NRECA

America's Electric Cooperatives®

TechAdvantage®: Takeaways from the Panel Session on Industrial Applications of Machine Learning, Augmented and Virtual Reality

Key Findings

- NRECA member cooperatives continue to lead the way in exploring how cutting-edge technologies and tools can be applied to daily operations at utilities.

- Machine Learning, Augmented Reality (AR) and Virtual Reality (VR) are changing the way cooperatives do business and offer opportunities to engage with consumer-members.

- Jo-Carroll Energy, Powder River Energy, and Tri-State are three cooperatives providing concrete examples of deploying cutting-edge technologies.

What has changed?

On March 1-4, 2020, engineering, operations, information technology, purchasing and supply management professionals, among others, from various utility industry organizations gathered at the annual TechAdvantage Conference and Expo to review leading technology practices and innovations in their industry. Part of the experience was attendance at breakout sessions that addressed various utility industry topics, and provided opportunities to learn from subject matter experts and engage with fellow attendees. One of the breakout sessions, *Industrial Applications of Machine Learning, Augmented and Virtual Reality* addressed how new tools using cutting-edge technologies are finding their way into the electric utility industry.

What is the impact on cooperatives?

Machine learning (ML) is fast emerging as a promising analysis method to realize value from data on a variety of applications – ranging from grid analytics, to optimizing equipment performance, to image recognition. Here, computers and software perform via cognition, like the brain. Likewise, augmented (AR) and virtual Reality (VR) is beginning to see increased investment and applications ranging from safety to operations to education and training. While both AR and VR refer to interactive experiences, in VR, the user is immersed in a manufactured space separate from the world around them where they can work and play. AR, on the other hand, overlays additional information to the user's actual world view. All three nascent technologies present the potential to enhance safety, productivity, and workforce development for the utility industry.

What do cooperatives need to know or do about it?

Discussing this topic at the TechAdvantage session were cooperatives from Powder River Energy[1] in Gillette, WY (Data Analysis & Machine Learning), Jo-Carroll Energy[2] in Elizabeth, IL (Augmented Reality) and Tri-State, a Colorado-based Generation and Transmission cooperative[3] (G&T) (Virtual Reality).

Powder River Energy focused their presentation on the various use cases for machine learning. The co-op has been able to harness copious amounts of data obtained from its meters and other devices on the grid to make decisions around pole testing and bird protection and run reliability analysis on its feeders via its outage management system. The use of analytics has helped the co-op reduce outages caused by birds by helping to identify the types of structures and places where bird contact occurs. Additionally, data from its outage management system allows the co-op to review its maintenance schedules and focus on feeders with the worst performance.

The presentation by Jo-Carroll Energy (JCE) demonstrated to the audience how "digital twin technology"[4] is used to visualize data and assets by developing 3D scans of their substations. The scans are used to support staff training and transfer legacy knowledge from long-term employees to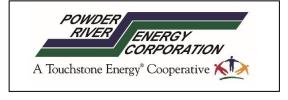 newer staff. JCE supported their presentation with an AR/VR experience in the conference "Learning Lab," which showed how they are "bringing substations into the office with AR/VR." Using virtual reality goggles, tablets and mobile phones with an augmented reality overlay, visitors to the Lab experienced how to work with reclosers at a substation, obtain critical data from it, and experience what it is like to visit and work in a real-life substation.

Veering away from the use of AR and VR for information technology/engineering and operations activities, Tri-State's presentation showed that virtual reality could also be used as a communications tool to connect face-to-face with members in a fun way, thereby enhancing member engagement. Tri-State has been working on a campaign called "Generating Possibilities" to raise awareness of its renewable energy portfolio. While the campaign used television, print, radio and other conventional means of advertising, the G&T wanted to offer its members "something more." Out of a team brainstorming session, the idea of virtual reality tours of wind turbines, hydroelectric dams, and solar arrays was born. Like what Tri-State offers to its members at various community events, the TechAdvantage session attendees were able to try out Tri-State's VR goggles and experience what it feels like to "climb up a wind turbine, soar above a solar farm, or explore inside a hydroelectric dam."

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[1] https://precorp.coop/

[2] https://jocarroll.com/

[3] https://www.tristategt.org/

[4] *Digital twin* refers to a digital replica of physical assets and devices, etc. that can be used for various purposes. In this case, JCE has scans of its substations and is using these scans for staff training and support, among other purposes.

The Q&A session with the audience included robust dialog on how these cutting-edge technologies can be applied at co-ops of various sizes, program economics, lessons learned from implementing the programs, cybersecurity concerns around the existence of substation scans, support from co-op leadership and staff, as well as other topics. JCE noted that cybersecurity remains very important to their co-op as they proceed with scanning their substations for the digital twin project. For Tri-State, their distribution co-ops have embraced the project, and all are happy to share the story of their renewable energy portfolio using virtual reality. The panelists emphasized the benefit of co-ops working together and sharing knowledge and resources. These co-op projects are available for other co-ops to learn from and consider how they might deploy the technology to benefit their respective co-ops.

The session ended with a "forecast on the future of machine learning, AR and VR." Powder River Energy shared that the current flood of data already available from AMI infrastructure (installed by as many as 70 percent of co-ops) will lead to the continued evolution of tools to help make the data actionable and impact critical business decisions at co-ops. Data analysis will become "something we do every day." There was consensus from the attendees that these cutting-edge technologies will likely play an important role in the future of our electric industry and it will be worthwhile to monitor their development and the benefits they may offer.

Additional Resources

- [Industrial Augmented Reality (AR) and Virtual Reality (VR) Technology](#)

- [Case Study: Jo-Carroll Energy – Bringing Substations Into the Office with Virtual Reality](#)

- [Case Study: Tri-State – Using Virtual Reality to Connect Face-to-Face with Members](#)

- [Analytics Success Stories: Turning Numbers into Action (Powder River Energy and other co-ops)](#)

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