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AUTUMN 2017

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WESTERN AREA POWER ADMINISTRATION

Delivering
value
40 years of
evolving services

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LETTER FROM THE CHIEF PUBLIC AFFAIRS OFFICER

This year, Western Area Power Administration enjoyed celebrating turning 40. This was a milestone highlighted by a legacy of leaders and the talent of tomorrow. Many of our key employees are currently on the retirement road or almost there. During this rapidly changing time there are realignments in many areas. Yet, we are rooted in our mission and in our refreshed core values that drive our business decisions and strengthen our customer service. This is also a time to build and reaffirm our relationships.

Relationships do not happen without people to build them. This year we celebrated our most important resource with the 40 People in 40 Weeks campaign highlighting our employees and customers. Our organization is made up of people from different cultures, backgrounds, generations, skillsets and points-of-view across a 15-state footprint. Even though we are all very different, we all adhere to a core set of standards. WAPA's core values were last updated in 1993. In 2017 we were dedicated to the inclusive and collaborative process of identifying and reflecting upon the internal WAPA promises that resound in our services.

Next year, WAPA will be rolling out and implementing its new, refreshed set of core values to serve as a guide in making decisions and as a standard for our behaviors and actions. Stated simply, they are:

- Listen to understand, speak with purpose.
- Seek. Share. Partner.
- Respect self, others and the environment.
- Do what is right.
- Be curious, learn more, do better. Repeat.
- Serve like your lights depend on it.

Throughout the next year, you will see and hear more about our principles and how they are increasing the value of WAPA for customers. At the end of the day, our mission is to keep the lights on. We do that through our commitment to each and every one of our customers, stakeholders and interested parties.

Teresa K. Plant

Chief Public Affairs Officer
Western Area Power Administration





40 years of valuable services

The energy industry has changed dramatically since the 1970s, when the oil crisis resulted in the development of a new department—the Department of Energy. It also created DOE’s Western Area Power Administration, which extracted grid management and federal hydropower marketing, delivery and ancillary services from its early formations in the Bureau of Reclamation.

From technological advances and innovations to policy and regulation changes, WAPA has analyzed and innovated to manage those changes since 1977. Some of the changes and accomplishments throughout the organization’s history include:

- 1980s:
 - Hoover Power Plant Act of 1984 carried out.
 - Miles City Converter Station built to create a direct current tie between the eastern and western interconnections.
 - Phase shifter installed in four corners area.
- 1990s:
 - Power operation moved from analog to digital.
 - California-Oregon Transmission Project built and energized to alleviate congestion on the northern California electric system.
 - Email and computer advances changed the business landscape and the energy industry prepared for Y2K.

- 2000s:
 - WAPA responded to the California energy crisis that caused rolling brownouts and blackouts.
 - Reliability and security requirements carried out through e-tagging, standards and auditing.
 - Legislation changes in the Energy Policy Act of 2005 and the American Recovery and Reinvestment Act of 2009 implemented.
- 2010s:
 - Federal IT Acquisition Reform Act incorporated in 2014 for IT investments across government.
 - Operations consolidated between Loveland and Phoenix balancing authorities to provide seamless backup control by BAs.
 - Fall Protection developed and standardized best practices to meet 100-percent attachment requirements when employees are working at height.

At each turn, WAPA addressed the changing environment and requirements to ensure it fulfilled its mission and delivered the services WAPA customers depend on to serve millions of Americans in the west. WAPA continues to work closely with customers, DOE and industry partners looking at the horizon and mapping out the path forward together in the energy frontier.

Power marketing for tomorrow

WAPA holds public forums about SPP membership for two projects

In November, WAPA held three public forums to solicit comments from customers and other interested parties regarding the recommendation to negotiate regional transmission organization, or RTO, membership for Loveland Area Projects and the Colorado River Storage Project.

As part of the Mountain West Transmission Group, WAPA is considering whether to pursue membership for those two projects in the Southwest Power Pool. WAPA is evaluating whether or not SPP membership will provide near- and long-term reliability and economic benefits for customers in alignment with WAPA's commitment to provide power at the lowest possible rates, consistent with sound business principles.

