IN THIS ISSUE

Message from New 2015 CA-NV AWWA Chair

Winners/Losers in CA’s Statewide Drinking Water Discharge Permit

LVVWD/SNWA Aim for 25% Renewables by 2025

Measuring the Energy Intensity of Water—So What?

Eastern Municipal Water District Looks to the Long-Term for Energy Management

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Demand the “B”
features

16 Measuring the Energy Intensity of Drinking Water—So What?
By Penelope Grenoble

18 A CASE IN POINT: East Bay Municipal Water Utility District’s EI Pilot Study
By Clifford Chan and David Beyer

20 Eastern Municipal Water District Looks to the Long-Term
By Alan Zelenka and Greg Kowalski

25 Burbank Water & Power to Evaluate Joint Water/Energy Behavioral Messaging
By Kapil Kulkarni

WATER-ENERGY NEXUS

ABOUT THIS ISSUE
Water and energy are two of the West’s most critical resources. Joint management may be the key to a sustainable future.

departments

6 From the Executive Director
The Water-Energy Nexus
By Timothy Worley

7 Section News

12 Drips & Droplets
By Brandyn Hancocks

14 Operations
Cucamonga Valley Water District Reopens Critical Water Treatment Plant
By Gidit Ludesirishoti

15 The Earth is Still Moving in Napa

28 Manager’s Corner
Las Vegas Valley WD and Southern Nevada Water Authority: 25 Percent Renewables by 2015
By Gary Wood

29 EPA’s Proposed Clean Power Plan Could Mean Funds for Energy Efficiency
By Adam Carpenter

30 Milestones

36 Product Marketplace

38 Index to Advertisers

We Want to Hear From You
Feedback is the SOURCE feature that invites readers and members of the California and Nevada water communities to comment on the magazine and issues in the water and wastewater industries. Please email Penelope Grenoble at pbg1747@sbcglobal.net.
The Water-Energy Nexus

On balance, it’s good that so much attention has been directed to the water-energy nexus. The argument goes that production of each consumes significant amounts of the other, and therefore conserving one helps conserve the other. It’s that simple, right? Well, maybe not. While water agencies certainly can find opportunities in the water-energy nexus, some dangers lurk in the shadows.

Power is a very substantial cost for water conveyance, treatment and distribution, and water utilities may be well served by improving efficiency. Variable speed motors and more efficient pumps won’t conserve water, but they can save on the electric bill. But replacements like these are the low-hanging fruit, and there could be a payback problem if, with routine maintenance, existing pumps and motors are functioning well.

Another sensible opportunity comes in partnerships between large power utilities and water agencies to provide incentives or even direct installation of water-conserving devices and processes. Exploratory projects of this kind have proven successful, stretching water dollars to cover more rebates for appliances and plumbing fixtures for example. But these partnerships can be limited by relatively high transaction costs. And they leave out many smaller water utilities.

Other sources of water conservation funding may be found in efforts to curb the greenhouse gases that contribute to global warming. In California, the state’s cap and trade policy on carbon emissions will generate substantial money, although projects like high-speed rail may take the lion’s share. On the federal level, the EPA’s Clean Power Plan could represent similar opportunities. AWWA’s Washington, D.C. office is keeping tabs on how this develops. See Adam Carpenter’s article in Manager’s Corner, page 29.

Other challenges lurk in misrepresentation of facts and one-size-fits-all regulation policies. In 2005, the California Energy Commission reported that 19 percent of the state’s electricity is attributable to the water sector. What gets lost in this statistic is that end uses consume nearly 60 percent of this in heating and cooling water, and over 20 percent is attributable to agricultural use. Municipal water and wastewater utilities combined are responsible for just one fifth of the state’s electricity demand associated with water.

On the regulatory front, water utilities are wise to be wary of attempts to institute a “loading order” for development of water supplies. The idea is to mandate less energy intensive alternatives before others can be pursued. However this represents an overly simplistic policy approach, inconsistent with proven strategies of supply diversification. Energy use is just one of several important considerations in a successful water resource strategy.

There’s little doubt that the connections between water and energy will remain important for years to come, and we examine many of these questions and challenges in this issue of SOURCE. If this touches on your job responsibilities, whether in planning or operations, or in some other way, consider getting involved with CA-NV AWWA’s relevant committees—water professionals helping each other is what AWWA is all about.

Cheers,

Timothy Worley, Ph.D.
Executive Director, CA-NV AWWA

By Sue Mosburg

It seems as if it was just last year when I walked into my first CA-NV AWWA committee meeting. The 1996 Safe Drinking Water Act amendment, which required water treatment and distribution system operator certification, had not yet been finalized, but already the Section was gearing up for change. Committees were discussing how to interact with State officials to draft new certification regulations, Section staff was collaborating with Distribution Certification Committee volunteers to update the Section’s certification database and exam processes and the Education Program was being expanded to offer more workshops and operator-centric training classes. Since then, computers have replaced typewriters, cell phones have shrunk from bricks to dominos and literature racks have been supplanted by walk-up workstations connected to the Internet. It’s hard to believe all this has happened in 20 years.

Looking forward, the areas the Section will be focusing on in 2014-2015 echo much of what it has accomplished in the past. Our goals and projects for 2015 include:

Collaboration: working with the Association on ACE 15 and on industry initiatives related to education, membership and leadership succession planning; partnering with other industry groups including ACWA (Association of California Water Agencies), CUWCC (California Urban Water Conservation Council), and SWMOA (Southwest Membrane Operators Association) on events and activities; actively engaging in State and Federal stakeholder workgroups and encouraging internal coordination between Section committees, divisions, volunteers and staff.

Communication: keeping volunteers and members informed of Section activities through email blasts, social media and member alerts; offering an expanded selection of workshops, classes, seminars and symposiums; actively advocating on water issues at the national, state and local level; creating forums for members and industry experts to network and exchange ideas and updating the Section website to include a master events calendar and improved member portal.

Certification: new programs are being considered, including water reuse and advance treatment technologies; the water use efficiency certification program is anticipated to expand as the drought and the need for qualified personnel in this specialty increases; continued effort is expected to keep all certification programs, including backflow and cross connection, relevant as technology and the needs of the industry change.

I didn’t know what to expect when I walked into that first committee meeting so many years ago. I was there to listen and learn. Little did I dream that one day I would have the honor of serving as Section Chair and working with such a dedicated group of volunteers, industry leaders and Section staff. Wow—it’s going to be a great year!
Clifford Chan and David Beyer
*A Case in Point: East Bay Municipal Utility District’s Energy Intensity Pilot Study*
Clifford Chan has 22 years of experience in engineering and operations. For the last eight years he has been the manager of East Bay Municipal Utility District’s (EBMUD) water treatment and distribution system. David Beyer has worked at EBMUD for 23 years. For the last 16 years he has worked on energy-related matters, including EBMUD’s hydropower generation facilities and annual energy purchases.

Brandy Hancocks
*California’s New Statewide NPDES Permit: Winners and Losers*
Brandy Hancocks is Manager of Environmental Compliance for Golden State Water Company where she and her team oversee compliance and training for 38 water systems serving one million customers across 10 counties in California. She is Chair of CA-NV AWWA’s Operations and Maintenance Division (2011–present) and former Chair of the Environmental Compliance Committee (2006–2010).

Kapil Kulkarni
*Burbank Water and Power to Evaluate Joint Water/Energy Behavioral Messaging*
Kapil Kulkarni is a Marketing Supervisor for Burbank Water and Power, managing customer energy efficiency, water conservation and Smart Grid programs, including Home Water Reports. Prior to joining BWP in 2011, he was a consultant with ICF International, primarily assisting investor-owned utilities with energy efficiency planning.

Gidti Ludesirishoti
*Cucamonga Valley Water District Reopens Critical Water Treatment Plant*
Gidti Ludesirishoti is a Project Engineer with HDR Engineering’s Water Business Group in Southern California. His projects include traditional design, engineering services during construction (ESDC), design-build and other alternative delivery projects in water and wastewater treatment.

Gary Wood
*LVVWD/ SNWA: 25 by 25*
Gary Wood is Renewable Energy Program Manager at Las Vegas Valley Water District-Southern Nevada Water Authority, where he’s involved in the design and installation of renewable energy facilities and the negotiation of long-term Power Purchase Agreements to support the utilities’ Renewable Energy Portfolio.

