JULY/AUGUST 2018 • VOL. 76 / NO. 4

PUBLIC POWER MAGAZINE

AMERICAN PUBLIC POWER ASSOCIATION

THE DATA ISSUE

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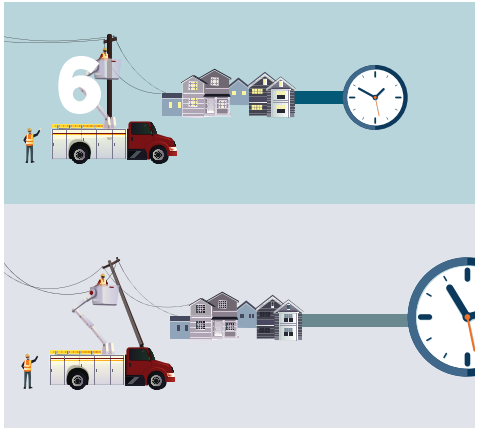

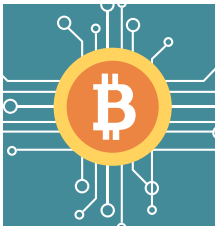

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ABOUT THE AMERICAN PUBLIC POWER ASSOCIATION

The American Public Power Association is the voice of not-for-profit, community-owned utilities that power 2,000 towns and cities nationwide. We advocate before federal government to protect the interests of the more than 49 million customers that public power utilities serve, and the 93,000 people they employ. Our association offers expertise on electricity policy, technology, trends, training, and operations. We empower members to strengthen their communities by providing superior service, engaging citizens, and instilling pride in community-owned power.

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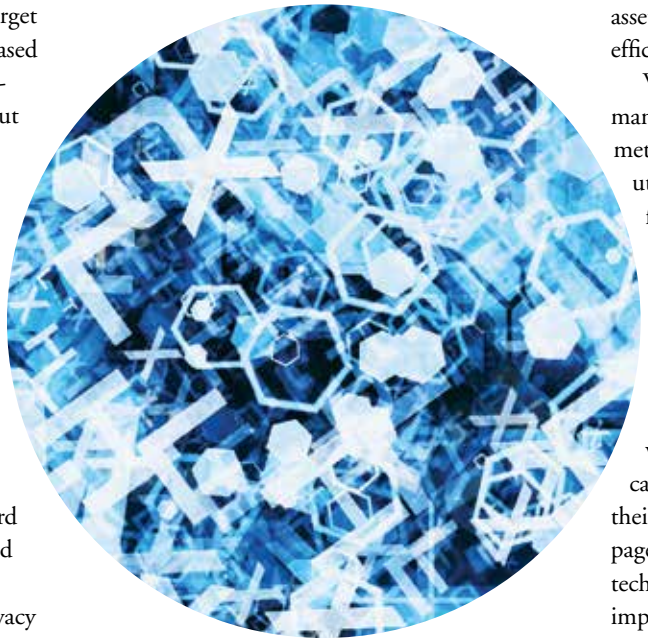
PUBLIC POWER LINES

SUE KELLY, PRESIDENT & CEO, AMERICAN PUBLIC POWER ASSOCIATION

Data, Data Everywhere: How Can We Drink It?

We've lived in a world of big data in recent years. Companies target their advertisements to you based on your online search history. Baseball managers use statisticians to make decisions about their lineup (think of Brad Pitt, my fellow Mizzou alum, in Moneyball).

We leave data footprints wherever we go and in whatever we do — even if we drive someplace with our smartphones in our pockets (without even mapping the destination!). We can make a concerted effort to ramp up our personal privacy controls (I confess to taking the radical step of signing off of Facebook earlier this year). But there are still ways that the companies and institutions in our lives can record some of our specific actions, preferences, and connections.



As we've unfortunately learned from privacy breaches and news about companies misusing data, there are plenty of people who are eager to use our data for nefarious purposes. Indeed, as we continue to connect more devices to the internet of things, privacy and security threats will only grow.

That doesn't mean that all collecting and analyzing of data is bad. On the contrary, data is what helps us to better understand our operations, customers, and the world we live in.

Companies like Uber recognize the importance of data and are continuously finding new ways to put data to use. Uber recently announced plans to integrate new transportation options into its app, including bikes, car-sharing services, buses, and trains. It will also share more of its data on traffic patterns and curbside use with cities to facilitate traffic planning and management.

In The Adventures of Sherlock Holmes, Sir Arthur Conan Doyle's title character opines that "it is a capital mistake to theorize before one has data. Insensibly one begins to twist facts to suit theories, instead of theories to suit facts."

Public power utilities have increasing opportunities to theorize — and implement — WITH data. Smart meters and advanced metering infrastructure are yielding reams of data. Technology can often produce more data than we know what to do with. But we can and should figure out ways to make sense of the data and use it to provide better service to our customers. Data can help us predict what retail customers might want and value if they sat down and thought about it. Then we can consider how to provide that before they think of it.

Public power utilities are also exploring other technologies to collect information and improve operations (see page 16). For example, the New York Power Authority is collecting data from more than 24,000 sensors that monitor all of its generation and transmission assets, to identify problems early and improve efficiencies.

When it comes to measuring our performance, utilities have long relied on reliability metrics such as SAIDI and SAIFI. While utilities should continue monitoring these figures, public power utilities have found that knowing the top culprits that cause outages or discovering trends in problem areas has helped us find ways to improve operations (see pages 6, 41).

We can share data with our customers but must be mindful of what they really want to know and how the data we share can help them monitor and take control of their use, or better understand their bill (see page 24). And when customers adopt a new technology that will undoubtedly have an impact on our service, such as electric vehicles, we as utilities must make sure we have the information we need to adjust accordingly (see page 32).

Data by itself does not translate to meaningful information or knowledge. That's why we as an Association work for you to translate industry reports into useful context through publications such as the annual public power statistical report, which accompanies this issue. It's also why we urge you to participate in our tracking and benchmarking services such as the eReliability Tracker (for outages) and the Public Power Data Source (for customer service).

We want you to be able to use the information you get from us to provide better service, improve your operations, and educate your workforce and customers. Please let us know if you have ideas about how we can improve in these areas. It is elementary, dear reader, that solid information and feedback from you, our members, is more sensible than us theorizing about what we think you want!

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PLAN. RESPOND. RESTORE. REPORT.

BEYOND OUTAGES: USING **RELIABILITY** DATA

BY SUSAN PARTAIN, SENIOR EDITOR AND CONTENT STRATEGIST, AMERICAN PUBLIC POWER ASSOCIATION

A UTILITY'S RELIABILITY STATISTICS DO MORE THAN DESCRIBE HOW MANY OUTAGES IT HAS HAD OR HOW LONG CUSTOMERS HAVE SPENT IN THE DARK. BY DIVING INTO THE DATA — AND MAKING IT ACTIONABLE — PUBLIC POWER UTILITIES CAN IDENTIFY TRENDS, PRIORITIZE INFRASTRUCTURE INVESTMENTS, AND IMPROVE CUSTOMER RELATIONSHIPS.

IDENTIFYING PATTERNS

City Utilities of Springfield in Missouri takes a quarterly look for areas or customers that have been out of power either three times or 10 hours in a year. These are referred to as "3-10" customers.

"Playing around with the numbers, we have found pretty consistently that's when people believe they have unreliable service," said Brent McKinney, director of electric transmission and distribution at City Utilities of Springfield. "Many times, when people call in, it's when people have had their third outage ... [However,] a lot of people are mad but don't call in. This helps us to proactively reach out, instead of them being mad enough to finally call us."

Once the utility pulls this data, Nathan Bruns, administrator of electric T&D reliability in Springfield, analyzes why these areas might be more problematic and then plans for special jobs to make improvements. Bruns also proactively contacts customers in those areas to let them know of the work being done and why.

Bruns has a background in geographic information systems, and so he will visibly map out the data to see if there are any hot spots or problem areas. "It helps to find those cluster areas a lot faster," he said.

"We do statistical analysis first, then allocate our manpower," said McKinney. "The worst thing you can do is do maintenance on a line that doesn't really need it. When we're doing tree trimming or maintenance, we always look at the SAIDI or SAIFI of the feeders and [concentrate on] the worst first. We may find that finding the clusters and fixing the clusters will change the whole dynamics of the area. Find those hot spots and work on those first."

> **"We do statistical analysis first, then allocate our manpower. The worst thing you can do is do maintenance on a line that doesn't really need it."**
>
> **BRENT MCKINNEY,** DIRECTOR OF ELECTRIC TRANSMISSION AND DISTRIBUTION AT CITY UTILITIES OF SPRINGFIELD

Jackson Center Municipal Electric System in Ohio also looks for patterns to prioritize maintenance. "If we have a section of town that we have multiple issues with the line — uses, multiple arrestors, etc. — that's when we'll take it from our infrastructure budget to get the whole line replaced," said Bruce Metz, village administrator for Jackson Center.

"What we've found is the macro look at your reliability data about how you or your substations are performing is great, but the more you can narrow it down, the better," said McKinney. "It's the old 80/20 rule: 80 percent of your problems are coming from 20 percent of your system."

City Utilities also maps out areas with more tree coverage or that tend to have more animal contact to try and get more wildlife protection or tree trimming in those areas.

