



Associates Tour Los Angeles Headworks Reservoirs

The Headworks Reservoirs, located north of Griffith Park in Los Angeles, US, are being constructed to replace the existing Silver Lake Reservoir Complex (SLRC). The facility comprises two concrete-lined open reservoirs, Silver Lake and Ivanhoe Reservoir, divided by a spillway in Silver Lake.

These two reservoirs will be replaced with two underground concrete reservoirs named Headworks East and Headworks West with a combined capacity of 110 million gallons. Construction on Headworks East began in March 2012 and was completed by the fourth quarter of 2014, whereas the construction on Headworks West began in February 2016 and is scheduled to complete in 2020.

"The reservoirs are facilities of the Los Angeles Department of Water and Power (LADWP) and were initially estimated to cost \$230 million, but the estimated cost has risen by almost \$100 million due to issues that arose during final design and construction. The reservoirs are being constructed under an alternative procurement mechanism known as Construction Manager at Risk (CMR) where the contractor gives a maximum bid and the owner and contractor work together to hold down costs. The process for this project was approved by the LA City Council by Ordinance. (Continued on page 3)

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ANNUAL MEMBERSHIP MEETING

Saturday, February 10, 2018
10:00 A.M.

111 N. Hope St., L.A.

All members

are encouraged to attend.

Bring a guest potential member.
Members to the Board of Directors
will be elected.

Bring photo I.D. for entrance
to the parking lot & the building.

Water & Power Associates Meetings First Quarter 2018

January 10, 2018 Guest Speaker
Gurcharan Bawa, General Manager
Pasadena Water & Power
11:00 AM - Taix Restaurant, 1911 Sunset Blvd.
Los Angeles, CA 90026
Insights on the changes occurring in the electricity industry in general and more particularly in California, from technology, the state's push for renewables, and customer preferences.

February 10, 2018 Annual Meeting
10:00 AM - LADWP ~ JFB
111 N. Hope St., L.A., Ca. 90012

March 14, 2018 Guest Speaker
Fernando Paludi, Associate General
Manager, West Basin MWD
11:00 AM - Taix Restaurant
Update on the Cal Fix Solution West Basin
Municipal Water District's plans for Desalination.

Water and Power Associates, Inc. is a non profit, independent, private organization incorporated in 1971 to inform and educate its members, public officials and the general public on critical water and energy issues affecting the citizens of Los Angeles, of Southern California and of the State of California.

Welcome. May all who join as guests leave as Friends



James C. Barner, P.E.,
Guest Speaker. Mechanical Engineer, Manager of Integrated Resource Planning, Power System Planning and Development Division Los Angeles Department of Water & Power

Barner is responsible for the preparation and approval of the annual Power System Integrated Resource Plan (IRP) which describes the renewable, demand side, and conventional generation and transmission resources to achieve LADWP's goals of reaching an 80% greenhouse gas (GHG) reduction from 1990 levels by 2050, and achieving a 65% renewable portfolio standard (RPS) by 2036 while providing reliable and cost effective electricity for the citizens of the City of Los Angeles.

Barner began his career at LADWP in 1990 and has managed the Power System Planning and Development, Integrated Resource Planning Group since 2010. In his current role, Barner has been responsible for development and modeling of resource case scenarios that results in a recommended case that is vetted through an Advisory Committee and Public Outreach process and ultimately approved by Power System Management and the General Manager.

Prior to his current assignment, Barner spent 5 years within the Energy Control Center's Wholesale Energy Marketing Group supervising the daily planning and market analysis activities, and implementation of new production cost modeling software used to prepare the daily plan, develop buy and sell strategies, and provide post analysis of trading activities.

Additionally, Barner manages the annual Fuel and Purchase Power Budget, updates to Bond Disclosure statements, and has represented LADWP in regulatory proceedings and discussions with various State agencies. Barner was also the lead technical representative for several California electric sector studies investigating high levels of renewables to achieve Statewide RPS and emissions goals.



Norm Buehring, P.E.
Retired Water System Manager, Los Angeles Department of. Water & Power.



