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A "Smart" Approach to Big Data in the Energy Industry

CenterPoint Energy's widely acclaimed smart grid delivers energy information in real time to improve safety, lower costs and raise customer satisfaction.

BY JOE MULLICH

In 2009, long before the term "big data" had entered the business lexicon, CenterPoint Energy launched an initiative to dramatically increase its stores of information—and ramp up the types of insights it could glean from those huge stockpiles of customer data.

CenterPoint Energy at a Glance

- **Headquarters:** Houston, TX
- **Services:** Electrical transmission and distribution, natural gas distribution, interstate pipelines and field services
- **Service Areas:** Arkansas, Louisiana, Minnesota, Mississippi, Oklahoma and Texas
- **Net income:** $1.357 billion
- **Employees:** 8,600

www.centerpointenergy.com

Source: CenterPoint Energy

CenterPoint, which serves more than five million metered electric and gas customers in the southeastern United States, implemented an aggressive multi-year smart grid plan. A smart grid provides unprecedented amounts of information about the health and energy efficiency of the grid—the meters, transformers, switches and other technology that are needed to provide electricity today.

The original pilot program found that consumers could control their home energy use as a result of the usage information provided to them by the smart meters. But as the number of smart meters has swelled, the technology has become a showcase for how big data and analytics can transform an entire industry with information insights not available before. CenterPoint was recently cited as having one of the most mature smart grid deployments in North America, providing "utilities across the globe a yardstick by which to set goals and measure best practices" that are needed to develop a successful smart grid plan.[1]

Dr. Steven Pratt, IT-corporate technology officer at Houston-based CenterPoint, notes the real-time information provided by the intelligent meters has significantly improved efficiency and reduced costs at the utility. "We used to read 88,000 meters a day manually and now can gather 221 million readings a day electronically," he says. "We have dramatically reduced time to diagnosis. We can tell if an incident, such as a power outage, is related to something inside a customer's house that they are responsible for—or if it's something on our side of the meter that we need to address."

Top 10 North American Utilities in Smart Grid Maturity

Utility	Average Maturity	State	Electric Customers
CenterPoint Energy	4.2	TX	2,280,000
Pacific Gas & Electric	4.2	CA	5,100,000
San Diego Gas & Electric	4.2	CA	1,400,000
Southern California Edison	4.0	CA	1,100,000
Arizona Public Service	3.6	AZ	1,100,000
Burbank Water & Power	3.6	CA	53,000
Commonwealth Edison	3.6	IL	4,000,000
EPB	3.6	TN	174,000
Florida Power & Light	3.6	FL	4,600,000
Oklahoma Gas & Electric	3.6	OK	833,000

Source: "The Utility Smart Grid Outlook in North America 2013," GTM Research

As a result, the company estimates it has resolved six million service orders without having the need to visit the location of the issue. Additionally, the company service fleet reduced fuel consumption by 600,000 gallons and fuel emissions by 5,400 metric tons. Although the financial impact has been impressive, Pratt says some of the other benefits of big data and analytics have been even more important.

The Real-Time Advantage

"Our number-one objective in implementing a smart grid is to drive real-time solutions to ensure the safety of our customers and employees," Pratt says. "We are dealing with electricity, which can injure or kill someone. Our ability to diagnose issues in real time is critical. Now, we can quickly determine if a power line is down and fix a live wire on the street before someone touches it."

1. "CenterPoint Energy, PG&E and SDG&E at Top of the Smart Grid Class in North America." *greentechgrid:*, April 24, 2013. http://goo.gl/U4MDGb

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"The value of data mining is finding out what you don't intuitively know."

—DR. STEVEN PRATT,
CENTERPOINT ENERGY

CenterPoint uses in-memory computing, which can aggregate and analyze huge volumes of data from many different sources much more quickly than traditional technology. This computing power, together with visualization and business intelligence software, is necessary for analyzing many complex problems, such as addressing the deceptive nature of power outages. If an area loses power, the assumption might be that the issue is a circuit breaker or transformer. However, a faulty transformer could hide a broader problem.

"When you are looking at this situation manually, without smart devices, you can't quickly diagnose when a problem is indicative of a bigger issue," Pratt says. "The value of data mining is finding out what you don't intuitively know."

Big data and analytics enable CenterPoint to anticipate problems. By immediately gathering and analyzing power usage information, ultimately the utility may shed electricity load when appropriate, without impacting critical facilities. The smart grid can also alert the utility to small fluctuations that go unnoticed in a person's house but signal a power loss may be imminent. "Before, we didn't know about a problem until a customer called," he says.

Along those lines, the utility is using external information such as weather forecasts to augment its big data collection. This weather data is needed to predict future events; for example, determining the likely magnitude of an outage if a storm occurs based on historical data, the age of the equipment in the area and other factors. "That allows us to have the right resources in place even before the storm comes through," Pratt says.

As a result, the utility is able to ensure service is restored as quickly as possible while using resources more efficiently.