Alan Zelenka and Greg Kowalski
*Eastern Municipal Water District Looks to the Long-term for Energy Management*
Alan Zelenka is the Energy Services Practice Leader for Kennedy/Jenks Consultants. In addition to Energy Management Plans, he works with clients to cost-effectively implement energy efficiency, renewable energy and climate change projects. Greg Kowalski has over 16 years experience in planning, design and construction of water and wastewater facilities. He is currently Eastern Municipal Water District’s Water Enterprise Team Leader in the Engineering Department, leading the Capital Improvement Program with projects totaling over $210 million.
AWWA President-Elect Gene Koontz
Updates Members at Fall ’14 Conference

AWWA President-Elect Gene Koontz spoke at the Opening Session of the CA-NV AWWA 2014 Fall Conference in Reno, NV and updated attendees on new AWWA projects and programs. Highlights included:

**Total Water Solutions.** AWWA will develop standards, manuals and training materials to help members better understand municipal and industrial wastewater technology, nonpoint sources, reclaimed water and stormwater management, particularly as potential sources of drinking water. In early Fall 2014, the six Councils of AWWA met for three days at the Association’s Denver headquarters to brainstorm Total Water Solutions products and services, which included a focus on direct potable reuse. Action items included: new management standards, technical tracks at the Annual Conference and Exhibition (ACE) and the Water Quality Technology Conference (WQTC) and Best In Class public communications materials and processes for bringing innovations to the field faster.

**AWWAIndia.** AWWA has created its first official physical presence and member community outside North America. With partial funding through a Department of Commerce grant, it will provide standards and manuals to help our Indian members improve conditions in their country.

**Community Engineering Corps.** A partnership with the American Society of Civil Engineers and Engineers Without Borders-USA will bring AWWA drinking water expertise to small disadvantaged communities within the United States.

**Expanded Workforce Development Programs.** Goals include bringing more younger professionals into the profession and the Association and leveraging and substantially expanding current scholarship programs through AWWA’s Annual Fund Campaign.

**AWWA2020: A Path to OneAWWA.** The Association’s Special Presidential Panel (SP) has recommended as a primary goal uniting the Association and Sections around common business processes and strategic plans that serve both members and the public. Cooperation will focus on five key areas: membership, education, finance, branding and communications. CA-NV AWWA Executive Director Tim Worley and TEC Chair Andrew DeGraca served on the panel.

Networking and Collaboration Are Themes at ACE ’15

The 2015 American Water Works Association Annual Conference & Exhibition (ACE ’15), will be held on June 7-10, 2015 at the Anaheim Convention Center adjacent to the Disneyland theme park and is expected to draw more than 12,000 water professionals worldwide. The professional program will feature 105 sessions by more than 450 expert presenters and upwards of 450 exhibitors and will include the traditional Pipe-Tapping, Top-Ops, Meter Madness competitions as well as People’s Choice and “Best of the Best” Water Taste Tests. In a first-of-its-kind agreement, CA-NV AWWA will co-host the conference, which replaces the Section’s annual Spring Conference, and will present a dedicated ACE ’15 track with five sessions: Communicating About Drought—the California Experience; Emergency Response in Action—Cybersecurity and the 2014 Napa Earthquake Response; Sustainability in a Time of Uncertainty; Potable Reuse in California; and Complying with California’s New Hexavalent Chromium MCL—Advances in Treatment. Super-saver rates are available through March 27, 2015. Special quantity discounts are also available and groups of utilities, operators and professors who register five or more attendees will receive one free attendee registration. To view the full conference program or register, go to www.awwa.org. Follow ACE ’15 on Twitter, Facebook, LinkedIn and any of the CA-NV AWWA social media sites.

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**CA-NV AWWA Vice Chair Heather Collins with the ACE ’15 Custom Surfboard.**
CA-NV AWWA Recognizes 2014 Contributions to AWWA and the Water Industry
By Jim Elliott

At its 2014 Annual Fall Conference in Reno, CA-NV AWWA recognized and thanked members, dedicated volunteers and Section leaders for their hard work and contributions to AWWA and the water industry. The awards recognize not only the efforts of these individuals, but in some cases the employers who supported them. Each of our awardees deserves a round of applause for providing knowledge, expertise and enthusiasm to support the mission of the CA-NV Section of AWWA.

Dr. Pankaj Parekh and Dr. Timothy Worley Elected to George Warren Fuller Society

AWWA’s George Warren Fuller Award was created in 1937 to honor Fuller for his outstanding and immense contributions to the profession and to the water industry. It is presented each year to recognize distinguished service to the water supply field in commemoration of the sound engineering skill, the brilliant diplomatic talent and the constructive leadership that characterized his life. This year CA-NV AWWA honored two individuals who have carried on Fuller’s tradition of service and dedication. They will be inducted at the AWWA 2015 Annual Conference in Anaheim.

The late Dr. Pankaj Parekh was recognized for his distinguished 30-year career at the Los Angeles Department of Water and Power, where he tirelessly searched for practical answers and solutions to providing safe drinking water for the masses. His leadership and mentorship spread well beyond Los Angeles in his service with other organizations including AWWA, USEPA, the Water Research Foundation, National Water Research Institute and Association of California Water Agencies. He helped prioritize and direct valuable research funds to address important water quality issues, including emerging contaminants. Throughout his career, Dr. Parekh used his environmental and public health background to eloquently communicate water quality issues within the larger public health community.

CA-NV AWWA Executive Director Dr. Timothy Worley has demonstrated a commitment of distinguished service to the water industry for more than 25 years. His early career included positions focused on public and external affairs, water utility management, conservation and water supply reliability policy. While working for California water utilities, he was actively engaged in state and federal legislative water affairs. He also served as AWWA Senior Manager of Technical Programs from 2009-11. Since 2011, his leadership as CA-NV AWWA Executive Director has extended far beyond the delivery of outstanding managerial business duties associated with his position. He is engaged in and actively supports a wide variety of Section volunteer leadership efforts, including the establishment of the CA-NV AWWA Technical Advisory Group on Hexavalent Chromium, participation as a CA-NV AWWA delegate for the AWWA Washington DC Fly-Ins, playing a key role in establishing the Section’s student chapters and organizing the effort to promote an effective water utility management program.

Uzi Daniel and Jim Wollbrinck Receive the George A. Elliott Memorial Award

The George A. Elliott Memorial Award is the highest award CA-NV AWWA can bestow. It honors the man who helped establish the Section in 1920 and who was its first Chair, 1920–1922. The award was created by the Section in 1949 to recognize outstanding volunteer achievement.

Uzi Daniel, from the West Basin Municipal Water District, has been an active par-

Spend St. Patrick’s Day at CA-NV AWWA’s 2015 Operator Symposium

n place of its Annual Spring conference, which is not being held this year because the CA-NV AWWA is co-sponsoring ACE’15 in Anaheim, the Section will host the Operator Symposium March 17–18, 2015 at the Doubletree Hotel in Ontario, CA. The Symposium will include 40 programs for distribution and treatment operators and field personnel. Operators will have the opportunity to earn up to 12 contact hours, and the symposium will showcase operator ingenuity and know-how in the Top Ops Challenge and the Hot Flare, Pipe Tapping and Meter Madness competitions. Registration includes the technical program, lunch and Operators Reception. The CA-NV AWWA Women’s Networking Group will host a dinner and presentation on Tuesday, March 17, 2015 for one contact hour credit. Visit www.ca-nv-awwa.org for details. ♦
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section news

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participant in Section activities for many years. Recently, she has served as Water for People Committee Chair and as a Section Trustee. For several years, she has helped recruit speakers for CA-NV AWWA’s Water Education Seminar in Orange County, as well as volunteering to work at other Section events wherever they may be. Her development of the Section’s leadership training efforts and initiation of monthly Committee Leadership calls have substantially improved our volunteer effectiveness. Her willingness to find useful things to do is an inspiration.

Jim Wollbrinck, from the San Jose Water Company, has provided extraordinary service through his leadership of CA-NV AWWA’s Security and Emergency Preparedness Committee. His innovative use of Internet communications for committee meetings, the inclusion of CalWARN trainings at Section conferences, his efforts on resource mapping and the development of cutting-edge technical sessions have advanced the committee and the Section and helped bring CA-NV AWWA into the 21st century.

Other 2014 Section Awards
Don Kaiser Volunteer of the Year: Jessica Adams-Weber; Walter O. Weight Membership Award: Larry Lyford; Larry C. Larson Safety Award: Park Water Company; Outstanding Energy Management Award: Eastern Municipal Water District; Section Leadership Award Past Chair: Jacques DeBra; Trustees: Heather Collins, Uzi Daniel; Certification Director: Darcey Burke; Technical Programs Director: Jessica Adams-Weber; Water Quality Division Chair: Joy Eldredge; Water Distribution Division Chair: Drew McIntyre; Chair’s Award by grouping: Brandy Hancock, Greg Buncab, Toby Roy, François Rodingardi (Statewide NPDES General Permit); Tarrah Henrie, Steven Bigley (Hexavalent Chromium Regulation Team); Randy Valenzano, Sita Ramakrishnan (West Sacramento Training Facility Team); Penelope Grenoble, Michael J. McGuire (SOURCE); Eric Brennan, Barry Crawford, Sue Mosburg, Jackie Parsons, Chuck Sparks (CA-NV Section Competitions Team); Joy Eldredge, NSF Team; Corrine Li; Tammie Myers, Michael Gualtieri (Conference Team); Kelli Burgess/Truckee Meadows Water Authority (Local Arrangements Committee Chair/Local Host Utility Group). 2013–2014 AWWA Awardees: Honorary Member: Dr. Kenneth Kerri; Water for People Kenneth J. Miller Award: Andrea Corrao.
Because Golden State Water Company is located in 10 counties across California, I have been participating in NPDES permitting statewide since 2004. Over ten years ago, the SWRCB tried to adopt a statewide NPDES permit for drinking water utilities. That effort failed because the board lacked a quorum. Subsequent major milestones in the development of the new statewide permit are as follows: In 2007, the Los Angeles Regional Water Quality Control Board (LARWQCB) drafted a permit to include distribution system discharges in its existing potable water supply well permit. Through the efforts of many utilities (led by David Kimbrough, Water Quality Director for Pasadena Water and Power), this permitting effort failed, and distribution system discharges remained in the Los Angeles County MS4 (Municipal Separate Storm Sewer System) permit. Los Angeles County’s 2012 MS4 had specific language covering these discharges and included some enhanced best management practices (BMPs).