Rod Fishburn,
Collections Manager for Orange Empire Railway Museum. Retired engineer from the Los Angeles Department of. Water & Power Energy Control Center.



Richard F. Harasick,
Senior Assistant General Manager, Water System, Los Angeles Department of. Water & Power.



Walter W. Hoyer,
Engineer of Design. Los Angeles Department of. Water & Power.



Andrew Kendall
Senior Assistant General Manager of Power System Construction, Maintenance, and Operations. Mr. Kendall is a 33-year veteran of the Los Angeles Department of Water and Power.



Reiko A. Kerr,
Senior Assistant General Manager - Power System Engineering Planning and Technical Services. Ms. Kerr joined the Los Angeles Department of Water and Power on November 14, 2016. She was formerly Chief Financial Officer for the city of Riverside, Founding member and current board member of the Association of Women in Water, Energy and Environment.



Delon Kwan, P.E.
Waterworks Engineer
Water Resources Development. Los Angeles Department of. Water & Power.



Juan Lozano
Los Angeles City Animal Services Department.



David R. Pettijohn
Director of Water Resources,
Los Angeles Department of. Water & Power.



Walter W. Zeist
Manager of Education Outreach,
Communication, Marketing and Community Affairs Division, Los Angeles Department of. Water & Power.



W&P Associates December Tour of Los Angeles Headworks Reservoirs

(Continued from page 1) These new reservoirs will supply clean drinking water to Los Angeles and comply with the two new water quality regulations set by the US Environmental Protection Agency (EPA), namely the Stage 2 Disinfectants and Disinfection By-Products Rule and the federal Long-Term 2 Surface Water Treatment Rule (LT2).

On Wednesday December 13, WAPA Board members toured the partially completed Headworks Reservoir at 6001 Forest Lawn Drive. The Headworks Project consists of two giant water tanks (among the largest in the USA) buried below ground to:

- ∞ protect drinking water quality and reliability, ensure water regulatory compliance,
- ∞ provide total storage capacity of 110 million gallons,
- ∞ include construction of a 4 MW hydroelectric plant, and
- ∞ create a future Los Angeles River Ecosystem Restoration Project.



Susan Rowghani, Director Water Engineering and Technical Services Division, described the headworks project, its planning, management, and issues

involved in the construction. Alex Liu and Juan Izaguirre, Project Coordination and Administration Water Engineering and Technical Services, acted as tour guides.

Drinking Water Regulations required LADWP to either cover, provide a treatment plant, or replace Silver Lake and Ivanhoe open reservoirs. Residents objected to covering up the reservoirs - wanting any construction someplace else - but leave the reservoirs alone. Former Los Angeles Councilman Tom LaBonge suggested the Forest Lawn location as one at a proper elevation and where there would be no residential opposition.

The tanks are irregularly shaped. *Regulations required State approval of the tank construction - so State inspectors are on hand for each phase of construction.* The project involves two tanks. Originally one larger one was planned, but issues with the geology of the foundation along with the need to meet a deadline of November 2014 for taking the existing reservoirs out of service required two tanks be constructed.

“The project is being built in four phases (see ahead **Headworks Reservoir**



Project Details), with the concrete surface of the two reservoirs covered with soil planted with drought tolerant plants and maintained for recreational use, including a wetlands area. *They are working with the Army Corps of Engineers on the design and implementation of the recreation plan.* LADWP expects the work to take fifteen years from start to final completion.”

At the end of 2011, an estimated \$250 million cost was approved. An additional \$100 million was approved recently. *The facility is being constructed by a private contractor under a Construction Management at Risk (CMR) process, where the contractor guarantees a maximum price and the parties work together to reduce costs while assuring that the finished project meets all requirements.* Monthly, LADWP supervising managers meet with the Contractor to discuss any issues. If cracks or leaks appear in the concrete, the contractor must take care of fixing the problem. There is a batch plant in place on site and the concrete is tested at random to assure compliance with the specifications. One segment of completed concrete developed unacceptable cracks, so the contractor was required to break out a 30 X 30 X 4 foot section and replace it. To date, they have used 59,000 cubic yards of concrete in 6900 truckloads between the two tanks.