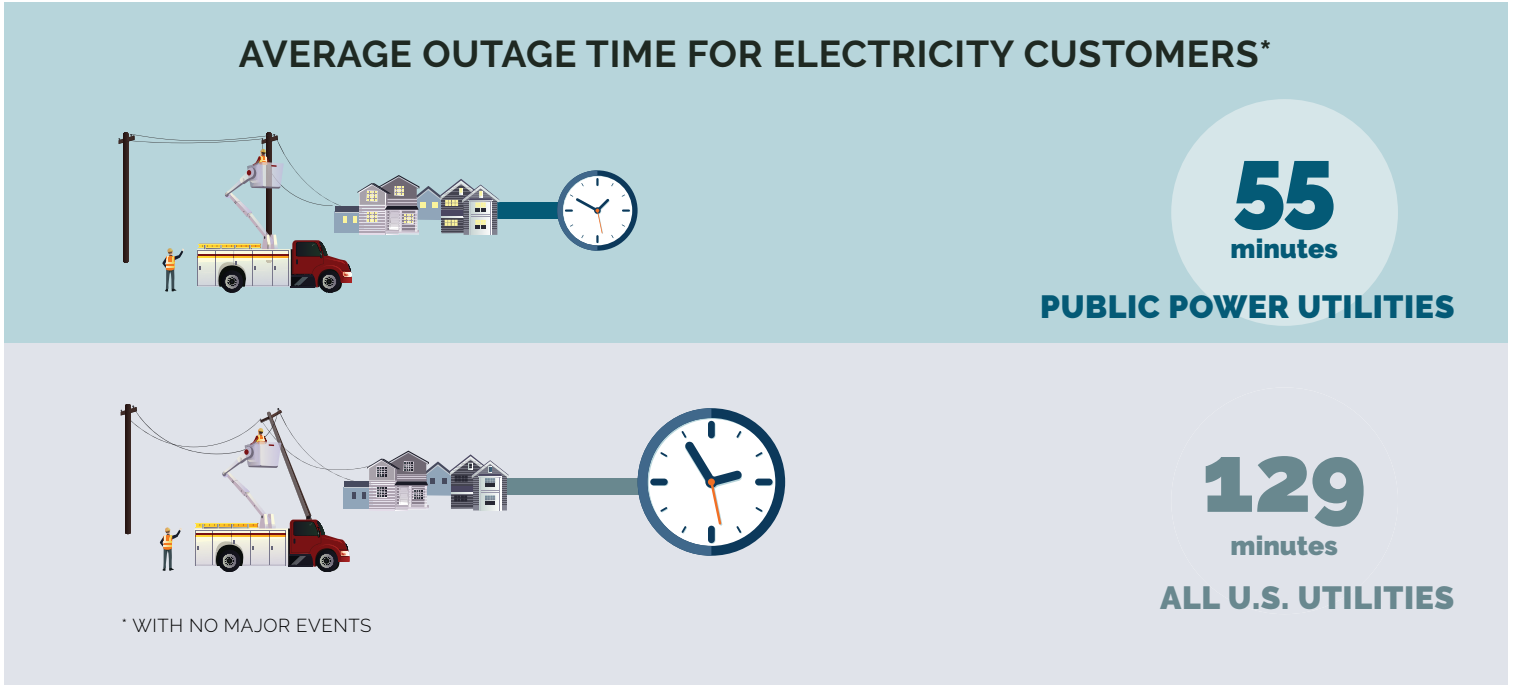
"Little stuff like that helps with the big picture. Really fixating on those smaller areas, taps with maybe only 30 houses on it, will really drive your numbers up," said Bruns. "Those small outages can really make a big difference if you are a small company like us."

GETTING THE RIGHT INFORMATION

When it comes to making data actionable, sometimes it is a matter of how a utility can cull through the data it has to make sense of it.

"Getting distracted by everything we could possibly collect about customers or equipment doesn't help us be more reliable," said Alex Hofmann, director of energy and environmental services at the American Public Power Association. "We need to understand what is the most useful in making the best investments in reliability and ensure that everyone has access and the ability to collect that information."

The village of Jackson Center used to experience numerous momentary outages, said Metz. To find out more information about what was causing those momentary outages, and to plan and track improvements, the public power utility subscribed to the American Public Power Association's eReliability Tracker service and hired a firm, Exacter, to take annual readings of equipment.



"It's actually very simple. Really, all we do is look at our list of outages, where they are at, and what causes them. Then what Exacter does is tell us where outages might be coming," said Metz. "That has helped us prioritize our different pole lines that we are changing. We use it as a guideline to see which section, town, street is next to be upgraded."

This kind of data collection and analysis doesn't require investment in sophisticated technology.

"You don't need [advanced metering infrastructure] to try and meet a certain expectation for your customers; you just have to have some way to siphon through the reporting of your outages, and take that information and put it to good use," said Bruns.

"The hardest thing we had to do was work through the procedures, how were we going to look through the data," said McKinney. "We started first with spreadsheets and kept going from there. Figuring out what you want is the hardest part. It is humbling, too."

Hofmann noted the importance of having a data policy in place to help support trusted data collection. And whether data is entered manually or collected from smart meters, utilities should check data sets regularly for common errors — from rounding to how accurately meters are mapped to circuits and protective devices.

> **"It is not easy to understand reliability data. Even when boiled down, it is not easy for people to understand or to communicate.**
>
> **ALEX HOFMANN,** DIRECTOR OF ENERGY AND ENVIRONMENTAL SERVICES AT THE AMERICAN PUBLIC POWER ASSOCIATION

BENCHMARKING

Collecting reliability data is also about putting it into context for a variety of stakeholders. "It is not easy to understand reliability data," said Hofmann. "Even when boiled down, it is not easy for people to understand or to communicate. This is where benchmarking comes into play."

Hofmann gave the example of how a utility's SAIFI can decrease but SAIDI remain the same, which will mean that CAIDI will increase. Explaining what drives these numbers can be helpful, because "people won't understand that you can see an improving trend that looks like you are getting worse per customer," said Hofmann.

Hofmann said that utilities doing benchmarking should seek data sources that focus on the same information and criteria of the utility's data. He also advised that utilities benchmark against utilities of similar size or in the same region, as it would be easier to show comparisons within similar weather patterns or conditions.

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Through looking at the data over time in the eReliability Tracker, Metz found that squirrels caused an average of about six outages per year prior to 2015.

"Our council is very big on reliability," said Metz. "They know that the closer we get to the [investor-owned utilities] in price, we have to do something to up the reliability."

Metz also regularly gets together with leaders from other area utilities to compare data and identify trends. "We look at our own data, and if everyone is having the same issue, then we talk about what [each of us is] doing, [and] any other tracking on the issue," he said.

Metz asked the group for advice on the latest wildlife protection strategies and got advice on effective squirrel guards. The utility installed squirrel guards and other devices on lines in 2015, and the average number of squirrel-related outages is now down to about 2.6 per year.

City Utilities of Springfield uses both internal and external benchmarks to measure the utility's performance. Each quarter, the utility tracks the percentage of customers that fall into the 3-10 report, which they have tracked for about seven years. The public power utility also looks at the national averages for metrics including SAIDI and SAIFI and has a goal to be at 80 percent of the national average or better.

IMPROVING CUSTOMER SERVICE

Metz shared how Jackson Center's outages, squirrel-related or not, have decreased, and how the process has helped to eliminate many of the momentary outages. "Every time we flickered, I would wait for another phone call," he said. Now, Metz said, he doesn't get these calls.

Customer calls have also gone down for Bruns. In addition to the outreach to 3-10

customers, City Utilities also conducts customer outreach after certain events, such as a feeder lockout, to give customers an idea about what affected the power supply.

"On an individual customer basis, I'll tell them what caused the outage on one day or another, to try to help them understand the system and what we're going to do to fix it, or what we can't do," said Bruns. "Giving them the high level of what caused an outage has really helped. I used to get 15 to 20 calls about a feeder lockout, and now it … may spur some comments, but it has helped educate and keep some people at bay. They know there are some things that we just can't control."

Bruns also attends town halls to educate customers about how the grid is organized, how outages get reported, how crews are dispatched, and the statistics the utility tracks. For meetings in specific neighborhoods, Bruns starts off by presenting the overall statistics for the neighborhood compared to the whole system, good or bad. He also uses data to tailor each presentation to focus on problems specific to the community, such as how vehicle crashes in areas with high-capacity streets can lead to outages.

"Most people generally don't want to talk math. They just want to know what's going on. We just tell them that [outages are] unsatisfactory. We never tell them what our average SAIDI or SAIFI is," said McKinney. "The worst thing you can tell a customer is that you have overall good reliability — they care about their own reliability."

"I don't know how much you can say the SAIFI or SAIDI really get impacted by this, but our customer satisfaction is definitely higher, which is always a benefit," said Bruns.

McKinney noted that satisfaction isn't just measured in reduced call volume, but in increased ratings on customer surveys. Before going to work on areas identified in the 3-10 analysis, City Utilities ensures line crews have been briefed on the numbers so that they are prepared in case customers come out to talk while they are working.

RELIABILITY'S MOST WANTED

Public power utilities work hard to prevent and reduce outages. Yet, these five types of foes often prove to be vigilant adversaries in the quest for increased reliability, according to data submitted to the eReliability Tracker in 2017. But fear not, reliability renegades: each foe can be countered.

Like this graphic? Download it from our Communication Templates page on PublicPower.org.