In 2009, the San Francisco Regional Water Quality Control Board (SFRWQCB) drafted a new MS4 permit it called a Municipal Regional Permit (MRP). Many utilities participated in the process but at the last minute were dropped from the list of permittees. In 2011, East Bay Municipal Utility District (EBMUD) received an Administrative Civil Liability (ACL)—an enforcement tool used for some Clean Water Act violations, essentially a monetary fine—for discharging without a permit when one of its discharges resulted in a fish kill. SFRWQCB ruled that EBMUD could not discharge under the MRP since it wasn’t a permittee and that EBMUD had to have its own permit. However, no resources were available at the regional board to write the permit. In 2012, eight utilities banded together and agreed to share the cost of writing a new permit.

In 2011, the Central Valley Regional Water Quality Control Board began rewriting its de minimis permit following issuance of fines over $100,000 for reporting errors. Diana Messina was the key person in charge of the permit. In March of 2012, the Sacramento Area Water Works Association formed a nine-person workgroup to work on the permit, and in mid-2013, Messina took a new position with SWRCB, which carried the project to the state level. Realizing that several regional boards were actively working on permits for these discharges, SWRCB decided to work on a tri-regional permit. While many of us suspected this was a template for a statewide permit, SWRCB staff denied it. It wasn’t until January 2014 that SWRCB made it clear that what it was working on would be a statewide permit to cover all drinking water system discharges.

Of the nine stakeholder meetings held by the SWRCB, I attended eight of them. I prepared comments and questions on permit specifics at all the stakeholder meetings I attended. I participated in the ACWA (Association of California Water Agencies) and CWA (California Water Association) workgroups on the permit and co-led the CA-NV AWWA workgroup with Greg Buncab from Alameda County Water District. The workgroup drafted a member survey to solicit feedback on the permit and helped draft two comment letters on behalf of CA-NV AWWA. I also helped draft CWA’s comment letter, which was over 100 pages in length, in addition to drafting and submitting comment letters on behalf of my utility. The 13-page comment letter the workgroup drafted on behalf of CA-NV AWWA represented over 70 hours on the phone with member agencies to craft language that everyone could agree with.

The Permit

On November 19, 2014, SWRCB approved the California Toxics Rule Exemption and adopted a General National Pollutant Discharge Elimination System Permit for Discharges from Drinking Water Systems. The permit will take the place of existing Regional Water Quality Board NPDES permits, which will be re-written to exclude discharges from drinking water systems or eliminated altogether. The permit will regulate both planned discharges conducted for compliance...
with the federal Safe Drinking Water Act and the state Health and Safety Code, as well as unplanned discharges such as pipe breaks, system failures and emergencies. The permit is available for any community water system or water purveyor that discharges from a drinking water system. It requires that drinking water systems with 1,000 or more connections either enroll under the permit or submit a “notice of non-applicability” for their system by September 2015. The State Board’s program page for the permit is available at: www.swrcb.ca.gov/water_issues/programs/npdes/drinkingwatersystems.shtml.

Key to compliance will be the implementation of best management practices (BMPs). In early 2014, CA-NV AWWA’s Environmental, Health and Safety Committee updated its BMP Manual, which is available in electronic form at no cost from the Section’s website. Go to: http://ca-nv-awwa.org/CANV/downloads/Armando/2014BMPManual(Final).pdf. The manual, originally developed in 2005, has become an industry standard and is cited as a reference in the new statewide NPDES permit.

There are definitely winners and losers in this final permit, but over time with changes in successive drafts, there will be more winners than losers. When CA-NV AWWA first surveyed its membership in the summer of 2014, most utilities were not in favor of a statewide permit and preferred to continue coverage under existing Regional Water Quality Control Board permits or their associated city/county NPDES (MS4) permits. The existing Regional Board and MS4 permits varied considerably in their requirements. Some permits had stringent limits for chlorine as low as .003 mg/L and required monthly reports and monitoring of every discharge. Other permits only required representative monitoring for a handful of constituents. Dischargers under most MS4 permits had no reporting requirements and avoided the liability associated with being a permittee. As a result, it was very difficult for CA-NV AWWA or any other industry association to make substantive comments on the permit drafts on behalf of their organizations.

Throughout the three-year permit development process, but especially during the past year, SWRCB staff made significant efforts to engage stakeholders and address the concerns of the water community. The staff held nine stakeholder meetings statewide and met one-on-one with many other utilities and stakeholder groups to incorporate the most crucial concerns related to small systems, feasibility and the cost of permit compliance. Over 100 utility comment letters were received. Three drafts of the permit were developed and in each revision, changes were made to address many of the water industry’s concerns.

Winners

A few key issues changed based on stakeholder involvement and resulted in a permit that works for the majority of utilities.

1. MS4 option: Originally SWRCB staff stated that it did not believe that utilities could legally discharge under a NPDES permit issued to a county or city unless the utility was owned and operated by the city or county. Many utilities perform essential activities, such as flushing, because the water isn’t meeting MCLs. This would make the permit condition a concern for almost all utilities. In the final

Continued on page 34
In 1997 the Cucamonga Valley Water District (CVWD) constructed the 3.0 (MGD) Arthur H. Bridge Water Treatment Plant (AHBWTP) to treat water from Cucamonga Canyon, a foothill canyon at the base of Southern California’s San Gabriel Mountains. Canyon water accounts for 10 percent of the district’s supply and helps reduce reliance on imported water for its almost 200,000 customers. In 2010, however, winter storms caused significant damage to the canyon facilities, including the treatment plant intake. This and complications with the original membrane filtration process caused the plant to be used intermittently before it was shut down completely in 2011.

In 2013, recognizing the value of this local resource, CVWD began to rehabilitate the intake facilities and replace the treatment technology, hiring HDR to work with the district and its consultants and permitting agencies on a design-build project that resulted in innovative solutions for both the canyon intake and the AHBWTP treatment train. Challenges to the project included:

- Remote operation of an unmanned and intermittent plant. AHBWTP is typically unmanned and only operational when there is sufficient flow in the canyon.
- The previous membrane filtration process was challenging to operate and maintain and ultimately failed, in part due to the longer durations of shutdown that were typical.
- The new process needed to be robust and capable of frequent shutdowns while also being low maintenance and with near-complete remote operation.
- The existing space in the building was limited and needed to house a completely different process than it was originally intended for.
- The new process did not require breaking head at the plant. The main process does not require any pumping and operates solely off existing head from the canyon.
- The original intake was washed out, damaged and had been replaced multiple times. The previous design created a pond and submerged intake that was easily damaged from debris flows during heavy storms and prone to seasonal algae blooms.

Given CVWD’s limited budget, there were several innovative solutions that reused various components of the existing plant, including raw water conveyance pipeline and strainers, disinfection facilities and underground storage tanks, which were repurposed for backwash equalization and solids storage, as well as the building, electrical power distribution and other ancillary facilities.

Intake
The new canyon intake features a self-sustaining design that draws both surface water and subterranean flows while allowing storm-driven canyon debris to roll past without impacting the intake’s performance. The new intake also improves raw water quality by eliminating the previously designed shallow intake ponds that were prone to algae blooms during certain times of the year.

Treatment Plant Innovations
Treatment plant upgrades provide a reliable plant capacity of up to 3 MGD. Modifications included replacing the existing membrane equipment with a pressure filtration technology from EPD USA, Inc. The dual-stage EPD pressure filtration system uses a garnet sand media and poly coagulant as a filter aid. The system designed for AHBWTP consists of two treatment trains with a total of 12 filter vessels in the first stage, followed by 10 vessels in the second stage. Each train has a maximum rated capacity of 1.5 MGD, and the design layout

Continued on page 26
Thirteen months later after a 6.0 earthquake struck the west Napa fault just southwest of the City of Napa in northern California, Water GM Joy Eldredge reports “a plethora” of continuing water main breaks, eight breaks over the Thanksgiving week alone. Immediately after the quake, the city made 120 repairs in less than five working days, mostly in 12-inch pipes and smaller, assisted by outside utilities responding under California’s CalWARN emergency response network. As of early December 2014, total earthquake-related breaks had increased to 224, in a system that historically experiences 100 leaks a year.

