

CASE STUDY

Knoxville Utilities Board (KUB)

PROJECT

Utilizing AMI for
Planning and
Futureproofing

TVA TENNESSEE
VALLEY
AUTHORITY



ABOUT KUB

ESTABLISHED

1939

SERVICE AREA

689
sq mi

CUSTOMERS

TOTAL

221,945

ADDING PER YEAR

1%-2%



Background

Building maturity in advanced metering infrastructure (AMI) and using the data to support planning and operations is essential for local power companies (LPCs) pursuing grid modernization. By investing in AMI, LPCs gain the tools needed for greater operational efficiency, customer engagement and demand management. AMI enables LPCs to operate the grid more reliably, support DER integration, enhance their system planning efforts, more accurately bill customers for energy usage and deliver better service to customers, all of which are critical for adapting to the evolving energy landscape.

In 2016, the Knoxville Utilities Board (KUB) began deploying AMI in its service area, with the rollout completed in 2020. Thanks to AMI, KUB has been able to leverage the availability of new information and data to enhance the utility's operations. By allowing KUB operators to see detailed energy use data down to individual customers, AMI enables more accurate future planning, load balancing and infrastructure investment decisions.



KUB is supporting the transformation of the regional grid by finding innovative applications for existing data and infrastructure, requiring minimal financial investment.

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Because reliability is critical to the mission of any utility, outages are a critical key performance indicator. They are typically measured by the number of customers they impact and the duration of time they take place. KUB identified a key use case for AMI meter data to improve outage reporting accuracy data as a way of making no- to low-cost improvements as they seek to modernize their grid and diversify their energy sources. In finding innovative applications for existing data and infrastructure, KUB is supporting the transformation of the regional grid and demonstrating how processes and operations can evolve with minimal financial investment.

KUB is identifying innovative applications of AMI meter data, demonstrating growth with minimal financial investment.

Goals

THE PILOT PROJECT TARGETED GOALS FOR THIS PROJECT WERE:



Innovative AMI Technology Utilization

Since KUB had already rolled out AMI, such as smart meters, the utility wanted to ensure they received the biggest return on their investment. With the emergence of new data, KUB saw a clear and compelling reason to leverage it for other business objectives, Investment planning.

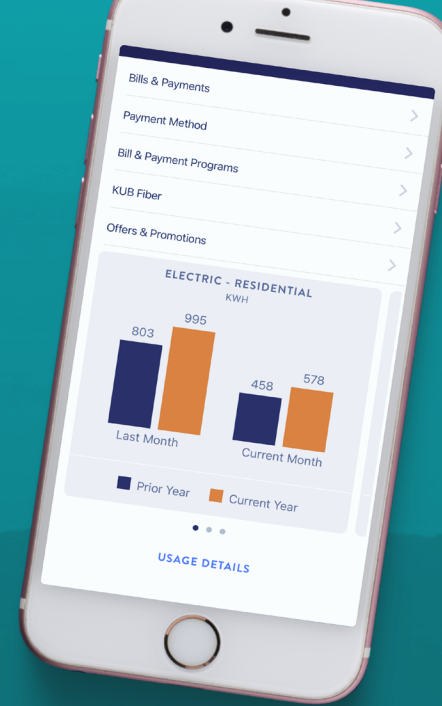


Increased Outage Accuracy

KUB sought to improve outage accuracy by relying on AMI data sets instead of reporting from field crews. The reporting from field crews on outage restoration times sometimes lagged due to the time between power restoration and returning to their work vehicles.

“We had full system-wide AMI deployment, and we were constantly looking for ways of using our AMI data for undiscovered process improvements beyond the traditional billing improvements and power outage notifications.”

MATHEW STINNETT | MANAGER, ELECTRIC ENGINEERING, KUB



Approach

This project was born out of collaborative discussions between KUB and other electricity providers regarding the typical outage reporting protocol, as follows:



This process, while successful, leaves room for errors in reporting outage restoration times. Field crews are focused on identifying problems, strategizing solutions, keeping themselves and customers safe and completing work promptly. It may take several minutes between the time an outage has been resolved and the time it is reported by the site foreman. That time discrepancy, while seemingly insignificant in a single instance, can take on exponential importance when hundreds or thousands of customers are involved.

