

Minnkota

MESSENGER

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On the cover: SkySkopes UAS pilots Jared Langley and Michael Marana take off for a multiday flight along Minnkota's lines in eastern North Dakota. The drone was equipped with first-in-the-region technology from eSmart Systems that efficiently scans and analyzes hundreds of structures and their components.

Minnkota Messenger is published six times a year by Minnkota Power Cooperative. Its mission is to communicate Minnkota's perspectives and concerns to its members, elected officials, employees and other business audiences. For editorial inquiries, call (701) 795-4282 or email bfladhammer@minnkota.com.

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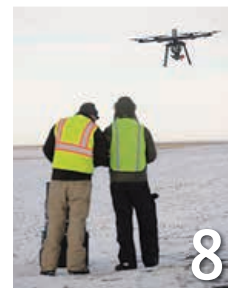
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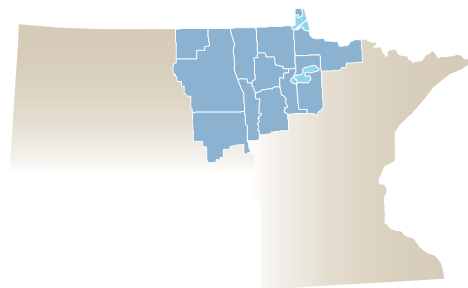
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Coming next issue ...

For electric cooperatives, the story sounds familiar: A group of residents who do not have access to an essential service band together to accomplish what none of them could do alone. Nearly 80 years ago, the focus was electricity, but today it is high-speed internet. We visit one of the Minnkota members that is developing a rural broadband company. We also learn about the people and businesses who are able to make a home in our service area and have a national presence due to access to reliable internet.



Minnkota Power Cooperative is a generation and transmission cooperative headquartered in Grand Forks, N.D. It supplies wholesale electricity to 11 member-owner distribution cooperatives, three in eastern North Dakota and eight in northwestern Minnesota. Minnkota also serves as operating agent for the Northern Municipal Power Agency, an association of 12 municipal utilities in the same service region. Together, the Joint System serves more than 150,000 customers.

From the editor

Real research

Minnkota Power Cooperative does not have to look far to find research shaping the future of the energy industry.

A few miles down the road from the cooperative's headquarters in Grand Forks, the University of North Dakota and the Energy and Environmental Research Center (EERC) are world leaders in exploring and developing new energy technologies. The town is also buzzing with unmanned aerial system (UAS) startups and the country's only operational UAS research and development park. From the soil of a reclaimed coal mine to the integrity of a power plant's data, North Dakota scientists and energy companies are joining together to unleash the power of innovation.

Minnkota's role in advancing these efforts is to build strong partnerships and provide real-world insight into the ideas that may one day change our industry. Energy research is almost always a group endeavor – breakthrough ideas are rarely the product of one entity, but of many entities coming together.

Perhaps the most ambitious research effort that Minnkota has pursued is Project Tundra. The cooperative is investigating the feasibility of building a carbon capture facility at the Minnkota-operated Milton R. Young Station. The technology would capture up to 95% of the carbon dioxide emissions from the Unit 2 generator. If completed as planned, it would be the largest carbon capture facility of its kind in the world.

Minnkota and the EERC are currently working to install a pilot system at the Young Station to directly take the plant's flue gas and test its interaction with a solvent that captures the CO₂. EERC is also conducting research on the potential of safely storing the CO₂ in a deep, geologic formation near the Young Station site – a project referred to as North Dakota CarbonSAFE.

As for the delivery of energy through Minnkota's transmission system, drones are taking flight to help improve the operation and maintenance of the cooperative's infrastructure. Pilots navigate the drones along expanses of power lines to identify potential issues and communicate information back to the cooperative. While many of these projects are still in the development stages, the advancement of UAS in the region has happened so fast that The New York Times has dubbed North Dakota's Red River Valley as "a Silicon Valley for drones."

Electric utilities across the country are looking toward technological research as a way to stay ahead of rapid industry change. Minnkota is well-positioned to help advance this research by working with the people and resources located right in its backyard. While not every project is going to be a home run, the lessons learned along the way help push the wheels of progress forward.

Our membership heard about many of these research efforts at our 79th annual meeting, which was aptly themed "Powered by Innovation." These efforts, especially Project Tundra, are not possible without strong, unified support from the members. We are hopeful that our research and our work can play a role in the great things to come for our industry.

Ben Fladhammer
Editor



Project Tundra forges ahead

CARBON CAPTURE RESEARCH MOVES FORWARD AT MILTON R. YOUNG STATION

Jason Laumb admits it was a bit of a pipe dream when he and his colleagues started talking more seriously about carbon capture and storage technology for North Dakota power plants.

That was about eight years ago at a conference table inside the Energy and Environmental Research Center on the University of North Dakota campus. Laumb is a principal engineer and advanced energy systems group lead at EERC.