During the initial post-earthquake response there were no failures on major transmission mains. Subsequently, however, the system’s major 36-inch asbestos-cement transmission main has experienced three breaks. Two of the three failures were rubber gaskets failing. “They can be rolled or pinched with any movement at the collars where two pipe segments connect,” says Eldredge, “What starts as a small leak, slowly develops into a major, self-eroding leak as one would expect on a main of that size.”

Repairs are being handled by water division crews assisted by other city divisions. “That’s the benefit of being a city,” says Eldredge, “we have been able to pull from the paving division, for example, which has supplied laborers, backhoes for trenching and trucks to haul dirt.” The USGS and the State of California recently approved the installation of monitors to track earth movement. The City of Napa has observed that portions of the water system have shifted between six inches and as much as a foot in some areas, and the USGS has observed that this shifting has continued.

Eldredge and Phil Brun, City of Napa Deputy Public Works Director, will present a full report on the City of Napa’s post-earthquake emergency response and system repairs at ACE ‘15, June 7-10, 2015 in Anaheim CA.

The City of Napa’s water system serves over 85,000 people through 25,250 connections. System reliability is based on two major treatment plants feeding from the northern and southern ends of the service area. The initial shake of the system resulted in no damage to any of the city’s three water treatment plants, two local surface water reservoirs and dams, or to the transmission facilities from the North Bay Aqueduct that conveys State Water Project supplies to the City of Napa.
Measuring the Energy Intensity of Drinking Water—So What?

By Penelope Grenoble, SOURCE Editor

Associate Director Dr. Edward Spang has been with the UC Davis Center for Water-Energy Efficiency (CWEE) since it was established over three years ago to help water and energy utilities develop projects to jointly conserve these two critical resources. A primary focus of the center has been mapping and calculating the energy embedded in the harvesting, treating and distribution of drinking water, also called its “energy intensity.” The guiding vision at CWEE is that a high-resolution understanding of the energy flows at water utilities enables collaboration with energy utilities to seek joint benefits that include: capturing energy savings via targeted water conservation, implementing water utility demand management and peak load shifting strategies, and improving capital investment decisions by balancing the water and energy implications of infrastructure options. Funding comes primarily from California’s energy IOUs (independently owned utilities), which have signaled their interest in investing in the water industry, in part as a result of California Public Utility Commission (CPUC) regulations that they invest capital dollars in efficiency to meet expanding energy needs as a first-choice alternative to developing additional infrastructure.

SOURCE: So what’s the bottom line? Spang: When a utility initiates an effective water conservation program and its customers save water, it saves on energy use. Less water used means less water treated and pushed through the system. The corresponding reduction in energy consumption translates into cost savings. Water utilities that are able to clearly calculate and communicate energy intensity values—that is the flow of embedded energy through their networks—will be more easily able to partner with energy utilities to secure funds for joint energy/water conservation programs.

SOURCE: Where do water utilities start? Spang: With an understanding of the kilowatt-hours consumed per unit of water. The bottom line equation is that the utility looks at how much water it delivered over the course of a year and how much energy it consumed to accomplish this. Divide one by the other and you get the energy embedded in that water, described as its energy intensity.

Although this approach is good for general scoping, the range of energy intensity values can vary between water utilities and within the utilities themselves. One of our goals has been to understand how the energy intensity of the system can change over time. We’re also looking at questions of how the energy intensity of the water varies by location in the network.

In one of our initial studies, we looked at total energy and water delivered on a monthly scale and discovered significant changes in intensity. Depending on the month, we saw values that were 10-12 percent above or below the annual mean. In addition to monthly variations in system-wide energy intensity, water conservation programs can be seasonal, such as water saved through smart irrigation. This means that if you want to understand what the energy savings are from a particular water conservation program, you need an energy intensity value that reflects the seasonal reality.

SOURCE: It would seem logical that the energy intensity of a system also varies depending on where the energy is being used.

Spang: Correct. The most efficient way to understand the geography of energy intensity is to divide the service territory by its pressure zones. Water flows from the treatment plant into a pressure zone of customers. Every time it passes through a pump to increase pressure or boost its elevation, it’s entering a new pressure zone. The interesting thing about water networks is they don’t just radiate out equally from a source; the water often travels through cascades of pumps to reach greater distances or higher elevations. This means that people who are getting water after it travels through multiple pumps have a much higher amount of energy embedded in their water than folks at lower elevations.

The objective is to target pressure zones that have the right balance between energy intensity and savable water in terms of volume. Water served to a small community that requires multiple pumps...
to reach it has a high energy intensity, but because of the small number of customers, there aren’t a lot of opportunities for water conservation, and thus energy savings.

This relationship also has interesting implications for water rates. In the context of most conventional water rates, the customers who consume water in less energy intensive pressure zones actually end up subsidizing people who have a higher amount of energy embedded in their water. Further, the folks who are unknowingly consuming a lot of energy in their water aren’t receiving appropriate conservation signals about the benefits of using less water.

**SOURCE: So a utility that wants to design programs to save energy as well as water has to go beyond the simple calculation of water treated versus energy expended?**

**Spang:** Yes. This type of bottom-up measurement is important for two reasons: First, to help utilities design effective joint water/energy conservation programs, and second, to evaluate the effectiveness of a particular intervention. In other words, once the data is identified and collected to make the initial energy intensity estimates, the same data processing approach can be used for ongoing monitoring and verification of embedded energy flows through its network. Having this information readily available should streamline the water utility’s ability to form a meaningful partnership with its associated energy IOU.

**SOURCE: Is this something a water utility can do itself?**

**Spang:** I would say that if a water agency has an existing data archive of basic water flows through its system and access to its historical energy consumption data, it’s able to do this analysis. It’s actually a rather simple, descriptive analysis of the system. What it involves is getting the right data and organizing it in a particular way. Water utilities know the components of their system and how the water flows through it. Generally, they have well-designed data flows for the core decision-making variables required for delivering safe and reliable water. Adapting their data systems to incorporate energy analysis requires a bit of a learning curve, but it is in no way an insurmountable obstacle. And the benefits of integrating energy information into operational decision-making permeate multiple departments in a utility, including water conservation, maintenance, capital planning and rate design, just to name a few.

**SOURCE: But the data has to be in a certain format to make sense to a utility’s energy provider?**

**Spang:** Yes. One of the things that has held up progress in this area is that the more generic estimates of the energy in water systems are not sufficient for the energy IOUs to have the confidence that a particular water conservation program will produce a particular energy savings. Our goal is to develop a more robust model to help water utilities understand their energy flows through their system so their energy IOU is more comfortable with estimating the energy it really can expect to save if it invests in the proposed water conservation program. Another important piece is that it has a method to verify those savings on the back end.

**SOURCE: What’s next?**

**Spang:** Converting our exploratory pilot assessments into a real tool that water utilities can adopt and keep up to date to use for decision-making. The hardware is available. Sensors and the IT-based components of infrastructure have gotten a lot cheaper and easier to adopt, along with the powerful computers required to integrate data. There’s more water data coming into water agencies every year. It’s a matter of extracting the best value from those growing data streams.

There are real opportunities for a win-win. If we really want to design programs that save water and include the benefits of saving the energy in that water, we should really be prepared to measure these things well. It’s worth the amount of effort to figure it out and do it right.

**SOURCE: The CPUC has introduced proposed rule-making (CPUC R-13-12-011), the objective of which is to establish/adopt a methodology to compute the comprehensive costs and benefits of joint water-energy nexus programs to secure a fair allocation of investments between water and energy utility partners. How does this relate to your work at CWEE?**

**Spang:** As a condition of spending rate-payer money collected specifically for energy efficiency programs, an energy IOU has to demonstrate that the money spent is benefiting the energy rate-payers who contributed it. The CPUC is currently evaluating a top-down approach designed to broadly determine the cost-effectiveness of capturing energy savings through investments in water conservation.

It’s a complex model, but the water sector is a complex place to operate. The commission has divided the state into the 10 hydrologic zones used by the Department of Water Resources and developed the marginal cost of water supplies to those different zones, along with average energy intensity estimates for those zones. These numbers will be used to determine if a project is cost-effective. There’s obvious value in a statewide policy to use this broadly encompassing universal model. However, some of the details are lost when you aggregate these values up to a broader regional scale. So we see their approach as complementary to the kind of high-resolution analysis we’ve been talking about for actually designing and implementing projects that seek to jointly capture water and energy savings within a particular water utility service territory.

