



The Edison Foundation

INSTITUTE for
ELECTRIC INNOVATION

Report

Electric Company Smart Meter Deployments: Foundation for a Smart Grid (2021 Update)

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EXECUTIVE SUMMARY

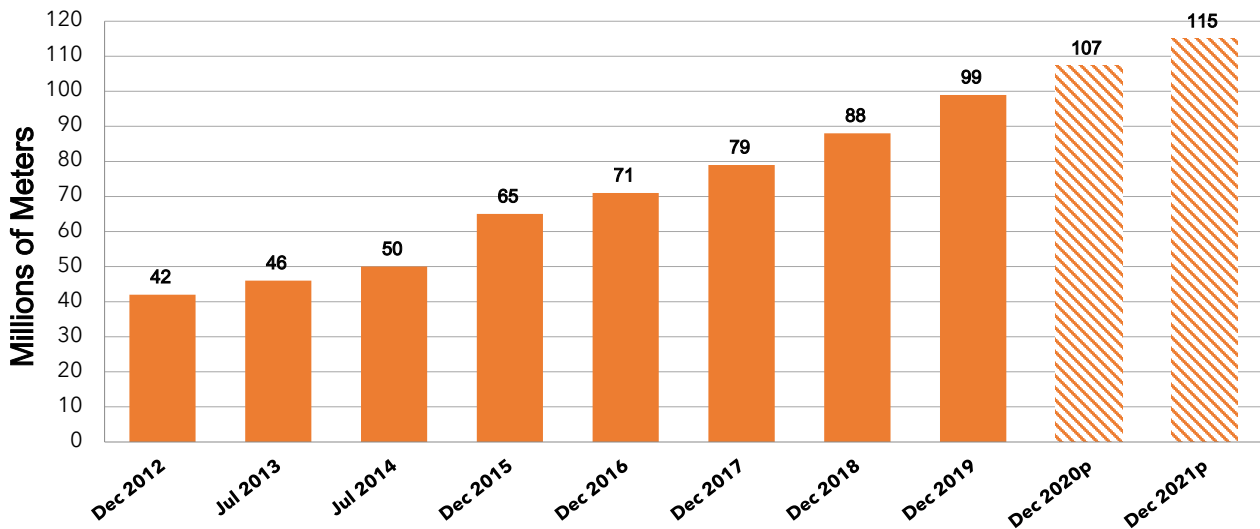
Smart meters continue to be a key technology for the electric power industry and are the foundation for a customer-facing energy grid. Smart meters enable more rapid two-way communications between electric companies and their customers; provide new and expanded services for customers; and enhance energy grid resiliency and operations.¹

Deployment of smart meters began more than a decade ago, and, today, electric companies continue to work with technology companies to utilize the data and capabilities that smart meters provide to benefit customers.² In fact, throughout 2020, many electric companies used smart meter data to deliver personalized energy management insights and tips to assist customers during the COVID-19 pandemic.

In this report, we discuss some of the innovations, benefits, and capabilities enabled by smart meters; summarize the status and projected number of smart meters installed nationwide; and provide our perspective on the growing importance of investing in the distribution system.

As shown in Figure 1, smart meter installations have grown dramatically since 2011. As of year-end 2019, electric companies had installed 99 million smart meters. Based on survey results and approved plans, we estimate that 107 million smart meters were deployed by year-end 2020, covering 75 percent of U.S. households, and that 115 million smart meter deployments are expected by year-end 2021.

Figure 1: U.S. Smart Meter Installations Reach 107 Million in 2020 and Are Projected to Reach 115 Million in 2021

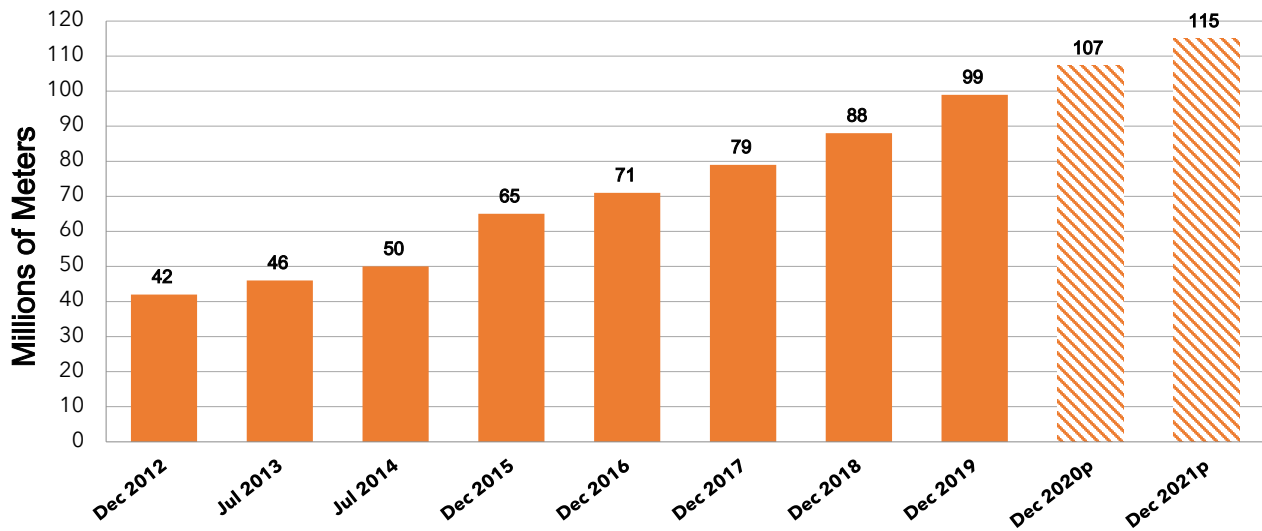


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1. Smart meters, or advanced metering infrastructure (AMI), are digital meters that measure and record electricity usage data hourly, or more frequently, and allow for two-way communication between electric companies and their customers.
 2. For the purposes of this report, the electric power industry includes investor-owned electric companies, public power utilities, electric cooperatives, and federal utilities. We use the term 'electric companies' in this report to encompass all of these industry segments.