During a 45-day public comment period, which ended Nov. 27, stakeholders submitted 15 responses that will help inform the decision.

In early 2018, WAPA expects to make its independent determination if it will or will not pursue final SPP negotiations as part of Mountain West. If the collective Mountain West participants decide to move forward, integration into SPP could potentially occur in late 2019.

Why evaluate RTO membership?

The electricity industry in the U.S. is undergoing a fundamental shift that will increasingly affect bulk electric system operations, markets and planning. Some of these changes include:

- low natural gas prices
- decentralization of natural gas and renewable generation
- increases in variable generation resources
- changes in consumer demand patterns
- advancement of demand-side technologies

Additionally, the rules and regulations associated with operating the system have evolved over time. It has

become an increasingly complex task to optimize the efficiency of the system while managing reliability. These shifts are affecting power system operations and economics at both the wholesale and retail levels,



motivating the expansion and creation of centralized markets for energy and ancillary services, altering power flows across the interconnection, increasing the interactions between the bulk electrical system and the distribution system

and impacting both short- and long-term purchase power transactions.

As a result of the shifts in the electricity industry, the way the Western Interconnection has historically operated is becoming unsustainable. There is an increasing need for wide-area situational awareness and control, access to geographically and operationally diverse generation resources, flow-based transmission operations, sub-hourly operations and fast dispatch centralized markets. RTOs have the ability to dispatch and rebalance the system in sub-hourly and near-real-time increments using algorithms designed to optimize system reliability and economic performance.

As a result, electricity providers in the West are evaluating risks associated with maintaining the status quo relative to the costs and benefits of RTO membership and variants of centralized operations and markets. For CRSP and LAP in particular, RTO participation has the potential to provide benefits to customers, preserve reliability and hedge against risks associated with ongoing changes in the electricity industry.

Read more about WAPA's recommendation and public process online at: wapa.gov/About/keytopics/Pages/Mountain-West-process.aspx





Hoover hydropower reaches more customers

Boulder Canyon Project contracts provide 50 years of stability

Beginning Oct. 1, the benefit of Hoover Dam's federal hydropower is serving 31 new electric service customers, including 23 Native American tribes who are recipients of cost-based power from the Boulder Canyon Project. They join 15 utility customers who have been receiving power from Hoover Dam for the past 80 years.

"Our Boulder Canyon customers, and the one million consumers they serve, depend on us for reliable hydropower and associated transmission to support their communities," said WAPA Administrator and CEO Mark A. Gabriel. "Starting today, more citizens will benefit from the stability of low cost, clean, renewable, reliable federal hydropower."

The culmination of a nine-year remarketing effort, the 50-year contracts widen the reach of hydroelectric power generated from Hoover Dam from 15 to 46 customers ranging from electric cooperatives and municipalities to irrigation districts, state agencies and tribes.

BCP has delivered hydropower from Hoover Dam to customers in southern Nevada, Arizona and Southern California for more than 80 years. WAPA's Desert Southwest region markets and transmits the power generated from Hoover Dam under the Hoover Power Allocation Act of 2011.

"This historic milestone is truly a success story," said WAPA Senior Vice President and DSW Regional Manager Ron Moulton. "I am so proud of the staff and their efforts in making sure that our customers enjoy the value of at-cost hydropower today, and for the next 50 years."

Hoover Dam, the highest and third-largest concrete dam in the U.S., sits on the Colorado River along the Arizona-Nevada border. The reservoir behind the dam, Lake Mead, is still the nation's largest man-made reservoir. The Bureau of Reclamation owns, operates and maintains the facility.

WAPA and Reclamation work collaboratively with the BCP customers to keep project costs as low as possible while ensuring safe and reliable operation. During the past year, WAPA staff held information sessions to:

- Help customers understand the various services and functions that DSW provides
- Describe the tools and processes used to exchange information between customers and WAPA
- Address rate-related topics such as the public process, power repayment study and billing determinants

With the 50-year contracts implemented, customers can begin passing the benefit of federal hydropower on to their consumers.