Originally, a checkerboard arrangement was used for installing the concrete in alternating square panels to avoid expansion cracks. However, they had better results when installing the panels in a chevron pattern. Even though the concrete was cooled as it was installed, its temperature heated to 150 degrees causing it to dry too quickly. Fly ash was then added which lowered the cooling to 120 degrees, which was then acceptable. Two feet of soil will be placed over the finished concrete tops of the tanks to support the future ecosystem restoration. The soil for this is provided by Forest Lawn from its expansion.

Ivanhoe and Silverlake reservoirs have been removed from service but will be maintained and kept filled for community esthetics and/or recreation. The City’s Bureau of Engineering is preparing the Master Plan for Silverlake and Ivanhoe reservoirs independent of LADWP and the Recreation and Parks Department will be responsible for operating and maintaining that part of the project. LADWP is providing water from non-potable wells and maintaining circulation in the two reservoirs to keep the water aerated and clear. (Continued on page 4)

Los Angeles Headworks Reservoir Tour



Breaking Ground

Susan R. Rowghani,
 Director
 Water Engineering and
 Technical Services Division,
 Los Angeles Department of
 Water And Power



Headworks Reservoir Project Details

(Continued from page 3) The primary supply for the tanks comes through the Los Angeles River Supply Conduit. The tanks will be supplying parts of the downtown and mid-city areas. Storage will be regulated so there is sufficient supply for firefighting and other emergency needs.

The project primarily involves replacing the existing reservoir with two new reservoirs with storage capacities of 54 million gallons and 56 million gallons, covered with two to three feet of soil and native vegetation. It includes natural wetlands by the Army Corps of Engineers, which will provide open areas for hiking, horse riding, cycling and pedestrians.

Construction of the new reservoir is being completed in four phases. The first phase included the construction of Headworks East reservoir and associated infrastructures, such as site piping and grading, river supply conduit 1A East, tunnel section and valve vaults. The second phase includes the construction of the second reservoir Headworks West.

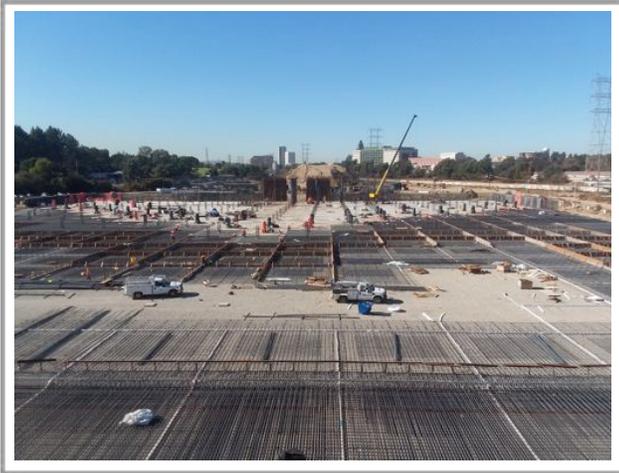
The 1A West river supply conduit, the hydroelectric power plant and the regulating station will be built in phase three.

The last phase will involve restoration of the ecosystem at the whole project site. *(Continued on page 5)*



**LADWP Guest Hosts on
 December Headworks tour**

Juan Izaguirre
 Project Coordination & Administration
 Water Engineering Technical Services
Alex C. Liu
 Construction Manager
 Project Coordination & Administration
 Water Engineering Technical Services



Associates Richard West, David Oliphant, Larry Kerrigan, Ed Schlotman, Phil Shiner, Scott Munson, Tom McCarthy, Bob Yoshimura, Jerry Gewe, Jack Feldman, Bruce Hammer standing on top of Reservoir #1 already completed. The building in background is control house for Reservoir #1.



Photos of the construction of the second reservoir that is scheduled to be completed in 2019, viewed from the roof of the first reservoir that was completed in 2014.

