awesense

Case Study: Energy & Utilities, Digital Transformation

Creating a New Pardigm

A Northwestern utility changed the status-quo of how utilities use data and analytics to solve issues and improve reliability in the distribution grid.

This utility started its digital transformation program with the rollout of its smart-meter program. This billion dollar investment was a part of their ambitious grid modernization goal which were in line with its clean-energy objectives. However, the smart-meters ultimately did not deliver on their promised insight. The utility was plagued with thousands of false-positive tamper flags which backlogged field crew work-orders and were suddenly overwhelmed with different types of data flowing from new metering infrastructure but didn't have analytical capabilities to make sense of it all. Furthermore, with data silos spread across the organization, analytics teams couldn't use other sensor data (SCADA devices, reclosers, DERs, etc.) together with meter data easily. The utility came to Awesense to provide enhanced grid visibility, monitoring and energy-flow analysis.

OBJECTIVE

This Northwestern based utility needed a way to better identify problematic areas in their grid, detect outages and prepare for future technology. With the integration of Awesense's True Grid Intelligence platform and low-cost sensors, Awesense is a key part of the modernization and digitization goals going forward.

UTILITY OVERVIEW

- Serves 4M customers
- 95% of power from clean and renewables sources
- 18,000 km of transmission lines
- 55,000 km distribution lines
- 2M smart meters

THE PROBLEM

The utility has a very large service territory, making it very difficult to monitor the massive distribution grid. Only a portion of the distribution system was covered by SCADA devices with varying degrees of accuracy. With such a large distribution network, there was a huge need to correct GIS, connectivity and topology data. With inaccurate connectivity and GIS data, it would be impossible to make critical decisions related to asset health, disaster recovery and forecasting.

With no visibility into the distribution grid between the substation and the meter, and no way of accessing real-time energy flow data at any point in the network, situational awareness was very limited. With much of the service territory at high-risk of wildfires throughout the summer, and extreme storms during winter, the utility was in need of real-time data, predictive analytics and additional outage detection to understand and limit these impacts.

Lastly, certain feeders were experiencing rapid DER-growth. The utility needed more insight in these areas to measure the output of DER, forecast that output and limit the impact on asset health.

THE SOLUTION

With Awesense's help, the utility proceeded in three key stages:

» ***Build a correct GIS, Connectivity & topology model***

- Validated, estimated and corrected GIS element and connectivity data to identify and ensure an accurate dataset. This was largely automated, with certain exceptional cases requiring more detailed attention.
- Having accurate GIS & connectivity information was crucial to ensure decisions being made were correct.
- The utility could be sure that consumption and local-generation was linked to correct transformers, phases and feeders.

» ***Ingest data from all measurement sources active in the grid into TGI***

- Set up a flow of information from the utility's existing measurement sources: smart-meters, SCADA, DERs, etc. and populate within TGI's dynamic GIS visualization solution. This created an easily-accessible, comprehensive location for all energy-flow data.
- Because of the large geographical service area, certain areas in the grid severely lacked measurement data. Over 5000 Awesense Raptor sensors were used to enrich data sparse areas like these and locations which required more thorough monitoring. These also act as robust outage detectors.

» ***Continuous Analysis and Monitoring***

- Using TGI's forecasting analysis, the planning team has access to precise short-term load forecasting, which incorporates data from AMI, SCADA, DER and TGI Raptor sensors, meaning the most comprehensive analysis possible. With TGI's Distributed Energy Flow Intelligence analysis, the grid is segmented into chunks and areas which are imbalanced are identified instantly.
- Using TGI's grid alerts feature, TGI users are alerted of any issue within the grid - the operations team customize thresholds to be notified of things such as unusually low/high voltage, fluctuating current, low power factor, overloaded transformers/feeders, among others. This enables proactivity instead of reactivity when treating and dealing with problems in the grid.
- A big focus for this utility was improving outage detection capabilities, TGI Raptor Sensors provide another dependable layer of outage detecting-devices across the grid. TGI's Outage module ingests data both from AMI and Raptor sensors to provide holistic outage response.
- Using TGI's mobile work-orders, field crews can be dispatched directly from the platform with custom instructions and feedback capabilities.

RESULTS

Thanks to the constant improvement of the GIS & connectivity accuracy, the utility now have a thoroughly accurate model of the distribution grid. This data is essential as they proceed to the next phases of their grid modernization programme, including the installation of an ADMS - which depends on accurate data for optimal operation.

The utility has also ingested the sensor data and associated analytics from TGI into its Hadoop data lake. This allows for the use of the data in other internal applications. This provides multiple teams across the company with access to accurate, comprehensive information on time-series load data in location-specific areas of the distribution system.

TGI monitors over 33 million data points per day from **2,715,484 sensors through TGI**. Automated detection of outages and response time has massively improved. Combined data from all measurement points in the network facilitates more accurate forecasting and planning for asset upgrades and changes in the grid. As renewables & DERs continue to the grid, areas which are receiving high levels of penetration are closely monitored to ensure no interruption of reliability.

Other benefits realized include:

» Rectification of metering and billing errors
» Identification of malfunctioning grid equipment
» Removal of inefficient distribution system configurations

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