Value-added stewardship

WAPA reaches \$50M cost-avoidance milestone

In its first three years, WAPA's Continuous Process Improvement program has reached a major milestone in cost-savings for WAPA and its customers. Since 2014, more than \$50 million in potential costs have been avoided through process improvements and streamlining efforts in three categories: initiatives, formal CPI projects and informal "Just Do It" efforts:

- Formal projects: \$2,729,766
- Informal "Just Do It" projects: \$23,229,957
- WAPA initiative projects: \$29,002,492

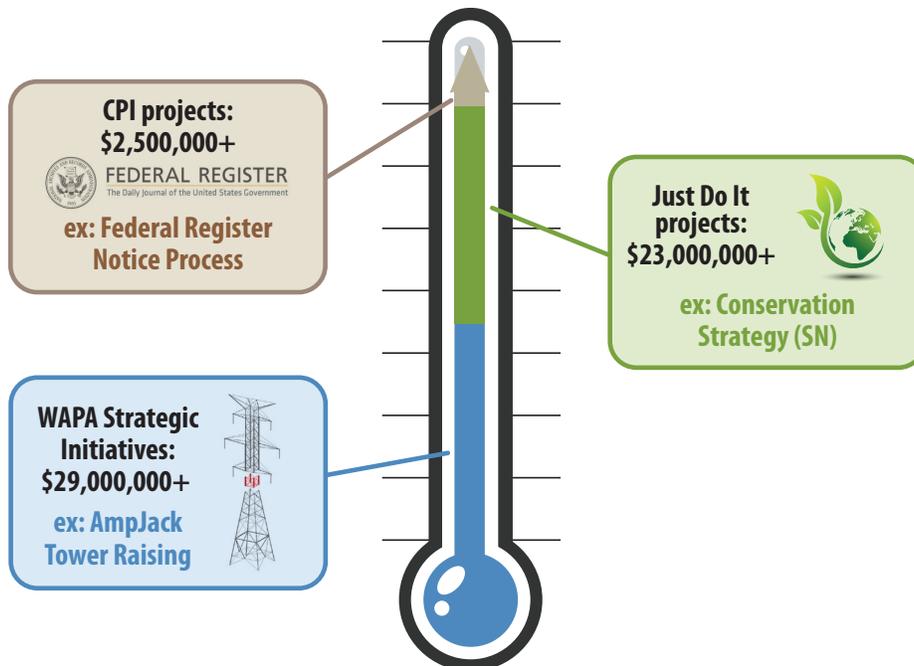
Conservation strategy: "Just Do It" effort in action

"Just Do It" projects are employee-driven process improvements implemented at their desks or in their trucks. For example, one project implemented a cost-effective conservation strategy benefitting the environment and strengthening federal partnerships.

The conservation strategy reduced costs by proactively funding U.S. Fish and Wildlife Service-approved programs rather than paying reactive mitigation costs. The innovative approach avoided more than \$21.5 million and better aids the recovery of both federally and state protected species. The success of this partnership provides a foundation for future proactive conservation strategies associated with environmental review.

"We take our commitment to financial and environmental responsibility very seriously," said WAPA Administrator and CEO Mark A. Gabriel. "This project highlights how we incorporate these values into our daily work."

This new paradigm was a great way to invest in a program that benefits energy infrastructure and the environment.



WAPA cost savings and avoidance: \$50,000,000+ as of Sept. 30, 2017

Answering the call

WAPA emergency response provides hope to USVI, PR

The 2017 hurricane season inflicted tremendous loss of life, as well as injury and property damage. Many within the public power community responded to the call for mutual aid in restoring power in Texas, Florida and other states, as well as the U.S. Virgin Islands and Puerto Rico, walloped by hurricanes Harvey, Irma and Maria.

The Federal Emergency Management Agency called on WAPA to provide line crews to aid emergency energy restoration efforts in the U.S. Virgin Islands and Puerto Rico. The FEMA-funded mission assignment was critical as more than 90 percent of the energy infrastructure on the islands sustained significant damage.

“It wasn’t just an energy mission. It was a humanitarian mission,” said WAPA Incident Commander Jim Kendrick, who also is the VP of transmission asset management for the Desert Southwest region. “When people don’t have power, they don’t have anything; no air conditioning or refrigeration, no communication, no food.”

