly \$1.5 million in construction costs and reach target flows more efficiently, reducing power consumption by 28 percent.

The opportunity: Could five 100 hp pumps do the work of four pumps totaling 1200 hp? At first glance, logic might say no. The BC design team said yes.

City managers were intrigued enough by the potential benefits to the environment, the community and ratepayers that they commissioned an independent lab to build a quarter-scale model. The model and a detailed hydraulic analysis demonstrated that the station could meet required flow rates and the project moved forward.

The final design was completed and submitted for permitting in just four months.

Greensboro is getting better performance with less than half the horsepower.

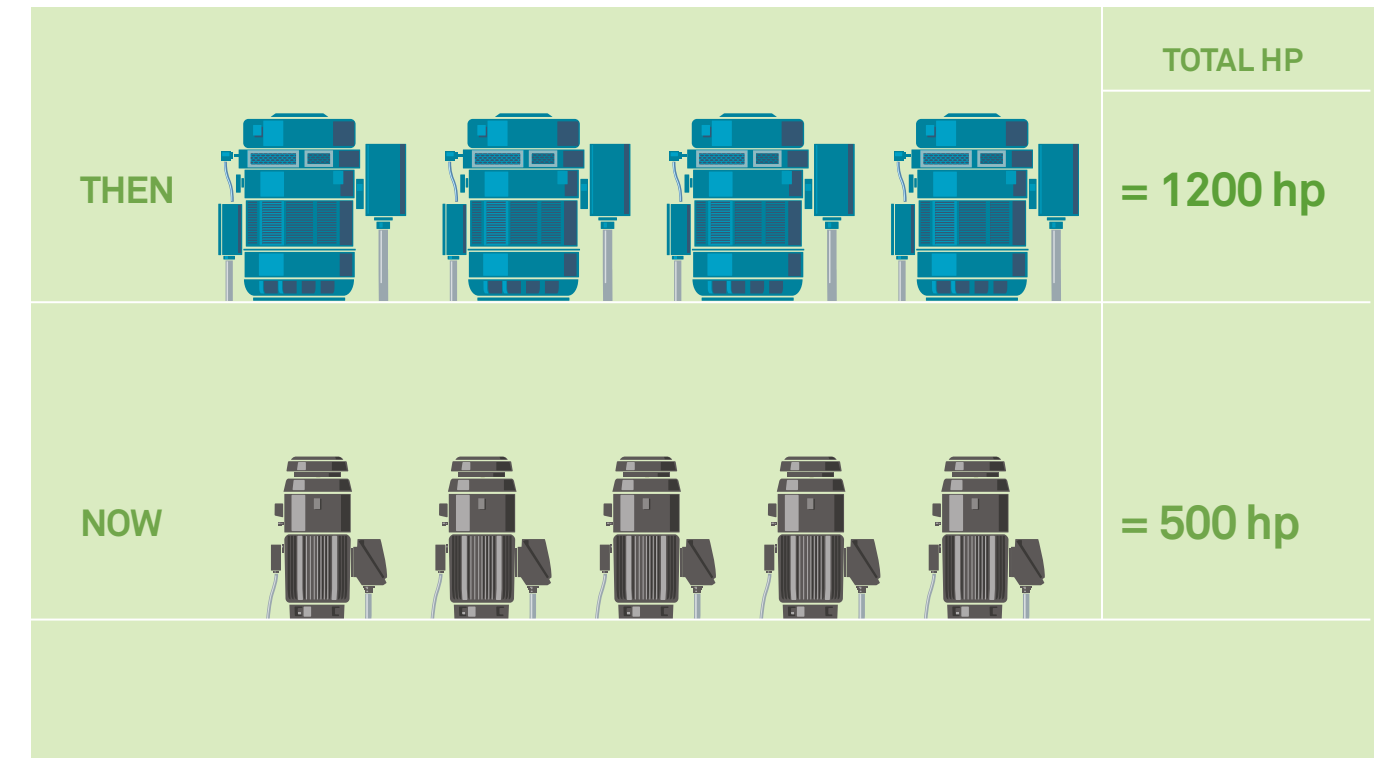


Illustration: Mark Stearney

Opposite page: Greensboro Water Supply Manager Steve Drew (left) and BC’s Project Manager Robert Teem, P.E., at the new Lake Townsend pump station.

“These pumps have turned out to be even more cost-effective because they give us more flexibility to deliver just the capacity we need.”

— Steve Drew, Greensboro’s water supply manager

When the station was commissioned in early 2009 and hit the 30 mgd target, it was clear that the city’s openness to a different approach had paid off.

“Since starting this project, agreements with neighboring agencies for water supplies have produced variable demands for water from Lake Townsend,” Drew says. “These pumps have turned out to be even more cost-effective because they give us more flexibility to deliver just the capacity we need when we need it, and provide redundancy when maintenance is required.”

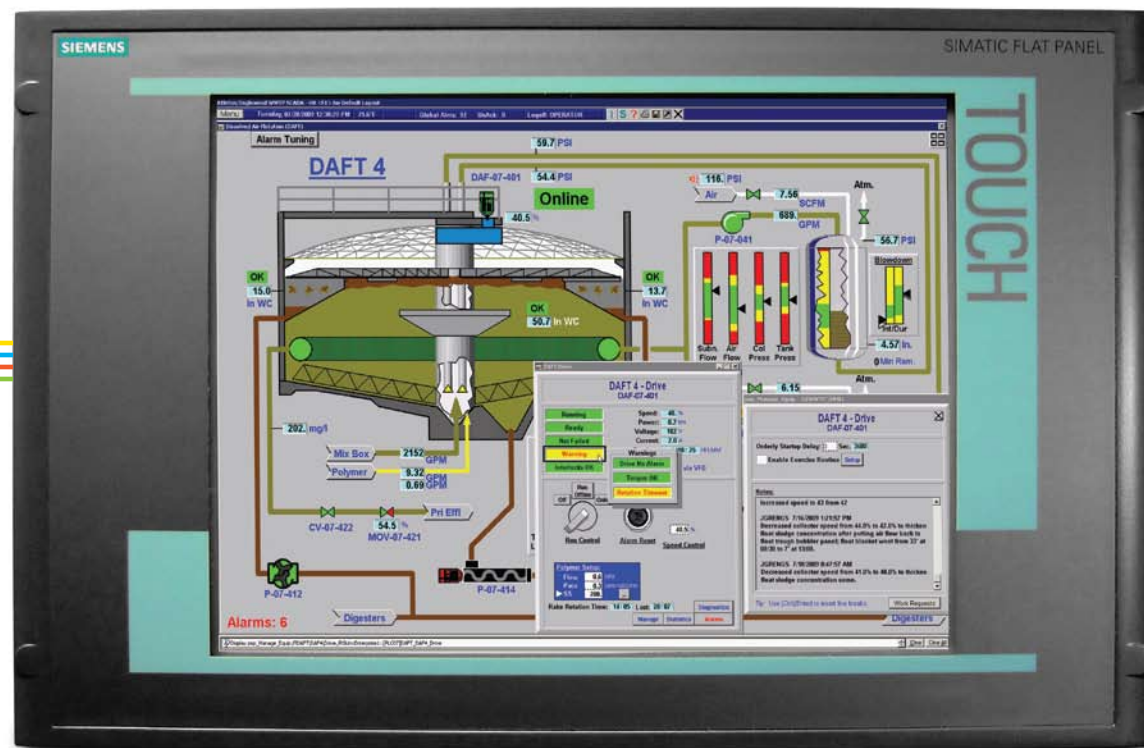
The new station’s three 48-inch raw water intakes draw water from multiple lake levels to adapt to seasonal changes and conditions. A combination of variable and fixed-speed vertical turbine pumps generate average daily flows in the range of 16 to 23 mgd, with a total capacity of 30 mgd.