INTRODUCTION

Smart meters are the foundation for a smart grid. Electric companies had installed 99 million smart meters as of year-end 2019. Based on approved plans, completed and ongoing deployments, and proposals before state regulatory commissions, we estimate that 107 million smart meters were deployed by the end of 2020, covering 75 percent of U.S. households, and that 115 million smart meters will be deployed by the end of 2021.

Figure 3. U.S. Smart Meter Installations Reach 107 Million in 2020 and Are Projected to Reach 115 Million in 2021



This report highlights how electric companies are using smart meter data, underlying communications systems, and technology to:

- respond to and support customers during the COVID-19 pandemic;
- effectively engage customers in programs to shift and shape their energy use to meet clean energy goals; and
- enhance energy grid resiliency and operations during severe weather events.

This report also includes examples of how technology companies are partnering with electric companies to use smart meter data to provide value to customers.

The Appendix includes the following smart meter deployment information:

- Table 1. Summary of smart meter installations and projected deployments.
- Table 2. Smart meter deployments by electric company.
- Table 3. Smart meter counts by state.
- Table 4. The 58 investor-owned electric companies with fully deployed smart meters.

SUPPORTING CUSTOMERS DURING COVID-19 & BEYOND

As the impacts of COVID-19 persist, residential customers are spending more time at home and are using more electricity to work and to learn from home. Throughout this pandemic, electric companies have supported their customers by offering innovative customer assistance and bill relief programs and flexible customer payment plans; providing proactive communications to engage customers in energy management; and helping to accelerate the delivery of energy assistance funds.

This section provides examples and describes how smart meter data and analytics are helping electric companies communicate and engage with their customers; deliver detailed insights that give customers greater control over their energy usage; provide personalized services; and help customers manage their carbon footprint.

HOME ENERGY USAGE INSIGHTS AND PROACTIVE BILL MANAGEMENT

The level of services and benefits that electric companies offer their customers has increased since these companies began deploying smart meters more than a decade ago. Smart meters provide data that households can use to manage energy, save money, set budgets, receive outage alerts and updates, and reduce their carbon footprints. This is particularly valuable as more customers are seeking to control their energy bills.

ELECTRIC COMPANY EXAMPLES

DTE Energy

- **DTE's Insight App**, powered by smart meter data, has proven to be a critical tool to meet rapidly changing customer needs during the pandemic. The average number of app downloads increased 51 percent in March and April 2020. By applying analytics to smart meter data, DTE Energy's Insight App delivers device-level energy usage data to customers with 99.8 percent accuracy and helps customers make informed home energy management decisions. On average, Insight generates 5 percent energy savings when a customer engages 25 times or more per calendar year. Since March 2020, five key features of the DTE Insight App have been driving the increase in customer energy engagement.⁵
 - **Keeping tabs on the Energy Budget:** More households are creating energy budgets - with budget tracking increasing by 78 percent.
 - **Extending Energy Management to the Smart Home:** More customers are connecting smart devices, like thermostats, smart plugs, and light bulbs. Connection rates increased by 45 percent since March 2020.
 - **Engaging with an Energy Advisor:** Via the Energy Advisor, customers can seek personalized advice to uncover and eliminate energy waste. Since March 2020, visits to the Advisor increased 34 percent.

5. <https://www.utilitydive.com/spons/proactive-empowered-key-trends-in-home-energy-management/582089/>

- **Finding Room for Improvement:** Customers are tracking how their actions are driving energy efficiency. Engagement in Energy Scores rose 30 percent since March 2020.
- **Keeping Track of Energy Usage:** More customers are tracking their whole-home energy usage and watching for energy spikes. Engagement in Energy Visualizations increased 20 percent since March 2020.

Florida Power & Light

- **Florida Power & Light's (FPL's) smart meter-enabled energy dashboard** helps residential customers understand how and why their electricity usage changes over time and provides personalized solutions to help customers control their energy consumption. The dashboard, accessible via FPL's website or app, utilizes interval data from the customer's smart meter to compare usage over time, project next month's bill, and FPL's Home Energy Survey identifies energy consumption by major household appliances. By using load curve analytics, the survey can pinpoint opportunities for energy efficiency improvements. In addition, FPL's Care Center Representatives are using the dashboard with customers who call in with bill concerns.

TECHNOLOGY COMPANY EXAMPLES

Oracle Utilities

- Using **Oracle Utilities' Opower** product suite, electric companies with smart meters can help their customers control their energy use by offering high usage alerts, weekly energy updates, and on-demand energy bill insights embedded into web, mobile, and agent desktop tools. In March 2020, when the COVID-19 pandemic started, Opower generated 400 percent more high usage alerts than usual, and customers digitally engaged with those alerts at rates 3 times the industry average.
- With smart meter data and artificial intelligence (AI) technology, electric companies are detecting—for each customer—the right pricing plan, the right time to charge an electric vehicle (EV), unusually costly appliances, and the customer's best opportunities to take action and save money. By layering meter, program participation, income, housing, and unemployment data, these electric companies are now automatically identifying their most financially vulnerable customers and proactively are reaching out to them with billing insights and assistance.

Uplight

- In 2020, 48 percent of energy customers reported that they were monitoring their energy consumption less due to COVID-19, according to market research by **Uplight**. Uplight has been working with electric companies to get customers more engaged by using smart meter data to provide high usage alerts during the middle of the billing cycle. These alerts help customers understand and potentially adjust their energy usage before their bill arrives. By giving customers benchmarks on comparative historical usage, electric companies arm customers with personalized tips to bring their energy usage in line with "normal" and avoid bill surprises.
- Uplight has found that mid-cycle usage and next bill notifications see a 55 percent average

open rate—nearly 3 times the industry standard. The engaging and informative nature of usage alerts has spurred electric companies to adopt them as a tool to help customers. Usage alerts engage customers and are the antidote for distracted customers.

Pricing and Bill Payment Options

Smart meters enable electric companies to offer a range of bill payment and pricing options to customers, including pre-payment, pay-as-you-go, and time-varying rates. Pricing options enabled by smart meter data can incent load shifting to off-peak hours or when clean energy is available on the grid and encourage reduced energy consumption.