The deployment was WAPA’s first assignment outside the continental U.S. In all, 36 WAPA power system experts from nine states deployed starting Sept. 17. The volunteer crews rotated deployments with 25 of them in the U.S. Virgin Islands at any given time. A few of them worked the entire mission, missing Halloween and Thanksgiving with their families.

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Safety and Occupational Health Manager Kevin Ripplinger, Lineman Jason Reeves and Rocky Mountain Field Maintenance Manager Billy Weber work on the U.S. Virgin Islands Water and Power Authority’s transmission infrastructure on St. Thomas, Sept. 26. (Photo by Will Schnyer)

Julio Rhymer, executive director and CEO of the Virgin Islands Water and Power Authority, shared his appreciation for WAPA's response in late September, "WAPA's assistance comes at a pivotal time in the recovery process. Our own workforce is stretched thin given the back-to-back hurricanes, which have left the electric system in dire straits."

Now, a few months later, WAPA's completed mission to restore the backbone of the U.S. Virgin Islands' electrical grid makes way for other distribution crews to provide mutual aid in repairs to the rest of the infrastructure on St. Thomas, St. John and St. Croix. When WAPA crews completed their deployment, Nov. 29, 40 percent of the power system had been restored, energizing more than 20,000 residents who had been without power since Sept. 6—about 80 days in the dark for some.

"Even though we were working in unfamiliar territory on an unfamiliar system, the crews were able to restore the transmission system beautifully," said Kendrick, who has experience running power operations in St. Kitts in the West Indies. "We repaired the U.S. Virgin Islands power system like it was our own."

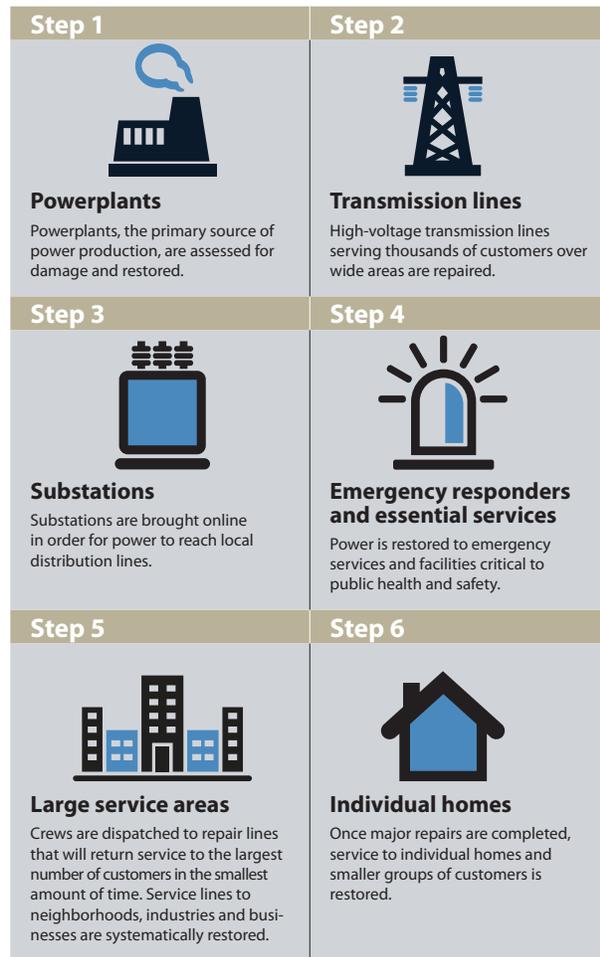
Employees worked 12- and 13-hour days, seven days a week, in mountainous jungle for more than two months. The crews lodged first in a merchant marine vessel and later in a retired cruise ship.

"WAPA staff is always willing to respond when natural disasters impact a power system," summarized Safety and Occupational Health Manager Will Schnyer. "We do it for ourselves and our customers, and we are doing it here now."

WAPA is also supporting the U.S. Army Corps of Engineers power recovery efforts on Puerto Rico. Since mid-October, WAPA has deployed a rotational team of three engineers to serve as subject matter experts.

"I am so proud of the people who volunteered to deploy away from their families and also the team at home who supported them," said WAPA Administrator and CEO Mark A. Gabriel. "They are dedicated and committed to our mission and our core value of serving like your lights depend on it."