"It was like, my goodness, what's it going to take?" Laumb said. "We drew out on the board the different parts we would need to make it happen – capture, oil fields, storage availability. After that meeting we went our separate ways and started developing those parts we had identified during that meeting."

A few years later in 2016, bingo – Minnkota set its sights high by beginning the evaluation of a post-combustion carbon capture project at the Milton R. Young Station near Center, N.D. Known as Project Tundra, the venture is still in the research and feasibility stages, but it shows promise as a real-world solution to operating in a carbon-constrained world.

Building partnerships with players such as EERC and working to prioritize funding for advanced energy technologies, Minnkota hopes to bring Project Tundra to the finish line.

"It is feasible to operate," Laumb said of carbon capture and storage. "What it comes down to is dollars and cents. What's it going to cost to operate? What's it going to cost to build the capture facility?"

"If things look right and Project Tundra gets built, it will have an impact to the power industry, it will have an impact to all the power consumers Minnkota's cooperatives have and it will have an impact to Oliver County in North Dakota."

– Jason Laumb

"Everything has to pencil out. Everyone has to win along that value chain. And it has to make economic sense. The preliminary indications are that, so far, it's still making sense."

Preliminary numbers put the Tundra price tag at more than \$1 billion. Various tax credits from the state and the federal governments would help offset the steep cost.

Laumb, who is leading the research in some of the Pre-FEED (front-ending engineering and design) work on the capture side of Project Tundra, says a better cost estimate will come later this year after the Pre-FEED work is done.

In addition to the EERC, other Minnkota partners on the project are the state of North Dakota Industrial Commission, the U.S.

Project Partners:



The carbon capture process

- 1) The flue gas is diverted from the power plant.
- 2) A scrubber cools the gas and removes impurities.
- 3) The gas flows into the bottom of a large absorber unit, which is filled with stainless steel structural packing. As the gas rises through the packing, an amine-based liquid solvent is released. The amine bonds with the CO₂ and removes it from the flue gas.
- 4) The solvent is sent to a regeneration unit. There, heat is used to separate the CO₂ from the liquid solvent, bringing the CO₂ back to a gaseous state.
- 5) The CO₂ is finally delivered to a compressor where it is compacted and prepared for transport via pipeline. The solvent, meanwhile, is routed back to the absorber unit where it is used again.



Jason Laumb, a principal engineer and advanced energy systems group lead at the Energy and Environmental Research Center at UND, says adding carbon capture to Unit 2 of Minnkota's Milton R. Young Station is technically feasible.

Department of Energy, engineers Burns and McDonnell, BNI Energy and Eagle Energy Partners.

Laumb is also the project manager for the \$12.7 million Project Carbon initiative. Those research efforts involve Tundra and other carbon projects in the state.

"We are focusing on barriers," he said. "What are the final barriers that we need to overcome to implement CO₂ capture in the state of North Dakota on a plant that uses North Dakota lignite?"

Building the pilot

Later this spring, a pilot-scale test unit will be installed on Unit 2 at the Young Station. Testing will run during the summer. The pilot will include a sulfur dioxide scrubber, a CO₂ absorber and a regenerator. The test system, made of stainless steel components, will capture the equivalent of a ton of CO₂ per day.

With the project gaining traction, Minnkota hired one of the world's foremost experts in CO₂ technology and development in 2018. David Greeson joined the project

team in October after previously serving as the vice president of development at Texas-based NRG Energy. In that role, he led the development of the Petra Nova initiative, which is currently the world's largest post-combustion CO₂ capture and enhanced oil recovery (EOR) project.

Petra Nova, located in Texas, is the only post-combustion carbon capture facility operating in the United States. Petra Nova became operational Dec. 29, 2016, on budget and on schedule.

Project Tundra is modeled after Petra Nova, which is capturing about 90% of the CO₂ emitted from a 240-megawatt (MW) flue gas slipstream. The captured CO₂ is then injected into mature reservoirs to release more oil.

Project Tundra aims to build on the success of Petra Nova by applying a similar, but much larger, set of technologies to Unit 2 of the Young Station. Unit 2 is a 455-MW generation facility, which has previously been retrofitted with emissions control equipment that meets or exceeds all current air quality standards.

Storage or oil recovery?

Minnkota and the EERC are researching the possibility of both carbon capture plus storage and carbon capture plus EOR. The Young Station has enough space and the right geology near the plant underground to handle straight CO₂ storage.

The North Dakota CarbonSAFE initiative (Carbon Storage Assurance Facility Enterprise) is a research project investigating the feasibility of taking captured CO₂ emissions from coal-fired plants, compressing it and injecting it a mile deep underground into the Broom Creek Formation in Oliver and Mercer counties, preventing the CO₂ from being emitted into the atmosphere.

"The only time they would use the Unit 2 chimney once carbon capture is installed



is during startup and maybe some during shutdown, where there's an upset condition in the carbon capture. Basically, there wouldn't be a lot of flue gas coming out of Unit 2," Laumb said.

While Greeson heads the business development side of Project Tundra, other key players include Minnkota's Stacey Dahl (legislative affairs), Gerry Pfau (technical manager) and Shannon Mikula (legal).