ELECTRIC COMPANY EXAMPLES

Baltimore Gas and Electric

- As part of **Baltimore Gas and Electric's (BGE's)** smart meter rollout, all residential customers automatically were enrolled in Smart Energy Rewards, a dynamic pricing program that enables them to earn bill credits for reducing their usage during an "Energy Savings Day." Customers receive a notice the day before the event, and, if they voluntarily reduce their usage, they receive a bill credit of \$1.25 per kilowatt-hour saved. Using behavioral science and smart meter data, BGE includes a home comparison savings feature in post-event communications to motivate customers to save more next time and to congratulate them for engaging. Smart Energy Rewards is one of the largest dynamic pricing programs in the United States, and BGE continually is testing new tactics to keep the program relevant and engaging for customers. Over the past three years, customer satisfaction has remained in the mid-80 percent range, and more than 1.2 million customers have engaged since its launch in 2013.

Georgia Power

- In 2020, **Georgia Power** launched "Pay by Day," a billing and payment plan that offers customers an option to manage their energy use and payments using a fixed daily price for electricity based on their projected consumption over an entire year. Georgia Power is a pioneer in offering prepaid service plans—more than 80,000 customers are enrolled in standard PrePay, with most making weekly payments and receiving text or email notifications about their usage and funds balance. Pay by Day combines the convenience of PrePay with the certainty of a fixed daily price, no matter the amount of energy used, giving customers certainty in their energy costs. In addition, the Pay by Day plan helps customers with outstanding balances regain control by applying 25 percent of every payment to the remaining balance.⁶

6. Georgia Power uses smart meter data to design and offer innovative rate solutions that fit customer needs and that help customers manage their budgets. As of December 2020, Georgia Power's residential customers can choose from seven different rate plans.

TECHNOLOGY COMPANY EXAMPLE

Powerley

- Through **Powerley's** electric company-branded home energy management (HEM) solution, real-time data accessed from smart meters is being transformed into new energy experiences that empower customers with greater control over their energy consumption. The consumption footprint data also is fueling intelligent insights that equip electric companies and their customers with the power of awareness, prediction, and control.
- The demand for Powerley's electric company-branded HEM solutions increased by 57 percent during the COVID-19 pandemic, as more people began working from home. These apps can help eliminate customer bill surprises through predictive insights—by allowing the customer to see not only what usage is today, but what it is going to be tomorrow. Engagement with Powerley Advisor, the personalized in-app energy assistant, increased 34 percent since March 2020, delivering prescriptive guidance to customers to curtail rising energy costs.
- These same predictive insights also can alert the electric company when a customer is struggling to stay within an energy budget or is experiencing unexpected surges in energy usage. The electric company then can suggest payment solutions proactively before the customer bill becomes a collection issue. By augmenting existing customer support programs with the added insight gained from HEM solutions, proactive payment assistance can be extended to the right customer when it matters most.

ENGAGING CUSTOMERS IN PATHWAYS TO A CLEAN ENERGY FUTURE

As of year-end 2020, preliminary data show that carbon emissions from the U.S. power sector were 40 percent below 2005 levels, the lowest level in more than 40 years. The transition to a clean energy future is underway, and smart meters are among the technologies electric companies are using to engage customers with energy management and demand response programs that encourage them to shift their electricity usage away from peak demand times. As the number of connected home/building devices like smart thermostats continues to grow, customers have more opportunities to save energy and money while reducing carbon emissions.

ELECTRIC COMPANY EXAMPLES

Consumers Energy

- In May 2020, **Consumers Energy** was able to quickly provide 100,000 households with smart thermostats at no cost to help Michigan residents power through the COVID-19 pandemic by saving energy and money while protecting the environment. Coupled with Consumers Energy's Peak Power Savers program and smart meter data, households can shift usage, creating the potential to reduce demand collectively by 14 megawatts or more during summer. Smart meter data is used to determine bill credits based on actual reductions during demand response events and to generate a feedback loop with customers. Analytics driven by smart meter data were very effective in targeting customers to engage in this initiative. Engagement rates were

as high as 90 percent, with approximately 15,000 smart thermostats deployed per week until the 100,000-household cap was reached. This rapid engagement by customers in a demand response program was unprecedented.

Southern California Edison

- In 2019, **Southern California Edison**, the University of California, and California State University entered a first-of-its-kind, performance-based, greenhouse gas (GHG) reduction pilot using 15-minute smart meter data to provide detailed time and location data for energy consumption with a goal of reducing emissions. This innovative, collaborative approach (formally known as the Clean Energy Optimization Pilot) is unique in that success is based on GHG emissions avoided, rather than reduced energy use. The universities are rewarded for focusing on actions that reduce GHG emissions, including energy efficiency, using on-site renewable energy resources, clean transportation, and energy storage. The actions the universities adopt to reduce GHG emissions can earn incentives based on actual metered results. This pilot is funded through SCE's GHG cap-and-trade allowance revenue.⁷

"The best, near-term opportunities to achieve deep carbon reductions quickly and cost-effectively are on the demand side, and those opportunities require smart meters. Electric company smart meters support price signals for shifting demand to times when the energy supply on the grid is cleanest, to make it obvious to customers which inefficient appliances need to be upgraded, and to identify and recruit high-value, coincident-peaking customers into smart device and demand flexibility programs. Finally, interval usage data from smart meters, paired with marginal emissions data, will enable accurate measurement of the actual emissions impacts of demand-side programs so that such programs can be appropriately rewarded for the carbon emissions reductions value they deliver." –Oracle Utilities

Other Services

Electric companies are supporting a range of other customer services using smart meter data, including:

- Offering online access to view and download energy use information from company websites and mobile apps.
- Providing fewer estimated bills for a better customer experience.
- Providing remote connect and disconnect services to customers who are moving.
- Using smart meter data to resolve billing questions.
- Enabling rate plan comparisons to ensure a customer is on the most economic plan.

As electric companies increasingly engage with customers via online platforms, apps, and other channels, even more customer services and solutions will be enabled by smart meter data.