Design of the Headworks Reservoir Complex

(Continued from page 4) The Headworks Reservoir is spread across a 43-acre site at the Headworks Spreading Grounds near the Los Angeles River and between the Forest Lawn Drive, north of Griffith Park and 134 Freeway in San Fernando Valley area of Los Angeles. The replacement tanks will be reinforced concrete water storage structures built to the current seismic code of the area.

Jacobs Associates and LADWP collectively designed the two tunnels that transport water from the new reservoir to existing service areas.

The Silver Lake Bypass Tunnel has been constructed in the Silver Lake district. It includes a tunnel of approximately 4,600ft length and diameter ranging from 9.5ft to 10ft, and another 66in-diameter tunnel. Welded steel pipe has been installed inside the tunnels. The project further includes a flow regulating station with a capacity of 250ft³/s.

Groundcover for tunnel excavation works will range from 50ft to 130ft (15m to 40m) and groundwater levels will reach a maximum height of 60ft (18.3m) above tunnel invert because of the tunnel's location close to the Los Angeles River.

The River Supply Conduit Lower Reach Unit 1A will be built by Webcor Builders, replacing the existing conduit to connect the Headworks Reservoir and the 4MW hydroelectric power plant, which is scheduled to be constructed in the third phase of the project. The connecting pipeline will be 6,400ft-long (1,951m) and 96in in diameter, with welded steel lining. Approximately 3,200 ft (975m) of the pipeline will be underground. (Continued on page 6)

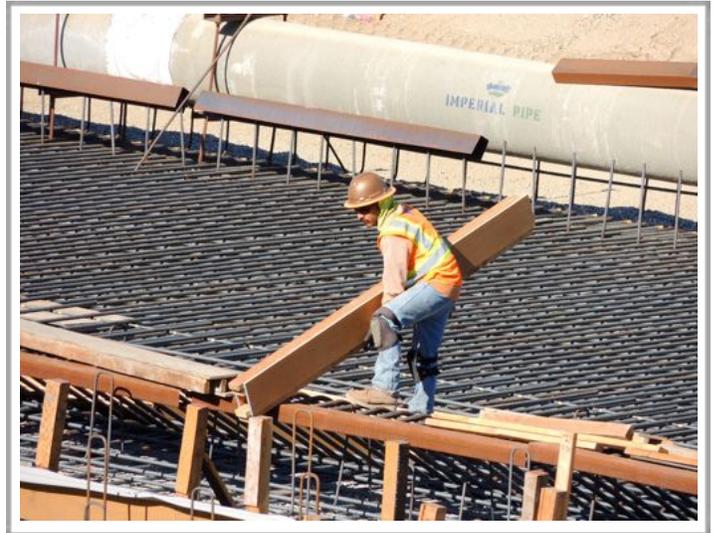


"USE OF SILVER LAKE AND IVANHOE RESERVOIRS WITH THE HEADWORKS RESERVOIRS IN SERVICE"

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Construction worker on the second reservoir

Water And Power Associates:
David Oliphant, Richard West, Larry Kerrigan, Jack Feldman, Robert Yoshimura, Scott Munson, Jerry Gewe, Bruce N. Hammer, Thomas J. McCarthy, Philip Shiner.



Articles, comments, and photographs of this tour were supplied by
Rex B. Atwell
Gerald A. Gewe
Thomas J. McCarthy,
David J. Oliphant,
Richard West.





Book Review

By Abraham Hoffman, Ph.D



THE MAN WHO THOUGHT HE OWNED WATER:

On the Brink with American Farms, Cities, and Food,

by Tershia D'Elgin.

Boulder: University Press of Colorado, 2016.

287 pp. Maps, Notes. Paper, \$29.95.



About 150 years ago Benjamin Harrison Eaton, pioneer in Colorado and fourth governor of the state, homesteaded in the South Platte River Valley. But this book isn't about him; it's the story of his great-grandson, written by his great-great-granddaughter. It's a book that challenges perceptions of water rights, the fairness or unfairness of eminent domain, and the way government revises, amends, changes, or breaks rules when it comes to meeting the challenges of urban growth and its effect on rural society.