"I'm just excited to be part of this," Laumb said. "If things look right and Project Tundra gets built, it will have an impact to the power industry, it will have an impact to all the power consumers Minnkota's cooperatives have and it will have an impact to Oliver County in North Dakota. There will be a regional impact during construction and then when it's done. If an EOR entity starts to come in and take CO₂, that will impact another part of North Dakota within that region."

Laumb said Project Tundra would be a major industry development if it moves forward after the FEED portion of the project. The earliest Tundra construction could start would be late 2021. If it happens, Project Tundra could add more than 2,000 jobs to the area.

"There are a lot of folks in the state of North Dakota who are looking at the lead that Minnkota Power is taking on Project Tundra, and it could be a template for other folks out there with power stations to replicate," he said.

"You're not going to be able to do it everywhere. Not everyone has the geology. In North Dakota, we are very fortunate to have the geology for the storage side and also the oil fields for the enhanced oil recovery side. Those are two very important parts to have. You need to be able to do something with the CO₂ and it has to have some value to it."

About EERC

The Energy & Environmental Research Center (EERC) was officially founded in 1951 as the Robertson Lignite Research Laboratory, a federal facility under the U.S. Bureau of Mines. However, the EERC's roots date back to the 1890s when Earl Babcock, a chemistry professor at the University of North Dakota (UND), began studying the state's vast lignite coal resources and investigating potential uses for them.

The work of Babcock and others at UND led to the establishment of a Bureau of Mines laboratory at the university and, in 1951, to the facility that is today the EERC. The Center became a federal energy technology center under the U.S. Department of Energy (DOE) in 1977 and was defederalized in 1983, at which time it became part of UND.

Since its defederalization, the EERC has evolved to conduct research on all fossil fuels, as well as renewable and alternative fuels, and has become a world leader in the field of environmental technologies.

Some key dates in EERC history

- 1977** – Became a federal energy technology center under DOE
- 1987** – All research entities within the UND School of Engineering and Mines combined into one entity called the Energy & Mineral Research Center
- 1989** – Renamed the UND Energy & Environmental Research Center
- 1992** – EERC moved under the UND President
- 1994** – \$7.6 million expansion of labs and pilot plant facilities completed
- 2003** – 47,000-square-foot expansion and renovation project opened
- 2006** – Contract awards exceeded \$45 million
Broke ground for new 15,000-square-foot hydrogen facility
- 2007** – Proposal number exceeds 300, valued at over \$138 million
- 2008** – Contract awards exceeded \$95 million
Hydrogen facility dedicated
- 2009** – EERC achieved sixth consecutive record year
Contract portfolio exceeded \$236 million
- 2011** – Broke ground on Fuels of the Future facility
- 2013** – EERC Bakken regional drilling activity map distributed to more than 10,000 worldwide

Hovering beyond the horizon

MINNKOTA RESEARCH PARTNERSHIPS HARNESS
ACADEMIC AND COMMERCIAL UAS EXPERTISE
FOR MORE EFFICIENT LINE INSPECTIONS

On a bright winter day in rural Nelson County, N.D., two bundled-up men stood in a snowy field with a large, propeller-adorned contraption hoisted between them.

Synchronized, they spun in circles. They swayed one way, then the other way. The equipment between them followed their lead.

It looked...bizarre.

"We call this the preflight dance of the UAS," Paul Snyder laughed, watching the distinctive calibration routine from the safety zone yards away. Snyder, the director of the University of North Dakota's UAS (unmanned aerial systems) program, joined the Northern Plains UAS Test Site (NPUASTS) and other UND representatives

for an afternoon of flight along Minnkota's power lines just east of Stump Lake.

The goal of the mission – to complete a safety case that would pave the way for Minnkota to use drones beyond visual line of sight (BVLOS) for monitoring its lines autonomously. NPUASTS Director of Operations Jakee Stoltz said applying for the necessary waiver requires data, operational history and written procedures.

"We joke that the submission is heavier than the drone sometimes," Stoltz quipped. "These flights will help us prepare that documentation to submit a nice strong safety case to the FAA."

"Today we're identifying how far out we can fly and still maintain the orientation of the 'bird' – or which direction the UAS is going while we can visually see it – and identify where that location is," Snyder explained. "If we can get to a point where we can take it outside of visual line of sight to inspect lines, there's a lot we could do –

SkySkopes UAS pilots Jared Langley (left) and Michael Marana guide their DJI Inspire 2 drone around power line pole tops west of Gardner, N.D.



everything from detecting flaws to downed wires to vegetation encroachment.”

This research partnership between Minnkota, UND and NPUASTS – made possible by a Research ND grant from the ND Department of Commerce and additional funding from Border States – is just one UAS project that Minnkota hopes will help make the maintenance of its power delivery systems safer, more efficient and, ultimately, more cost-effective.

Minnkota’s UAS alliance with UND goes back about three years, when the cooperative was constructing its 345-kV transmission line from Center to Grand Forks, N.D. At that time, UND helped Minnkota fly over the lines to identify potential issues from the air.