7. Additional information on SCE's Clean Energy Optimization Pilot can be found here: <https://energized.edison.com/stories/fighting-climate-change-through-higher-education#YHYHqslHnk.link>

TECHNOLOGY COMPANY EXAMPLE

IBM

- According to **IBM**, early adopters of smart meters are actively planning for the next generation of meter and network assets and analytics. Internet of Things (IoT) sensors, big data management, and embedded AI will help to maintain the safety, resilience, and security of energy grids as decentralized generation, EVs, storage, and expanded customer participation options continue to grow.
- Smart meters, powered by 5G and edge computing, will enable an open smart metering ecosystem that promotes broad participation and new offerings for customers. Streaming analytics will digest and process millions of messages in real-time to better predict asset failures and identify faults, enable self-healing grids, and enhance field operations and restoration efforts. These intelligent workflows will create value for operations and customer service groups and will improve communications between customers and their electricity providers.
- To capture the opportunities, IBM is partnering with electric companies to embrace the latest metering and digital technologies, to design intelligent workflows to increase transparency and operational resilience, and to embrace changes in skills and culture. Via intelligent workflows, the next generation of intelligent meters and technologies truly will make both energy providers and customers even smarter.

SUPPORTING CUSTOMERS DURING WEATHER EVENTS

Having a reliable supply of electricity is more than just a convenience—it is a necessity. Our economy and our way of life depend on it. Customers expect continual improvements to resilience and reliability, and smart meters, coupled with other advanced technologies and continued investment in people and processes, are changing the ways electric companies identify, respond to, and recover from disruptions to the energy grid. For example:

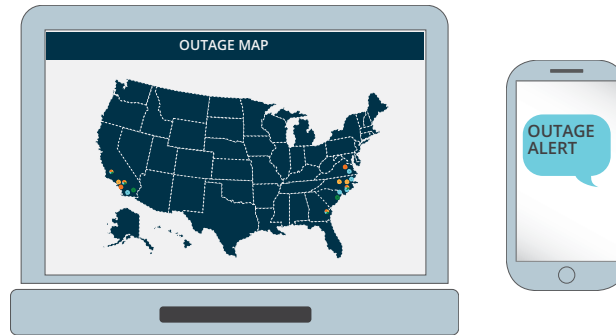
- Smart meter data and analytics provide situational awareness so that crews can be sent to the highest priority outage locations.
- On circuits that have switching devices or automation, faults are isolated, and outages can be avoided, or a large percentage of customers can be restored within minutes.

Electric company investments in the distribution system were estimated to be more than \$41.8 billion in 2020.⁸ Through targeted investments, electric companies are developing a digital distribution system that can serve as a platform to enhance energy grid resilience and reliability, integrate a growing number of DERs, and provide more customer solutions.

This section outlines how electric companies use smart meter data, analytics, technology, and communication networks to notify customers about outages and estimated restoration times proactively, to mitigate wildfires, and to predict and enhance energy grid reliability and operations.

8. EEI Industry Capital Expenditures with Functional Detail (December 2020). https://www.eei.org/issuesandpolicy/Finance%20and%20Tax/EEI_Industry_Capex_Functional_2020.pdf

Smart meters help keep customers informed



about outages and restoration times.

Proactive Outage Communications

By investing in smarter energy infrastructure, physical grid hardening, digital grid technologies, and data analytics to enhance grid resiliency and to improve visibility into outages, electric companies can restore power faster when outages do occur, resulting in millions of avoided outage minutes. Smart meters help to notify customers if their power is out, provide an estimated time to restore service, and deliver a final notice when the power is back on.

ELECTRIC COMPANY EXAMPLE

Orange & Rockland Utilities

- In August 2020, Tropical Storm Isaias strengthened well beyond forecasted levels hours before landfall, requiring **Orange & Rockland Utilities (O&R)** to ramp up communications to customers quickly. Ahead of the storm, O&R sent text messages to 200,000 customers who were enrolled in the proactive notification program. O&R used its smart meter network to avoid 3,000 truck rolls and restored 97 percent of customers within 100 hours, about 2,000 customers per hour. Battery backup of the network allowed smart meters to communicate power on/off status with the O&R control center, which helped O&R's restoration strategy.

TECHNOLOGY COMPANY EXAMPLE

Itron

- **Itron's** smart metering technology is broadly deployed and serves as the foundation for electric companies to push critical intelligence to the point of service, providing an elastic and efficient infrastructure to improve energy grid reliability, reduce outages, engage customers, and enable new applications. Recent advancements in embedded distributed intelligence—which is the ability to move analysis, decision-making, and action closer to the point of origin of distribution grid events—allow electric companies to manage rapidly changing grid conditions,

monitor voltage, detect outages and high impedance, support active transformer load management, disaggregate customer load, and more.

Wildfire Mitigation Plan

In 2020, Pacific Gas & Electric (PG&E) updated its wildfire mitigation plan to focus on executing smaller, shorter, and smarter Public Safety Power Shutoff (PSPS) events.⁹

ELECTRIC COMPANY EXAMPLE

Pacific Gas & Electric

- **PG&E** has enabled single-phase smart meters to send real-time alarms to the Distribution Management System under partial voltage conditions (25-75 percent of nominal voltage). This enhanced situational awareness can help detect and locate downed distribution lines more quickly to enable faster response. Faster response not only may reduce the amount of time the line is down, but also may allow first responders to extinguish wire down-related ignitions more quickly if they occur.¹⁰
- This application of smart meters, in addition to other upgrades in weather station technology and high-definition cameras, have increased weather modeling granularity by more than 50 percent. In combination with more than 600 sectionalizing devices and transmission switches, the first PSPS event in 2020 impacted 170,000 customers, compared to impacting approximately 1 million customers during a 2019 PSPS event. In addition to impacting fewer customers, PG&E is aiming to achieve 50 percent faster service restoration times (12 hours or less from event clearances).