SQUIRRELS
AND OTHER WILDLIFE

2017 offenses:
More than 6,013 outages

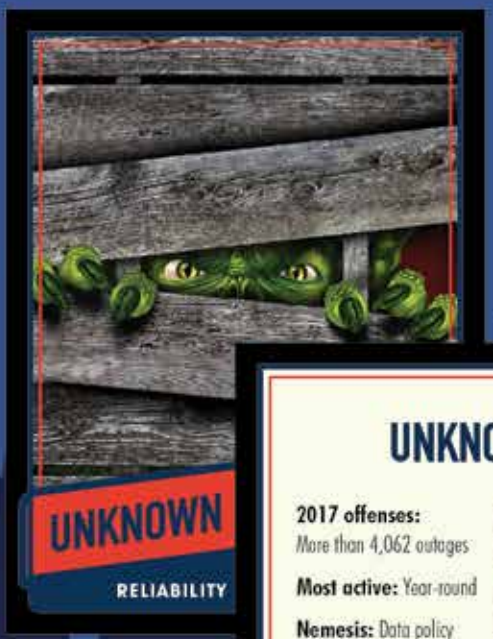
Most active: Summer and fall

Posse includes: Racoons, birds, and other rodents and small mammals; Also known to associate with trees as accomplices.

If spotted: Install guards and other protective devices, consider creating alternative habitats

WILDLIFE

RELIABILITY SUPER VILLAIN



EXTREME

WEATHER

2017 offenses:
More than 2,590 outages

Most active:
Spring and summer

M.O.: To destroy equipment by any means possible

Nemesis: Mutual aid

WEATHER

RELIABILITY SUPER VILLAIN

UNKNOWN

2017 offenses:
More than 4,062 outages

Most active: Year-round

Nemesis: Data policy

If spotted: Train staff on reducing this scourge

UNKNOWN

RELIABILITY SUPER VILLAIN

#PublicPower

KEEPING PACE WITH EMERGING TECHNOLOGIES

BY RK PENDERGRASS, CONTRIBUTING WRITER

The electric utility industry is undergoing dramatic change. As new technologies emerge, public power utilities face new customer expectations and new opportunities to use technology to improve services and operations.

From handling dynamic load to connecting with equipment and improving reliability, electric utilities increasingly turn to technology to transform them into the utilities of the future.

ANTICIPATING CUSTOMER NEEDS

BEFORE BRYAN TEXAS UTILITIES INSTALLED ADVANCED METERING INFRASTRUCTURE in 2012, the start and end of each college semester was pure chaos. BTU's service area includes a large portion of students from Texas A&M and Blinn College, which means huge seasonal migrations.

"It can be Armageddon when you're trying to do 750 move-in and move-outs in a day," said David Werley, executive director of business and customer operations at BTU.

Before installing AMI, this meant sending staff and a truck to each site to manually turn the meter on or off. Now BTU has the ability to turn meters on and off remotely. "Since then we've done very near that number in an automated fashion, and you'd never know it. It's just happening," said Werley.

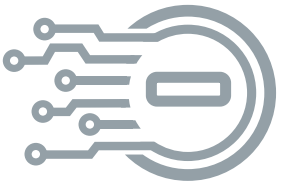
Outside of being able to more easily manage the crowds of college students, the ability to turn on and monitor meters remotely has given BTU, which covers a large geographic footprint, countless savings in labor and gas that had been spent on meter reads. Those savings are passed on to the customers, as are countless other benefits, including those of the cost-of-service analyses that BTU is now able to do with a high degree of accuracy. Werley said the biggest benefit is increased safety, as the technology allows staff to avoid going into customers' backyards and reduces driving time.

"People are reliant more now than ever on electricity … 10 years ago, if you lost power for two or three days it turns into a camping trip," said Chris Mieckowski, the global director of solutions portfolio marketing at Siemens Power and Gas. "Resilience, reliability — those are the names of the game now. Before, it used to be efficiency and what are the megawatts we're making."

As a result, today's customers have a very low tolerance for brownouts and blackouts.

Increased reliability is why BTU made instituting an outage management system a key priority when installing its advanced metering infrastructure. At BTU's systems operation control center, an electronic map displays every meter on the system. If even a single meter stops functioning properly, the utility can send a team out to fix it before the customer even knows there's an issue. During an outage, that capability is crucial.

"We can pick the low-hanging fruit to get bigger groups of customers back on. … You do not have those capabilities without a meter that does not tell you that it's out," said Werley.



AMI
BRYAN TEXAS UTILITIES
THE ABILITY TO MONITOR METERS REMOTELY

BATTERY STORAGE
GLENDALE WATER AND POWER
"IT'S AKIN TO A TEST LABORATORY."

UPGRADING TO A NEW APPROACH

"TEN YEARS AGO, THE ENERGY LANDSCAPE WAS COMPLETELY DIFFERENT," said Mieckowski. "I don't want to say things were better, but things were simpler."

Planning future growth used to be fairly straightforward, explained Mieckowski, as a utility could draw a direct correlation between projected population and demand. The generation side was equally stable, thanks to the reliability of generating power from coal and nuclear sources, the big players at the time.

Once regulations and subsidies started pushing in the direction of renewable energy, that all started to change. Many of the technologies that are now starting to take off in the public power world came about largely to help manage the challenges that come with a power source that can't be as easily controlled and relied upon.

When California public power utility Glendale Water and Power decided to renovate the Grandview Substation, which was built in 1939, the upgraded and improved equipment cleared up a significant physical footprint on the property. There was also unused property next door.

With this space, GWP saw an opportunity to branch into an area it hadn't explored before: battery storage. GWP took advantage of this spare area to install the two-megawatt Battery and Energy Storage System (BESS).

"It's akin to a test laboratory," said Steve Zurn, general manager of GWP. He thinks that batteries are going to become an everyday, integral part of the electric utility industry. "So, let's put this small project in and learn from it, and see where the pitfalls are, and see if we can overcome those, and then as we expand it, we'll be that much better for the effort."

BESS is not simply a low-stakes training facility, however. The substation serves the heart of the region's commercial and industrial sector, including The Walt Disney Co., as well as residential customers.

The battery industry is rapidly evolving, which creates some unknowns when planning new projects. GWP's Grayson power plant, built in 1941, isn't much younger than the Grandview station and is next on the list for a full upgrade. When GWP started planning the Grayson upgrade project four years ago, battery storage prices and capabilities were in a whole different world than they are today. Originally, GWP budgeted for the storage component to be $1 million per megawatt, and now that's down to roughly $500,000 per megawatt. GWP restructured its plans to incorporate even more of the rapidly improving technology.

""We want to be progressive and to take advantage of this clean energy technology," said Zurn. "At the same time, we need to be conservative in our approach with what is a very new technology to our industry. We want to see the potential impacts from an operational perspective and ultimately ensure that we will continue to provide a safe, reliable and cost-effective service to our customers."

Manufacturers estimate that these batteries and converters each have around a 10-year life span, but there isn't much data on how accurate that number is out in the field. Investor-owned utilities in California, including Southern California Edison and PG&E, have put in large installations, but only over the past two years. Utilities don't yet know how heavy usage versus gentler wear-and-tear might affect life span or impact plans for repair and battery replacement.

One of the main goals GWP has for the projects is tying the battery system to a renewable energy source whenever possible.

"If we're going to put a battery storage unit in, it makes a lot of sense that we're energizing those batteries with renewable energy," said Zurn. "If we're just energizing them off thermal generation, it seems to defeat the purpose of integrating a renewable plant."

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THINKING LIKE A TECH COMPANY

WHEN GIL QUINIONES BECAME CEO OF THE NEW YORK POWER AUTHORITY IN LATE 2011, HE BROUGHT BIG DREAMS FOR TRANSFORMING THE ORGANIZATION. He looked at trends in computing power, the rising sophistication and plummeting price of sensors, and advances in data analytics and cloud computing software and made a plan for NYPA to become the first end-to-end digital utility.

NYPA's Vision 2020 plan includes digital asset management in its Integrated Smart Operations Center (iSOC) at NYPA's headquarters in White Plains, N.Y., the Advanced Grid Innovation Lab for Energy (AGILe) hubs that bring a fully digitized version of New York state's grid, digital-enabled plant and field workers, and cybersecurity advancements.

It's an enormous undertaking and requires big changes. According to Quiniones, change is the biggest challenge.

"How do you inspire a shared vision amongst all of our employees, to really get them engaged, and that we all sing from the same song sheet?" said Quiniones. "It's about execution. In the end, that's going to be the key for us."

To empower employees to embrace the changes, Quiniones draws inspiration from the playbooks of smaller, agile tech startups. The utility is starting to restructure its offices to physically embody the change, with more open space, fewer closed offices and cubicles, and facilities that are wired for the future.

"We need to act more and more like a Silicon Valley technology company than a traditional facility," said Quiniones.

One of the principles NYPA is embracing is fostering collaboration. Quiniones is hoping to work with trusted third-party technology companies, utilities, grid operators, students, and more as time goes on.

"I can see us opening our platform and having those trusted third parties use our data and develop new apps and new products and services for their customers — or for all kinds of customers — and really make New York a hub for innovation in terms of energy," said Quiniones.

One such application monitors the health of transformers in an effort to catch any anomalies before they fail, a useful feature for a piece of equipment that tends to catch fire when it fails and can take up to two years to replace.

In terms of future partnerships, NYPA is thinking global. NYPA has partnered with Israeli electric power research institute mPrest for its transformer asset monitoring application. The engine NYPA will use in the asset monitoring system is the same type as the one mPrest developed for Israel's Iron Dome, an air defense system used to block missiles and short-range rockets.