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A CASE IN POINT:
East Bay Municipal Water Utility District’s Energy Intensity Pilot Study

By Clifford Chan and David Beyer

As a result of 2005 California Energy Commission estimates that 19 percent of electricity used in the state is used for water-related activities, the water sector statewide has been a target for energy efficiency. The focus has traditionally been on the energy efficiency of technologies for pumps, treatment technologies and lighting fixtures, and studies on the energy intensity (EI) of water have targeted major water transfers and estimating the EI of a number of water and wastewater utilities (measured in kilowatt hours per million gallons–kWh/MG). None of these studies has investigated why EI varied between utilities. To address this gap, East Bay Municipal Utility District (EBMUD) partnered with the University of California at Davis’ Center for Water Energy Efficiency (CWEE) and Pacific Gas and Electric Company’s Emerging Technology program to establish a method for assessing the EI of water it delivers to its customers.

The goals of this pilot study were: 1) to develop a defensible method to estimate the EI in the water EBMUD served and 2) to understand the temporal and spatial variability of EI. This would make it possible to: set realistic targets for energy and water conservation programs, enhance efficiency by intelligently targeting water conservation and infrastructure upgrades and potentially open the door to provide energy efficiency rebates for water conservation projects.

EBMUD provides water service to 1.3 million customers across a 332-square mile service area in northern California’s Alameda and Contra Costa counties. Ninety percent of the district’s source water comes from the protected Mokelumne River Watershed along the western slopes of the Sierra Nevada and is conveyed mostly by gravity to the service area through a series of aqueducts. Prior to the current drought, EBMUD provided up to 220 million gallons per day (MGD) of potable water to its customers. Post-drought that has dropped to 175 MGD.

Due to topography of the service area, the water distribution system consists of 123 pressure zones, which rise from sea level to approximately one-quarter mile above sea level. To supply water to its customers, EBMUD operates five water treatment plants, approximately 135 distribution pumping plants and 165 distribution reservoirs. Treating and pumping water to customers account for nearly 55 percent of the energy used by the water system.

Methodology
Calculating a system-wide EI can be complex, and using a simplified top-down approach, with only the total monthly water production and energy consumption, can obscure significant seasonal and spatial effects on energy. To better understand the EI of the water in its systems, a utility could install a network of sub-metering to monitor energy and water flows system-wide. (i.e., electric meters and flow meters to monitor energy and water flows). Because this option is expensive, this study focused on developing and validating a less expensive method of high-resolution analysis utilizing existing data collection systems, specifically the Supervisory Control and Data Acquisition system (SCADA). The objective was to repurpose existing SCADA data on flow and pressure measurements across a water system to calculate the energy consumed in the water operations (raw water pumping, water treatment and distribution pumping). Five years of hourly SCADA data from the specific study areas (June 2006-May 2011) was used for this pilot study.

For the purposes of the study, EBMUD and CWEE studied two complex cascades within EBMUD’s distribution system, which included 10 of the system’s pressure zones. It was important to select pressure zones that were not independent of one another in order to capture how the EI increased as the water traveled from the source through the raw water pumps, treatment plants and successive distribution pumps. In addition, the cascades were selected based on their relatively large size, variation in elevation and their location within the service area. The study also mapped and analyzed the energy of water delivered throughout the two areas of the study, taking into account the energy needed to pump water over distances and elevations and across seasons.
Findings

Analysis found that the water distribution system had the highest average EI, while raw water pumping had the lowest. This was consistent with previous studies of EBMUD’s system, which found that the estimated EI for raw water pumping, treatment and distribution pumping was between 10-597 kWh/MG, 135-310 kWh/MG and 319-699 kWh/MG, respectively. However, unlike the past study, this work identified how the EI changed over time and geographically across the service area. The mean annual EI of EBMUD’s entire potable water system was found to be approximately 1,224 kWh/MG, which was also consistent with past studies. The study also found that the monthly EI varied ± 13 percent around the annual average (Figure 1), highlighting how the operation of the water system affects EI. This month-to-month variability suggests that energy efficiency programs designed around an annual EI value would likely under- or overestimate potential energy savings generated through water conservation programs. For example, a water conservation program for irrigation that used the annual EI average would over-estimate the energy savings because the EI is highest during the months of November, December and January when there is little irrigation.

Figure 2 shows a map of the EI along with the total water consumption in the various pressure zones. Higher elevation pressure zones had EI values more than five times higher than low-elevation pressure zones. For example, water conserved in the Leland Pressure Zone would save about 500 kWh per MG, but water saved in the Miller Pressure Zone would save almost 5000 kWh per MG. As a rough estimate, the study found that the EI increased by approximately 1000 kWh for every 200 feet of elevation change.

The study also identified a strong seasonal pattern in raw water pumping (Figure 3), which is typically done during the winter months when electricity rates are cheaper and the pumped water is used in the summer when water demands are higher. This operation “embeds” the energy into the water during the winter, and to address this time lag, the monthly raw water pumping data was aggregated into an annual amount.

Conclusions

There is no one-size-fits-all EI number for a given a gallon of water, and improving the estimation of EI of water is necessary to give utilities the tools they need to develop programs to save both water and energy. The study found significant seasonal and spatial variability of the EI, and understanding EI variability is a necessary starting point to design programs for saving energy through water conservation. The analysis of the EI and water consumption in the two pressure zone cascades found that a better way to look at EI is to calculate the total embedded energy, which is the EI multiplied by the water consumption.

Using the total embedded energy, a utility...
Eastern Municipal Water District Looks to the Long-Term for Energy Management

By Alan Zelenka and Greg Kowalski

When the senior staff at Eastern Municipal Water District (EMWD) sat down to analyze the district's increasing energy use and escalating costs, its objective was to develop a blueprint that would direct significant progress toward the Board of Directors' goal of energy independence while simultaneously lowering energy costs in a market where prices are projected to rise. The result was a comprehensive energy audit and planning document that is expected to reduce the district's energy use by 11 percent and save an average $1.2 million annually over the next 20 years.

The Challenge

EMWD's 2014 overall energy costs, including electricity, natural gas and fleet fuel totaled $16.7 million. Given the double compounding effect of energy price increases and the expected development of new and expanded facilities to accommodate on-going growth in the region, energy costs were anticipated to reach $56 million in the next 20 years, an increase that would likely be passed on to the 768,000 customers in the district's 542-square mile Riverside County service area.

The goal of the audit and planning process was to take a strategic and comprehensive look at the district's energy use and costs along with greenhouse gas (GHG) emissions. Specific goals included: 1) identifying a portfolio of potential projects to reduce existing and future energy use, 2) reducing GHG emissions and improving air emissions compliance, and 3) advancing EMWD's strategic goal of net energy independence, including reduction of costs and passing the savings along to district customers. The plan, developed with Kennedy/Jenks Consultants, was built off existing energy efficiency projects, including:

- Fuel cells installed at the Moreno Valley Regional Water Reclamation Facility in 2009 (900 kW) and the Perris Valley Regional Water Reclamation Facility in 2011 (600 kW).
- Nine 60 kW Capstone microturbines (540 kW) at the district's administrative headquarters facility.
- Derceto Aquadapt energy optimization software (2005) that integrates with the District's SCADA system and reduces electricity use by 8-12 percent a year.
- Investments in Energy Efficiency. This flexible planning framework uses principles from electric utility least-cost planning. It can be used not only at large utilities such as EMWD, but also equally well to meet the needs of small to medium-sized utilities.

“...the senior staff at Eastern Municipal Water District (EMWD) sat down to analyze the district’s increasing energy use and escalating costs, its objective was to develop a blueprint that would direct significant progress toward the Board of Directors’ goal of energy independence while simultaneously lowering energy costs in a market where prices are projected to rise. The result was a comprehensive energy audit and planning document that is expected to reduce the district’s energy use by 11 percent and save an average $1.2 million annually over the next 20 years.” — Joe Mouawad, EMWD Senior Director for Engineering

A Step-by-Step Process

Development of the comprehensive Energy Management Plan utilized a five-step process. Step 1, Baseline and Forecast, looked at baseline energy use, effectively developing a snapshot of the district's current electricity, natural gas and fleet fuel consumption and projecting a 20-year forecast of usage and cost in each area. Step 2, Alternative Project Investigations, included audit and evaluation of existing energy-related projects including the Derceto energy optimization software, energy facilities at the water treatment and water filtration plants (including continued use of fuel cells), and an assessment of the potential conversion of 56 natural gas-fired internal combustion engines (IC engines) to electric motors. This step also included a review of new potential energy projects, including microturbines, small hydro projects in the pumping, storage and distribution systems, a potential grease-to-biodiesel project, a food-waste-to-energy project and evaluation of four options to dry biosolids from water reclamation plants.