“This plant was built for the ages,” Drew says. “The design looked good and everything—the pumps, the chemical feed system, the ergonomics of the layout and the SCADA system—performs even better.”

ONE SMART UPGRADE

Not only will the new 50 mgd, \$114 million Littleton/Englewood Wastewater Treatment Plant help the agency meet capacity targets and clean up the South Platte River, it will help train its future workforce.





“...Our current best practices and thinking will be available to future operations personnel.”

- L/E's SCADA Administrator Gary Wyse, one of the managers set to retire.

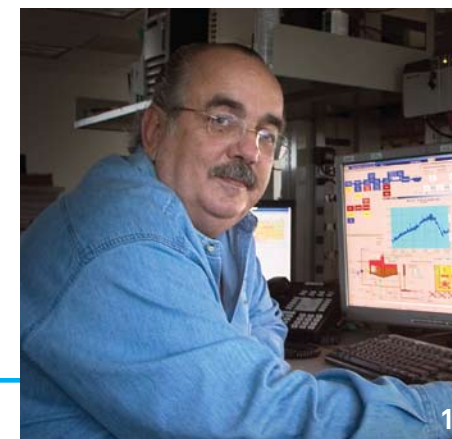
Prompted by requirements to increase capacity and reduce nitrates flowing into the South Platte River, the Littleton/Englewood Wastewater Treatment Plant (L/E) upgrade project was the largest of its kind in Colorado when it began in 2004. Expanding from 36 to 50 mgd and installing new denitrification processes required a massive planning, design and construction effort led by Brown and Caldwell to upgrade this facility while maintaining existing treatment processes.

Yet the most innovative aspect of the project may be the plant's information networks. A new Supervisory Control and Data Acquisition (SCADA) system fully automates all plant operations. It performs real-time equipment maintenance diagnostics and computerized maintenance management, process analysis and control and alarm paging. In addition, a new online O&M manual not only helps staff understand how the system works, its knowledge management program captures the hands-on experience of employees.

“Brain drain” has been a persistent concern for utilities around the country as a generation of workers approaches retirement. L/E's leadership team, many nearing retirement themselves, tackled the two-fold challenge: to create a system to collect operational knowledge on an ongoing basis and record past insights from veteran workers.

To capture the knowledge of its maturing workforce, managers interviewed senior staff and entered this information into the O&M manual's database. Operations staff also log their process and equipment journal entries online to continually update the knowledge database. “This ensures that our current best practices and thinking will be available to future operations personnel,” says L/E's SCADA Administrator Gary Wyse, one of the managers set to retire.

Not only does the system include the maintenance know-how of employees, it continuously monitors the status of equipment and real-time performance data. “The depth of information is



1. Gary Wyse, L/E SCADA Administrator 2. L/E's New denitrification facility 3. Secondary clarifiers 4. (Left to Right) Vince Heiken, Plant Operator; Greg Farmer, Process Specialist; John Wright, Lead Operator; Brenna Durkin, Data Analyst; Jim Tallent, Operations Division Manager

unbelievable,” says Wyse. “With the click of a mouse I see the performance of almost any valve, motor and pump in the plant. The O&M manual, asset management, maintenance procedures and records are all integrated. I can compare real to expected performance, know if repairs are required and get it done before a serious failure becomes more likely.”

More telling: The new information system has improved efficiency so effectively that no new staff was required to operate the expanded plant.

“L/E and BC have created a slick information management system that extracts and delivers L/E's operational and institutional knowledge. It is one the most advanced facilities in the nation,” says Kirk Petrik, P.E., BC's L/E project manager.

“This project brought L/E into the 21st century,” said Jim Tallent, L/E Operations Division Manager. “Technology has replaced many physical tasks, allowing operators to focus on other priorities.

Downloading and retaining institutional knowledge into SOPs within the O&M manual is a huge benefit for both current and future plant staff. We are ‘growing our future.’”

The 8½-year project was driven by unprecedented population growth in the late '90s, a new, stringent nitrate requirement and the need to improve an aging infrastructure. All 11 treatment processes were upgraded and include innovations that produced significant cost savings and an engineering process patent, and that positioned the facility for future expansion and modification. That the project came in on time, under budget, with no permit violations and an excellent safety record, made the success even greater.

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GETTING IT DONE IN LOUISIANA

BC is helping Louisiana maximize funding
and program efficiency for its massive
150-project coastal restoration program.

Key members of Brown and Caldwell's coastal restoration team include (from left) Laura Belden, P.E., CIAP deputy program manager; Cindy Paulson, Ph.D, P.E., national Water Resources practice leader; Joe Wyble, 2010 Annual Plan project manager; and Lucila Cobb, Louisiana operations manager. Photo: David Humphreys





fter hurricanes Katrina and Rita devastated the Gulf Coast in 2005, Louisiana faced increased pressure to secure its coastline and quicken the pace of restoration. The state has lost more than 2,300 square miles of wetlands during the past 70 years and today is losing about one football field of land every 30 minutes.

To meet this challenge, Louisiana is taking a more integrated approach to protecting and restoring its coast. The Comprehensive Master Plan for a Sustainable Coast—which lays out the plan for one of the three largest coastal restoration programs in the nation’s history—was completed in 2007 and establishes four key coastal restoration objectives: reducing economic losses due to storm-based flooding; promoting a sustainable ecosystem; providing fish and wildlife habitats that support commercial and recreational activities; and sustaining Louisiana’s unique heritage and culture.

“As program managers, one of our roles is to identify and mitigate obstacles before they become roadblocks.”

- Laura Belden, P.E., CIAP deputy program manager at BC



Photos: Weeks Marine

Above: Sediment is piped to Timbalier Island in Louisiana to create dune and marsh habitat. More than 3 million cubic yards of dredge material will be used in the restoration project.
Left: The Barataria Land Bridge dedicated dredging was one of the first CIAP projects to begin construction in Louisiana. The project dredged sediment from the nearby bayou and deposited the material within the contained area to create and nourish marshes.

To spell out in detail how the Master Plan will be implemented, Brown and Caldwell collaborated with RAND Corporation, the University of New Orleans and the University of Louisiana to help develop the landmark 2010 Annual Plan. The \$1.4 billion plan, which includes more than 150 projects, has been hailed by legislators, state officials and the public for its thoroughness, transparency and for its potential to accelerate the implementation of the Master Plan. State officials stated that the 2010 Annual Plan was pivotal in helping to secure \$290 million in surplus funds this past legislative session.

“We have given the client far more than just a list of projects and schedules,” said Cindy Paulson, Ph.D, P.E., BC’s national practice leader for water resources. “The state now has a more comprehensive, three-year framework to implement the right projects to achieve the Master Plan’s vision of a living, sustainable coast.” Paulson and Patricia Strayer, P.E., BC’s Southeast region practice leader for water resources, worked hand in hand with the Coastal Protection and Restoration Authority of Louisiana to ensure this landmark plan met their needs and expectations.

The annual plan provides a roadmap on how to operate programs and provides benchmarks for evaluating projects, budgets and performance to enable more accountability. BC is using tools and lessons learned from the 2010 plan to springboard improvements to the 2011 plan.