The research goals have evolved since then.

“UND, as a research university, tries to find some new way to



Matt Henry (left) and Eric DeGray of the Northern Plains UAS Test Site complete calibrations for their UND research flight near Stump Lake, N.D. The xFold Dragon is equipped with a gas generator with a two-stroke engine.

look at things and provide value to us, the end user and partner,” said Wayne Lembke, Minnkota engineering manager. “The scope changed to beyond visual line of sight. That’s one thing we haven’t done much in our industry.”

University to utility

In addition to its academic connection, Minnkota is teaming up in the private sector for more industry-leading UAS research.

Minnkota is working with the drone services company SkySkopes, eSmart Systems, Border States and Microsoft on a first-in-the-region pilot project to digitally document and archive thousands of drone-captured images of power lines and their





Paul Snyder (right), director of UND's UAS program, joined the NPUASTS mission team to analyze the visibility of the drone flying along Minnkota's lines. Snyder says every flight is an opportunity to learn new practices, "and it's fun to be a part of that."

components. A utility could then review and analyze that data, helping to automate the drone inspection process when a line issue arises.

For a week in late December, SkySkopes drone pilots flew eSmart technology along 45 miles of 69-kV line from Page, N.D., east across Interstate 29, and then south to Harwood, N.D., taking photos of the pole tops from every angle. Minnkota could use those images immediately to check for loose bolts, conductor damage or cracked components. However, eSmart's pilot project system scans the line repeatedly, so that the software can learn to detect differences from flight to flight, easily pointing out potential issue areas.

A snapshot from the eSmart Connected Drone system shows a crack in the pole top. The system has the ability to find discrepancies in the structures without a lineworker harnessing up for inspection.



Terry Sando, eSmart Systems business manager for UAS operations (and mayor of Hillsboro, N.D.), said that eSmart initially conceived and tested this system in its headquarters country of Norway. The team was searching for a way to bring the technology to the Upper Midwest.

"We were working with our strategic partner for UAS operations, SkySkopes, and Minnkota was right at the back door," Sando said.

"Only in North Dakota are you going to find such world-class subject matter experts and use cases like what Minnkota put forth," added SkySkopes president and CEO Matt Dunlevy. "I think that the team that we put together on this is one that's difficult to find."

The eSmart Connected Drone system photographs and scans more than 180,000 images an hour of components along a power line – more than three times what can be done manually in a year. The collective team has also used drones to gather 16 miles of LiDAR data from a 115-kV line near Thief River Falls, Minn. LiDAR is a surveying system that uses reflected light imaging to create a 3-D point cloud model of a land area. It's a promising technology for quickly capturing detailed data on hundreds of miles of lines and their corridors.

"LiDAR, right now, is the one of the best reasons to be flying unmanned aircraft," Dunlevy said.

Beyond finding innovative ways to inspect lines faster and more effectively, these research efforts could bear an even more valuable benefit for Minnkota – the enhanced safety of its crews. Unmanned inspections and surveys mean line workers

“We’re trying to solve industry problems, seeing ways we can increase efficiencies for companies so that they can move forward and do bigger and greater things.”

– Paul Snyder, UAS program director
University of North Dakota



don’t need to climb poles, plane and helicopter pilots can avoid challenging areas and crews can remain in safe zones during storm damage assessments.

Power of partners

Minnkota is also planning for a drone of its own, with an aim of training and licensing personnel for UAS flights and investing in an entry-level drone for small inspections and other utility uses.

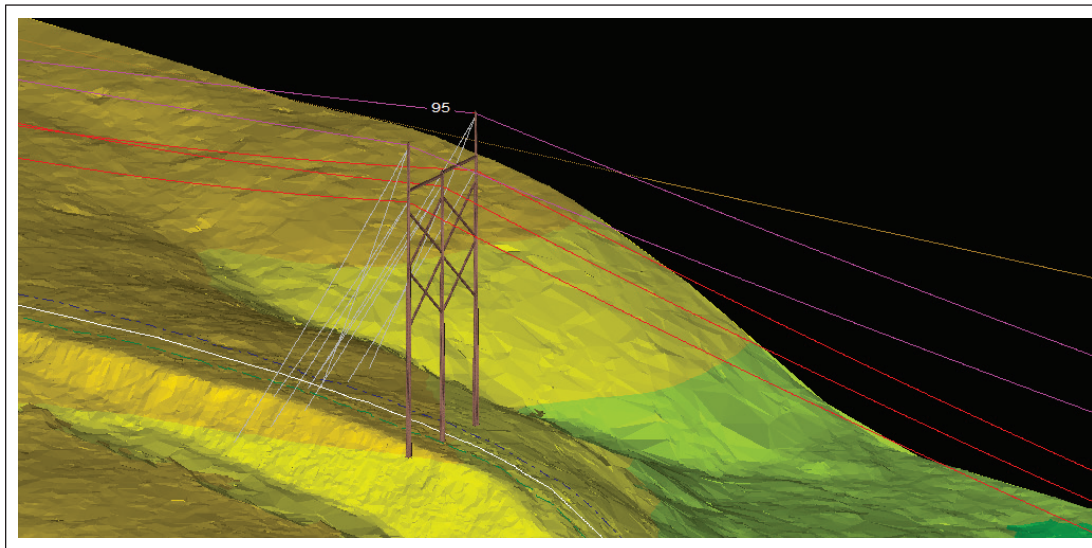
“I see Minnkota using UAS more and more, as long as it can get more efficient and the cost can go down on LiDAR and other general inspections,” said Power Delivery engineer Brenden LaHaise, part of the team digging deeper into drone possibilities for Minnkota. “We’re getting in front of this technology, and it will be interesting to see where it goes.”