At an industry conference in June 2018, Quiniones said that NYPA is able to assess the health of its generation fleet on a real-time basis from 26,000 points from sensors and meters. By the end of 2019, Quiniones said that NYPA plans to increase the number of sensors to about 90,000.

Having a "constant MRI" on the authority's power plants and substations "is extremely, extremely important," Quiniones said. "We're cataloguing all the savings — we're over $5 million in savings just from analyzing trends.

NYPA also developed an app that warns ships in the Long Island Sound not to drop anchor when they're above a NYPA transmission line. Because it co-developed both the ship app and the transformer app, anytime there's a sale, NYPA gets a royalty cut.

Beyond working with its 47 member public power utilities in New York, NYPA expects that the applications it is building will be useful for other public power utilities.

There's still work on the horizon. NYPA is still working to connect equipment and systems to the network and adding new sensors, but Quiniones is already looking even further into the future.

"We're really just starting in our journey," he said. "I can see us doing much more sophisticated data analytics using artificial intelligence and machine learning."

DATA ANALYTICS AND CLOUD COMPUTING

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WHEN GIVING IS GETTING:

ENGAGING CUSTOMERS WITH DATA

BY JAMES PATERSON,
CONTRIBUTING WRITER

hen a customer called Tennessee public power utility BrightRidge after a bitterly cold spell to complain about higher than normal bills at an unoccupied house, the utility used a little detective work to find the answer.

The utility's customer service department was puzzled at first when it looked at bills that seemed to be much higher than expected, especially since the customer had fled south and had set back thermostats to conserve power.

"Having good data paid off. We were able to examine their usage and eventually discover that they had not removed some resistance heating units, so when the temperature dipped below a certain level, they kicked in," said Jeff Dykes, CEO at BrightRidge.

It might seem like a small victory, but Dykes, whose utility has won recognition from Tennessee Valley Authority and the American Public Power Association for innovations benefiting its roughly 77,000 customers in a rural but fast-growing region along the southern edge of the Appalachian Mountains, uses data to demonstrate a bigger point. He knows that public power utilities using more and better customer data can cut usage — BrightRidge has saved about $1 million a year — and engage and please customers at the same time.

Jasper Schneider, vice president of member and industry at National Information Solutions Cooperative, a member-owned information technology company that serves public power utilities, said using such data gives power companies "smarter and more nimble operations."

"With the strong adoption of smart meters, the industry has evolved from only 12 data points a year about a customer, to now more than 8,000," he said. "By examining and using that data, we can change the way we operate and dramatically change our connections to our customers."

In a very different service area than that of BrightRidge, Arizona's Salt River Project is providing its approximately one million customers in and around Phoenix new services and more information based on the data it gathers from its more than two-decade push to modernize its grid. It uses smart meters, better analytics and more creative and useful responses to customer needs and preferences.

"We are using this new technology in three ways. To give customers options for digital engagement, provide proactive and personalized communications, and give them a mix of pricing and payment plans," said Michael Mendonca, senior director for revenue cycle services. "It has changed the way we do business."

And in southwest Tennessee, the Bolivar Energy Authority offers its 11,000 customers a web portal, phone application, prepay system, better customer service and improved outage management thanks to what Steve Herriman, purchasing and IT manager, said are growing efforts to focus on customer data.

"We are using this new technology in three ways. To give customers options for digital engagement, provide proactive and personalized communications, and give them a mix of pricing and payment plans"

MICHAEL MENDONCA
SENIOR DIRECTOR FOR REVENUE CYCLE SERVICES
SALT RIVER PROJECT

ENGAGED CUSTOMERS MEAN MORE DATA

SRP created a multifunctional web portal and a mobile application that is regularly used by about 122,000 customers. The portal allows customers to check daily costs, review personal usage, report and see outage information, and pay their bill, increasingly with an expanded and user-friendly prepay function. Approximately 155,000 SRP customers take advantage of the prepay option.

"These tend to be highly engaged customers. They often pay multiple times a month," said Glen Traasdahl, director of emerging customer technology at SRP. "And they want a lot of information, so if we showed them kilowatt hours, that's great, but we knew they wanted more, and we went a step further and showed them their cost per day and cost per hour."

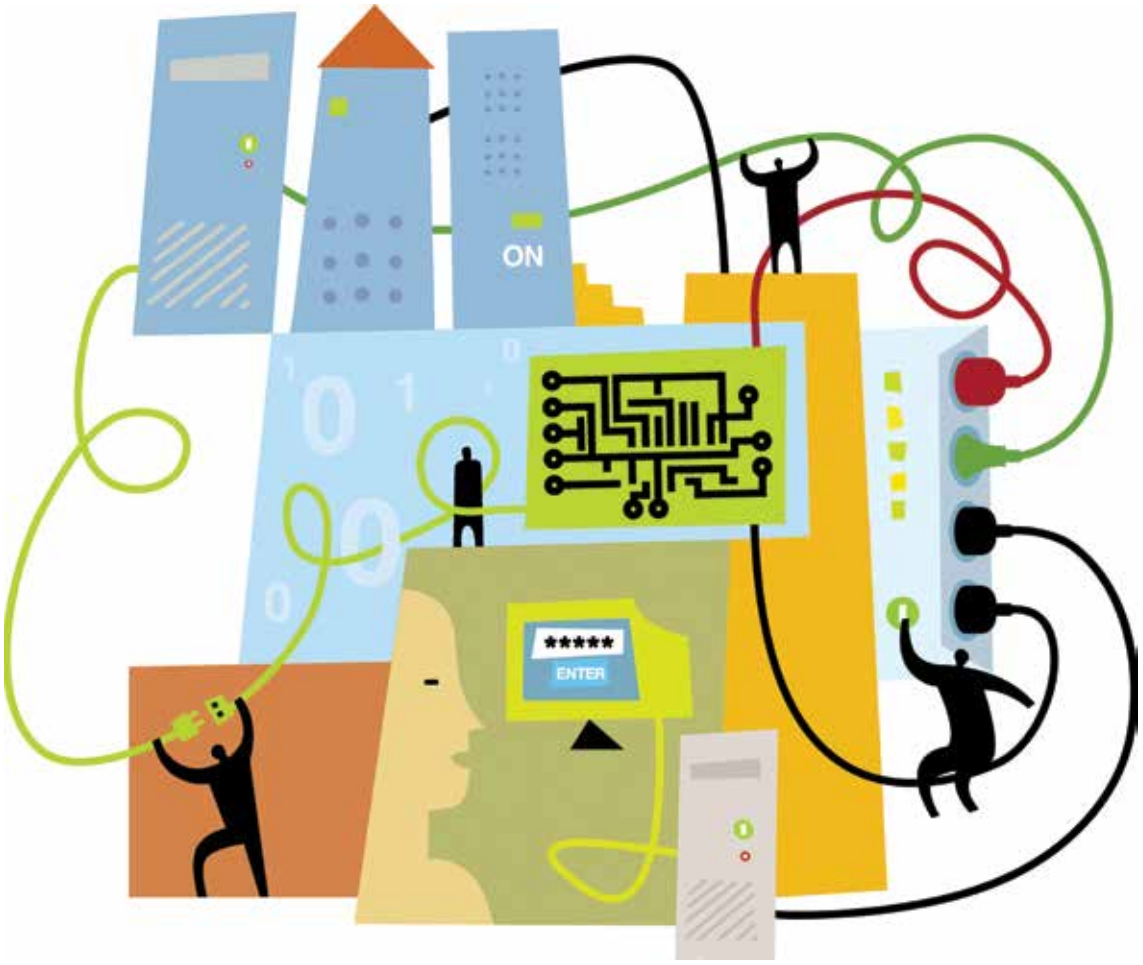
With more customer data, SRP was able to design a variety of price plans and show customers how each would benefit them based on their data. It also began providing a "shadow billing" feature that shows customers how much they would have saved under one of the utility's time-of-use price plans. Additionally, the data has allowed SRP to create a range of pricing options, from using less power from 3 to 6 p.m. on weekdays, to a prepay option, or one that benefits those who charge their electric vehicle at night. One third of its customers are now on time-of-use plans.

Customers also can be warned about usage issues (the company tracks their usage over 36 months and reports anomalies) through alerts or when they view usage online, so they can adjust usage and are less likely to be surprised and aggravated by high bills.

Herriman said Bolivar's prepay option, which has significantly improved debt collection, is automated so that any payment directly activates the meter for customers who are behind in payment. But it also is increasingly used by other customers.

"Prepay helped us offer a much better mobile application experience," he said. "The app allows a customer to not only add funds to their account, but also gives usage history and even allows customers to report outages and add a photo of any damage."

Schneider noted how offering customers a prepay option provides a data-laden link between customers and the utility. He also said some industry reports show prepay results in, on average, 13 percent less usage.



A LOOP OF INFORMATION

Schneider described a growing cycle of information where technology allows utilities to collect and sort through data, then offer services and platforms for customers to access and use it, which in turn provides more information on which the utilities can act.

Increasingly, more sophisticated smart meters, advanced metering infrastructure, and meter data management systems are in place at public power utilities, and SRP is finding ways to use the data it obtains to reduce a load that can spike wildly on hot Arizona afternoons.

