

STATE OF THE NATION'S UTILITIES

Utilities lead the charge for more efficient power delivery by harnessing renewables and adopting a service-based model that perfects the electric supply-demand relationship. TILITIES, the essential power backbone of our country, are evolving rapidly to provide seamless, clean energy to a growing population. From increasing use of renewables to employing smart technology to embracing a new servicebased model, utilities are pulling out all the stops to ensure the veracity of America's power grid.

THE RENEWABLES SHIFT

Today, the United States is increasingly integrating renewables into its energy grid, while reducing its reliance on coal. In 2016, renewables made up almost 15 percent of the country's electricity generation at utilityscale facilities, according to the Energy Information Administration. In addition, reliance on natural gas is on the rise, making up roughly 34 percent of the U.S.'s electricity generation in 2016.

The increase in natural gas can be attributed to its low cost and flexible generation capacities. The low prices have encouraged utilities to run plants more, leading natural gas to surpass coal as the top U.S. generating resource last year.

Consumers continue to be a driving force in the use of renewables. One example of this is through net metering, which allows people who generate their own electricity to buy and sell it to utilities. Net metering, which is often done through power generated by solar panels, incorporates renewables into the grid on a smaller scale.

However, according to James Jackson, a business development manager at Emerson Climate Technologies, practices like net metering are forcing utilities to re-evaluate their business models. "Renewables and energy efficiency are consumer-driven, not programmatic, impacting how utilities see future business," Jackson explains. "They don't want to become a 'wires business'— meaning connecting A to B, and the grid just moves power no matter where it comes from. Utilities have done well selling electricity because of high demand. Now, microgrids, batteries, and such infringe on their business model. They can't continue to raise rates and raise rates."

As part of their re-evaluation of their business

models, utilities are incorporating renewables into their grid through integrated resource plans, or IRPs, through which they have to look at every reasonable option for providing consumers with reliable and low-cost energy. "Customers, without knowing it, are consuming renewables because it's part of the IRP," Jackson points out.

SMART-HOME TECH GROWS

As consumers become more interested in conserving energy to save money and help the planet, the number of smart-home devices has increased. These devices aim to help consumers lower the amount of energy used by providing them with more information and tools to better manage their energy consumption.

Through this technology, customers can receive more data and be able to choose a variety of technologies and services to support their individual needs. The growing popularity of devices such as Amazon's Alexa and Google Home are steadily shifting public attitudes toward smart-home devices.

As this trend grows, there will likely be more interactions between utilities and consumers through mobile, web, and even social media.

A common example of this is the smart thermostat, which enables customers to monitor and control their home's temperature from their smartphone or tablet while reducing their energy bills. These devices can monitor temperature and humidity inside and outside the home, keep track of when people come and go, and create cooling and heating cycles that match. In addition, many of these smart thermostats allow users to create preset schedules, and mobile controls can help them save energy if, say, they go on vacation and forget to turn off their heat.



Emerson's ComfortGuard Monitoring Service aims to reduce energy consumption and save customers money through a set of sensors monitored to one's air conditioning unit that provide up-to-date information and on the health of an HVAC system.

Some smart thermostats include geofencing, which tracks a customer's location in order to decide how cool or warm to keep one's home. This is helpful for those who have busy or irregular schedules and can't always predict when they'll be home. Instead of having to creating a preset schedule, the thermostat is adjusted by the owner's smartphone. For example, when he drives into his community at night, the temperature will automatically adjust.

At Emerson, a ComfortGuard Monitoring Service aims to reduce energy consumption and save customers money through a set of sensors monitored to one's air conditioning unit. These sensors provide people with up-to-date information and on the health of their HVAC system. If a problem is detected, ComfortGuard alerts Emerson's monitoring team, which will analyze the data and send an alert and a service technician. By keeping customers aware of possible maintenance issues, this system helps avoid larger problems before they happen and keeps HVAC systems running as efficiently as possible.

"It makes the AC communicate so performance or maintenance issues are caught," Jackson says. "The system monitors and sends alerts to contractors for repairs, and troubleshooting is preemptive. The system picks up the failure so contractors can be scheduled to fix or change filters."

In addition to residential customers, business customers are increasingly interested in managing their energy use platforms. Sustainability has become a goal of companies pursuing energy efficiency, rather than just gaining a competitive advantage by the cheapest means possible. Many of the nation's largest corporation, such as Walmart, McDonald's, and Google, have all set their own energy-efficiency targets for 2020.

SERVICE-BASED MODEL

Until recently, utilities typically used a commodity-based model, which focused on cost-effective supply acquisition and overall bill reduction. However, as energy efficiency becomes more of a priority for consumers, utilities will have to adjust so that they can enable customers to reduce their energy consumption without having to raise the cost of energy and still make a profit.

Those working to conserve energy will often require the kind of help utilities can provide. Going forward, utilities can take advantage of this opportunity to provide energy management services to all of their customer base. Many utilities currently offer expert energy management to their commercial customers in areas such as infrastructure, large-scale equipment, and industrial platforms; however, most of these services have not yet been extended to residential and other small-scale customers.