Better Service Through Analytics

As the use of smart grid technology grows, Pratt says the industry will need to focus more on how analytics can improve customer service. "There has been a lot of hype around big data, so you need to identify use cases for your company," he says. "You may need a different set of technology, applications and capabilities than the company right next door."

CenterPoint Energy's Big Data Mandate

- Improve employee and customer safety
- Identify issues faster—often before customers realize them
- Use workforce time and resources more efficiently
- Raise customer satisfaction, conserve energy and eliminate "information disconnects"

CenterPoint's IT Solutions

- Implemented a smart grid to gather information in real time
- Adopted big data analytics and visualization technology to troubleshoot problems faster and improve customer service
- Created the Customer Vision Platform to segment customers better and provide more personalized customer service

For example, in the past, CenterPoint gauged its level of service using customer surveys, but the response rate for the surveys was so low that it was difficult to get a clear picture. Now, the utility is turning to new tools, like customer sentiment analysis, which enables it to analyze comments from customers on the Web. For example, the company's Customer Vision Platform—an integrated services application now in development—will pull data from different areas of the business and enable analysis of the customer experience from multiple angles. Ultimately, the platform will streamline customer interactions across all channels in the company's natural gas distribution, electric transmission and distribution, and Home Service Plus businesses.[2]

In time, CenterPoint hopes to leverage the Customer Vision Platform to segment customers and market to them in a more personalized way based on their actual needs. "If we can provide specific energy services that will truly make our customers' lives easier, we know we are using the data to serve them better," Pratt says. "And that's what big data and analytics is all about." •

Joe Mullich is a freelance business and technology writer based in Sherman Oaks, Calif.

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2. "CenterPoint Energy Orders New Customer Vision Platform." *Transmission & Distribution World*, April 10, 2013. http://goo.gl/FqbJ48

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Big Data Analytics Delivers Real-Time Insights for Energy, Process Industries

New research, qualitative interviews and the report from Bloomberg Businessweek Research Services clearly show that energy and process industries struggle to leverage big data and analytics today to improve profitability, mitigate risk and increase expectations for returns on investments in these technologies.

Many companies face inflexible legacy systems, lack of enterprise-wide analytic tools and large volumes of a wide variety of data (structured, semi-structured and unstructured). This creates what is known as the big data problem. SAP's energy and process industry team discusses how technology innovations and real-time insights can help energy and process industry companies overcome these challenges and drive business results—including better ways to reach customers, better asset maintenance and better risk mitigation.

How do technology innovations solve the challenges faced by most energy and process companies today?
A fast analytical platform that can handle large amounts of transactional and process data quickly and effectively in real time is the foundation solution. The in-memory computing platform called SAP HANA® is built to store and analyze big data from multiple systems. It helps companies achieve a more comprehensive—and instant—view of their assets, customers and business performance. The solution from SAP consists of the SAP BusinessObjects Business Intelligence platform, agile data visualization by SAP Lumira and the ability to leverage sophisticated models and algorithms to predict customer behavior with SAP Predictive Analysis.

What can energy and process companies do to derive real-time insights?
To start with, a company needs to assess its current status. For example, are you able to maximize return on capital invested? Are you able to keep up with dynamic markets, customer needs and regulations? Are you able to manage your assets efficiently? Are you able to deliver the right insight to your internal stakeholders to support decision-making and customer service? Second, define your vision for the future. For example, how will your customer needs change? How will your company's offerings need to change? How will you deliver products and services to your future customers? Finally, consider taking a gradual approach to your transformation.

The most immediate value SAP HANA and analytics can provide utility companies—independent systems operators (ISOs) that must handle large quantities of data every day—is to keep the power markets functioning, detect fraud and theft, and identify unbilled accounts. Energy and process companies are also starting to realize savings by using analytics to prioritize capital investments in equipment and to integrate sales and operations planning that support real-time what-if simulations and social collaboration. In addition, by analyzing data from smart meters, utilities can gain a better understanding of customers' consumption behavior.

Select a line of business or a region as a test bed and implement an integrated, real-time reporting and analytics solution. Using SAP HANA, energy and process companies will quickly discover how the sheer speed and flexibility of the platform provide immediate value to business users. Then adopt an enterprise-wide analytics strategy that includes big data. The SAP BusinessObjects Business Intelligence suite will support that strategy. It is a simple, one-stop solution that supports big data, real-time insights, agile visualization and predictive analytics.

For more information please visit this Web site: www.sap.com/appliedanalytics/

SAP's Recipe for Success

- **SAP HANA** platform handles your big data challenges and delivers real-time insights
- **SAP BusinessObjects** Business Intelligence suite enables every individual in the organization to make fact-based decisions via easily accessible and relevant information whenever and wherever needed
- **SAP Lumira** is an agile data visualization solution that helps decision-makers easily discover unique insights
- **SAP Predictive Analysis** empowers business users with predictive and advanced analytics
- **SAP Solutions for Social Media** is for analyzing social data and improving business customer experience
- **SAP Services** help you differentiate your company and make more profitable business decisions

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