Perfectly paired partnerships will be integral to reaching new heights with UAS. Minnkota knows this and has already assembled a dynamic, collaborative team.

“We can go to SkySkopes, and they know exactly what we want, and we know what kind of product they have,” LaHaise said. “We can work with other utilities, too, and learn from their experiences and get ideas from them.”

“You see this so much – academia and industry working together,” Snyder emphasized as a UND drone buzzed along the lines behind him. “We’re trying to solve industry problems, seeing ways we can increase efficiencies for companies so that they can move forward and do bigger and greater things.”

By Kaylee Cusack / Photography Kevin Jeffrey



This LiDAR image shows a stretch of 115-kV line between the Itasca area and Laporte, Minn. It's one example of the kind of data map that could be used to design future lines with the help of drones.



Power of blockchain, unchained

MINNKOTA AND UNIVERSITY OF NORTH DAKOTA
PARTNER TO DEVELOP CONTROL SYSTEM SECURITY
FOR POWER FACILITIES

Imagine you're driving down the interstate at the posted speed limit of 75 mph. Suddenly, your speedometer tells you you're travelling at 55 mph. You don't want to hold up traffic, so you increase your speed until that speedometer says 75 mph again.

Now you see red and blue flashing lights in your mirror. You're going too fast and the authorities have caught you. You made a decision based on faulty dashboard informa-

tion caused by a hacker, and now there are consequences.

This is the example Michael Mann uses to explain how malicious data manipulators can create devastating issues for a power generation facility.

"You may think that a hacker is going in and cranking up the generator itself, but they don't have to," explained Mann, professor and director of the Institute for Energy Studies at the University of North Dakota

(UND). “It could simply be sending false signals, which makes you believe things are bad, and then you are actually the one that causes the adverse effect.”

This kind of attack is the reason why Mann and his research team hope to collaborate with Minnkota on a study of integrating blockchain technology into power plant control system security.

“UND proposed a unique idea. As soon as you hear the word ‘blockchain,’ interest is piqued,” said Dan Inman, Minnkota vice president and chief information security officer. “I initially couldn’t see how it would economically work for utilities because when people think of blockchain, they think of Bitcoin or other cryptocurrency.”

UND researchers laid out their plan. They would work with the control center team at the Milton R. Young Station near Center, N.D., to create a mock-up of how power data flows from point to point within a plant control system. Researchers would then apply blockchain technology to those simulated testbeds – using the data system of a real-world generation facility while maintaining the security integrity of Minnkota’s actual data.

In February, UND responded to a Department of Energy (DOE) proposal call that would award funding to research projects addressing power grid security – a focus born from recent large-scale cyberattacks in Ukraine that disrupted electric service to more than 200,000 consumers.

Mann assembled the interdisciplinary

“If somebody hacks into the system, they’ll probably have access to one of the nodes of the distributed system, yet there are still many other locations where your data is untouched, giving you the security you need.”

– Hossein Salehfar
University of North Dakota



UND’s Hossein Salehfar says the Minnkota research project has the potential to make systems more efficient, reliable and secure – enhancing our society and the everyday lives of people.

team of Hossein Salehfar (electrical engineering/power systems) and Jun Liu (computer science) knowing UND had a perfect environment to tackle this global challenge.

“Sometimes universities are doing esoteric work that is interesting to the researcher, but without a lot of applicable value. Our researchers want to make it realistic and have applications, in this case to the electric utility industry,” Mann said. “We reached out to Minnkota thinking this would be a great project for them – partnering with UND so we can meet the DOE’s goal, but also the goals of Minnkota and of the state.”

Why blockchain?

Minnkota's Gerry Pfau, senior manager of project development at the Young Station, admits that he, like others approached at the ideation of this partnership, thought more of blockchain as security for transactions – not for general data protection.

"It surprised me, all of the ways it can be used in different industries," Pfau said.

From supply chain management of produce at Walmart to high-value cargo tracking at FedEx, more and more businesses are examining how they can leverage the principles of blockchain to become more efficient and secure.

But what is blockchain? It can be a confusing concept.