Outage management generally has been enhanced with customer data from AMI systems that inform and populate outage management systems and an outage map on the utility site and mobile application. Herriman said customers are happy to get more and better information during an outage, and the utility can more quickly locate problems and, with a connected GPS, get repair crews underway faster.

"We know in real time what is happening," said Tim Whaley, a spokesperson for BrightRidge, which has a similar system. "If we have a handful of meters out in a single geographical area, we know it's a very localized problem. If we have 1,000 meters out, we might glean that an entire feeder circuit from the substation may be impacted."

Customer down time has dropped 35 percent, and average outages per customer and time to restore an outage both dropped about one-fifth, all information that would previously have been difficult to track.

In addition, Dykes said that for more than 5 years, BrightRidge's AMI system has allowed the utility to handle some 65,000 transfers electronically rather than through site visits and make 30 percent of its disconnects online. It has even cut out 3,000 site visits for rereads or other investigations.

"The system reduces truck rolls by about 20,000 a year, and it's streamlined our back office operations," he said.

BrightRidge saved about $200,000 last year by pairing a system that handles sophisticated customer data and communications with water heaters. The Take a Load Off, or TALO, system is aimed at reducing unnecessary usage from hot water heaters and offers customers a rebate and free water heater maintenance in exchange for a load control switch on their tanks. The utility just installed its 5,000th system.

"As a local power company within the TVA system, we pay a monthly peak charge based on the highest one-hour system demand for electricity, so this helps the customer and us control costs," said Dykes.

BrightRidge estimates that it can shed an average of 2.5 megawatts during high-demand periods and expects the system will save nearly $8 million by 2030.

KEEPING CUSTOMER DATA SAFE

One issue has lately put customer data acquisition and use in a less positive light — security.

Schneider said data protection should be a key consideration for utilities when they establish basic new structures that gather, analyze and use customer data — and when they add each new feature handling it.

Schneider said he often recommends that utilities rely heavily on cloud-based systems to avoid problems an on-site server could have, such as physical security threats or out-of-date software.

SRP makes a point to inform its customers about system security. "Protection begins at the meter itself," it tells customers. "Proprietary meter protocols defend against hacking. Encryption is used at each step of the data transmission process: at the meter, during transit from the meter to SRP, and at SRP. The meters are password protected and meet the ANSI 12.21 and 12.22 security standards for communication." (ANSI refers to the American National Standards Institute.)

It adds that the "equipment SRP uses is completely removed from the broad internet" with a "separate system with firewalled access to the outside world."

Utilities should get consent about the use of data, make sure it is accurate, and control its availability while still making it readily accessible to customers. Utilities should carefully train staff who handle customer data and should regularly do audits and risk assessments.

Encryption is used at each step of the data transmission process: at the meter, during transit from the meter to SRP, and at SRP.

INTO THE FUTURE

Schneider said that while this data about customers is valuable now, it will become even more important in the future.

Utilities "will increasingly have to understand their customers and their needs — and respond to them," he said.

"We aren't just selling kilowatt-hours anymore," he said, making a comparison between a taxicab, which simply transports riders, and Uber, which uses an array of data about riders. "The days of being about just generation and transmission and measuring success by the size of the load are gone. Now the benchmark has changed, and it's about things like customer satisfaction and customer support scores. Information will be critical."

Schneider said utilities will need to not just collect data but find useful ways to use it, pointing to Amazon's accomplishments as a company that has successfully enhanced the customer experience to a large degree by using customer information.

"More and more often we are hearing from utilities who are saying 'Give us tools that will make us look good with customers and serve them well — based on good information,'" he said.

He expects to see more use of business intelligence, predictive analysis, and interfacing with smart homes, smart thermostats, and voice recognition, some of the areas SRP is exploring.

"Our industry is changing so quickly. Who knows what it will look like in even 5 to 10 years?" said Dykes. "But we know providing customers service will be at the center of it, and good information will be critical."

Traasdahl said SRP will soon introduce hourly information for customers telling them what they'd save if they shifted usage to off peak, and the utility plans to continue to expand the customer's ability to see their usage and respond. Dykes said utilities will need to take such steps to succeed.

"Our customers will need to see beyond the meter," he said.

"The days of being about just generation and transmission and measuring success by the size of the load are gone."

JASPER SCHNEIDER,
VICE PRESIDENT OF
MEMBER AND INDUSTRY
NATIONAL INFORMATION SOLUTIONS
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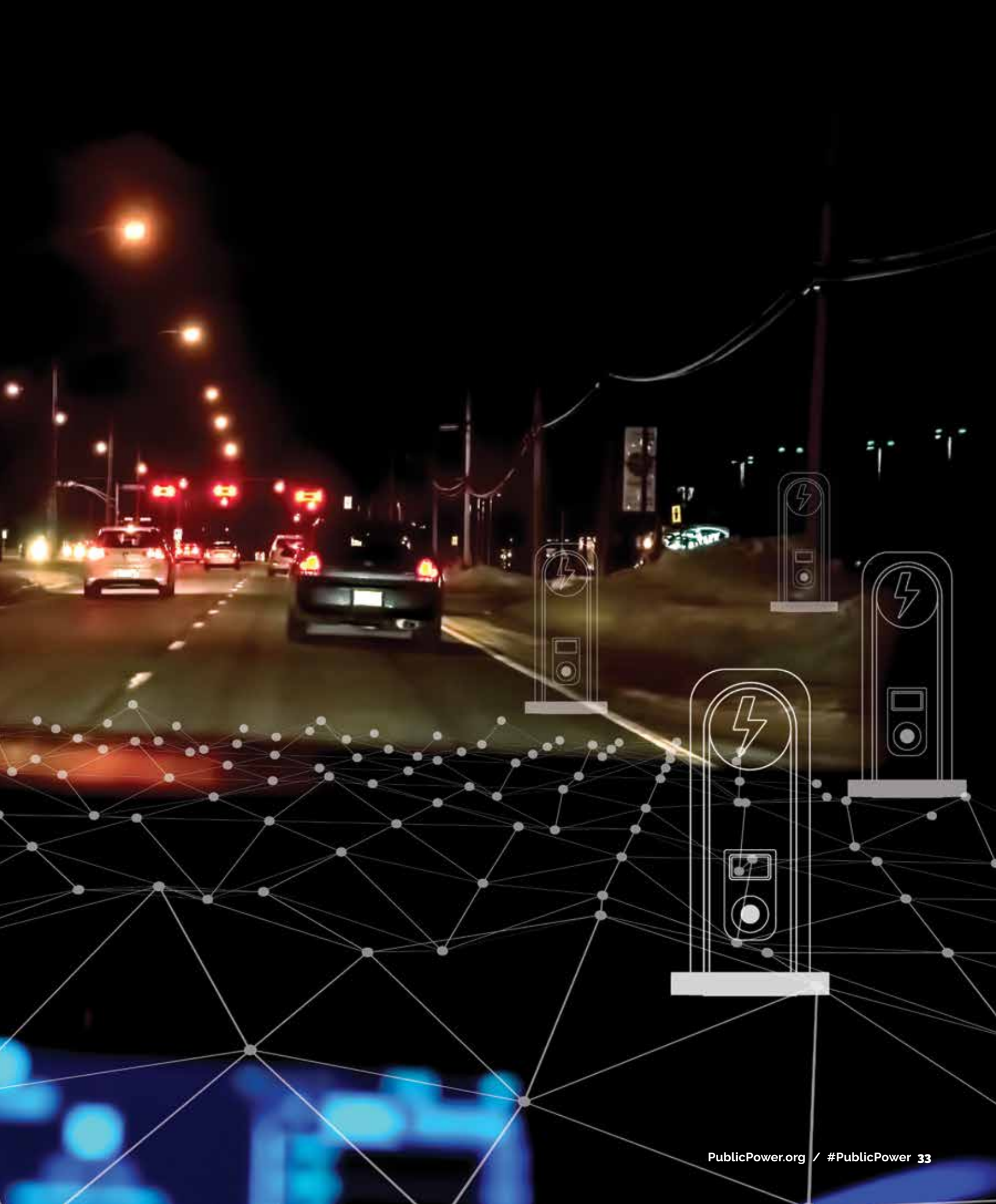
UNDERSTANDING HOW EV DRIVERS MAKE DECISIONS ABOUT CHARGING

BY ELISA WOOD, CONTRIBUTING WRITER



The transportation sector, specifically electric vehicles, is a whole new world for utilities. Indeed, EVs are a whole new world for everyone.

In theory, EV charging offers opportunity for public power utilities. As electricity sales otherwise flatten, EVs create new demand.

As public power utilities begin to scope out getting involved in EV charging, significant questions loom about how people will charge EVs: Where will they charge, when will they charge, and how will they react to price signals and other motivators?

Fortunately, some pioneers and researchers are beginning to tease out answers. Even though EVs remain nascent in use, certain charging patterns are emerging.

"We don't really even understand how people drive their conventional vehicles," said Jamie Dunckley, a data scientist at the Electric Power Research Institute, who has researched EV charging in partnership with about 35 utilities. "People drive their cars 5 percent of the day, and 95 percent of the time they are parked and could be charging."

New phobia: Charge anxiety

Initially, "range anxiety" — the concern of a driver about having fewer miles of charge on a battery than the distance to a charging station — served as an inhibitor to EV growth. But with more chargers now installed, range anxiety is giving way to a new fear, what Dunckley calls "charge anxiety."

"You are confident that you can get to a station. But when you get there, will it be working? Will there be a big line? And is the network I'm part of (e.g., Blink, ChargePoint, EVgo) compatible with the network where I stop? Will I be able to pay?" she said.