No project can be completed without funding, of course. A vital component of securing coastal restoration and protection funds is the Coastal Impact Assistance Program (CIAP), which allocates money to outer continental shelf oil- and gas-producing states. This program will provide about \$500 million in federal funding to Louisiana and its coastal parishes during fiscal years 2007 through 2010. Brown and Caldwell is providing program management of CIAP to Louisiana, which was the first state to be approved to manage CIAP funds and apply them to specific projects.

“Louisiana is under immense pressure to spend this money quickly and smartly,” said Laura Belden, P.E., CIAP deputy program manager at BC. “CIAP is just one of the state’s funding sources, but it’s a large chunk of the financing for these projects. As program managers, one of our roles is to identify and mitigate obstacles before they become roadblocks.”

In addition to its broad management role, Brown and Caldwell is involved in the finer details, such as managing the Long Distance Sediment Pipeline project, touted by some as “the future of Louisiana.” The project will use a renewable source of sediment from the Mississippi River to bring new sediment into areas that were cut off from this critical sediment source decades ago when the Mississippi River levees were constructed. The 20- to 30-mile project will harvest sediment from the Mississippi River bed and pump it via slurry into three parishes. The sediments will be used to create wetlands and/or ridges, both of which are essential to coastal protection. To date, approximately \$70 million has been allocated for this project.

“It is exciting to be involved in a project of this scale. It is really the first of its kind,” said Belden. “Sediments have been pumped through pipelines previously to create marshes, but not over such long distances as proposed for this project. We’ll be recreating marshes in an area with extremely high land-loss rates. For example, one of the areas we’ll be working in was projected to lose 28 percent of its marshland between 1990 and 2050.”

Transparency has been a major priority in Louisiana’s restoration effort. Local residents provided valuable feedback to planners during public meetings and expressed willingness to help the state make difficult choices about how to best protect and restore the coastline. This transparency also extends to BC’s supervision of regional stakeholder workgroups, which are just now being initiated for the upcoming 2011 plan update.

Although restoration of the Louisiana coastline will take time, the state has positioned itself—with the help of partners like Brown and Caldwell—to produce results more quickly and with greater efficiency. By moving forward in a systematic and transparent manner, Louisiana is creating a stronger and more sustainable future for its coast.



Illustration: Mark Stearney

all for one

BC study team supports San Diego's goal to develop a sustainable recycled water plan.

Like many California cities sweating out a three-year drought coupled with regulatory-imposed cutbacks, San Diego is thirsting for change—preferably with an invigorating splash of sustainability.

Even with conservation measures already in place, by 2030 the city will need 18 percent more water than it uses today. So, city leaders have turned to Brown and Caldwell to lead a collaborative study involving water/wastewater agencies and environmental groups to hammer out an economical and ecological blueprint for the region's watershed.

Project Manager Bill Kennedy, P.E., and Managing Engineer Victor Occiano, P.E., are focusing a \$2 million study of San Diego's recycled water and wastewater system on the development of sustainable and cost-effective methods to optimize recycled water that otherwise would have been discharged to the ocean from the Point Loma Wastewater Treatment Plant.

"A good part of the community wants to see more recycling happen," Kennedy says. "This is a classic study for Brown and Caldwell to engage with stakeholders in the process. We've already had a workshop to understand the nature and goals of this important study, and to develop a sense of being on one team working toward a common goal. We received good insights from that meeting."

The study is designed to engage the stakeholders' review and input at key points. San Diego Coastkeeper and the San Diego chapter of the Surfrider Foundation are key supporters of the study goals.

Team members will identify and evaluate a number of creative options to address regional recycled water demands, most notably a close examination of the feasibility of indirect and direct potable reuse.

The study team also will evaluate alternatives to upgrade the Point Loma facility to secondary treatment at a much reduced capacity by optimizing recycling of the wastewater generated by the city and 14 agencies in the Metro Joint Powers Authority.

"This would be an innovative and challenging upgrade," Occiano points out, "because it involves incrementally reducing the Point Loma plant's capacity over time, as more recycled water facilities are put into service to satisfy recycled water demands upstream of the plant. The true challenge is to develop a plan that is pragmatic, yet visionary and pioneering. Rules on the field are in their infancy; we have an opportunity to help shape and improve the future and our community."



Photo: Fred Greaves

The study team includes (from left): Victor Occiano, deputy project manager; Amer Barhoumi, project manager, City of San Diego; Reynaldo Novencido, assistant engineer, City of San Diego; Amy Dorman, senior project manager, City of San Diego; and Bill Kennedy, BC project manager. Not pictured are Kevin Davis of CDM, Jennifer Thompson of Black & Veatch and Marsi Steirer, project director for the city.

San Diego's Metropolitan Wastewater System consists of the 240 mgd Point Loma plant, the 30 mgd North City and the 15 mgd South Bay water reclamation plants, as well as major conveyance facilities and the Metropolitan Biosolids Center. Commissioned in 1963, the Point Loma plant operates as a chemically enhanced primary treatment plant.

In 2008, it treated an average of about 140 mgd of wastewater generated by more than 2.2 million residents within a 450-square-mile area. Although the plant has been operating under a 301(h) waiver for many years, the city has studied the possibility of converting it to a secondary treatment facility.

"The San Diego region has been a pioneer in water recycling since the early '70s, and recycled water is viewed by many as an essential component of water resources planning for the region," Kennedy notes. "Steady progress has been made by the city and the Metro JPA; however, the long-term drought, coupled with imported water supply concerns, has prompted a vision of much higher recycled water use."

Scheduled for completion in February 2011, the study will not be a standalone piece of work; rather, it will be an integral component of the city's ongoing water resources and wastewater planning studies. BC is already preparing the city's 2010 Urban Water Management Plan.