Simply described, blockchain is a "decentralized digital ledger." The content of every node (data holder) within that ledger is shared with a cluster of other com-

puters, so all the computer points in the system can own and verify the data at once. If someone from outside that "chain" tries to manipulate the data, they must manipulate it at every point in the system at the same time – virtually impossible to pull off unnoticed.

UND's Salehfar explains that in the case of a power facility, data sent to different plants or sub operations through the utility would be replicated and distributed across the system.

"If somebody hacks into the system, they'll probably have access to one of the nodes of the distributed system, yet there are still many other locations where your data is untouched, giving you the security you need," he said. "That's what this project is about – to work with Minnkota to look at some of the ways they control different distributive resources, and how we

can make sure that all of this data that is going back and forth is secured and private."

Future of security

Although Minnkota already has multiple layers of security to keep threats out of the system, Inman acknowledged that the world of cybersecurity is constantly evolving.

"Nothing is 100%," he said, "and we're just a little co-op, trying to protect ourselves from state-sponsored hackers. If we can see some advantages in implementing new practices, cost-effectively, and add more layers of security without giving up anything, that's a win-win for everybody."

"Our control system is vital for the operation of the plant. We can't do what we do without it," Pfau added. "To have the possibility of something that will protect us if someone did break into the network – that would give us a warning and we could lock them out – could be critical to the plant's success."

If the DOE accepts UND's funding proposal this summer, research could begin as soon as September 2019. The team knows that its work will only be the beginning of a multiyear journey to implement blockchain security into utilities like Minnkota. From there, they won't set the cruise control at 55 mph – this kind of innovation is going places, fast.

"The ultimate goal is really much more than what this project is going to be. It's on a wide scale because it's a technology that can be applied to so many areas of utilities," Salehfar assessed, adding that industry trends are moving toward more direct customer interaction, which involves a broad and sophisticated data system. "It's going to take some years of research to come to that. This is a first step that will help utilities, internally, make their operations secure."

By Kaylee Cusack / Photography Kevin Jeffrey



Covering new ground

AWARD-WINNING BNI COAL RESEARCHES RECLAMATION PRACTICES



Somebody once said, “The biggest room in the world is the room for improvement.”

One can always make room in processes to get better. Even if people think things are perfect, there's likely a small area or two that can be upgraded.

That's why BNI Coal and others are looking at reclamation at their mines and seeing if they can improve what are already award-winning processes. After all, BNI Coal and Minnkota are dedicated to properly reclaiming all land impacted by the mining of lignite coal for the Milton R. Young Station.

As part of a five-year, \$1.1 million state- and industry-funded study involving BNI, North American Coal and North Dakota State University, researchers will test the practices of deep ripping and mulch soil additions as well as seeding changes to determine whether they can make a difference in reclamation at four North Dakota mining locations.

The entities are pursuing the improvements even though North Dakota already has some of the strongest reclamation laws in the nation, which are administered and enforced by the North Dakota Public Service

Commission (PSC). All phases of reclamation are conducted with the approval of the PSC. BNI and others must statistically prove that every acre mined is reclaimed to a level of production equal to or greater than that which existed prior to mining.

One of the biggest challenges mining companies seek to address through research is soil compaction, according to Jay Volk, environmental manager for BNI Coal's Center Mine. Everything is being looked at as a possible improvement to reclamation, including agriculture practices and equipment.

“Following the mining process, heavy machinery is used to move soil, which applies compressive pressure during the reclamation process,” Volk said, adding that companies try to decrease the compaction by changing traffic patterns, but it still exists to a certain level.

Ryan Limb, project director and principal investigator, and three other researchers from North Dakota State University's Department of Natural Resources are heading the project.

“We started taking soil samples and probes and densities to see how things have changed over time,”

Volk said. “The hypothesis out there is if you get water in the soil, that water will freeze and thaw and create crevices and cracks and let moisture go down. Organics start building and, over time, the soil permeability should go up. Soil penetration goes up. You get more productive soil. What we found was that wasn't happening as quickly as we thought it would.”

Researchers will also experiment with a change to how companies are seeding. Kentucky bluegrass is prevalent on reclaimed lands. It meets production benchmarks, but its shallow root system puts it at risk in drought and wet conditions.

Receiving more flexibility in how the soil is returned to production in the reclamation process is what Volk and others would like to see. When and if solutions are found to improve reclamation, the PSC will need to approve any changes.

“If we can change a couple of things on the regulatory side, give us some more flexibility on how we put soil back, the depths we put soil back, I can get you a more diverse, more functional landscape,” Volk said.

By Kevin Fee / Photography Kevin Jeffrey

Red River Valley has change of leadership

BRORBY SET TO RETIRE;
WHITCOMB TAKES OVER AS CEO

Lauren Brorby had his sights on working at an electric cooperative for several years.

"I knew when I was in public accounting that I wanted to get into this industry," Brorby said. "The class of people, the industry itself, the benefits, the desire to help people – we're a very compassionate industry."

"Most of the employees here want to provide a service and a product to our members that will improve their quality of life, and we have a product you can't live without."