After World War I William Eaton Phelps brought his bride to the ranch that had been in his family since the 1860s. There they raised a family, including Tershia, the author of this book. Bill Phelps held a senior water right on the South Platte River. Colorado had pioneered the prior appropriation water right, and Bill's dated back to his great-grandfather Benjamin's day. Bill enjoyed doing the hard work required for farming and cattle raising, and in the 1950s-1960s the ranch, located in a rural area, provided water for his needs as well as those with junior rights.

What Bill did not anticipate was the rapid growth of Denver and its suburbs. He didn't realize that to meet the urban needs, plus the increase in new housing tracts, the water he took for granted was not quite the absolute right he believed he held. In a series of court decisions, his water right became limited. And when a prolonged drought affected the region,

state officials placed severe restrictions on what he could do and how much water he would get. Before he passed away in 2006 he found that not only he but many of his neighbors could not maintain their farms to grow cash crops.

Bill Phelps, the man who thought he owned water, was done in by the changing times. Major corporations such as Monsanto were calling the shots with genetically modified corn. Independent farmers such as Bill Phelps couldn't compete with large corporations and their numerous attorneys, nor could he fathom the intricacies of water law when the state kept changing the rules.

Bill Phelps's story is essentially a case study of the commodification of water and the priorities of urban growth as against a static rural way of life. Reading this book calls to mind similarities in other areas where urban development trumped water rights. Tershia D'Elgin's book is lucidly written, combining the personal story of her family's history and a well-researched examination of how water laws work and how they can be changed. To help the reader, she includes numerous sidebars that define the jargon used by lawyers and public officials such as the state engineer. Although the tale is told in microcosm, it can be applied in a broader context to take in any rural-urban dispute over water in the West. ❖

Abraham Hoffman teaches history at Los Angeles Valley College.



Mystery



By Jack Feldman



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**Attend the 10:00 a.m.
February 10, 2018
MEMBERSHIP MEETING
at LADWP JFB
111 N. Hope St.,
Los Angeles
to elect new members.
All members are
encouraged to attend.**



A group of men survey a new construction project. The man on the right holding one end of the scrolled plans is William Mulholland. Harry Chandler is third man from the right. Next to him, at center, is the controversial Moses Sherman.

What project are these men surveying?

- Mulholland Dam
- St. Francis Dam
- Lower Van Norman Reservoir
- Sherman Way Extension
- Mulholland Highway
- Silver Lake Reservoir

What year was the project dedicated?

- 1920
- 1924
- 1928
- 1932
- 1936

Answers at: http://waterandpower.org/museum/Mystery_History.html

Visit our website at www.waterandpower.org
Electronic Newsletters are available to Associates members. Send your requests and share your comments at comments@waterandpower.org



Big natural gas consumers want more transparency from producers

A worker helps monitor water pumping pressure and temperature at a hydraulic fracturing and extraction site in Western Slope of Colorado.

America's biggest natural gas consumers are calling on fuel producers to ramp up their green cred.

Seven companies and two municipally owned utilities that consume large amounts of natural gas are urging the producers that supply them with the fuel to step up disclosure on a range of environmental issues, according to a new report viewed exclusively by Axios before its release today.



Why it matters:

America's natural gas boom has lowered carbon emissions and fueled economic growth across the country. But the public's perception of natural gas is mixed. A lot of people are concerned that hydraulic fracturing — where a mix of water and chemicals is injected into rock to release gas — contaminates drinking water supplies.

The report is coming as the Trump administration grapples with how to move forward with repealing and maybe replacing President Obama's regulations. This report is separate from that debate, though it adds additional pressure to oil and natural-gas producers to take a public step on the environmental impacts of natural gas.

"We believe this to be the first time natural gas purchasers are directly engaging with natural gas suppliers on environmental sustainability reporting," said Robert LaCount, executive vice president at Michael J. Bradley and Associates, the consulting firm that conducted the study.