Step 3, Scoring and Ranking, developed and weighted consensus evaluation criteria that were used to score and rank 30 specific energy projects selected from the existing and potential projects reviewed and evaluated in Step 2. Using this, a short list of potential projects was created. Step 4, Portfolio and Sensitivity Analysis, developed and ranked eight potential portfolios from the short list of projects identified in Step 3. Six different metrics were used to evaluate the projects: Net Capital Cost, Net Savings, Net Present Value of Cumulative Savings, Green House Gas Emissions Reduction, Natural Gas Generated or Saved and Electricity Generated or Saved. These metrics were then applied to each of the potential portfolios to select one Preferred Portfolio. This was then subjected to a sensitivity analysis using five different scenarios. The five scenarios included Electric Cost, Natural Gas Cost, Green House Gas Fees, Discount Rates and Bond Interest Rates. The Preferred Portfolio was determined to be cost-effective under all five.

In Step 5, Action Plan, a detailed implementation plan prioritized the seven projects in the Preferred Portfolio according to projected return on investment, net capital cost, average annual net savings, net present value (NPV) of the cumulative net savings over 20 years, staffing requirements and the department that would be responsible for moving the project forward.
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The final Emergency Management Plan included:

**Project No. 1: Perris Valley Regional Water Reclamation Facility (PVRWRF) Equipment Audit:** A detailed energy audit of the building envelope, lighting, HVAC and operational equipment to identify Energy Efficiency Measures (EEMs) to reduce energy; 16 EEMs were identified and 12 were recommended as cost-effective.

**Project No. 2: PVRWRF Process Audit:** Evaluation of process improvements to reduce energy use; 18 EEMs were identified, seven were recommended as cost effective, and 11 process improvements were suggested for further investigation.

**Project No. 3: Perris Water Filtration Plant Energy Audit.** The process and equipment energy audit identified 19 EEMs and three Water Efficiency Measures (WEMs) and recommended 11 cost-effective EEMs and two WEMs for implementation.

**Project No. 4: IC Engines to Electric Motors Optimized Ranking.** Evaluated operating performance and cost of the district’s 56 natural gas IC engines and the cost-effectiveness of converting 41 to electric motors. The final plan recommended conversion of 16.

**Project No. 5: Digester Gas-Fueled Microturbines.** Evaluated the potential energy savings from five microturbines to be fueled by digester gas from the district’s water reclamation facilities (analysis provided by the South Coast Air Quality Management District).

Continued on page 24
**EMWD Long Term, continued from page 23**

**Project No. 6: Continued Use of Fuel Cells and Moreno Valley Water Reclamation (MVRWRF) Facility Optimization.** Evaluated and recommended continued operation of the fuel cells at both water reclamation facilities as the most cost-effective option for generating electricity at these sites; recommended optimizing their operation to full capacity.

**Project No. 7: Solar Photovoltaic Projects.** Evaluated and recommended owning and operating five 1 megawatt (MW) solar photovoltaic projects at four existing regional water reclamation facilities and one at an existing desalination facility.

**TABLE 1: Short-List of Preferred Projects**

<table>
<thead>
<tr>
<th>Project Number</th>
<th>Incentives</th>
<th>Net Capital Cost</th>
<th>Average Annual Net Savings ($/year)</th>
<th>NPV of Average Annual Net Savings</th>
<th>Average Annual Electricity Generated or Saved (kWh/year)</th>
<th>Natural Gas (therms/year)</th>
<th>Average Annual GHG Reduction (MT/year)</th>
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<tr>
<td>1</td>
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<td>$1,760,300</td>
<td>$142,300</td>
<td>$2,140,100</td>
<td>1,741,200</td>
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<td>659</td>
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<tr>
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<td>460</td>
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<tr>
<td>3</td>
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<td>$420,500</td>
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<td>4</td>
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<td><strong>TOTALS</strong></td>
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<td>$26,317,000</td>
<td>$1,211,700</td>
<td>$17,912,200</td>
<td>10,155,200</td>
<td>(436,100)</td>
<td>4,940</td>
</tr>
</tbody>
</table>

Note: The numbers in the table are representative of the savings and calculated in the Portfolio spreadsheet using the sum of the annual values of all the projects.

**Plan Implementation**

When implemented, the seven energy projects identified in the final Energy Management Plan will reduce the district’s overall electricity use by 11 percent for an annual savings of over 10 million kWh (203 million kWhs over 20 years), and result in a nearly 10 percent reduction in electricity costs ($1,211,000 per year) with a NPV of nearly $18 million over 20 years, plus a reduction of nearly 5,000 metric tons of CO₂ per year, the equivalent of taking 1,000 cars off the road (98,000 metric tons over 20 years). A number of projects identified in the EMP have been initiated and others are on their way to construction. ✨

**Editor’s Note:** EMWD won the 2014 CA-NV AWWA Excellence in Energy Management Award and is one of two municipal water agencies nationwide to participate in the 2013 U.S. Senate Committee on Energy and Natural Resources’ roundtable on the water/energy nexus.

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**ENGAGE. SAVE. SMILE.**
Burbank Water and Power (BWP) is partnering with the Southern California Gas Company (The Gas Company) and UC Davis’ Center for Water-Energy Efficiency (CWEE) on a pilot project to test the effectiveness of consumer messaging to affect water, electric and natural gas savings. This is the second project BWP will be working on with The Gas Company.

As a community-owned utility that relies totally on imported water, BWP is continually searching for new tools to help residents cope with the current drought. And as a smaller sized utility, it is always on the lookout for opportunities and partnerships with other public agencies to achieve increased economies of scale and customer engagement.

The design of the new 12-month randomized control behavioral message pilot will divide 15,000 of Burbank’s 18,500 single-family water customers into three groups that will each be targeted with three different behavioral change messages. The remaining 3,500 customers will function as a control and receive no messaging. The messages will be sent in six bi-monthly flyers separate from the utility’s monthly billing. The first targeted group will receive conservation tips plus a rebate offer, the second group, conservation tips along with the chance to be entered in a competition (e.g., customers who meet energy and water conservation thresholds will be entered to win an incentive) and the third group, conservation tips only. Messages will be developed and delivered using WaterSmart software; data will be analyzed at CWEE.

Similar projects have achieved a five percent water savings for each report recipient, which amounts to almost 350 AF (acre feet) saved per year for BWP.

As part of the project, the city will be able to utilize a companion Home Water Reports web portal. Residents can log on to: 1) check their hourly and daily water use and reduce usage before they receive their next bill, 2) discover immediately if they have a leak, and 3) view an interactive tip library that informs them how much they can save through specific water-conserving actions.

BWP and The Gas Company were logical partners, given that Burbank has smart electric and water meters for all its 18,500 single-family households and The Gas Company has advanced gas metering in place in the area. A unique factor of the project is the availability of hourly water, electric and natural gas use for each customer, allowing for a rich dataset that will help inform how and when customers use and save water and energy in their household.

Although one of the challenges was developing messages that blend the utilities’ unique voices, BWP had previously worked with The Gas Company in the award-winning Green Home House Call program, a free audit and direct install program for residents. This program provides Burbank residents with free installation of energy and water saving measures, such as attic insulation and low-flow showerheads. Much like the current pilot project, this program would not be economically feasible without the cooperation and cost sharing provided by The Gas Company and the Metropolitan Water District of Southern California. In addition the resulting partnerships have made it easier to develop this pilot project and create the joint messaging necessary. BWP plans to meet periodically with its project partners to evaluate whether ongoing messaging has been effective and to create new campaigns that engage study recipients where necessary.

The joint water-energy behavioral messaging project will run through 2015 with results projected by June 2016.

“A unique factor of the project is . . . a rich dataset that will help inform how and when customers use and save water and energy in their household.”

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allows for a future expansion of up to 3.5 MGD. Water passes through the existing strainers, the first- and second-stage filters, then chlorine is added before the treated water flows to the plant’s clearwell. The poly coagulant is injected upstream of static mixers before the first- and second-stage filters.

The EPD pressure filtration system has been approved by the Division of Drinking Water for 2.0 log Giardia and 1.0 log virus removal credit. The district achieves the remaining pathogen inactivation through free chlorine disinfection.

Design-Build

The design-build project delivery method was chosen for a number of reasons. It provided CVWD a single point of responsibility for design and construction services as well as the opportunity to select innovative and best-value solutions while reducing the overall duration of the project. Although the project was design-build, there were still costs the district could potentially incur as a result of unforeseeable delays and issues related to permitting. Just such an incident occurred. The project was under construction in 2013, during the federal government shutdown, when unforeseeable delays in obtaining Army Corps of Engineering permits were encountered. There were concerns that these delays would make it difficult to complete construction before the rainy season, when it might be too dangerous to work. To solve the problem, HDR, CVWD and its environmental consultant worked in partnership with the permitting agencies to resolve the permitting schedule delay without additional cost to CVWD.

AHBWTP reopened in June 2014. The $4.26 million project was partially funded by a grant from the Federal Emergency Management Agency and the California Emergency Management Agency.
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Las Vegas Valley Water District and Southern Nevada Water Authority: 25 Percent Renewables by 2025

By Gary Wood

Over the past 10 years the combined Las Vegas Valley Water District-Southern Nevada Water Authority’s Energy Management Department, which provides primary power for pumping and water treatment facilities at both utilities (here referred to as the Enterprise), has evolved from relying exclusively on traditional power to including renewable energy as an integral part of its energy portfolio. Arguments for this transformation have included renewable energy as:

- A long-term power hedge where the price of power is known for the next 25 years.
- A demonstration of social responsibility and support of a company’s sustainability mission.
- A mechanism to address future clean energy regulations or similar political/regulatory pressures.
- Economically sound.