So, after working at Eide Helmeke in Fargo for 12 years, Brorby jumped at the chance to become finance manager at Red River Valley Co-op Power in Halstad, Minn., in 1997. Two years later, in 1999, he became chief executive officer of the co-op.

That was no big surprise to Brorby or those who knew his long-term goals while living in the Fargo area.

"It was my intention to become a CEO of a co-op somewhere," Brorby said. "It was a matter of timing."

After a successful 22-year career with Red River Valley Co-op Power, Brorby is retiring at the end of April. Rich Whitcomb, member services director at the co-op, will succeed him.

Brorby's tenure was filled with disasters – ones that were out of his control.

"In the first seven years I was here, I think we had 11 FEMA-declared disasters," he said.

These disasters were a blessing as well as a curse.

"The disasters that have hit our organization and the Red River Valley were actually good for the utilities because it made us improve our systems," he said. "So timing was everything, whether you were on the Minnesota or North Dakota side. We received millions of federal funds to improve or update our systems, so we took advan-

tage and buried an awful lot of line.”

Red River now has about a third of its lines underground today. Burying line is one of many Red River upgrades over the years. As a result, co-op flood fears have softened. Relaxing those worries even more was the buyout of homes in the flood plain.

More than anything, he says, technology has changed drastically from the time he entered the co-op world.

“Going to self-read, self-billed metering to the metering system that we have today is almost information overload,” he said. “It’s amazing what’s at your fingertips.”

Another big change has been members’ expectations.

“They are far greater today than they were 20 years ago,” Brorby said. “Society today is changing and patience seems to be a virtue these days. People who haven’t grown up without power don’t understand that. Our younger generation expects and demands power 24/7.”

Whitcomb takes over

Brorby and new CEO Whitcomb have a bit in common. Both graduated from Moorhead State University and both commute to work daily.

While Brorby lives in Fargo, Whitcomb resides in Beltrami, Minn.

Whitcomb travels 26 miles one way to work each day.

“I see the same three cars at the exact same time if all of us are on time every day,” Whitcomb said. “I will pass a car right at the Scandia Church, and I always pass two cars at the same time on County Road 19.

“I know exactly where to pull off and how far I can travel in a blizzard, all that stuff.”

Whitcomb is walking into a storm of sorts at Red River Valley. The company is migrating to a new computer system and a new metering system.

“It’s a big challenge. There’s an awful lot of change for people right now because we

have the metering system,” Whitcomb said.

“I care deeply about the co-op. I know the big picture of where I want it to go. I’m a big believer in ‘do what you do well and find somebody to do things you’re not as good at.’ We have 22 employees and they all play a role. It’s a team effort.

“You need to just give employees the tools and the training they need and then stay out of their way, because this co-op has been around for 82 years. Somebody’s doing something right.”

“Society today is changing and patience seems to be a virtue these days. People who haven’t grown up without power don’t understand that. Our younger generation expects and demands power 24/7.”

– Lauren Brorby, retiring CEO



Whitcomb graduated from a Management Internship Program in 2017. It’s a comprehensive, six-week program, broken into three two-week units, that provides in-depth analysis of the functions and processes of co-op management.

“That gives you an idea of what’s to come,” he said. “You go through different scenarios, labor negotiations, rates, employee issues.”

Whitcomb’s first few days as CEO were eye-opening.

“Already I’m seeing things through a different lens,” he said. “Before, I was focused on a couple of areas, but now I’m focused on personnel and the big picture of the co-op and member relations. It’s quite encompassing.”

By Kevin Fee / Photography Kevin Jeffrey



POWERED BY
INNOVATION

Minnkota holds 79th annual meeting

Minnkota Power Cooperative and Square Butte Electric Cooperative celebrated successful years at their annual meetings on April 5 at the Minnkota Power corporate campus in Grand Forks.

While Minnkota hosted its 79th annual meeting, Square Butte hosted its 45th annual meeting.

Leadership reported on operations and presented year-end results to nearly 200 members and guests. Other business included the election of directors and adoption of policy resolutions on issues of importance to Minnkota and Square Butte.

Minnkota chairman Collin Jensen (Roseau, Minn.) and Square Butte president Mark Habedank (Twin Valley, Minn.) presided.

During his report, Jensen encouraged the members to spend less time looking in the rearview mirror and more time looking to the future. "One of the things we have to remember is we can't be so focused on the challenges that we miss the opportunities."

This sentiment is why Minnkota is looking at a number of innovative technological advances, including using drones for line inspections and continuing development of

Project Tundra, a potential carbon capture project at the Milton R. Young Station.

Jensen also talked about the positive safety record of Minnkota employees in both Grand Forks and Center.

Habedank praised safety efforts at the Young Station, which had one of its safest years in cooperative history with no lost-time incidents or injuries. Square Butte is owned by the cooperatives associated with Minnkota and sells electricity to Minnkota and Minnesota Power.

"As a cooperative, one of the pillars of our core beliefs is safety," he said. "We want our people to come home at the end of the day to their families."