The Power Restoration Process



USVI lessons affirm maintenance practices

This emergency assistance effort was the embodiment of the value WAPA brings and the personification of the "Do what is right" core value. Additionally, WAPA crews and leadership brought home valuable lessons that reaffirm and enhance maintenance activities for our system stretched out across 15 states. Key take-aways include:

- Crews gained more experience in emergency power restoration and working with FEMA.
- Affirmation of WAPA's strong standards and Maintenance craftsmanship.
- Learned how to improvise under challenging circumstances to complete the mission.
- Validation of common work practices and combined crew work. This ensures crews from every region can flawlessly work together because they all use the same operational processes.

Serving communities

Delivering service that changes lives

WAPA markets and delivers federal hydropower and valuable services to communities throughout its 15-state service territory. Here are three examples of how WAPA's service touches the communities, businesses and citizens through partnering with municipalities, tribes and cooperatives across the West. We will continue to evolve our services to meet our customers' needs in the future.

WAPA helps tribal customer avoid rate increase

Navajo Tribal Utility Authority, a Navajo Nation enterprise and longtime WAPA customer, found itself facing a substantial cost increase earlier this year. Fortunately, WAPA was able to help.

"The balancing authority serving NTUA was on the verge of implementing some rate changes and adjustments," said Acting Senior VP and Colorado River Storage Management Center Manager Steve Johnson. "When all was said and done, their rates could have risen by as much as 400 percent, and those costs would have been passed on to their customers. Walter Haase, NTUA's general manager, got in touch with us to see how we could help."

Haase contacted CRSP MC, Jan. 6, to discuss joining the Western Area Colorado Missouri Balancing Authority, which would avoid the rate increase. The idea of joining WACM was initially raised in fall 2016, but no action was taken at that point. With the rate increase looming, however, discussions resumed.

"We had to get NTUA into WACM by March 1 to avoid the new rate," Johnson explained. "They were also interested in WAPA providing merchant services. That gave us only about seven weeks to work through a process that would normally take several months."

In order to meet this deadline for the customer, CRSP MC mobilized staff members from the Salt Lake City, Utah, and Montrose, Colorado, offices, as well as Rocky Mountain Operations staff from Loveland, Colorado. Staff came together with NTUA, Jan. 10, for a kickoff meeting, followed by a second meeting, Jan. 20, to finalize plans. Desert Southwest staff assisted with logistics and provided conference rooms.

"Moving loads between two balancing authorities and taking over merchant services for those loads is a lot of work," said Johnson. "We were able to do it extremely fast when you consider that contract creation and execution, metering requirements, scheduling package additions, transmission reservation adjustments, training, testing and a lot more all had to be fully addressed prior to going live."

Ultimately the team was able to successfully meet NTUA's request, avoiding the potential rate increase of up to 400 percent. WACM provides the operations and reliability functions necessary to serve NTUA's load. NTUA now also has a merchant agreement with the Energy Marketing and Management Office in Montrose to provide load and resource management services.



NTUA holds a ribbon-cutting ceremony for its new solar project, just months after it moved into WAPA's balancing authority for operation, reliability and merchant services.

Valley City builds future on reliable power

A WAPA customer for nearly 40 years, Valley City is also the largest of eight power municipalities in North Dakota, according to City Administrator David Schelkoph. WAPA delivers the majority of the power to this city of 6,600 people that sits alongside the Sheyenne River. By Schelkoph's figures, the city is powered by about 71 percent federal hydropower from WAPA.

City officials know they can count on the power to be there when it is needed most. According to Valley City Mayor Dave Carlsrud, the power has been on 99.99 percent of the time WAPA has served the community. "Power is probably the least of my concerns," said Development Group Economic Development Director Jennifer Feist. "We are in such good hands with what we have."

The partnership between WAPA and Valley City helps drive the businesses in the area. John Deere Seeding Group, located in Valley City, provides a significant source of employment and status for the city. This facility creates and manufactures large-scale agricultural farming equipment for planting and seeding fields. "Electricity is very important to us," said John Deere Seeding Group Facility Manager David Beierle. "We are a welding operation. We paint and assemble. We rely on a significant amount of electricity to meet the needs that we have here."