For more information contact **Bill Kennedy** at wkennedy@brwncaled.com

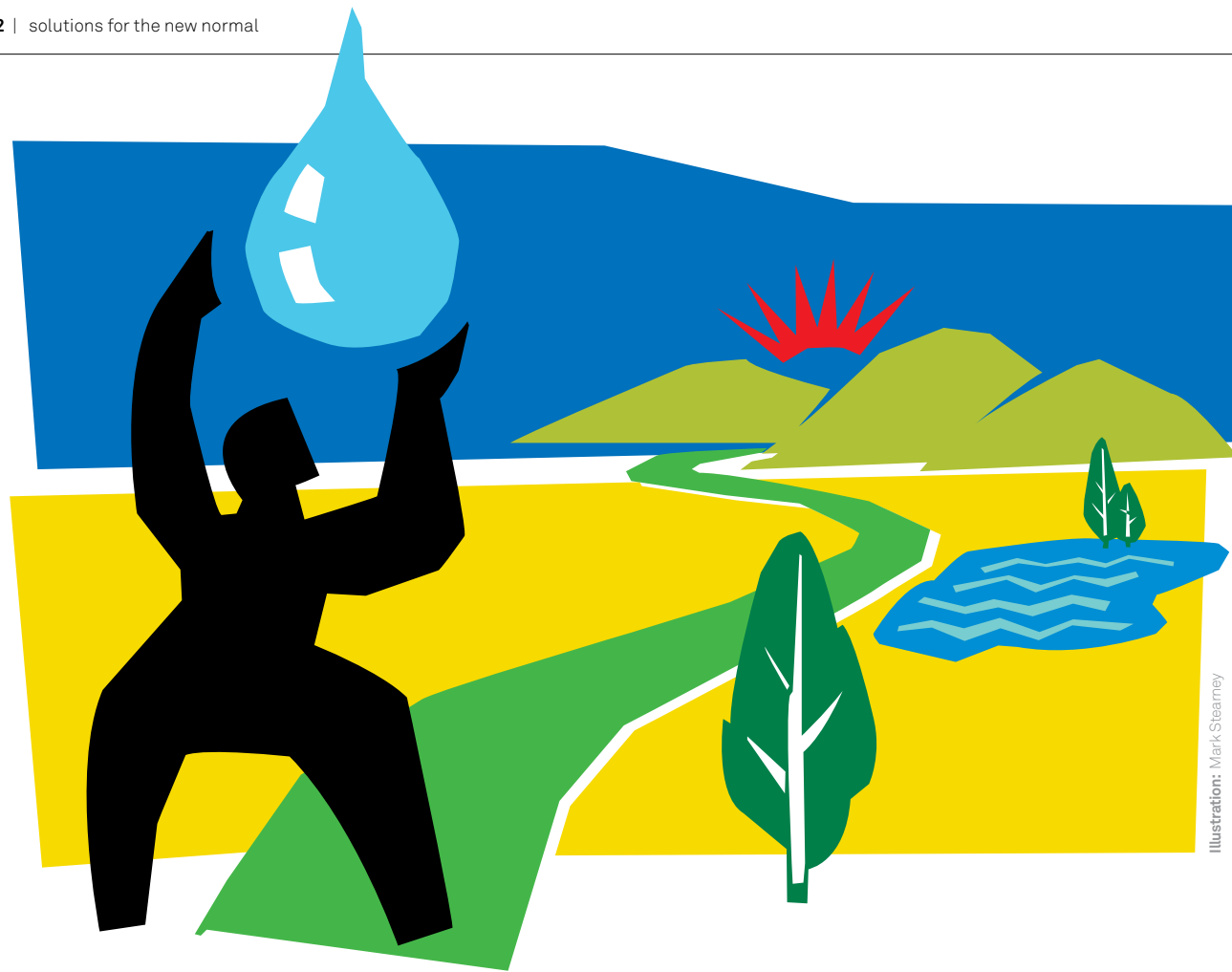


Illustration: Mark Stearney

The Sustainable Path

20 key elements of a financially and environmentally sustainable 21st century water infrastructure.

On four separate occasions between May 2008 and March 2009, The Aspen Institute convened a multistakeholder Dialog on Sustainable Water Infrastructure in the U.S., bringing together leaders from the water utility industry, regulatory bodies and environmentally focused nonprofits to develop policy recommendations that address water infrastructure challenges for the coming decades.

In addition to producing 10 recommendations, the group created the Sustainable Path—20 key elements of a financially and environmentally sustainable 21st century water infrastructure. These Sustainable Path elements, listed here, include concepts for good governance, watershed optimization, public outreach, water conservation and energy management, and utility pricing.

Transparency

The sources and uses of funds deployed by water and wastewater utilities and stormwater agencies should be regularly reported in sufficient and consistent detail.

Good Governance

Governing boards, city councils, and utility special district boards with oversight of water and wastewater utilities and stormwater agencies should have the authority—and accept the responsibility—to expand their focus beyond cost control to encompass concerns for sustainability.

Costs of Development

New development should be charged the full capital, operating and replacement costs of water, wastewater and stormwater capacity through connection or other impact fees. New development and re-development should employ low-impact development (LID) techniques, conservation and reuse strategies.

Security & Emergency Preparedness

Economic security and preparedness measures appropriate to water and wastewater utilities and stormwater agencies should be deployed to ensure overall system reliability and resiliency.

Stewardship

Utilities and stormwater agencies should adopt a leadership role in promoting the sustainability of the natural infrastructure of rivers, lakes, streams, groundwater aquifers, floodplains floodways, wetlands, forests and watersheds.

Public Outreach & Stakeholder Involvement

Public, customer and stakeholder involvement in defining sustainable water infrastructure services and associated funding strategies should be highly developed and continuous. The public should also be involved in ensuring that sustainability objectives are achieved.

Full Cost Pricing

The price of sustainable water, wastewater, and stormwater services should fairly impose the total cost of meeting the requirements of sustainability on ratepayers/customers.

Asset Management

Best practices in asset management should be applied to identify the best lifecycle cost combinations of repair/rehabilitation/replacement expenditures. New rehabilitation and replacement technologies and innovative management approaches should be used to produce even greater cost savings and better resource management.

Conservation & Water Efficiency

Utilities should encourage water-use conservation and efficiency to reduce long-term system costs and produce additional societal benefits.

Energy Management

Utilities and stormwater agencies should maintain adaptive strategies to deal with increasingly complex choices presented by the need to minimize energy use and greenhouse gas emissions while ensuring system reliability and striving for continual improvement in water resource management.

Climate Change Mitigation & Adaptation

As water and wastewater utilities and stormwater agencies build and rebuild their infrastructure, they should consider what type of infrastructure is right for the future, balancing needs for system reliability, mitigating embedded carbon and greenhouse gas emissions, and adapting to climate change in areas such as water resource management, source water protection and stormwater management.

Modernized Plant Operations

Utilities should employ modern management practices to strive for continually improved treatment plant operations.

Watershed & Regional Optimization

Water and wastewater utilities and stormwater agencies should engage in collaboration and partnerships to maximize positive environmental and public health outcomes at watershed and regional scales.

Regulatory Optimization

Utilities and stormwater management agencies should work with regulators, stakeholders and each other to pursue significant potential cost savings and additional benefits that could be derived from closer integration of regulatory program implementation and innovative compliance strategies.

Affordability

Water and wastewater utilities and stormwater agencies should provide service at the most efficient cost, while also employing a wide selection of best practices to assist low-income customers.

Advanced Procurement & Project Delivery Methods

Utilities should strive to attain cost advantages through alternative forms of procurement for such things as bulk chemicals. Design/Build and Design/Build/Operate approaches to construction project delivery and other forms of public/private partnerships should be considered as alternative strategies to deliver major capital projects when they may offer cost advantages.

Environmental Impacts

Water and wastewater utilities should evaluate and implement alternative approaches that minimize the adverse hydrological and environmental impacts of their operations.

Network Optimization

As water and wastewater utilities and stormwater agencies build and rebuild infrastructure, they should strive to work in close collaboration with each other and with state and municipal road and highway agencies to obtain significant cost savings and environmental benefits.

Workforce Management

A highly capable, flexible workforce armed with modern information technology, and modern labor relations approaches are necessary to attain and sustain optimal performance.

Research and Technological, Managerial Innovation

Utilities should invest in research and innovation, particularly focused in technology and management improvements with the outcome of improving efficiency, quality of service and environmental protection and restoration.

Obtain a PDF copy of *Sustainable Water Systems: Step One - Redefining the Nation's Infrastructure Challenges* at BCTodayOnline.com/Aspen

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> People Making a Difference

From optimization to energy production to water reuse, meet some folks who are blazing new trails

Sami Sarrouh, P.E.
Managing Engineer, Water Resources
Cleveland, Ohio

Simply put, Sami Sarrouh pursues perfection in every project. “Optimization is as close to perfection as a mechanical engineer can get,” he says. “I strive to create water facilities that are optimized on every level.”

For Sami, an optimized system is one that is exquisitely efficient—requiring little power and maintenance and producing minimal heat, vibration or noise. For example? “A manager came into a pump station we recently designed and said ‘OK, you can turn on the pumps now.’ They were already on, but so quiet he couldn’t hear them.”

Sami is now helping the Cleveland Division of Water—which at 100 billion gallons per year is one of the nation’s largest water utilities—slash its energy use by 10 percent. “Optimized water facilities are better for the operators, the communities and the planet. It is my way of making a difference.”