TECHNOLOGY COMPANY EXAMPLE

Sensus

- According to technology company **Sensus**, by incorporating intelligence at the edge, smart meters are continually monitoring the grid—acting as an extension of the electric company’s workforce. With its latest meter, the Stratus IQ™, the company reimagined the traditional measurement hardware and introduced software-defined metrology. This technology shift addresses the rapidly changing nature of the power system. Through simple code changes, electric companies now can dynamically add new measurement capabilities to the smart meter. With this advanced software architecture, electric companies can incorporate four quadrant metering, as well as solutions like open-neutral detection across their existing meter population. This allows them to track the flow of electricity more accurately and to provide a safer environment for their customers. With a traditional metrology chip, this would not be feasible.
- High-resolution snapshots of voltage and current signals also were implemented to provide insight into momentary outages, allowing the electric company to investigate and take action

9. https://www.pge.com/pge_global/common/pdfs/safety/emergency-preparedness/natural-disaster/wildfires/PGE_2020_CWSP_Update.pdf

10. https://www.pge.com/pge_global/common/pdfs/safety/emergency-preparedness/natural-disaster/wildfires/Wildfire-Safety-Plan.pdf

before the issue escalates. Smart meters do not exist in isolation, though. When paired with a reliable network and advanced software solutions, tools like digital twins and machine learning enable electric companies to perform rigorous network modeling and proactively to identify system anomalies, thereby reducing outage times and, subsequently, operation expenses for the electric company and its customers.

Advanced Grid Operations & Analytics

Electric companies are supporting a range of other distribution system planning and operations capabilities using smart meter data and underlying communication networks, including:

- Leveraging the smart meter network to connect to, monitor, communicate with, and control devices with smart inverters (e.g., solar energy systems).
- Using asset monitoring and diagnostics to inform proactive maintenance and to identify overloaded and underloaded transformers.
- Using mapping and model validation, such as meter to transformer mapping.

CONCLUSION

As the role of the distribution grid continues to grow and to evolve, smart meters remain the fundamental building block. By the end of 2020, an estimated 107 million smart meters were deployed across the country; 115 million smart meter deployments are expected by year-end 2021.

Increasingly, electric company distribution resource plans identify and prioritize grid modernization investments—both software and hardware—that must be made to improve visibility into the distribution system, enhance resiliency, manage outages, integrate growing numbers of DERs, and provide a platform for advanced customer solutions.

As electric companies continue to manage, operate, and invest in an increasingly digital energy grid, a critical next step is to continue to utilize the data generated from smart meters as a strategic asset to improve grid operations, use customer resources more efficiently, and offer new services to customers.

Table 1. Summary of Smart Meter Installations and Projected Deployments

| Electric Company Type | Total Installed Smart Meters | | |
|---|------------------------------|--------------------|--------------------|
| | 2019 | 2020p | 2021p |
| Investor-Owned | 73,149,000 | 79,029,000 | 84,733,000 |
| Public Power Utilities & Electric Cooperatives | 25,899,000 | 28,330,000 | 30,517,000 |
| U.S. Total | 99,048,000 | 107,359,000 | 115,250,000 |

Note: Totals are rounded to nearest thousand. 'p' indicates projected for 2020 and 2021.

Table 2. Smart Meter Installations and Projected Deployments by Investor-Owned Electric Company

| Electric Company | State | Meters Installed (2019) | Projected Meters Installed (2020) | Projected Meters Installed (2021) | Notes |
|--------------------|----------|-------------------------|-----------------------------------|-----------------------------------|---|
| AES Indiana | IN | 185,000 | 273,000 | 366,000 | AES Indiana has installed 273,000 smart meters and is strategically deploying smart meters where needed. AES Indiana has a pending application for full deployment of smart meters in 2023. |
| AES Ohio | OH | 2,000 | 2,000 | 28,000 | AES Ohio filed a Grid Modernization Plan that is pending approval from the Public Utilities Commission of Ohio (PUCO), which includes full deployment of smart meters in 2024. |
| ALLETE | MN WI | 102,000 | 138,000 | 148,000 | Minnesota Power deployed 87,000 smart meters by year-end 2019 in northeast Minnesota and expects to complete full deployment by the end of 2021. Superior Water, Light & Power has fully deployed 15,000 smart meters in Wisconsin. |

| Electric Company | State | Meters Installed (2019) | Projected Meters Installed (2020) | Projected Meters Installed (2021) | Notes |
|--------------------------------|--|-------------------------|-----------------------------------|-----------------------------------|--|
| Alliant Energy | IA WI | 957,000 | 974,000 | 974,000 | Wisconsin Power and Light's smart meter implementation was completed in December 2011, totaling 477,000 meters. In Fall 2017, Interstate Power and Light began deploying smart meters in Iowa, and the work was substantially completed as of year-end 2019. |
| Ameren Corporation | IL MO | 1,342,000 | 1,498,000 | 1,748,000 | In 2019, Ameren substantially completed deployment of smart meters throughout its Illinois territory. The pending 2019 Ameren Missouri rate case includes a plan to fully deploy smart meters by 2025. |
| American Electric Power | IN MI OH OK TX VA WV | 3,138,000 | 3,366,000 | 4,073,000 | AEP's Indiana Michigan Power subsidiary has deployed 16,000 smart meters; AEP Ohio has deployed 1,054,000 and is pending approval for Phase 3 to reach full deployment of 1,554,000 by the end of 2022; AEP Texas reached full deployment of 1,098,000 meters; AEP's Public Service Company of Oklahoma has deployed 578,000 meters; and AEP's Appalachian Power deployed 445,000 smart meters as part of a broadband pilot program in Virginia. |
| Arizona Public Service | AZ | 1,269,000 | 1,269,000 | 1,269,000 | APS achieved full deployment of smart meters in March 2016. |