The joint LVVWD-SNWA Enterprise currently manages approximately 300 megawatts (MW) of peak load through a combination of methods, including a gas-fired power plant, federal and local hydropower, power contracts and Power Purchase Agreements. It initiated its renewable energy program in 2004 with six single-axis tracking solar panel installations at reservoir sites in the Las Vegas Valley at a cost of $23 million. While the power offset from these installations and the value of the monetized renewable benefits made the investment economically prudent, the decision was based partly on the utilities’ commitment to not raise rates. Clean Renewable Energy Bonds were utilized to finance approximately 20 percent of the cost of the installations while the remaining funding came from municipal bonds. Five of the six installations were constructed over underground reservoirs and had to be constructed to accommodate access; the sixth was installed over carports.

Based partly on its experience with these installations and the new Nevada Renewable Portfolio Standard (RPS), which requires 25 percent of energy from renewables by 2025, management opted to continue to investigate renewable energy options. Although it wasn’t bound by the RPS requirements, the Enterprise adopted a 25 by 25 strategy, mirroring the State’s Portfolio Standard as its energy goal. Between 2007 and 2008, additional small-scale renewable installations were completed:

- **SNWA Wahoo Ranch Solar Project**

Solar covered carports at two water treatment facilities. These multipurpose installations used traditional solar panels built on carports and tested a new concept of inverters. Combined capacity of this installation is .24 MW.

Energy recovery at its pump stations. The project replaced existing flow control valves with hydroturbines to recover pressure reduction energy that would typically be absorbed by the valves (combined capacity, 2.0 MW).

24 MW Photovoltaic Installation at the River Mountains Water Treatment Facility (RMWTF). A pre-market installation of a concentrated solar photovoltaic system, which uses the magnification of the sun through a lens on a small cell. This technology was being considered as a hedge against the cost of rising photovoltaic material. Although part of the Enterprise’s interest in experimenting with leading edge technologies, the technology required more precise controls and tracking systems, making it more complicated to operate and maintain.

Although small compared to the total load, the projects were undertaken as research and development and to demonstrate a commitment to renewables.

The 2008 recession and the goal of the Enterprise to maintain existing rates, led to investigation of a new deal structure that would closely follow short-term market prices through energy swaps or back-loading power agreements. The goal was a vehicle that would facilitate a short-term swap with renewables and market energy with onsite generating systems to reinforce the image of the agencies’ commitment to renewables. This structure was rejected in part because it required three parties—developer, power off-taker (the Enterprise) and a power marketer. Other options included self-build, and energy partnering arrangements. Investigating the self-build option, the department purchased a .01 MW solar package from a big box store and installed it with internal labor for a total cost of $28,000. An internal white paper concluded that self-build was cost effective, but management opted not to pursue that option due to constraints on internal resources.

Coincidentally, due to oversupply, the price of solar panels began to drop, and conventional power agreements became a more economical option, with the price of renewable power dropping from $100-120 a megawatt hour to $70 + MWh (megawatt hour). Monetizing renewable benefits brought the price down to $40 +MWh, comparable to what the Enterprise...
EPA’s Proposed Clean Power Plan Could Mean Funds for Energy Efficiency

By Adam Carpenter

On June 2, 2014, USEPA’s Office of Air and Radiation released its proposed Clean Power Plan (CPP), which if implemented, will use Section 111(d) of the federal Clean Air Act to regulate carbon dioxide emissions from existing fossil-fueled power plants. Specifically, the plan is intended to reduce national carbon dioxide emissions from power plants by 30 percent by 2030 from a 2005 baseline, but there are a number of benchmarks and impact analyses targeted for 2020. The CPP uses four “building blocks” of emissions reduction techniques to reach the plan’s overall goal:

1. Making fossil fuel power plants more efficient.
2. Increased use of low-emitting power sources (primarily natural gas).
3. Increased use of more zero- and low-emitting sources (renewables and nuclear).
4. Energy efficiency (increasing efficiency by 1.5 percent per year through 2030).

The agency’s complex formula to derive carbon emission reduction goals for each state has resulted in a wide range of goals and likely costs. On a per megawatt hour rate (carbon intensity), Wyoming has the lowest goal at 19 percent reduction, Washington state the highest at 72 percent. California’s goal has been set at 23 percent and Nevada’s at 35 percent.

Using EPA’s projections of impacts on the energy sector, the cost of retail electricity is expected to rise on average by an additional six-seven percent by 2020. Based upon the sector’s one percent of total electricity use, this would increase costs for water utilities by $230 million per year.

Using EPA’s projections of impacts on the energy sector, the cost of retail electricity is expected to rise on average by an additional six-seven percent by 2020 due to this rule (on top of other drivers adding to the cost of electricity). Based upon the sector’s one percent of total electricity use, this would increase costs for water utilities by $230 million per year. The projected impact varies substantially by region. California can expect an eight percent increase and Nevada, seven percent. A number of organizations have suggested that the EPA analysis is too conservative on costs, and rate increases may actually double these projections or more. Additionally, unregulated wholesale rates may be more volatile or could increase more than regulated retail rates.

Because energy efficiency is in many instances less expensive than replacing or substantially modifying the power plants themselves, the CPP will likely result in the availability of substantial new funding for energy efficiency projects beyond current programs. If water utilities can access just one percent of this additional funding as estimated by the proposed rule (equal to the sector’s one percent of electricity use) this could translate to $100 million per year by 2020 to increase energy efficiency, based again on EPA’s projections of increased energy efficiency funds to meet the state goals. The potential is much higher when wastewater and other water uses are added. EPA expects California’s current energy efficiency funding to double and Nevada’s to quadruple by 2020 for all sectors. This provides a significant opportunity for AWWA and the water sector as a whole to engage to offset a significant portion of the rule’s expense. Ongoing processes, such as the California Public Utilities Commission’s Water-Energy Nexus program will set the stage for future discussions across the state and across the country.

Adam Carpenter works in AWWA’s Washington D.C. Government Affairs Office and serves as an expert and advocate on a diverse set of drinking water issues including climate change, hydraulic fracturing, the energy-water nexus and carbon capture and storage.
Getting the Story Straight
In the Fall 2014 issue of SOURCE we misidentified the photograph of SOURCE Editorial Advisory Committee Chair Issam Najm. Our apologies.

The following water industry professionals have been named to serve with Najm on the committee: Stefan Cajina (California State Water Resources Control Board Division of Drinking Water), Andrew DeGraca (San Francisco Public Utility Commission), Joy Eldredge (City of Napa), Uzi Daniel (West Basin Municipal Water District), Bruce Macler (USEPA and CA-NV AWWA Past Chair), Arlene Post (CDM Smith), Karen Snyder (Katz & Associates) and Tim Worley (CA-NV AWWA). Najm is President of Los Angeles-based Water Quality & Treatment Solutions, Inc. ♦

CONTRIBUTE TO SOURCE: Check the 2015 Editorial Calendar at ca-nv-awwa.org and contact the editor, pbg1747@sbcglobal.net with your idea.

CA-NV AWWA to Participate in Tap Water Day May 7, 2015
As part of AWWA’s annual Drinking Water Week Campaign, the CA-NV Section will host its first Tap Water Day on May 7, 2015 to promote greater public awareness of the value of tap water and encourage consumers to make it their first choice when drinking water. The objective is to support efforts to improve access to drinking water fountains in public spaces and reduce reliance on bottled water or sodas by providing easier access to tap water through drinking fountains or hydration stations. The focus will be particularly on under-served areas.

Watch for future communications on this event and how your organization can participate. ♦
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Eastern MWD Director Ron Sullivan Honored by AWWA

Eastern Municipal Water District Board Director Ronald Sullivan has been honored by the American Water Resources Association with its prestigious Mary H. Marsh medal, presented to honor an individual’s achievements in “setting, designing, influencing, and/or implementing water-related policies, practices, or programs at the national, state, or local government level.”

Sullivan represents District 4 (Menifee and Perris) on EMWD’s board and is a commissioner on the Santa Ana Watershed Project Authority (SAWPA), a collection of local agencies responsible for oversight of the region’s watershed.

Under Sullivan’s guidance, SAWPA has established its One Water, One Watershed approach to groundwater management, allowing regional users to have a voice in watershed planning. Sullivan has been at the forefront of EMWD’s energy management efforts and has taken part in numerous advocacy efforts in Washington, D.C., including a national panel on the water-energy nexus.