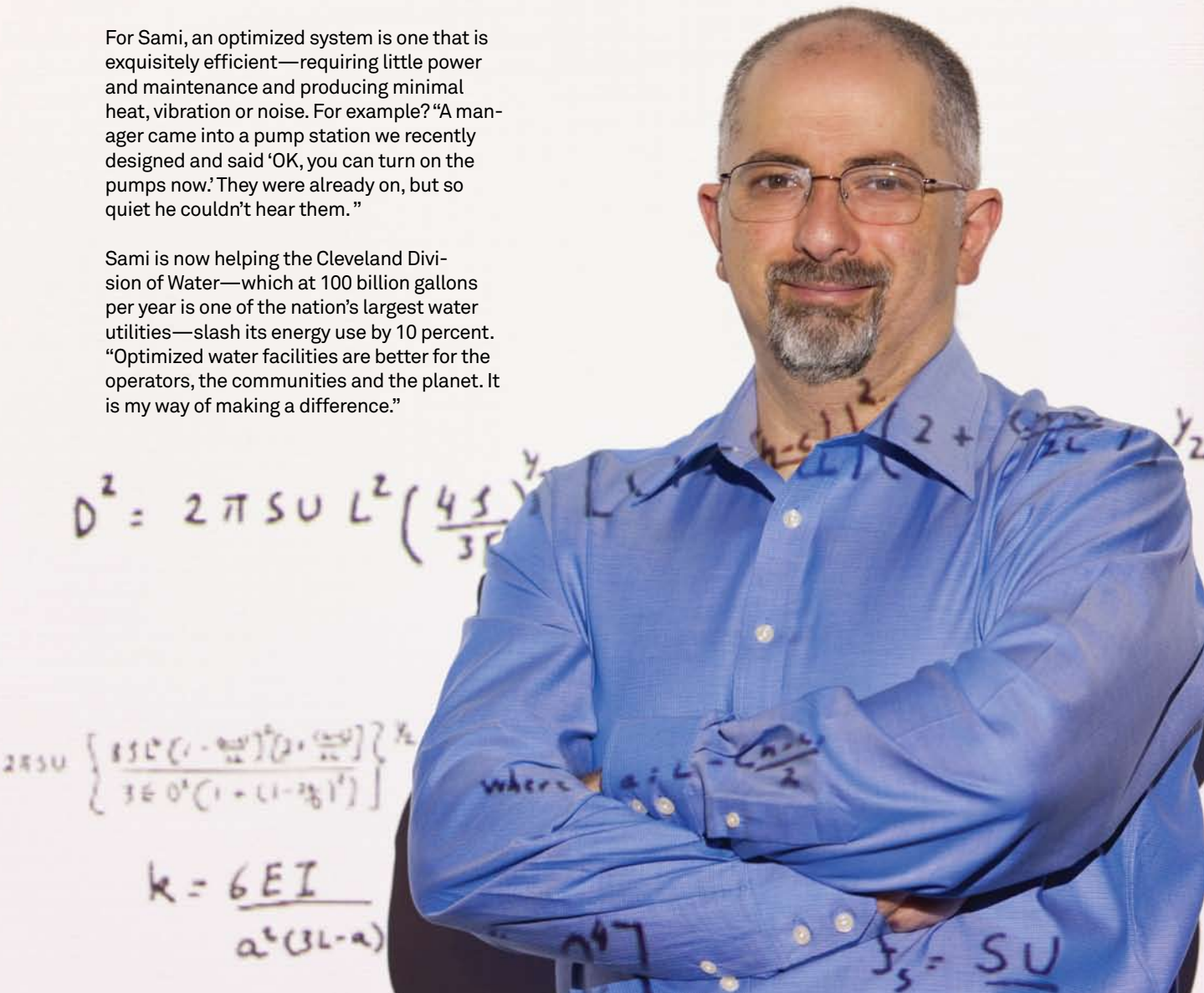


Photo: Gary Yasaki



Jo Ann Jackson, P.E.
Water Reuse Practice Leader
Orlando, Fla.

“Frankly, I can’t imagine living any place but on the water,” says Jo Ann Jackson, who enjoys scuba diving, kayaking and water skiing. Given her love of water, it is hardly surprising to friends and colleagues that she is a national leader in water reuse.

One of Jo Ann’s first projects, the Orlando Easterly Wetlands, was one of the first constructed wetlands in the nation to treat and reuse wastewater. The 1,200-acre project harnesses the cleaning power of aquatic ecosystems to remove damaging nutrients and return 20 mgd of clean water back to the St. Johns River. She’s stayed involved with the project that, for more than 20 years, has been a model for how constructed wetlands can be used for treatment and disposal, and to reclaim a vital wetland and create wildlife habitat.

As a member of the WaterReuse Association board of directors and chair of its National Regulatory committee, Jo Ann is deeply involved in U.S. water reuse policies and is a persistent advocate for protecting and enhancing water supplies.

Photo: Jim Sanderson



Jeff Herr, P.E.
National Stormwater Design Leader
Atlanta, Ga.

A high school marine science class in Bradenton, Fla., sparked Jeff Herr's interest in clean water. "By seining Sarasota Bay for marine life that we'd keep in an aquarium," he says, "I learned a lot about the effect of water quality on the environment."

That interest in water quality led Jeff to become a leading designer of stormwater treatment systems. He's one of a few engineers in the United States who specialize in chemical treatment systems to rid stormwater runoff of nutrients and bacteria that impair water and damage wildlife. Of 45 or so such systems in the nation, more than 35 are Jeff's designs.

"One thing my high school teacher did was challenge us to imagine Sarasota Bay in 20 years," he recalls. "I envisioned it clean and healthy." Jeff's current vision is of a future where low-impact development and similar practices reduce the amount of stormwater that needs to be cleaned. And in the Sarasota Bay watershed, that vision is being realized with several low impact retrofit projects he's working on. "Slowly but surely, folks are realizing that stormwater is a resource rather than a pollutant source."

