

Improving Estimated Time to Restoration (ETR) at CenterPoint with Machine Learning

Leveraging data to improve customer satisfaction and operational efficiency.

The Challenge

To most customers, their utility has only one job - to keep the lights on. And utilities do an excellent job - the US EIA indicated that in 2015, the average utility customer experienced approximately 1.5 outages with a total outage time of about 3 hours¹, representing >99.97% uptime.

For an average residential customer, a power outage might be an unexpected inconvenience, but for a business, it can result in a significant loss in revenue. And for a medical facility, a power outage can put lives at risk. Communicating to customers what is happening, and when their power will return is a critical function of Customer Service and Operations.

CenterPoint Energy offers their customers the Power Alert Service (PAS), an opt-in messaging system with nearly 1 million subscribers to automatically alert customers of outages and expected restorations times. Providing an accurate estimate of the time to restore power is an important way to increase customer satisfaction during one of the few times a customer engages with their utility - during an outage. J.D. Power provides an annual study of customer satisfaction with electric utilities, and found that "Overall satisfaction among customers who receive outage information is much higher than among those who do not receive such information."²



COMPANY SNAPSHOT

CenterPoint Energy, headquartered in Houston, Texas, is one of the largest gas and electric utilities in the United States.

CenterPoint's electric transmission and distribution operations serve over 2.4 million customers and covers over 5,000 square miles.

SUMMARY

New model to estimate outage restoration time developed, using statistical modeling and machine learning techniques.

Demonstrated 38% improved accuracy in ETR over current methods used by CenterPoint.

New ETR model deployed in CenterPoints' operations and customer support centers using TreverityEDGE™.

CenterPoint has been using a method of calculating the Estimated Time to Restoration (or ETR) for an outage based on average historical restoration times across several variables, including the type of equipment and the service center where the outage occurred. This analysis provided operations and customer service with a "first guess" at ETR, implemented in a static lookup table, that has proven to be effective. CenterPoint recognized that this analysis could be improved by factoring in other variables that may influence restoration time - for example - the number of other outages, weather, staffing levels, and real-time locations of crews. An automated prediction method was also desired, to reduce demands on staff and field crews, and to automatically update ETR estimates with the latest real-time information.

¹Source: US Energy Information Agency, <http://bit.ly/2zLC4X6>, <http://bit.ly/2lr3X1l>

² Press Release, "Overall Residential Electric Utility Customer Satisfaction Increases for Sixth Consecutive Year, J.D. Power Finds", <http://bit.ly/2lils1j>

To improve their method of computing ETR, CenterPoint turned to Treverity to apply modern statistical modeling and machine learning techniques, and the power of the TreverityEDGE™ software platform.

The Solution

TreverityEDGE™ has been operating at CenterPoint since 2012, capturing data from over 30 different utility systems, and providing numerous situational awareness, workflow management, and operational analytics applications. TreverityEDGETM powers many of the control room, desktop, and mobile displays that the operations and customer service teams use to manage the day-to-day operations of the utility, as well as manage through challenging storms, like Hurricane Harvey. The system has collected years of data relevant to outages, and Treverity's Data Science team used this trove of data to assess the relationships of hundreds of unique variables to outage times. Treverity developed a machine learning model, a probabilistic deep Gaussian process model, that provides more accurate ETR predictions. And the model provides more than just an ETR value - it provides a full probability distribution of restoration times for a given outage, natural metrics for repair operations status, and produces these automatically, every few minutes. The information-rich output provides greater context to the organization for decision making.

This Treverity model was tested and verified by applying it to historical data (which contains a record of the actual restoration times), and the results were compared to the current method used by CenterPoint. The new model showed an impressive 38% improvement in prediction accuracy.

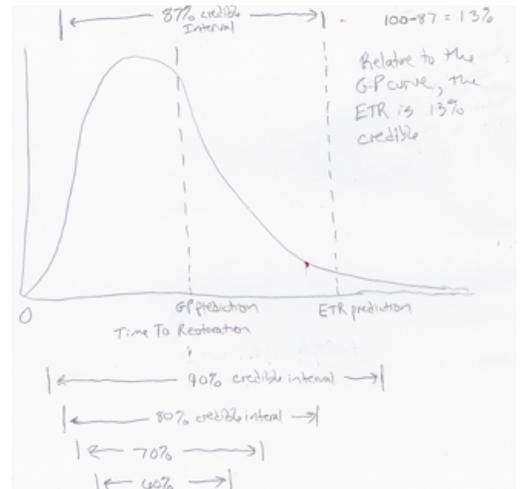
The new ETR model is deployed on the TreverityEDGE platform, which collects data from multiple operations and IT systems. It delivers a new ETR prediction automatically, every 5 minutes, taking into account changes in underlying conditions - weather, dispatch status, presence of new outages, customer segmentation and more. It also minimizes the demands on operations, customer support, and field crews to manually update ETR estimates as conditions change. And it improves situational awareness for operations and customer service teams, driving better decisions.

What's Next

Treverity is continuously working to improve the ETR model by employing ever-more sophisticated machine learning and data preparation techniques. Additional gains in accuracy are expected as improvements to the model are made and as newly occurring data become incorporated into the model. The next step for CenterPoint and Treverity is go beyond predicting ETR, and use Treverity's platform to deploy a decision support model - to help operators, customer support, and field crews make better decisions during outages. The end result will not only be more accurate ETR values, but greater potential to reduce outage times through more efficient deployment of resources and improved understanding of the underlying factors that contribute to prolonged restoration times.

**CUSTOMERS
WOULD RATHER
YOU TELL THEM
NOTHING,
THAN GIVE
THEM WRONG
INFORMATION**

FRED SMITH
Technology Operations Manager |
CenterPoint Energy



EOT	Confidence Score
12/13 9:00 ●	LOW ■■■
12/13 9:00 ●	MEDIUM ■■■■
12/13 9:00 ●	HIGH ■■■■■

ABOVE: Sample model output of a Treverity ETR prediction.

BELOW: Treverity's machine learning ETR predictions enable new interactions for operations and customer service to assess outages and communicate with customers