Mark Weston Elected New Chair of SDCWA

Mark Weston has been elected Chair of the San Diego County Water Authority’s Board of Directors, effective October 1, 2014, replacing Thomas V. Wornham, who has led the board for the past two years. Weston represents the city of Poway and is the retired GM of Helix Water District. “This will undoubtedly be a challenging tenure in light of the ongoing drought,” said Weston. “But the San Diego region is a statewide leader in water conservation, and I have no doubt that our residents, businesses and civic leaders will once again pull together to save more water.” San Dieguito Water District representative Mark Muir will serve as vice chair and Jim Madaffer from San Diego is the new secretary.

Rowland Heights Water District Names Tom Coleman GM

Rowland Water District (RWD) has selected industry leader Tom Coleman to serve as the district’s next General Manager, replacing Ken Deck, who served as GM for more than 28 years. Coleman joined the district as Assistant General Manager.
in 2013, working closely with Deck in supervising overall operation and maintenance of the agency. Coleman previously served as Executive Director of Bellflower Somerset Mutual Water Company in Bellflower, CA, General Manager of Orchard Dale Water District in Whittier, CA and eight years in various water management positions with the City of Alhambra. RWD provides potable and recycled water for approximately 58,000 people in southeast Los Angeles County, including portions of Rowland Heights, Hacienda Heights, La Puente and the cities of Industry and West Covina.

EMWD Director Randy A. Record Elected Metropolitan Water District of Southern California Chair

Randy A. Record, who has served on Eastern Municipal Water District’s (EMWD) Board of Directors since 2001, has been elected Chair of the Metropolitan Water District of Southern California (MWD) Board of Directors, taking over for longtime Director John V. “Jack” Foley, who passed away in March 2014. Record is a third-generation San Jacinto Valley farmer and is Immediate Past President of the Association of California Water Agencies. He is known for his work in advancing recycled water, water use efficiency and groundwater management and has been an advocate for the Bay Delta Conservation Plan and helped EMWD become the industry standard for its recycled water efforts. He is also the founding chair of the Riverside County Water Task Force.

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Industry Leader and Past CA-NV AWWA Chair Alfred W. Jorgensen

In Fall 2014 Milestones we noted that the Foundation for Cross-Connection Control and Hydraulic Research at the University of Southern California was celebrating its 70th Anniversary. The Foundation plays a key role in CA-NV AWWA’s backflow and cross-connection courses as well as its certification program. Subsequently, the Foundation reported that one of its founders, Al Jorgensen, who was instrumental in developing initial financial backing and support and served on its Advisory Board since its inception, passed way in November 2014. Jorgensen also served CA-NV AWWA as 1980 Chair and as National Director 1984-1987.

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version, all discharges conducted in order to comply with the federal Safe Drinking Water Act, the California Health and Safety Code or the Division of Drinking Water requirements are allowed.

3. Turbidity: Initial permit language had a turbidity effluent limit of 10 NTU. A turbidity limit this low would have eliminated coverage for the vast majority of discharges, and several utilities provided written comments demonstrating the adverse impact on their operations. The final language, which was acceptable to nearly all utilities, was for the turbidity effluent limit to be converted to a 100 NTU action level.

4. California Toxic Rule: In initial discussions with the SWRCB staff, it became clear that one of the hurdles to allowing discharges was the California Toxic Rule (CTR), which requires compliance with numeric effluent limits for an ever-growing list of priority pollutants as determined by USEPA. Some utilities found they could not comply, while others were burdened with sampling of over 100 constituents. The SWRCB staff solved this issue by exercising its authority to issue an exemption from the CTR for all drinking water utility discharges. The California Environmental Quality Act (CEQA) analysis by the SWRCB staff concluded that this exemption could be allowed under a Mitigated Negative Declaration (MND). Adopted by the State Board, this MND is one of the significant positive outcomes of the permit process.

5. Direct discharge monitoring: The first drafts of the permit required sampling for all discharges within 300 feet of a receiving water. Given the complexity of some utilities and their proximity to water bodies, this may have required them to sample every discharge. The requirement was removed entirely.

6. Inclusion of others besides Community Water Systems: Originally, the permit only provided coverage to utilities permitted by the Division of Drinking Water. After several wholesale water agencies commented, the permit coverage was expanded to include all water purveyors, including wholesalers and distributors.

Losers

While significant gains were made on the permit, there were some issues that did not get resolved for all utilities.

1. TMDLs: When a surface water does not meet water quality standards, Total Maximum Daily Loads (TMDLs) are created. TMDLs are incorporated into NPDES Permits to ensure that the surface water eventually meets standards. There are TMDLs in many surface waters in California, but the new permit only requires water purveyors in two regions, Los Angeles and San Diego, to comply with local TMDLs. Many water purveyors objected to this arbitrary inclusion of TMDLs into the permit and requested that they be removed. This request was denied. Utilities will need to track the development of additional TMDLs across the state.

2. Small Systems: Several utilities, particularly small utilities, wanted to be able to secure an exemption from the permit on the basis that their discharges were not large enough to have an impact. CA-NV AWWA, in addition to others, asked for an exemption for utilities with fewer than 3,000 connections. An environmental group commented that depending on the location, discharges from a small utility could have a significant impact. The final permit language was modified so that utilities with less than 1,000 connections are not required to apply, but they are not exempt. If they don't get the new NPDES permit, they must get another type of permit if they discharge to a receiving water body.

3. Liability: The most important thing to remember when complying with a NPDES permit is that the Clean Water Act (CWA) is very different than the Safe Drinking Water Act (SDWA). Under the SDWA, a water purveyor that follows all the rules can’t be held liable for any adverse public health impact. Under CWA, if you follow all the rules and you impact a receiving water body, you are liable for the damages to the environment. The CWA is designed, in part, to be enforced via third party lawsuits. Several utilities asked for coverage to be clarified and subsequently limit the liability. These issues were not addressed within the permit, which means that utilities may still need to conduct additional sampling to prove they are not impacting receiving waters.

4. Filter backwash discharges: Many utilities wanted coverage of all their discharges under one permit because existing permits that regulate filter backwash in many areas of the state are expensive to comply with. In some cases, small groundwater treatment plants could not comply due to restrictions under the California Toxic Rule. Other utilities did not want to be covered under the statewide per-
prise was paying for power purchased from the grid. Economically more viable and offering less risk, PPAs are presently the strategy of choice for the Enterprise’s renewable power projects. In July 2014, it signed an agreement for a 14 MW solar facility at the RMWTF, scheduled to be operational by the end of 2015. The 20-year arrangement is structured with two five-year options at the end and the option to purchase after seven, ten and fifteen years. The levelized rate is approximately $78 a megawatt hour. With the addition of this project and including federal hydropower, 19 percent of the department’s energy will come from renewable sources by 2016, putting it well ahead of its 25 by 25 goal.

For more on PPAs, see SOURCE, Spring 2013: Inland Empire Utility Agency Uses PPAs to Go Gridless.

SWRCB to Adopt Permit. continued from page 34

mit because of expensive capital improvements that would be needed to comply. These utilities successfully argued that the CEQA exemption granted was not broad enough to cover filter backwash, and therefore the discharges should not be covered. As a result, filter backwash is not exempt from the toxic rule under this permit or any other state or regional permit, which means some utilities will have to get sanitary sewer permits or treat their filter backwash onsite.

Thanks to everyone, especially the members of CA-NV AWWA NPDES Permit Ad Hoc Committee, who worked hard on this process over the past three years. Many hours of work and effort were undertaken by utilities across the state to craft a permit that balances environmental protection with necessary drinking water operations and the cost of compliance.

The State Board directed its staff to coordinate with industry associations to develop and implement a plan for outreach to water systems. If you would like to be part of the outreach effort, receive email updates on the permit or obtain the outreach workshop schedule, please contact me (bhancocks@gswater.com) or Greg Buncab (GregoryLee.B uncab@acwd.com). The two of us are currently leading an effort, in collaboration with ACWA and CWA and SWRCB staff, to organize a series of workshops on the permit to be held throughout California. The Section’s Operator Symposium (March 17-18, 2015 at the Doubletree Hotel in Ontario, CA) will also provide both members and interested non-members an opportunity to learn more about how to prepare, apply for and obtain the new NPDES permit.

LVVWD & SNWA, continued from page 28

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East Bay MUD, continued from page 19

ity can identify energy intensity“hot spots,” which can be used to target initial water conservation projects to maximize energy savings (Figure 2). Areas with very high EI values may have relatively low water consumption, and therefore may not be the best targets for maximizing energy savings. Therefore water conservation efforts and infrastructure upgrades may want to target energy-intensive neighborhoods that also have high water consumption in order to yield the greatest energy conservation.

What’s Next
EBMUD is continuing its work to understand the relationship between water and energy and to look for ways to maximize energy savings. Leveraging existing SCADA system data was essential for the study, but manipulating and analyzing the data was cumbersome. Future work may include automating the calculations of EI from SCADA data to provide more real-time EI estimates and an opportunity to monitor and verify the energy and associated greenhouse gas savings associated with any water conservation programs.
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