Using AMI data does not change the outage itself, but it better reflects when the power stopped and the exact moment that it came back online. Additionally, AMI allows for people to focus on the job at hand. Field crew members, for example, can focus on their critical tasks – restoring power, ensuring safe working conditions, keeping everyone safe and moving on to the next assignment – rather than spending time on paperwork at the end of a restoration.

Once the team at KUB had the data, they needed a way to properly display it for internal reports and then track it for larger reports on outage management. Knowing that they did not have the existing resources for effective advanced data analytics and reporting, KUB worked with Microsoft to develop custom reports in PowerBI and help train their staff to manage the reporting.

Departments Involved

Engineering

Field crews

System operations

Reliability planning

Metering

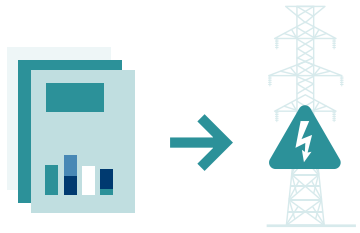
Reporting and data analytics

“We actually brought in Microsoft to help with some of the data sets through Power BI. That was not our specialty, and we were just learning about Power BI at that point. So we brought them in to help develop the reporting for bringing all of the data sets together.”

MATHEW STINNETT | MANAGER, ELECTRIC ENGINEERING, KUB



These PowerBI reports accurately reflect the outage information collected through AMI. With the reports configured and the data readily available, KUB is now focusing on data quality and reviewing the information from a quality assurance and quality control standpoint.



Results

The accurate information from AMI data allowed KUB to refine their outage minutes to demonstrate the actual outage minutes rather than what was reported via customer calls and reports from field crews.

Another benefit of this improved data is the identification of gaps in the GIS maps at KUB. With utilities, minor mislabeling of GIS data sets is common. For example, a meter might be identified as connected to one transformer in the field when, in reality, it is connected to another one nearby. Using the AMI data for outage information, KUB was able to not only identify these errors but also get them corrected at no cost. A truck roll was not required – all it took was looking at the data to identify any incorrect labels in GIS.

In the first year of the project, KUB reported a

12%

improvement in reliability metrics

over the prior year, as the outage metrics more accurately reflected customer experiences.

Lessons Learned

This project was a big success for KUB – it showed the potential for no- or low-cost solutions to have a significant impact through innovative applications.

As utilities explore grid-modernizing priorities, technologies and investments, using processes and data in untraditional ways can provide meaningful progress when more resource-intensive updates are out of reach.

Looking Ahead

KUB continues to look at innovative ways to leverage AMI data to gain efficiencies in, and improve, other aspects of their operations. For example, the utility is looking into asset management applications with its AMI data. With supply chain challenges and projected increases in load, maintaining long-term transformer health is pivotal. KUB is looking to AMI to help identify, monitor and report on overloaded units, particularly key with the increasing adoption of electric vehicles. Thanks to AMI, KUB analyzes load usage data to the hour to see where, when and for how long transformers are overloaded. Lastly, KUB will evaluate the future use case of gleaning AMI load profiles to identify EV charging.

LEARN MORE

The Regional Grid Transformation (RGT) initiative is a collaboration between local power companies and TVA to transform the power grid into a more resilient, flexible and integrated system to meet customer expectations and changing world conditions.

Visit [tva.com](https://www.tva.com) for details.

KUB IDENTIFIED SEVERAL THINGS TO KEEP IN MIND FOR SIMILAR PROJECTS:

1

To properly report and understand the data, utilities will benefit from staff or contractors with advanced skills to analyze and report the data.

2

Utilities may also need to work with software or program experts to help them accurately and appropriately present the data and findings.

3

AMI data presents a prime opportunity for utilities to explore organizational data governance, revise protocols and expand related policies.