Tesla appears to be aware of this issue and prides itself on producing reliable charging stations where lines are short. As a result, the company's charging stations are receiving favorable reviews from customers, she said.

But for people who don't own Teslas, "it's a smattering of different networks," Dunckley said. The business model for charging stations remains undeveloped, so a sizable number are run by startups that tend to "either flop or change their business model," she said. As a result, service stations fall into disrepair.

No quick remedy exists. Having utilities own and operate the charging stations is one possibility. However, the investment in charging infrastructure requires first understanding the business case for the utility, when and where customers would want to charge, and any state rules or regulations regarding utility involvement in EV charging.

"Each state, each utility is different. And if you think about long-distance driving, you are going to be crossing from one utility territory to another," said Dunckley.

For now, charge anxiety might require time and market maturity to quell.

Where to locate chargers

Minnesota's Elk River Municipal Utilities, a public power utility within commuting distance of Minneapolis-St. Paul, has learned the importance of location when it comes to charging stations.

The utility installed two public chargers — a 240-volt Level 2 charger and a 480-volt DC fast charger — that are powered by 100 percent renewable energy. In addition, ERMU recently purchased a second Level 2 EV charger, which will be located at ERMU's headquarters and will serve its own and the city's fleets.

ERMU's goal is to garner data about charging patterns and preferences that it can share with the broader utility industry, in keeping with a grant it received through the American Public Power Association's Demonstration of Energy & Efficiency Developments program. The utility is working with the city of Elk River and FleetCarma, which provides utilities with technology and services to plan for EVs and support charging operations.

Utilities win praise from EV supporters when they install new charging stations. But others, such as store owners whose income is tied to gasoline sales, are not always happy with the move. ERMU contemplated this problem and came up with a diplomatic solution: Make potential competitors into partners.

"We intentionally tried to identify some adversaries and make them partners. We knew that convenience stores and gas stations were probably not going to be happy about electric vehicles and electric vehicle public chargers," said Troy Adams, ERMU's general manager.

Such partnerships benefit both the store owners and the EV owners. While the vehicle charges, the owner is likely to shop, providing revenue for the convenience store. In addition, the customers can get a cup of coffee while waiting, which speaks to another important consideration in terms of location: Is there a way EV owners can occupy their time while waiting for a vehicle to charge?

"We tried to locate the chargers on heavily trafficked corridors, but also close to businesses that can support someone walking there, having a cup of coffee, having a doughnut. Our DC fast charger is by a fuel station, a grocery store, a liquor store. You can walk to them easily within two or three minutes. Plug in your vehicle, run some errands, and come back," said Tom Sagstetter, ERMU conservation and key accounts manager.

INCENTIVIZING ELECTRIC

Charging electric vehicles offers benefits to utilities whether as a new source of electricity sales or a load management tool. So, how does a utility encourage more EVs in its service territory? That's the topic of an ongoing Electric Power Research Institute study with eight utilities.

The study, which finishes up in December 2018, looks at a range of triggers, from HOV lane availability to gasoline prices in various regions.

"What motivates someone in Hawaii might be different than what motivates someone in Tennessee or Nebraska," said data scientist Jamie Dunckley.

A clear commonality is that EV owners are the best promotion for EVs. Utilities can play a strong role in helping them have a good experience so they will encourage peers to join the club.

"When someone buys an EV, it can be overwhelming in terms of thinking about what they can do next and how charging works," she said. To address this problem, Dunckley gave the example from Arizona's Salt River Project, which offers a $50 Amazon card to EV buyers who provide their contact information. The public power utility then includes them in a group that receives educational information and invitations to EV events.

"If the EV owners are having a great time with their EVs, they will tell other people about it," she said.

Is nighttime the right time?

Like many utilities investing in EV charging, ERMU found appeal in the load pattern changes EVs offer. The expectation is that EV owners will do most of their charging when demand for electricity is otherwise low and supply at a surplus.

"From the highest level, we started looking at EV as a part of a strategic planning initiative. We identified EVs as one of the very unique opportunities where we can grow load at the right time of the day while being environmentally responsible," Adams said.

The "right time" is nighttime in Elk River's home state of Minnesota — and in most places.

California, however, is becoming an exception, with its vast amount of renewable energy leading to a daytime energy surplus. Sacramento Municipal Utility District, an early leader in researching EVs, is exploring how to encourage daytime charging.

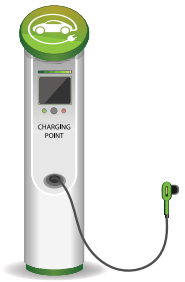
Potential exists to help tackle California's infamous "duck curve" by encouraging some EV charging during the day, according to Lupe Jimenez, manager for electric transportation and energy storage research and development at SMUD. The duck curve is a graphic representation of the flood of solar energy that creates a daytime energy surplus. The surplus is depicted in the form of a fat duck belly. Jimenez sees the possibility of trimming the chart's belly by absorbing the energy through EV charging during the day.

"As renewables continue to proliferate and as electric vehicles become more common, we are going to have the opportunity to help shape that in real time, and we'd rather get ahead of it than wait until it's a problem," Jimenez said.

Of course, many people are not at home during the day; they are at work. So, encouraging employers to install EV charging stations is key to shifting the demand pattern.

There are good reasons for employers to do so. For one thing, the presence of EV charging stations improves the business' image as a forward-looking, sustainable enterprise. Businesses also may offer charging as an employee benefit.

But Jimenez points out that many obstacles must be overcome before employers readily embrace EV charging. Capital costs for installation can be high. The employer might not have the space within a parking lot for the chargers. Moreover, many



simply know little about EVs and how to install chargers. On top of that, administering the programs creates new work. If there is not a 1:1 ratio of chargers to EVs, who gets to charge first? Is it first-come, first-served, or should the employer create a schedule for who charges when? And who pays for the electricity — the employer or the employee?

To help with the cost, SMUD offers customers a $1,500 incentive for each Level 2 charging station. Business customers can take advantage of the incentive for installing up to 20 chargers per location. SMUD also offers up to $120,000 for DC fast charging stations with public access.

EPRI's Dunckley pointed out that EV drivers tend to be clustered in terms of geography. Often they are centered in high-income areas, not evenly spread out over a service territory. This will affect how utilities use them in managing load and planning capacity. "It's something to consider — not necessarily a bad thing, but something to watch for."

Changing fuels and changing habits

How people pay for electric refueling, not just how much they are charged, has an impact on habits and expectations, a lesson learned by ERMU.

Unlike EV operators, most drivers of gasoline-powered cars fall into common refueling patterns. One popular habit is to wait until the gas needle hits near full and then "top off" the tank with two or three clicks (shut-offs) of the pump handle.

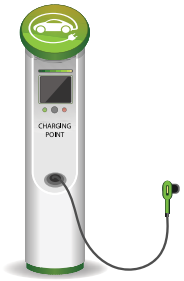
Another is to "run on empty," which is the habit of putting just enough gas in the tank to get you from point A to point B and maybe back again. This is the "pump upon need" model.

When ERMU studied EV driver behavior, it found some resistance to the charging fees it levied on its users — one for the connection and the other for the energy itself. It turned out that the resistance was a result of drivers' EV charging needs.

"Our rate design works well if you are going to completely charge your vehicle. Our initial observation of behavior is that it doesn't work well if you are going to just charge for 15 minutes to grab milk," Adams said.

The ERMU study found that the source of concern centered on unique EV driver behavior. Drivers liked to "top up" their vehicle while out running errands. The practice let them put in a few kilowatt-hours of charge to get them through the day. They then did the bulk of their charging at home at night. The fixed connection fee made the cost for just a few kWh very high and noncompetitive with third-party stations that have nominal fees.

The fact that most EV charging occurs at home could provide a challenge to utilities that seek to use connection fees to recover the costs of installing public charging units.



The fact that most EV charging occurs at home could provide a challenge to utilities that seek to use connection fees to recover the costs of installing public charging units.

In general, time-of-use rates seem to hold appeal, at least to early adopters. EPRI tracked 100 EVs over 18 months, gathering data every minute. Researchers found that even Tesla buyers — those driving vehicles that can cost in the six figures — "shifted their behavior to save a couple of dollars," Dunckley said.

"When there is a time-of-use rate effectively communicated, EV drivers — at least in two studies I've been working on — adhered to them across the board," she said.

EV charging is opening new opportunity for utility supply and demand, but it requires careful thinking about the logistics of getting customers to plug in at the right time. Understanding the inspirations and anxieties behind EV charging behavior not only helps utilities make effective installation investments, but also creates happier EV owners, which makes more of them, opening up a new business path for electric utilities.

INSIGHTS

TECHNOLOGY • WORKFORCE • RELIABILITY • DRONES • BIG DATA

TECHNOLOGY

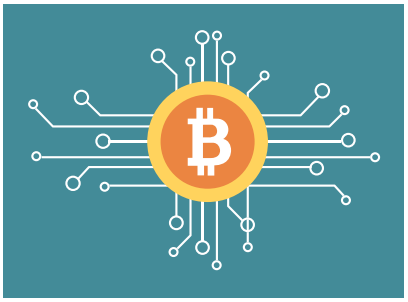
Technologies We're Watching in 2018

BY **PAUL ZUMMO,** DIRECTOR OF POLICY RESEARCH AND ANALYSIS, AND **PATRICIA KEANE,** MANAGER, REGULATORY POLICY AND BUSINESS PROGRAMS, AMERICAN PUBLIC POWER ASSOCIATION

The power industry is being transformed by new technologies and new applications of existing technologies. As we look ahead to changes in the industry, some of the technologies we're keeping an eye on are smart meters, storage, electric vehicles, and cryptocurrencies.