| Electric Company | State | Meters Installed (2019) | Projected Meters Installed (2020) | Projected Meters Installed (2021) | Notes |
|-------------------------------------|----------------------|-------------------------|-----------------------------------|-----------------------------------|--|
| Avangrid | CT ME NY | 876,000 | 912,000 | 952,000 | Central Maine Power Company completed its smart meter deployment in 2012 and currently has 632,000 smart meters installed. United Illuminating has installed 244,000 smart meters and anticipates full deployment in 2022. Both NYSEG and Rochester Gas & Electric have received approval to begin smart meter deployment in 2022 and to fully deploy in 2025. |
| Avista Corporation | ID WA | 256,000 | 256,000 | 256,000 | Avista has substantially completed a full rollout of smart meters in Washington and is currently evaluating smart meter deployment in Idaho. |
| Baltimore Gas & Electric | MD | 1,309,000 | 1,328,000 | 1,328,000 | BGE has fully deployed 1,309,000 smart meters, with anticipated growth through new customer enrollments. |
| Black Hills Corporation | CO MT SD WY | 214,000 | 214,000 | 214,000 | Black Hills Energy has fully installed 214,000 smart meters in its service territory across four states. |

| Electric Company | State | Meters Installed (2019) | Projected Meters Installed (2020) | Projected Meters Installed (2021) | Notes |
|----------------------------|--------------|--------------------------------|--|--|---|
| CenterPoint Energy | IN TX | 2,694,000 | 2,694,000 | 2,694,000 | CenterPoint Energy received approval in 2008 to install an advanced metering system across its Texas service territory. It completed deployment in July 2012 and currently has 2,542,000 smart meters installed in the greater Houston area. Vectren, recently acquired by CenterPoint, fully deployed 152,000 smart meters in its Indiana service territory in 2019. |
| Cleco Power | LA | 288,000 | 288,000 | 288,000 | Cleco Power fully deployed smart meters across the company's entire service territory, after receiving approval from the Louisiana Public Service Commission in 2011. |
| Commonwealth Edison | IL | 4,156,000 | 4,156,000 | 4,156,000 | In June 2013, ComEd received regulatory approval for full deployment of smart meters, which was completed in 2018. |
| Consolidated Edison | NY NJ | 2,614,000 | 3,739,000 | 5,039,000 | ConEdison received approval to deploy 5,039,000 by 2022. As of December 2019, ConEdison had deployed 2,614,000 smart meters. |
| Consumers Energy | MI | 1,841,000 | 1,841,000 | 1,841,000 | Consumers Energy, a subsidiary of CMS Energy, achieved full deployment in 2017. Through 2020, new customer enrollments led to a total of 1,841,000 smart meters deployed. |

| Electric Company | State | Meters Installed (2019) | Projected Meters Installed (2020) | Projected Meters Installed (2021) | Notes |
|-------------------------------|----------------------------------|-------------------------|-----------------------------------|-----------------------------------|---|
| Dominion Energy | NC SC VA | 464,000 | 767,000 | 1,687,000 | Dominion Virginia completed installation of 641,000 smart meters through 2020 and plans to have more than 1 million deployed by the end of 2021. Dominion South Carolina, formerly SCANA, expects 120,000 smart meters deployed by the end of 2020 and full deployment in 2023. Dominion North Carolina currently is in early-stage development and smart meter deployment. |
| DTE Energy | MI | 2,539,000 | 2,539,000 | 2,539,000 | DTE Energy achieved full deployment in 2016 and currently has 2,539,000 smart meters. |
| Duke Energy | FL IN KY NC OH SC | 6,207,000 | 7,798,000 | 7,870,000 | Duke Energy has fully deployed 747,000 smart meters in Ohio, 149,000 in Kentucky, 869,000 in Indiana, and 798,000 in South Carolina. In other jurisdictions, through the end of 2020, Duke Energy was projecting to have deployed 1,728,000 meters in Florida and 3,507,000 in North Carolina. Full deployments continue in North Carolina and Florida into 2021. Nearly 8 million meters are projected to be installed by the end of 2021. |
| Duquesne Light Company | PA | 600,000 | 600,000 | 600,000 | Duquesne Light has deployed 600,000 smart meters. |

| Electric Company | State | Meters Installed (2019) | Projected Meters Installed (2020) | Projected Meters Installed (2021) | Notes |
|-----------------------------|----------------------|-------------------------|-----------------------------------|-----------------------------------|--|
| Entergy Corporation | AR LA MS TX | 934,000 | 2,189,000 | 2,943,000 | In 2020, Entergy deployed 2,189,000 smart meters of an enterprise-wide deployment of 2,943,000 smart meters expected by July 2021. Entergy has fully deployed smart meters in New Orleans and Texas; 705,000 in Louisiana; 467,000 in Arkansas; and 340,000 in Mississippi. |
| Evergy | KS MO | 1,590,000 | 1,594,000 | 1,598,000 | Evergy expected 1,594,000 smart meters to be fully deployed across its service territories by the end of 2020: 630,000 in Missouri and 964,000 in Kansas. |
| FirstEnergy Corp. | NY OH PA | 2,112,000 | 2,112,000 | 2,112,000 | Pennsylvania Act 129 (2008) requires electric distribution companies with more than 100,000 customers to install smart meter technology. Faster than originally planned, 2,078,000 smart meters have been deployed in Pennsylvania as of yearend 2020. FirstEnergy subsidiary, Penn Power, is fully deployed with 170,000 meters. At year-end 2020, West Penn Power had 732,000 smart meters deployed; MetEd had 581,000; Penelec had 594,000. The Illuminating Company in Cleveland installed 34,000 meters as part of a pilot. |
| Green Mountain Power | VT | 271,000 | 273,000 | 275,000 | Green Mountain Power has deployed 271,000 smart meters to customers across Vermont. |

| Electric Company | State | Meters Installed (2019) | Projected Meters Installed (2020) | Projected Meters Installed (2021) | Notes |
|-------------------------------------|----------------|-------------------------|-----------------------------------|-----------------------------------|--|
| Hawaiian Electric Industries | HI | 28,000 | 50,000 | 50,000 | Hawaiian Electric installed 5,000 smart meters during the first phase of its smart grid program. The company filed a grid modernization plan with its state regulatory commission and will make targeted smart meter investments through 2020. |
| IDACORP | ID OR | 559,000 | 559,000 | 559,000 | Idaho Power has fully deployed 559,000 smart meters across its service territories in Idaho and Oregon. |
| MGE Energy | WI | 10,000 | 10,000 | 10,000 | MGE Energy has deployed 10,000 smart meters. |
| National Grid | MA NY RI | 30,000 | 30,000 | 30,000 | National Grid's pilot was approved by the Massachusetts Department of Public Utilities in August 2012; 30,000 smart meters have been installed for a pilot demonstration. A recent filing in New York and anticipated filings in Rhode Island project larger scale deployment of smart meters between 2023 and 2027. |
| NextEra Energy | FL | 5,629,000 | 5,536,000 | 5,536,000 | FPL has fully deployed 5,160,000 smart meters to residential, commercial, and industrial customers. Gulf Power reached full deployment in 2012 and has 469,000 meters. |