As part of a more service-focused model, utilities will need to provide alternative generation sources, equipment replacement, energy monitoring systems, data analytics, and facilities management services. In addition, the growing use of apps and online tools expands relationships between customers and the people providing their utilities.

One way some utilities are beginning to embrace a service-based model is through demand response, in which people can shift their electricity usage during peak periods, often in exchange for financial incentives. For utilities, this is a way to manage supply and demand. When everyone's air conditioners are running at the same time, and utilities are close to meeting capacity, they can use demand response to reduce the burden on the electrical grid.

"This used to be a way to get out of hot water; it's now a resource. If you're able to better control the grid, you can control power production," Jackson says. 'They're looking for ways to round their dollars to lowest dollar in the budget by using connected thermostats and energy efficiency."

In addition to the national trends in how utilities are changing the way they do business, there are regional ones as well. Following are case studies of three of the nation's utility companies, highlighting how they are helping guide the nation's energy grid into a new era.

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NV Energy

PowerShift by NV Energy—the right tools to save energy and money.

V ENERGY TAKES PRIDE in helping customers save energy and money while making their homes and businesses more comfortable. That is why it launched PowerShift - a one-stopshop for energy-efficiency products and service with the power tools to save.

For more than a century, NV Energy has served the state of Nevada. Today, the company delivers safe, reliable electricity to more than 1.2 million customers and a state tourist population of more than 43 million annually, and also provides natural gas to more than 165,000 citizens in the Reno-Sparks area.

With a 46,000-square-mile service territory that includes the desert southwest and Sierra Nevada mountain range, NV Energy cares deeply about the environment and the preservation of its beautiful home state.



"Our customers drive our daily operations and decision-making because we're dedicated to partnering with them. Together, we're working to ensure a reliable and sustainable energy future for generations to come." Cynthia Messina, NV Energy



NV Energy offers a Free Smart Thermostat program, which can save homeowners up to \$100 on home energy per year. The handy app allows users to access their thermostat remotely.

In 2017, PowerShift customers saved nearly 249,338 megawatt-hours of electricity, enough to power more than 14,330 homes. "Our job is to provide excellent service and help our customers make their home or business more energy efficient," said Cynthia Messina, Senior Project Manager, NV Energy. "That is why we are hard at work every day offering PowerShift tools that increase savings and contribute to the sustainability of our communities."

Free Smart Thermostat

State-of-the-art-technology helps save up to \$100 on home energy bills every year and takes the hassle out of temperature adjustments. Professionally installed, smart thermostats make it easy to set heating and cooling schedules, participate in Community Energy Events scheduled June through September and remotely access the thermostat from the free mobile app or website. A \$300 value, they are the smart way to save.

Free In-Home and Online **Energy Assessments**

PowerShift Energy Advisors make house calls when they visit a home to inspect lighting, insulation levels, seals around doors and windows and more. Customized assessments are a great way to learn about inexpensive ways to increase energy efficiency, save money and potentially receive free energy-saving products. Appointments are conveniently scheduled Monday through Saturday.

Powered by the latest technology, customers can also take a free online home energy assessment via MyAccount, the NV Energy account portal. Convenient and confidential, this interactive tool provides usage information, energy updates throughout the day, along with bill comparisons and customized tips to increase savings.

Businesses Save With PowerShift

Energy costs are controllable operating expenses for many businesses. PowerShift tools that support business





Las Vegas salon owner Donna Catalfamo loves the ability to check the thermostats in her salons to keep utility costs in check.

energy management include smart thermostats, energy assessments and incentives. Here's what Donna Catalfamo, owner, Posare Salons, Las Vegas, had to say about her PowerShift tools:

"I love being able to check the smart thermostats in our salons 24/7 from the app on my phone. It helps me manage our energy use while keeping our customers and staff comfortable. I can also adjust the temperature in one of our salons from my phone and that's really convenient. The app also notified me if the A/C unit isn't working properly and that's important because it helps with energy efficiency and maintenance."

Environmental Stewardship

Between 2005 and 2015, Nevada tripled its in-state renewable production and reduced carbon emission in the electricity sector by 44 percent. Today, that means even more clean energy with nearly 50 projects statewide. That is enough renewable energy to power more than a million homes at once.

PowerShift tools help to lower energy costs, save homes and businesses money and help the environment. NV Energy is a leader in offering a variety of energy efficiency products and services that allow customers to monitor and understand their energy use. Because when you have the right tools, you have the power to save. PowerShift Energy Advisors are available 24/7 at 855-676-9373.

Visit NV Energy at nvenergy.com/powershift.

Pacificorp

From its innovative Energy Imbalance Market to green fleets, Pacificorp helps California manage its massive grid.



PacifiCorp and the California Independent System Operator launched the Energy Imbalance Market (EIM) in 2014. The EIM uses a sophisticated system to automatically balance demand every five minutes with the lowest cost energy available across the combined grid. The EIM leverages the growing diversity of renewable resources, flexible backup resources and demand using advanced technology to keep energy supply affordable and reliable. The new market is attracting additional participants and has the benefit of increasing benefits for all customers as diversity increases.