Reliable and affordable power is a mainstay for businesses. If companies pay more in electricity, it

cuts into their margins and can result in higher prices to end users. "Electricity is a big part of our budget," said Beierle. "Anytime our budget can be managed well, that's good for us. It keeps our costs down, which keeps our prices down for our customers."

Schelkoph explained that because of Valley City's partnership with WAPA, they can provide value-priced energy with a high degree of reliability to their customers. According to Feist, the low energy cost in Valley City has been effective in bringing in new business.

Recently, a technology company worked with city officials to set up offices in town. As part of the agreement, the company offered to wire Valley City with high-speed fiber. This created opportunities for employees to telework, providing another benefit for corporations and employees throughout Valley City.

"As we continue to broaden our technology base and manufacturing base, it really does affect all aspects of what we do, every single day," said Feist. "The reliability and affordability of power really do touch every single man, woman and child here in Valley City."

Schelkoph added that the relationship between Valley City and WAPA has created a place in which citizens are secure. "WAPA has been there through thick and thin, through the good years and bad years," concluded Schelkoph. "We know we can always rely on the energy we get from WAPA."



Attendees gather for the ribbon-cutting ceremony of the city's new National Guard facility. According to Valley City Mayor Dave Carlsrud, the reason the facility happened at all is the service WAPA provides.

Needles sees economic turnaround from power partnership

Drive historic Route 66 two hours west of Las Vegas, and there, near the California and Arizona border, a traveler will find the small city of Needles, California. For years Needles struggled economically with lack of tourism. Now the city is back on its feet, touting some of the lowest electric rates in the country. WAPA helped to bring about that change.

In 2007, Needles Public Utility Authority recruited Jack Lindley to serve as electric line crew supervisor and fix the city's electrical system. Upon arriving, Lindley determined that it needed substantial work. The city's power was expensive and flowing across an unstable system with lines more than 60 years old. This was a significant problem as temperatures in Needles are some of the highest in the world, approaching 120-125 degrees in the summer. Air conditioning is crucial to the residents and is also a big draw on power, causing outages when the residents needed it the most.

"Our outages were systemwide," said Lindley. "We would have the entire system out of power for 12 to 24 hours at a time. It was unacceptable. We were totally collapsing as a utility." Extended periods without air conditioning caused life-threatening issues for residents and posed particular threats to senior citizens and small children.



Electric Line Crew Supervisor Jack Lindley was recruited by Needles Public Utility Authority in 2007. After surveying the state of the electrical system, he reached out to WAPA for help.

"Contacting WAPA was the smartest thing I've ever done," said Lindley. The utility built a line from WAPA's local substation to the town.

Through the partnership with WAPA, NPUA saw an immediate reduction of outages in 2008, by almost 96 percent in Lindley's estimation. Working with WAPA increased the city's power system reliability and NPUA's access to multiple power suppliers.

Needles is now a Parker-Davis Project firm electric service customer. "How this works is that we enter into transactions with suppliers based on who has the best price either monthly, daily or hourly," explained Desert Southwest Supervisory Energy Management and Marketing Specialist John Paulsen. "The power rate Needles pays is based on whatever the wholesale market for power is trading for. It's a very helpful system because WAPA has the staff and the enabling agreements already in place to make these transactions for the city from a wider pool of potential suppliers than they could practically manage on their own."

In January 2014, Needles joined an aggregated group of DSW preference customers for which the DSW EMMO also provides portfolio management services. As a member, Needles has been able to realize further savings through the sharing of energy resources and administrative costs within the group, an opportunity WAPA affords all of its customers.

Since NPUA began working with WAPA, the city's power rates have dropped 66 percent. Previously, their customers were paying 15.8 cents per kilowatt-hour; as of Jan. 1, their rate is 4.65 cents per kWh.

That results in lower costs for the rate payers, saving residents money. When an electric bill drops by \$100, it is an extra \$100 that every household can use to provide for their families, to make a house payment or purchase food and clothing for their children.

"We were able to reduce costs like that because we partnered with the right partner, and the right partner was WAPA," said Lindley. "The entire economic situation of the community has changed more in the last 12 months than it had in the previous 50 years."

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