Though advanced metering infrastructure, or smart meters, have been around for years, utilities are beginning to consider potential applications of AMI beyond remote meter reading or outage detection. AMI produces data in short intervals that can give a utility insight into customer behavior and load patterns. Being able to access this kind of data can help utilities to see specific load management profiles and capture emerging reliability constraints at a substation level. AMI also enables different rate structures, such as time-of-use rates, as it allows utilities to send more accurate price signals to customers that are reflective of the actual cost to serve them.

Solar paired with storage is quickly becoming a more economically viable option for both customers and utilities. While solar panel prices have been declining, storage prices have also declined dramatically in the last year and are predicted to continue to decline significantly. This means that solar energy produced during peak solar periods, but not necessarily times of systemwide peak, can be stored and then used when demand intensifies. This has the potential to mitigate the effects of the so-called "duck curve," and can help utilities reduce wholesale power costs through peak energy reduction.



Electric vehicle adoption is important for utilities to understand and monitor because of potential grid impacts and customer benefits. EVs have the potential to stop flatlining load and increase revenue for your utility. Your customers can benefit from lower vehicle operating and maintenance costs. EVs do not have tailpipe emissions, so they can lower pollution in your community. If left unmanaged, EVs have the potential to stress your distribution and transmission infrastructure and add to your peak demand. Whether you want to actively promote EVs or to accelerate adoption depends on your community. However, investigating state and local EV and charging station laws, regulations, and policies; evaluating your rates; monitoring adoption in your service territory; and understanding driver behavior will help you be ready to manage this potential new load.

As EV interest and adoption grow, more utilities are investigating the use of EVs as a grid resource through vehicle-grid integration technologies. A more simplified form is managed charging, or V1G, where a utility can control the charging of an EV that is plugged into the grid. This is similar to some utility demand response programs that involve altering the use of customer's air conditioning units or water heating. A more complex technology is vehicle-to-grid, or V2G, where EVs supply power back to the grid. With both technologies, EVs become an asset that utilities can leverage to manage load.

Cryptocurrency mining, predominantly of bitcoin, is pushing some public power communities into the spotlight. Mining is the process of verifying and maintaining the distributed ledger, which serves as the record of all transactions. The mining and exchange process uses blockchain and is quite energy-intensive. The sizeable load from bitcoin mining has led some public power communities to actively recruit bitcoin mining companies, while others have put moratoriums in place.

Communities promoting bitcoin mining see it as an economic development opportunity with associated load growth. Some communities putting in moratoriums are dealing with bitcoin mining companies that have circumvented the utility, leading to challenges to public health and safety, as well as reliability. There is also the question of what rates and billing procedures make sense for these companies. Public power prides itself on high reliability and affordable rates, so utilities are looking to ensure that these companies pay their fair share and other customers are not left footing the bills.

What technologies are on your watch list? Join the Public Power Forward listserv to discuss how public power responds to emerging technology. Email Info@PublicPower.org to join.

WORKFORCE

What Story Does Your Employee Data Tell?

BY AMY RIGNEY-GAY, VICE PRESIDENT, HUMAN RESOURCES AND ADMINISTRATION, AMERICAN PUBLIC POWER ASSOCIATION

In human resources, data analytics can seem like the type of subject that is only relevant to massive Fortune 500 companies with a big technology budget. Not true! When you hear "data" or "data analytics," don't be afraid.

All employers big and small have a core set of data at our fingertips that can paint a picture about our employees and workforce. Through a few simple pieces of information about each employee, you can start to see where you might want to look into succession planning, recruitment, compensation, or training and development.

From the point of hire, any utility has a minimum of two data points about each employee: date of birth and hire date. That's simple enough to start looking at the tenure and demographics of your utility's workforce to forecast succession planning or develop other strategies.

Mel Palmer, manager of human resources at Lincoln Electric System in Nebraska, noted how tracking this information by role and department helped her notice that a majority of a certain employee type was retirement-eligible. From there, LES prioritized learning to better prepare for developing talent that could potentially fill those roles when needed.

Starting from the data can help you to develop a strategy. Sometimes the data can spark simple, helpful ideas for focusing on the people you have now. You might already know if you have a growing emerging workforce, but crunching the specific numbers may help you to see if you have the right programs in place to support them. Employees often want growth opportunities and ways to connect. If you notice you have a number of younger women, you might want to see if there is interest in starting a women's affinity group.

Exploring turnover can tell you whether it is happening in a particular department or job category, if there is a problem with a specific manager, or if training is needed.

Finding the data to support your story of turnover and retention might be as simple as looking at compensation. Looking at salary information against industry or regional ranges is a helpful exercise in knowing where your pay falls. If you look at a salary band for everyone, and how each salary compares to the midpoint of the band, that gives you a big picture of your pay practices. It is a quick calculation that can show you and your utility's management whether you are on par (or not).

Palmer regularly confers with her counterparts at other regional utilities to benchmark benefits and share other information, and she engages a compensation consultant every few years to check the market pricing for utility and non-utility-specific roles.

There are plenty of tools available to benchmark benefits, from surveys about what other companies are covering to reports that detail how much health care cost employees typically take on. Even if you don't control benefits decisions for your employees, it is helpful to know where you stand, and it might help in negotiating with benefit companies during renewals.

Data can also help with recruitment. For example, if you are interested in tracking or increasing diversity, you could ask people to self-identify when hiring. You can use this data to see if your recruiting is diverse, or if you might want to rethink efforts to get a more diverse pool of applicants. Do you have historically black colleges in your area you can recruit from? Are there diversity job boards you should consider posting to? Are there professional associations geared toward diversity that you can develop a partnership with?

Data collection doesn't have to be a big, onerous task. And you can do it without having to invest money and time in a complicated system. There are affordable, lightweight systems you can use to track this data — even a simple spreadsheet can work. You might already have programs that track employee data, such as a benefits enrollment system.

Everyone who pays payroll has some form of a human resources information system, or HRIS. So much of HR is tied to finances and budgets, and there's data in all of that. Collaborating with your financial team is extremely important. Ask if there are ways that you can pull data from the payroll system, or if there are fields you can add and track on this system.

Even utilities that can count their workforce on their hands can benefit from stepping back to look at the complete story. You might have a good picture, but pulling the numbers might change your mind or help you see something that wasn't as clear.

Have more questions about HR analytics? Ask the HR listserv to see what your peers are doing and using. Email Info@PublicPower.org to join.

RELIABILITY

In Search of Reliable Reliability Data

BY ALEX HOFMANN, DIRECTOR OF ENERGY AND ENVIRONMENTAL SERVICES, AMERICAN PUBLIC POWER ASSOCIATION

In poring over thousands of reliability reports and metrics, it is clear that utilities have vastly different ways of collecting and calculating data. While it is fine for utilities to independently decide how to make their data collection and analysis work, it does make benchmarking these measures difficult.

Before the American Public Power Association puts out a report or uses a measure for national benchmarking, we carefully check through the data and flag any irregularities. Some common issues we find within data include missing information or unknowns, rounding, and differing definitions.

Don't get me wrong — most utility data are pretty good. But some simple checks can make it even better, which can help you make more informed decisions.

The best performers often have few unknown causes of outages. Sometimes you are not going to be able to figure out what the cause of an outage is, but when you have an unknown, you don't have enough information to make any decisions or take any action. If you look at your outages and see that you have an unknown cause rate that's higher than five percent, that is an opportunity to educate and train people in the field on how this information might be able to help the utility invest better in the future.

Another common issue is rounding. For example, outage start times and end times should be random, but often data sets show clear spikes at even intervals throughout the hour. The same rounding happens with the number of customers affected, and we see spikes at counts ending in 50 and 20. That indicates a human process that might not be giving you a fully accurate picture.

Smart meters will make some rounding go away, but they can create errors, too. Meter mis-mapping can occur, and the people who wrote your outage management system software might not understand how you want things to be calculated or connected. Taking a close look at the matchup between customer records and the protective device and the customers that are out, and the minutes that are out and the time, can give you some insight into how well your meters are mapped to locations, circuits, and protective devices.

The calculation of major events, or including major events in general reliability data, can also be problematic. This is because utilities don't have similar definitions of what constitutes a major event and don't calculate it in the same way. A major event is really a way to describe something that is unusual. But this description is not helpful in explaining to the public how the next major storm could impact the utility or planning how you should invest to mitigate one.

After major events, the best we can do in terms of benchmarking is to look at restoration curves as a group relative to the other segments of the industry. Following Hurricane Irma in Florida in 2017, we compared the curves for public power and other utilities and saw that public power restored 90 percent of customers, on average, nearly two days faster than other utilities and reached 50 percent of customers restored one day ahead of other utilities.

Moving ahead, we have to think more critically about what information is useful and what is useless. Getting distracted by everything we could possibly collect about customers or equipment doesn't help us be more reliable. We need to learn how to separately focus on what we collect for accounting purposes, what allows us to solve operations problems, and what helps us to make the best investments in reliability.

