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PART OF BURNS & McDONNELL

CASE STUDY

Comprehensive Software Solution Streamlines Transmission System Modeling for LG&E and KU

Louisville Gas & Electric and Kentucky Utilities (LG&E and KU) must annually gather data on updated load forecasts, generation resources, current transmission system information and planned transmission system projects within a 10-year planning horizon in order to build a digital model of the transmission system. As a registered transmission planner, LG&E and KU is responsible for collecting this data and updating the model annually to satisfy the NERC MOD-032 requirement. A robust software solution is streamlining this complex and burdensome requirement.

Challenge

As a registered transmission planner, LG&E and KU faces a complex task each year when it collects and compiles modeling data, including forecasted load, generation and transmission facilities required to build the digital model of the power system for its planning area. The resulting power system models are then used to perform required studies to evaluate system reliability and produce the long-range plan for its system.

Project Stats

Client
LG&E and KU

Location
Louisville, Kentucky

32
EXTERNAL ENTITIES

1.3
MILLION CUSTOMERS

10
YEARS IN PLANNING HORIZON

This annual process involves collecting a large amount of system data that must be reconciled with data provided by 32 external entities, such as municipal and cooperative utilities, that purchase power wholesale from LG&E and KU and distribute it to their own customers. This enormously complex process involves both forecasts of expected power demand as well as any capital construction projects that will impact system operations within a 10-year planning horizon.

The goal is to build a digital model that accurately represents the LG&E and KU operational footprint and all its transmission system interconnects with neighboring utilities. The model is an essential piece of a larger model of the Eastern Interconnection, the enormous power grid that serves roughly all the eastern geographic region of the U.S.

1898 & Co. was engaged by LG&E and KU to build a software solution that streamlines and optimizes the data collection and model build process. The goal was to enable a more efficient process of gathering and organizing the most accurate information possible and then to digest, validate and check the information as it is fed into models that simulate the actual transmission system.

The central challenge that had to be overcome was updating the larger Eastern Interconnection model with the latest information for the LG&E and KU planning area and setting the generation dispatch of the model to meet the forecasted load. Each data-reporting entity is asked to provide the most current data available, including forecasts of future load and expected system updates or changes.

Solution

The 1898 & Co. team was tasked with building a comprehensive software solution that streamlined data collection — synthesizing, validating and consolidating it so it can be easily viewed, processed and audited for use with other downstream business applications. The solution required development of highly customized algorithms that dictate rules and formulas for data collection, resulting in consistency within all the power system computer models.

The central goal was to streamline basic data collection and produce power flow models that are solvable in the Siemens PSS/E software while maintaining an audit history of data changes over time. For example, a key outcome was to create better audit reports that could present a clear picture of how data was provided, who provided it and how it may be updated, reflecting various ranges of values in load forecasts, system capacities and other key operational indicators.

The project followed a series of two-week sprint cycles that involved segmenting different phases of software development to meet a defined set of requirements — then building and testing the software, followed by a demonstration to gain feedback and make any revisions.

Results

Upon completion of the initial development, the software was deployed on the LG&E and KU system.

The project delivered a software solution that has the flexibility to efficiently produce system models as updated data is received on an annual basis for the 10-year planning horizon. Updates to the power system could reflect new construction, the addition of new generation sources such as renewables, or changes in load such as growth in electric vehicle charging stations. For example, specific workflows with defined rules are now in place to model how generation is dispatched, based on costs of certain units, as well as rules that apply to power purchase agreements for generation that is not owned by LG&E and KU.

In addition to efficient data collection, other benefits included:

- An ability to track model updates, audit capabilities, eliminate errors and streamline the overall process.
- A multistep process now is transformed into a single-click solution.
- Multiple databases now are combined into a single repository.
- Custom cases can more easily be generated on demand.
- Custom project lists can now be created.
- Functionality to auto generate files.
- Cases can now be archived with historical tracking.

The models produced by this software solution can be used as the basis for all analysis needed for future system planning as well as studies needed to gain further insight on developing issues.

The LG&E and KU team had a large role in the ultimate success of this effort, particularly because transmission planners were working alongside a software team with both engineering and domain expertise. This resulted in robust testing and quality feedback. Because of that involvement, LG&E and KU got exactly what they needed.

About 1898 & Co.

1898 & Co. is a business, technology and cybersecurity consulting firm serving the industries that keep our world in motion. As part of Burns & McDonnell, our consultants leverage global experience in critical infrastructure assets to innovate practical solutions grounded in your operational realities. For more information, visit **1898andCo.com**.