Energy Imbalance Market. Pacificorp aims to increase energy efficiency, utilize natural resources, and save money by participating in the Energy Imbalance Market. The market was launched in 2014 by Pacificorp and the California Independent System Operator. It uses a system that automatically balances demand every five minutes with whatever energy is available at the lowest cost across the combined grid.

Through the Energy Imbalance Market, Pacificorp utilizes the growing diversity of renewable resources, flexible backup resources and demand to keep energy supply affordable and reliable. By allowing real-time visibility across and between grids, the Energy Imbalance Market measures supply and demand closer to when energy is consumed and strengthens grid reliability. Once the market systems identify changes in supply in demand, they automatically find the best resource to meet fluctuating demand.

Because the amount of energy produced by renewable sources like wind and solar is often weather-dependent, more precise regional coordination has become more important. The Imbalance Energy Market improves the ability to manage the growing diversity of resources available, smoothing out power flows and effectively integrating renewables into the grid.

Ry Schwark, a spokesperson for Pacificorp, notes that being able to use more renewables lowers overall costs: "Anytime I have to run a fossil fuel plant, there are real world costs associated with that. With renewable energy, once it's running you have no fuel costs. The incremental cost of that is zero, and you're willing to share that cheaply with neighbors. In an EIM, the renewables get used and traded first."

By taking advantage of a wider portfolio of resources Pacificorp and other utilities connected to the market can reduce the quantity of reserves required at any one time to ensure electricity is available when it's needed.

Greening Our Fleet Initiative. Pacificorp is actively pursuing new technologies to reduce fleet miles and

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related fuel consumption within the company. They've set a company-wide goal of reducing idling across their fleet by 10 percent and plan to accomplish it through an idle-free policy. By doing this, Pacificorp will avoid emitting approximately 974 tons of CO2 per year and reduce gasoline and diesel consumption by about 93,000 gallons annually.

The policy prohibits idling except when the trucks in their fleet are performing essential work that requires power from the engine. The fuel economy of each truck is monitored and reported to encourage more environmentally-friendly driving habits.

Pacificorp's growing use of automated meter reading,



GREEN TRUCK SOLUTION

Pacificorp uses Altec-built AT37G bucket trucks. The trucks use Altec JEMS (Jobsite Energy Management System), which is an integrated plug-in system that uses stored electrical energy to power the aerial device, tools and exportable power, and provides cab comfort. The energy storage system is recharged by plugging into shore power or by the truck's internal combustion engine.



which enables the company to avoid periodic trips to each physical location to read a meter, has allowed them to remove 27 pickup trucks from their active fleet, resulting in a reduction of 324 tons of CO2 emissions annually. Additionally, by replacing full-sized trucks in their automatic reading fleet with smaller, more efficient Ford Escapes, Pacificorp is able to avoid the release of about three tons of greenhouse gases each year.

Finally, new 37-foot bucket trucks used by linemen reduce carbon dioxide emissions The trucks, Altec-built AT37Gs, use plug-in hybrid electric technology to power boom operation, air conditioning and cabin heat without running the diesel engine.

THIS TECHNOLOGY:

- Eliminates idle time at the job site
- Reduces fuel consumption
- Lessens noise pollution
- Decreases carbon footprint and tailpipe emissions
- Minimizes impact on payload
- Offers reliable performance with automatic stationary recharge
- Reduces maintenance costs
- Complies with anti-idle legislation
- Is approved by the EPA

MidAmerican Energy

Part of the Midwest is served by this utility, which touts a 100% renewable vision.

Private Generation. MidAmerican Energy, which serves a 10,600-square mile area in Iowa, Illinois, South Dakota, and Nebraska, encourages energy efficiency through its commitment to customers who generate their own energy. MidAmerican provides energy to private generation customers when a private generation source isn't producing enough energy to meet their needs.

Private generation customers can also sell any excess energy they produce to MidAmerican Energy in a net metering program. Excess energy is sent through a customer's meter to the grid, and MidAmerican credits the customer. This both encourages users to produce their own energy and, in some cases, reduces MidAmerican's own need to generate.

100% Renewable Vision. In April 2016, MidAmerican announced a goal to eventually provide 100 percent renewable energy for its customers. In 2004, 70 percent of the company's generation came from coal, and it wasn't using wind energy at all. By the end of 2016, 48 percent of its generation capacity came from wind, and 31 percent came from coal.

A key component in accomplishing this vision is the Wind XI project, in which MidAmerican will invest \$3.6 billion to install additional wind turbines in Iowa by the end of 2019. When this project is completed, the company's annual renewable energy generation is expected to reach a level equivalent to 89 percent of MidAmerican's Iowa customers' annual use.

In addition to its focus on generating more renewable energy, MidAmerican is preparing to support the integration of renewable energy into its power grid by investing in its transmission infrastructure and working to ensure it can carry the growing power load.



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