Companies involved: Calpine Corporation, Consolidated Edison Company of New York, National Grid, NRG Energy, NW Natural, Pacific Gas and Electric Company, Xcel Energy and two municipally owned utilities: Austin Energy and Los Angeles Department of Water and Power.

One level deeper: The biggest areas in the report are around

emissions of methane, a potent greenhouse gas that's also the primary component of natural gas, and water, a big worry for people living near oil and natural gas wells.

New Mexico Electric Company Seeks Electricity Options Other than Coal

New Mexico's largest electric provider on Monday put out a request for proposals for hundreds of megawatts of electricity to fill a future void as the electric company plans ahead for weaning itself from coal-fired generation over the next several years. Public Service Co. of New Mexico plans to close two units at the San Juan Generating Station in northwestern New Mexico before the end of the year to meet a federal mandate aimed at reducing haze-causing pollution in the region. By 2022, the rest of the plant could close. *Associated Press, Oct. 30*



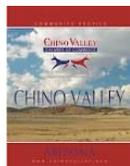
ITC Holdings Plans 2,000-MW Pumped Hydro Project in Arizona



An ITC Holdings Corp. subsidiary is considering plans to build a 2,000-MW pumped storage hydro project in north-central Arizona. The Big Chino Valley Pumped Storage Project would be located near Chino Valley in Yavapai, Coconino and Mohave counties, and could help integrate thousands of megawatts of renewable generation capacity expected to be added to the grid by 2030, the developer said in a recent application to the Federal Energy Regulatory Commission. ❖

SNL, Oct. 20

Tags: Arizona Public Service Company, ITC Holding Corp.



Electric Cars In China Are on Track for a Record Year

Pushed by strong government incentives, dirty air pollution and an appetite for automobiles, the world's largest car market, China, is on a path to buy a record number of electric cars this year. The China Association of Automobile Manufacturers said this week that companies likely will sell 700,000 electric cars in China in 2017.

Greentech Media, Oct. 20 ❖



CAN CALIFORNIA ACHIEVE 100% RENEWABLE ELECTRICITY BY 2040?

JERRY BROWN THINKS SO

But it will take some major breakthroughs in energy storage and grid regionalization. Plus, some crafty resource planning amid the rise of community-choice aggregation.

by Julia Pyper, Senior Editor Greentech Media December 15, 2017



As 2017 comes to an end, California can boast that it's making substantial progress toward reaching its ambitious renewable energy goals, which has renewed calls for the state to pass a 100 percent clean electricity target in 2018.



The California Public Utilities Commission recently released its annual renewables portfolio standard report showing that large investor-owned utilities have already executed the renewable electricity contracts necessary to exceed their 33 percent RPS requirement for 2020 --

and are on track to meet the 2030 RPS requirement of 50 percent renewables a full 10 years early.

Building on this momentum, Governor Jerry Brown recently suggested that the state could achieve a 100 percent renewables energy mix before mid-century.

"We will be at 50 percent by the more restricted measures of renewable energy -- that's basically solar, geothermal, wind and some biofuel -- probably in 2025," he said, speaking at The New York Times' ClimateTECH conference in San Francisco last month. Reaching "100 percent in 2040 is not out of the question at all."

But is that target truly within reach? ❖

"California's energy policies are like driving a car with no seatbelt"



Setting aside the debate on whether or not 100 percent renewables is the optimal way to decarbonize the grid, there are a number of very real challenges tied to executing that goal that are worth addressing. For one thing, California's investor-owned utilities may not be as close to their renewable energy goals as it may seem. Also, as Governor Brown pointed out in his talk, hitting 100 percent renewables hinges on two big unknowns: "It'll depend on storage. It'll depend on a regional grid," he said.

Energy storage and regionalization are indeed major question marks. Without advancements on both fronts, California's aspiration to achieve 100 percent renewable electricity could remain a pipe dream.

If the renewable energy transition isn't managed well, it could create a disaster scenario, according to



Gary Ackerman, executive director of the Western Power Trading Forum, a broad-based membership organization dedicated to encouraging

competition in Western states' electric markets.