Photo: Jim Sanderson



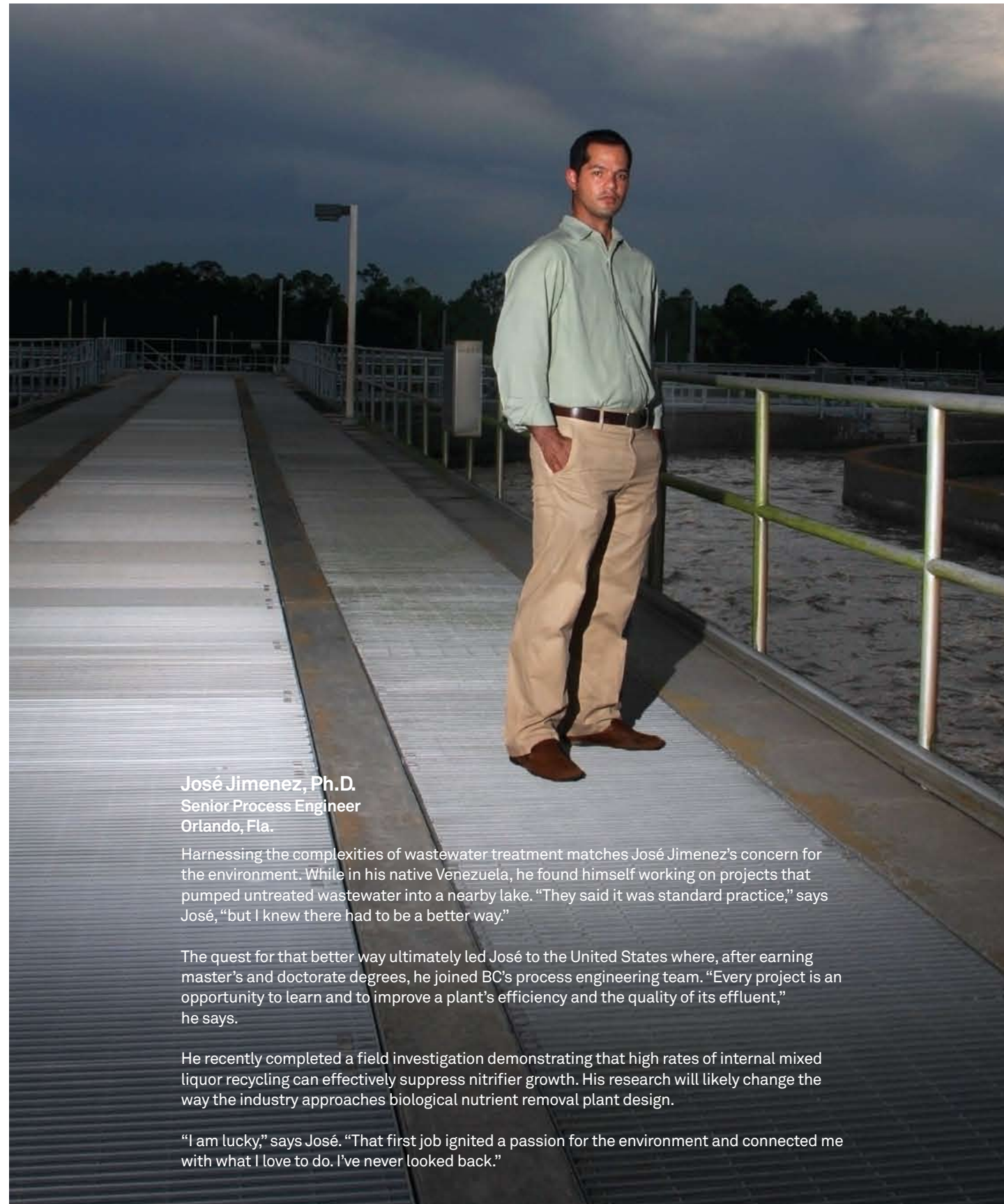
John Willis, P.E.
Southwest Region Wastewater Practice Leader
Atlanta, Ga.

"Wastewater utilities represent up to 4 percent of the nation's energy use," says John Willis, "but we should be producing more power than we consume."

John has spent much of his career finding ways to convert wastewater to energy. For Columbus Water Works, he designed the first thermophilic anaerobic digester in the United States to be run entirely off heat from digester gas-driven power generation. The International Water Association gave the project its 2008 Global Project Innovation Superior Achievement Award, naming it the best wastewater treatment project in the world.

John says his passion for efficiency came from rubbing shoulders with some of BC's most innovative thinkers. "I've watched people like Neil Waterman, Garr Jones, Denny Parker, Warren Uhte and Jim Schettler help agencies get the most out of a project, sometimes more than they were looking for. Their examples motivate me to do the same."

Photo: Jim Sanderson



José Jimenez, Ph.D.
Senior Process Engineer
Orlando, Fla.

Harnessing the complexities of wastewater treatment matches José Jimenez's concern for the environment. While in his native Venezuela, he found himself working on projects that pumped untreated wastewater into a nearby lake. "They said it was standard practice," says José, "but I knew there had to be a better way."

The quest for that better way ultimately led José to the United States where, after earning master's and doctorate degrees, he joined BC's process engineering team. "Every project is an opportunity to learn and to improve a plant's efficiency and the quality of its effluent," he says.

He recently completed a field investigation demonstrating that high rates of internal mixed liquor recycling can effectively suppress nitrifier growth. His research will likely change the way the industry approaches biological nutrient removal plant design.

"I am lucky," says José. "That first job ignited a passion for the environment and connected me with what I love to do. I've never looked back."

Photo: Jim Sanderson

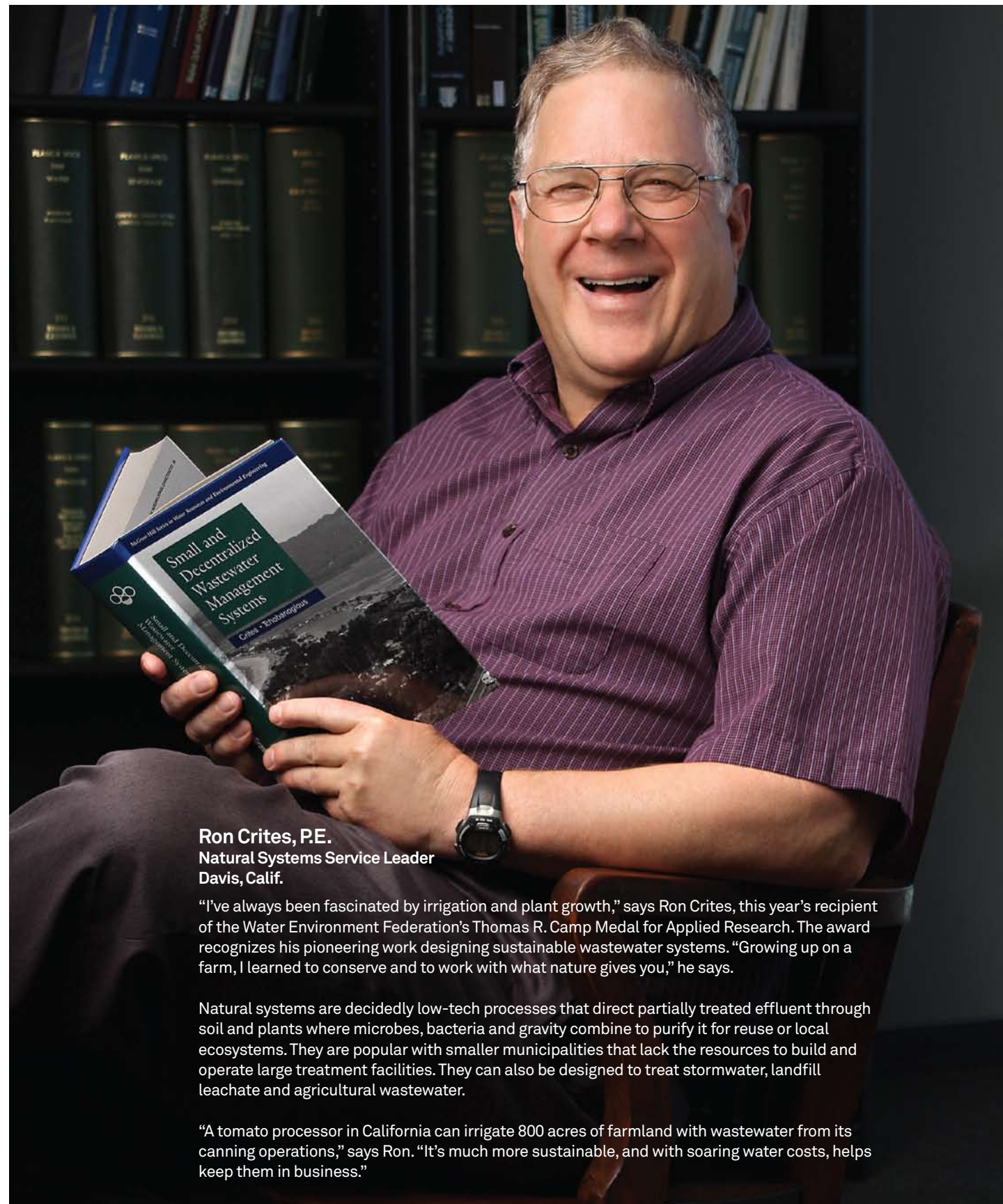


Karina Tipton, P.E.
Senior Remediation Engineer
Allendale, N.J.