| Electric Company | State | Meters Installed (2019) | Projected Meters Installed (2020) | Projected Meters Installed (2021) | Notes |
|-------------------------------|----------|-------------------------|-----------------------------------|-----------------------------------|---|
| NorthWestern Energy | MT SD | 95,000 | 95,000 | 275,000 | In 2018, NorthWestern Energy began installing new electric smart meters as part of a technology upgrade project that will enable two-way meter communication between NorthWestern Energy and its customer meters. As of year-end 2019, NorthWestern Energy had installed 95,000 smart meters in South Dakota. In 2021, NorthWestern Energy plans to install 180,000 smart meters in Montana with full deployment of approximately 380,000 smart meters expected to be completed in Montana in 2023. |
| NV Energy | NV | 1,328,000 | 1,328,000 | 1,328,000 | NV Energy has fully deployed 1,328,000 smart meters. |
| OGE Energy Corporation | AR OK | 887,000 | 887,000 | 887,000 | OG&E has fully installed 887,000 meters: 817,000 in Oklahoma and 70,000 in Arkansas. |
| Oncor | TX | 3,677,000 | 3,677,000 | 3,677,000 | Oncor has fully deployed 3,677,000 smart meters across its service territory. |
| PG&E Corporation | CA | 5,323,000 | 5,323,000 | 5,323,000 | PG&E has fully deployed 5,323,000 smart meters across its service territory. |
| Pacific Power | CA OR | 657,000 | 657,000 | 657,000 | Pacific Power reached full deployment of smart meters in 2019 across service territories in California (47,000) and Oregon (610,000). |
| PECO | PA | 1,685,000 | 1,685,000 | 1,685,000 | PECO has fully deployed 1,685,000 smart meters. |

| Electric Company | State | Meters Installed (2019) | Projected Meters Installed (2020) | Projected Meters Installed (2021) | Notes |
|--|----------------|-------------------------|-----------------------------------|-----------------------------------|--|
| Pepco Holdings | DC DE MD | 1,447,000 | 1,447,000 | 1,447,000 | Pepco has reached full deployment in the District of Columbia with 317,000 smart meters installed. In Maryland, Pepco and Delmarva Power have reached full deployment, with 585,000 and 213,000 smart meters installed, respectively. In Delaware, Delmarva Power has reached full deployment with 330,000 meters installed. |
| Portland General Electric | OR | 889,000 | 889,000 | 889,000 | PGE's smart meter program was approved by the state regulatory commission in 2008; full deployment was completed by the fall of 2010. |
| PPL Corporation | KY PA | 1,472,000 | 1,472,000 | 1,472,000 | PPL is in compliance with PA Act 129 and has fully deployed 1,450,000 smart meters in its Pennsylvania service territory. Pilot programs in Kentucky have deployed 22,000 smart meters. |
| Public Service Enterprise Group | NJ NY | 450,000 | 682,000 | 1,297,000 | In 2020, PSE&G updated its 2018 filing with the New Jersey Board of Public Utilities and is planning to deploy 2.2 million smart meters between 2021 and 2025. PSE&G's NY service territory has 434,000 smart meters deployed, with full deployment anticipated by 2023. |
| Puget Sound Energy | WA | 387,000 | 575,000 | 764,000 | Puget Sound Energy plans to deploy smart meters to all electric customers by the end of 2023. |

| Electric Company | State | Meters Installed (2019) | Projected Meters Installed (2020) | Projected Meters Installed (2021) | Notes |
|---|----------------|--------------------------------|--|--|--|
| San Diego Gas & Electric Company | CA | 1,461,000 | 1,461,000 | 1,461,000 | SDG&E has fully deployed 1,461,000 meters across its service territory. |
| Southern California Edison | CA | 5,179,000 | 5,179,000 | 5,179,000 | SCE has fully deployed more than 5 million smart meters and will continue to accommodate population growth. |
| Southern Company | AL GA MS | 4,009,000 | 4,207,000 | 4,207,000 | Southern Company has deployed smart meters in all its service territories. Georgia Power reached full deployment in 2012 and has 2,498,000 meters; Alabama Power reached full deployment in 2010 and has 1,453,000 meters; Mississippi Power reached full deployment in 2020 and has 198,000 meters. |
| Tampa Electric | FL | 391,000 | 666,000 | 813,000 | Tampa Electric has installed 666,000 smart meters and anticipates full deployment within its service territory by June 2021. |
| Texas-New Mexico Power | TX | 255,000 | 255,000 | 255,000 | TNMP has fully deployed 255,000 smart meters. |
| Tucson Electric Power | AZ | 131,000 | 131,000 | 131,000 | Tucson Electric Power has deployed 131,000 smart meters to customers in Arizona. |
| Unitil Corporation | MA NH | 108,000 | 108,000 | 108,000 | Unitil has fully deployed 108,000 smart meters across its service territory around Concord, NH, and Fitchburg, MA. |
| Versant Power | ME | 123,000 | 123,000 | 123,000 | Versant Power, formerly Emera Maine, has fully deployed 123,000 smart meters in its service territory. |

| Electric Company | State | Meters Installed (2019) | Projected Meters Installed (2020) | Projected Meters Installed (2021) | Notes |
|----------------------------------|----------------------|--------------------------------|--|--|--|
| WEC Energy Group | WI | 946,000 | 1,145,000 | 1,145,000 | WE Energies has deployed 946,000 smart meters to customers in Wisconsin. |
| Xcel Energy | CO MN NM TX | 31,000 | 30,000 | 425,000 | Full deployment of smart meters in Colorado for 1.5 million Xcel Energy customers will begin in 2021 and conclude in 2024. Xcel's Southwestern Public Service territory will begin deploying smart meters at scale in 2023; Northern States Power in 2021. |
| Other | | 2,000 | 2,000 | 2,000 | Limited deployments by multiple operating companies account for roughly 2,000 smart meters deployed through 2019. |
| Investor-Owned U.S. Total | | 73,149,000 | 79,029,000 | 84,733,000 | |