"The ability to balance the grid, which is a moment-by-moment function of the grid operator, becomes more challenging as you add more renewable energy," he said. "It's undeniable you have to provide a certain frequency within a well-defined bandwidth. When renewable energy comes offline, hence the definition of a variable resource, it presents more challenges to people in the control center."

There can be up to a 13,000-megawatt ramp in demand in California in the evenings, as solar generation falls off the system and people power up their homes after work, Ackerman pointed out. "You just need one transmission line to trip or generation station to go offline while making that ramp and everything becomes super-critical."

"You might not see renewables as an issue until then, because people will say the lights haven't gone out," he added. "But that's like saying, 'I didn't wear a seatbelt and I didn't get in an accident.' California's energy policies are like driving a car with no seatbelt. You're taking enormous risks that you won't realize until it's too late." ❖



News From the Hill

Electric Companies Talk Drones on Capitol Hill



Drones help electric companies improve the resiliency, reliability, and security of the energy grid. Across the United States, electric companies are using drones to maintain and inspect their critical energy infrastructure, including more than 45,000 substations and approximately 400,000 miles of transmission lines.



On November 29, the House Transportation and Infrastructure Committee's Subcommittee on Aviation held a hearing on the emerging uses of drones in America's changing airspace. Southern Company Executive Vice President and Chief Transmission Officer Billy Ball testified about how electric companies are using drones, particularly as part of the response and restoration effort following this year's historic hurricane season.

"Our company, and the electric power industry at large, is committed to building smarter energy infrastructure that is reliable and resilient to all hazards—from natural events like storms to manmade malicious attacks," Ball said.

"Drones are a critical part of our strategy, both for inspecting and maintaining our infrastructure to prevent outages and for our efforts to respond and to recover following incidents. Drones can also go places where planes cannot. From the inside of a boiler or a stack to flying in wide-open transmission rights of way, drones provide a valuable service." ❖

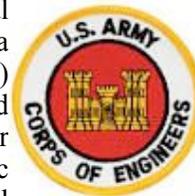
Restoration and Recovery

Electric Company Incident Management Teams Deploy to Puerto Rico



The electric power industry has deployed a contingent of seven incident management teams (IMTs) to Puerto Rico to support ongoing power restoration efforts across the island. These IMTs, each comprising seven to 10 operations experts, will be assigned to seven key regions on the island and will coordinate with the Puerto Rico Electric Power Authority (PREPA) and the U.S. Army Corps of Engineers (USACE), both of which already are working to restore power to the people of Puerto Rico.

As part of the industry's response, several electric companies are entering into a memorandum of understanding (MOU) with PREPA. The MOU was developed by the American Public Power Association (APPA), the Edison Electric Institute (EEI), and the National Rural Electric Cooperative Association (NRECA), and will serve as a vehicle that allows electric companies on the mainland (that are members of APPA, EEI, or NRECA) to enter into emergency agreements to provide resources and workers to PREPA on a not-for-profit basis. The first phase of the MOU includes the IMTs now dispatched to the island.



The initial IMT deployment consisted of storm response experts from investor-owned electric companies and public power utilities, with additional experts from electric cooperatives joining in a second relief wave.

"Since our industry first received the request for mutual assistance from PREPA at the end of October, we have been working aggressively to provide crews, equipment, materials, expertise, and additional resources to assist with the massive power restoration mission," said EEI President Tom Kuhn. "The development and agreement of the MOU and the deployment of the first IMTs represent major steps forward in getting the lights back on for so many who have been without power since Hurricane Maria ravaged the island in late September. EEI and our member companies remain fully committed to doing all we can to assist our fellow citizens in Puerto Rico."

In total, there are now more than 3,500 workers on the island who are dedicated to the power restoration mission. This includes PREPA's own workers and crews mobilized under USACE contracts. This number will grow as full assessments are completed and the coordinated restoration plan is fully implemented. ❖

Joint EEI-APPA-NRECA press release - Dec. 21, 2017