To Karina Tipton, sustainability is largely about choices. By day, she specializes in helping companies find more sustainable ways to tackle their water and soil contamination issues. "Remediation methods and technologies can be very energy intensive, but a client's hands are often tied by government regulations," she says. "The opportunities to reduce a project's carbon footprint aren't always immediately apparent, but they're almost always there."

On her own time, Karina writes for TinyChoices.com, a blog she co-founded to encourage people to share their ideas on living more sustainably. "People often ask me how to live more sustainably, as if there's a 'right answer' for every situation," she says. "Sustainable choices depend a lot on the circumstances, and the blog brings people together to find the best solutions. With good information, practical experience and the desire, individuals and organizations can make greener decisions."

Photo: Sara Stathas



Ron Crites, P.E.
Natural Systems Service Leader
Davis, Calif.

"I've always been fascinated by irrigation and plant growth," says Ron Crites, this year's recipient of the Water Environment Federation's Thomas R. Camp Medal for Applied Research. The award recognizes his pioneering work designing sustainable wastewater systems. "Growing up on a farm, I learned to conserve and to work with what nature gives you," he says.

Natural systems are decidedly low-tech processes that direct partially treated effluent through soil and plants where microbes, bacteria and gravity combine to purify it for reuse or local ecosystems. They are popular with smaller municipalities that lack the resources to build and operate large treatment facilities. They can also be designed to treat stormwater, landfill leachate and agricultural wastewater.

"A tomato processor in California can irrigate 800 acres of farmland with wastewater from its canning operations," says Ron. "It's much more sustainable, and with soaring water costs, helps keep them in business."

Photo: Jim Sanderson

TOOLS OF THE TRADE



Photo: Jim Sanderson

ET Controllers 'Phone Home'

Increasingly sophisticated evapotranspiration technology is enabling innovative utilities like the Irvine Ranch Water District to help customers reduce their outdoor water use.

For the past decade, the Irvine Ranch Water District (IRWD) in Orange County, Calif., has been a leader in the use of weather-based, evapotranspiration (ET) technology to reduce water use and help customers keep water bills in check. The agency uses sophisticated ET data to set water allocations for ratepayers, and provides financial incentives for residential and commercial customers to install weather-based irrigation controllers to water efficiently while keeping their landscapes healthy and attractive.

"Outdoor watering accounts for 40 percent to 70 percent of the water used in our district," says Fiona Sanchez, IRWD's conservation manager. "The more efficient we are with irrigation, the more sustainable our water supplies."

Studies by the district since the late 1990s have shown that weather-based irrigation controllers can save an average of 600 gallons a day on commercial and municipal properties, and 37 gallons per day for residential users. Pollution-causing runoff due to overwatering is also significantly reduced. The studies have been used by agencies around the world to improve water-use patterns.

At IRWD, weather stations monitor three climate zones to track the effects of solar radiation, relative humidity, temperature and wind on ET levels. This weather data enables the district to calculate water allocations sufficient for sustaining landscape needs and more accurately define reasonable vs. excessive use in each zone. IRWD provides updated allocation information to customers via its Web site (www.irwd.com/conservation/ethotline.php) and ET hotline (949-453-5451).

Through public information and rebates, IRWD is helping more of its customers install weather-based controllers on their irrigation systems to stay within usage limits. The controllers vary widely in their complexity and sophistication and are available from a growing number of companies. Depending on their make and model, they use real-time weather information, soil moisture calculations, historical data or a combination of inputs to automatically adjust watering schedules on a daily or weekly basis.

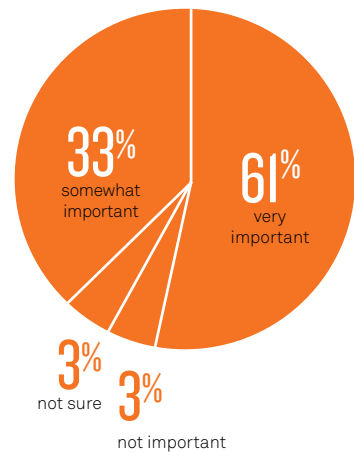
"Good information is critical to helping customers use water efficiently," says Sanchez. "Weather-based systems have proved very effective at saving water and money, and reducing runoff."

SUSTAINABILITY SNAPSHOT

Water News readers had a lot to say about sustainability in our July 2009 survey. Based on the survey data, sustainability has clearly emerged as an important issue that most agencies are taking steps to address. Yet of the activities cited, many aren't necessarily related to the issues that will affect operations over the long term. There appears to be a real need to reframe sustainability as a strategic issue that organizations can approach in more actionable and relevant ways. Brown and Caldwell is preparing a more detailed analysis of the results, and here we present a first glimpse.

To make sure you receive a copy of this report or to find out more about how Brown and Caldwell is helping organizations approach sustainability, contact Steffan Neff at sneff@brwnclald.com.

HOW IMPORTANT IS SUSTAINABILITY?



1,318

PEOPLE RESPONDED TO OUR SURVEY FROM 45 STATES

50%
are considering sustainability training for their employees.

30%
said that internal training is a high priority.

25%
are completing carbon footprinting and planning for climate change as well as working to reduce greenhouse gas emissions and construct green buildings.

50%
are pursuing energy efficiency, water efficiency and waste reduction projects.

WHAT'S DRIVING SUSTAINABILITY?

43%
ENVIRONMENTAL CONCERNS

36%
COST SAVINGS

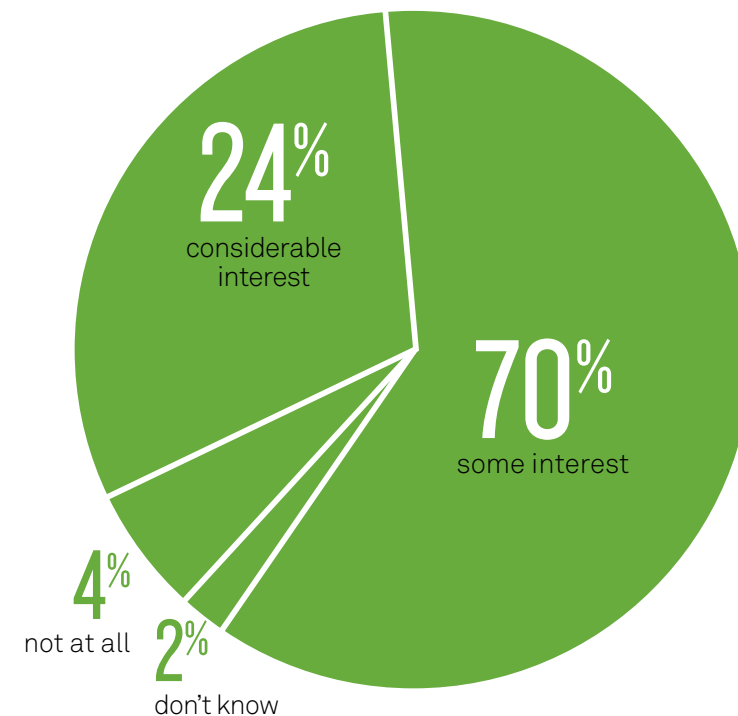
35%
PUBLIC IMAGE

32%
REGULATORY REQUIREMENTS

15%
AGENCY DIRECTIVE

43%
ALL OF THE ABOVE

HOW CONCERNED ARE YOUR CUSTOMERS?