Table 3. Smart Meter Installations by Electric Company Type and State (2019)

| State | Investor-Owned Electric Company | Public Power Utilities & Electric Cooperatives | Total |
|-------|---------------------------------|--|------------|
| AK | 0 | 225,000 | 225,000 |
| AL | 1,461,000 | 571,000 | 2,032,000 |
| AR | 317,000 | 480,000 | 797,000 |
| AZ | 1,277,000 | 1,318,000 | 2,595,000 |
| CA | 12,009,000 | 1,189,000 | 13,198,000 |
| CO | 120,000 | 643,000 | 763,000 |
| CT | 294,000 | 43,000 | 337,000 |
| DC | 318,000 | 0 | 318,000 |
| DE | 330,000 | 58,000 | 388,000 |
| FL | 6,479,000 | 1,410,000 | 7,889,000 |
| GA | 2,548,000 | 1,893,000 | 4,441,000 |
| HI | 28,000 | 32,000 | 60,000 |
| IA | 479,000 | 255,000 | 734,000 |
| ID | 541,000 | 102,000 | 643,000 |
| IL | 5,371,000 | 254,000 | 5,625,000 |
| IN | 1,209,000 | 580,000 | 1,789,000 |
| KS | 960,000 | 369,000 | 1,329,000 |
| KY | 169,000 | 813,000 | 982,000 |
| LA | 724,000 | 172,000 | 896,000 |
| MA | 45,000 | 129,000 | 174,000 |
| MD | 2,108,000 | 221,000 | 2,329,000 |
| ME | 755,000 | 131,000 | 886,000 |
| MI | 4,380,000 | 404,000 | 4,784,000 |
| MN | 104,000 | 831,000 | 935,000 |
| MO | 630,000 | 704,000 | 1,334,000 |
| MS | 183,000 | 606,000 | 789,000 |
| MT | <1,000 | 155,000 | 155,000 |
| NC | 2,997,000 | 1,203,000 | 4,200,000 |
| ND | <1,000 | 124,000 | 124,000 |

| State | Investor-Owned Electric Company | Public Power Utilities & Electric Cooperatives | Total |
|--------------|---------------------------------|--|------------|
| NE | 0 | 309,000 | 309,000 |
| NH | 78,000 | 85,000 | 163,000 |
| NJ | 456,000 | 24,000 | 480,000 |
| NM | <1,000 | 131,000 | 131,000 |
| NV | 1,328,000 | 19,000 | 1,347,000 |
| NY | 2,688,000 | 19,000 | 2,707,000 |
| OH | 1,792,000 | 355,000 | 2,147,000 |
| OK | 1,395,000 | 447,000 | 1,842,000 |
| OR | 1,518,000 | 327,000 | 1,845,000 |
| PA | 5,814,000 | 247,000 | 6,061,000 |
| RI | <1,000 | 1,000 | 1,000 |
| SC | 810,000 | 667,000 | 1,477,000 |
| SD | 165,000 | 152,000 | 317,000 |
| TN | 0 | 2,933,000 | 2,933,000 |
| TX | 7,756,000 | 3,442,000 | 11,198,000 |
| UT | 0 | 134,000 | 134,000 |
| VA | 918,000 | 440,000 | 1,358,000 |
| VT | 271,000 | 36,000 | 307,000 |
| WA | 630,000 | 776,000 | 1,406,000 |
| WI | 1,433,000 | 368,000 | 1,801,000 |
| WV | 1,000 | 8,000 | 9,000 |
| WY | 46,000 | 64,000 | 110,000 |
| Total | 73,149,000 | 25,899,000 | 99,048,000 |

Note: Totals are rounded to nearest thousand.

Table 4. Electric Companies with Full Smart Meter Deployment (2019)

| Smart Meter Full Deployment by Operating Company | |
|---|---|
| AEP Texas | Idaho Power |
| Alabama Power | Idaho Power (OR) |
| Ameren Illinois | Interstate Power and Light |
| Arizona Public Service | Met-Ed |
| Baltimore Gas & Electric | Mississippi Power Company |
| Black Hills Colorado Electric | NV Energy |
| Black Hills Power (MT) | Oklahoma Gas & Electric (AR) |
| Black Hills Power (SD) | Oklahoma Gas & Electric (OK) |
| Black Hills Power (WY) | Oncor Electric Delivery |
| CenterPoint Energy (IN) | Pacific Gas & Electric |
| CenterPoint Energy (TX) | PacifiCorp (OR) |
| Central Maine Power | PacifiCorp (CA) |
| Cleco Power | PECO Energy |
| Commonwealth Edison | Pennsylvania Electric |
| Consumers Energy | Pennsylvania Power |
| Delmarva Power (DE) | Portland General Electric |
| Delmarva Power (MD) | Potomac Electric Power (DC) |
| DTE Energy | Potomac Electric Power (MD) |
| Duke Energy (IN) | PPL Electric Utilities |
| Duke Energy (KY) | Public Service Company of Oklahoma |
| Duke Energy (NC) | Rockland Electric Company |
| Duke Energy (OH) | San Diego Gas & Electric |
| Duke Energy (SC) | Southern California Edison |
| Duquesne Light | Superior Water, Light and Power Company |
| Evergy (KS) | Texas-New Mexico Power |
| Evergy (MO) | Unitil (MA) |
| Florida Power & Light | Unitil (NH) |
| Georgia Power | West Penn Power |
| Green Mountain Power | Wisconsin Power & Light |

Note: Full deployment may exclude customer with opt-out clauses or hard-to-access meters.

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