Habedank's term on the Square Butte board ended with the meeting. He was elected to become the Wild Rice Electric Cooperative director on the Minnkota board. Wild Rice director Larry Sollie was elected to replace Habedank on the Square Butte board.

In its reorganization meeting, Square Butte elected Marcy Svenningsen of Cass County Electric Cooperative as its new president, replacing Habedank. Paul Sigurd-

son of Nodak Electric Cooperative remains the vice president, Roger Amundson of Roseau Electric Cooperative remains secretary-treasurer and Paul Aakre of PKM Electric Cooperative was elected assistant secretary-treasurer.

On the Minnkota side, Jensen was re-elected chairman. Les Windjue of Nodak Electric Cooperative was elected vice chairman, replacing Russ Okeson, who retired from the Minnkota board. Colette Kujava of Red Lake Electric Cooperative was re-elected secretary-treasurer.

Mac McLennan, Minnkota president & CEO, drew the meeting to a close, noting Minnkota is in stable financial position and is preparing to meet the needs of a changing utility industry. He added that Minnkota is well-prepared to adapt to change, and technology advancements may be a key to defining the cooperative's future.

"The world is changing rapidly," he said. "I don't want to lose the history that we have, and I don't want to ever suggest that history is not a good guide, but history is not going to define what we do in the future."

By Kevin Fee / Photography Kevin Jeffrey

Schneider named NMPA general manager

Jasper Schneider is the new general manager of the Northern Municipal Power Agency. He replaces Darryl Tveitbakk, who retired Nov. 5, 2018. Dalene Monsebroten served as interim GM until Schneider was hired.

A Fargo native, Schneider graduated from Jamestown College and the Hamline University School of Law. Schneider comes to NMPA from the National Information Solutions Cooperative (NISC), where he served as a vice president since 2015. Before that, Schneider was acting administrator of the U.S. Department

of Agriculture's Rural Utilities Service. Schneider was also a member of the North Dakota House of Representatives from 2006-09.

He and wife Kim have four children.

Minnkota and NMPA operate together in what's referred to as the Joint System. NMPA owns 30% of the Coyote Station, a lignite-based power plant near Beulah, N.D., and a load-ratio share of Minnkota's transmission system.



Jasper Schneider

Minnkota completes Fargo-area upgrades

Minnkota completed a multiphase, \$35 million power delivery upgrade project in the Fargo area in March.

Much of the cooperative's transmission system was uprated from 69 kilovolts (kV) to 115 kV in the Fargo area starting in 2014.

"We've situated ourselves so we should be able to handle things for the next 50 years within the areas of those substations that we serve," said Wayne Lembke, Minnkota engineering manager.

In early 2014, the planning group at Minnkota conducted a study on potentially converting the 69-kV system in the Fargo area to 115 kV. This was initiated due to the increasing loads for Cass County Electric Cooperative in Fargo and West Fargo and in order to provide better reliability in those areas.

In late 2014, engineering moved forward with the design of the Veterans substation and four miles of

115-kV double circuit transmission line from the Stanley switch to the Veterans substation. This phase of the project was completed in 2015.

In the next three-plus years, Minnkota ultimately built an addition at the Grager, Frontier and Maple River substations, along with a line rebuild to double-circuit 115 kV/69 kV from Maple River to Frontier. This all culminated with a final energization to 115 kV.

Future work in the Fargo area will be based on load growth and could entail adding second transformers at Veterans and Grager if/when additional capacity is required. Those substations are already equipped with larger transformers than Minnkota's standard substations.

Minnkota is now in position to provide the reliable power needed into the future in the Fargo area with room to expand if the market dictates.

GIVING BACK TO THE COMMUNITY

Employees make a splash on Giving Hearts Day

Minnkota's Grand Forks employees gave \$500 through their Jeans Day fund to the Grand Forks Parks and Recreation Foundation for its Make a Splash program.

The check was dated Feb. 14 to coincide with Giving Hearts Day.

Make a Splash provides pool passes for low-income children. Just \$25 helps a child swim all summer.

First held in 2008, Giving Hearts Day is a 24-hour online fundraising charity event.

Together, the organizations offer resources that equip nonprofits to accomplish their missions, specifically by teaching them how to perfect the act of fundraising. Throughout the year, charities involved are provided the necessary tools to learn how to raise funds with more impact. Each year, their skills then get put to use on Giving Hearts Day.

More than \$16 million was raised this year for North Dakota and western Minnesota charities during Giving Hearts Day.

Minnkota and Nodak Electric Cooperative also combined to provide a donation to the Community Violence Intervention Center (CVIC) to help with the minimum funding it needed from an external source prior to Giving Hearts Day.

When the due date is near, Brian has the light for late nights. When the crib calls for blueprints, he can dig them up digitally. When the lumber is gathered, his tools are charged.

He has the passion.
He has the purpose.
He has the power.

Electricity makes this dad-to-be
A CRAFTSMAN.



 **ELECTRICITY**
WE SHARE OUR POWER SO YOU CAN SHARE YOURS