READERS TOLD US:

"Water sustainability conflicts with water rights."

"The myth is that planning and investing for the long-term costs too much in the short-term (in real or political terms)."

"Employee knowledge of our sustainability goals is mostly jargon oriented and cosmetic in nature."

"Some employees have a good idea of our goals but the rest have a very hazy understanding of what we are trying to accomplish."

AGENCIES PURSUING SUSTAINABILITY...

42%
have sustainability goals and are implementing initiatives.

25%
are starting to form goals and initiatives.

20%
have informal sustainability efforts.

78%
ranked funding as their top challenge.

TOP PRIORITIES

1 WASTE REDUCTION & RECYCLING

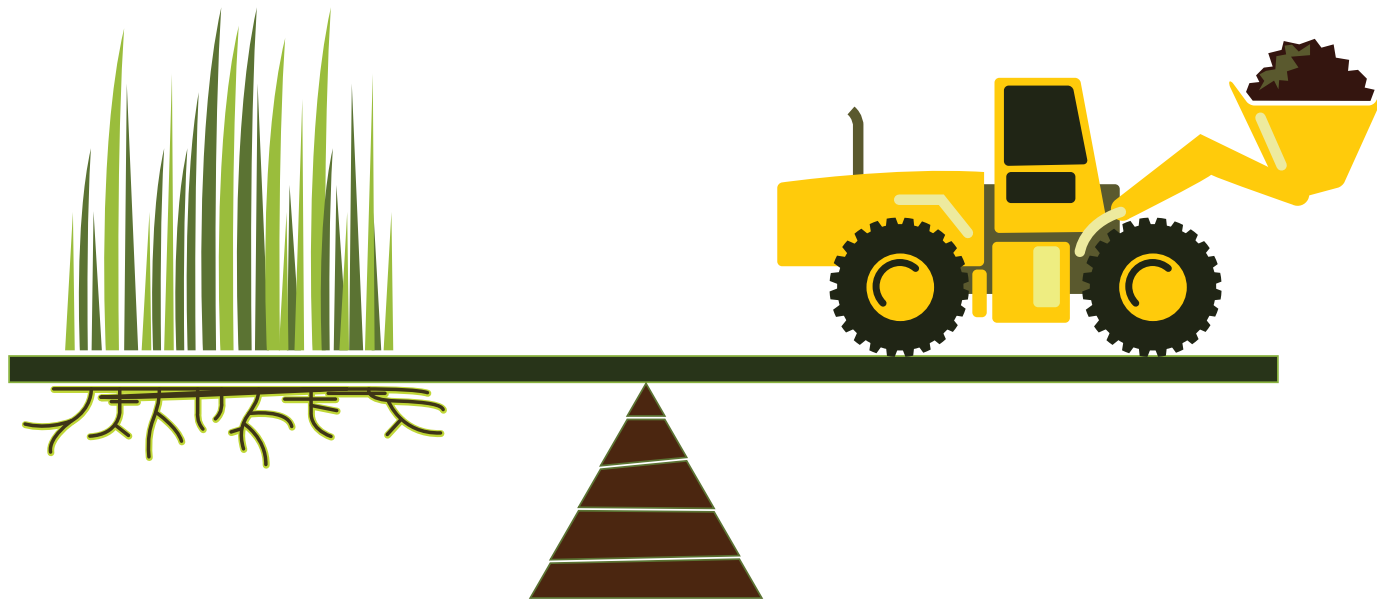
2 WATER QUALITY IMPROVEMENTS

3 UPGRADING INFRASTRUCTURE

Also being considered: internal training, energy audits, upgrading infrastructure with more efficient pumps, solar power, sustainability assessment and analysis

“Sustainable Remediation” is not an oxymoron

After some serious flirting, remediation actions and the triple bottom line seem set to start tying the knot



“Pump and treat” and “dig and haul” have long been the mantras of remediation, says BC Regional Environmental Services Leader Jeff Caputi, P.E. “Now we are looking at the environmental impact of the remediation strategies themselves, and finding better ways to clean contaminated sites.”

Caputi contributed to a landmark white paper published by the Sustainable Remediation Forum (SuRF), a group of industry stakeholders committed to bringing sustainability practices into remedial action decision making. The 110-page “Integrating Sustainable Principles, Practices and Metrics into Remediation Projects” is the first comprehensive, independent assessment of sustainable remediation. “The goal is to clean up sites as quickly and cost-effectively as possible using technologies and processes that minimize emissions and conserve energy, while still addressing the risks to human health and the environment,” he says.

Ridding soil and water of toxic substances and preparing sites for reuse can require considerable natural resources—resources that are increasingly scarce and/or harmful in their own right. Scientists, regulators and the regulated community are

now questioning whether a project that, for example, releases tons of carbon emissions into the air through digging, pumping and hauling to treat a few hundred pounds of contaminants makes sense. At issue is the net environmental impact of the entire process.

According to Ed Ricci, BC’s National Environmental Services Practice Leader, “Environmental Restoration Program Optimization (ERP-O) can help active remediation sites harness incredible sustainability potential.” ERP-O is a systematic approach for evaluating existing remediation alternatives to improve their effectiveness, reduce a site’s cleanup costs and increase efficiency—all without increasing risks. Brown and Caldwell is working with the U.S. Air Force on ERP-O at more than 30 sites. What’s more, the Air Force Center for Environmental Excellence has developed a Web-based “sustainable remediation tool” to help users optimize remediation technology systems already in place, or to compare their approach with sustainability metrics.

“Sustainable remediation integrates environmental stewardship, economic viability and social responsibility in remediation activities,” says Javier Santillan, Air Force Subject Matter

“We want our actions to have a minimum impact on the environment while being good stewards of all resources that have social, economic, quality of life or ecological effects.”

— Javier Santillan, Air Force Subject Matter Expert for Environmental Restoration

Expert for Environmental Restoration. “We want our actions to have a minimum impact on the environment while being good stewards of all resources that have social, economic, quality of life or ecological effects.”

Similarly, the Interstate Technology and Regulatory Council (ITRC), a national coalition of regulators and industry representatives, is working to streamline the layers of requirements imposed by state, regional and federal agencies. “There’s a great deal of need for coordination on this topic to ensure consistency and reduce redundancy,” says Sharon Stecker, principal environmental scientist with BC. “While SuRF is working to carefully and credibly define sustainable remediation, the ITRC is looking at policies that are uniform across jurisdictions.”

There is also an evolving movement to meet existing cleanup targets with a softer environmental touch. The EPA has launched a “Green Remediation” Web site and issued guidelines to “foster the use of best management practices for green remediation at contaminated sites throughout the United States.” At a Superfund site in New York on which BC is working, the EPA has selected the remedy and has required an evaluation of green remediation alternatives as part of the plan. “It’s a step in

the right direction,” says Stecker. It is also consistent with many clients’ sustainability principles for everyday operations.

Industrywide consensus on sustainable remediation will require agreement among regulators, industry, other government agencies and the public. “Everyone will have to embrace a broader agenda for what ‘clean’ means,” says Caputi. “When feasibility studies takes a broader view of environmental benefits and impacts, remedies that use *in situ* and on-site technologies—like bioremediation, chemical oxidation, stabilization and subsurface barriers—are more likely to be selected over conventional remedies like dig and haul and pump and treat.”

RESOURCES

USAF Center for Environmental Excellence: afcee.af.mil

EPA Green Remediation: clu-in.org/greenremediation

ITRC: itrcweb.org

SuRF: sustainableremediation.org

For more information contact **Sharon Stecker** at sstecker@brwnncald.com

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