Member Advisory

Distribution Optimization:
It’s Not Your Grandfather’s Distribution Cooperative Anymore

What has changed?

Cooperatives today must overcome many new and evolving challenges including technological, operational, and environmental. Distribution cooperatives are no longer merely re-sellers of power in a one-way transaction to member-consumers; rather, they are more and more dealing with two way flows of electrons and data. As the grid evolves to accommodate more distributed energy resources (DER) and enables enhanced data availability for real-time monitoring and analysis, one of the strategic challenges for distribution cooperatives is to integrate new technologies while ensuring safe, reliable, resilient, and cost-effective power to their members.

Compounding this is the need to embrace a more engaged and diverse membership in order to effectively meet their evolving needs and growing expectations. To successfully manage and adapt to this complex system, a new model for electric distribution planning, operation and optimization, called Distribution System Operator (DSO), must incorporate:

1) data analytics,
2) interoperable systems, and
3) secure communication networks.

All three must holistically rest on a solid foundation of cybersecurity and function within a framework that promotes and maintains a culture of safety for the employees and the public.

Analytics

Cooperative engineers play a key role in assuring these new demands are met and can use new tools to plan and operate the system safely and effectively. One way they accomplish this is through the use of new dynamic modeling and analytical tools, such as the Open Modeling Framework (OMF). These tools help the engineers to continually analyze their systems, identify key performance trends in near real-time, and help optimize core distribution system operations.

What is OMF?

The Open Modeling Framework (OMF) is a modeling tool to help utilities evaluate smart grid components using real-world data prior to purchase.
Engineers must also strategically employ the use of system data and key performance metrics, such as SAIDI (System Average Interruption Duration Index) and SAIFI (System Average Interruption Frequency Index), to help analyze and improve the reliability and the overall performance of their distribution systems. Gathering and maintaining accurate data on system performance is essential to the development of accurate distribution models and performance metrics to achieve and maintain an optimized, reliable, and resilient distribution system.

**Interoperability and Security**

Industry standards are critical resources and tools for engineers. For example, MultiSpeak®, the leading interoperability standard and software integration solution for 17 years, is available to help facilitate data sharing between software systems in a seamless, cyber secure, cost effective, and standardized way.

Cooperative engineers are also encouraged to utilize other key industry standards whenever possible, and to participate in promoting new and updated standards in prominent industry forums such as RUS, IEEE, NESC, NEC, and others that most effectively address the new and evolving distribution system. Engineers serving on the NRECA T&D Engineering Committee (TDEC), the T&D Member Advisory Group (MAG), and MultiSpeak® Users Group are already performing many of these important functions. The ongoing efforts and collaboration activities of these groups are vital to maintaining industry standards and identifying key research opportunities and best practices for cooperatives. Their continued support is essential to all cooperatives to optimize their existing distribution systems and to identify and embrace new technologies. For more information on how to join the T&D Committee or advisory group, please contact Robert Harris at Robert.Harris@nreca.coop; and for the MultiSpeak® Users Group, please contact Alvin Razon at Alvin.Razon@nreca.coop.

**What is the impact on cooperatives?**

As the industry becomes more complex, technologies and customers’ needs and wants are continually changing. Engineers are faced with constantly needing to address new integration challenges and demands within the existing framework of their system. For example, a significant challenge in achieving distribution optimization is de-risking technology integration in the electric distribution system.

Interoperability standards and an ecosystem of connectivity, as provided through MultiSpeak®, is fundamental in achieving system optimization. NRECA is continuously working with the MultiSpeak® Users Group to improve the MultiSpeak® specification and meet the needs of the evolving industry in the areas of cybersecurity, testing and certification, and DER integration.
MultiSpeak® enables software systems to “talk” to each other without custom integration, a key component of the optimized DSO framework. Since 2000, MultiSpeak® is used by over 800 electric utilities in more than 21 countries worldwide. If co-ops’ systems are built using the MultiSpeak® specification, then they are already working with an eye towards the future, while achieving savings that would otherwise be spent on custom integrations. Cooperative support of MultiSpeak® is essential to this future success.

For examples of how cooperatives are implementing system integration with MultiSpeak® and the associated benefits, see NRECA’s user case study series available on http://www.multispeak.org/use-case-studies/.

It is important for cooperative engineers to monitor, benchmark, and analyze their distribution reliability performance by collecting outage data and accurately calculating their reliability metrics/indices (SAIDI and SAIFI). These metrics provide valuable insights into various components of the distribution system. The quality of outage data and accuracy of metrics calculations are paramount in improving system performance. Bad data can lead to bad conclusions and ultimately work against system optimization.

Ensuring that data is accurate when provided to government agencies, such as the EIA, during their regular data collection, monitoring, and reporting processes is a key responsibility of cooperative engineering. As part of the Energy Information Administration (EIA) standard quality assurance process, EIA communicates with utilities on potentially incorrect reported data. Emails are sent to utilities to confirm SAIDI/SAIFI data values reported on the EIA-861 Annual Generator Report. Department of Energy (DOE) assesses the reliability of the U.S. electric grid with these submitted data. To support cooperatives in their reporting requirements, NRECA’s Business and Technology Strategies Department (BTS) has a technology advisory that explains the Importance of the SAIDI Number, and a FREE Reliability Benchmarking Group (RBG) Web App to help accurately calculate SAIDI/SAIFI, provide visualization tools, and benchmark with other utilities nationwide by uploading outage data online within minutes. Co-ops are encouraged to join the NRECA RBG and use the FREE web app: http://webinar.pwrmetrixonline.com/NRECARegistration.aspx.

What do cooperatives need to know or do about it?

As the grid continues to evolve and becomes more complex, it is important for cooperatives to increase their focus on interoperability and distribution reliability metrics to ensure system performance. Further, America’s Electric Cooperatives interests will be best advanced by continuing and expanding member involvement in key national initiatives and processes. Supporting MultiSpeak® advances this objective in several ways by helping to achieve more seamless and cyber secure integration, by automating different processes more efficiently, and by supporting the reduction of human error elements involved in manual data manipulations because of the lack of interoperability between systems. Learning and utilizing new tools for better system analytics, such as dynamic modeling through Open Modeling Framework are valuable next steps. Finally,
ensuring quality data, accurate calculation and reporting, such as SAIDI and SAIFI reporting to EIA, are critical to ensuring a robust distribution optimization of the future.

**Additional Resources**

- Technology Advisory: Importance of the SAIDI Number
- OMF Website and Webinar
- MultiSpeak® Website
- Example of recent interconnection standards work:
  - TechSurveillance article series on IEEE-1547 standard revisions and impact
- BTS Portfolio of Work
- TechUpdate twice-monthly newsletter for ongoing information on BTS research, reports, and events: Sign-Up here

**Contacts for Questions**

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- NRECA RBG Study and FREE Web App: Tony Thomas, Sr. Principal Distribution Engineering & Operations: Tony.Thomas@nreca.coop