A number of utilities are looking at reliability from an economic standpoint. This can include taking a backward look at trends in key indices (e.g., SAIDI) by outage cause to see which investments have had an impact, such as tree trimming, or by looking at estimated outage costs by circuit to prioritize system upgrades. For this latter measure, we've adapted the interruption cost estimator from Lawrence Berkeley National Laboratory in the eReliability Tracker to make it easy for public power utilities to estimate what outages truly cost. We've also worked with the Department of Energy to use outage cost data to allow utilities to simulate the cost of a systemwide outage caused by a cyberattack.

We care about quality reliability metrics because we know how innate they are to your operations. And it makes me proud of the industry to see how intensely everyone is thinking about these problems.

DRONES

FAA Reauthorization: A Step Toward Improving Utility Drone Use

BY ANDREW WILLS, GOVERNMENT RELATIONS DIRECTOR AND COUNSEL, AMERICAN PUBLIC POWER ASSOCIATION

Utilities can use unmanned aerial vehicles, or drones, as a cost-effective, safe way to site infrastructure, inspect facilities, and recover from emergencies. However, they need to follow safety and operational rules set by the Federal Aviation Administration. The now 60-year-old FAA must periodically be "reauthorized" by Congress, which can instruct the FAA to take certain actions during this process. In this year's reauthorization, the American Public Power Association is advocating for rules that will expand public power utilities' ability to safely and effectively use drones.

After a series of difficult negotiations, the House passed a full five-year reauthorization (H.R. 4) in April 2018. The bill included a few provisions addressing issues we raised with congressional staff. The Senate is considering passing its own version of the bill in the summer. If the Senate accepts the drone provisions from the House bill, the final FAA reauthorization will bring several key developments in how utilities can use drones.

First, the bill recognizes the FAA as the best entity to safely manage the national airspace. The House considered a provision that would have divided the FAA's control of the national airspace across all states and localities. Several groups, the Association included, expressed concerns about how such a law could create a "patchwork" of local regulations that could be cumbersome for drone users, such as public power utilities. For instance, we explained that a utility using drones across multiple jurisdictions would be required to keep track of many different rules about where, when, and how they can fly. As a result of this advocacy, Congress decided not to include this provision in the reauthorization bill.

The House-passed version of the reauthorization would require the FAA to expand its waiver process. A waiver is required for drone users who want to use a drone at night, over people, or beyond the pilot's "visual line of sight," which can be important for utilities that want to use drones for day-to-day operations. This process has historically been challenging for utilities — and only one utility, Xcel Energy, has ever gotten a waiver from the rules. Improving the waiver application process would allow utilities to more easily deploy drones following outages or disruptions or during major events where access to infrastructure might be limited or compromised.

A provision in H.R. 4 codifies a "partnership" program between the FAA and state and local governments. Through this provision, the House envisions natural collaboration, such as between a utility and local law enforcement in using drones. The program was initially put in place by President Trump through an executive memorandum in 2017, and it requires the FAA to work with 10 state and local entities to draft better drone regulations. While none of the chosen partners is a utility, the sites include cities and law enforcement agencies. This program might offer insight into where and when these groups can partner with utilities to use drones. It might also highlight areas for improvement in drone use regulations, including for public power.

Utilities are interested in seeing rules about creating "no-fly zones" over critical infrastructure. Just ask Brandon Edwards at JEA, a public power utility in Jacksonville, Florida. Edwards has a table covered in wayward drones that have been found on JEA property. Beyond the nuisance, a drone flying over critical infrastructure has the potential to create significant safety and reliability issues.

The Association pushed Congress to revive a section of the 2016 reauthorization that required the FAA to work on a "no-fly" process for airspace over critical infrastructure that was never implemented. This work led to an amendment to H.R. 4 that would require the FAA to begin the process to create physical security protections for critical infrastructure within one year. This is a prudent approach, because it does not require the FAA to rush to create a rule that might not be effective. Instead, it will create an iterative process to identify critical infrastructure across all industries. Through this action, utilities can work with the FAA to ensure protection of facilities without identifying all critical infrastructure on a map, which could create security concerns locally and even nationally.

Overall, the FAA reauthorization bill addresses several significant challenges and opportunities for drone use. As lawmakers continue the conversation on better, safer, and more efficient drone rules, we will be sure that public power has a voice in that discussion.

ADVERTISER INDEX

DATA THAT DEFINES YOU

A public power utility is much more than a set of numbers, yet a variety of data tells your story. The following items are a handful of data points that define your utility.

YOUR CUSTOMERS

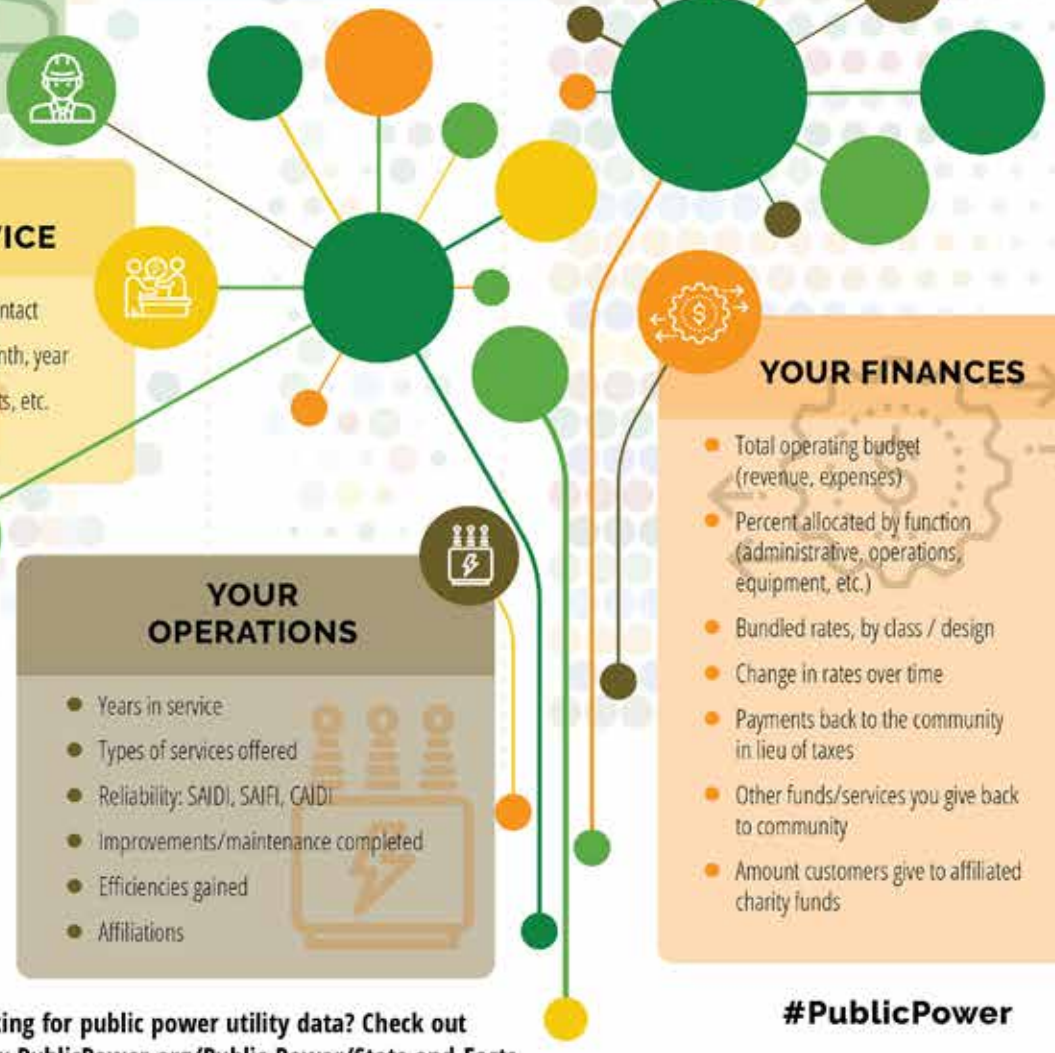
- Number of meters served
- How many residential, commercial, industrial customers
- Change in number of customers served over time
- Participation in programs (e.g., efficiency, demand response, community solar)
- LIHEAP participation
- Number of customers with DERs

YOUR EMPLOYEES

- Number of employees
- Average tenure of employees
- Turnover
- Diversity of workforce / utility leadership
- Skills and honors within your workforce
- Locality of workforce
- Annual workforce development budget

YOUR FACILITIES

- List of facilities
- Square footage covered
- Financial investment from/for the community in these facilities



YOUR CUSTOMER SERVICE

- Percent of issues addressed in first contact
- Number of customers reached by month, year
- Number of customer calls, online chats, etc.
- Customer satisfaction rating

YOUR FINANCES

- Total operating budget (revenue, expenses)
- Percent allocated by function (administrative, operations, equipment, etc.)
- Bundled rates, by class / design
- Change in rates over time
- Payments back to the community in lieu of taxes
- Other funds/services you give back to community
- Amount customers give to affiliated charity funds

YOUR POWER

- Generation owned
- Annual capacity
- MWh purchased / sold
- Breakdown of resource mix
- Peak/off-peak times
- Percent of power to different customer classes

YOUR OPERATIONS

- Years in service
- Types of services offered
- Reliability: SAIDI, SAIFI, CAIDI
- Improvements/maintenance completed
- Efficiencies gained
- Affiliations

Looking for public power utility data? Check out www.PublicPower.org/Public-Power/Stats-and-Facts.

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